LEGISLATIVE COVER MEMO

Introduction:	April 21, 2025
Public Hearing:	May 5, 2025
Effective Date:	June 4, 2025
Agenda Item:	**Ordinance 2025-10** ADOPTING THE STANDARD CONSTRUCTION DRAWINGS AND SPECIFICATIONS FOR ROADWAYS, STORM DRAINAGE, SANITARY SEWER AND PIPE
Submitted by:	Jonathan Westendorf, City Manager
Scope/Description:	The City has worked with Verdantas and McBride Dale Clarion to update the Standard Construction Drawings and Specifications. The last update was done in 2004. This document provides specifications for roadways, storm drainage, water distribution, sanitary sewer, and pipe specifications for new construction and development. The Public Works and Utilities Committee reviewed the standards at their April 17, 2025 meeting and voted to recommend the updates to Council.
Vote Required for Passage:	Per Section 4.03(b) of the City's Charter, the passage of this Ordinance requires the affirmative vote of a majority of members of Council present.
Exhibits:	Exhibit A: Standard Construction Drawings and Specifications
Budgetary Impact:	None.
Recommendation:	Approval

CITY OF FRANKLIN, OHIO
ORDINANCE 2025-10

ADOPTING THE STANDARD CONSTRUCTION DRAWINGS AND SPECIFICATIONS FOR ROADWAYS, STORM DRAINAGE, SANITARY SEWER AND PIPE

Whereas, certain Ordinances require that construction plans be approved by the City "as set forth" by the Service Director or City Engineer; and

Whereas, the Service Director and City Engineer, in conjunction with other appropriate City staff and consultants recommend certain revisions be made to the City's standard construction drawings and specifications for roadways, storm drainage, sanitary sewer and pipe.

THE CITY OF FRANKLIN HEREBY ORDAINS, a majority of the members of the Council present concurring, that:

Section 1. That the Standard Construction Drawings and Specifications, City of Franklin, Ohio, dated April 2025, as set forth in the attached Exhibit A, are hereby adopted. These Standards and Specifications shall fully replace any Standards and Specifications previously adopted by reference and any Ordinance, parts of Ordinances, Resolutions, rules or regulations inconsistent herewith.

Section 2. It is found that all formal actions of this Council concerning and relating to the adoption of this Ordinance were adopted in an open meeting of this Council, and that all deliberations of this Council that resulted in this formal action were in meetings open to the public in compliance with all legal requirements, including Section 121.22 of the Ohio Revised Code, and the Rules of Council.

Section 3. This Ordinance shall go into effect June 4, 2025.

INTRODUCED: April 21, 2025

ADOPTED: May 5, 2025

ATTEST: _____ APPROVED: _____
Khristi Dunn, Clerk of Council Brent Centers, Mayor

CERTIFICATE

I, the undersigned Clerk of Council for the Franklin City Council, do hereby certify that the foregoing is a true and correct copy of Ordinance 2025-10 passed by that body on May 5, 2025

_____
Khristi Dunn, Clerk of Council

APPROVED AS TO FORM:

_____
Ben Yoder, Law Director

STANDARD CONSTRUCTION DRAWINGS

AND

SPECIFICATIONS

CITY OF FRANKLIN, OHIO

ADOPTED BY COUNCIL: ORDINANCE
DATE

REVISED 3/29/2025

STANDARD DRAWING INDEX

DIVISION 100 - ROADWAYS

DIVISION 200 - STORM DRAINAGE

DIVISION 300 - WATER DISTRIBUTION

DIVISION 400 - SANITARY SEWER

DIVISION 1000 - PIPE SPECIFICATIONS

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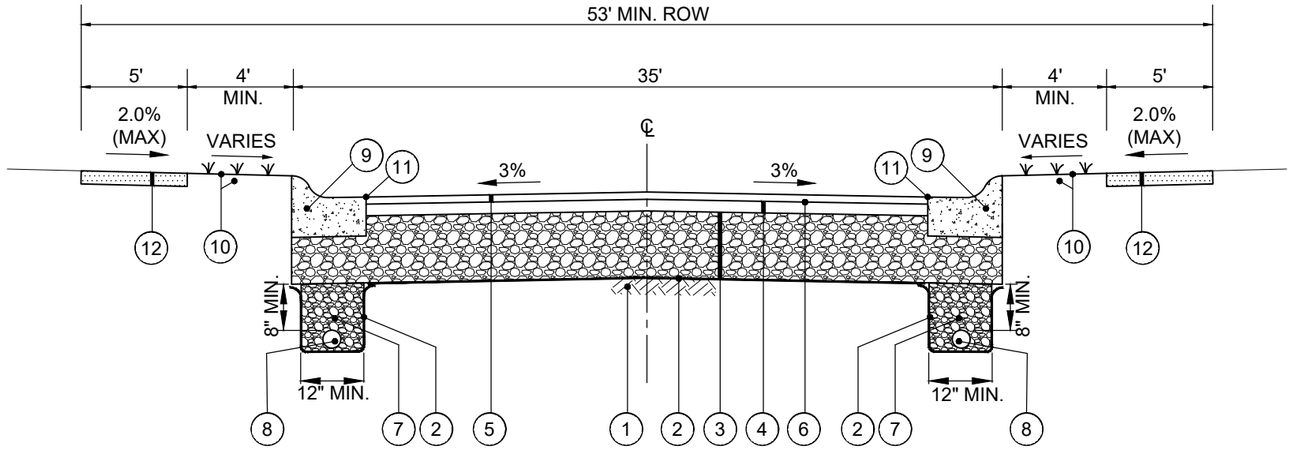
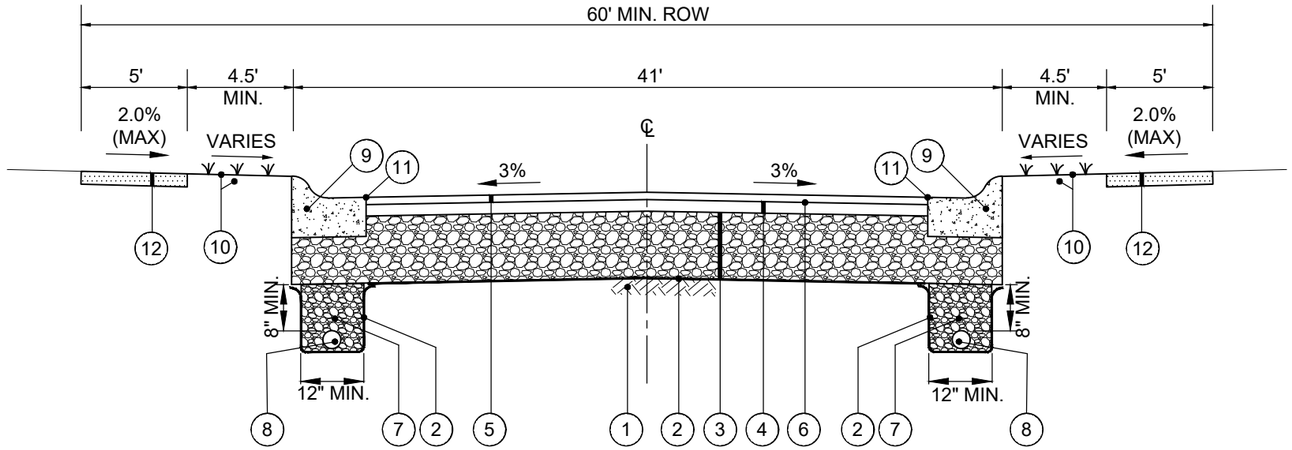
REVISED 3/29/2025



MINOR STREET ASPHALT PAVEMENT SECTION

N.T.S.



COLLECTOR STREET ASPHALT PAVEMENT SECTION

N.T.S.

1. ITEM 204 - SUBGRADE COMPACTION (INCIDENTAL TO ITEM 608)
2. ITEM SPL - WOVEN GEOTEXTILE, MIRAFI 600X OR EQUIVALENT, ALL OVERLAPS TO BE 18"
3. ITEM 304 - CRUSHED AGGREGATE BASE (10" MIN), ADJUST FOR DESIGN
4. ITEM 441 - ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE 2 (448) (2")
5. ITEM 441 - ASPHALT CONCRETE SURFACE COURSE, TYPE 1 (446 & 448), PG64-22 (1.5")
6. ITEM 407 - ASPHALT TACK COAT (INCIDENTAL TO ITEM 441)
7. ITEM 203 - GRANULAR MATERIAL (INCIDENTAL TO ITEM 605)
8. ITEM 605 - 6" RIGID PVC PERFORATED PIPE UNDERDRAIN
9. ITEM 609 - COMBINATION CURB AND GUTTER, ODOT TYPE 3 (OR MATCH EXISTING CURB)
10. ITEM 659 - 6" TOPSOIL PLACED, SEEDING (80% FESCUE, 20% RYE) AND MULCHING, NO TREES, UNLESS WIDTH BETWEEN BACK OF CURB AND SIDEWALK IS GREATER THAN XX'; SEE STREET TREE DETAILS
11. ITEM SPL - 3" WIDE HOT JOINT SEALER WHERE ASPHALT MEETS CURB PER ODOT MATERIAL SPEC 705.04
12. ITEM 608 - 5" CONCRETE WALK, AS PER PLAN (7" AT DRIVES AND RAMPS FOR RESIDENTIAL, 9" AT COMMERCIAL APRONS)
13. ITEM 301 - ASPHALT CONCRETE BASE, PG64-22 (6"), ADJUST FOR DESIGN
14. ITEM 609 - COMBINATION CURB AND GUTTER, ODOT TYPE 2 (OR MATCH EXISTING CURB)

GENERAL NOTES:

1. MINIMUM STREET GRADE SHALL BE 1.0%.

2. REFER TO THE LATEST VERSION OF THE CITY OF FRANKLIN UNIFIED DEVELOPMENT ORDINANCE, SECTION 1111.01 - SUBDIVISION REGULATIONS, FOR STREET RIGHT-OF-WAY WIDTHS, BACK OF CURB TO BACK OF CURB WIDTHS, AND OTHER DESIGN CRITERIA.

3. PAVEMENT REMOVAL SHALL BE SAW CUT IN NEAT, STRAIGHT LINES. EXCAVATE AS SMALL AN AREA AS NEEDED. IF THE PAVEMENT IS DAMAGED BEYOND ORIGINAL SAW CUT LINES, CONTRACTOR MUST CUT BACK A SQUARED OFF SECTION FAR ENOUGH TO CLEAN UP THE DAMAGED AREA.

4. JOINT OR CRACK SEAL IS REQUIRED ON EACH STREET REPAIR AND PAVEMENT CUT MADE.

5. APPLICANT TO RESTORE TRENCH IN THE ROADWAY PER TRENCH RESTORATION DETAIL.

6. ALL WORKMANSHIP AND MATERIALS USED IN THE CITY RIGHT-OF-WAY BY THE PERMIT HOLDER, AND/OR ITS SUBCONTRACTORS, SHALL BE APPROVED BY THE CITY INSPECTOR AND SHALL BE WARRANTED FOR A PERIOD OF ONE (1) YEAR FROM THE DATE OF COMPLETION FOR FAILURE DUE TO WORKMANSHIP OR QUALITY OF MATERIALS.

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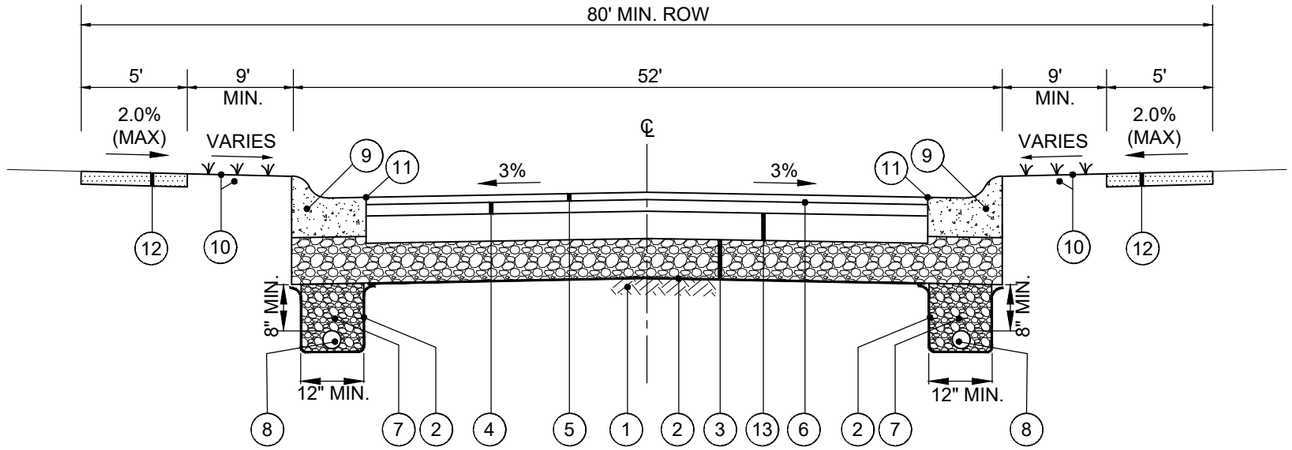
REVISIONS

3/29/2025	REVISION TO CITY STANDARD DETAILS

TYPICAL RESIDENTIAL STREET SECTIONS

DWG NO.
100-1



MAJOR STREET ASPHALT PAVEMENT SECTION

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3. PAVEMENT REMOVAL SHALL BE SAW CUT IN NEAT, STRAIGHT LINES. EXCAVATE AS SMALL AN AREA AS NEEDED. IF THE PAVEMENT IS DAMAGED BEYOND ORIGINAL SAW CUT LINES, CONTRACTOR MUST CUT BACK A SQUARED OFF SECTION FAR ENOUGH TO CLEAN UP THE DAMAGED AREA.

4. JOINT OR CRACK SEAL IS REQUIRED ON EACH STREET REPAIR AND PAVEMENT CUT MADE.

5. APPLICANT TO RESTORE TRENCH IN THE ROADWAY PER TRENCH RESTORATION DETAIL.

6. ALL WORKMANSHIP AND MATERIALS USED IN THE CITY RIGHT-OF-WAY BY THE PERMIT HOLDER, AND/OR ITS SUBCONTRACTORS, SHALL BE APPROVED BY THE CITY INSPECTOR AND SHALL BE WARRANTED FOR A PERIOD OF ONE (1) YEAR FROM THE DATE OF COMPLETION FOR FAILURE DUE TO WORKMANSHIP OR QUALITY OF MATERIALS.

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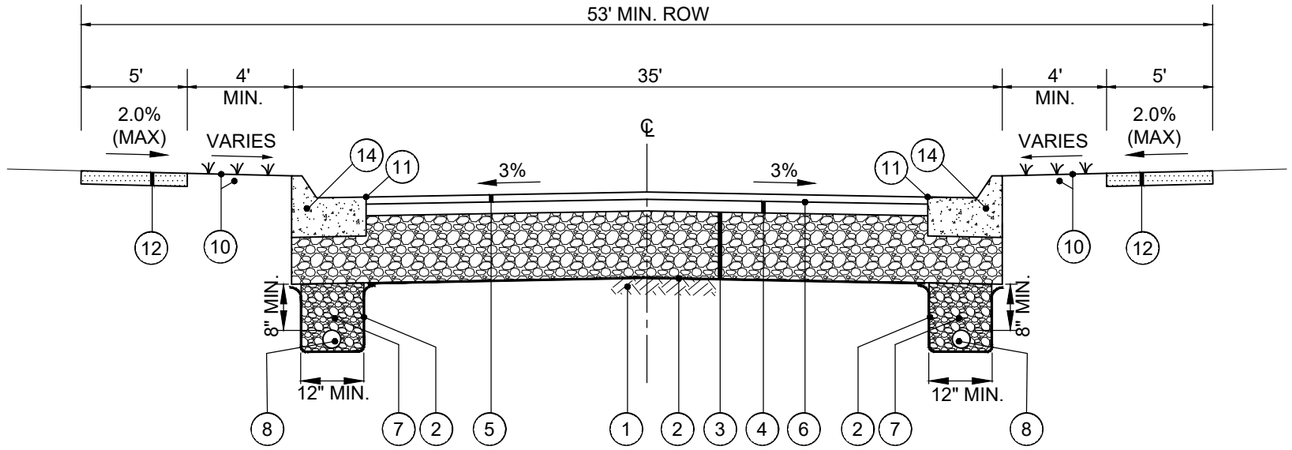
REVISIONS

3/29/2025	REVISION TO CITY STANDARD DETAILS

TYPICAL RESIDENTIAL STREET SECTIONS

DWG NO.
100-1A



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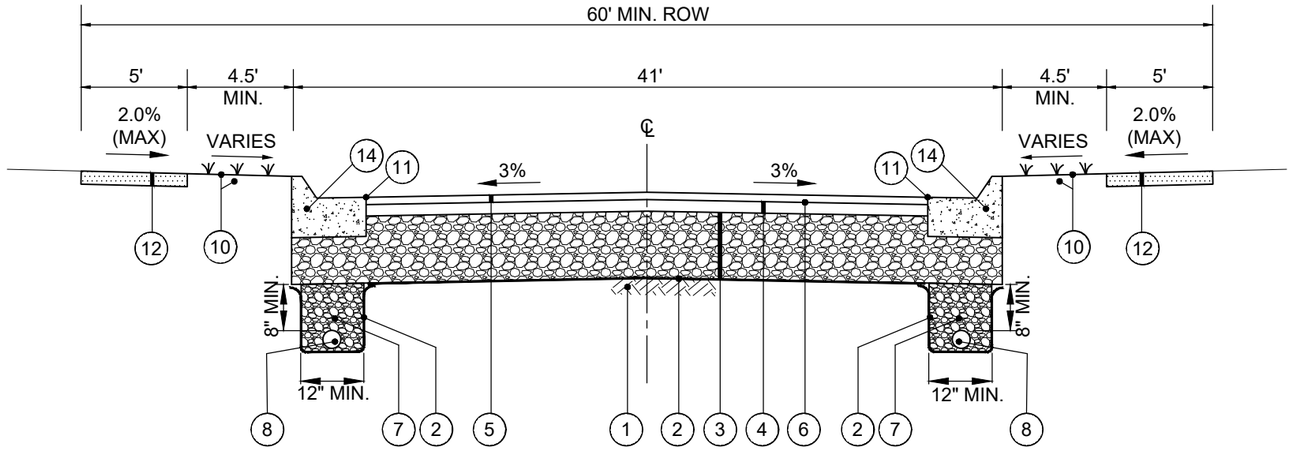

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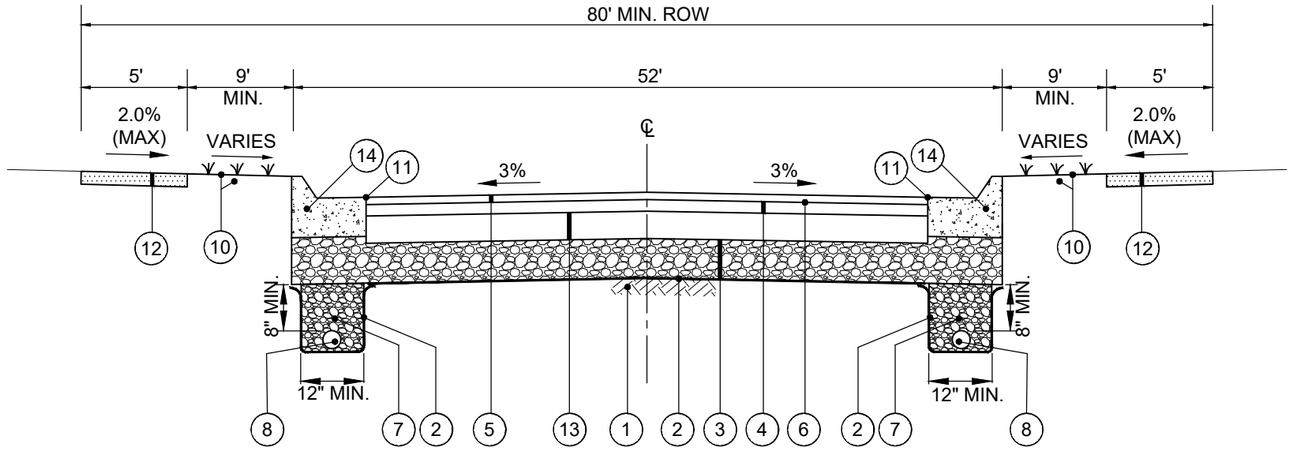
TYPICAL NON-RESIDENTIAL STREET SECTIONS

