CITY OF HILLSBORO, OHIO
ORDINANCE NO. 2025-15

AN ORDINANCE AMENDING SECTIONS OF THE CODIFIED ORDINANCES OF THE CITY OF HILLSBORO AND ADOPTING THE CITY OF HILLSBORO STANDARD DRAWINGS MANUAL AND DESIGN CRITERIA MANUAL

WHEREAS, upon recommendation of the Public Works Superintendent, the Safety and Service Director has submitted a Standard Drawings Manual and Design Criteria Manual for consideration of Council; and

WHEREAS, Council believes that Hillsboro Codified Ordinances 91.60, 96.15, 96.16, 96.17, 96.18, 96.19, 96.20, 96.21, 96.22, 96.23, 50.020, 50.021, 50.022, 50.035, 50.036, 50.037, 50.038, 50.039, 50.043, 50.044, 51.026, 51.027, 51.045, 51.046, 51.047, 51.048, 51.075, 159.22, 159.23, 159.24, 159.25, 159.26, 159.27, 159.28, 159.29, 159.30, 159.31, 159.32, 159.33, 159.45, 154.044, 154.046, 154.047, 154.052, 154.048, 154.067, 154.068, 154.069, 154.070, 154.071, 154.072, 154.073 shall be amended to conform with the recommendations of the Public Works Superintendent.

NOW, THEREFORE, BE IT ORDAINED BY THE COUNCIL OF THE CITY OF HILLSBORO, STATE OF OHIO, WITH A MAJORITY OF ALL COUNCIL MEMBERS CONCURRING THAT:

SECTION 1: That the Standard Drawings Manual, as attached hereto as "Exhibit A" and the Design Criteria Manual, attached hereto as "Exhibit B" is hereby authorized, approved, and adopted.

SECTION 2: That Hillsboro Codified Ordinances 91.60, 96.15, 96.16, 96.17, 96.18, 96.19, 96.20, 96.21, 96.22, 96.23, 50.020, 50.021, 50.022, 50.035, 50.036, 50.037, 50.038, 50.039, 50.043, 50.044, 51.026, 51.027, 51.045, 51.046, 51.047, 51.048, 51.075, 159.22, 159.23, 159.24, 159.25, 159.26, 159.27, 159.28, 159.29, 159.30, 159.31, 159.32, 159.33, 159.45, 154.044, 154.046, 154.047, 154.052, 154.048, 154.067, 154.068, 154.069, 154.070, 154.071, 154.072, 154.073 shall be amended by striking the current language and replacing such language with "The Standard Drawings Manual and Design Criteria Manual is adopted by reference as if set out at length herein. A copy shall be on file in the office of the Mayor."

SECTION 3: That it is found and determined that all formal actions of this Council concerning and relating to the passage of this Ordinance were adopted in an open meeting of this Council, and that all deliberations of this Council and of any of its committees that resulted in such formal actions were in meetings open to the public, in compliance with all legal requirements, including Section 121.22 of the Ohio Revised Code.

SECTION 4: This Ordinance shall take effect and be in full force as the earliest period allowed by law.

1st Reading 4-16-2025
2nd Reading 5-15-2025
3rd Reading 6-12-2025

Passed this 12 day of June, 2025.

Tom Eichinger, Council President

Attest: Lauren Walker
Lauren Walker, Clerk of Council

Approved: _____ Date: 6/16/2025
Justin Harsha, Mayor

Prepared by the City Law Director.

EXHIBIT A

City of Hillsboro Standard Drawings

THE CONSTRUCTION STANDARDS AND DRAWINGS HAVE BEEN PREPARED TO AID ENGINEERS AND DEVELOPERS IN THE PREPARATION OF DEVELOPMENT PLANS AND ENGINEERING DESIGN AND TO INFORM INTERESTED PERSON OF THE PROCEDURES AND STANDARDS FOR THE CITY OF HILLSBORO, OHIO. IT IS ALSO INTENDED TO BE USED DURING RECONSTRUCTION OR REPLACEMENT OF EXISTING FACILITIES OR ANY CONSTRUCTION WITHIN THE CITY RIGHT-OF-WAY. THE RULES, STANDARDS, SPECIFICATIONS, CRITERIA, ETC. ARE TO SUPPLEMENT ANY APPLICABLE ZONING REGULATION AND THE CITY OF HILLSBORO SUBDIVISION REGULATIONS OF THE CITY OF HILLSBORO.

IT IS NOT THE INTENT OF THE CONSTRUCTION STANDARDS AND DRAWINGS TO TAKE AWAY FROM THE DESIGNING ENGINEER ANY RESPONSIBILITY FOR THE TECHNICAL ADEQUACY OF THIS DESIGN OR FREEDOM TO USE HIS ENGINEERING JUDGMENT AND DISCRETION. IT IS RECOGNIZED THAT MATTERS OF ENGINEERING DESIGN CANNOT BE SET OUT IN WRITING TO COVER ALL SITUATIONS; HOWEVER THE CONSTRUCTION STANDARDS AND DRAWINGS AS SET OUT HEREIN REPRESENT GOOD CONSTRUCTION STANDARDS AND DRAWINGS AS SET OUT HEREIN REPRESENT GOOD ENGINEERING PRACTICE. ANY DESIGN METHODS OR CRITERIA DIFFERENT THAN THAT LISTED WILL RECEIVE CONSIDERATION FOR APPROVAL, PROVIDED THE PROPOSED VARIANCES AND THE REASONS FOR THEIR USE ARE SUBMITTED TO THE CITY FOR THE CITY ENGINEER'S APPROVAL.

THE CITY, AT ANY TIME DURING THE DESIGN OR CONSTRUCTION, SHALL HAVE THE AUTHORITY TO MODIFY ANY ENGINEERING OR CONSTRUCTION DETAIL, WHENEVER REQUIRED FOR THE PROTECTION OF THE PUBLIC INTEREST.

THE STANDARD SPECIFICATIONS OF THE CITY OF HILLSBORO AND THE STANDARD SPECIFICATIONS OF THE OHIO DEPARTMENT OF TRANSPORTATION INCLUDING CHANGES AND SUPPLEMENTS SHALL GOVERN ALL IMPROVEMENTS.

