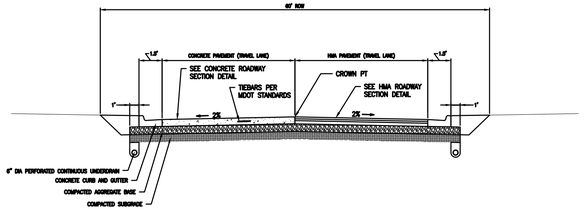
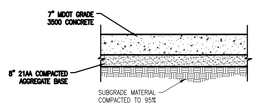


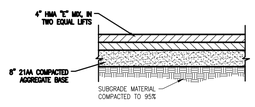
TYPICAL CROSS SECTION RESIDENTIAL ROAD PAVEMENT

NOT TO SCALE



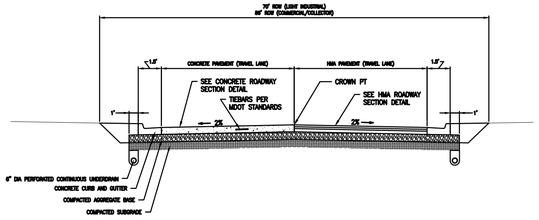
TYPICAL CONCRETE ROADWAY SECTION FOR RESIDENTIAL ROAD

NOT TO SCALE



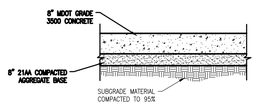
TYPICAL HMA ROADWAY SECTION FOR RESIDENTIAL ROAD

NOT TO SCALE



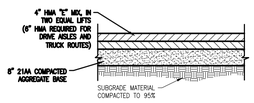
TYPICAL CROSS SECTION COMMERCIAL/LIGHT INDUSTRIAL ROAD PAVEMENT

NOT TO SCALE



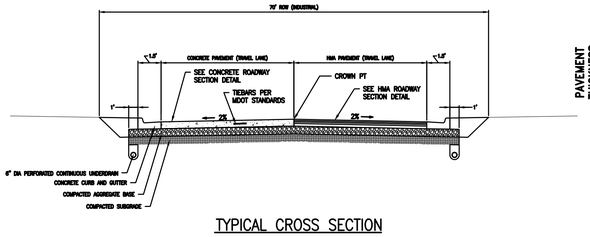
TYPICAL CONCRETE ROADWAY SECTION FOR COMMERCIAL/LIGHT INDUSTRIAL ROAD

NOT TO SCALE



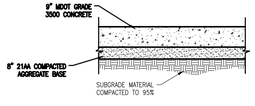
TYPICAL HMA ROADWAY SECTION FOR COMMERCIAL/LIGHT INDUSTRIAL ROAD

NOT TO SCALE



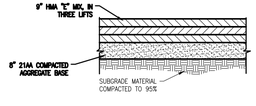
TYPICAL CROSS SECTION INDUSTRIAL ROAD PAVEMENT

NOT TO SCALE



TYPICAL CONCRETE ROADWAY SECTION FOR INDUSTRIAL ROAD

NOT TO SCALE

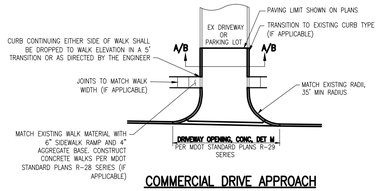


TYPICAL HMA ROADWAY SECTION FOR INDUSTRIAL ROAD

NOT TO SCALE

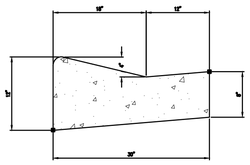
RESIDENTIAL DRIVEWAY APPROACH

NOT TO SCALE



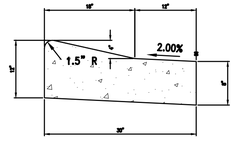
COMMERCIAL DRIVE APPROACH

NOT TO SCALE



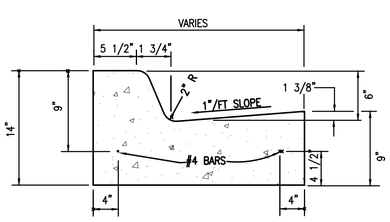
4" MOUNTABLE CURB

NOT TO SCALE



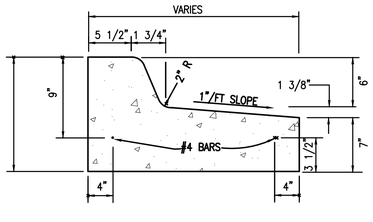
4" REVERSE CURB & GUTTER

NOT TO SCALE



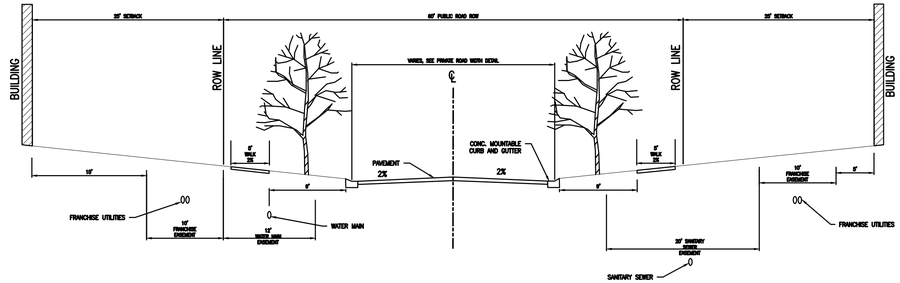
6" CONCRETE CURB AND GUTTER DETAIL

NOT TO SCALE
NOTE: DIMENSIONS VARY. FOLLOW MDOT STANAARD DETAIL SERIES R-30



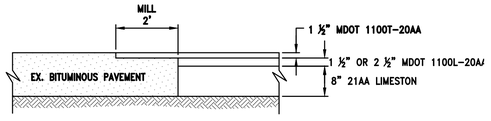
6" REVERSE CONCRETE CURB AND GUTTER DETAIL

NOT TO SCALE
NOTE: DIMENSIONS VARY. FOLLOW MDOT STANAARD DETAIL SERIES R-30



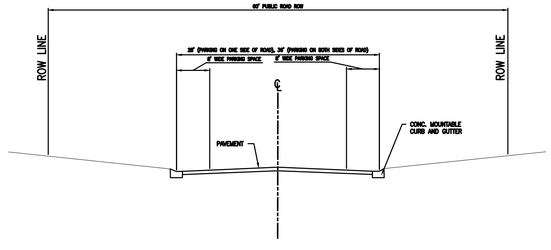
TYPICAL ROAD CORRIDOR (SINGLE FAMILY RESIDENTIAL)

NOT TO SCALE



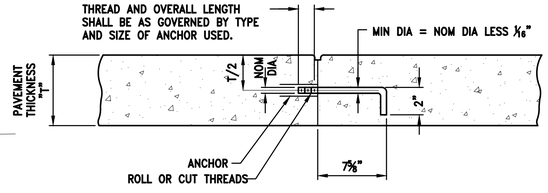
2" BITUMINOUS BUTT JOINT DETAIL

NOT TO SCALE



TYPICAL ROAD WIDTHS WITH PARKING (PRIVATE ROAD)

NOT TO SCALE



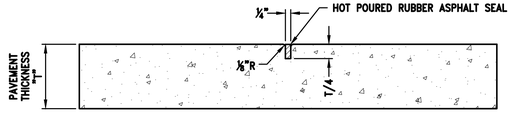
THIS JOINT SHALL BE CONSTRUCTED ACCORDING TO STANDARD FOR LONGITUDINAL BULKHEAD CONSTRUCTION JOINT EXCEPT THAT THE "FIRST POUR" IS AN EXISTING PAVEMENT.

SPACING CENTER TO CENTER SHALL BE AS SHOWN IN THE FOLLOWING TABLE:

DIAMETER	½"	¾"	⅞"
SELF-DRILLING FLUSH TYPE	24"	32"	48"
TORQUE – TYPE	40"	40"	---

LONGITUDINAL BULKHEAD JOINT

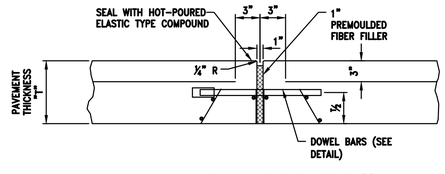
NOT TO SCALE



TRANSVERSE WEAKNESS PLANE JOINTS SHALL BE CONSTRUCTED IMMEDIATELY AFTER THE FINISHING OPERATION HAS BEEN COMPLETED. A GROOVE SHALL BE FORMED IN THE CONCRETE WITH METAL FORMING STRIP TO THE DEPTH SHOWN. THE PRE MOLDED FILLER STRIP SHALL BE PLACED IN GROOVE FORMED BY THE METAL STRIP. FROM A BRIDGE OPERATING ON THE PAVEMENT FORMS. THE CONCRETE SHALL BE HAND FLOATED AGAINST THE SIDES OF THE FILLER AND THE JOINT EDGE TO THE RADIUS SHOWN. THESE JOINTS SHALL BE PLACED AT APPROXIMATE 20' INTERVALS BETWEEN TRANSVERSE EXPANSION JOINTS.

TRANSVERSE WEAKENED PLANE JOINT

NOT TO SCALE



WITH LOAD TRANSFER – SYMBOL (E)
WITHOUT LOAD TRANSFER – SYMBOL (E_1)

TRANSVERSE EXPANSION JOINT "E"

SEAL WITH COLD
NOT TO SCALE

GENERAL PAVING NOTES

1. All construction shall conform to the current standards and specifications of the City of Auburn Hills and the Road Commission for Oakland County (R.C.O.C.) where applicable. All public pavement construction shall have full-time inspection directed by a professional engineer provided by, or caused to be provided by, the City of Auburn Hills.
2. Three (3) working days prior to construction, the Contractor shall telephone MISS DIG (1-800-482-7171) for underground facilities locations.
3. Existing topsoil, vegetation and organic materials shall be stripped and removed from proposed pavement area prior to placement of base materials. Tree roots shall be completely removed.
4. Prior to placement of base material or pavements, the contractor shall proofroll the subgrade in the presence of a geotechnical engineer and remove any unsuitable material observed. The pavement subgrade shall be compacted to 95% of the maximum dry density prior to placement of the proposed pavement. The final subgrade shall be proofrolled in the presence of a geotechnical engineer.
5. Concrete and asphalt testing is required for all projects. A copy of the test results shall be provided to the City.
6. If the inspector/engineer determine that field conditions warrant additional testing, the contractor/developer shall arrange for and pay for all required additional testing.
7. For any work within the public right-of-way, the contractor shall secure all necessary permits and arrange for all required inspection.
8. Fill areas shall be machine compacted in uniform lifts to 95% of the maximum dry density prior to placement of the proposed pavement.
9. All aggregate base material shall be compacted to 95% of the maximum dry density prior to placement of the proposed pavement. Aggregate base shall extend a minimum of 2 feet beyond the back of curb or the paved edge.
10. 6" underdrain shall be installed on both sides of all roadways in geotextile wrapped trench.
11. Prior to street acceptance, the full cross section must be installed per the approved plans and any repairs to the pavement and curb must be completed at the direction of the City Engineer. The full pavement cross section shall be paved in a continuous process without delay between separate courses.

CONCRETE PAVEMENT NOTES

1. Concrete shall be MDOT Grade 3500 (3500 psi) with a slump of 1-1/2" to 3".
2. All concrete pavement, drive openings, curb and gutter, etc. shall be spray cured with white membrane curing compound immediately following finishing operation.
3. No concrete paving shall be allowed prior to May 1, or after November 1 (unless approved by the City).
4. Do not place concrete when precipitation is imminent or when moisture on existing surface will prevent satisfactory curing. Unless otherwise approved by the City Engineer in writing, temperature and seasonal requirements for placing concrete will be according to the current MDOT Standard Specifications. Paving will not be allowed below these minimum temperatures, nor when frost is on or in the grade or on the existing surface.
5. All mix designs require review and approval by the geotechnical engineer.

ASPHALT PAVEMENT NOTES

1. Asphalt shall be of the mix specified on the standard details herein and shall conform to all MDOT Standard Specifications.
2. All bituminous material shall be compacted to a density of 95% of the field control density as determined by the theoretical maximum density.
3. A bond coat of SS-1H emulsion is required between all courses of asphalt immediately prior to placement of each course of pavement. The bond coat shall be applied in a uniform manner over the surface at a rate of 0.10 gallon/sq. yd. between leveling courses & 0.05 gallon/sq. yd. between wearing and leveling course.
4. Do not place HMA or apply bond coat when precipitation is imminent or when moisture on existing surface will prevent satisfactory curing. Unless otherwise approved by the City Engineer in writing, temperature and seasonal requirements for placing concrete will be according to the current MDOT Standard Specifications. Paving will not be allowed below these minimum temperatures, nor when frost is on or in the grade or on the existing surface.
5. All mix designs require review and approval by the geotechnical engineer.

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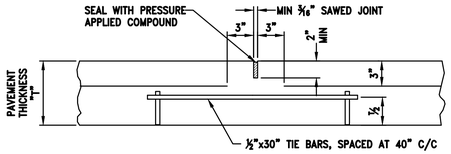
REVISIONS

DATE 6/2/2021 | PROJ NUMBER | ENG AKS | PROJ MGR APC | CADD | COUNTY OAKLAND | CITY/VILLAGE/TOWNSHIP AUBURN HILLS | H: NTS | SCALE | V: NTS | HORIZ DATUM | VERT DATUM

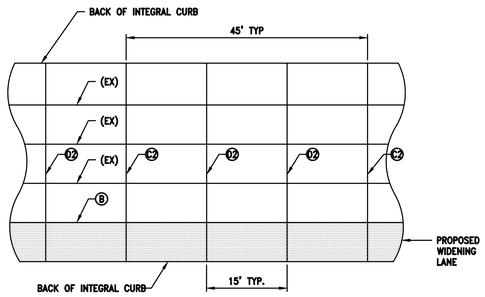
CITY OF AUBURN HILLS
PAVING STANDARD DETAILS

SHEET 1 OF 2



LONGITUDINAL LANE TIE JOINT "D"

NOT TO SCALE

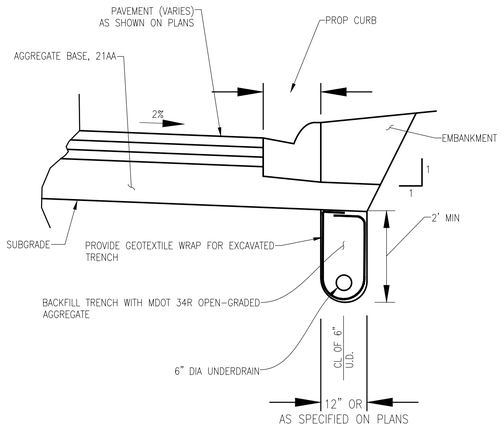


JOINTS	JOINTS TO BE PAID FOR SEPARATELY
C2 (MOD.)	TRANSVERSE CONTRACTION JOINT
E2	EXPANSION JOINT
D2 (MOD.)	PLANE OF WEAKNESS JOINT

JOINTS PAVEMENT	JOINTS INCLUDED IN THE COST OF CONCRETE
B (MOD.)	LONGITUDINAL BULKHEAD JOINT
D (MOD.)	LONGITUDINAL LANE TIE JOINT
(EX)	EXISTING

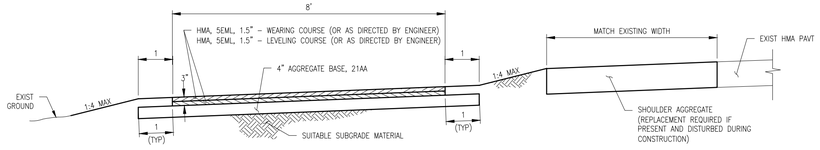
TYPICAL JOINT LAYOUT

NOT TO SCALE



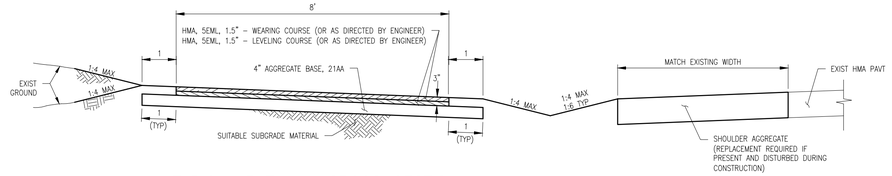
TYPICAL UNDERDRAIN ALONG ROADWAY CURB AND GUTTER SECTION

NOT TO SCALE



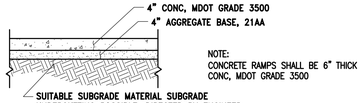
TYPICAL PATHWAY CROSS SECTION

NOT TO SCALE
REVERSE DETAIL FOR GRADE RIGHT



TYPICAL PATHWAY CROSS SECTION

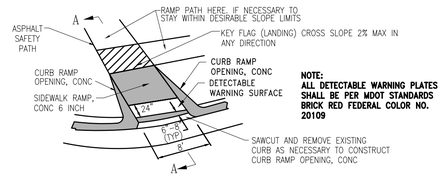
NOT TO SCALE
REVERSE DETAIL FOR GRADE LEFT