DWG NO.
100-2



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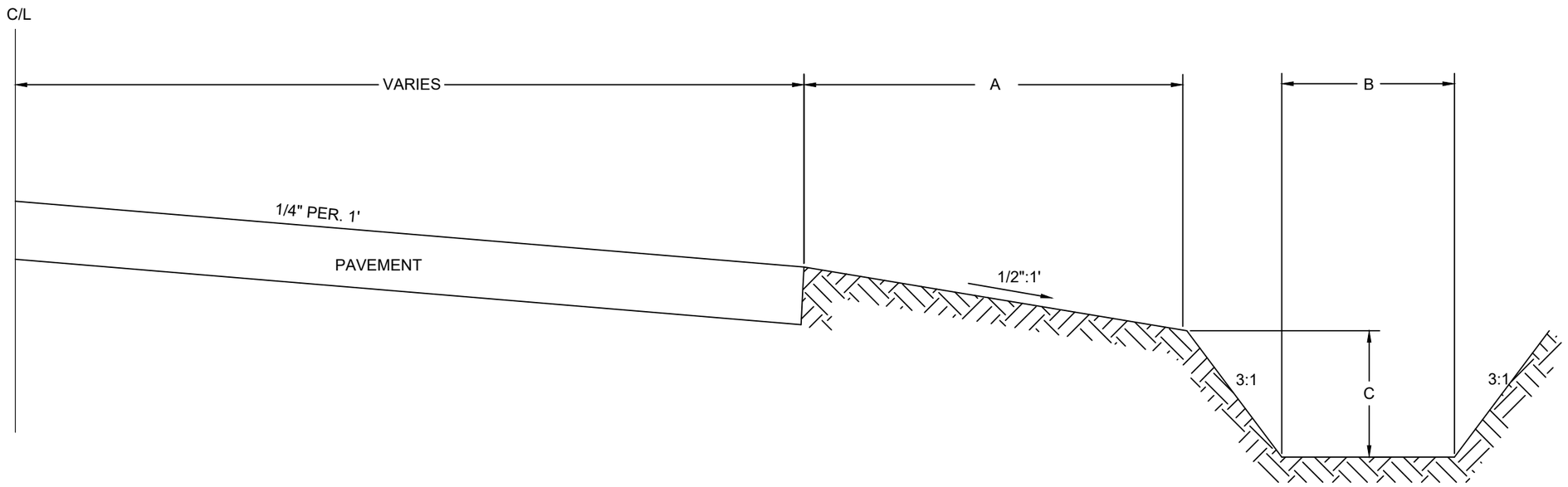
REVISIONS

3/29/2025	REVISION TO CITY STANDARD DETAILS

TYPICAL NON-RESIDENTIAL STREET SECTIONS

DWG NO.
100-2A



NOTES:

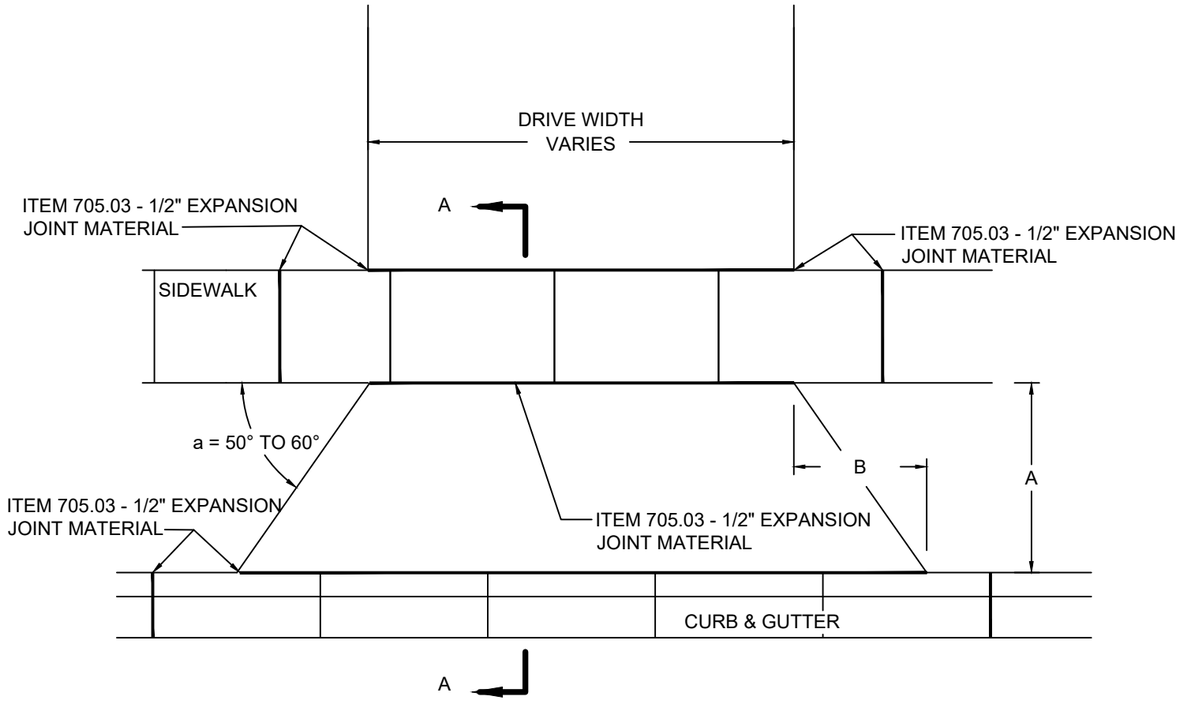
1. RECOMMENDED MINIMUM STANDARDS:
   A. BERM WIDTH SHALL BE FIVE (5) FEET.
   B. DITCH BOTTOM WIDTH SHALL BE ONE (1) FOOT.
   C. DITCH BOTTOM DEPTH SHALL BE EIGHTEEN (18) INCHES.
2. FOR MORE INFORMATION ON ROCK CHANNEL PROTECTION SEE: 200-7

ROAD DITCH SECTION
N.T.S.

REVISIONS	
3/29/2025	REVISION TO CITY STANDARD DETAILS

ROAD DITCH AND BERM TYPICAL SECTION

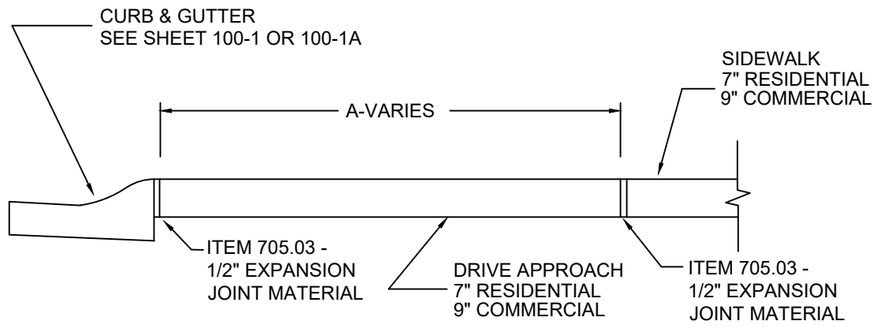
DWG NO.
100-3



PLAN VIEW

VALUES OF DIMENSION B

a \ A	3	4	5	6	7	8	9	10
50°	2.5	3.4	4.2	5.0	5.9	6.7	7.6	8.4
60°	1.7	2.3	2.9	3.5	4.0	4.6	5.2	5.8



SECTION A-A

GENERAL NOTES

1. DRIVEWAY SURFACING SHALL BE CONCRETE, ASPHALT OR PAVERS.

2. DRIVE APPROACHES SHALL NOT BE POURED MONOLITHICALLY WITH CURB AND GUTTER.

3. MAXIMUM JOINT SPACING SHALL BE TWELVE (12) FEET LONGITUDINALLY AND TRANSVERSELY.

4. COMPACTED GRAVEL MAY BE USED FOR LEVELING COURSE UNDER CONCRETE DRIVE APPROACH.

5. WHERE CURB HAS NOT BEEN PREVIOUSLY DEPRESSED, IT SHALL BE ENTIRELY REMOVED AND REPLACED AS SHOWN IN PLAN.

6. WHERE ASPHALTIC CONCRETE PAVEMENT IS DISTURBED THE ASPHALT SHALL BE REPLACED AS DIRECTED BY THE ENGINEER.

7. WHERE SIDEWALK EXISTS PRIOR TO CONSTRUCTION OF DRIVE APPROACH, THE REPLACEMENT OF THE SIDEWALK IS REQUIRED. EXCEPTION TO REPLACEMENT IS WHEN EXISTING SIDEWALK IS IN GOOD CONDITION AND IS SAME THICKNESS AS PLANNED DRIVE APPROACH.

8. ANY VARIATION FROM THE ABOVE STANDARD MUST BE APPROVED BY THE ENGINEER.

9. ALL CONCRETE FOR CURB AND GUTTER, SIDEWALK, AND DRIVE APPROACH SHALL MEET THE REQUIREMENTS SET FORTH IN ITEM 609 (ODOT SPECS.).

10. FOR DRIVES IN CUL-DE-SACS, SEE STANDARD DRAWING 100-8.

STANDARD DRIVE APPROACH
N.T.S.

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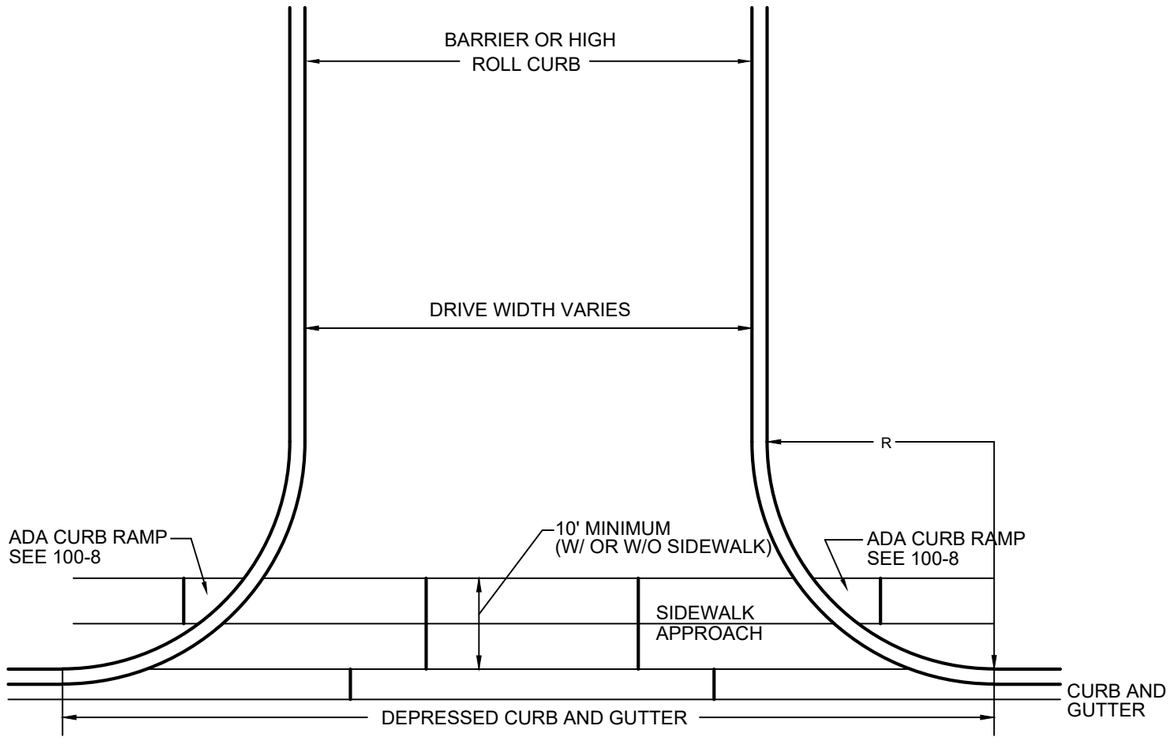
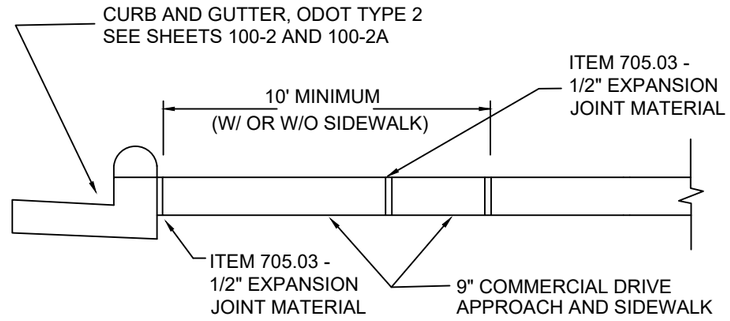
3/29/2025	REVISION TO CITY STANDARD DETAILS

RESIDENTIAL AND LIGHT COMMERCIAL DRIVEWAY APPROACH DETAIL

DWG NO.
100-4





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5. WHERE ASPHALTIC CONCRETE PAVEMENT IS DISTURBED, THE ASPHALT SHALL BE REPLACED AS DIRECTED BY THE ENGINEER.

6. WHERE SIDEWALK EXISTS PRIOR TO CONSTRUCTION OF DRIVE APPROACH, THE REPLACEMENT OF THE SIDEWALK IS OPTIONAL.

7. ANY VARIATION FROM THE ABOVE STANDARD MUST BE APPROVED BY THE ENGINEER.

8. ALL CONCRETE FOR CURB AND GUTTER, SIDEWALK, AND DRIVE APPROACH SHALL MEET THE REQUIREMENTS SET FORTH IN ITEM 609 (ODOT SPECS.).

9. CURB RADIUS "R" SHALL MEET THE TURNING RADIUS OF LARGEST TRUCK ACCESSING SITE (35' MIN).

COMMERCIAL DRIVE APPROACH
N.T.S.

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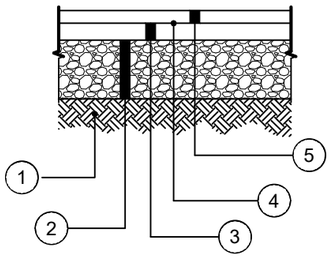
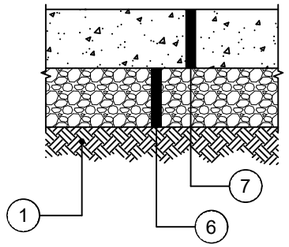
3/29/2025	REVISION TO CITY STANDARD DETAILS

HEAVY COMMERCIAL AND INDUSTRIAL DRIVEWAY APPROACH DETAIL

DWG NO.
100-4A



LIGHT DUTY ASPHALT PAVEMENT
N.T.S.



LIGHT DUTY CONCRETE PAVEMENT
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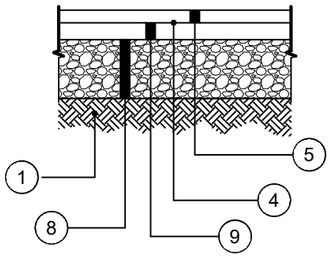

HEAVY DUTY ASPHALT PAVEMENT
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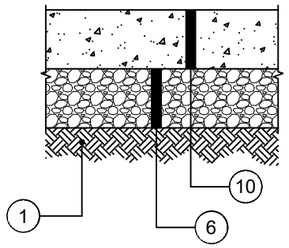

HEAVY DUTY CONCRETE PAVEMENT
N.T.S.

1. ITEM 204 - SUBGRADE COMPACTION (INCIDENTAL TO ITEM 608), PROOF ROLLED IN PRESENCE OF CITY INSPECTOR
2. ITEM 304 - AGGREGATE BASE (8" MIN) CRUSHED LIMESTONE, ADJUST FOR DESIGN
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6. ITEM 203 - AGGREGATE BASE (6" MIN) CRUSHED LIMESTONE, ADJUST FOR DESIGN
7. ITEM 452 - NON-REINFORCED CONCRETE PAVEMENT (6"), CLASS QC1
8. ITEM203 - AGGREGATE BASE (10" MIN) CRUSHED LIMESTONE, ADJUST FOR DESIGN
9. ITEM 441 - ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE 2 (448) (3.5")
10. ITEM 452 - NON-REINFORCED CONCRETE PAVEMENT (8"), CLASS QC1

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REVISIONS

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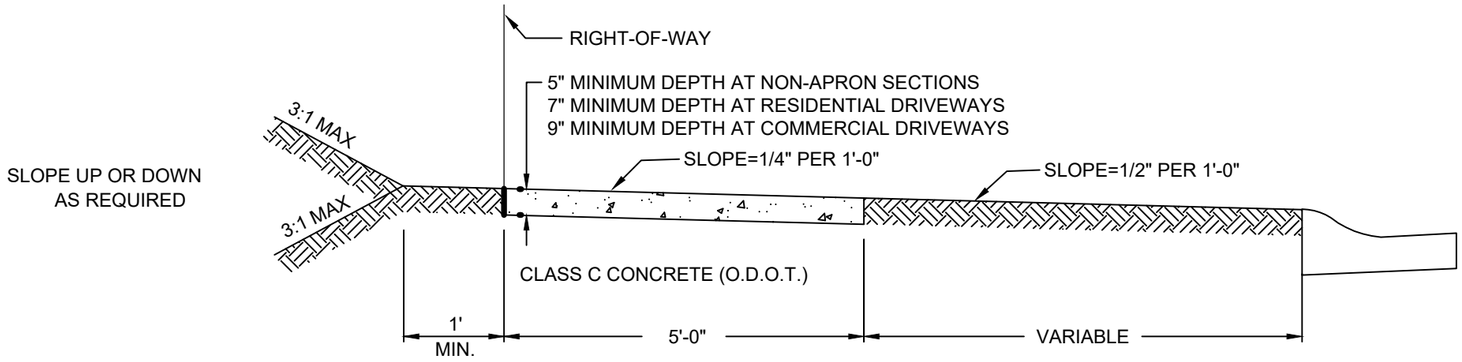
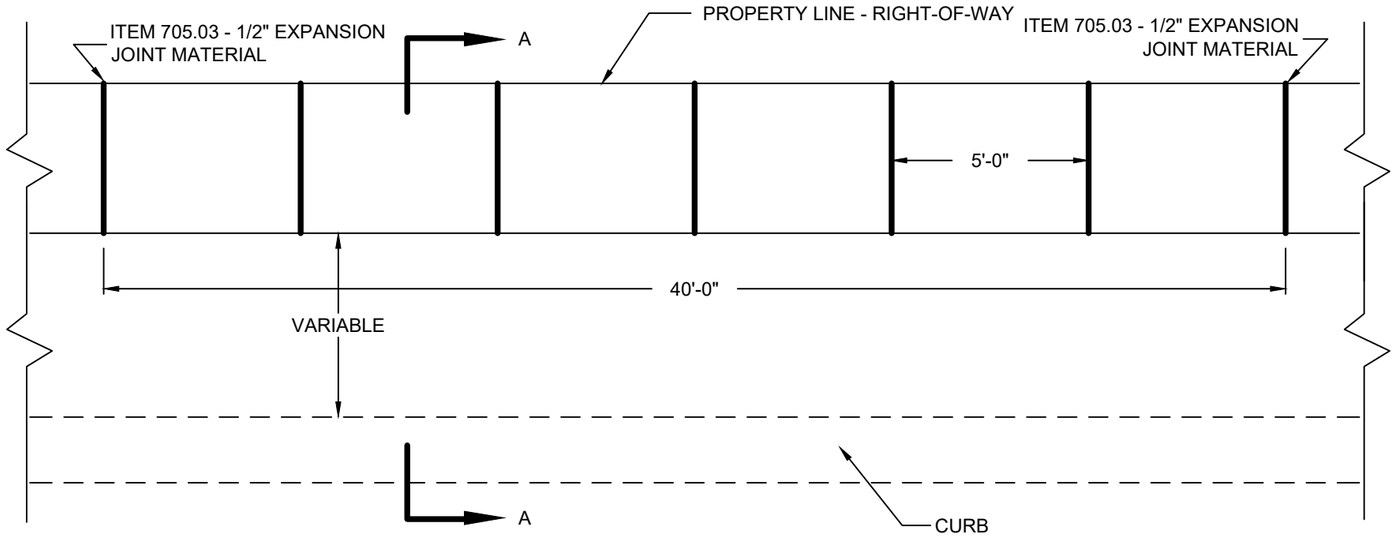
PRIVATE DEVELOPMENT
TYPICAL PAVEMENT SECTIONS

DWG NO.
100-5



SECTION A-A



PLAN VIEW

NOTE:

1. PROVIDE LIGHT BROOM FINISH TO ALL EXPOSED SURFACES

2. CONCRETE SHALL CONFORM TO ODOT ITEM 608

REVISIONS	
3/29/2025	REVISION TO CITY STANDARD DETAILS

CONCRETE SIDEWALK DETAILS

DWG NO.
100-6

GENERAL NOTES

1. WATER AND SEWER MAINS AND LATERALS TO CONFORM WITH CITY, STATE, AND FEDERAL REQUIREMENTS.

2. THE DEVELOPER SHALL COORDINATE WITH ALL UTILITY COMPANIES, IE., WATER, SEWER, GAS, ELECTRIC, TELEPHONE AND CABLE TV, DURING THE DESIGN PROCESS TO ESTABLISH LOCATION AND DEPTHS TO AVOID CONFLICTS DURING CONSTRUCTION.