300 -ROADWAYS

500 GENERAL

600 STORM DRAINAGE

800 WATER DISTRIBUTION

900- SANITARY SEWERS

CITY OF HILLSBORO

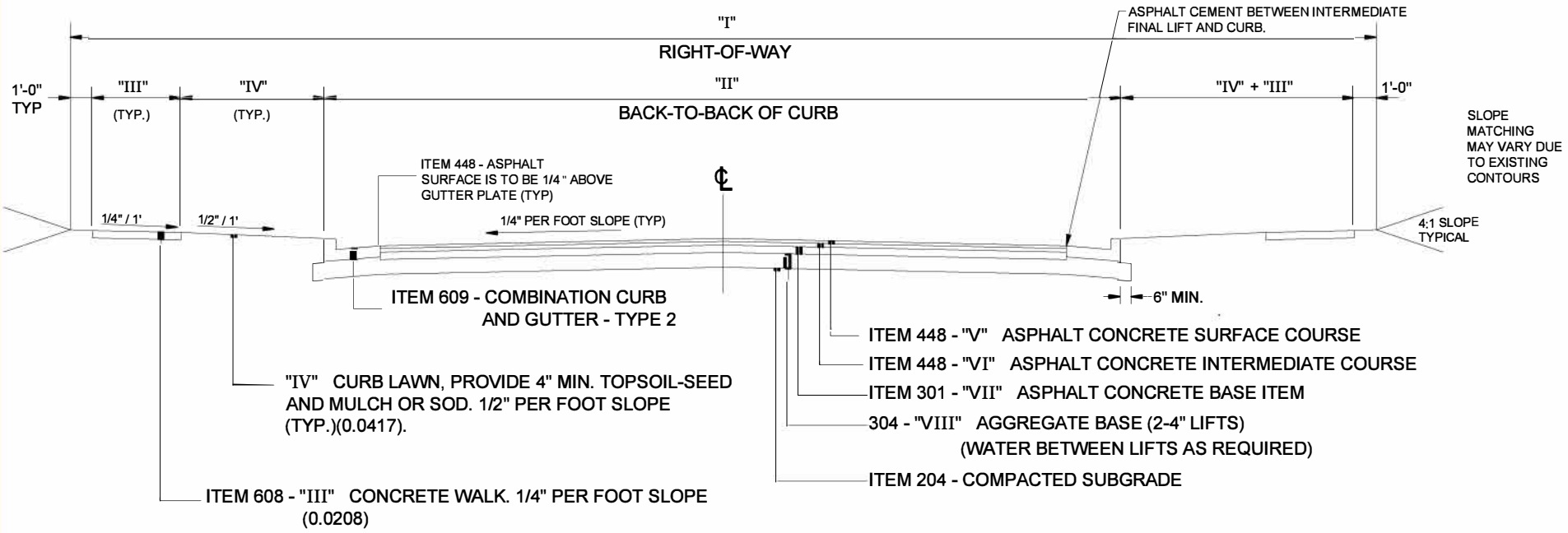
TABLE OF CONTENTS

REVISIONS:

DATE APPROVED:

SANITARY SEWER CONTINUED

300 - Roadways



MINIMUM STANDARDS					
			COLLECTOR		
ITEM	DESCRIPTION	ARTERIAL	COMM. & IND	RESIDENTIAL	MINOR
I	RIGHT-OF-WAY	80'	60'	60	50'
II	B/B CURB	59'	37'	37'	31'
III	SIDEWALK WIDTH	4'	4'	4'	4'
IV	CURB LAWN	8.0'	6.5'	6.5'	6.0'
V	ITEM 448	1-1/2"	1-1/2"	1-1/2"	1-1/2"
VI	ITEM 448	1-1/2"	1-1/2"	2"	2"
VII	ITEM 301	6"	3"	----	----
VIII	ITEM 304	2--4" LIFTS	2--4" LIFTS	2--6" LIFTS	2--5" LIFTS

NOTES

A. ALL WORK TO CONFORM TO ODOT CONSTRUCTION AND MATERIAL SPECIFICATIONS LATEST RECISION UNLESS OTHERWISE SPECIFIED.

B. ITEM 407 TACK COAT, SHALL BE REQUIRED WHEN 10 DAYS HAVE ELAPSED BETWEEN ASPHALT PLACEMENT LIFTS UNLESS OTHERWISE SPECIFIED BY THE CITY. APPLICATION RATE IS 0.10 GALLON PER SQUARE YARD.

C. ALL BUTT JOINTS SHALL BE SEALED WITH PG64-22 WITHIN 24 HOURS AFTER PLACEMENT OF ITEM 448

D. NO CONCRETE PAVEMENT WILL BE ACCEPTED

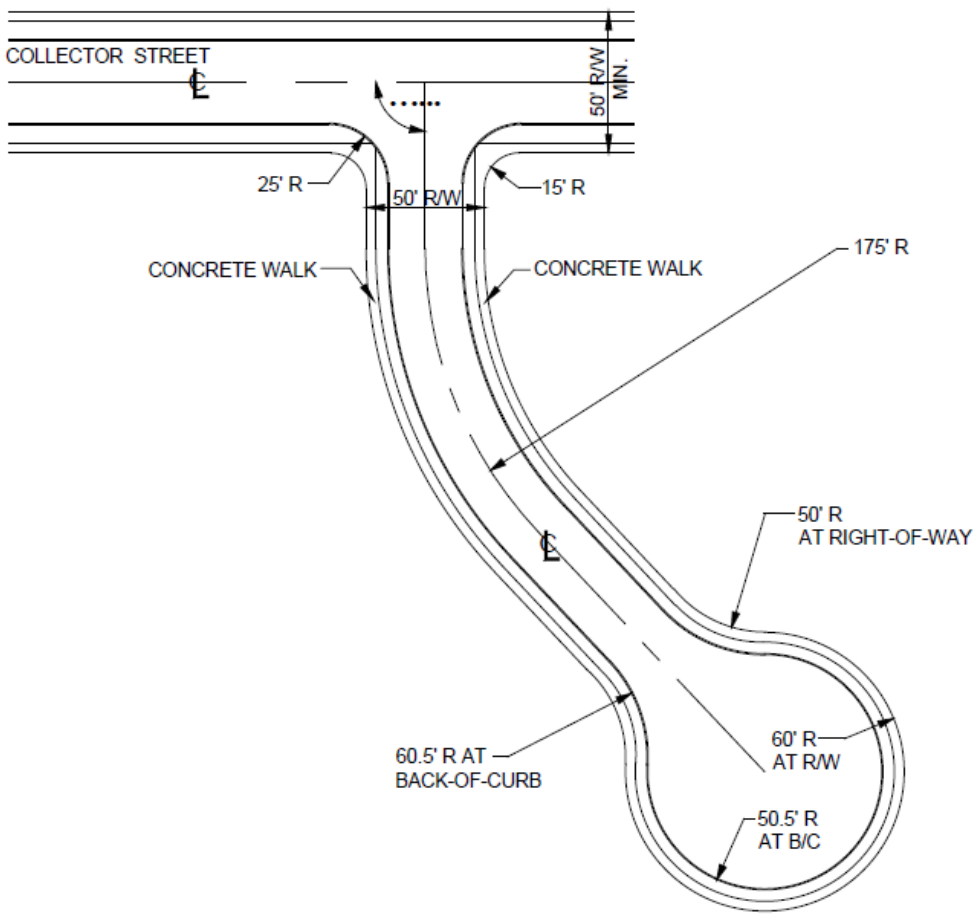
CITY OF HILLSBORO

TYPICAL SECTIONS AND PAVEMENT COMPOSITION

REVISIONS:

DATE APPROVED:

TYPICAL STREET AND CUL-DE-SAC PLAN



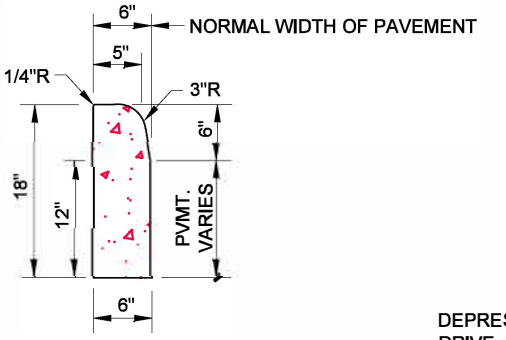
MINIMUM STREET DESIGN STANDARDS

MINIMUM CENTERLINE GRADES	.50%
MAXIMUM CENTERLINE GRADES	10%
MINIMUM LENGTH OF VERTICAL CURVE (SEE NOTE A)	50FT
MINIMUM CENTERLINE RADIUS	250FT
MINIMUM LENGTH TANGENT BETWEEN CURVES	50FT
MINIMUM BACK- OF-CURB RADIUS	25FT
MINIMUM HORIZONTAL VISIBILITY	200FT
MINIMUM STOPPING SIGHT DISTANCE (MEASURED FROM 3.5' EYE-LEVELTO 6" OBJECT HEIGHT)	200FT
CROSSROAD GRADE-STOP CONDITION-WITHIN 100' OF AN INTERSECTION.	3%
RIGHT-OF-WAY WIDTH	50FT

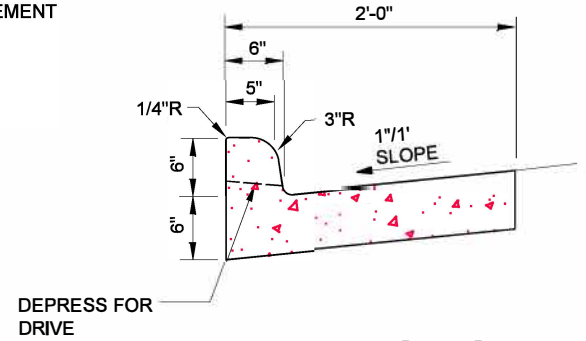
NOTES

A. MINIMUM LENGTH OF VERTICAL CURVE CAN BE REDUCED OR ELIMINATED TO ALLOW FOR PROPER DRAINAGE, WITH APPROVAL.

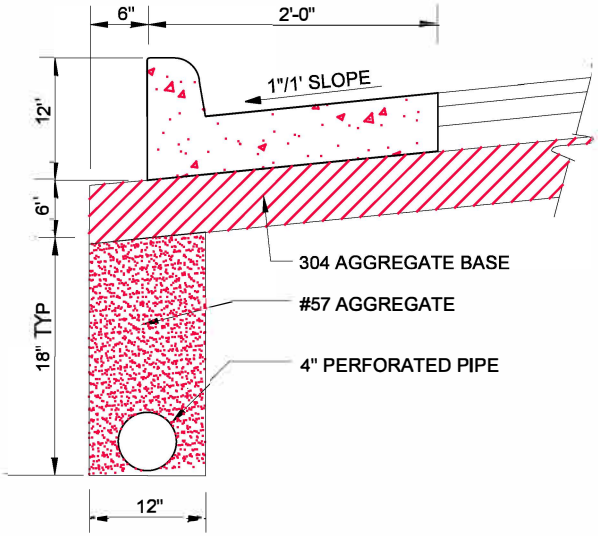
CITY OF HILLSBORO	STREET DESIGN STANDARDS	REVISIONS:	DATE APPROVED:
			PAGE No. 300-3



TYPE 6
BARRIER CURB



TYPE 2 COMBINATION
CURB AND GUTTER



4" SHALLOW PIPE UNDERDRAIN DETAIL
(AS REQUIRED BY CITY)

NOTES

A. CONCRETE AND WORK SHALL MEET THE REQUIREMENT SET FORTH IN ODOT ITEM 609 CURBING.

B. CURBING SHALL HAVE CONTRACTION JOINTS EVERY 10'.

C. MINIMUM OF 6" OF ODOT 304 SHALL BE PLACED UNDER CURBING.

D. CURBING SHALL BE BACKFILLED IMMEDIATELY AFTER FORMS ARE REMOVED OR AS SOON AS PRACTICAL WHEN SLIP FORMING PRIOR TO OTHER CONSTRUCTION OPERATIONS.

E. PROVIDE BROOM FINISH AND EDGING TO ALL EXPOSED SURFACES.

F. ALL CONCRETE SHALL BE ODOT CLASS QC1, (4000 PSI, 520 LB/CY CEMENT) PROPORTIONING OPTIONS 1,2, AND 3 NOT ALLOWED.

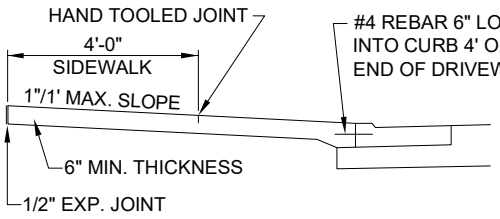
G. CONCRETE SHALL CONTAIN 7% ± 2% OF TOTAL AIR.

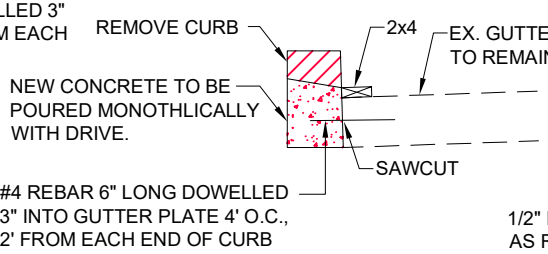
ALL CURBING PLACED SHALL HAVE A FRONT AND REAR FORM. EXCEPTION: UNLESS CURBING IS SLIP FORMED BY MACHINE OR IS ABUTTING CONCRETE DRIVEWAY OR SIDEWALK OR OTHERWISE

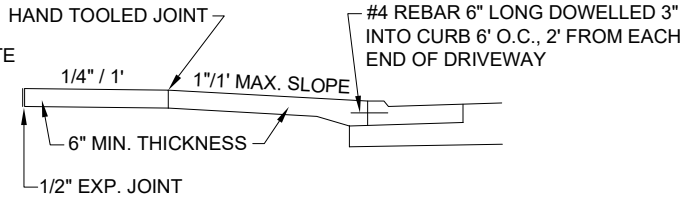
I. APPROVED BY THE ENGINEER.