NOTE:
CONCRETE RAMPS SHALL BE 6" THICK CONC, MDOT GRADE 3500

TYPICAL CONCRETE SIDEWALK CROSS-SECTION

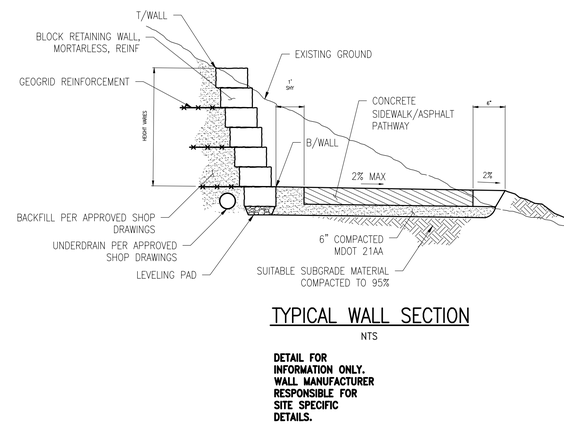
NOT TO SCALE



NOTE:
ALL DETECTABLE WARNING PLATES SHALL BE PER MDOT STANDARDS BRICK RED FEDERAL COLOR NO. 20109

SAFETY PATH RAMP WITH CURB

NOT TO SCALE



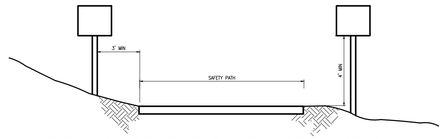
TYPICAL WALL SECTION

NTS

DETAIL FOR INFORMATION ONLY. WALL MANUFACTURER RESPONSIBLE FOR SITE SPECIFIC DETAILS.

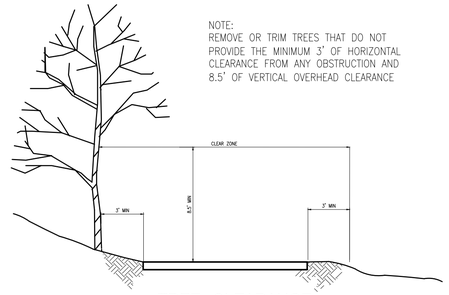
NON-MOTORIZED PATHWAY AND SIDEWALK NOTES

1. All pathway shall be constructed per the current version of MDOT standard plan R-28 series and shall follow all current ADA guidelines.
2. All pathway shall be constructed to the City of Auburn Hills Standard Details.
3. Maximum pathway cross slope is 2%. Design cross slope shall be 1.25% to 1.5%.
4. ADA ramps shall be provided at all intersections and street crossings. Detectable warning surfaces shall be provide for all ADA ramps and shall extend the full width of the curb ramp.
5. A clean saw cut joint shall be provided wherever new pavement matches existing pavement.
6. Utility structures in the pathway pavement shall be adjusted to proposed plan grade. Where possible, utility structures shall be outside of the pathway alignment.
7. Pathway and sidewalk shall be free of standing water prior to final acceptance.



SIGN PLACEMENT ON SHARED USE PATH

NOT TO SCALE



TREE CLEARANCE

NOT TO SCALE

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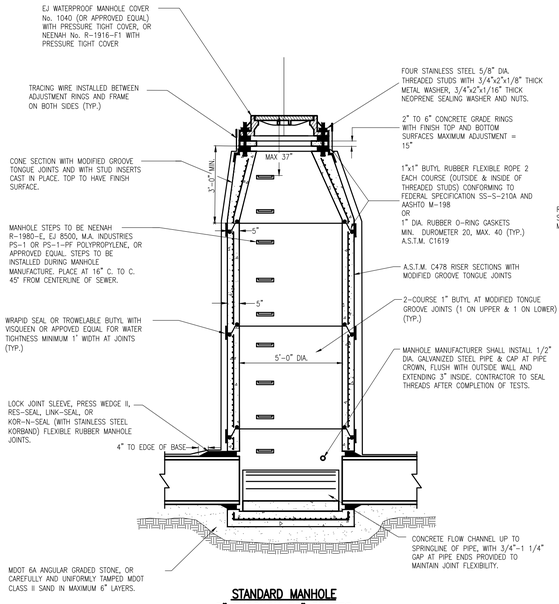
REVISIONS

DATE	PROJ NUMBER	ENG	PROJ MGR	CADD	COUNTY	CITY/VILLAGE/TOWNSHIP	H:	SCALE	V:	HORIZ DATUM	VERT DATUM
6/2/2021		AKS	APC		OAKLAND	AUBURN HILLS	NTS		NTS		

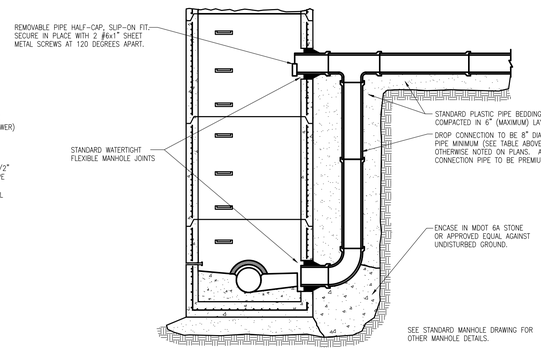
CITY OF AUBURN HILLS
PAVING STANDARD DETAILS

SHEET 2 OF 2



STANDARD MANHOLE 8" THROUGH 24" SEWERS

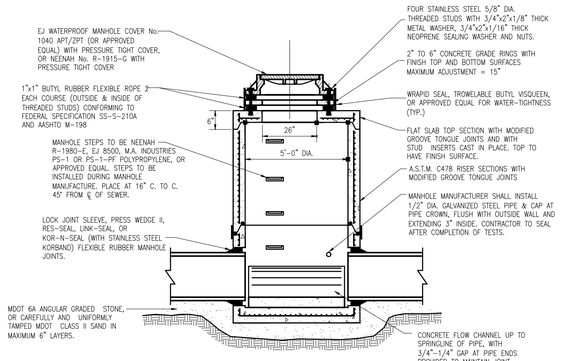
NOTE:
THE MAXIMUM PIPE SIZE FOR STRAIGHT PIPE INSTALLATION IS 24".



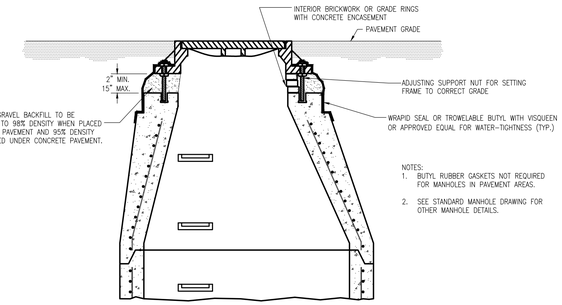
EXTERNAL DROP MANHOLE CONNECTION

(ONLY AS APPROVED BY O.C.W.R.C. AND AUBURN HILLS D.P.W.)

SEWER SIZE	EXTERNAL DROP SIZE	MH SIZE (I.D.)
UP TO 10"	8"	4'
UP TO 18"	10"	4'
UP TO 30"	18"	5'



FLAT TOP MANHOLE FOR SHALLOW MANHOLE INSTALLATIONS



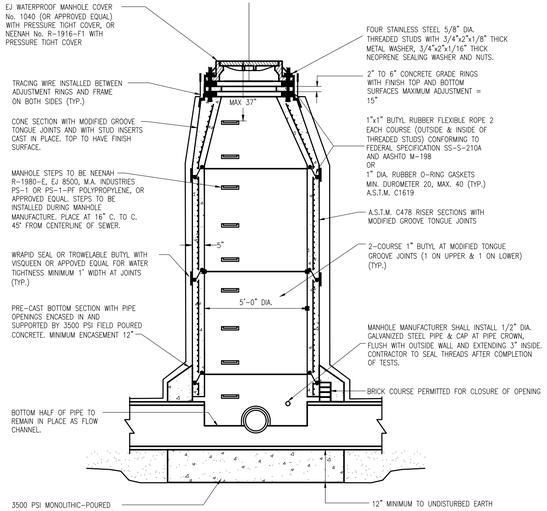
NOTES:
1. BUTYL RUBBER GASKETS NOT REQUIRED FOR MANHOLES IN PAVEMENT AREAS.
2. SEE STANDARD MANHOLE DRAWING FOR OTHER MANHOLE DETAILS.

CONSTRUCTION DETAILS FOR MANHOLE TOPS WITHIN PAVEMENT AREAS

SANITARY SEWER CONSTRUCTION NOTES

GENERAL NOTES:

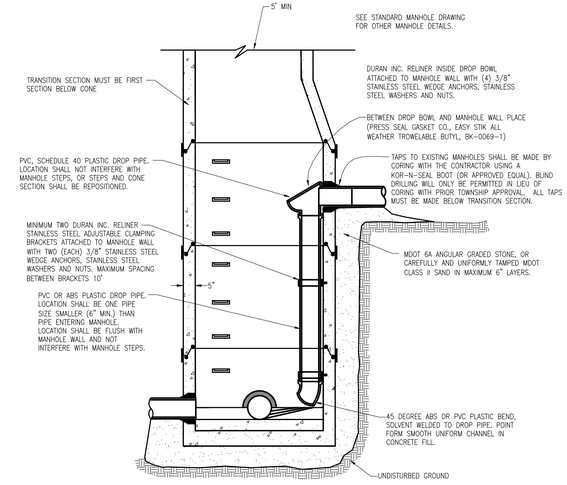
1. All construction shall conform to the current standards and specifications of the City of Auburn Hills and the Oakland County Water Resource Commissioner (O.C.W.R.C.). All sanitary sewer construction shall have full-time inspection directed by a professional engineer provided by, or caused to be provided by, the City of Auburn Hills.
2. At all connections to O.C.W.R.C. sewers or to extensions thereto, and before the start of construction, the Contractor must request and have in his possession an approved Sewer Inspection Permit issued by the O.C.W.R.C. The Contractor shall be responsible for all O.C.W.R.C. charges and shall contact O.C.W.R.C. for their fees, bonds and deposit requirements. The Contractor shall notify the City of Auburn Hills, Orchard, Hiltz & McClIment and the O.C.W.R.C. 72 hours, or three working days, prior to the beginning of any construction. Final air test must be witnessed by the O.C.W.R.C. personnel and must be scheduled in advance. Prior to County testing, a preliminary test will need to be conducted with the OHM inspector present. All structures must be completed before scheduling. Site tubes must be in place for at least 24 hours, if the ground water was present during construction.
3. Three (3) working days prior to construction, the Contractor shall telephone MISS DIG (1-800-482-7171) for underground facilities locations.
4. The sanitary sewer contractor shall notify the inspection section of the Great Lakes Water Authority (GLWA) at (313) 833-4949 at least 3 working days prior to the beginning of construction.
5. No ground water, storm water, construction water, downspout drainage or weep tile drainage shall be allowed to enter any sanitary sewer.
6. 18 inch minimum vertical separation and 10 foot minimum horizontal separation must be maintained between sanitary sewer and water main.
7. No sewer installation shall have an infiltration or exfiltration exceeding 100 gallons per inch diameter per mile of pipe per 24 hour period and no single run of sewer between manholes shall exceed 100 gallons per inch diameter per mile. All sewer runs of 8 inches in diameter or greater shall be tested. Air tests in lieu of infiltration tests shall be as specified in O.C.W.R.C. D.P.W. "Acceptance Tests". Only Modified Groove Tongue, ASTM C425, ASTM C443, O-Ring, Uniloc, Amvit, Nobel, Ring-Tite, Fluid-Tite or equal, as approved by the O.C.W.R.C. may be used for sewer joints. All joints shall meet requirements of ASTM C425 or C443. No clay pipe or schedule 35 will be allowed for main line sanitary sewer or for sewer leads.
8. At all connections to an existing O.C.W.R.C. sewer or to extensions there to, a temporary watertight bulkhead with a threaded, capped or valved 1 inch diameter pipe to permit measuring infiltration shall be provided to be removed only after directed by the engineer. A 12 inch temporary sump and a watertight mechanical bulkhead shall be installed on the first manhole upstream of the proposed connection. The temporary sump shall be filled in after successful completion of any infiltration test up to the standard fillet provided for the flow channel, and the bulkhead shall be removed after directed by engineer. Infiltration testing is required for all sewers twenty-four (24) inch diameter and greater, or for all sewer pipe diameters where the ground water level is seven (7) feet above the top of the sewer pipe.
9. A videotape of the interior of the sanitary sewer (with log and lead locations) shall be submitted and approved by the City prior to final acceptance. Said videotape shall be performed a minimum of 30 days after construction is completed. Typical items to be reviewed on the videotape will include pipe deflections, pipe settlement, lead connections, joints and pipe cleanliness. If the videotape review reveals unsatisfactory conditions, the Contractor shall correct the condition at his own cost and shall then re-videotape the affected pipe for review by the City. The sanitary sewer must be cleaned prior to videoing. Water must be run through the system from the upstream manhole prior to videoing. The video will not be accepted if the sewer is not cleaned prior to the inspection.
10. The completed installation shall at no point have out-of-round pipe deflections greater than 5%. The Engineer shall have the option of requiring deflectometer or go/no-go gauging tests run prior to acceptance on pipelines where high deflections are suspected.
9. Tracing wire shall be provided for all sanitary sewer and sewer leads, regardless of pipe material. Wire shall be copper, 12-gage stranded, green insulated per City requirements. Connection is required at all service leads and manholes. Wire shall be brought through each manhole and connected to the top step. All wire exposed above ground surface shall be encased in ½" metal conduit. The conduit should extend 6" below the ground surface. Conductivity shall be tested by the City prior to acceptance of the sewer. All splices shall be made using a gel-cap product which provides a water proof seal, such as 3M's Direct Bury Splice Kit #P054007/09964 or approved equal.
10. New manholes constructed directly on O.C.W.R.C. sewers shall be provided with covers reading "Oakland County-Sanitary" in raised letters. New manholes built over any existing sanitary sewers shall have monolithic bottoms.
11. All new manholes shall have O.C.W.R.C. approved, flexible water-tight seals where pipes pass through walls. Manholes shall be precast sections with modified groove tongue and rubber gasket type joints. Precast manhole sections shall be O.C.W.R.C. approved modified eccentric cone type. All manholes shall be provided with water-tight covers.
12. PDF "As-Built" plans shall be provided to the O.C.W.R.C. and the City of Auburn Hills by the Engineer. "As-Built" plans shall specifically designate where ABS Truss or PVC Truss sewer pipe was installed. A GIS file or AutoCAD file shall also be provided to the City of Auburn Hills.
13. The materials specified below may be subsituted with an approved equal as determined by the City. It is at the sole discretion of the City to determine if a material is acceptable and can be utilized. Written authorization must be obtained prior to ordering or installing the approved equal.



MINIMUM MANHOLE REQUIREMENTS ON MANHOLES CONSTRUCTED OVER EXISTING SEWERS

FOR LOCAL SANITARY SEWER EXTENSIONS CONNECTING DIRECTLY OR INDIRECTLY TO OAKLAND COUNTY WATER RESOURCE COMMISSION SEWER

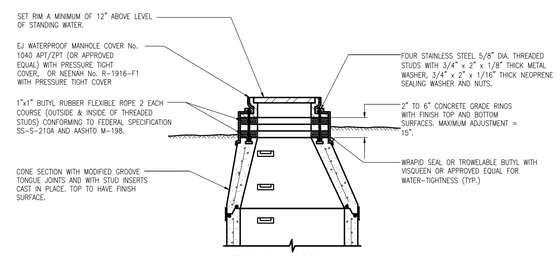
NOTE:
THE MINIMUM PIPE SIZE FOR STRAIGHT THROUGH PIPE INSTALLATION IS 24".
THE MAXIMUM PIPE SIZE FOR RIGHT ANGLE PIPE INSTALLATION IS 18".