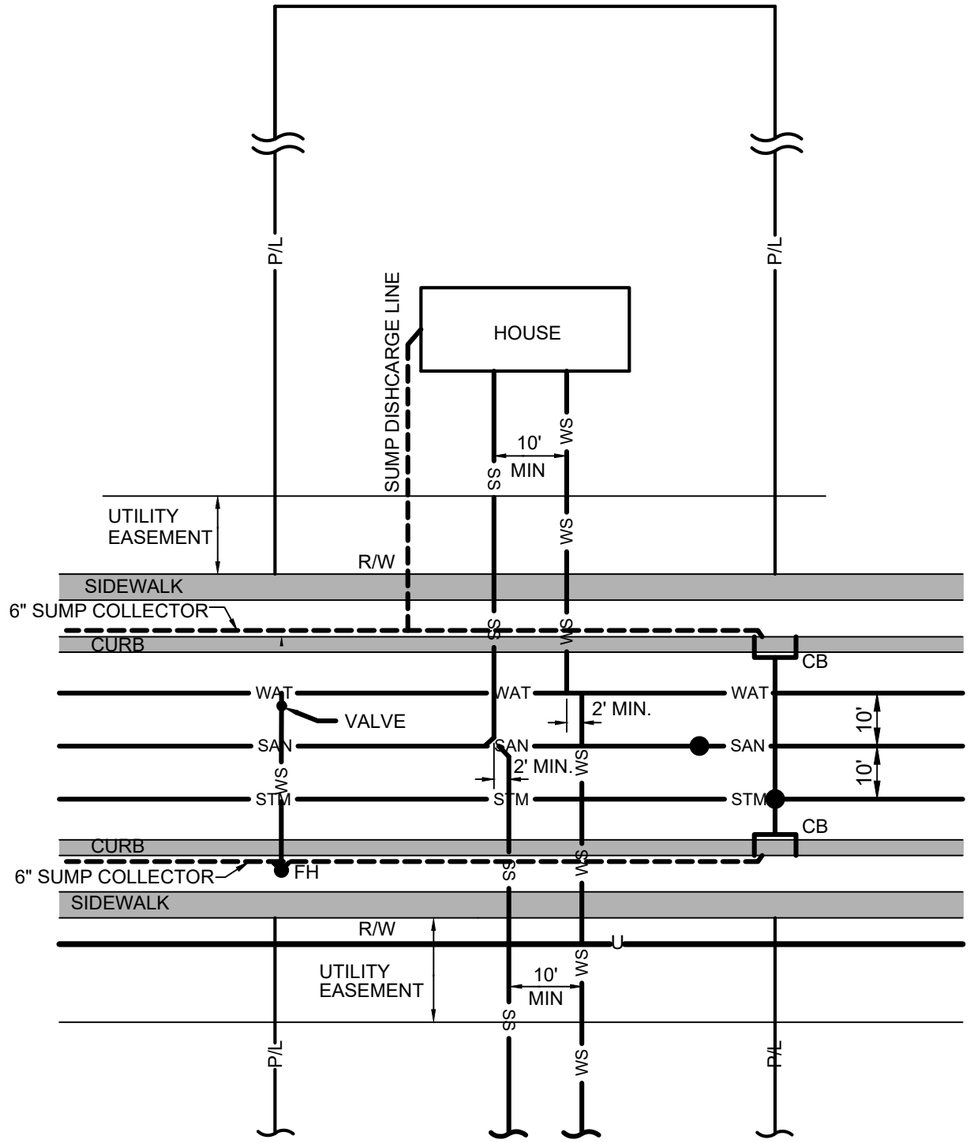
3. LATERALS SHALL BE EXTENDED TO THE HOUSE SIDE OF THE UTILITY EASEMENT.

4. ALL UTILITIES TO BE LOCATED UNDERGROUND UNLESS SPECIFIC APPROVAL IS GRANTED BY COUNCIL.

5. DOWNSPOUT DRAINS SHALL NOT CONNECT TO THE 6" SUMP COLLECTOR.

LEGEND

WAT	WATER MAIN
WS	WATER SERVICE
SAN	SANITARY SEWER
SS	SANITARY SERVICE
CB	CATCH BASIN
STM	STORM SEWER
U	UTILITY (GAS, ELECTRIC, TELEPHONE AND CABLE TV)
P/L	PROPERTY LINE
●	MANHOLE
R/W	RIGHT-OF-WAY
FH	FIRE HYDRANT



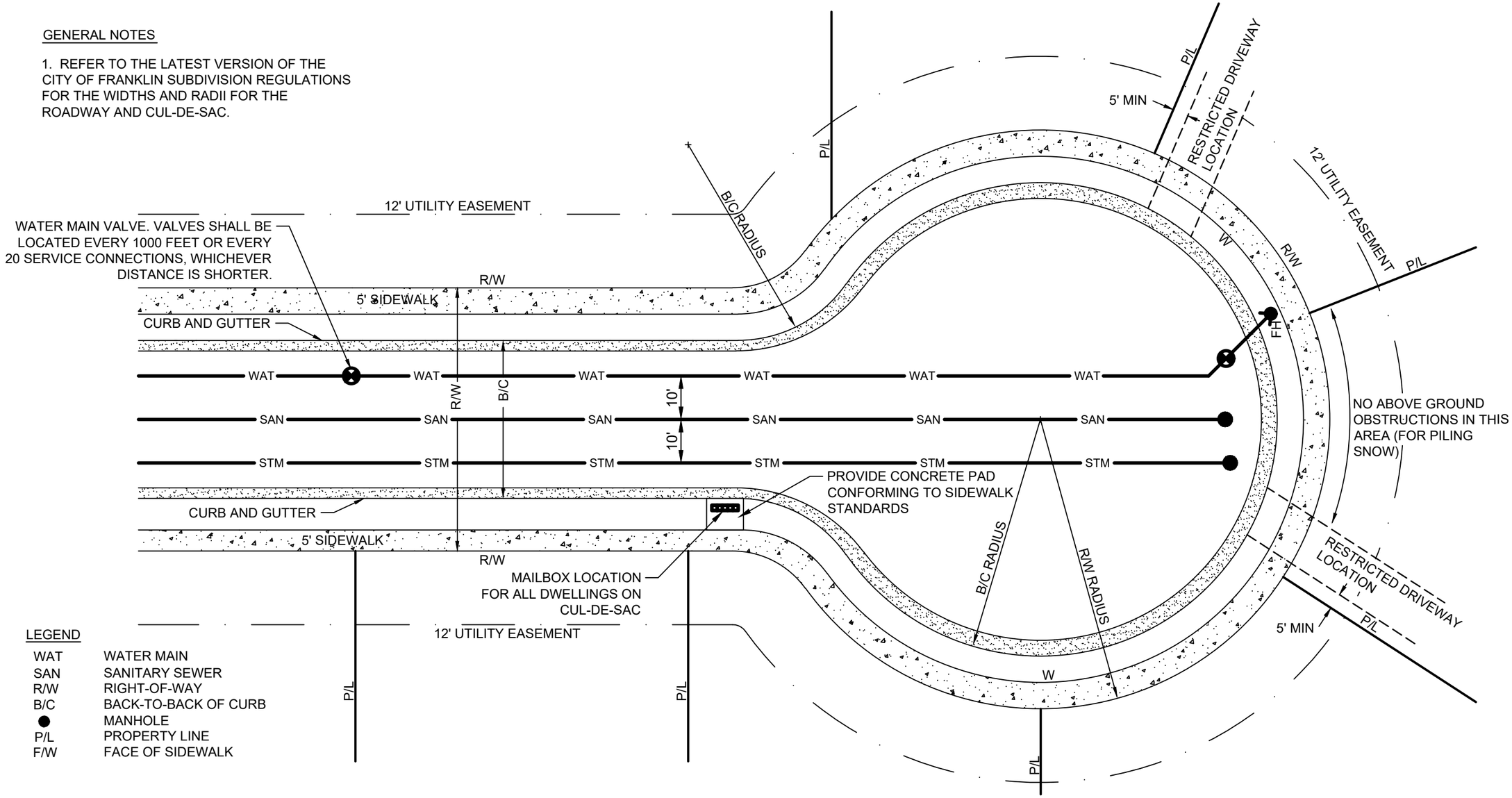
REVISIONS	
3/29/2025	REVISION TO CITY STANDARD DETAILS

TYPICAL UTILITY AND SERVICE LOCATION

DWG NO.
100-7

GENERAL NOTES

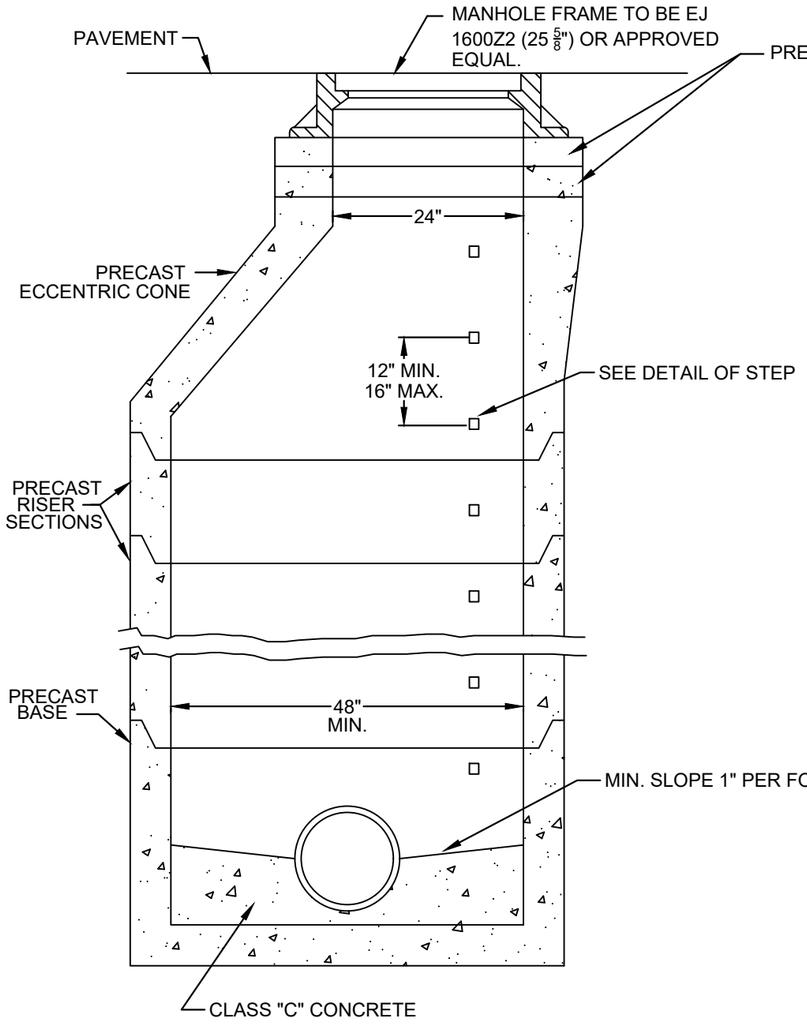
1. REFER TO THE LATEST VERSION OF THE CITY OF FRANKLIN SUBDIVISION REGULATIONS FOR THE WIDTHS AND RADII FOR THE ROADWAY AND CUL-DE-SAC.



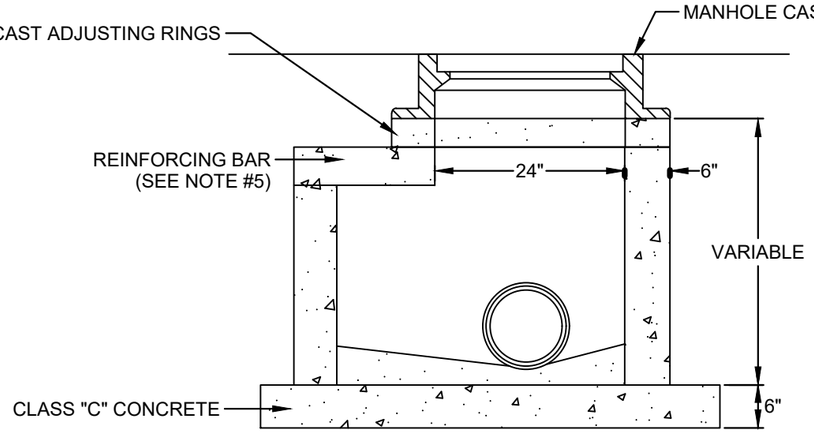
REVISIONS	
3/29/2025	REVISION TO CITY STANDARD DETAILS

TYPICAL CUL-DE-SAC

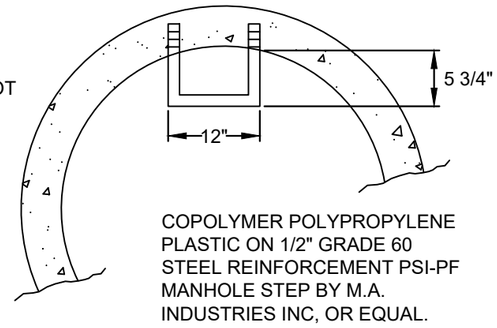
DWG NO.
100-8



CONE TOP



SLAB TOP



COPOLYMER POLYPROPYLENE PLASTIC ON 1/2" GRADE 60 STEEL REINFORCEMENT PSI-PF MANHOLE STEP BY M.A. INDUSTRIES INC, OR EQUAL.

STEP DETAIL

GENERAL NOTES:

1. PRECAST CONCRETE MANHOLES MAY BE CONSTRUCTED OF REINFORCED CONCRETE SECTIONS CONFORMING TO ASTM SPECIFICATION C-76-57 T, TABLE II.
2. MANHOLE FRAME TO BE EJ 1600Z2 OR APPROVED EQUAL.
3. SANITARY MANHOLE COVER TO BE EJ 1600C3 OR APPROVED EQUAL.
4. STORM MANHOLE COVER TO BE EJ 1600C OR APPROVED EQUAL.
5. BASE SECTION MAY BE PRECAST OR CAST IN PLACE.
6. ECCENTRIC CONE MAY BE USED IN PLACE OF CONCENTRIC CONE OR FLAT SLAB TOP IF APPROVED BY THE CITY ENGINEER.
7. TOP SLAB SHALL BE 6" THICK WITH #4 REINFORCING BAR 6" O.C. BOTH WAYS. IF LOCATED IN STREETS, TOP SLAB SHALL BE 7" THICK WITH #5 REINFORCING BARS 6" O.C. BOTH WAYS.
8. CHANNEL IN BOTTOM OF MANHOLE MAY BE FACTORY OR JOB FORMED.
9. THE MAXIMUM HEIGHT OF ADJUSTING RINGS SHALL NOT EXCEED 12".
10. SPACING BETWEEN STORM MANHOLES SHALL BE 400' MAX.
11. STORM MANHOLES SHALL BE USED WHEN THE PIPE DIAMETERS IN THE STORM SEWER SYSTEM ARE GREATER THAN 18". PIPE DIAMETERS 18" & UNDER CAN RUN FROM CATCH BASIN TO CATCH BASIN.
12. ANY VARIATION FROM THIS STANDARD MUST HAVE APPROVAL OF CITY ENGINEER.