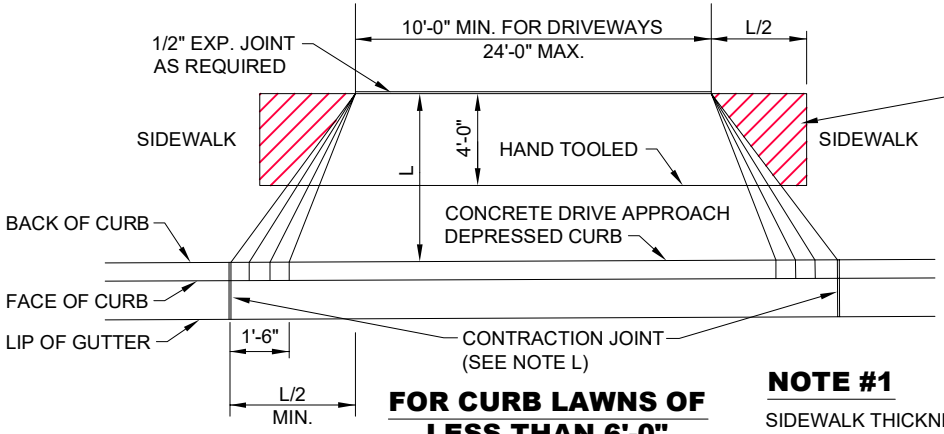
J. MINIMUM FLOW LINE SLOPE OF THE PERFORATED PIPE IS TO BE 0.003 FT/FT TO OUTLET.

CITY OF HILLSBORO	CONCRETE CURB DETAILS	REVISIONS:	DATE APPROVED:
			PAGE No. 300-4

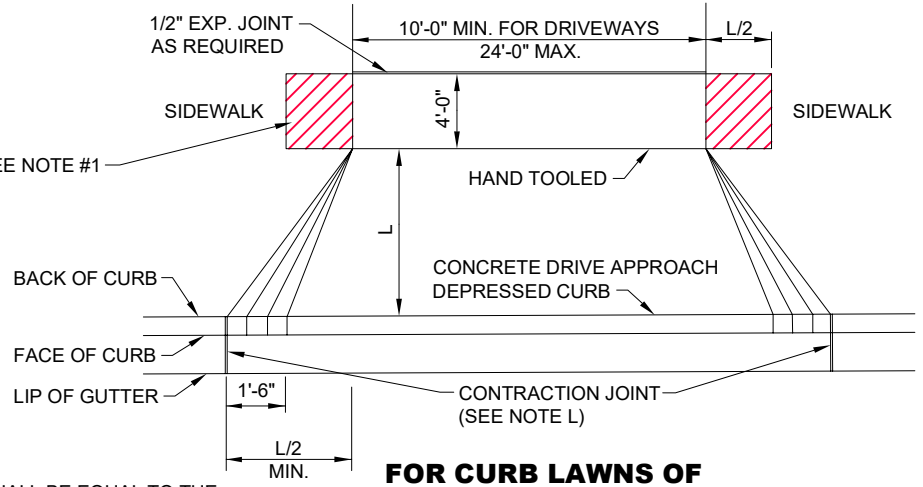








FOR CURB LAWNS OF LESS THAN 6'-0"



FOR CURB LAWNS OF 6'-0" OR MORE

NOTE #1

SIDEWALK THICKNESS SHALL BE EQUAL TO THE THICKNESS OF THE DRIVEWAY IN THIS AREA.

NOTES

A. DRIVE APPROACHES SHALL MEET THE REQUIREMENTS OF ODOT ITEM 452, 499, 608, AND 609 CAST IN-PLACE CONCRETE

B. DRIVE APPROACHES MAY BE PLACED MONOLITHICALLY WITH CURB.

C. MAXIMUM JOINT SPACING SHALL BE 10' LONGITUDINALLY, TRANSVERSELY AND AT TAPERS.

D. EXPANSION MATERIAL SHALL BE ½" PREMOLDED, ODOT APPROVED.

E. 6" OF COMPACTED ODOT ITEM 304, ITEM 411 OR 57'S AGGREGATE BASE SHALL BE PLACE UNDER DRIVE APPROACHES.

F. PROVIDED BROOM FINISH AND EDGING TO ALL EXPOSED SURFACES.

G. WHERE CURB AND GUTTER HAS NOT BEEN DROPPED AT DRIVE APPROACHES, THE CONTRACTOR WILL CUT AND REMOVE CURB. (SEE DETAIL)

H. WHERE ASPHALT CONCRETE PAVEMENT HAS BEEN DISTURBED, THE ASPHALT SHALL BE REPLACED BY THE CONTRACTOR AS DIRECTED BY THE CITY.

I. JOINTS SHALL BE CLEANED AND EDGED BY A 1/4" RADIUS EDGER. LONGITUDINAL JOINTS SHALL BE AS DIRECTED BY THE CITY. EXPANSION JOINTS SHALL BE OF SUCH DIMENSIONS AS SHOWN ON STANDARD DRAWINGS FOR CONSTRUCTION JOINTS.

J. CONCRETE SHALL CONTAIN 6% ± 2% OF TOTAL AIR.

K. CONCRETE SHALL BE ODOT CLASS QC1.

L. THIS STANDARD DRAWING IS FOR GUIDELINE PURPOSES. EACH INDIVIDUAL DRIVE WILL NEED TO BE DESIGNED AND SUBMITTED TO THE CITY FOR REVIEW AND APPROVAL.

M. "W"=10' MINIMUM TO 24' MAXIMUM UNLESS OTHERWISE APPROVED BY THE CITY.

N. IF CURB IS REMOVED AND REPLACED DURING DRIVEWAY CONSTRUCTION, JOINTS BETWEEN EXISTING AND NEW CURB ARE TO BE DOWELLED WITH #4 REBAR 6" IN LENGTH, 3" INTO CURB, 4' OC.

O. ALL NEW CONSTRUCTION OR MODIFICATIONS OF DRIVE APPROACHES REQUIRE A CONCRETE APPROACH; REGARDLESS OF WHETHER THERE IS A SIDEWALK OR NOT. THE NEW APPROACH IS TO GO FROM EDGE OF THE EXISTING STREET TO RIGHT OF WAY OR MINIMUM OF 6'0".