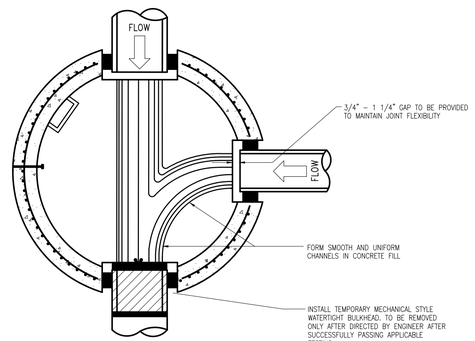
INTERNAL DROP MANHOLE CONNECTION

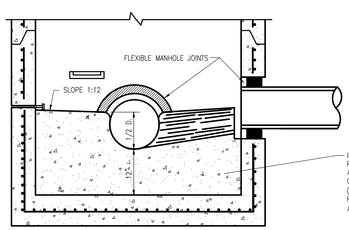
(ONLY AS APPROVED BY O.C.W.R.C. AND AUBURN HILLS D.P.W.)

SEWER SIZE	DROP SIZE	MH. SIZE (I.D.)
UP TO 10"	8"	5'
UP TO 18"	10"	5'
UP TO 30"	18"	6'
UP TO 42"	24"	6'



CONSTRUCTION DETAILS FOR MANHOLE TOPS WITHIN FLOOD PRONE AREAS





SUMP MANHOLE FOR TESTING, CLEANING & DEWATERING

OHM
ARCHITECTS ENGINEERS PLANNERS
34000 PLYMOUTH RD
LIVONIA, MI 48150
P: (734) 522-6711
OHM-ADVISORS.COM

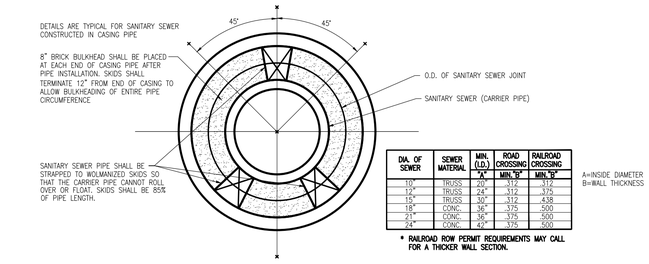
REVISIONS
REVISED STANDARDS UPDATE 6/22/2021

DATE	PROJ NUMBER	ENG	PROJ MGR	CADD	COUNTY	CITY/VILLAGE/TOWNSHIP	SCALE	H:	V:	HORIZ DATUM	VERT DATUM
DEC 2007		JLK	JLK		OAKLAND	AUBURN HILLS	NTS	NTS	NTS		

CITY OF AUBURN HILLS
SANITARY SEWER STANDARD DETAILS

SHEET 1 OF 2

DRAWING PATH: P:\0101_0125\0120200330_Auburn_Hills_Standards_Update\Drawings\Civil\Details\AH-SAN DET.dwg Jul 13, 2022 - 3:21pm



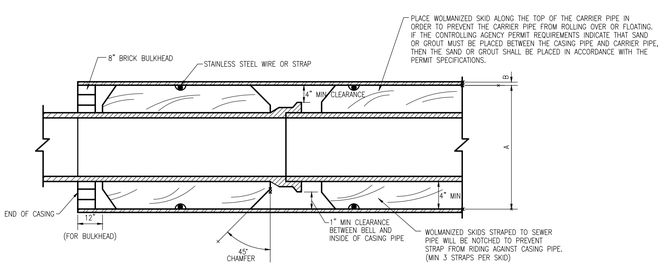
DIA. OF SEWER	SEWER MATERIAL	MIN. (I.D.) "A"	ROAD CROSSING MIN."B"	RAILROAD CROSSING MIN."B"
10"	TRUSS	20"	.312	.312
12"	TRUSS	24"	.312	.375
15"	TRUSS	30"	.312	.438
18"	CONC.	36"	.375	.500
21"	CONC.	36"	.375	.500
24"	CONC.	42"	.375	.500

A=INSIDE DIAMETER
B=WALL THICKNESS

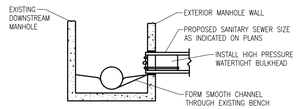
* RAILROAD ROW PERMIT REQUIREMENTS MAY CALL FOR A THICKER WALL SECTION.

PIPE BARREL SUPPORT FOR SANITARY SEWER CONSTRUCTED IN CASING PIPE

CASING SHALL BE SPIRAL WELDED STEEL PIPE A.S.T.M. A-252, GR. 2.

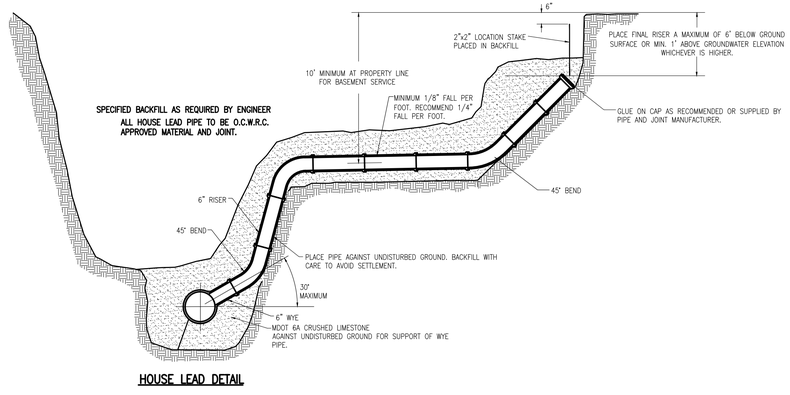


STANDARD CASING SECTION



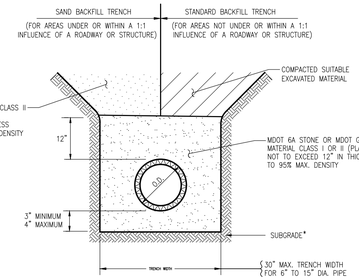
TESTING BULKHEAD WITH PIPE TAP

* AT ALL CONNECTIONS TO AN EXISTING O.C.W.R.C. SEWER OR EXTENSIONS THERETO, A WATERTIGHT BULKHEAD WITH A THREADED CAPPED OR VALVED 1 INCH DIA. PIPE TO PERMIT MEASURING INFILTRATION SHALL BE PROVIDED. TO BE REMOVED ONLY AFTER DIRECTED BY ENGINEER.
* INFILTRATION TESTING IS REQUIRED FOR ALL SEWERS TWENTY-FOUR (24) INCH DIAMETER AND LARGER OR FOR ALL SEWER PIPE DIAMETERS WHERE THE GROUND WATER LEVEL IS SEVEN (7) FEET ABOVE THE TOP OF THE SEWER PIPE.



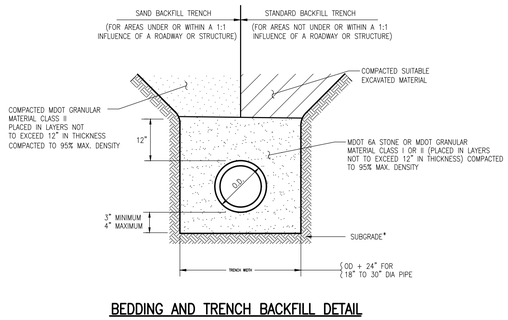
HOUSE LEAD DETAIL

NOTE:
TRACING WIRE REQUIRED FOR ALL SANITARY LEADS.



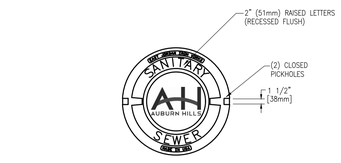
BEDDING AND TRENCH BACKFILL DETAIL FOR ABS OR PVC TRUSS PIPE

NOTE:
1. IF THE EXISTING SUBGRADE SOILS MEET THE REQUIREMENTS FOR MDOT GRANULAR MATERIAL CLASS II (MINIMUM 3" THICK), THEN THE SANITARY SEWER MAY BE LAID DIRECTLY ON THE COMPACTED NATIVE SUBGRADE SOILS.



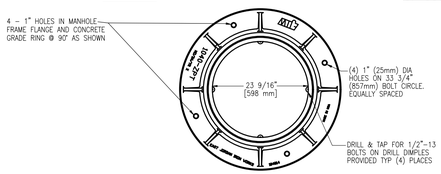
BEDDING AND TRENCH BACKFILL DETAIL FOR REINFORCED CONCRETE PIPE

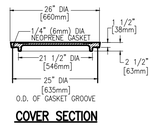
NOTE:
1. IF THE EXISTING SUBGRADE SOILS MEET THE REQUIREMENTS FOR MDOT GRANULAR MATERIAL CLASS II (MINIMUM 3" THICK), THEN THE SANITARY SEWER MAY BE LAID DIRECTLY ON THE COMPACTED NATIVE SUBGRADE SOILS.



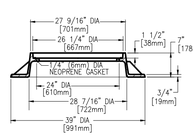
TOP VIEW OF COVER

BOTTOM VIEW OF COVER

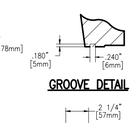




COVER SECTION



FRAME SECTION



GROOVE DETAIL

PICKHOLE DETAIL

CATALOG NO.
1040AGS/10402

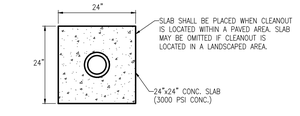
EST. WT.
COVER: 150 LBS 68kg
FRAME: 230 LBS 104kg
UNIT: 380 LBS 172kg

MAT'L SPEC.
COVER – GRAY IRON ASTM A48 CL35
FRAME – GRAY IRON ASTM A48 CL35

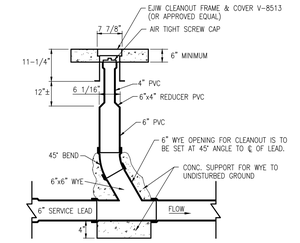
LOAD RATING
HEAVY DUTY

COATING
DIPPED

C.I. MANHOLE COVER E.J.I.W. 1040 AGS/ZPT



TOP VIEW



ELEVATION

DETAIL OF SANITARY SEWER CLEANOUT

SANITARY SEWER CONSTRUCTION NOTES

SANITARY SEWER NOTES:
MATERIALS AND CERTIFICATIONS

1. Truss Pipe and Fittings shall be as described under the current ASTM Designation D2680, Standard Specification for Acrylonitrile–Butadiene–Styrene (ABS) and Poly(Vinyl Chloride) (PVC) Composite Sewer Piping. Appendix XI of said specification shall be as modified by the bedding requirements outlined below.
2. Solid wall pipe for 6" house connection sewers shall be PVC SDR 23.5 conforming to ASTM Designation D3034 Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings or PVC Schedule 40 conforming to the current ASTM Designation D2665 Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings. Solid wall pipe shall be installed in accordance with bedding requirements outlined below.
3. All pipe shall be certified by the manufacturer to meet the applicable ASTM specification requirements. Certification forms, together with a report of the test results, shall be provided to the inspector with pipe deliveries and copies shall be forwarded to the Engineer or the Owner. Certification forms shall include project name, location, Contractor, and test lot number. Lot sizes shall be acceptable to the Engineer.
4. All pipe and fittings shall be suitably marked to provide manufacturer's name, extrusion code (including date and location of manufacture), ASTM designation, type of plastic, nominal diameter, and SDR number, where applicable. Fittings however, need not contain the extrusion code. Pipe shall have a "home" mark. Truss Pipe with an absence of filler material at the ends greater than 1/4" deep shall be subject to rejection or acceptable repair.
5. O.C.W.R.C. D.P.W. flexible manhole joints shall be used. Where adaptors to other materials are required, only approved adaptors and joints may be used. Where the connections are made to existing manholes, a rubber waterstop shall be used around the pipe.
6. No clay pipe will be allowed for main line sanitary sewer or for sanitary sewer leads.

BEDDING

1. Bedding for Truss Pipe and solid wall pipe shall be in accordance with the current ASTM Designation D2321, except, (1) only MDOT Class I and Class II granular materials or MDOT 6A stone may be used, (2) embedment shall extend to minimum 12" above top of pipe, and (3) flooding or puddling shall not be used. The use of flexible and semi-flexible pipe requires that the bedding provide unyielding side support and complete bedding contact under pipe haunches. Bedding material must be properly placed and compacted to provide lateral restraint against deflection in the pipe diameter. Pipe must be bedded to the true line and grade throughout its length. Bell holes shall be provided where required.
2. Where unstable bottoms are encountered, the Contractor shall undercut to stable ground and construct a foundation consisting of MDOT 6A stone to act as an impervious mat to prevent migration or vertical movement of unstable soils or bedding materials. Where trench sheeting, plates, or a trench box are used due to severe ground conditions, all voids to the side and below the top of the pipe caused by the sheeting, plates, or box withdrawal shall be completely filled or the supports left in place below the top of the pipe.
3. Concrete cradle bedding shall not be used where allowable trench widths are exceeded. In lieu of concrete cradle bedding, standard pipe bedding shown shall be provided to the full width between undisturbed trench walls or at least 2.5 pipe diameters on both sides of the pipe.
4. Due to potential damage to exterior walls of Truss Pipe or solid wall pipe, particularly under cold weather conditions, if rocks, frozen material, or large objects strike the pipe, the Contractor shall carefully avoid dumping any materials other than approved bedding sand or stone on the pipe until 12" cover is placed on it, particularly under cold weather conditions. Pipe walls and ends shall also be protected from abrasion and damage during handling, and shall be fully inspected just prior to placing in the trench.
5. Care shall be taken during bedding compaction to avoid distorting the shape of the pipe or damaging its exterior wall. Mobile equipment shall not be used over the pipe trench until 48" of cover has been placed.

BACKFILL

1. Backfill shall be as indicated on construction drawings. Trench backfill shall be a suitable material and shall be free of any organic materials and rocks larger than 3" in size. Under road surfaces, pavement, sidewalks, curbs, driveways and areas where trench is within a 1:1 influence of the pavement, sand backfill shall be used which shall consist of MDOT granular material Class II or III compacted in layers not to exceed 12" in thickness to a density of 95%. All backfill placed within a 1:1 influence of structures shall be approved sand, placed in 1' layers and compacted. Trenches which are to be left open overnight shall be enclosed with suitable fencing and lighted barricades, unless otherwise approved by the city.

JOINTS

1. Joints for ABS Truss Pipe and ABS solid wall pipe shall be chemically welded in accordance with the manufacturer's recommendation and the current ASTM Designations D2680 and D2235. Additionally, all exposed ends of Truss Pipe shall be fully and thoroughly coated with plastic jointing cement prior to making joints so as to seal ends to eliminate the possibility of false low pressure air tests. Care shall be taken to insure all joints being pushed to the full "home" position and held tightly in the "home" position during any grade or line adjustments. Pipe shall be rotated during joint insertion to insure a complete spread of jointing cement. ABS Plastic Cement Primer and ABS Plastic Pipe Cement shall arrive at the job site in sealed and labeled containers. "Johnny Mops" or similar swab type applicators shall be used to apply primer and cement. Opened containers in the trench shall be protected from dirt, water, and other contaminants.
2. Joints for PVC Truss Pipe, PVC solid wall pipe and fittings shall be of the elastomeric gasket push–on type. Such joints shall conform to the current ASTM Designation D3212 and the pipe manufacturer shall file with the O.C.D.C. a copy of certified test results of its jointing system prior to use. Gasket joints shall be installed in accordance with procedures specified by the pipe manufacturer, such that the gasket will be compressed (not displaced) in the joint to form a positive seal. Care shall be taken to insure all joints be pushed to the full "home" position and held together in the "home" position during any grade or line adjustments.

