

**Appendix A:  
CITY OF ANN ARBOR MATERIAL REQUIREMENTS**

- This reference sheet provides a list of some commonly used materials. This is not a comprehensive list of all material types that may be used for Public Improvements and other improvements in the public right-of-way. Each type of material listed includes requirements that must be followed such as applicable standards, manufacturer or model, and other details. Materials provided on the list are deemed acceptable; materials not listed are subject to approval by the PSAA. Additional materials information is provided within the Articles of the City of Ann Arbor Standard Specifications.

- The City of Ann Arbor recognizes its responsibility to minimize negative impacts on human health and the environment while supporting a vibrant community and economy. The City further recognizes that the products and services the City buys have inherent environmental and economic impacts and that the City should make procurement decisions that embody, promote, and encourage the City's commitment to the environment. The City encourages potential vendors to bring forward emerging and progressive products and services that align with the City's environmental principles as well as these Standards.

Material Type	Applicable Standards	Allowable Materials (Manufacturer/Model) and Additional Requirements
<b>AGGREGATES/BACKFILL MATERIAL</b>		
2NS	MDOT 2NS	Required Bedding & Backfill for Road Underdrain/Edgedrain
6A Crushed Limestone	MDOT 6A	Required Bedding & Initial Backfill for PVC Sewer Pipe
21AA	MDOT 21AA	
City of Ann Arbor Class II Sand	MDOT Class II	
Aggregates		Each gradation for drainage system (3 different material certifications)
<b>DRIVES, SIDEWALKS AND BIKE FACILITIES</b>		
Detectable Warning	See Article 10, Section III.H.3.f)	ADA Solutions Cast in Place Paver - Composite Armor-Tile Cast in Place Composite
Bike Lane Separator and Delineators		Qwick Kurb Slender Bender Qwick Kurb Lane Separator City Post Surface Mount Delineator (28 in. height; black post with white sheeting where white edgeline would be used; or yellow post with yellow sheeting in areas where yellow edgeline would be used)
<b>SANITARY</b> <i>Also see 'Utilities- General' for materials that apply to multiple utility areas</i>		
Chimney Seal Wrap		WrapidSeal™ Manhole Encapsulation System
Concrete Pipe	Reinforced ASTM Designation C-76 Class IV or Class V depending on depth	Allowed for 18" diameter or greater pipe, subject to approval of PSAA
Ductile Iron Sewer Pipe	Pressure Class (PC) 350 for 12-inch and smaller, PC 250 for 14-20-inch, and PC 200 for 24-inch conforming to ASTM A746	American Pipe with Protecto 401 Lining US Pipe with Protecto 401 Lining McWane with Protecto 401 Lining
Ductile Iron Sewer Pipe Joints	ANSI/AWWA C111/A21.11	
Polyvinyl Chloride (PVC) Pipe	ASTM Designation D3034, minimum SDR 26 (4-15 inch diameter), or ASTM Designation F679, PS115 (18-48 inch diameter)	Integral wall bell and spigot required
Precast Concrete Sanitary Manholes	ASTM C478 with precast rubber boot connections for openings conforming to ASTM C923 and joints conforming to ASTM C443	
PVC Joints	Elastomeric gasketed push-on joints conforming to ASTM D3212	
Vitrified Clay Pipe	ASTM C700, Extra Strength	Pipe to be the bell and spigot type and glazed
Vitrified Clay Pipe Joints	Premium compression joints conforming to ASTM C-425	
<b>STORMWATER</b> <i>Also see 'Utilities- General' for materials that apply to multiple utility areas</i>		
Concrete Masonry Units/Block for Structures	ASTM C139	
Concrete Pipe	Reinforced ASTM Designation C-76 Class IV or CI V depending on depth Reinforced Elliptical - ASTM Designation C-507	Allowed for 18" diameter or greater pipe
Corrugated Exterior, Smooth Interior, Polyethylene Pipe (PE)	AASHTO M294 or ASTM F2306	ADS N-12
Corrugated Metal Pipe	AASHTO M36, Type I or Type II	For single family residential driveways only, with PSAA approval
Corrugated Metal Pipe Joints	Coupling bands conforming to AASHTO M36	
Curb Drain	AWWA C906 and ASTM D3350	HDPE, DR17 with green stripe
Edgedrain/Underdrain	Except PVC plastic, shall conform with ASTM D3033; Geotextile wrapping	ADS 6-inch underdrain - 06430100MI Pipe: AASHTO M252 Filter Sock: ASTM D6707