P. DRAINAGE ISSUES WILL HAVE TO BE ADDRESSED, WHEN A DRIVEWAY IS INSTALLED OR MODIFIED.

Q. PRECAUTIONS SHALL BE TAKEN TO PROTECT EXISTING CONCRETE, BRICK FROM TIRE MARKS AND DAMAGE DURING CONSTRUCTION.

CITY OF HILLSBORO

RESIDENTIAL DRIVE APPROACH

REVISIONS:

DATE APPROVED:

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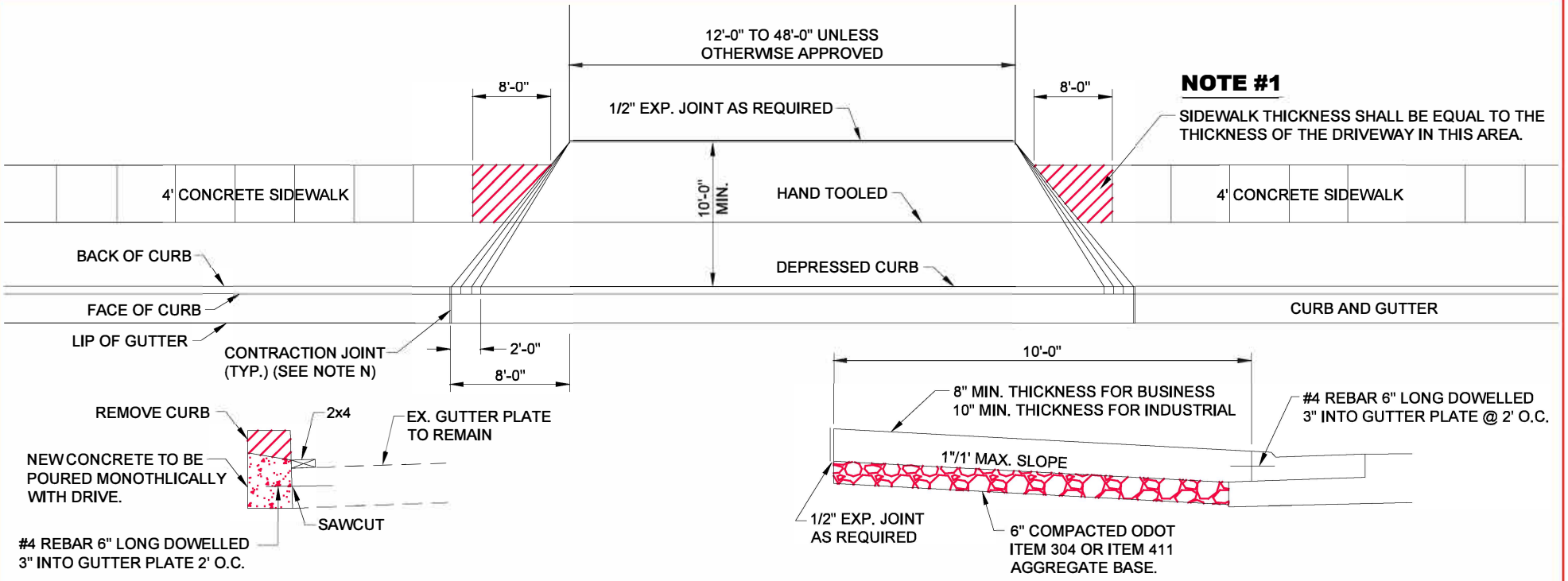

NOTES

A. DRIVE APPROACHES SHALL MEET THE REQUIREMENTS OF ODOT ITEM 452, AND 499 CAST IN PLACE CONCRETE
B. DRIVE APPROACHES MAY BE PLACED MONOLITHICLY WITH CURB
C. MAXIMUM JOINT SPACING SHALL BE 10' LONGITUDINALLY AND TRANSVERSELY WITH JOINTS AT TAPERS
D. EXPANSION MATERIAL SHALL BE 1/2" PREMOLDED.
E. 6" OF COMPACTED ODOT ITEM 304 OR ITEM 411 AGGREGATE BASE SHALL BE PLACED UNDER DRIVE APPROACHES.
F. PROVIDE BROOM FINISH AND EDGING TO ALL EXPOSED SURFACES.
G. WHERE CURB AND GUTTER HAS NOT BEEN DROPPED AT DRIVE APPROACHES, THE CONTRACTOR WILL CUT AND REMOVE CURB (SEE DETAIL)
H. WHERE ASPHALT CONCRETE PAVEMENT IS DISTURBED, THE ASPHALT SHALL BE REPLACED BY THE CONTRACTOR AS DIRECTED BY THE CITY.
I. JOINTS SHALL BE CLEANED AND EDGED BY A 1/4" RADIUS EDGER. LONGITUDINAL JOINTS SHALL BE AS DIRECTED BY THE CITY, EXPANSION JOINTS SHALL BE OF SUCH DIMENSIONS AS SHOWN ON STANDARD DRAWINGS FOR CONSTRUCTION JOINTS.
J. MINIMUM WIDTH FOR ONE-WAY TRAFFIC IS 16'-0" MINIMUM WIDTH FOR TWO WAY TRAFFIC IS 25'-0" MAXIMUM WIDTH IS 36'-0" FOR BUSINESS AND 45'-0" FOR INDUSTRIAL UNLESS OTHERWISE APPROVED BY THE CITY.
K. THIS STANDARD DRAWING IS FOR GUIDELINE PURPOSES, EACH INDIVIDUAL DRIVE WILL NEED TO BE DESIGNED AND SUBMITTED TO THE CITY FOR REVIEW AND APPROVAL.
L. CONCRETE SHALL BE QC1 WITH 6% ± 2% OF THE TOTAL AIR. (4000 PSI, 600 LB/CY CEMENT. PROPORTIONING OPTIONS 1,2,&3 NOT ALLOWED.
M. IF THE CURB IS REMOVED AND REPLACED DURING DRIVEWAY CONSTRUCTION, JOINTS BETWEEN CURB AND DRIVEWAY ARE TO BE DOWELED WITH #4 REBAR 6' IN LENGTH DOWELED 3" INTO THE GUTTER PLATE @ 2' OC.
N. ALL NEW CONSTRUCTION OR MODIFICATIONS OF THE DRIVE APPROACHES REQUIRE A CONCRETE APPROACH REGARDLESS OF WHETHER THIS IS A SIDEWALK OR NOT. THE NEW APPROACH IS TO GO FROM EDGE OF EXISTING STREET TO THE RIGHT OF WAY OR A MINIMUM OF 10'-0"
P. DRAINAGE ISSUES WILL HAVE TO BE ADDRESSED WHEN A DRIVEWAY IS INSTALLED OR MODIFIED.
Q. PRECAUTIONS SHALL BE TAKEN TO PROTECT EXISTING CONCRETE, BRICK FROM TIRE MARKS AND DAMAGE DURING CONSTRUCTION.