CUTTING AND HANDLING

1. Cutting of pipe lengths, where required, shall be performed with tools or equipment that will provide a neat, perpendicular cut without damage to the plastic or the filler material. All burrs shall be removed by the use of a file, knife, or abrasive paper. Spigot ends on cut pipe shall be beveled similar to factory beveling to prevent gasket damage. Bowing or warping of Truss Pipe or solid wall pipe can occur with temperature fluctuations. The Contractor shall store and protect the pipe to minimize bowing. Nominal 12'6" or longer pipe lengths having deviations from straight greater than 1", as measured along a straight line, shall not be used.

STRUCTURE NOTES:

1. All new manholes shall have O.C.W.R.C. approved flexible, watertight seals where pipes pass through walls. Manholes shall be precast sections with modified groove tongue and rubber gasket type joints. Precast manhole sections shall be O.C.W.R.C. approved modified eccentric cone type. All manholes shall be provided with bolted, watertight covers.
2. At all connections to manholes on O.C.W.R.C. sewers or extensions thereto, drop connections will be required when the difference in invert elevations exceeds 18 inches. Only outside drop connections will be approved for drops less than 20 feet. However, for special conditions, such as poor soils or manhole depths greater than 20 feet, the Auburn Hills DPW and/or O.C.W.R.C. may allow an internal drop connection. To maintain the flexibility of the pipe materials, concrete encasement of drop connections shall not be used.
3. All new manholes requiring a drop connection shall be constructed using a manhole base with a precast drop as shown on sheet 1 of these details.
4. Wherever existing manholes are to be tapped, the tap shall be made by coring. The contractor shall place a KOR–N–SEAL boot (or approved equal) after coring is completed. Blind drilling will not be permitted in lieu of coring.
5. Manholes constructed or adjusted as part of the system maintained by the City of Auburn Hills shall be provided with covers as depicted on this detail sheet.
6. New manholes constructed directly on O.C.W.R.C. sewers shall be provided with covers reading "Oakland County Drain Commissioner – Sanitary" in raised letters per detail in the O.C.W.R.C. specifications. New manholes built over any existing sanitary sewers shall have monolithic poured bottoms.

SANITARY SEWER LEAD NOTES:

1. All building leads and risers shall be 6 inch S.D.R. 23.5 ABS pipe with chemically fused joints, Schedule 40 or S.D.R. 23.5 PVC with rubber gasket joint, or an approved equal pipe and joint. Sewer pipe wye openings shall contain factory installed premium joint material of the type identical to that of the building lead pipe used. Building leads to be furnished with removable airtight and watertight stoppers. Taps to existing PVC of Truss Pipe shall be made with wye saddle taps. Where an existing building lead is being extended, dissimilar types and sizes of pipe shall be joined using an O.C.W.R.C. approved adapter.
2. Saddle taps of existing sanitary sewers shall be made by installing a wye fitting for house connections. Fernco fittings with stainless steel bands shall be used to secure the wye fitting to the sanitary sewer pipe. Bedding for house connection sewers shall be equal to that of the main sewer bedding. Risers in deep and unstable trenches should be bedded in MDOT 6A stone, or an approved equal, to avoid settlement. Concrete shall not be used for bedding. End caps or plugs shall be braced or anchored to withstand air test pressures. Caps or plugs shall not be chemically welded in place.
3. Where sanitary sewer cleanouts fall within a paved area (parking lot, service drive area, etc.), the cleanout shall have a cast iron cover that is centered in a 2'x2'x6" (min.) concrete slab having a compressive strength of 3000 psi at 28–day cure time.

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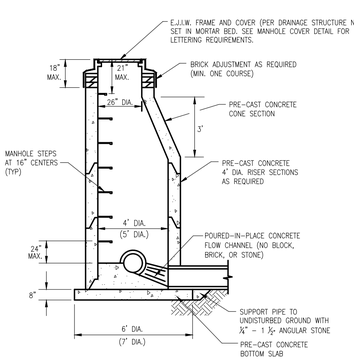
LIVONIA, MI 48150
P: (734) 522-6711
OHM-ADVISORS.COM

REVISIONS
REVISED (CASTING LOGO UPDATED) 5/1109
REVISED STANDARDS UPDATE 6/2/2021

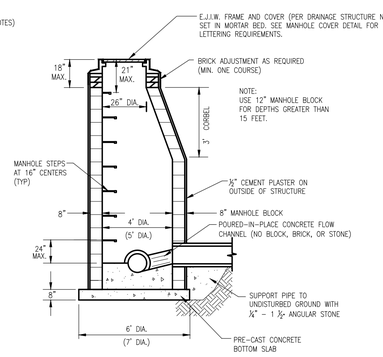
DATE	PROJ NUMBER	ENG	PROJ MGR	CADD	COUNTY	CITY/VILLAGE/TOWNSHIP	SCALE	HORZ DATUM	VERT DATUM
DEC 2007		JLK	JLK		OAKLAND	AUBURN HILLS	V: NTS	H: NTS	

CITY OF AUBURN HILLS
SANITARY SEWER STANDARD DETAILS

SHEET 2 OF 2

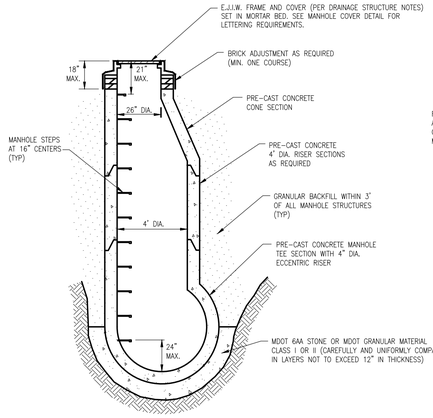


PRE-CAST MANHOLE

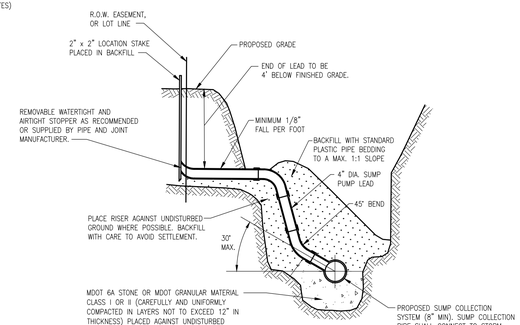


BLOCK MANHOLE

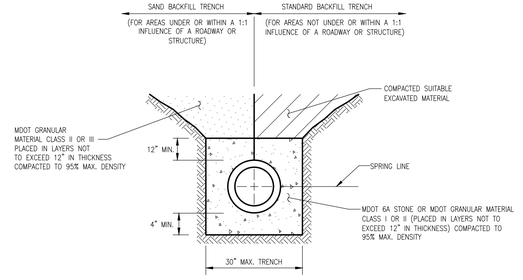
STANDARD MANHOLE DETAILS



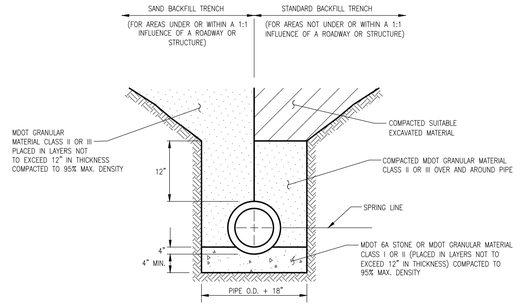
PRE-CAST TEE MANHOLE DETAIL



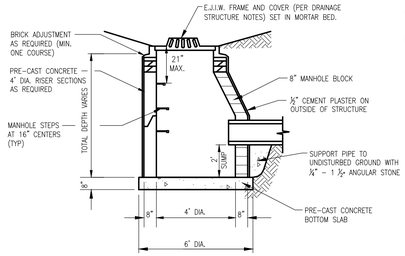
HOUSE LEAD DETAIL FOR 4" DIA. PLASTIC SUMP PUMP LEADS



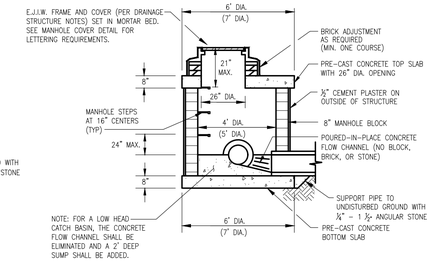
BEDDING AND TRENCH BACKFILL DETAIL FOR 18" DIAMETER AND SMALLER PIPE (PVC AND HDPE PIPE)



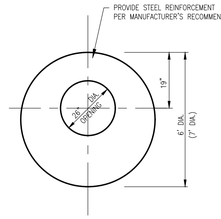
BEDDING AND TRENCH BACKFILL DETAIL FOR 24" DIAMETER AND SMALLER PIPE (CONCRETE AND METAL PIPE)



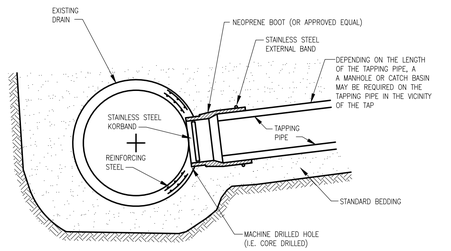
CATCH BASIN DETAIL



LOW HEAD MANHOLE AND CATCH BASIN DETAIL



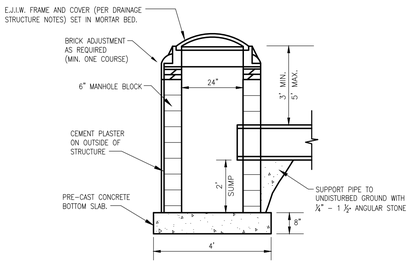
PRE-CAST CONCRETE TOP SLAB DETAIL, 8" THICK



NOTE:
1. CONNECTION DETAIL FOR DIRECT TAPS TO PIPE WALL OF EXISTING DRAINS SHALL NOT BE USED UNLESS PRIOR APPROVAL IS OBTAINED FROM CITY ENGINEER AND/OR OWNER OF EXISTING STORM SYSTEM
2. USE KOR-N-TEE FOR NON-CONCRETE TO CONCRETE TAPS. USE LINK-SEAL, A-LOCK OR APPROVED EQUAL FOR CONCRETE TO CONCRETE TAPS.

KOR-N-TEE TAP FOR CONCRETE PIPE

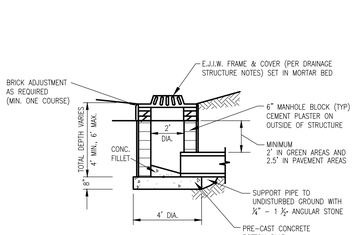
BEDDING AND TRENCH BACKFILL DETAIL FOR 24" DIAMETER AND SMALLER PIPE (CONCRETE AND METAL PIPE)



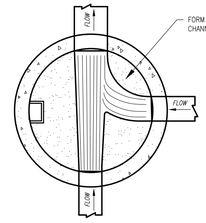
2' DIA. CATCH BASIN DETAIL

NOT TO SCALE

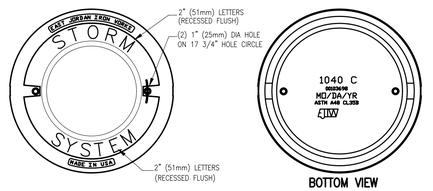
NOTE:
1. 2' DIA. CATCH BASIN SHALL NOT BE USED UNLESS PRIOR APPROVAL IS OBTAINED FROM CITY ENGINEER.

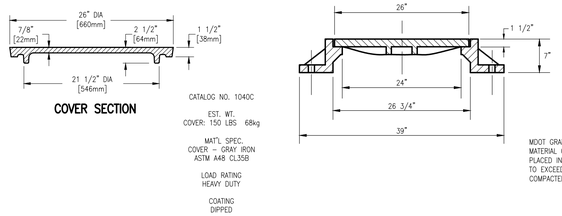


2' DIA. INLET DETAIL



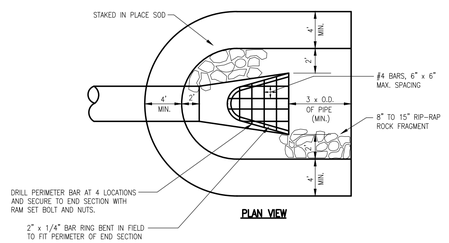
CHANNEL DETAIL



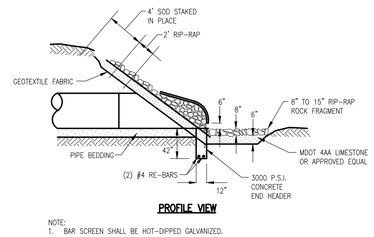


CAST IRON MANHOLE COVER E.J.I.W. 1040

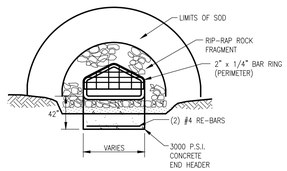
NOTE:
1. LETTERING SHALL BE USED ONLY FOR PUBLIC STORM SYSTEM. ALL OTHERS SHALL HAVE NO LETTERING.



PLAN VIEW



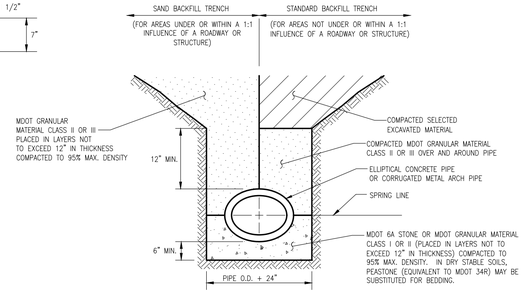
PROFILE VIEW



END VIEW

NOTE:
1. BAR SCREEN SHALL BE HOT-DIPPED GALVANIZED.

END SECTION AND BAR SCREEN DETAIL



BEDDING AND TRENCH BACKFILL DETAIL FOR 27" DIAMETER AND LARGER PIPE (CONCRETE AND METAL PIPE)

BEDDING AND TRENCH BACKFILL DETAIL FOR ELLIPTICAL CONCRETE PIPE OR CORRUGATED METAL ARCH PIPE

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LIVONIA, MI 48150
P: (734) 522-6711
OHM-ADVISORS.COM

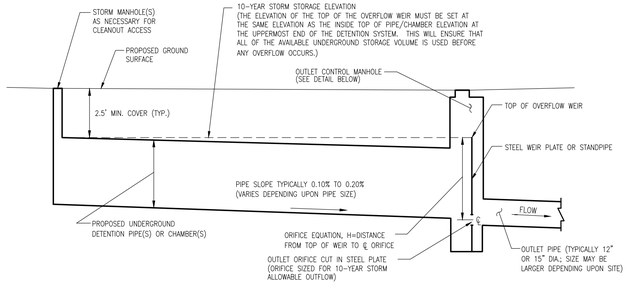
REVISIONS
REVISED STANDARDS UPDATE 6/22/2021

DATE	PROJ NUMBER	ENG	PROJ MGR	CAD	COUNTY	CITY/VILLAGE/TOWNSHIP	H:	V:
DEC 2007		JLK	JLK		OAKLAND	AUBURN HILLS	NTS	NTS

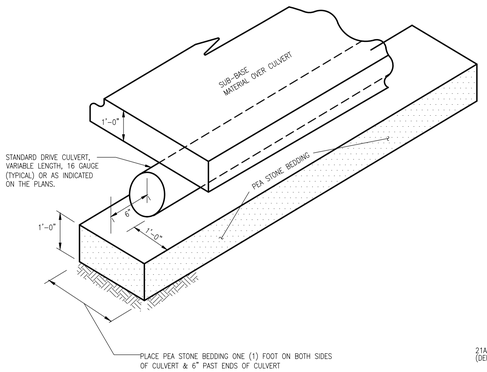
HORIZ DATUM
VERT DATUM

CITY OF AUBURN HILLS
STORM SEWER STANDARD DETAILS

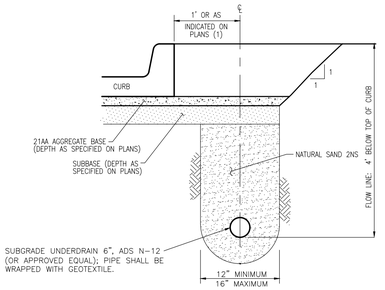
SHEET 1 OF 2



DETENTION SYSTEM PROFILE

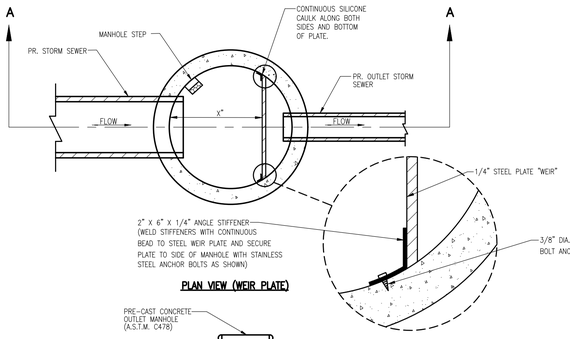


DRIVE CULVERT BEDDING DETAIL

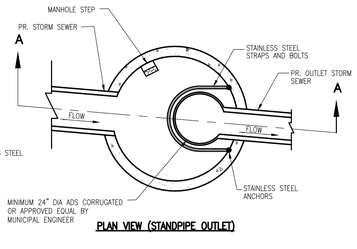


NOTES:
1. LOCATION MAY BE ADJUSTED IN THE FIELD BY THE ENGINEER.
2. ALL UNDERDRAIN SHALL BE APPROVED PLASTIC PIPE PER MDOT SECTION 909.07. METAL PIPE SHALL NOT BE USED.
3. ALL UNDERDRAIN SHALL OUTLET TO DRAINAGE STRUCTURE.
4. UNDERDRAIN CONNECTIONS (AT LOW POINTS) SHALL BE MADE AS CLOSE TO THE STRUCTURE INVERT AS PRACTICAL, WITH A SPIRAL WRAP OF THE STRUCTURE USED TO MAKE THE TRANSITION FROM THE REQUIRED FLOW LINE DEPTH TO STRUCTURE INVERT.