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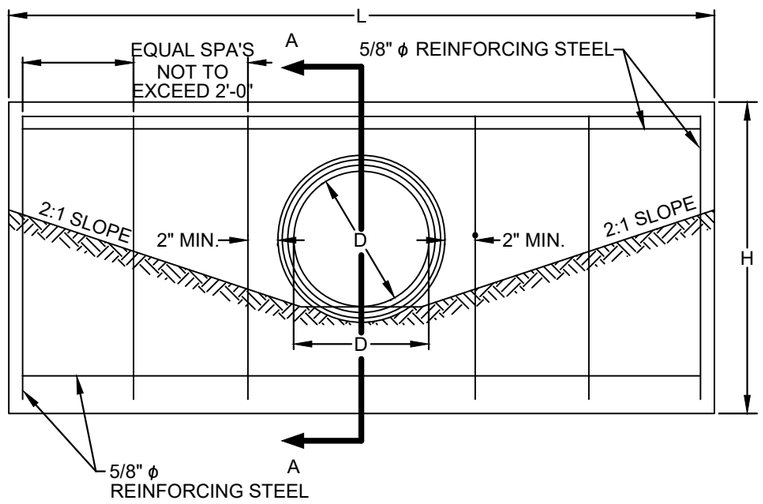
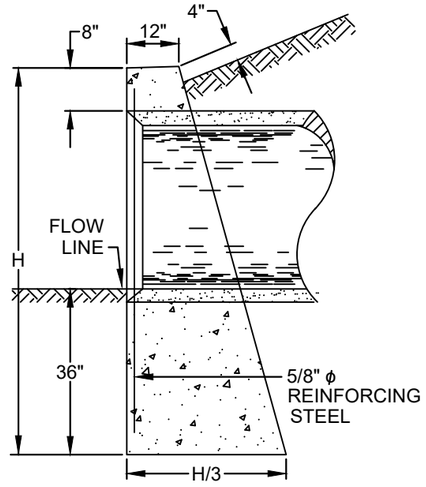
REVISIONS	
3/29/2025	REVISION TO CITY STANDARD DETAILS

STORM MANHOLE

DWG NO.
200-1



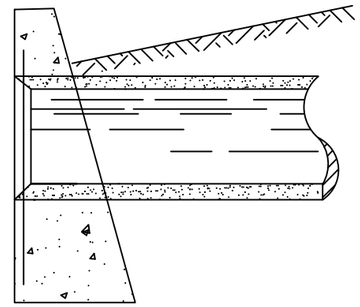
ELEVATION



SECTION A-A

NOTES:

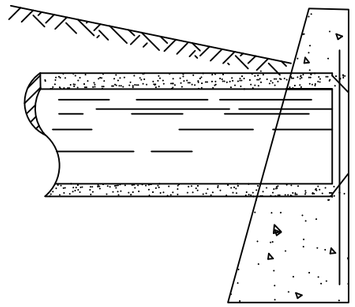
1) NO. 1 HEADWALL WHERE REQUIRED WILL BE PROVIDED FOR NONSKEWED CULVERTS HAVING A DIAMETER OR RISE OF 36" OR LESS.
2) CONCRETE SHALL BE CLASS "C" REINFORCING STEEL BARS SHALL BE 5/8 " ROUND. DIMENSIONS AND QUANTITIES ARE SHOWN FOR CIRCULAR SECTIONS ONLY. IT WILL BE NECESSARY TO DETERMINE DIMENSIONS FOR THE NO. 1 HEADWALL REQUIRED FOR REINFORCED ELLIPTICAL CONCRETE PIPE IN ACCORDANCE WITH THE EQUATIONS LISTED ON THIS DRAWING.
3) CHAMFER ALL EXPOSED CORNERS 3/4" FOUNDATION- WHERE THE SOIL BORINGS INDICATE A BEARING CAPACITY OF LESS THAN 2600 POUNDS PER SQUARE FOOT, IT WILL BE NECESSARY TO INCREASE THE WIDTH OF THE BASE.



INLET END

GROOVE OR BELL UPSTREAM

RIGID & FLEXIBLE PIPE



OUTLET END

TONGUE OR SPIGOT DOWNSTREAM

STANDARD NO. 1 HEADWALL

N.T.S.

DIMENSIONS			QUANTITIES ONE HEADWALL	
DIAMETER	H	L	CONCRETE CU. YDS.	REINFORCING STEEL LBS.
15"	5'-2"	7'-0"	1.7	41
18"	5'-5"	8'-4"	2.2	57
21"	5'-8"	9'-8"	2.8	62
24"	5'-11"	11'-0"	3.3	69
30"	6'-5"	13'-8"	4.7	92
36"	7'-0"	16'-4"	6.5	105

L CIRCULAR SECTIONS = 5D + 4T
L ELLIPTICAL OR PIPE-ARCH = 4R + 4T + S
H CIRCULAR SECTIONS = D + T + 44"
H ELLIPTICAL OR PIPE-ARCH = R + T + 44"

D = DIAMETER OF PIPE
R = RISE OF PIPE
S = SPAN OF PIPE
T = THICKNESS OF BARREL
L = LENGTH OF HEADWALL
H = HEIGHT OF HEADWALL

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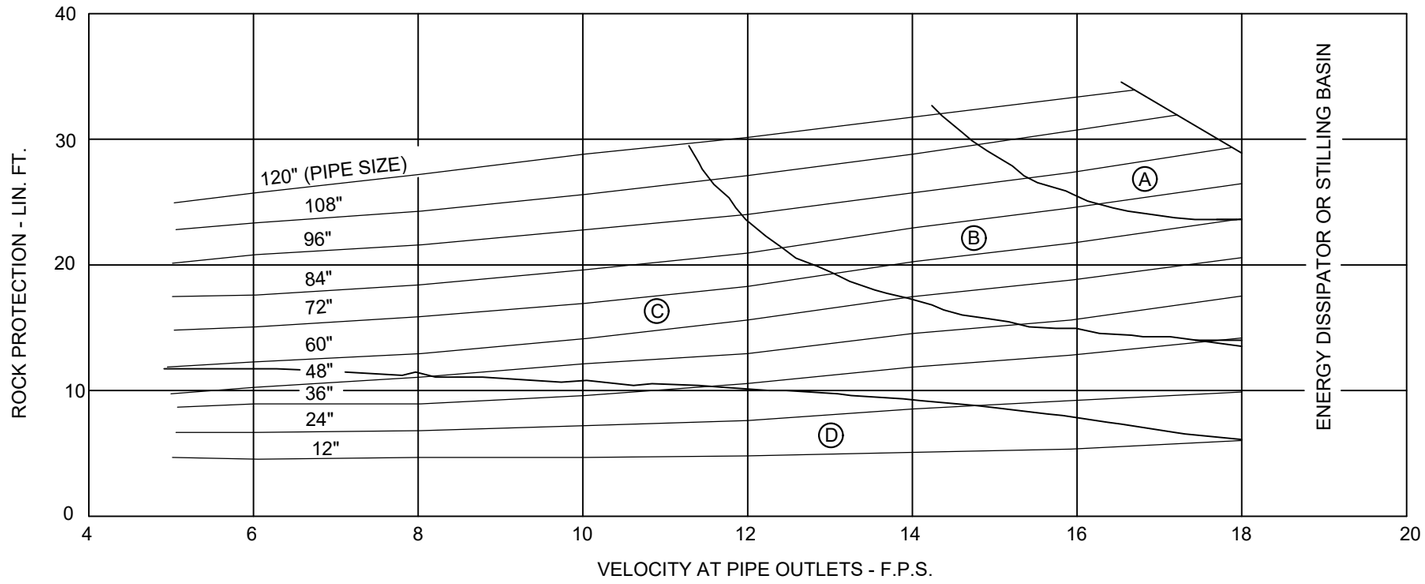
REVISIONS

3/29/2025	REVISION TO CITY STANDARD DETAILS

HEADWALL (FORMER TYPE HW-1)

DWG NO.
200-2

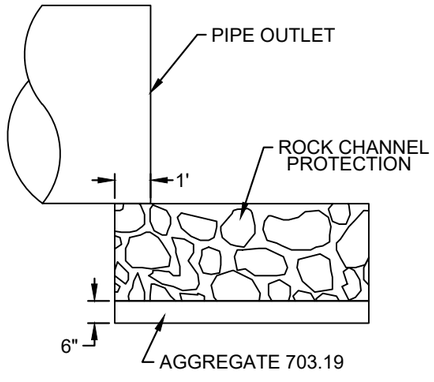


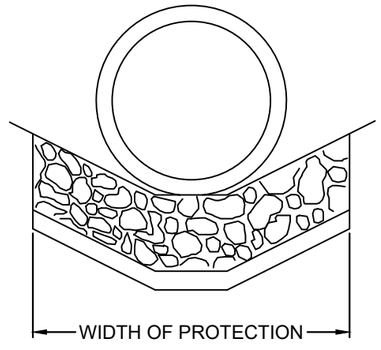
LEGEND (HEIGHT & SIZE OF ROCK)

Ⓐ 48" OF 18" ROCK Ⓑ 36" OF 12" ROCK Ⓒ 30" OF 6" ROCK Ⓓ 18" OF 3" ROCK

NOTES:

1. SOUND AND DURABLE ROCK, BROKEN CONCRETE, OR STONE CONFORMING TO 703.19 SHALL BE PLACED AS ROCK CHANNEL PROTECTION WITH OR WITHOUT A 6-INCH THICK LAYER OF AGGREGATE CONFORMING TO 703.19, AS SPECIFIED.
2. REASONABLE CARE SHALL BE EXERCISED IN PLACING THE ROCK TO ASSURE THAT THE FINISHED SURFACE OF THE PROTECTED CHANNEL WILL CONFORM WITH THE CHANNEL CROSS SECTION AS REQUIRED BY THE PLANS.
3. WIDTH OF PROTECTION SHALL BE TWICE THE PIPE DIAMETER, BUT SHALL NOT BE LESS THAN FOUR (4) FEET.
4. ROCK CHANNEL PROTECTION SHALL BE OF FOUR (4) TYPES, AS DEFINED IN ODOT 703.19.
5. ROCK SIZE (9 INCHES OR 18 INCHES), REFERRED TO IN THE ABOVE GRAPH LEGEND, INDICATES THE SQUARE OPENING ON WHICH 85 PERCENT OF THE MATERIAL BY WEIGHT WILL BE RETAINED.





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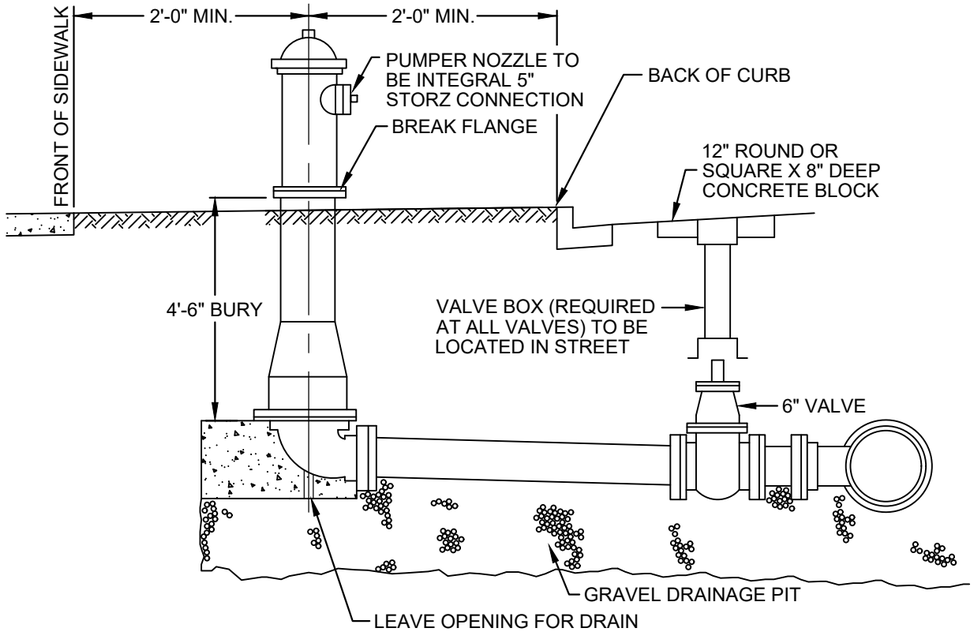
ROCK CHANNEL PROTECTION

DWG NO.
200-3

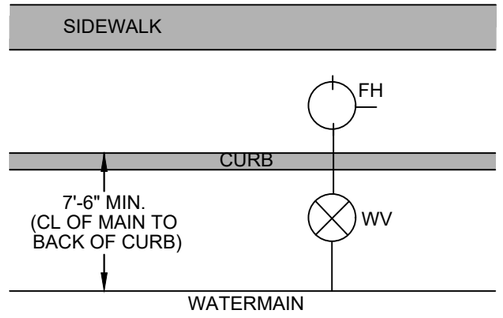


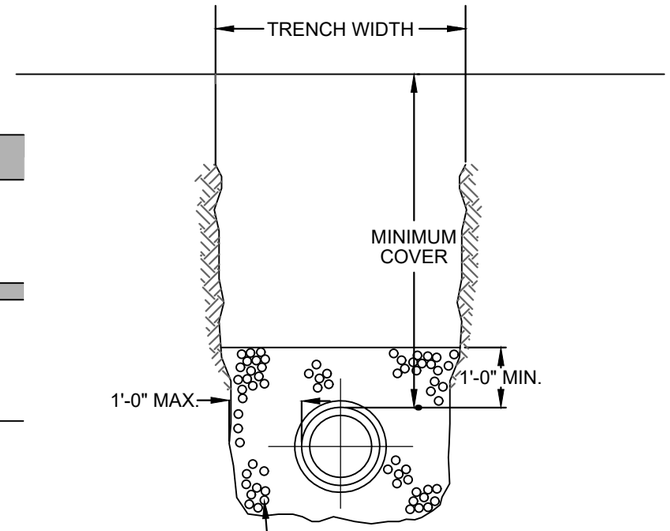
ACCEPTABLE FIRE HYDRANT BRAND

1. KENNEDY GUARDIAN K81-D W/ 5" STORZ CONNECTION
2. AMERICAN DARLING B-62-B W/ 5" STORZ CONNECTION

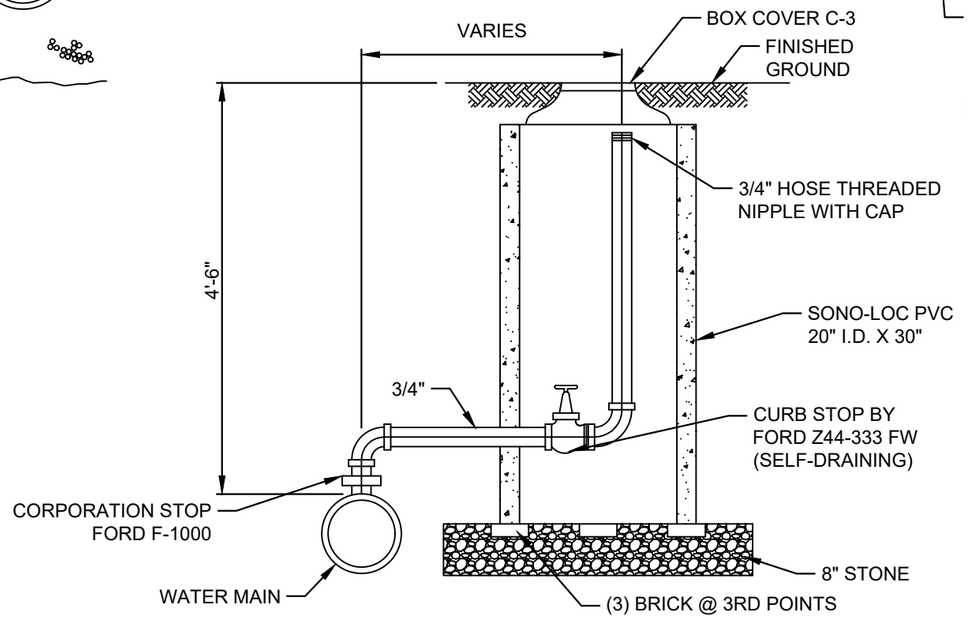
FIRE HYDRANT DETAILS

1. DIA.- MAIN VALVE OPENING: 5 1/4"
2. DIA. - PUMPER CONNECTION: I.D. 4 1/2 " O.D. 5 3/4"
3. DIA.- HOSE CONNECTIONS: TWO 2 1/2"
4. THREAD TYPE: NATIONAL STANDARD - NO THREAD EXPOSED TO WATER (STORZ CONNECTION FOR PUMPER NOZZLE)
5. SHAPE -CAPS & OPERATING NUT: PENTAGON
6. DIMENSIONS - OPERATING NUT: TOP 1 3/8", BOTTOM 1 3/8"
7. DIRECTION OF OPENING: RIGHT (CLOCKWISE)
8. COLOR TO BE PAINTED: RED
9. VALVE SEAT: MACHINED BRONZE
10. BARREL: TWO PIECE WITH BREAK AWAY FEATURE
11. TOP: DRY
12. BEARING: ANTI-FRICTION THRUST BEARING
13. SPACING BETWEEN HYDRANTS: 300' MAX. (400' MAX. FOR RESIDENTIAL)





PIPE SHALL BE SET ON 6" OF BEDDING SAND AND TRENCH SHALL BE FILLED WITH SAND BACKFILL TO 1'-0" ABOVE PIPE. SEE SHEETS 400-4 AND 400-5 FOR BACKFILL REQUIREMENTS.



BLOWOFF DETAIL
N.T.S.

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3/29/2025	REVISION TO CITY STANDARD DETAILS

FIRE HYDRANT AND WATER MAIN TRENCH EXCAVATION

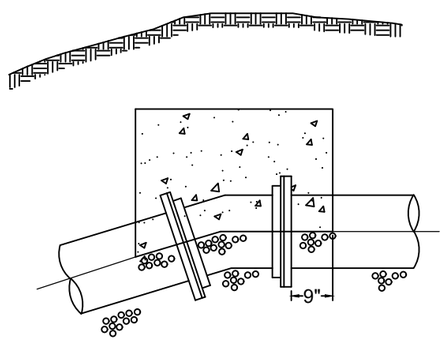
DWG NO.
300-1

CONC. REQUIRED FOR VERTICAL BENDS (CU. FT.)

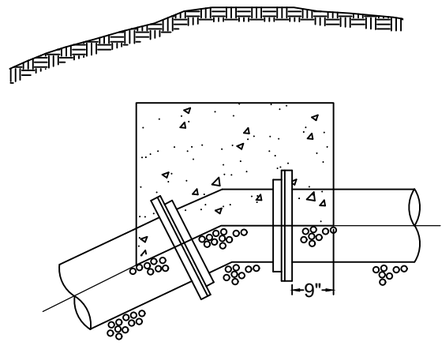
DIA.	11 1/4°	22 1/2°	11 1/4° & 22 1/2°
6"	4	8	11
8"	7	14	20
10"	11	21	30
12"	15	30	44

NOTES:

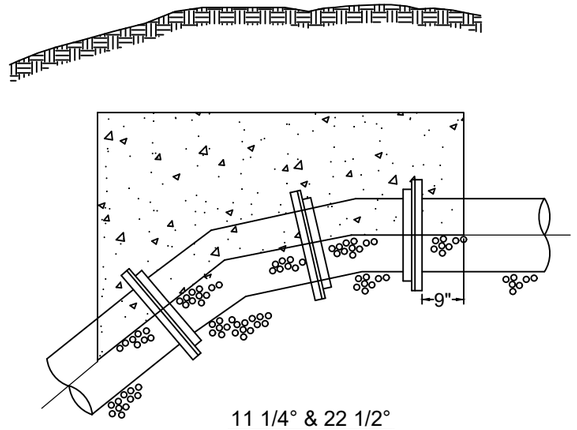
1. CLASS A CONCRETE TO BE USED FOR ALL BLOCKING (CLASS C ODOT SPECS.)
2. TIED OR RESTRAINED JOINTS MAY BE USED IN LIEU OF CONCRETE BLOCKING AT THE DIRECTION OF THE ENGINEER.
3. BEFORE POURING CONCRETE, COVER PIPE WITH POLYETHYLENE PLASTIC.
4. MEGALUGS AND RESTRAINED JOINTS MAY BE ACCEPTED IN LIEU OF CONCRETE BLOCKING.
5. THRUST BLOCKS TO BE POURED AGAINST FIRM UNDISTURBED SOIL.