CITY OF HILLSBORO

COMMERCIAL AND INDUSTRIAL DRIVE APPROACH

REVISIONS:

DATE APPROVED:

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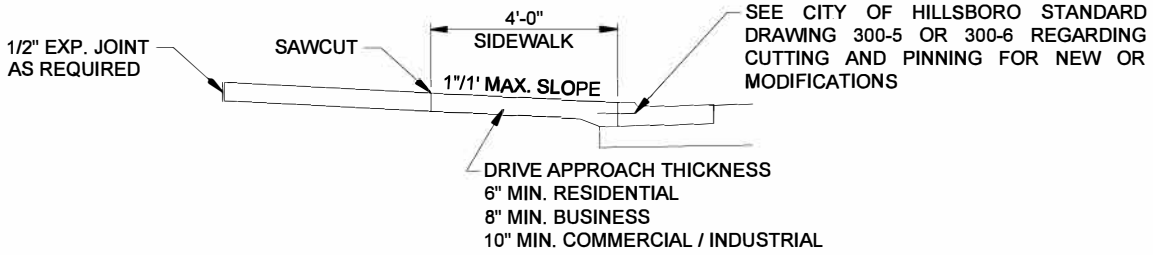
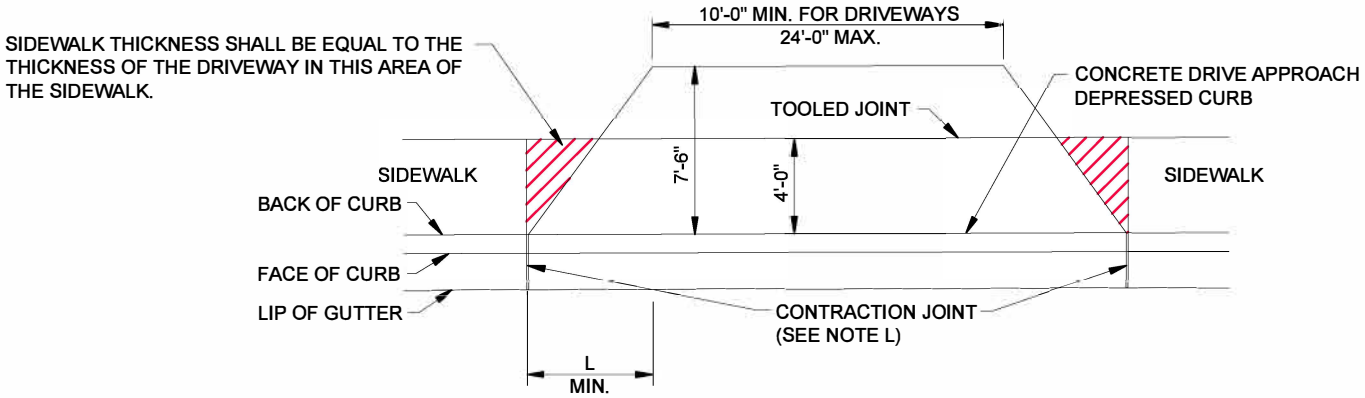


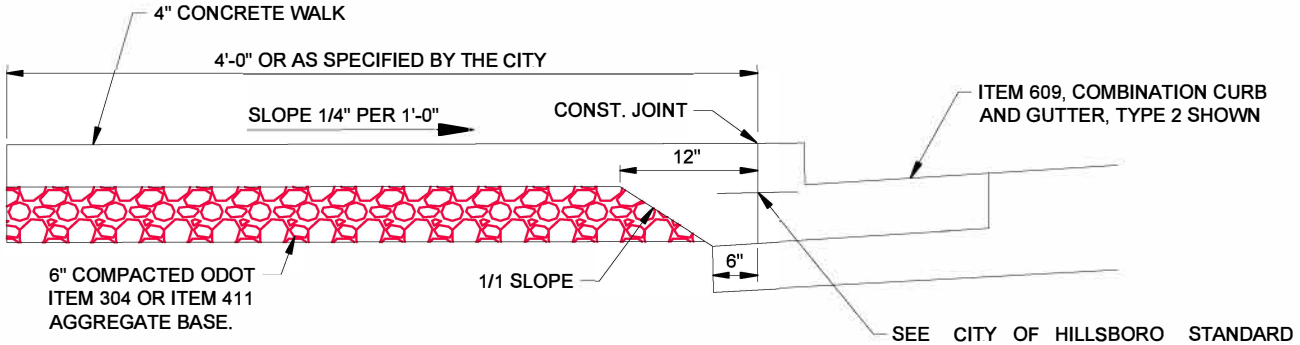


DRIVE APRON WITH NO CURB LAWN

FOR DRIVEWAY SPECIFICATIONS SEE PAGE 300-5 OR 300-6

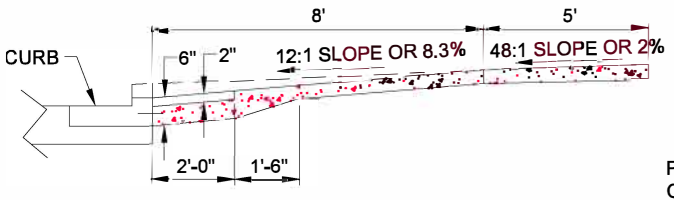
NOTE #1

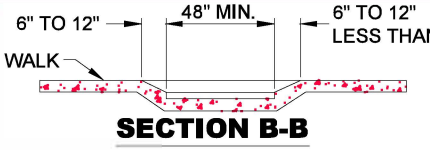
ALL CURB, DRIVEWAY OR SIDEWALK CONSTRUCTION SHALL COMPLY WITH CITY OF HILLSBORO STANDARD DRAWINGS 300-04, 300-05 AND 300-06



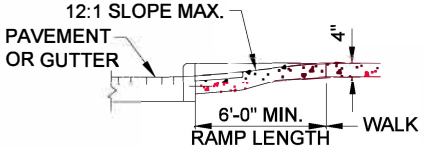
CONCRETE SIDEWALK ABUTTING CURB, COP TYPE #2 CURB SHOWN

CITY OF HILLSBORO	DRIVE APPROACH AND CONCRETE SIDEWALK DETAIL WITH NO CURB LAWN	REVISIONS:	DATE APPROVED:
			PAGE No. 300-7