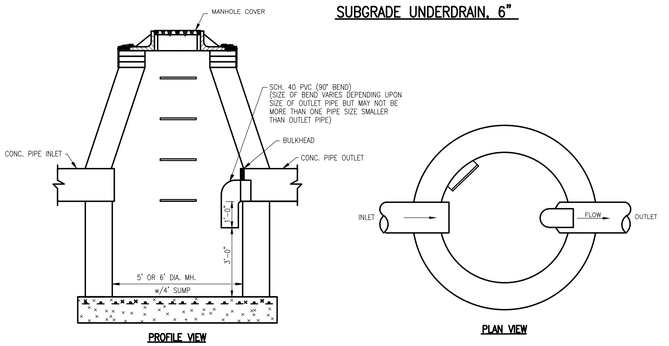
SUBGRADE UNDERDRAIN, 6"



PLAN VIEW (WEIR PLATE)



PLAN VIEW (STANDPIPE OUTLET)

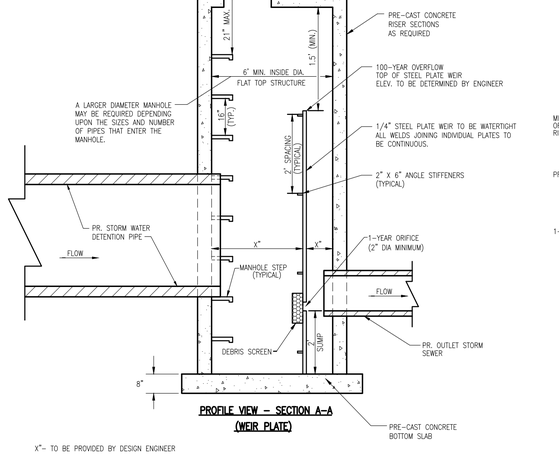


PROFILE VIEW

PLAN VIEW

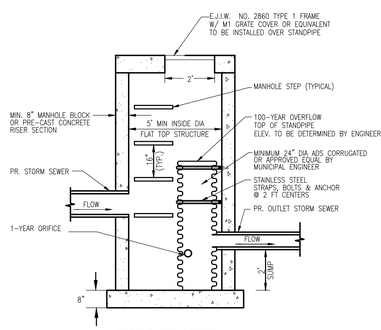
OIL/GAS SEPARATOR PLACEMENT DETAIL FOR 18" DIAMETER AND SMALLER OUTLET PIPE

(FOR OUTLET PIPES LARGER THAN 18" IN DIAMETER AN ALTERNATE DESIGN MUST BE APPROVED BY THE CITY ENGINEER)



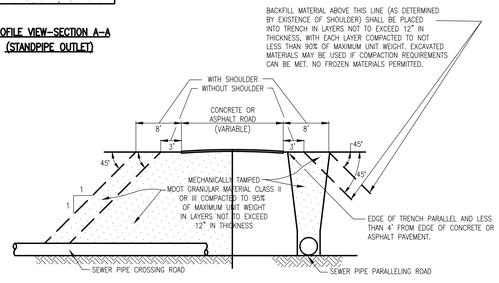
PROFILE VIEW – SECTION A–A (WEIR PLATE)

X"– TO BE PROVIDED BY DESIGN ENGINEER



PROFILE VIEW–SECTION A–A (STANDPIPE OUTLET)

TYPICAL UNDERGROUND DETENTION AND OUTLET MANHOLE DETAILS



SAND OR GRAVEL BACKFILL DETAILS FOR SEWERS UNDER CONCRETE OR ASPHALT PAVEMENTS, SIDEWALKS, DRIVEWAYS AND PARKING AREAS

STORM SEWER CONSTRUCTION NOTES

GENERAL NOTES:
1. All materials and workmanship shall be in accordance with the standards and specifications of the City of Auburn Hills.
2. No storm sewer is to be installed without the City's inspector present.
3. Notify MISS DIG (1-800-482-7171) at least three working days prior to the start of construction.
4. Trenches that are to be left open overnight shall be enclosed with suitable fencing and lighted barricades, unless otherwise approved by the city.
5. All end sections 18" and larger shall be provided with a galvanized bar screen.
6. Hinged bar grates will be required for headwalls per O.C.W.R.C. or MDOT standards, whichever is stricter.
7. All vertical and horizontal bars shall be tack-welded to the angle frame.
8. The bar grate screen shall be hot-dipped galvanized after fabrication is complete.
9. The design engineer shall furnish The City of Auburn Hills with PDF "Record Drawings" of the water main plans as well as a GIS file or AutoCAD file, upon job completion. Plans shall locate all storm sewer and structures.
10. The materials specified below may be substituted with an approved equal as determined by the City. It is at the sole discretion of the City to determine if a material is acceptable and can be utilized. Written authorization must be obtained prior to ordering or installing the approved equal.
11. Tracing wire shall be provided for all storm sewer, regardless of pipe material. Wire shall be copper, 12-gage stranded, green insulated per City requirements. Wire shall be brought through each structure and connected to the top step. All wire exposed above ground surface shall be encased in ½" metal conduit. The conduit should extend 6" below the ground surface. Conductivity shall be tested by the City prior to acceptance of the sewer. All splices shall be made using a gel-cap product which provides a water proof seal, such as 3M's Direct Bury Splice Kit #P054007/09964 or approved equal.

STORM SEWER NOTES:
1. Type and class of pipe shall be as specified on plans.
2. Concrete Pipe Requirements:
   - 2.1. The contractor shall provide reinforced concrete pipe as specified on the plans.
   - 2.2. All round reinforced concrete pipe shall meet the requirements of ASTM C76, Standard Specifications for Reinforced Concrete Culvert, Storm Drain and Sewer Pipe, with modified grooved tongue and rubber gasket meeting the requirements of ASTM C443, Standard Specifications for Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets.
   - 2.3. All elliptical reinforced concrete pipe shall meet the requirements of ASTM C507, Standard Specifications for Reinforced Concrete Elliptical Culvert Storm Drain and Sewer Pipe, with tongue and grooved joints with bituminous (DeWitt #10) joint material meeting the requirements of C443. Elliptical concrete pipe joints shall also be wrapped per ASTM C877, Standard Specification for External Sealing Bands for Concrete Pipe, Manholes and Precast Box Sections. In addition, elliptical concrete pipe of 42" equivalent size and larger shall require inside concrete pointing.
   - 2.4. The inside joint of pipe over 27" diameter shall be pointed with mortar upon completion of backfilling operations.
3. Plastic Pipe Requirements:
   - 3.1. Per City standards, the maximum allowable pipe size for plastic storm sewer is 12" diameter. Larger diameter plastic storm sewer may be approved by the City, depending on site conditions.
   - 3.2. All plastic storm sewer pipe shall have a smooth interior.
   - 3.3. PVC pipe shall meet the requirements of ASTM F949, Standard Specification for Poly (Vinyl Chloride) (PVC) Corrugated Sewer Pipe With a Smooth Interior and Fittings, with push-on type joints meeting the requirements of ASTM D3212, Standard Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals, and F477, Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.
   - 3.4. HDPE pipe shall meet the requirements of AASHTO M294 and ASTM D3350, Standard Specification for Polyethylene Plastics Pipe and Fittings Materials, with push-on type joints meeting the requirements of ASTM D3212 and F477.
4. Bedding Requirements:
   - 4.1. Bedding shall be used as called for on the details.
   - 4.2. Where unstable ground conditions are encountered, stone bedding shall be used as directed by the Engineer in order to provide a stable foundation for pipe and manholes.
   - 4.3. All pipes entering or leaving a manhole shall be adequately supported with ¼"–1½" angular stone fill from undisturbed earth to springline.
   - 4.4. Bedding shall extend a minimum of 4" below pipe, unless otherwise noted on construction plans. Bedding shall be uniform in grade. However, if the existing native soils meet the requirements for MDOT granular material class II (minimum 4" thick), then the storm sewer may be laid directly on the compacted native subgrade soils.
5. Backfill Requirements:
   - 5.1. Backfill as indicated on construction drawings. Trench backfill shall be of a suitable material and shall be free of any organic materials and rocks larger than 3" in size. Backfill shall be ramped into trench and compacted with a small dozer or other approved methods.
   - 5.2. Where trench is within a 1:1 influence of streets, alleys, sidewalks, driveways and parking areas, sand backfill shall be used which shall consist of MDOT granular material Class II or III compacted in layers not to exceed 12" in thickness to a density of 95%.
   - 5.3. All backfill placed within a 1:1 influence of structures shall be approved sand, placed in 12" layers and compacted.
   - 5.4. No frozen material shall be buried more than 4' below the final elevation of the ground.

DRAINAGE STRUCTURE REQUIREMENTS:
Contractor shall construct manholes with precast reinforced concrete in lieu of concrete, brick and block manholes in accordance with the following conditions:
1. Precast reinforced concrete section with modified groove tongue joint shall conform to ASTM C-478, Standard Specification for Precast Reinforced Concrete Manhole Sections, with rubber gasket.
2. No openings shall be made in precast units which would leave less than 12" of undisturbed precast structure wall between pipes (as measured between outside pipe walls) or would remove more than 40% of the circumference along any horizontal plane.
3. Precast riser placed on the concrete base shall be set in a full bed of mortar. All joints & liftholes shall be pointed up with mortar on the outside and inside.
4. Structures for sewers larger than 18", or those not meeting the opening requirements, may be built of block or brick up to a minimum of 8" above the top of sewer, with precast units being used above this point. Where precast units rest on the block or brick, the groove in the precast unit shall be filled with mortar.
5. Block used for standard catch basins and manholes shall be 8" (for 0'-15' deep) and 12" (for 15'-25' deep). Block used for 2' diameter inlets and catch basins shall be 6".
6. All vertical openings in concrete block structure walls shall be completely filled with mortar. All vertical wall joints shall be cement pointed.
7. Plaster all outside masonry surfaces with 1:2½ masonry cement (type II) 1/2" thick.
8. All manholes and catch basins shall be 4' or 5' in diameter unless otherwise indicated on construction drawings. Larger diameter drainage structures (6', 7', 8', 10', 12' diameter) may be needed for large storm sewer pipe or for situations where the angles between entering pipes require a larger diameter structure in order to maintain at least 1' of structure wall between the pipes. 2' diameter catch basins and inlets may be used where approved by the City Engineer.
9. Manhole steps shall be steel, encased with polypropylene plastic or approved equivalent to M.A. Industries, Inc., PS-1 for brick, or PS-1B for block, East Jordan Iron Works 8503 (or approved equal). Manhole steps shall be placed at 16" centers.
10. Catch basin steps shall be East Jordan Iron Works 8503 plastic coated (or approved equal).
11. Manhole frame and cover shall be East Jordan Iron Works 1040, type "C" solid cover or as per construction drawings.
12. Catch Basin and inlet frame and cover shall be:
    - 12.1. East Jordan Iron Works 5105, type "M1" cover (with trout logo) with straight face curb and gutter (or approved equal).
    - 12.2. East Jordan Iron Works 5105, type "M1" cover (with trout logo) with mountable curb and gutter and integral curb and gutter (or approved equal).
    - 12.3. East Jordan Iron Works 1040, type "02" cover (beehive) to be used on open ditches and swales, rear yard catch basin (or approved equal). If within 8' of road, type "N" cover (low beehive) shall be used. East Jordan Iron Works 1040, type "A" cover to be used on all 2' cleanouts and structures not located at storm water collection points (or approved equal).
13. Frames shall be set in full bed of mortar and the side shall be overlapped to prevent leakage.
14. A minimum of one course of brick must be used and a maximum of 5 courses of brick can be used to adjust a structure. All bricks and blocks used for adjustment shall be concrete.
15. A proper channel shall be constructed within the existing manhole or other structure at which the connection is to be made to direct the flow to the existing outlet in a manner that will tend to create the least amount of turbulence. The channel shall be constructed to the same size as the inside diameter of the existing pipes, and shall be built to height of 1/3 the existing pipe diameter with a minimum of 2% slope on the benches.
16. Concrete base for manhole, catch basin, and inlet shall be MDOT grade 30P (Min.), 8" thick, 3000 psi.
17. When tapping into an existing structure a brick collar shall be placed 12" thick around the pipe and extended 12" beyond the opening. If pre-cast section is tapped, bend mesh and use as reinforcement with brick collar.

SUMP PUMP LEAD REQUIREMENTS:
1. All sump pump leads connected to a drain shall be pre-manufactured.
2. Sump pump leads shall be (1) SDR 35, non-perforated, solid wall PVC, (2) ARMCO Truss Pipe, or (3) approved equal, with premium joints.
3. Sump collection system pipes shall be connected at drainage structures. However, if approved by the engineer, taps to 12" storm sewer may be made with a Fernco EZ Tap or approved equal. Taps to other size storm sewer may be made with a Romac saddle, KOR-N-TEE lateral connector for concrete pipe, or approved equal.
4. Ends of all 4" sump pump leads shall be temporarily capped and their location staked, witnessed and recorded.
5. All sump pump leads are to be taken to the property line, easement line or as indicated on the plan.
6. Sump pump cleanouts shall be a minimum inside diameter of 24" and be constructed at changes of alignment ends of sump pump mains or as indicated on the plan.

RESTORATION REQUIREMENTS:
1. All disturbed areas within the right-of-way shall be restored as follows, unless otherwise noted on construction drawings: Finish Grade. Place 3" thickness of "quality" topsoil acceptable to the engineer. Apply sod or seed and fertilizer as follows:

	LOCATION	SODDING/ SEEDING REQUIREMENTS	FERTILIZER REQUIREMENT
SEED AND FERTILIZER	Slopes & ditch banks, etc.	MDOT "Roadside" mix (20% Perennial Rye, 10% Kentucky Blue, 40% Red Fescue, 30% Hard Fescue) applied at 220 lbs/acre	240 lbs/acre of chemical fertilizer nutrients in equal proportions of Nitrogen, Phosphoric Acid and Potash. (Must be a slow-release fertilizer)
	Other areas	MDOT "Class A" mix (20% Perennial Rye, 30% Kentucky Blue, 50% Red Fescue) applied at 220 lbs/acre	240 lbs/acre of chemical fertilizer nutrients in equal proportions of Nitrogen, Phosphoric Acid and Potash. (Must be a slow-release fertilizer)
SOD	Ditch bottoms, slopes exceeding 3:1, and at structures	3" Topsoil with Class A Sod	

2. Apply straw mulch at the rate of 2–3 bales/1000 square feet.
3. The contractor shall be responsible to insure the growth of all seeded areas, and shall re-seed as necessary to accomplish this.