11 1/4°



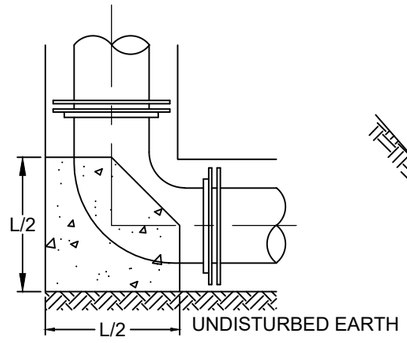
22 1/2°



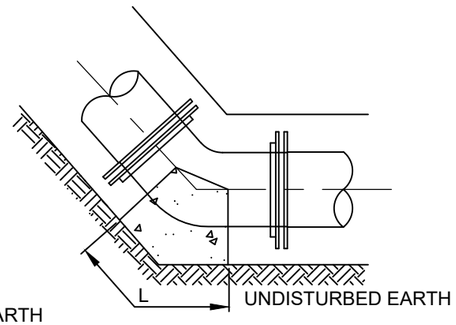
11 1/4° & 22 1/2°

CONCRETE BLOCKING FOR VERTICAL BENDS

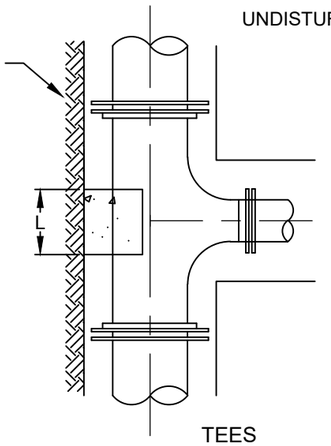
N.T.S.



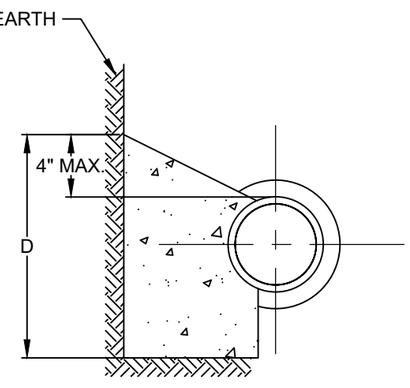
90° BENDS



BENDS LESS THAN 90°



TEES



TYPICAL SECTION

BENDS								
SIZE OF PIPE	DEGREE OF BEND							
	11 1/4°		22 1/2°		45°		90°	
	L	D	L	D	L	D	L	D
3",4",6"	8"	6"	10"	6"	20"	6"	36"	6"
8"	9"	8"	14"	8"	24"	8"	50"	8"
12"	14"	12"	22"	12"	30"	16"	60"	15"
16"	18"	16"	24"	18"	33"	36"	70"	22"

TEES								
RUN	BRANCH							
	3",4"&6"		8"		12"		16"	
	L	D	L	D	L	D	L	D
3",4"&6"	16"	7"						
8"	14"	8"	18"	12"				
12"	9"	12"	18"	12"	24"	18"		
16"	8"	16"	14"	16"	28"	16"	30"	26"

CONCRETE BLOCKING FOR HORIZONTAL BENDS

N.T.S.

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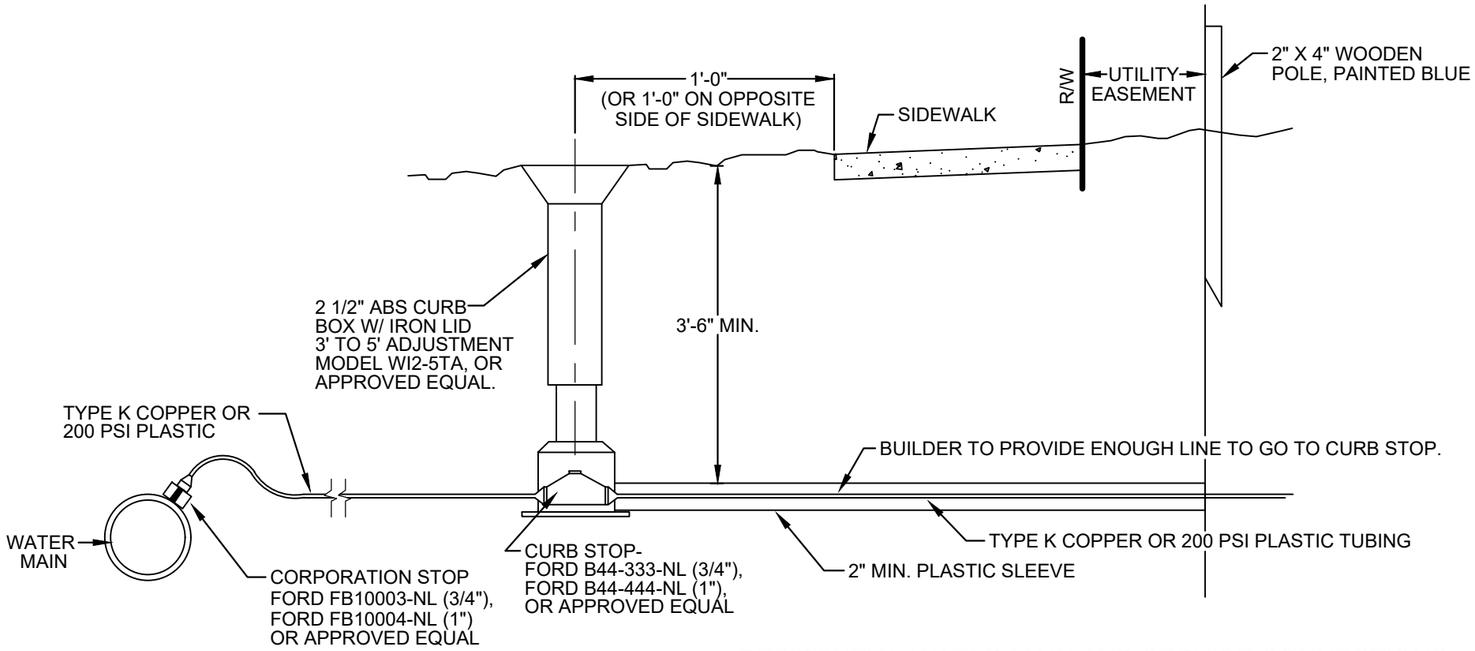
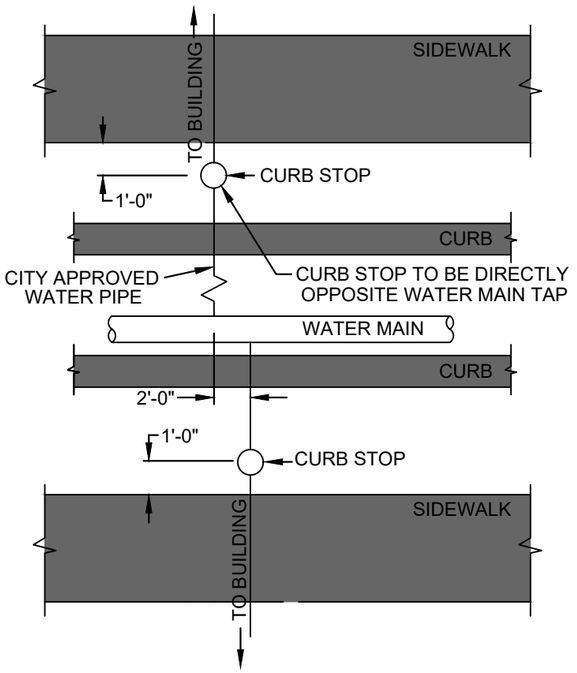
CONCRETE BLOCKING FOR WATER MAINS

DWG NO.
300-2





RESIDENTIAL WATER MAIN AND SERVICE CONNECTIONS

N.T.S.

NOTES:

1. SERVICE LINES FROM THE WATER MAIN TO THE CURB STOP AND FROM THE CURB STOP TO THE BUILDING SHALL BE TYPE "K" COPPER OR APPROVED AWWA STANDARD C901-78 PLASTIC TUBING, 200 PSI MINIMUM.
2. THE ABOVE PLASTIC TUBING APPROVED FOR 3/4-INCH AND 1-INCH DIAMETER. FOR LARGER DIAMETER, CHECK WITH CITY ENGINEER.
3. SERVICE LINE SIZE AND METER SIZE TO BE REVIEWED BY THE CITY.
4. PIPE DEPTHS:
   TYPE "K" COPPER - 3'-6"
   CITY-APPROVED PLASTIC (W/12 GAUGE COPPER TRACER WIRE) - 4'0"
5. ALL CONNECTIONS OF TYPE "K" COPPER PIPE SHALL BE COMPRESSION FITTINGS OR FLARED FITTINGS.
6. BUILDING SERVICE LINE TAPS ON PVC PLASTIC PIPE MEETING AWWA SPECIFICATION C-900 SHALL BE MADE WITH FORD STYLE 202, DOUBLE-STRAP SADDLES, WITH CORROSION-RESISTANT PARTS (OR APPROVED EQUAL). NO SINGLE-STRAP SADDLES WILL BE PERMITTED.
7. PLASTIC SERVICE LINES TO BE DEPRESSED SIX (6) INCHES AT BUILDING FOUNDATION.
8. A BACKFLOW PREVENTER, NO SMALLER THAN METER SIZE, SHALL BE INSTALLED ADJACENT TO THE WATER METER.

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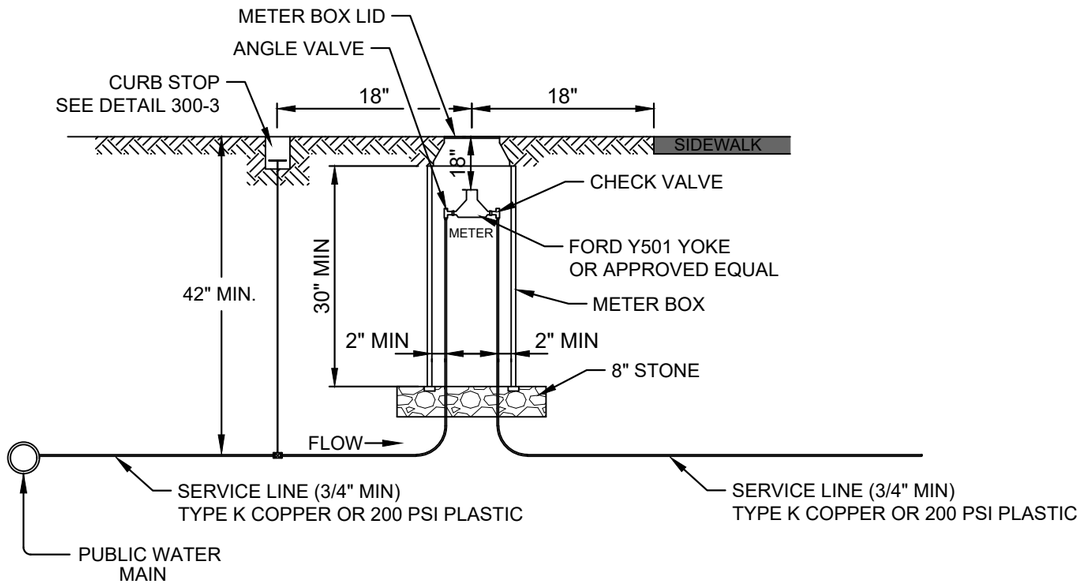
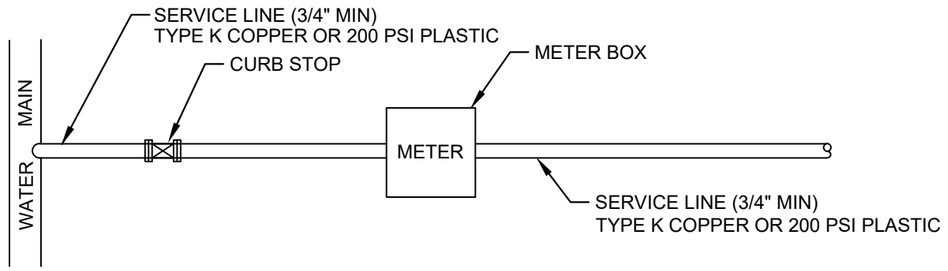
WATER MAIN AND RESIDENTIAL SERVICE CONNECTIONS

DWG NO.
300-3



SECTION



PLAN

NOTES:

1. 12-GAUGE COPPER TRACER WIRE SHALL BE PROVIDED ALONG ALL PLASTIC PIPE.
2. BACK FLOW PREVENTER TO BE INSTALLED AHEAD OF ANY SPRINKLER BUT NOT IN METER PIT.

METER SIZE	ANGLE VALVE	CHECK VALVE	METER PIT & COVER	CORP STOP	COUPLINGS
3/4"	FORD BA43-332-NL	FORD HA34-323-NL	METER PIT 20"X30" SIGMA RMP2030-SW-W ROUND STRAIGHT WALL COVER FORD METER BOX COVER FC3 TRUMBULL LIDS PART #367-5810	FORD FB10003-NL	FORD C44-33-NL
1"	FORD BA43-444-NL	FORD HA34-444-NL	METER PIT 20"X30" SIGMA RMP2030-SW-W ROUND STRAIGHT WALL COVER FORD METER BOX COVER FC3 TRUMBULL LIDS PART #367-5810	FORD FB10004-NL	FORD C44-44-NL

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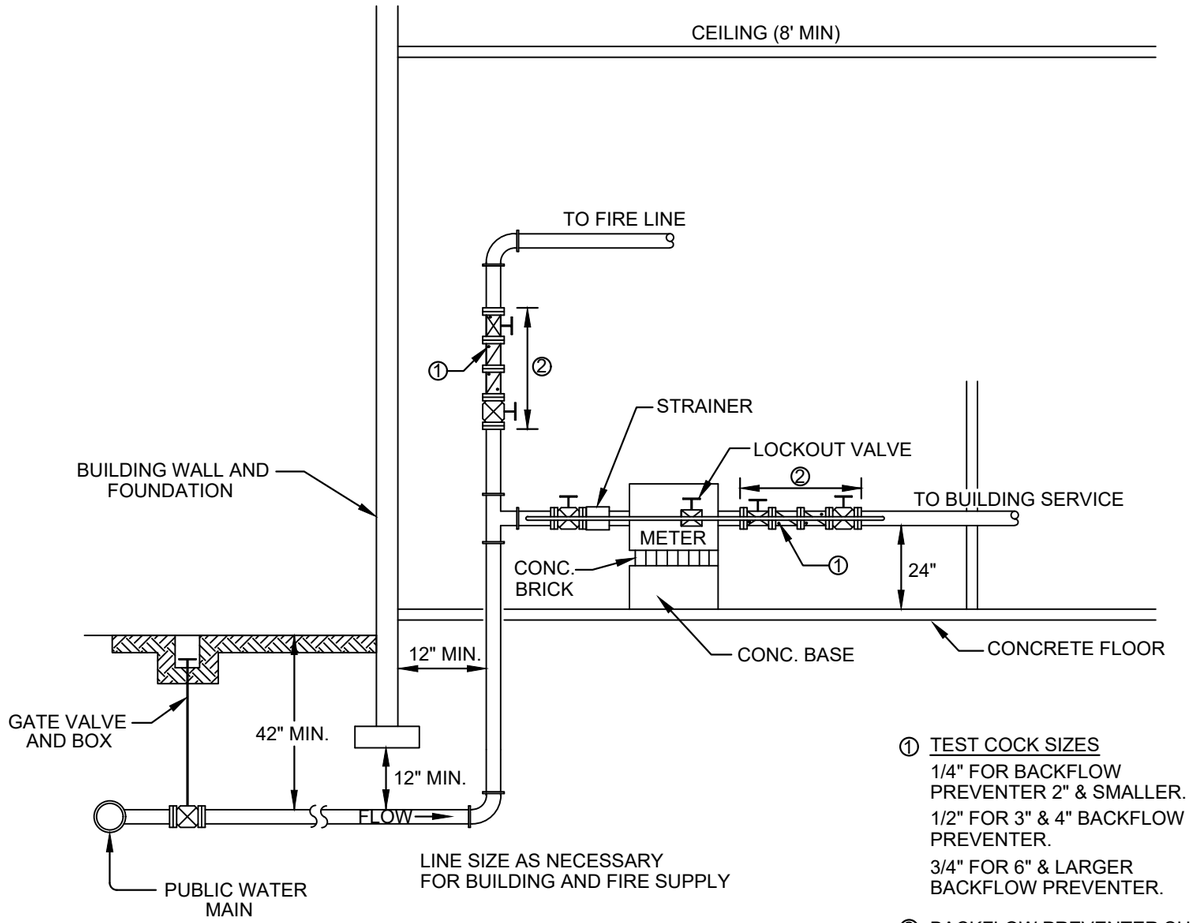
RESIDENTIAL METER PIT DETAILS

DWG NO.
300-4

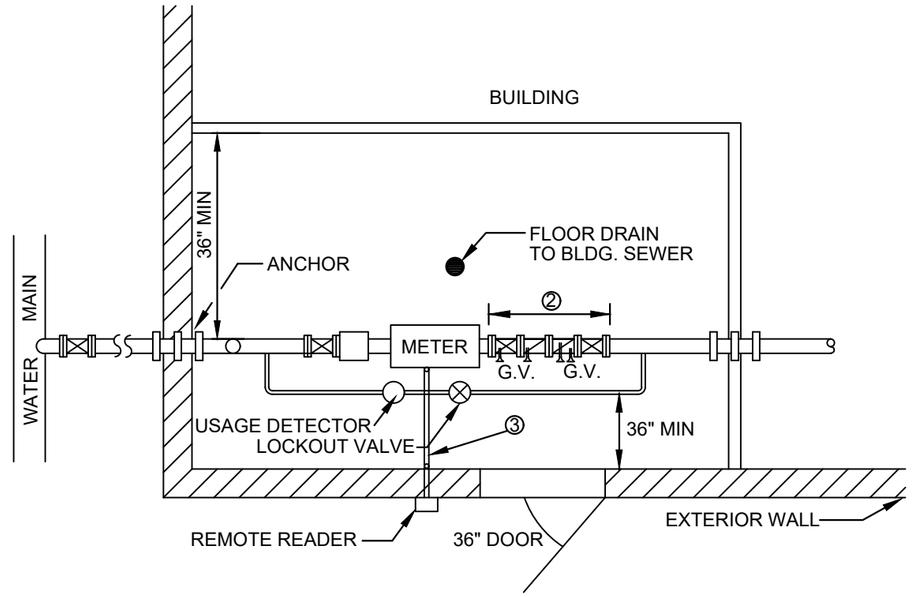


SECTION

① TEST COCK SIZES
1/4" FOR BACKFLOW PREVENTER 2" & SMALLER.
1/2" FOR 3" & 4" BACKFLOW PREVENTER.
3/4" FOR 6" & LARGER BACKFLOW PREVENTER.

② BACKFLOW PREVENTER SHALL BE NO SMALLER THAN METER SIZE.

③ 3/4" PLASTIC CONDUIT FROM METER TO OUTSIDE WALL REMOTE READER



NOTES

1. ROOM CONTAINING METER AND FIRE SUPPLY EQUIPMENT ONLY MUST BE DIRECTLY ACCESSIBLE FROM BUILDING EXTERIOR WITHOUT PASSING THRU ANY PART OF THE BUILDING. ROOM MUST BE HEATED TO MAINTAIN 60° MINIMUM TEMPERATURE AND FREE OF ALL FUMES AND NOXIOUS ODORS. CEILING EXHAUST FAN OF 150 CFM MINIMUM CAPABLE OF AT LEAST 4 AIR CHANGES PER HOUR TO BE PROVIDED CONNECTED TO THE CEILING LIGHTING CIRCUIT AND WALL SWITCH AT EXTERIOR DOOR.
2. LAYOUT OF METER ROOM AND EQUIPMENT SHALL BE REVIEWED AND APPROVED BY THE DIRECTOR OF PUBLIC WORKS BEFORE CONSTRUCTION COMMENCES.