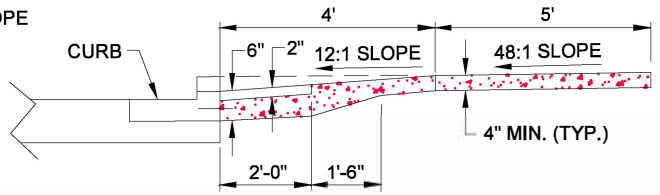


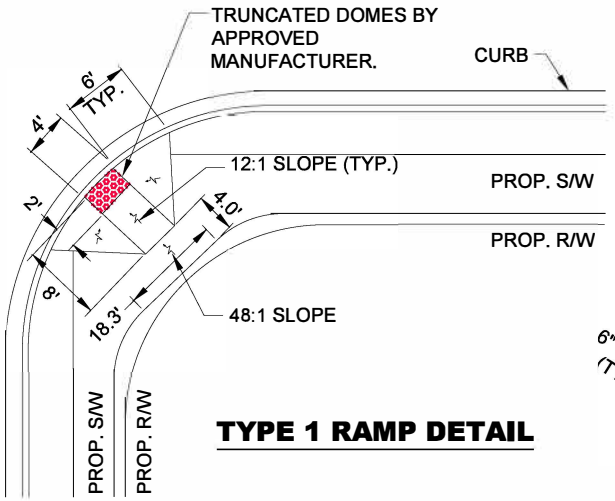


SECTION B-B

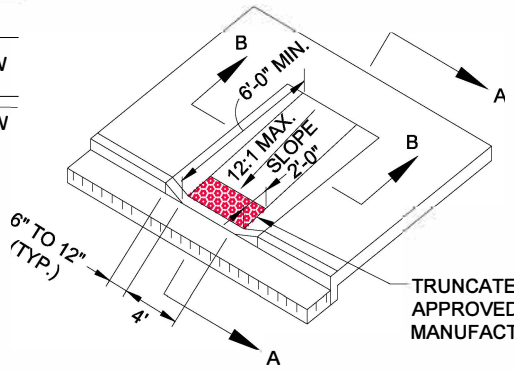


SECTION A-A



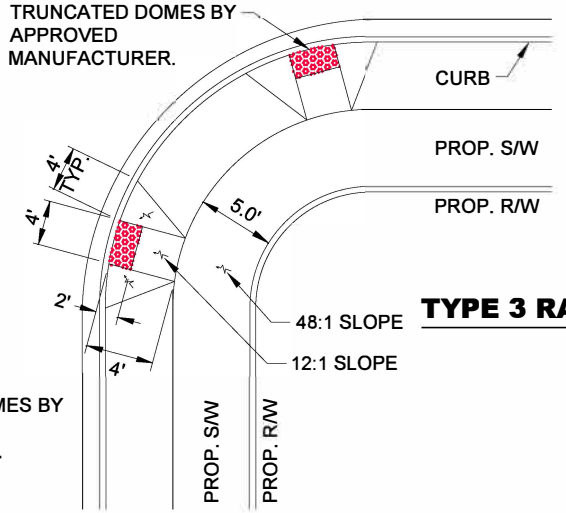


TYPE 1 RAMP DETAIL



TRUNCATED DOMES BY
APPROVED
MANUFACTURER.

TYPE 2 RAMP DETAIL



TYPE 3 RAMP DETAIL

NOTES

A CITY TO SPECIFY TYPE 1,2, OR 3 RAMP.

B ANY COMBINATION OF SIDE SLOPES ON OPPOSITE SIDES OF A RAMP MAY BE USED TO BEST FIT THE SITE CONDITIONS.

C THE MINIMUM RAMP LENGTH IS 6'-0" FOR THE BACK OF A 6'-0" CURB AND MAY BE INCREASED WHERE FEASIBLE TO OBTAIN FLATTER RAMP SLOPE OR TO BETTER BLEND WITH THE WALK CONFIGURATION.

D WALK THICKNESS IN THE RAMP SLOPES SHALL BE 6" MINIMUM OR THICKER AS NECESSARY TO MATCH ADJACENT WALK THICKNESS.

E CURB RAMPS SHALL MEET AND BE FINISHED TO AMERICAN WITH DISABILITIES ACT (ADA) STANDARDS.

F TEXTURE OF CONCRETE SURFACES SHALL BE OBTAINED BY COURSE BROOMING TRAVERSE TO THE RAMP SLOPES AND SHALL BE ROUGHER THAN ADJACENT WALK.

G. CURB RAMPS SHALL MEET THE REQUIREMENTS OF ODOT TEM 608 UNLESS OTHERWISE SPECIFIED WITHIN. REFER TO ODOT STANDARD DRAWINGS FOR ADDITIONAL CURB RAMP CONFIGURATIONS.

H. CONCRETE SHALL BE ODOT QC1, (4000 PSI 520LB/CY CEMENT) PROPORTIONING OPTIONS 1,2, & 3 NOT ALLOWED. CONCRETE SHALL CONTAIN 7% ± 2% TOTAL AIR.

I. FOR RECONSTRUCTION JOBS THE CURB RAMPS WILL HAVE TO BE ADDRESSED BASED ON THE EXISTING CONDITIONS.

J. TRUNCATED DOME SPECIFICATIONS; INSTALL DETECTABLE WARNINGS (TRUNCATED DOMES) FOR A DISTANCE OF 24" FROM THE BACK OF THE CURB FOR THE ENTIRE WIDTH OF THE RAMP OPENING WHERE IT IS FLUSH WITH THE PAVEMENT. THE TRUNCATED DOMES SHALL BE ODOT APPROVED, THE COLOR OF THE PANEL SHALL BE RED.

K CURB RAMPS TO BE POURED ON COMPACTED GRANULAR BEDDING. CITY INSPECTION OF FORM WORK IS REQUIRED PRIOR TO PLACING CONCRETE.