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REVISIONS: REVISED STANDARDS UPDATE 6/2/2021

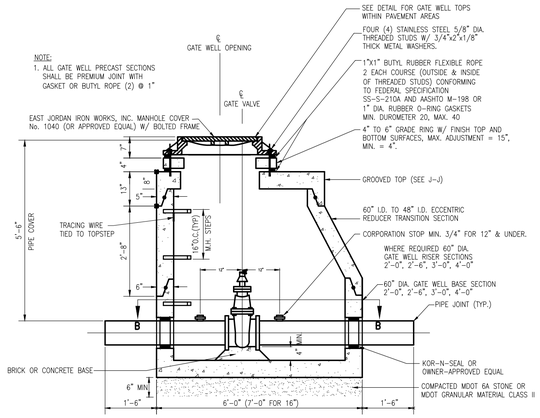
HORIZ DATUM | VERT DATUM | SCALE: V: NTS H: NTS

CITY/VILLAGE/TOWNSHIP: AUBURN HILLS | COUNTY: OAKLAND | CAD'D | PROJ MGR | ENG | JLK | JLK | PROJ NUMBER | DATE: DEC 2007

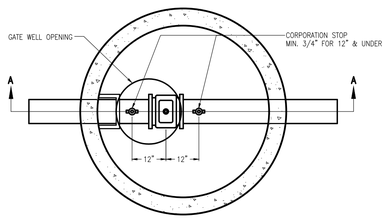
CITY OF AUBURN HILLS
STORM SEWER STANDARD DETAILS

SHEET: 2 OF 2

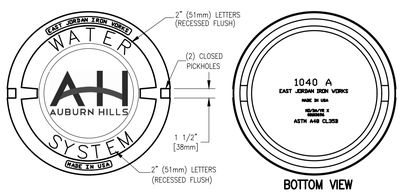
DRAWING PATH: P:\0101_0125\01202200330_Auburn_Hills_Standards_Update\Drawings\Civil\Details\AH-STM DET.dwg Jul 13, 2022 - 3:22pm



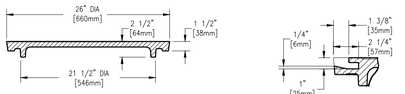
6", 8", 12" AND 16" GATE WELL
(A-A)



6", 8", 12" AND 16" GATE WELL TYPICAL
(PLAN VIEW, B-B)



BOTTOM VIEW



COVER SECTION

PICKHOLE DETAIL

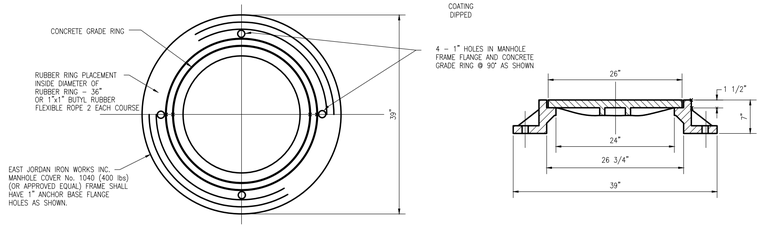
CATALOG NO. 1040A

EST. WT. COVER: 150 LBS 68kg

MAT'L SPEC. COVER – GRAY IRON ASTM A48 CL35

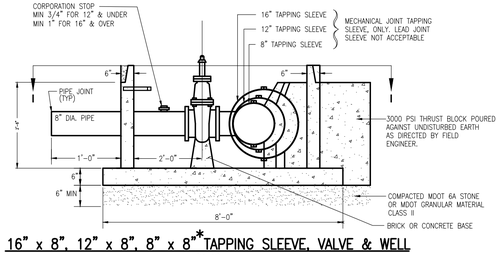
LOAD RATING HEAVY DUTY

COATING DIPPED



CAST IRON GATE WELL COVER AND GRADE RING

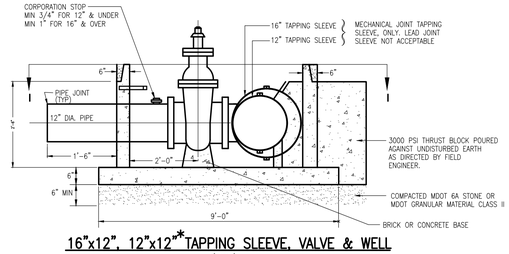
NOTE:
OPENING IN PRECAST BASE TO BE FILLED WITH BRICK.



16" x 8", 12" x 8", 8" x 8"* TAPPING SLEEVE, VALVE & WELL
(H-H)

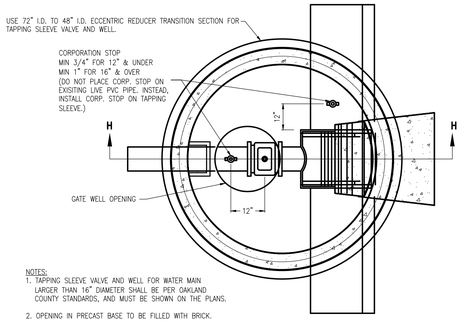
- **USE OF 8" x 8" TAPPING SLEEVE VALVE & WELL MUST BE APPROVED BY AUBURN HILLS DPW.**
- **IF THRU MAIN IS DUCTILE IRON AND TAP IS NOT 8"x8", A STAINLESS STEEL TAPPING SLEEVE IS ALLOWABLE.**

NOTE:
OPENING IN PRECAST BASE TO BE FILLED WITH BRICK.



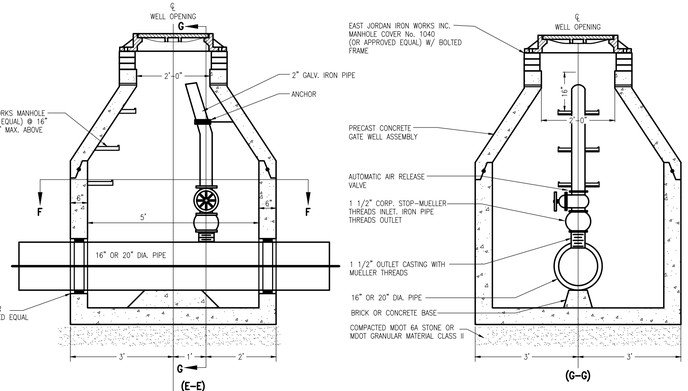
16"x12", 12"x12"* TAPPING SLEEVE, VALVE & WELL
(H-H)

- **USE OF 12 x 12" TAPPING SLEEVE VALVE & WELL MUST BE APPROVED BY AUBURN HILLS DPW.**
- **IF THRU MAIN IS DUCTILE IRON AND TAP IS NOT 12"x12", A STAINLESS STEEL TAPPING SLEEVE IS ALLOWABLE.**



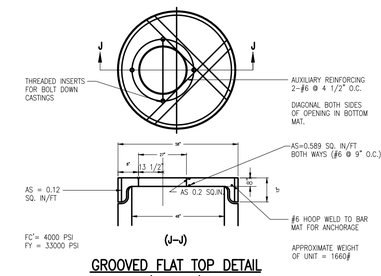
NOTES:
1. TAPPING SLEEVE VALVE AND WELL FOR WATER MAIN LARGER THAN 16" DIAMETER SHALL BE PER OAKLAND COUNTY STANDARDS, AND MUST BE SHOWN ON THE PLANS.
2. OPENING IN PRECAST BASE TO BE FILLED WITH BRICK.

TAPPING SLEEVE VALVE & WELL TYPICAL
(PLAN VIEW, I-I)



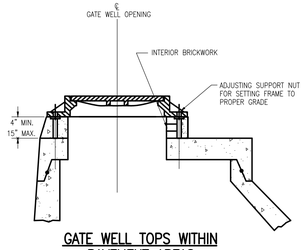
NOTES:
1. ALL AIR RELEASE WELLS SHALL BE PRECAST STRUCTURES.
2. ALL AIR RELEASE VALVES SHALL BE AUTOMATIC PER AUBURN HILLS DPW REQUIREMENTS.

STANDARD AIR RELEASE VALVE & WELL
FOR 16" & 20" WATER MAIN



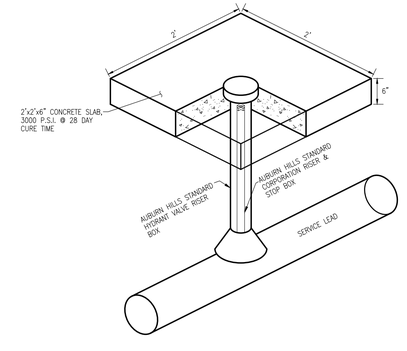
GROOVED FLAT TOP DETAIL
(SEE A-A)

NOTE:
1. AS DENOTES CROSS-SECTION AREA OF REINFORCING STEEL, IN SQUARE INCHES PER FOOT.



GATE WELL TOPS WITHIN PAVEMENT AREAS

NOTE:
1. RUBBER O-RINGS SHALL NOT BE USED IN PAVEMENT.



STOP BOX IN PAVEMENT DETAIL

NOTES:
1. TWO HOLE ARCH PATTERN (ERIE PATTERN) TYPE WITH 1" UPPER AND 5" EXTENDED LENGTH WITH 42" ROD (FORD STOP BOX PART NO. EA1-50-40-42R OR APPROVED EQUAL); SMALL BOX REQUIRED FOR 3/4" AND 1" SERVICE; LARGE BOX REQUIRED FOR 1-1/2" AND 2" SERVICE; HYDRANT VALVE BOX REQUIRED FOR 3" AND 4" SERVICE; GATE WELL REQUIRED FOR 6" AND LARGER SERVICE.
2. WHERE WATER SERVICE CORPORATION BOX FALLS WITHIN A PAVED AREA (PARKING LOT, SERVICE DRIVE AREA, ETC.) THE STOP BOX SHALL BE PLACED IN A STANDARD HYDRANT VALVE BOX. THE VALVE BOX SHALL BE CENTERED IN A 2'x2'x6" CONCRETE SLAB.

GENERAL WATER MAIN NOTES

GENERAL NOTES:
1. All construction procedures and materials used on all water main projects shall conform to American Water Works Association (AWWA), Great Lakes Water Authority (GLWA) and The City of Auburn Hills current Standards and Specifications.
2. No water main is to be installed without the City's inspector present.
3. Notify MISS DIG (1-800-482-7171) at least three (3) working days prior to start of construction.
4. Where work is to be performed in the vicinity of a GLWA water main, contractor shall notify the GLWA Field Office (833-4682) 3 working days prior to the start of construction and request job site inspection where necessary.
5. All pipe and all pipe fittings shall be made in the U.S.A. and shall comply with AWWA C111 and/or AWWA C115.
6. Unless otherwise specified on plans, top of all water mains shall be 5.5 ft. below existing or proposed road centerline, or 5.5 ft below existing or proposed ground, whichever results in lower elevation.
7. An 18" minimum vertical clearance between storm or sanitary shall be maintained.
8. All required cross connection devices shall be installed as required by the local plumbing inspector and in accordance with the standards of the Michigan Department of Public Health.
9. Tracing wire shall be provided for all water main, regardless of pipe material. When PVC is installed for a service line, tracing wire shall be run from the meter setup to the curb box. Wire shall be copper, 12-gage stranded, blue insulated per City requirements. Connection is required at all service leads, hydrants, and gate wells. Wire shall be brought through each gate well and connected to the top step. All wire exposed above ground surface shall be encased in ½" metal conduit. The conduit should extend 6" below the ground surface. Conductivity shall be tested by the City prior to acceptance of the main. All splices shall be made using a gel-cap product which provides a water proof seal, such as 3M's Direct Bury Splice kit #P054007/09964 or approved equal. In addition, underground marking tape shall be placed 1' above the top of PVC or HDPE water main. Underground marking tape shall be Magnatech 3" wide, foil-backed tape, #31-022 by Empire Level Manufacturing Corp., or approved equal.
10. Polywrap shall be placed as required by the City.
11. Connection to an existing water main shall be made only after pressure and bacteriological test have been successfully completed. The city engineer must be present for the test and review the results. Testing and disinfection procedures shall meet the requirements of AWWA-C600/C651.
12. When temporary water main jumpers are used during water main construction, a dual check valve backflow preventer (A.S.S.E. Std. # 1024) shall be placed on the jumper hose that is connected to the new water main. Contact the City of Auburn Hills (248-391-3777) before the water main jumper is installed for inspection.
13. Where water main is located under pavement, the City shall not be responsible for repairing pavement within the easement in the event that maintenance or repairs to the water main become necessary.
14. The design engineer shall furnish the City of Auburn Hills with PDF "Record Drawings" of the water main plans as well as a GIS file or AutoCAD file. Plans shall locate all water mains, hydrants, and gate valves and wells.
15. The materials specified below may be subsituted with an approved equal as determined by the City. It is at the sole discretion of the City to determine if a material is acceptable and can be utilized. Written authorization must be obtained prior to ordering or installing the approved equal.

TESTING:
1. Pressue testing of water main including standard fire suppression leads and riser into the building will be conducted by OHM witnessing on behalf of the municipality. Water main testing shall be per AWWA. Notify OHM (site coordinator) of schedule (3 working days prior to test). Prior to any utility testing, the remaining escrow amount will be reviewed to verify that there is enough escrow to complete the project.
2. Pressure testing of remote FDC's and fire suppression lines extending between buildings will be conducted by Auburn Hills Fire Department. Water main testing shall be per NFPA 13 2016. Notify the Fire Department for the City of Auburn Hills at 248-370-9461 of schedule (3 working days prior to test).
3. Prior to chlorinating the water main, the main shall be filled with potable water to eliminate air pockets and flushed to remove particulates. The flushing velocity in the main shall not be less than 3.0 ft/sec per AWWA C600-17. The main shall be disinfected per AWWA C651-14 and then flushed following chlorination.
4. Bacteriological testing shall be conducted per AWWA C651-14. No bacterial tests will be performed until pressure tests have been passed. Two sets of bacteria samples (two consecutive days, at least 24 hours apart) will be obtained by a licensed testing agency, with the contractor and OHM inspector witnessing. Contractor shall contact Jerry Ashburn (734) 891-1450 for scheduling. Cost of the sampling/testing is the responsibility of the contractor/developer. Hard copy results must be on file at OHM prior to any tie-in. Contractor shall have the samples taken and analyzed at a Michigan Department of Environment, Great Lakes, and Energy (EGLE) approved lab. Two current local labs are:

AquaTest Laboratories
9165 Highland Road
White Lake, MI 48386
248-698-9500

Brighton Analytical, LLC
2105 Pless Drive
Brighton, MI 48114
248-229-7575

OHM
ARCHITECTS ENGINEERS PLANNERS
34000 PLYMOUTH RD
LIVONIA, MI 48150
P: (734) 522-6711
OHM-ADVISORS.COM

REVISIONS
REVISED (CASTING LOGO UPDATED) 5/1109
REVISED STANDARDS UPDATE 6/2/2021

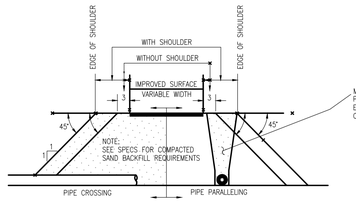
DATE	PROJ MGR	ENG	CADD	COUNTY	CITY/VILLAGE/TOWNSHIP	HORIZ DATUM	VERT DATUM
DEC 2007	JLK	JLK		OAKLAND	AUBURN HILLS	NTS	NTS

SCALE V: NTS H: NTS

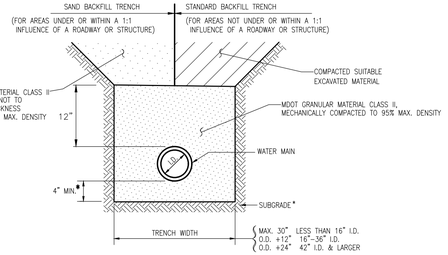
CITY OF AUBURN HILLS
WATER MAIN STANDARD DETAILS

SHEET 1 OF 3

DRAWING PATH: P:\0101_0125\0120200330_Auburn Hills_Standards_Update\Drawings\Civil\Details\AH-WM DET.dwg Jul 13, 2022 - 3:22pm

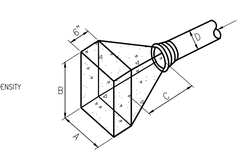


BACKFILL IN THE AREA OF STREETS, ALLEYS SIDEWALKS, DRIVES & PARKING LOTS

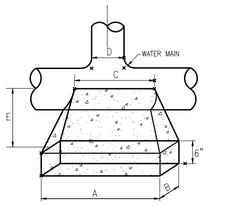


STANDARD BEDDING AND TRENCH BACKFILL DETAIL FOR WATER MAIN

* NOTE: IF THE EXISTING SUBGRADE SOILS MEET THE REQUIREMENTS FOR MDOT GRANULAR MATERIAL CLASS II (MINIMUM 4" THICK), THEN THE WATER MAIN MAY BE LAID DIRECTLY ON THE COMPACTED NATIVE SUBGRADE SOILS.