PLAN

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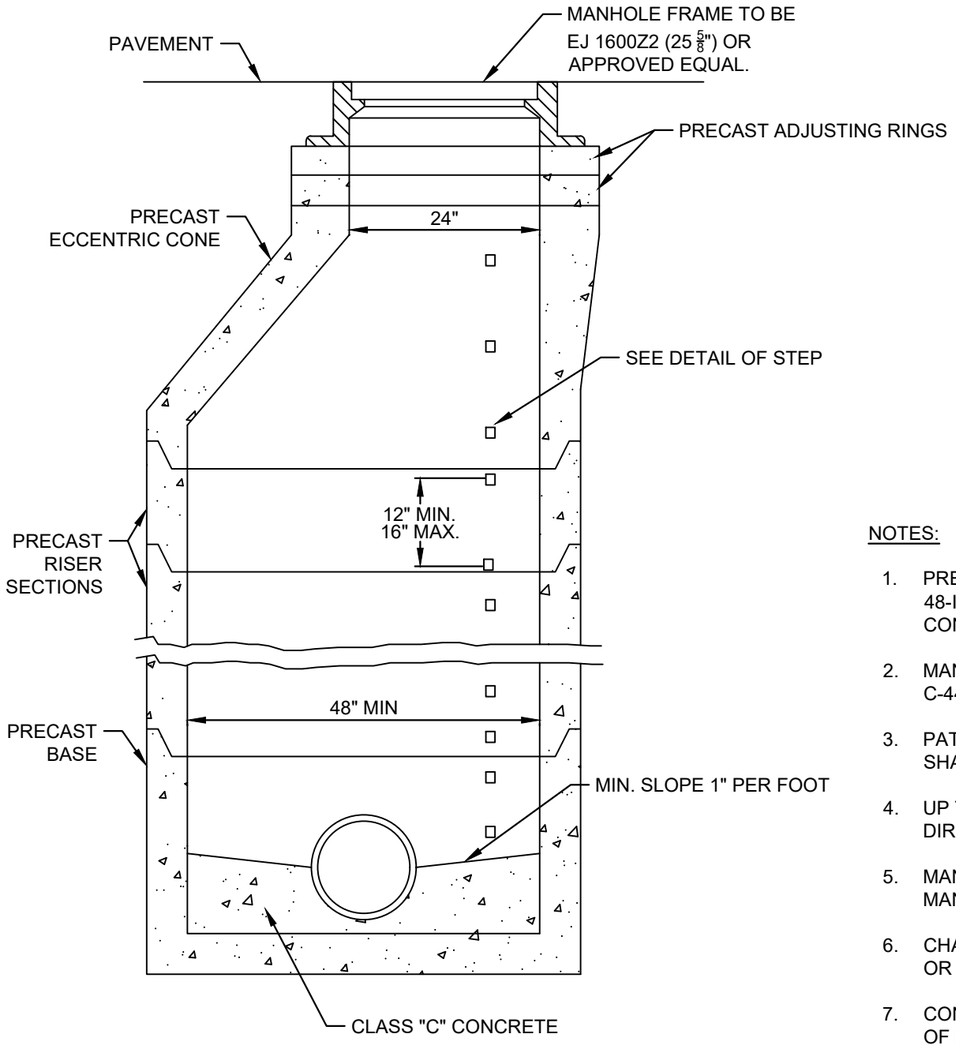
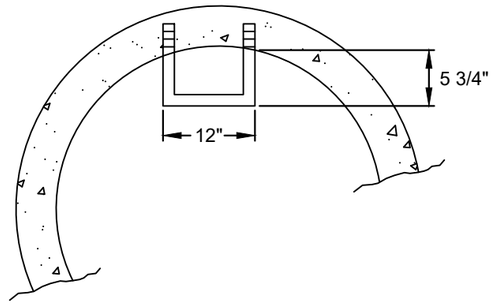
COMMERCIAL BUILDING INTERIOR METER DETAILS

DWG NO.
300-5





STEP DETAIL

NOTE: COPOLYMER POLYPROPYLENE PLASTIC ON 1/2" GRADE 60 STEEL REINFORCEMENT PSI-PF MANHOLE STEP BY M.A. INDUSTRIES INC, OR APPROVED EQUAL.

NOTES:

1. PRECAST CONCRETE MANHOLES SHALL BE CONSTRUCTED OF 48-INCH DIAMETER REINFORCED CONCRETE SECTIONS CONFORMING TO ASTM SPECIFICATION C-76-57T, TABLE II.
2. MANHOLE JOINTS TO CONFORM TO REQUIREMENTS OF ASTM C-443 (RUBBER GASKETS).
3. PATENTED RUBBER GASKET SEAL AT INLET AND OUTLET PIPE SHALL BE KOR N SEAL BOOT OR APPROVED EQUAL.
4. UP TO NINE DEGREES (9°) DEFLECTION IS ALLOWABLE IN ANY DIRECTION WHERE PIPE ENTERS MANHOLE.
5. MANHOLE FRAME SHALL BE EJ 1600Z2 OR APPROVED EQUAL. MANHOLE COVER SHALL BE EJ 1600C OR APPROVED EQUAL.
6. CHANNEL IN BOTTOM OF MANHOLE MAY BE FACTORY-FORMED OR JOB-FORMED.
7. CONCENTRIC CONE OR FLAT SLAB TOP MAY BE USED IN PLACE OF ECCENTRIC CONE IF APPROVED BY THE CITY ENGINEER.
8. ECCENTRIC OR FLAT SLAB REDUCER SHALL BE USED WHERE BASE SECTION OF MANHOLE IS LARGER THAN 48-INCHES IN DIAMETER AND SHALL BE INSTALLED DIRECTLY ABOVE THE BASE.
9. CAST-IN-PLACE BOTTOMS ARE ACCEPTABLE IF APPROVED BY THE CITY ENGINEER.
10. MAXIMUM HEIGHT OF ADJUSTING RINGS SHALL NOT EXCEED 12 INCHES.
11. ALL SANITARY MAINS BETWEEN MANHOLES SHALL BE DESIGNED SO AS TO HAVE A MINIMUM CLEANSING VELOCITY OF 2.0 FPS.
12. SPACING BETWEEN SANITARY MANHOLES SHALL BE 400' MAXIMUM.
13. ANY VARIATION FROM THIS STANDARD MUST HAVE APPROVAL OF THE CITY ENGINEER.
14. STEPS SHALL NOT BE INSTALLED ON ANY MANHOLE DEEPER THAN 20 FEET. A "NO ENTRY INSERT" SHALL BE PROVIDED.
15. ALL DROP CONNECTIONS SHALL BE EXTERIOR DROPS, UNLESS THE SEWER MAIN IS LESS THAN 8" AND RISER PIPE LESS THAN 4".

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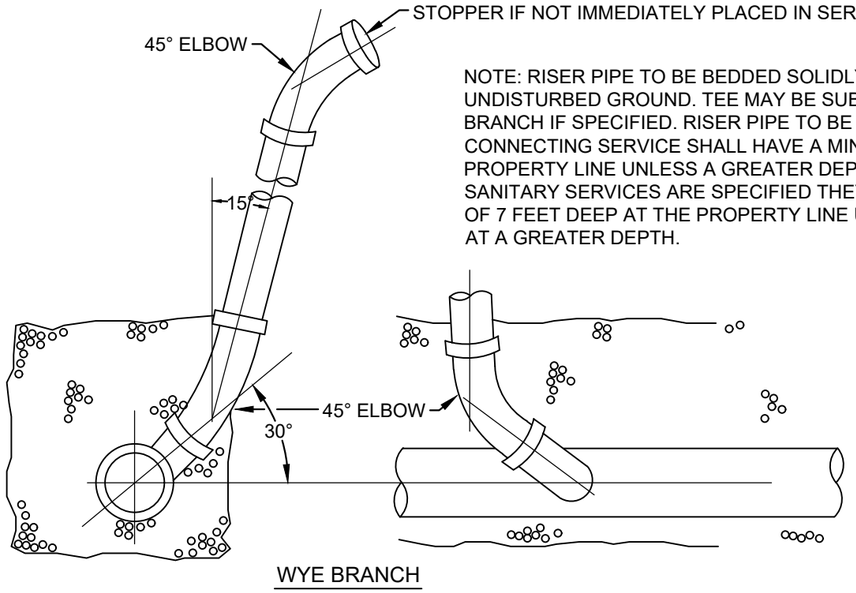
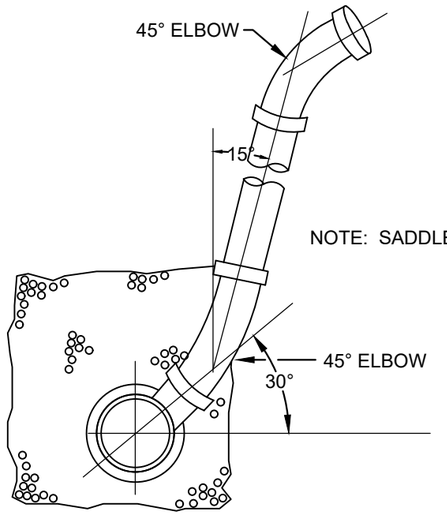
SANITARY SEWER MANHOLE

DWG NO.
400-1



NOTE: RISER PIPE TO BE BEDDED SOLIDLY AGAINST UNDISTURBED GROUND. TEE MAY BE SUBSTITUTED FOR WYE BRANCH IF SPECIFIED. RISER PIPE TO BE INSTALLED SO THAT CONNECTING SERVICE SHALL HAVE A MINIMUM OF 7 FEET AT THE PROPERTY LINE UNLESS A GREATER DEPTH IS DIRECTED. IF SANITARY SERVICES ARE SPECIFIED THEY SHALL BE A MINIMUM OF 7 FEET DEEP AT THE PROPERTY LINE UNLESS DIRECTED TO BE AT A GREATER DEPTH.

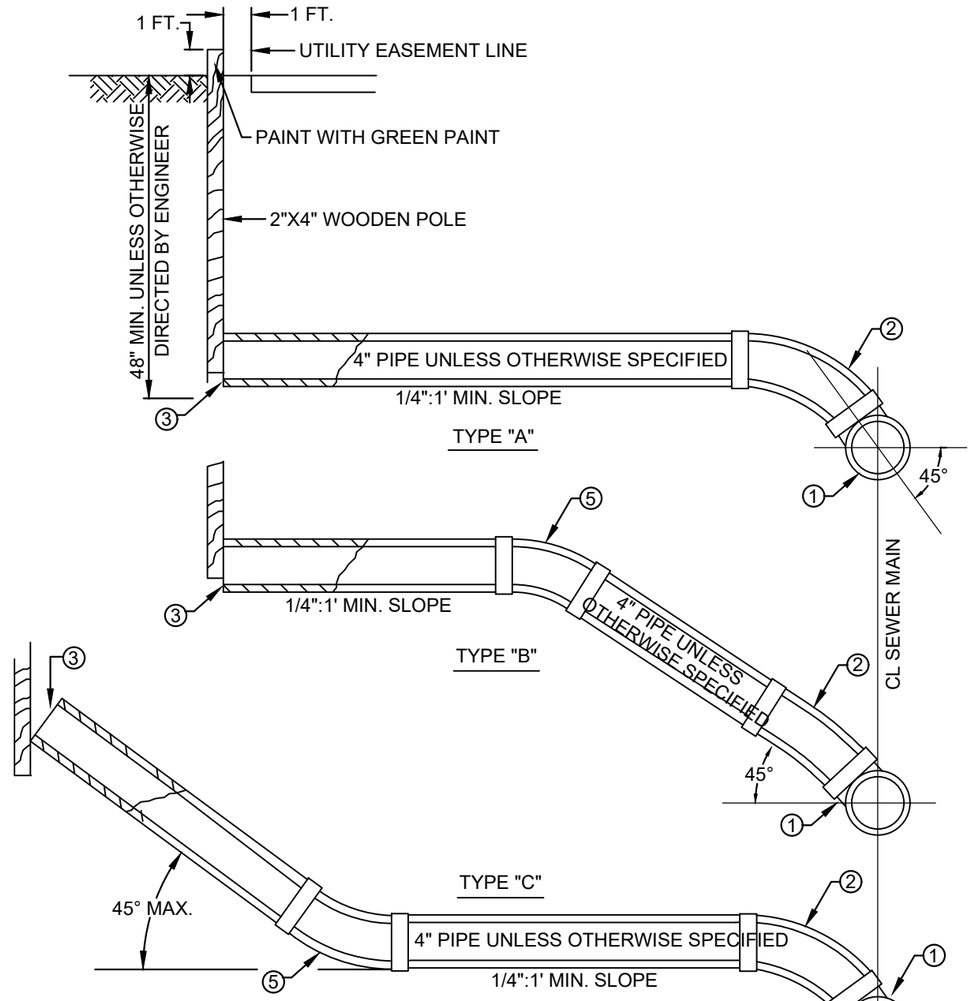
WYE BRANCH



NOTE: SADDLE OR WYE SHALL BE USED FOR LATERAL CONNECTION.

TEE BRANCH

DEEP CONNECTOR
N.T.S.



① 4" WYE-ROTATE 45° FROM HORIZONTAL UNLESS OTHERWISE SPECIFIED.
② 4" 1/8 BEND OR 1/16 BEND AS NECESSARY
③ CAP UNLESS JOINING EXISTING HOUSE CONNECTION
④ BED PIPE WITH 4" GRANULAR MATERIAL AND BACKFILL WITH GRANULAR MATERIAL T0 12" ABOVE PIPE.
⑤ EXACT RECORD OF BEND LOCATIONS MUST BE MADE, AS TO DEPTH FROM SURFACE AND DISTANCE FROM CL OF SEWER, BEFORE BACKFILL IS PLACED.

HOUSE CONNECTION
N.T.S.

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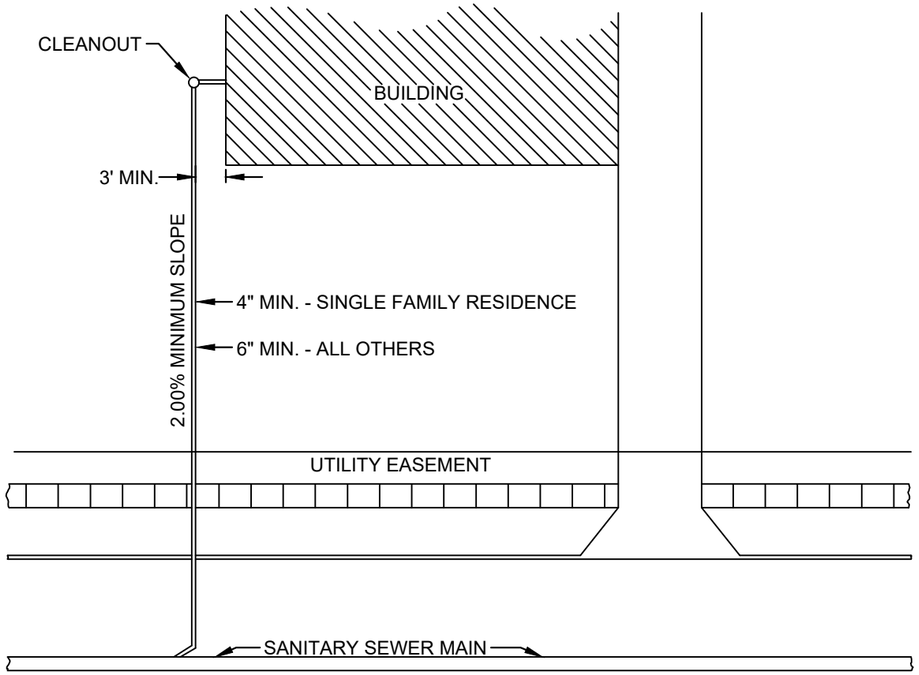
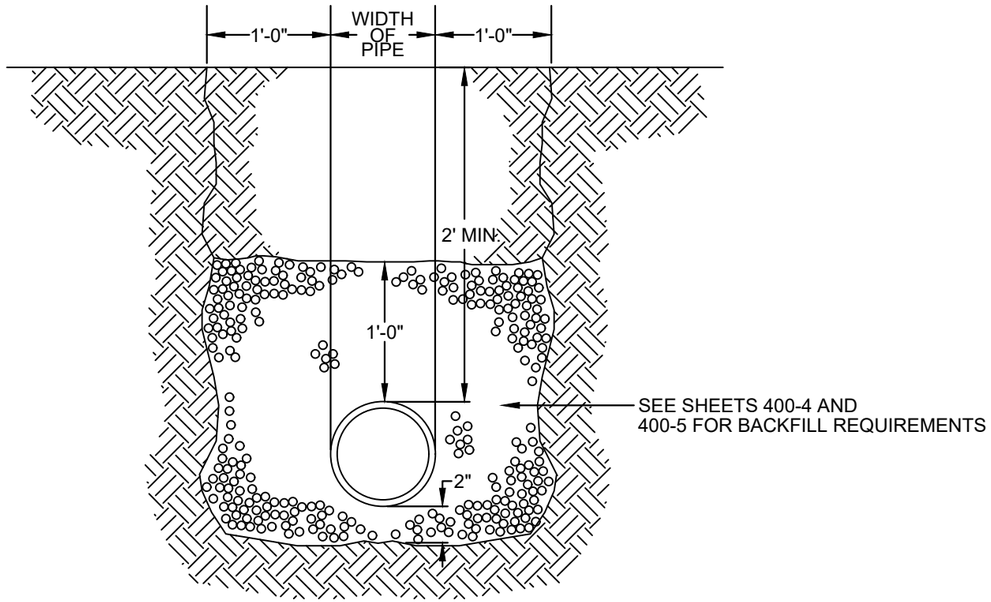
DEEP CONNECTOR AND HOUSE CONNECTION

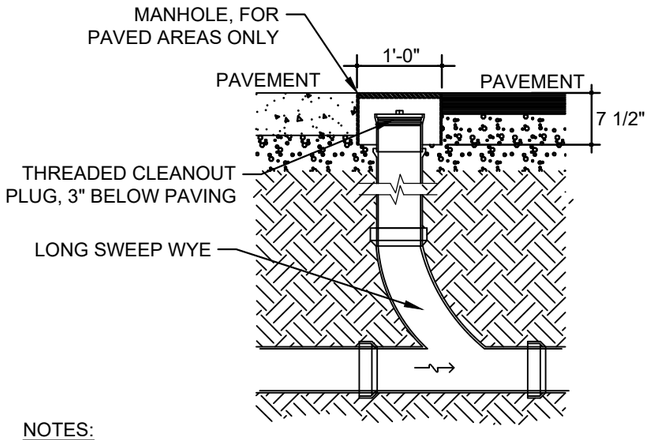
DWG NO.
400-2



NOTES:

1. BUILDING SEWERS SHALL NOT BE CONSTRUCTED CLOSER THAN THREE (3) FEET TO ANY EXTERIOR WALL, CELLAR, BASEMENT, OR CISTERN, NOR SHALL THERE BE LESS THAN TWO (2) FEET OF COVER.
2. ALL EXCAVATIONS SHALL BE BY OPEN CUT, WITH THE TRENCH CUT TWO (2) INCHES BELOW GRADE AND REFILLED PER DETAILS ON SHEETS 400-4 AND 400-5.
3. THE WIDTH OF THE TRENCH AT THE TOP OF THE PIPE SHALL NOT EXCEED TWO (2) FEET PLUS THE OUTSIDE DIAMETER OF THE PIPE.
4. THE MINIMUM SEWER SLOPE SHALL BE 2.00%.
5. PIPE SIZE SHALL NOT BE LESS THAN FOUR (4) INCHES FOR SINGLE-FAMILY RESIDENCES AND NOT LESS THAN SIX (6) INCHES FOR ALL OTHER BUILDINGS.
6. THE FOLLOWING IS A LIST OF APPROVED PIPES:
   - PVC PIPE - SDR 35 WITH RUBBER GASKET FOR PIPES WITH A BURY DEPTH LESS THAN 12 FEET
   - PVC PIPE - SDR 26 WITH RUBBER GASKET FOR PIPES WITH A BURY DEPTH GREATER THAN 12 FEET
7. ALL PIPING, FLEXIBLE COUPLINGS, DONUTS, ETC., ARE SUBJECT TO THE APPROVAL OF THE INSPECTOR.
8. ALL CHANGES IN ALIGNMENT OR GRADE ARE TO BE MADE USING THE PROPER BENDS OR CURVES.
9. ALL SEWERS EXCEEDING 100 FEET IN LENGTH MUST HAVE A CLEANOUT EVERY 100 FEET.
10. ANY VARIATION FROM THIS STANDARD MUST HAVE PRIOR APPROVAL FROM THE CITY ENGINEER.