Material Type	Applicable Standards	Allowable Materials (Manufacturer/Model) and Additional Requirements
HDPE Pipe	AASHTO M-294 or ASTM F-892	Hancor Titeline ADS N-12
HDPE Pipe Joints (Gaskets)	ASTM D-3212	
PE Pipe Joints	Water-tight joints meeting ASTM D3212; Gaskets meeting ASTM F477	
Precast Concrete Storm Manholes	ASTM C478 with precast rubber boot connections for openings conforming to ASTM C923 and joints conforming to ASTM C443	
<b>STREETLIGHTS</b>		
All Streetlight Materials and Equipment	Shall fully comply with the latest IEEE, NEMA and ANSI Standards, for that class of equipment	
Cables (direct bury)		Copper, #6 AWG or larger
Cables (underground)		600V, XLPE, U.L. listed USE.
Cable Connectors	UL 486A (Wire Connections and Soldering Lugs for Use with Copper Connectors) and UL 486B (Standard for Safety Wire Connectors for Use with Aluminum Conductors)	Connector Cable Tap Alum #8-1/0 for aluminum terminal blocks Cover Plastisol F/Utilco SLC4-0 for covers Connectors at lighting standards shall be multiple aluminum with four positions for #2 AWG copper and a fifth position for #12 AWG or larger fixture wire
Conduit for Service Pole Risers (first 10 feet above ground)	Article 346 of National Electric Code (NEC)	Rigid galvanized steel Hot-dip galvanized inside and out; zinc coating throughout Threaded connections
Conduit for Service Pole Risers (more than 10 feet above ground)	Article 347 of NEC	Schedule 80 PVC or HDPE SDR11
Disconnect Cabinets (non-DDA areas)		Trinetics MY-RO Spec 6442 per details on Plan
Fuse Holder Kit		BUSS HEB-AA for fuse holder and boots kit BUSFNM-5 for 5A fuse
Handholes in concrete or soil		Type-Below Ground Enclosure Material-Polymer Concrete Wall Type-Straight Load Rating-Tier 22 for handhole and lid/cover Open Bottom Size shall be 17" x 30" x 18" Including 8-foot ground rod, 5/8 inch diameter
Luminaires	IES RP-8	Match adjacent lighting, subject to approval by PSAA Color temperature shall be no greater than 3000K Must be LED  Streetlight Luminaire - Detroit Series Small Area Light - Lumecon LDS-SAL-60-GR-T2-1-30-TM-7P-2FT - 60W, 8,400 lumens, Gray, Type II Distribution, 120/277v, 3,000K, Tenon Mount, 7-Pin Receptacle, 40kV Extreme Rated Surge Suppressor ** 2ft wire coming out of fixture  Decorative Post Top Streetlight - Globe Style - 35 West Globe Luminaires - Lumecon L35W-1-1-OW-B-D-7P - 54W, Type V Distribution, 3000K, 120-277v, Acrylic Prismatic Globe with Black Cast Aluminum Cage, Diffused Cutoff Litelid, 7-Pin Photocell Receptacle, 40kV Extreme Rated Surge Suppressor **Used in DDA, also see Downtown Street Design Manual (Appendix D)  Decorative Post Top Streetlight - Acorn Style - Lumecon - LROF-3-1-OW-A-CL-8-X-2-S-B-X-X-L - Ring of Fire - Type 3, 58W, 4574 Lumens 3000K, Spike Finial 8" Fitter for 4" OD Pole, Part number 27-00145, Perforated Lit-Lid, 20KA Surge
Poles (DDA District)		Decorative 11'2" Center City District Steel Post - Spring City Electrical - Hancock with Steel Shaft Assembly - 3 1/2" SCC 40 Steel Pipe (4" O.D.) Tenon 4" Dia x 5" High, Decorative Cast Ductile Iron 2-Piece Wrap Around Base Included. Finish: HD Galvanized then Powder Coat Gloss Black - (TMP-12BC4)