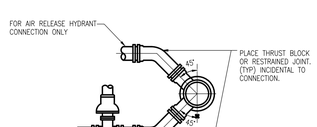


FOR PLUGS			
D	A	B	C MIN.
20"	1'-7"	5"	2.5"
16"	4"-10"	4"-10"	2"
12"	4"-4"	3"	1'-9"
10"	3"	2"	1'-6"
8"	2"-10"	2"-6"	1'-6"
6"	1'-6"	1'-6"	3"

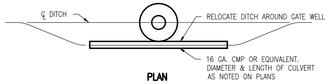


FOR TEES AND TAPPING SLEEVES				
D	A	B	C	E MIN.
20"	6.5"	4.5"	3.5"	3"
16"	4'-8"	4'-8"	2.5"	2.75"
12"	4"	3"	2.5"	2.5"
10"	3"	2"	2"	2.25"
8"	2'-6"	2"	2"	2.25"
6"	2"	2"	2"	2.25"

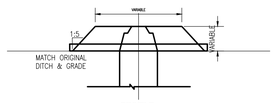
THRUST BLOCK DETAILS



HYDRANT AIR RELEASE AND BLOW-OFF CONNECTION

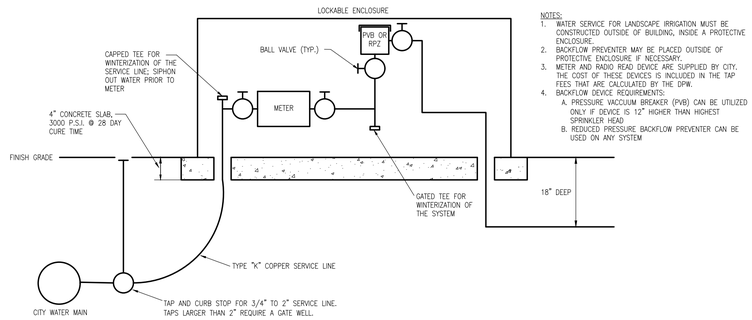


PLAN



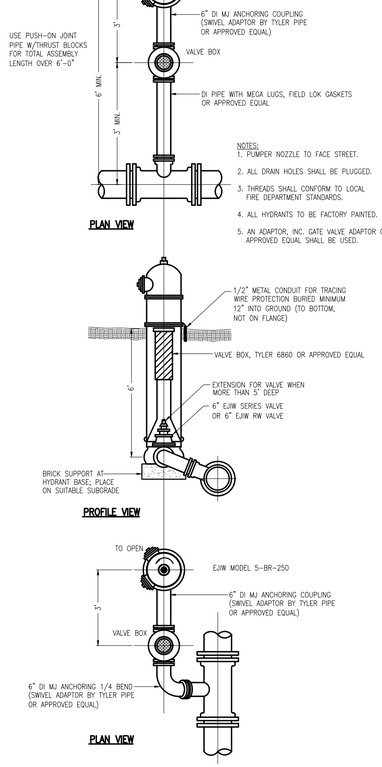
PROFILE

DITCH ENCLOSURE AT GATE WELL OR HYDRANT

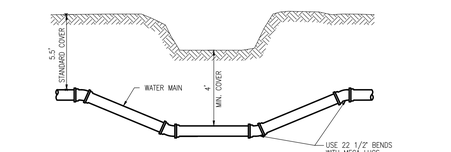


NOTES:
1. WATER SERVICE FOR LANDSCAPE IRRIGATION MUST BE CONSTRUCTED OUTSIDE OF BUILDING, INSIDE A PROTECTIVE ENCLOSURE.
2. BACKFLOW PREVENTER MAY BE PLACED OUTSIDE OF PROTECTIVE ENCLOSURE IF NECESSARY.
3. METER AND RADIO READ DEVICE ARE SUPPLIED BY CITY. THE COST OF THESE DEVICES IS INCLUDED IN THE TAP FEES THAT ARE CALCULATED BY THE DPW.
4. BACKFLOW DEVICE REQUIREMENTS:
   A. PRESSURE VACCUUM BREAKER (PVB) CAN BE UTILIZED ONLY IF DEVICE IS 12" HIGHER THAN HIGHEST SPRINKLER HEAD
   B. REDUCED PRESSURE BACKFLOW PREVENTER CAN BE USED ON ANY SYSTEM

SEPARATE OUTDOOR IRRIGATION METER (NON-RESIDENTIAL)



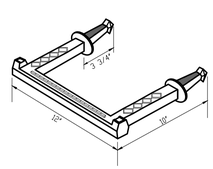
DETAIL OF HYDRANT SETTINGS



SEWER OR CULVERT CROSSING

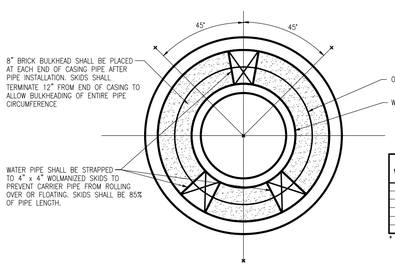
NOTE:
BENDS CAN BE ELIMINATED FOR MINOR VERTICAL DEFLECTIONS IN DUCTILE IRON PIPE (1° OR LESS). IN THIS CASE, THE PIPE MAY BE DEFLECTED UP TO 4° PER JOINT.

DITCH OR STREAM CROSSING



MANHOLE STEP

M.A. PSI-375



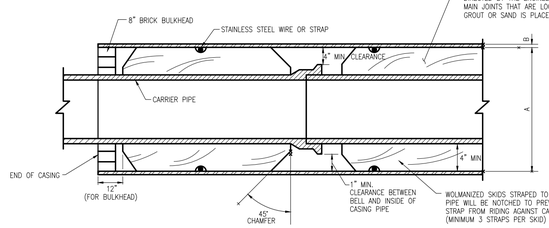
DIA. OF WATER MAIN	MIN. (I.D.) "A"	ROAD CROSSING MIN."B"	RAILROAD CROSSING* MIN."B"
6"	16"	.312	.312
8"	18"	.312	.375
12"	22"	.312	.438
16"	26"	.375	.500
20"	30"	.375	.500
24"	36"	.375	.500

A=INSIDE DIAMETER
B=WALL THICKNESS

* RR ROW PERMIT MAY REQUIRE A THICKER WALL SECTION.

PIPE BARREL SUPPORT FOR WATER MAIN CONSTRUCTED IN CASING PIPE

PLACE W/GALVANIZED SKID ALONG THE TOP OF THE CARRIER PIPE IN ORDER TO PREVENT THE CARRIER PIPE FROM ROLLING OVER OR FLOATING. IF THE CONTROLLING AGENCY PERMIT REQUIREMENTS INDICATE THAT SAND OR GROUT MUST BE PLACED BETWEEN THE CASING PIPE AND CARRIER PIPE, THEN THE SAND OR GROUT SHALL BE PLACED IN ACCORDANCE WITH THE PERMIT SPECIFICATIONS. UNLESS OTHERWISE DIRECTED BY THE ENGINEER, RESTRAINED JOINTS SHALL BE REQUIRED FOR WATER MAIN JOINTS THAT ARE LOCATED INSIDE THE CASING PIPE IN THE EVENT THAT NO GROUT OR SAND IS PLACED BETWEEN THE CASING PIPE AND CARRIER PIPE.



NOTE:
1. CASING SHALL BE SPIRAL WELDED STEEL PIPE A.S.T.M. A-252, GR. 2.
2. 4" MINIMUM CLEARANCE BETWEEN MAX. O.D. AT A JOINT OF THE PIPE AND THE I.D. OF THE CASING PIPE FOR THE TOP 90° OF THE CASING
3. THE CONTRACTOR SHALL SUBMIT IN WRITING THE DETAILS OF THE APPROPRIATE PIPE CASING INSTALLATION FOR THE REVIEW AND APPROVAL BY THE ENGINEER BEFORE INSTALLATION OF ANY CASING STARTS
4. IF THE CONTROLLING AGENCY PERMIT REQUIREMENTS INDICATE THAT SAND OR GROUT MUST BE PLACED BETWEEN THE CASING PIPE AND CARRIER PIPE, THEN THE SAND OR GROUT SHALL BE PLACED IN ACCORDANCE WITH THE PERMIT SPECIFICATIONS.

STANDARD CASING SECTION

WATER MAIN NOTES

WATER MAIN NOTES:
1. All water main shall be ductile iron. Concrete, HDPE or PVC water main may be permitted upon city approval. Water main shall be per the following specification.
   1.a. Ductile Iron pipe shall be ANSI 1-A21.51 (AWWA-C151) std. wall thickness, cement lined with bituminous seal coat Class 54 for sizes 3" through 16" and Class 55 for 20" through 24" pipe. All 6" pipe MUST be ductile iron.
   1.b. Pre-stressed Concrete Cylinder pipe (P.C.C.P.) shall be AWWA C-301 specification for sizes larger than 24".
   1.c. Polyvinyl Chloride (PVC) pipe shall meet the requirements of ANSI/AWWA C909-98 (including any appendices) as amended for the pressure class of 200 psi (SDR 14). PVC may only be used for 8" or 12" mains or 2" water services. All fittings for PVC shall be ductile iron, as specified in ANSI 1-A21.10 (AWWA-C110) as amended. PVC pipe shall only be used when approved by the City of Auburn Hills.
   1.d. High Density Polyethylene (HDPE) pipe shall meet the requirements of AWWA C906 (SDR 11) with blue shell or blue stripe.
2. Water services up to 2" shall be either Type K soft copper or PVC with tracing wire meeting the requirements of AWWA for a pressure class of 200 psi. If PVC is used, a tracing wire shall be run from the meter setup to the curb box (See General Notes, Item #9 for tracing wire requirements). All water services greater than 2" shall follow the standards listed in Water Main Note #1.
3. The maximum allowable deflection at joints for ductile iron water main shall be per manufacturers standards (i.e. 4" – 36" water main – 5° per 20').
4. Polywrap may be required by the city and shall be placed around the water main.
5. Mega lugs shall be placed at all valves, bends, tees, plugs, hydrants and mechanical fittings. Surrounding joints shall be restrained using field lok gaskets or approved equal and shall be per the manufacturer's joint restraining schedule.
6. All bolts on all flanged and mechanical joint fittings shall be domestic origin high strength, low alloy COR-BLUE steel bolts or approved equal. These bolts shall meet the current provisions of American National Standard ANSI/AWWA C111/A21.11-90 for rubber gasket joints for ductile iron pressure pipes and fittings. Bolt manufacturer's certificate of compliance must accompany each shipment.
7. Backfill shall be compacted above pipe as indicated on construction drawings. Trench backfill shall be a suitable material and shall be free of any organic materials and rocks larger than 3" in size. Under road surfaces, pavement, sidewalks, curbs, driveways and areas where trench is within a 1:1 influence of the pavement, sand backfill shall be used which shall consist of MDOT granular material Class II or III and shall be compacted in layers not to exceed 12" in thickness to a density of 95% as determined by AASHTO T99. Where water main is to be placed on fill material, all fill material below the pipe must also be compacted to 95% maximum unit density. All backfill placed with a 1:1 influence of structures shall be approved sand, placed in 1' layers and compacted. Trenches that are to be left open overnight shall be enclosed with suitable fencing and lighted barricades, unless otherwise approved by the City.
8. PVC Installation Specifications:
   8.a. Where pipe must be cut, machine beveling shall be provided as specified by the manufacturer, unless the cut end will be butted against a fitting with an approved bolt-type joint. The factory beveled end of the spigot must be removed when the spigot will be butted against a fitting.
   8.b. All PVC pipe deflections shall be made using mechanical fittings. PVC pipe shall not be placed or connected by "breaking" or "opening" joints (0° deflection). Physically bending the pipe is not allowed either. Each individual length of PVC pipe shall be placed in a straight line.
   8.c. PVC water main shall not be exposed to sunlight for more than one (1) week. The contractor shall provide an opaque covering to shield all parts of pipe. Such pipe that is not adequately protected will be rejected.
   8.d. PVC water main shall not be installed when temperatures are below zero (0) degrees Fahrenheit.
   8.e. Pipe shall be joined per the manufacturer's recommendation. Push-on type joints shall not be installed past the "home" mark on the pipe, or otherwise disrupt the required elastomeric gasket.
   8.f. PVC water main shall not be used in areas where any petroleum products are found or suspected to exist in the soils or surrounding area.
   8.g. Extreme care must be used when attaching fittings. Mechanical joints to PVC pipe must distribute the loading evenly to avoid damage and potential breaks or weak points in the pipe.
   8.h. Extreme care must be used when bringing PVC pipe into and out of structures. A uniform annular space must be created to eliminate any potential point loading on the pipe. Point loading and pipe movement at the structure joint can cause the pipe to split.
   8.i. Rubber "boots" or "sleeves" are required for pipes entering structures (similar to sanitary sewer "boots").
   8.j. Taps shall not be made on PVC water main that is bent, or otherwise in tension.
   8.k. A Ford or McDonald double-banded brass tapping saddle shall be provided for all taps to PVC water main.
   8.l. All taps shall be made with a sharp bit and high speed tap, as recommended by the manufacturer.

VALVE & SLEEVE NOTES:
1. Gate Valves shall be ductile iron body, fully bronze mounted, E.J.I.W. resilient wedge, non-rising stem, opening counterclockwise conforming to AWWA or C515, E.J. Flow Master or approved equal.
2. All gate valves 6" or larger shall be placed in a well; curb stops and boxes are required for water main 2" or smaller. A valve shall be placed in a well for all water main larger than 2" and smaller than 6" when a tapping sleeve will be utilized; otherwise, a valve may be placed in a box for water main larger than 2" and smaller than 6".
3. All gate valves with operating nuts at a distance greater than 5' below ground surface shall be provided with an extension stem. The length of the extension shall be such that it will be within 5' of ground surface when an extension stem is used. It shall be held in place by two extension stem guide assemblies. Each assembly shall be comprised of a "J" bracket and "L" bracket supplied by E.J.I.W. The stem guides shall be located opposite from each other, and shall be suitably fastened to the wall of the gate well. In addition, a "stop" shall be welded to the extension stem in a location that will prevent the extension stem from slipping off the operating nut. Details of extension stem and method of installation shall be approved by the engineer prior to installation.
4. All pre cast concrete gate well sections shall be manufactured to conform with ASTM C478, standard specifications for precast reinforced concrete manhole sections, except wall thickness shall be as shown on these details. All joints for precast concrete gate well sections shall be "modified grooved tongue" with gasket manufactured to conform with ASTM C443, standard specification for joints for circular concrete sewer and culvert pipe using rubber gaskets.
5. All gate well covers shall be E.J.I.W. #1040A with bolted frame and have the Auburn Hills Logo imprinted on it (see detail on sheet 1), or approved equal. All cover bolts shall be stainless steel.
6. Tapping sleeves shall be mechanical joint with E.J. SERIES Mechanical Joint Tapping Gate Valve. Lead joint sleeves shall not be used. Like size tapping sleeves can only be used when the existing main is ductile iron and must be a mechanical tapping sleeve.
7. All tongue and groove joints on wells shall be cement tuck-pointed inside and out.