NOTES:

A. CLEANOUT LOCATIONS SHALL BE INDICATED ON PLANS AS "CO".
B. CLEANOUTS LOCATED WITHIN PAVED AREAS SHALL BE SPECIFIED AS ZURN Z-1400 HD CLEANOUTS WITH A "SERVICE STATION" TYPE MANHOLE, OPW 104A-1200 - DOVER COMPANY/OPW DIV.

CLEANOUT IN PAVEMENT
N.T.S.

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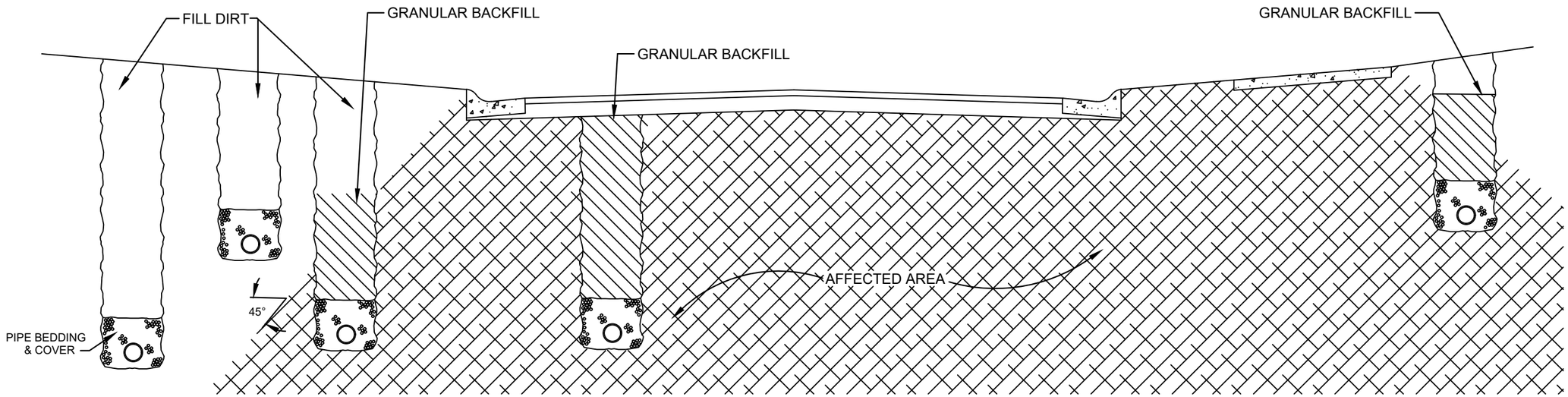
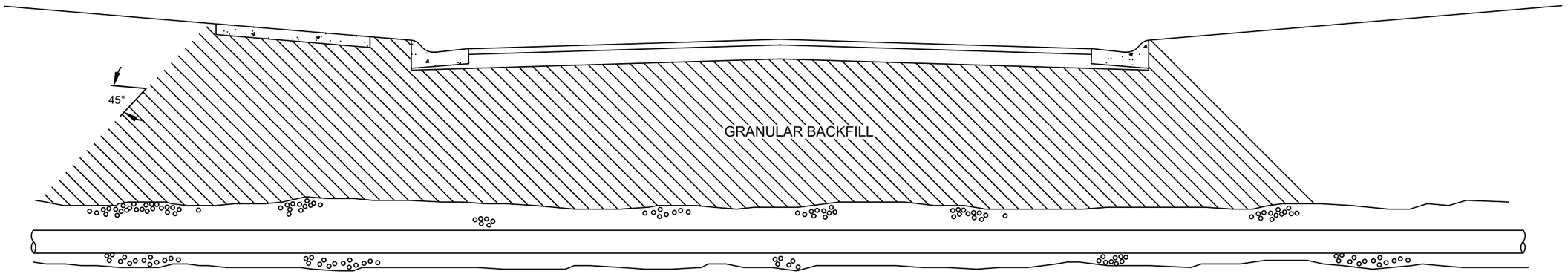
BUILDING SEWERS

DWG NO.
400-3



TRENCH RUNNING PARALLEL TO PAVEMENT (NEW STREET)

N.T.S.



TRENCH CROSSING PAVEMENT (NEW STREET)

N.T.S.

NOTES:

1. EXAMPLES ONLY, TO SHOW EXTENT OF BACKFILL IN VICINITY OF PAVEMENTS.
2. PIPE BEDDING AND COVER SHALL BE SAND.
3. GRANULAR BACKFILL TO BE COMPACTED IN 6" LAYERS WITH MECHANICAL TAMPER.
4. THIS STANDARD APPLIES TO ALL UTILITY TRENCHES FOR NEW STREET CONSTRUCTION.

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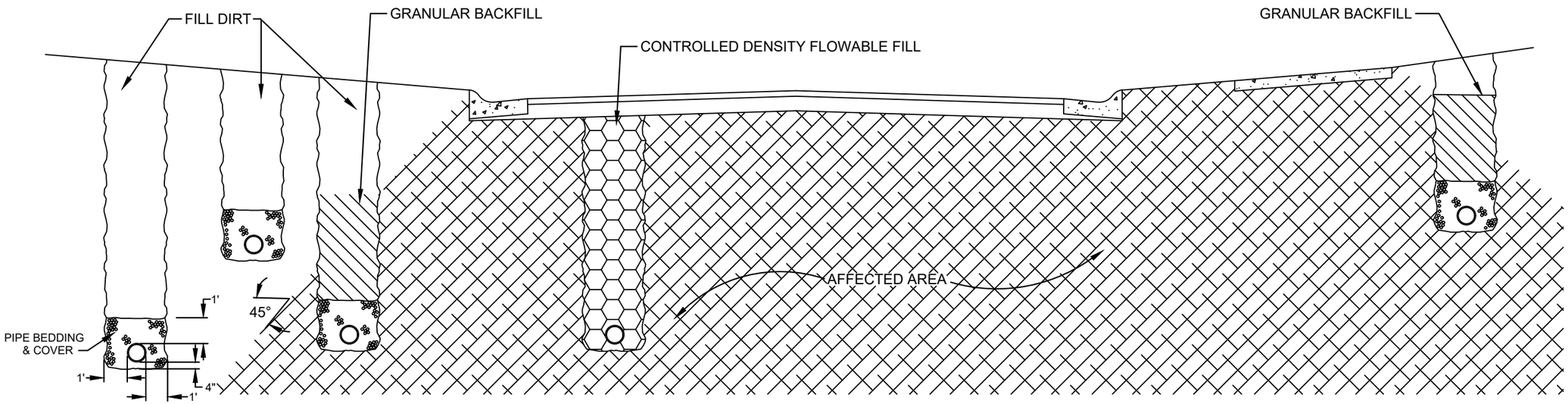
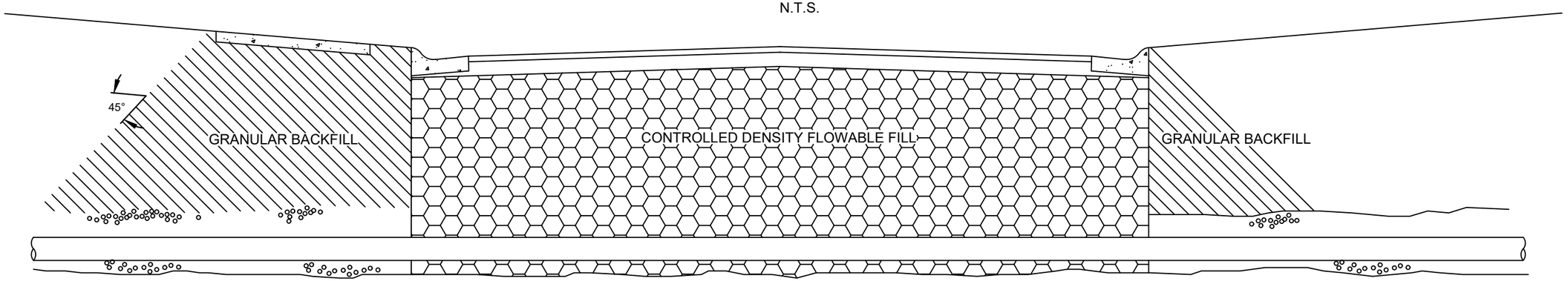
BACKFILL REQUIREMENTS FOR NEW STREETS

DWG NO.
400-4



TRENCH RUNNING PARALLEL TO PAVEMENT (EXISTING STREET)

N.T.S.



TRENCH CROSSING PAVEMENT (EXISTING STREET)

N.T.S.

NOTES:

1. PIPE BEDDING INSDIE OF STREET SECTION SHALL BE CONTROLLED DENSITY FLOWABLE FILL.
2. PIPE BEDDING AND COVER SHALL BE SAND.
3. GRANULAR BACKFILL TO BE COMPACTED IN 6" LAYERS WITH MECHANICAL TAMPER.
4. THIS STANDARD APPLIES TO ALL UTILITY TRENCHES WITHING EXISTING STREETS.

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BACKFILL REQUIREMENTS FOR EXISTING STREETS

DWG NO.
400-5

GENERAL SPECIFICATIONS

1.0 GENERAL NOTES

All construction within the City of Franklin shall comply with the City of Franklin's UDO, City of Franklin Standard Construction Details and Specifications, Warren County Requirements, and ODOT. Where conflict occurs between requirements, the most stringent of these shall apply.

PIPE MATERIAL SPECIFICATIONS

1.0 PRESSURE PIPE

1.1 PIPE MATERIAL

PVC Pipe shall conform to ANSI/AWWA C-900, DR 18, pressure class 200.

Ductile iron pipe shall conform to the American National Standards Institute Specification," ANSI A21.51 (AWWA C151) and ODOT 748.01. Ductile Iron Pipe shall be Class 52 Pipe.

1.1.1 JOINTS

Mechanical joints, bell and spigot joints and flanged joint for ductile iron pipe in sizes from two inches (2") through forty-eight inches (48") in diameter shall conform to all of the dimensions, shapes, and requirements of ANSI A21.10 (AWWA C110) "Cast Iron Fittings, 2 inches through 48 inches for Water and Other Liquids." The mechanical joint shall also conform in all respects to ANSI A21.11 (AWWA C111), "Rubber Gasket Joints for Cast Iron Pressure Pipe and Fittings."

Push-on joints shall be a single rubber gasket joint designed to be assembled by the positioning of a continuous, molded rubber ring gasket in an annular recess in the pipe and forcing of the plain end of the entering pipe into the socket, thereby compressing the gasket radially to the pipe to form a positive seal. The gasket and the annular recess shall be so designed and shaped that the gasket is locked in place against displacement as the joint is assembled. The push-on type joint shall conform to the requirements of ANSI A21.10 (AWWA C110) and ANSI A21.11 (AWWA C111) where applicable.

Where ductile iron pipe with bell and socket-type joints are specified, they shall be of the mechanical gland or push-on joint type. Provisions shall be made for longitudinal expansion and contraction with a positive stop against disengagement of the joint. Up to fifteen degrees (15°) angular deflection shall be accommodated without leakage and without decrease in full diameter of pipe.

1.1.2 FITTINGS

Cast iron or ductile iron fittings in sizes 2-inches through 48-inches for mechanical joints; bell and spigot joints and flange joints shall conform to all the requirements of ANSI A21.10 (AWWA C110), "Cast Iron Fittings 2-inches through 48-inches, for Water and Other Liquids," and to the requirements of ANSI A21.11 (AWWA C111), "Rubber Gasket Joints for Cast Iron Pressure Pipe Fittings," for mechanical joints and push-on type joints. Push-on joints for cast iron fittings shall be as described in 1.1.1 of this specification.

The fittings for use on ductile iron pipe may be either cast iron or ductile iron. The fittings larger than 12-inches shall have a minimum pressure rating of 200 p.s.i., unless otherwise shown on the construction drawings.

1.1.3 COATING FOR DUCTILE IRON PIPE AND FITTINGS

The ductile iron pipe and cast iron or ductile iron fittings shall be furnished with cement mortar lining in accordance with ANSI Specification A21.4 (AWWA C104), "Cement Mortar Lining for Cast Iron Pipe Fittings." The lining will be one-sixteenth (1/16) inch thick for pipe sizes four inches (4") through twelve inches (12") in diameter and three thirty-seconds (3/32) inch thick for sizes fourteen inches (14") through twenty-four inches (24") in diameter. A bituminous seal coat shall be applied to the lining surface immediately following the lining operation to prevent loss of moisture and ensure proper curing of the cement mortar. The outside of the iron pipe shall be furnished with a protective bituminous coating.

1.1.4 ANCHORING

Special anchoring may be required at places along the pipe lines. Where the construction drawings call for special anchoring, it shall include the use of mechanical joint anchoring fittings, couplings and pipe or positively restrained push-on joint-type pipe and fittings which allow for deflection at the joint after assembly, EBAA Iron Works, "Megalug", or approved equal.

2.0 GRAVITY PIPE

2.1 REINFORCED CONCRETE PIPE STORM SEWER

2.1.1 GENERAL

Reinforced concrete pipe shall conform in all respects to the requirements of ASTM C76, "Reinforced Concrete Culvert, Storm Drain and Sewer Pipe." Wall "B" thickness designs shall be supplied.

Table V of ASTM C76 shall be modified as specified in ODOT 706.02.

Class for the reinforced concrete pipe shall be as shown on the construction drawings, but no less than Class IV.

2.1.2 JOINTS

Bituminous plastic cement, which meets with the requirements of ODOT Specification 706.10, and which is applied in conformance with the requirement of ODOT Specification 603.06, will be accepted as a joining material. (Storm Sewer Only) Sanitary sewer joints shall conform to ASTM C443, "Joints for Circular Concrete and Culvert Pipe, Using Flexible, Watertight, Rubber Gaskets." Lubricants and/or adhesives shall be used as recommended by the manufacturer of the pipe and shall be supplied in quantities sufficient to assemble all of the concrete sewer pipe joints.

2.1.3 SERVICE CONNECTIONS

Service connections to a non-reinforced concrete sewer shall be made through a wye pipe saddle. Each wye shall be furnished with a stopper, which shall be sealed and banded into the branch opening until the service line is installed. The stopper joint shall be suitable to withstand an internal pressure of five (5) psi without leaking.

2.2 ABS DOUBLE WALL PIPE STORM SEWER

2.2.1 GENERAL
The thermoplastic material utilized for the manufacturer of the pipe walls shall be virgin, rigid acrylonitrice-butadiene-styrene (ABS). The material shall conform to the requirements of Type One, Grade One or Two, or Type Four, Grade One, ASTM D-1788, except that the minimum heat deflection temperature ASTM D648 shall be 180 degrees Fahrenheit.

2.2.2 COMPOSITE PIPE
Composite pipe consisting of two (2) ABS tubes integrally braced across the annulus with ABS webbing and with the resultant annular space filled with an inert filler the equal of Portland Cement Perlite Concrete, shall conform to the requirements of ASTM D-2680, except as specifically modified herein. The ends of manufactured sections of pipe shall be square and smoothly finished to prevent the rupture and/or loss of the concrete filler material.

Eight-inch (8") thru fifteen inch (15") nominal inside diameter pipe shall conform to the dimensions and tolerances given in Table 1, "Pipe Dimensions" of ASTM D-2680.

2.2.3 SOLID WALL PIPE
Solid wall pipe of ABS material shall conform to the requirements of ASTM D-2751. Wall thickness, however, shall not be less than 0.180 inches for four-inch (4") diameter pipe or 0.265 inch for six-inch (6") diameter pipe.

2.2.4 JOINTS
The sections of pipe shall be joined by chemically-welded couplings. Couplings shall be solid wall, molded of the same material as the pipe. Primer for chemical welding shall be Methyl-Ethyl-Keytone (MEK). Cement shall be MEK containing a minimum of twenty (20) percent dissolved ABS. Primer and cement shall be provided by the manufacturer of the ABS pipe.

2.2.5 SERVICE CONNECTIONS
The service lateral connections to the main line shall be made by use of saddles with stainless steel bands. The fittings shall be molded from the same material as the pipe. The service connection shall include such adapters as may be approved by the City Engineer to provide connection to the service line.

Each service shall be furnished with a spigot end cap, which shall be chemically welded onto the branch opening until the service line is installed. The joint shall be suitable to withstand an internal pressure of five (5) psi without leaking.

2.3 PVC PIPE SANITARY SEWER

2.3.1 GENERAL
The material used for unplasticized polyvinyl chloride (PVC) plastic pipe shall be clean, virgin Type 1, Grade 1 PVC compound conforming to ASTM D-1784. All PVC plastic used in the manufacture of pipe for this project shall be all new material and shall not include any rework or scrap PVC material from previous manufacturing processes.

Rubber compounds for the joint sealing ring shall conform to the requirements of ASTM D-1869.

2.3.2 PIPE

Solid wall PVC plastic pipe and fittings for gravity sewer installation shall conform to ASTM D-3034, SDR 35 for pipes buried at a depth less than 12 feet and D-3034, SDR 26 for pipes buried at a depth greater than 12 feet.

4-inch Diameter	0.125-inch Minimum Wall Thickness
6-inch Diameter	0.180-inch Minimum Wall Thickness
8-inch Diameter	0.240-inch Minimum Wall Thickness
10-inch Diameter	0.300-inch Minimum Wall Thickness
12-inch Diameter	0.360-inch Minimum Wall Thickness
15-inch Diameter	0.437-inch Minimum Wall Thickness

For pipe larger than 15", material and specifications shall be approved by City Engineer.

2.3.3 JOINTS

Pipe shall be bell and spigot, the bells being formed integrally with the pipe. The bells shall contain two (2) PVC retainer rings, which accurately and securely contain the solid rubber joint sealing ring. Joint design shall permit expansion and contraction of the pipeline as well as flexibility at the joint.

2.3.4 SERVICE CONNECTIONS

The service lateral connections to the main line shall be made by the use of wyes or saddles. Fittings shall be manufactured of the same material as the main line pipe and have similar style joints. The service connection shall include such adapters as may be approved by the City Engineer to provide connection to the service line. Factory-molded fittings shall be required.

Each branch or tee shall be furnished with a suitable stopper which shall be sealed into the branch opening until the service line is installed. The stopper joint shall be suitable to withstand an internal pressure of five (5) psi without leaking.

Roof drains , foundation drains, and all other clean water connections to the sanitary sewer system are prohibited.

2.4 SANITARY SEWER PUMP STATION

Sanitary lift station shall be aluminum, no vault type pump station with appropriately sized chopper pumps, such as Excel Fluid Group, LLC, EX-ALNV2 or approved equal.

CONSTRUCTION SPECIFICATIONS

1.0 PRESSURE PIPELINES

1.1 TRENCH EXCAVATION

1.1.1 GENERAL
Trenches for buried pressure pipelines shall be excavated so that the pipes and appurtenances may be installed and joined to the alignments and grades required.