Material Type	Applicable Standards	Allowable Materials (Manufacturer/Model) and Additional Requirements
Poles (non-DDA areas)		<p>30' Straight Composite Round Pole with 6' arm - Shakespeare/Valmont - AS30-10S1DB01/OPAR6-BK-H - 30' Smooth Finish, Anchor Base w/Handhole 4"x12", Drilled for 6' Aluminum Mast Arm and Base Cover, Black Powder Coated 1pc Black Base Cover, 1" Diameter Anchor Bolts</p> <p>15' Straight Aluminum Round Pole - Hapco - H-A3S15-SRO-T304-BA, Straight Aluminum Round Pole with Alren 13 Base, 15' Height x 4" diameter, Black Powder Coat Finish, 2 7/8 Tenon</p> <p>25' Steel Streetlight Pole with Luminaire (Stadium) - Spring City Electrical - LP-29769 - Columbia 80w LED Luminaire, Columbia Arm, Type III, 300k Type III, 300k with Columbia Crossarm, Base and Shaft  - ALMCLU-LED080/EVX/X2-30-CR3-GR14-LACLB-FED-CU Luminaire  - AARCLA-1s-51-53-TN2.38/7.00-CU Cross Arm Bracket  - DWBNRT-20-CU Ductile Iron Base  - SSH6-G11-7.50/20.50-TN3.50/8.00-GV/CU Pole Shaft</p>
<b>UTILITIES - GENERAL</b> <i>These materials are common amongst multiple utility areas.</i>		
Cast Iron Manhole Frames and Covers	ASTM A 48, Class No. 35B per Casting Schedule (SD-GU-1 through -4)	
Concrete Brick for Adjustments and Structures	ASTM C-55, Grade N-1	
Concrete Pipe Joints	Elastomeric gasketed push-on joint conforming to ASTM C443	For concrete pipe over 36" diameter, inside joints to be cement mortar pointed to their full depth and outside joints to be provided with a cement mortar collar.
Couplings Dissimilar Material	ASTM C1173 (Standard Specification for flexible transition couplings for underground piping systems), latest edition.	
Manhole Adjustment Rings	ASTM C-478 for concrete ASTM D4976 for HDPE	
Manhole Steps	ASTM D-4101	MA Industries PS1-PF
Precast Manholes	ASTM C-478	
Spacers		HDPE
Steel Casing Pipe	Midway Structural Pipe and Supply ASTM A-139, Grade B, 35,000 PSI Minimum Yield Strength	Diameter of Pipe --> Wall thickness (minimum) Under 14" --> 0.250" 14", 16", 18" --> 0.312" 18" --> 0.375" 20", 22" --> 0.375" 24", 26", 28", 30" --> 0.500" 32", 34" --> 0.563" 36", 38", 40", 42" 48" --> 0.625" Non-spiral, minimum yield strength 35,000psi, leakproof joints, continuous welds; ASTMA53; Type E or S; Grade B
<b>WATER</b> <i>Also see 'Utilities- General' for materials that apply to multiple utility areas</i>		
All Water Materials	NSF/ANSI Standard 61	
Boxes - Valve		EJ 8560 Series Tyler Union 6860, 32U (Heavy Duty) Size D, screw type 3-piece, 5 1/4 inch shaft and a #6 base for a valve 8" or less and #8 base for 10" and 12" valves
Boxes - Curb		Tyler Union 6500 Bibby Ste. Croix B-2000 Buffalo type, Size 95E, screw type, 2-piece, 2 1/2 inch shaft, extendable from 4 1/2 feet to 6 1/2 feet
Butterfly Valves	AWWA C504, require special approval	Henry Pratt AWWA "Groundhog" Mueller "Lineseal III" DeZURIK AWWA Butterfly Valve, BAW, MJ, CI, NBRN-NRB, 150B, CI, Nut Where approved shall have an operator for buried service with 2 inch square opening nut, operating right, push-on by push-on only with restrained gaskets.