HYDRANT NOTES:
1. All hydrants shall be E.J.I.W. #5BR-250-Traffic Model and shall conform to AWWA Spec. C-502 as amended, and shall have a minimum 5 1/4" valve opening that closes with the water pressure. Hydrants shall be traffic style with breakable flange and coupling.
2. Hydrants shall have a swivel flange to allow bonnet to be turned 360 degrees without removing the bonnet, and barrel flanges shall be integrally cast with the barrel. Inlet shoe shall have a bronze valve seat, which can be removed without digging.
3. Inlet connection shall be 6" mechanical joint, ASA-A21-11. Stem threads shall be sealed with double "O" rings and shall be permanently lubricated with all weather grease.
4. Hose connections: Two (2) 4 1/2" pumper nozzles, one (1) with Harrington Integral Hydrant Storz nozzle (part# 946081/EJW# 540360) and one (1) with City of Detroit Fire Department (DFD) threads. The Storz nozzle shall have a brass metal face seal and hard anodized aluminum Storz ramps and lugs. The aluminum's finish shall be hardcoat anodized to Mil-A-8625f, Type 3 dark gray. The adapter shall be made of forged or extruded 6061-T6 aluminum. The blind cap shall have hard anodized aluminum Storz ramps and lugs, made of forged or extruded 6061-T6 aluminum. The center cap shall be equipped with a suction seal. The cap shall be connected to the adapter or the hydrant with a 0.125" vinyl coated aircraft cable.
5. Operating Nut: (1) 1 1/2" P-F pentagon, open left. 5.5' cover or specified on plans. A suitable nozzle lock shall be in place to prevent inadvertent nozzle removal. Wedge locks and/or ductile iron retainer rings to secure nozzles shall not be allowed.
6. Hydrants shall be painted red above the ground and black below, with a finish coat of Glamortex 501 enamel, color 314 vermilion, or approved equal. Top flange shall be painted with JDL Industries (305) 599-2022, Bright White Reflective paint, color No.1460 or taped with 3M Scotchlite High Intensity Reflective Tape #3870. Nozzle cap shall be painted per Auburn Hills Fire Dept. requirements: White – 4" mains, Red – 6" mains (Paint #4431-01), Orange – 8" mains (Paint #4431-24), Green – 12" mains (Paint #4431-10), Blue – 16" or larger mains (Paint #4431-12). Paint can be obtain at Tractor Supply Company using the associated Paint Numbers. DO NOT paint Storz nozzle.

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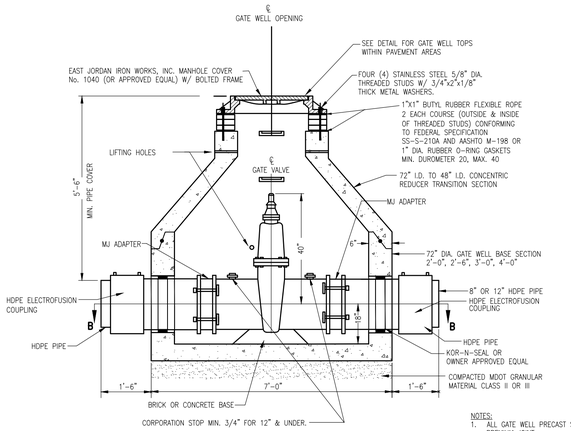
REVISIONS
REVISED (WATER MAIN NOTE #5: CASING PIPE MINIMUMS)
REVISED (HYDRANT NOTE #6) 04/30/09
REVISED STANDARDS UPDATE 6/2/2021

DATE	PROJ NUMBER	ENG	PROJ MGR	CADD	COUNTY	CITY/VILLAGE/TOWNSHIP	H:	SCALE	V:	HORIZ DATUM	VERT DATUM
DEC 2007		JLK	JLK		OAKLAND	AUBURN HILLS	NTS		NTS		

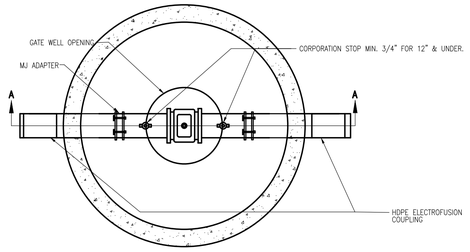
CITY OF AUBURN HILLS
WATER MAIN STANDARD DETAILS

SHEET 2 OF 3

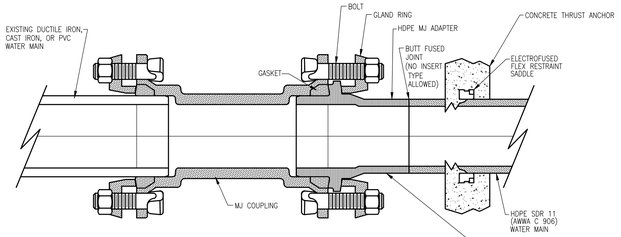


8" AND 12" GATE WELL FOR HDPE WATER MAIN
(A-A)

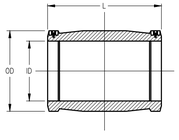
NOTES:
1. ALL GATE WELL PRECAST SECTIONS SHALL BE PREMIUM JOINT.
2. LIFT HOLES SHALL BE FILLED WITH CONCRETE.
3. FOR WATER MAIN LARGER THAN 16" DIAMETER, A 16" GATE VALVE SHALL BE USED. REDUCERS SHALL BE INSTALLED ON THE WATER MAIN OUTSIDE OF THE GATE WELL.
4. USE A 5' DIAMETER GATE WELL FOR 8" HDPE ASSEMBLY AND USE A 6' DIAMETER GATE WELL FOR A 12" HDPE ASSEMBLY.



8" AND 12" GATE WELL TYPICAL FOR HDPE WATER MAIN
(PLAN VIEW, B-B)

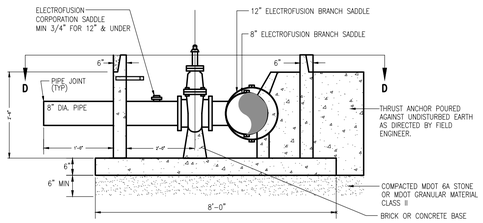


HDPE WATER MAIN JOINT RESTRAINT
(FOR CONNECTING HDPE PIPE TO DUCTILE IRON PIPE)

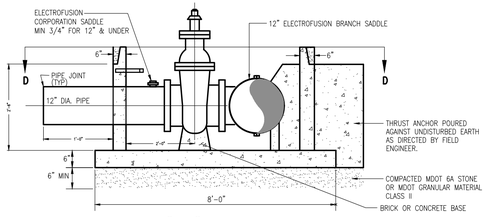


ELECTROFUSION DIPS COUPLINGS

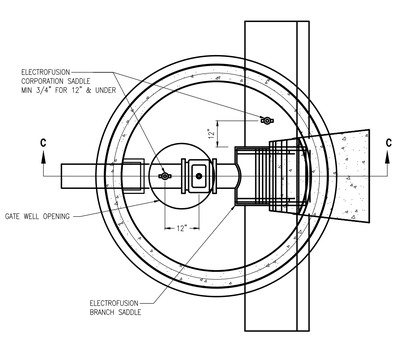
NOMINAL SIZE	INSIDE DIA (MAX) ID	INSIDE DIA (MIN) ID	OUTSIDE DIA (NOMINAL) OD	OVERALL LENGTH (NOMINAL) L
4"	4.84	4.810	6.06	6.93
6"	6.96	6.910	8.74	8.19
8"	9.13	9.060	11.14	9.53
10"	11.15	11.14	13.66	11.02
12"	13.29	13.25	16.22	13.07



12"x8", 8"x8" VALVE & WELL
(C-C)



12"x12" VALVE & WELL
(C-C)

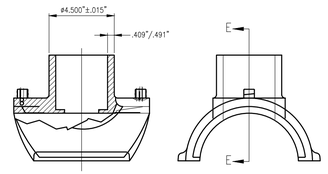


VALVE & WELL TYPICAL
(PLAN VIEW, D-D)

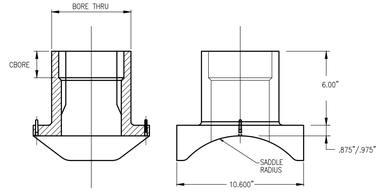
EQUIVALENT DUCTILE IRON PIPE SIZES (DIPS)		
		CLASS 150 SDR 11
NOMINAL PIPE SIZE (DIPS)	O.D. SIZE (INCHES)	MIN WALL THICKNESS (INCHES)
6"	6.90	0.627
8"	9.05	0.823
10"	11.10	1.009
12"	13.20	1.200
16"	17.40	1.582
20"	21.60	1.964
24"	25.60	2.345

MJ ADAPTER

DIAMETER DIPS	DR	OVERALL LENGTH	BOLT LENGTH REQUIRED	WEIGHT
6"	11	8.25"	4 1/2"	4.4
8"	11	8.25"	5"	7.3
10"	11	8.75"	5"	11.3
12"	11	8.75"	5"	15.8
16"	11	9.97"	6"	33.0
20"	11	10.22"	6"	51.0
24"	11	10.22"	6 1/2"	71.7

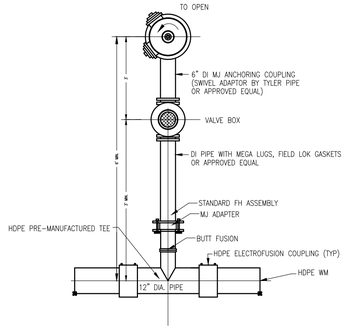


SECTION E-E

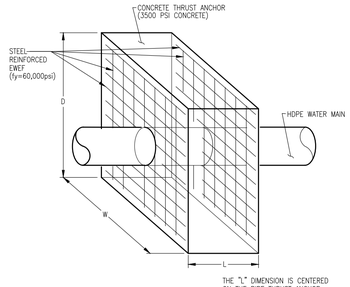


8" SDR 11 OUTLETS

ELECTROFUSION BRANCH SADDLE DETAILS



FIRE HYDRANT ASSEMBLY
WITH HDPE PRE-MANUFACTURED TEE



THE "L" DIMENSION IS CENTERED ON THE PIPE THRUST ANCHOR THAT WRAPS AROUND THE PIPE.

CONCRETE THRUST ANCHOR FOR HDPE PIPE

PIPE SIZE	THRUST BLOCK SIZE (W x D x L)	REINFORCEMENT
6"	2' x 2' x 12"	#5 @ 12" EWEF *
8"	2.5' x 2.5' x 12"	#5 @ 12" EWEF
12"	4' x 4' x 20"	#6 @ 12" EWEF
16"	5' x 5' x 26"	#6 @ 9" EWEF
20"	6.5' x 6.5' x 32"	#7 @ 12" EWEF
24"	8' x 8' x 36"	#8 @ 12" EWEF

* EWEF = EACH WAY, EACH FACE

NOTE:
VARIATIONS TO THE W AND D DIMENSIONS CAN BE MADE ON A CASE BY CASE BASIS DEPENDING ON THE DEPTH REQUIREMENTS FOR WATER MAIN FOR THAT PARTICULAR PROJECT. IF CHANGES ARE MADE TO THE SIZE, THE DESIGN ENGINEER WILL BE REQUIRED TO SUBMIT CALCULATIONS SUPPORTING THE REVISED SIZE, INCLUDING ANY CHANGES TO THE REINFORCING STEEL.

HIGH-DENSITY POLYETHYLENE (HDPE) WATER MAIN NOTES

1. HDPE pipe shall be manufactured from high density PE 3408 polyethylene resin and shall have a standard dimension ratio (SDR) of 11 or less and a minimum working pressure rating pipe of 160 psi. The SDR is the outside diameter of the pipe divided by the minimum wall thickness.
2. HDPE pipe, appurtenances, and installation methods shall conform to the most current edition of AWWA standard C906.
3. All HDPE materials must be listed and approved for use under ANSI/NSF Standard 14.
4. All pipes shall be made of virgin material as defined in ASTM D3350 with an established hydrostatic design basis of 160 psi. for water at 73.4°F. No rework except that obtained from the manufacturer's own production of the same formulation shall be used. The pipe shall be homogeneous throughout and shall be free of visible cracks, holes, foreign materials, blisters, or other deleterious faults.
5. A certificate of "Compliance with Specification" shall be furnished for all materials supplied.
6. The physical appearance of the pipe having deformities such as concentrated ridges, discoloration, excessive spot roughness, pitting, varying wall thickness, etc., shall constitute sufficient basis for rejection. Pipe with gashes, nicks, abrasions or any physical damage that occurred during storage and/or handling which are wider or deeper than 10% of the wall thickness, shall not be used and must be removed from the construction site. Any pipe that has been damaged or does not meet the City's approval shall be replaced at the Contractor's expense.
7. Mechanical fittings used with HDPE pipe shall be specifically designed for, or tested and found to be acceptable for use with HDPE by the fitting manufacturer. Mechanical fittings designed for other materials shall not be used.
8. Tracing wire shall be provided per the City's specifications and details for all water mains. Wire shall be copper, 12 gage stranded, blue insulated per City's requirements and shall be brought through each gate well and connected to the top step. In addition, an approved continuous tracing tape shall be placed one foot above the HDPE pipe. Underground marking tape shall be Magnatech, 3" wide, foil-backed tape, #31-022 by Empire Level Manufacturing Corp., or approved equal.
9. Pipe and fittings must be marked as prescribed by AWWA C906 and NSF. Pipe markings will include nominal size, OD base, dimension ratio, pressure class, working pressure rating, AWWA C906, manufacturer's name, manufacturer's production code including day, month, year extruded, and manufacturer's plant and extrusion line; and optional NSF logo. Permanent identification of piping service shall be provided by co-extruding longitudinal blue stripes into the outside of the pipe (stripes printed on the outside surface of the pipe shall not be acceptable) or the pipe material shall be black with a blue shell.
10. Personnel trained in the use of butt-fusion equipment shall perform the joining of polyethylene pipe by methods recommended for new pipe connections. Personnel directly involved with installing the new pipe shall receive training in the proper methods for handling and installing the HDPE pipe by a qualified representative.
11. The mechanical joint end must meet outside diameter requirements for connection to ANSI/AWWA C111/A21 and ANSI/AWWA C153/A21.53 mechanical joints. The adapter through-bore inside diameter is equal to SDR11 DIPS HDPE pipe. Butt-fusion ends must meet AWWA C906 DIPS requirements for butt fusion to SDR11.
12. Bolts, nuts, gaskets, and glands meeting ANSI/AWWA C111/A21.11 and ANSI/AWWA C153/A21.53 are recommended. Install mechanical joint components in accordance with manufacturer's recommendations.
13. Connections to HDPE pipe shall not be made immediately after the pipe has been installed. The fused pipe should be laid in the trench and be allowed to reach an equilibrium temperature overnight (24-hour period) in its surrounding environment.
14. The HDPE pipe must be properly aligned at all transitions to conventional or HDPE water main and appurtenances.
15. Under no circumstances shall HDPE pipe be pressure tested when the temperature of the pipe is above 80°F.
16. The polyethylene pipe shall be pressure tested after the line and all fittings and valves have been installed. Connections may be left exposed for visual leak inspection.
17. The newly installed polyethylene water main will be disinfected and samples checked for complete disinfection by the City of Auburn Hills DPW. The number of samples and sampling points will be determined by the city.
18. Water service saddles on HDPE water main shall be "VA" Eletrofusion Service Saddles by Friatec, Inc. or approved equal.

ADDITIONAL NOTES FOR WATER MAIN PIPE BURSTING PROJECTS

19. The method approved for rehabilitation of existing water mains by pipe bursting and installation of new HDPE pipe is T.T. Technologies GRUNDOCRACK SYSTEMS, 800-533-2078) or approved equal. All contractors must be licensed to use the particular technology proposed for this work.
20. The pipe-bursting tool shall be designed and manufactured to force its way through existing pipe materials by fragmenting the pipe and compressing the old pipe sections into the surrounding soil as it progresses. The bursting unit shall be pneumatic and shall generate enough force to burst and compact the existing pipeline.
21. The Manufacturer's specifications shall dictate what size tool should be used in what diameter pipe, as well as parameters of what size tool for percentage of upsize allowed.
22. Prior to construction, the Contractor shall develop a temporary water system to supply water services to area residents and businesses during pipe bursting operations. It is anticipated that the temporary system will be fed from existing fire hydrants. The temporary system and hydrants shall have passed bacteriological testing by the City of Auburn Hills DPW.
23. All service connections on the existing water main that is to be burst or will be taken out of service, shall be connected to the temporary water system prior to mainline bursting, disinfection, testing and service reconnection operations. Temporary service connections shall be made at the water service stop box by disconnecting the existing water service and connecting the temporary water line to the stop box.

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REVISIONS
REVISED STANDARDS UPDATE 6/2/2021

DATE: DEC 2017 | PROJ NUMBER | ENG: JLK | PROJ MGR: JLK | CADD | COUNTY: OAKLAND | CITY/VILLAGE/TOWNSHIP: AUBURN HILLS | H: NTS | SCALE | V: NTS | HORIZ DATUM | VERT DATUM

CITY OF AUBURN HILLS
WATER MAIN STANDARD DETAILS

SHEET 3 OF 3