1.1.2 TRENCH DEPTH
The depth of pressure pipeline trenches shall be a minimum of four (4) feet plus the outside diameter of the pipelines measured from the existing street grade or the proposed street grade, if shown on the construction drawings. Excavation for depths greater or less than the minimum are shown on profile on the construction drawings.

Pressure pipeline trenches shall be excavated in a manner that will provide a uniform and continuous bearing and support for the barrels of pipe on solid and undisturbed ground at every point between bellholes, except for that area near the mid-section of the pipe disturbed by the withdrawal of pipe slings or other lifting tackle. Bellholes will be provided at each joint to permit the jointing to be made properly. Rock, if present in the trench bottom, shall be excavated to a minimum depth four (4) inches below the outermost dimension of the pipeline. Excavated rock shall be disposed of by the Contractor and not used for backfilling.

1.2 INSTALLING PRESSURE PIPELINES
The specifications for the installation of pressure pipelines are intended to conform with AWWA Specification C600. The City shall require compliance with the specification contained in AWWA C600, the same as if they were totally incorporated herein, except where these specifications direct otherwise.

Pressure pipelines shall be laid and maintained to the required lines and grades with fittings and valves set at the required locations, spigots, centered in bells, and all valves and hydrant stems plumb. All pipe and fittings shall be carefully examined for cracks and other defects while suspended above the trench immediately prior to installation in final position. Spigot ends shall be examined with particular care. Defective pipe or fittings shall be removed from the construction site.

As each length of pipe is placed in the trench, the spigot end shall be centered accurately in the bell and the pipe forced home and brought to correct line and grade. Precautions shall be taken to prevent dirt from entering the annular joint space.

At times when pipe laying is not in progress, the open ends of the pipe shall be closed by a water-tight plug or other means approved by the City Inspector. If ground water rises in the trench, such a seal shall remain in place until the trench is pumped completely dry, ready for continued pipe laying operations. The cutting of the pipe for the insertion of valves, fittings, or closure pieces shall be done in a neat and workmanlike manner without damage to the pipe or lining so as to leave a smooth end cut at right angles to main axis of the pipe.

Pipe shall be laid with bell ends facing in the direction of laying, unless directed otherwise by the City Inspector. Where pipe is laid on a grade of ten percent (10%), or greater, the laying shall start at the bottom and shall proceed upwards with the bell ends of the pipes upgrade.

1.3 DEFLECTION OF DUCTILE IRON PIPE

Whenever the construction drawings require the deflection of mechanical joint or push-on joint pipe in order to form a long radius curve, the amount of the deflection shall not exceed the maximum limits specified in Table 1, Mechanical Joint Pipe, and Table 2, Push-On Joint Pipe, contained in AWWA C600.

1.4 PIPELINE FITTINGS

Pipeline fittings, plugs, and caps of the required size and type shall be furnished and installed at the locations shown on the construction drawings or as directed by the City Inspector. It shall be the responsibility of the Contractor to furnish and install all proper size fittings for both horizontal and vertical deflections, which are required to construct the pressure main to the line and grade shown on the construction drawings, or as established in the field by the City Inspector. The fittings, plugs, and caps shall be set and joined to the pipe in the manner hertofore specified for installation.

1.5 TESTING

The Contractor shall subject the completed pressure pipeline to a leakage test. The test shall be performed on all newly-laid pipe in lengths not to exceed 1000 feet. The length of the test section shall not exceed the specified maximum without explicit approval of the Director of Public Works. The test may be conducted after the trench has been backfilled, but must be completed before replacement of pavements and final restoration. All testing shall be done in the presence of the City Inspector.

1.6 FLUSHING AND CLEANING

The completed pipeline shall be flushed with clean water until all dirt has been washed free. Sufficient pressure and volume of water shall be furnished by the Contractor to ensure that a thorough cleaning job has been accomplished.

1.7 LEAKAGE TEST

The Contractor shall furnish the pump, pipe connection, temporary testing plugs and caps, and all necessary apparatus, including pressure gauges, meters, and a supply of approved water. The Contractor shall make all necessary taps into the pressure pipelines. The Contractor shall be responsible for all labor and equipment necessary to conduct the tests, including excavating and backfilling the test pit at the location selected by the Director of Public Works.

The completed pipeline shall be slowly filled with water. All air shall be expelled from the pipe at high points by means of test plus in valve bonnets, fire hydrants, or through corporation stops installed by the Contractor for this purpose. After all air has been expelled, the opening shall be closed and the test pressure applied by means of a test pump connect to the pipe in a manner satisfactory to the Director of Public Works.

Test pressure for the leakage tests shall be 1.5 times the normal operating pressure at the lowest point in the section of line under test, as corrected to the elevation of the test gauge. The duration of each leakage test shall be two (2) hours. Minimum test pressure 100 psi.

The exposed piping and/or surface of the backfilled trench shall be carefully inspected during the test for any signs of leakage. Any cracked or defective pipe, fittings, valves, hydrants, joints, etc. discovered in consequence of the leakage tests, shall be removed and replaced by the Contractor with sound material, and the test repeated until satisfactory results are obtained. The Contractor is responsible for the location, excavation, and backfilling of a pressure pipeline trench at no cost to the Owner, in addition to replacing the defective material, if the leakage test is conducted on a backfilled pressure pipeline. At all times during the leakage test, the Contractor shall maintain the specified hydrostatic pressure through his test pump. Maximum variation in pressure during the test is 5 psi.

Leakage shall be defined as the quantity of water that must be supplied into the newly laid pipe or any valved section therof to maintain pressure within 5 psi of the specified test pressure after the pipe has been filled with water and the air has been expelled. Leakage shall not be measured by a drop in pressure in a test section over a period of time. No pipe installation will be accepted if the leakage is greater than the values in Table 3.

TABLE 3
ALLOWABLE LEAKAGE / AWWA C600

AVG. TEST PRESSURE PSI	PIPE SIZE-IN															
	3	4	6	8	10	12	14	16	18	20	24	30	36	42	48	54
	ALLOWABLE LEAKAGE PER 1,000 FT-GPH															
450	0.48	0.64	0.95	1.27	1.59	1.91	2.23	2.55	2.87	3.18	3.82	4.78	5.73	6.69	7.64	8.60
400	0.45	0.60	0.90	1.20	1.50	1.80	2.10	2.40	2.70	3.00	3.60	4.50	5.41	6.31	7.21	8.11
350	0.42	0.56	0.84	1.12	1.40	1.69	1.97	2.25	2.53	2.81	3.37	4.21	5.06	5.90	6.74	7.58
300	0.39	0.52	0.78	1.04	1.30	1.56	1.82	2.08	2.34	2.60	3.12	3.90	4.68	5.46	6.24	7.02
275	0.37	0.50	0.75	1.00	1.24	1.49	1.74	1.99	2.24	2.49	2.99	3.73	4.48	5.23	5.98	6.72
250	0.36	0.47	0.71	0.95	1.19	1.42	1.66	1.90	2.14	2.37	2.85	3.56	4.27	4.99	5.70	6.41
225	0.34	0.45	0.68	0.90	1.13	1.35	1.58	1.80	2.03	2.25	2.70	3.38	4.05	4.73	5.41	6.03
200	0.32	0.43	0.64	0.85	1.06	1.28	1.48	1.70	1.91	2.12	2.55	3.19	3.82	4.46	5.09	5.73
175	0.30	0.40	0.59	0.80	0.99	1.19	1.39	1.59	1.79	1.98	2.38	2.98	3.58	4.17	4.77	5.36
150	0.28	0.37	0.55	0.74	0.92	1.10	1.29	1.47	1.66	1.84	2.21	2.76	3.31	3.86	4.41	4.97
125	0.25	0.34	0.50	0.67	0.84	1.01	1.18	1.34	1.51	1.68	2.01	2.52	3.02	3.53	4.03	4.53
100	0.23	0.30	0.45	0.60	0.75	0.90	1.05	1.20	1.35	1.50	1.80	2.25	2.70	3.15	3.60	4.05

1. IF THE PIPELINE UNDER TEST CONTAINS SECTIONS OF VARIOUS DIAMETERS, THE ALLOWABLE LEAKAGE WILL BE THE SUM OF THE COMPUTED LEAKAGE FOR EACH SIZE.
2. WHEN TESTING AGAINST CLOSED METAL-SEATED VALVES, AN ADDITIONAL LEAKAGE PER CLOSED VALVE OF 0.0078 GPH/IN OF NOMINAL SIZE SHALL BE ALLOWED.
3. ALL VISIBLE LEAKS ARE TO BE REPAIRED, REGARDLESS OF THE AMOUNT OF LEAKAGE.

1.8 BACKFILLING

The construction drawings indicate trenches which shall be completely backfilled per Standard Drawings 400-4 and 400-5. In these cases, the excavated material from the trench shall be disposed of directly from the equipment excavating the trench into appropriate type carriers for removal from the construction site. Where granular trench backfill is indicated on the construction drawings, all of the material used to backfill the trench, excluding the pipe bedding and cover material, shall be of the gravel type material. Controlled density flowable fill is to be used for trenches in existing street sections.

1.9 BEDDING (SAND)

All trenches shall be backfilled by hand from the bottom of the trench to the centerline of the pipe with material placed in three (3) inch layers and compacted by tamping in a manner which shall not disturb the alignment of the pipe or fittings. The bedding shall be constructed of select bedding sand free from stones, refuse or organic material. Each individual length of pipe shall be bedded after installation and prior to the connection of an additional length of pipe.

1.10 INITIAL BACKFILL (SAND)

The trench shall be backfilled by hand or approved mechanical methods from the centerline of the pipe to a height one (1) foot above the top of the pipe. The material used shall be the equal of the sand specified for bedding. The Contractor shall use special care in placing this portion of the backfill so as to avoid injuring or displacing the pipeline. Mechanized equipment, such as bulldozers, front-end loaders, etc., shall, under no condition, be used to push excavated material directly into the open trench as backfill between the bottom of the trench and a point one (1) foot above the top of the pipe.

1.11 BALANCE OF BACKFILL (GRANULAR)

Where granular trench backfill is specified, the backfill material from one (1) foot above the pipe to the street or shoulder grade (or subgrade of pavement) shall consist of gravel that shall be puddled with hose and pipe nozzle after the trench is backfilled. The Contractor shall furnish the necessary tank trucks, water pumps, and all equipment required to settle the gravel backfill by the puddling method.

Where backfill with excavated materials is indicated on the construction drawings, the Contractor may backfill the trench from one (1) foot above the top of the pipe to the top of the trench with excavated material, provided that such material consists of loam, clay, sand, gravel, or other materials that, in the opinion of the Director of Public Works, are suitable for backfilling. Care should be taken to carry the backfill up evenly in the trench. Backfill shall be neatly rounded over the top of the trench to a sufficient height to allow for settlement to grade after consolidation.

1.12 ANCHORAGE

The Contractor shall anchor all deflections in excess of ten (10) degrees by use of restrained joints or concrete blocking to prevent movement of any portion of the pipe due to internal pressure.

The length of pipe with restrained joints called for on the construction drawings shall be considered as a minimum for the stated test pressure and stated minimum compacted backfill over the pipe.

If the pipeline is tested at a higher than stated internal pressure and/or without the stated minimum compacted pipe cover, additional restrained joints will be required and shall be furnished and installed.

1.13 WATER SERVICE LINE POLE

The Contractor shall install a 2" x 4" wooden pole at the end of all water service lines. The pole shall be painted blue.

2.0 GRAVITY PIPELINES

2.1 TRENCH EXCAVATION

2.1.1 GENERAL

Trenches for underground gravity pipelines shall be excavated so that the pipes and appurtenances can be installed to the alignments and grades required. The specifications for the installation of gravity pipelines are intended to conform with ASTM D-2321, "Underground installation of Flexible Thermo-Plastic Sewer Pipe," excepting therefrom Section 7, and as further modified by Appendix A1, ASTM D-2680, "ABS Composite Pipe." The City Engineer shall require compliance with the applicable stated ASTM Specification for installation, except where modified by these specifications.

Special installation instructions, issued by the manufacturer of the pipe, relative to making pipe joints shall be adhered to by the Contractor.

2.1.2 TRENCH DEPTH

The trench shall be excavated to a minimum depth of four (4) inches below the outermost dimension of the pipe barrel or pipe bell to be installed therein. Rock, if present in the trench bottom, shall be excavated to a minimum depth five (5) inches below the outermost dimensions of the pipeline.

The trench for lateral service gravity pipelines shall be excavated to a minimum depth of four (4) inches below the outermost dimension of the pipe barrel or pipe bell to be installed therein. Rock, if present in the lateral service gravity pipeline trench bottom,shall be excavated to a minimum depth four (4) inches below the outermost dimensions of the pipeline.

2.2 INSTALLING GRAVITY PIPELINES

The gravity pipelines shall be laid in a finished trench commencing at the low point with the spigot ends pointing in the direction of flow. All gravity pipe, including service laterals, shall be placed on a dry, stable bedding sand shaped to receive the barrel support for the full length of the pipe, and form a straight gravity pipeline with a uniform grade true to the established line and grade. If the open end of the pipe section is low, the individual pipe must be removed and the bed prepared to the proper grade.

Line and grade for the gravity pipeline may be established by the Contractor using batter boards, grade strings, plumb lines and grade rods. The batter boards shall be placed at each grade stake. Three (3) consecutive batter boards shall be in place at all ties unless otherwise approved by the Director of Public Works. Distance between grade stakes shall not exceed twenty-five (25) feet or by the use of a laser beam, with a minimum of stakes placed at each manhole and 100 feet upstream of each branch.

2.3 BEDDING

2.3.1 PIPE BEDDING - ALL PIPE (BEDDING SAND)

A cradle pipe bedding sand shall be furnished for all gravity pipelines. The bedding sand shall be thoroughly compacted by hand-placing under the pipeline and hand-tamping to produce a dense cradle free from voids to completely support the pipeline throughout its entire length. There shall be a minimum of four (4) inches of bedding between the outermost dimension of the pipe and the bottom of the excavation areas for normal excavation. There shall be a minimum of five (5) inches of bedding sand between the outermost dimension of the pipe and the bottom of the excavation in areas of rock excavation.

As soon as possible after joint is made, the balance of the bedding sand shall be placed up to the spring line of the pipe to offset conditions that might tend to move the pipe off from line or grade. Disturbing the pipe in any manner after the joints have been made shall not be permitted. The balance of the bedding sand shall be thoroughly compacted by hand-placing and hand-tamping to produce a dense fill around the pipeline. The pipe bedding shall extend laterally to the outermost limits of the trench.

2.3.2 INITIAL BACKFILL (SAND)
The trench shall be backfilled by hand or approved mechanical methods from the spring line of the pipe to a height one (1) foot above the top of the pipe. The material used shall be the equal of the sand specified for bedding. The Contractor shall use special care in placing this portion of the backfill so as to avoid injuring or displacing the pipeline. Mechanized equipment, such as bulldozers, front-end loaders, etc., shall, under no condition, be used to push excavated material directly into the open trench as backfill between the bottom of the trench and a point one (1) foot above the top of the pipe.

2.4 INSTALLING GRAVITY SERVICE LINES

2.4.1 GENERAL
Gravity service connections to main line gravity pipes shall not be installed until their location has been approved by the City Engineer. No service lines to be backfilled until checked by the City Inspector.

Gravity service lines shall terminate at a point one (1) foot behind the utility easement on the property to be served, unless otherwise indicated by the Director of Public Works. Gravity service lines will be fitted with a stopper into the upper end. The slope of service line from upper end toward the main line gravity pipeline shall be two (2) feet per 100 linear feet of service line, unless otherwise authorized or approved by the City Engineer. The service lines shall be laid on a straight grade unless otherwise directed or approved by the City Engineer. No sewer line may be cut or broken in the field to permit the installation of a service wye.

2.4.2 INSTALLATION
Appropriate sections of this Specification for trench excavation, pipeline installation, flushing, cleaning and testing, pipe bedding, initial backfill and balance of backfill shall apply to the installation of the specific type of material used for the gravity service lines. The balance of backfill material shall be gravel for all gravity service lines installed within the street tor roadway.

2.4.3 SERVICE LINE POLE
The Contractor shall install a 2" x 4" wooden pole at the intermediate upper end of all gravity service lines. The pole shall be installed in a vertical plane extending from the bottom of the service pipe to a point twelve (12) inches above ground elevation. The pole shall be painted green. Care should be exercised to keep the pole plumb during backfilling operations and to preserve the above-ground extension during clean up and restoration operations.

2.5 CLEANING AND ALIGNMENT CHECK
The Contractor shall clean out the completed gravity pipeline of all sand, gravel, stones, or other debris by proper flushing. Other methods may be used if approved by the Director of Public Works. Particular care shall be taken at the location where a connection is made to an existing system to prevent any foreign materials from entering an operating pipeline. The outlet for a new gravity pipeline shall be bulkheaded at the existing manhole and bulkhead shall not be removed until the project is completed.

The Contractor and the Director of Public Works will then check the pipeline between manholes for alignment by means of mandrel testing. If the test shows any misalignment, displaced pipe, or any other defects, the defects designated by the Director of Public Works shall be remedied by the Contractor.

2.6 TESTING

2.6.1 LEAKAGE

The Contractor shall furnish all labor, equipment, and materials which are required to test the sections of the gravity pipeline and manholes for tightness. Either the infiltration test or the hydrostatic test will be ordered by the Director of Public Works. All tests shall be conducted under the supervision of the City.

The Contractor shall determine the locations where excess water is entering or leaving the pipeline. If the amount of leakage exceeds the allowable , the gravity pipeline and/or manholes shall be repaired and retested until the leakage of the system is within the allowable limits as specified. The tests for leakage shall include portions of the service lines to be installed by the Contractor.

All visible leaks shall be repaired by the Contractor whether amount of leakage exceeds the allowable or not.

2.6.2 INFILTRATION TEST

The infiltration test will be conducted on that portion of the pipeline where the top of the pipe at the upper manhole is a minimum of one (1) foot below the level of the ground water table.

The infiltration test shall be made by installing a weir or other measuring device approved by the Director of Public Works in the lower end of the pipeline section to be tested. The incoming pipe or pipes in the upper end of the test section shall be securely sealed. The quantity of ground water infiltrating into the test section shall be measured. The allowable leakage for gravity pipelines shall not exceed one-hundred (100) gallons per day per mile of pipe per inch of pipe diameter.

The following formulae are given for the ease of calculations:

Gallons per Minute Allowed = 0.000131*L*d
Cubic Feet per Second Allowed = 0.00016*L*d
Where L = Length of 100-Foot Stations of Sewer Being Tested and
d = Nominal Diameter in Inches of Sewer Being Tested

Each size of main sewer pipe shall be tested separately. Each test section shall not exceed 1,000 feet of sewer pipe.

2.6.3 EXFILTRATION TEST

The exfiltration test shall be conducted over a twenty (20) minute period. Water for testing shall be supplied by the Contractor. The elevation of the level of water in the manhole and the drop in the level of the water in the upper manhole shall be carefully measured during the duration of the test. The allowable leakage for the hydrostatic test shall not exceed 100 gallons per day per mile of pipe per inch of inside diameter of the pipe tested.

The exfiltration test shall be conducted between two (2) successive manholes. The lower end of the pipeline and all inlet pipes of the upper manhole shall be sealed with pipe stoppers. The span of gravity pipeline to be tested shall be filled with water to a point four (4) feet above the top of the crown of the pipeline in the upper manhole, or the outside water table, whichever is higher. The water shall stand in the pipe and manhole so that absorption can take place if the concrete in the manhole or pipeline is dry.