Material Type	Applicable Standards	Allowable Materials (Manufacturer/Model) and Additional Requirements
<b>Ductile Iron Pipe (DIP)</b>	ANSI/AWWA C151/A21.51 with cement mortar lining with: 1) seal coat per ANSI/AWWA C104/A21.4 and 2) outside coating per ANSI/AWWA C151/A21.51 and 3) polyethylene wrap meeting the requirements of ANSI/AWWA C105/A21.5 and 4) non-restrained push-on rubber gasket joints per ANSI/AWWA C111/A21.11 (unless otherwise req.) The pipe markings should indicate class of pipe and that is double cement lined.	Pressure Class (PC) 350 for 12-inch and smaller, PC 250 for 14-20-inch, and PC 200 for 24-inch. Exception: Ductile iron pipe crossing under a railroad, river, or interstate highway shall be Special Thickness Class 56.
<b>DIP Fittings (General)</b>	ANSI/AWWA C110/A21.10 or C153/A21.53 with: 1) cement mortar lining with seal coat per ANSI/AWWA C104/A21.4 and 2) outside coating per ANSI/AWWA C151/A21.51 and 3) polyethylene wrap meeting the requirements of ANSI/AWWA C105/A21.5 and 4) restrained push-on rubber gasket joints per ANSI/AWWA C111/A21.11 (unless otherwise required)	
<b>Fire Hydrants</b>	ANSI/AWWA C502	EJIW WaterMaster 5BR250 - product number 55931D American Flow Control Waterous 5-1/4" Pacer, WB67-250, DDP nozzle arrangement  One 3 3/8 inch threaded Ann Arbor standard pumper connection with 7 1/2 threads per inch and 4.05-inch outside diameter and one 5-inch Storz pumper connection, breakable traffic flange, and mechanical joint assembly with high strength, low alloy steel, ceramic-filled fluorocarbon resin coated bolts are required.  1 3/8 inch pentagon operating nut and cap nuts shall be utilized (1 3/8 inch point-to-flat at top and 1 1/16 inch point-to-flat at base) and shall open left
<b>Fire Hydrant Extensions</b>		Fire hydrant extensions shall be as furnished by manufacturer
<b>Joints for Directionally Drilled Installations</b>		US Pipe - HDSS McWane - TR Flex American Pipe - Flex Ring
<b>Mechanical Joints for Hydrants &amp; Solid Sleeves</b>		EBAA Mega Lug Series 1100 Joint Restraint System Ford Meter Box Company, Uni-Flange Retainer (UFR1400-D-x style) Bolts to be high strength, low alloy steel, ceramic-filled fluorocarbon resin coated
<b>Polyethylene Pipe Fittings</b>	AWWA C906 and approved for use with potable water under ANSI/NSF Standard 14	Restraining collars, reducers and ductile iron to PE transition adaptor shall be DIOD sized
<b>Polyethylene Pressure Pipe</b>	AWWA C906 and approved for use with potable water under ANSI/NSF Standard 14	SDR 11; PE-4710 All pipe shall have be DIOD (Ductile Iron Outside diameter) sized
<b>Polyethylene Wrap for DIP</b>	ANSI/AWWA C105/A21.5, Polyethylene Encasement for Ductile Iron Pipe Systems	V-Bio® Enhanced Polyethylene Encasement for Ductile Iron Pipe
<b>Push-On Restrained Rubber Gasket Joint Systems</b>		American Pipe "Fast Grip" Gasket System US Pipe "Field Lok 350" Gasket System McWane "Sure Stop" Gasket System
<b>Resilient Wedge Gate Valves</b>	AWWA C509 or C515	American Flow Control Series 2500 Single Resilient Wedge w/ push-on ends Clow Model 2638 (4" through 16") Resilient Wedge Valve, F-6112 EJIW FlowMaster Resilient Wedge Valve, Tyton x Tyton Mueller Series (4"-12") A-2361-61 Resilient Wedge Valve SL. x SL for Field Lok Gaskets. US Pipe A-USP1-61 Resilient Wedge Valve SLxSL for Field Lok Gaskets Operator for buried service with 2-inch square opening nut, operating right, push-on by push-on only with restrained gaskets
<b>Solid Sleeves</b>		Shall be long sleeves
<b>Solid Sleeves for Oversized Existing Main</b>		Tyler Dual Sleeve 5-146L Smith-Blair 441 Coupling Sleeves

Material Type	Applicable Standards	Allowable Materials (Manufacturer/Model) and Additional Requirements
<b>Tapping Sleeves</b>	ANSI/AWWA C223 for stainless steel ANSI/AWWA C111/A21.11 high-strength low-alloy steel	Ford FTSS Smith Blair 665 Mueller H-615 Kennedy 920ss Bolts to be Grade 304 stainless steel or high strength, low alloy steel, ceramic-filled fluorocarbon resin coated
<b>Tracer Wire</b>		For open trench: #12 AWG Solid Copper Clad Steel, High Strength with minimum 450 lb. break load, with minimum 30 mil HDPE insulation thickness  For directional drilling: #12 AWG Solid Copper Clad Steel, Extra High Strength with minimum 1,150 lb. break load, with minimum 30 mil HDPE insulation thickness