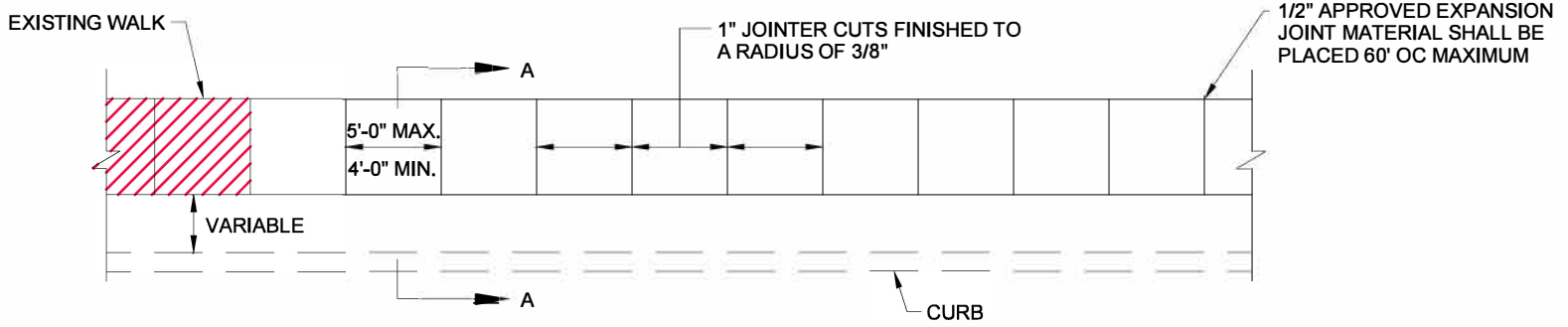
L PROVIDE BROOM FINISH AND EDGING TO ALL EXPOSED SURFACES. TEXTURE SHALL BE A MEDIUM BROOM WITH TOOL FINISH, CITY TO REVIEW AND APPROVE PRIOR TO POURING.

M ALL DETECTABLE WARNINGS CURB RAMPS TO BE CAST IRON MANUFACTURED BY EAST JORDAN IRON WORKS 7005 SERIES, NEEHAH FOUNDRY MODEL R-4984.

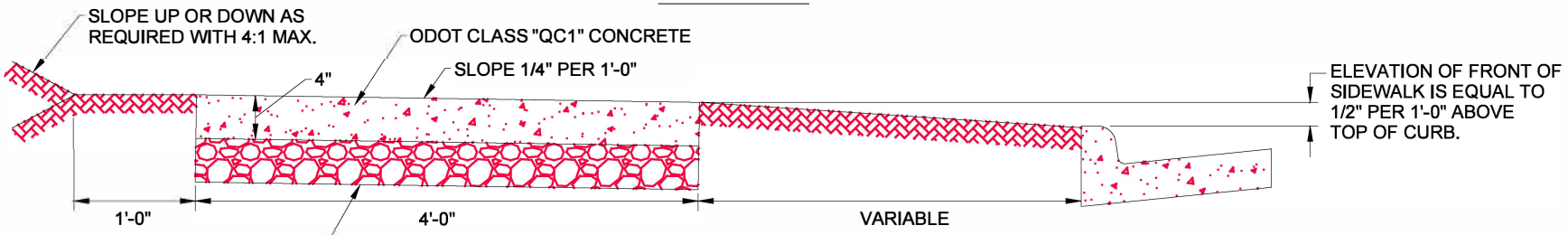
N ALL RAMPS SHALL BE DOWELLED TO THE CURB BY THE USE OF #4 REBAR AS PER CITY STANDARDS 300-07 CONCRETE SIDEWALK ABUTTING TYPE 2 CURB DETAIL.

O. ADA SPECIFICATIONS SHALL ALL INCLUDE ALL PUBLIC RIGHT OF WAY ACCESSIBILITY GUIDELINES (PROWAG) FEDERAL STANDARDS.

CITY OF HILLSBORO	CURB RAMPS	REVISIONS:	DATE APPROVED:
			PAGE No. 300-8

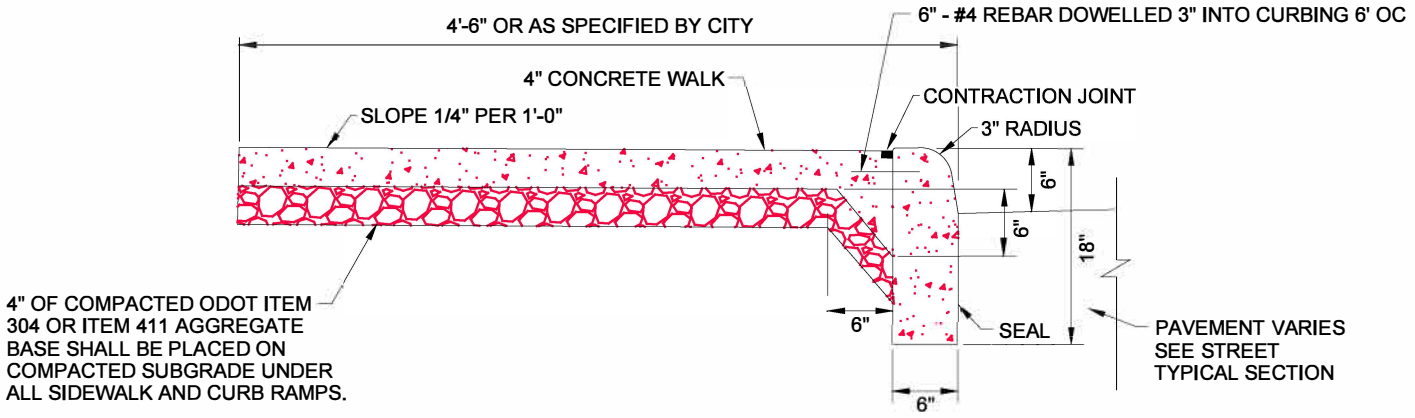


PLAN VIEW



4" OF COMPACTED ODOT ITEM 304 OR ITEM 411 AGGREGATE BASE SHALL BE PLACED ON COMPACTED SUBGRADE UNDER ALL SIDEWALK AND CURB RAMPS.

SECTION A-A



4" OF COMPACTED ODOT ITEM 304 OR ITEM 411 AGGREGATE BASE SHALL BE PLACED ON COMPACTED SUBGRADE UNDER ALL SIDEWALK AND CURB RAMPS.

COMBINED CURB AND SIDEWALK DETAIL

CITY OF HILLSBORO	CONCRETE SIDEWALK DETAIL	REVISIONS:	DATE APPROVED:
			PAGE No. 300-9

NOTES

A. WALK TO BE POURED ON COMPACTED GRANULAR BEDDING.

B. PROVIDE BROOM FINISH TO ALL EXPOSED SURFACES.

C. CONCRETE SHALL CONFORM TO ODOT ITEM 499 CONCRETE. CONCRETE WORK SHALL CONFORM TO ODOT ITEM 499 UNLESS OTHERWISE SPECIFIED WITHIN.

D. PROVIDE EDGING AROUND ALL EXPOSED SURFACES.

E. APPLY ONE COAT OF A WHITE PIGMENTED ODOT APPROVED CONCRETE SEALER ON ALL SURFACES ACCORDING TO MANUFACTURER'S RECOMMENDATIONS.

F. WHEN RENOVATING EXISTING STREETS, THE SIDEWALKS SHALL BE REPLACED TO CONFORM WITH CITY CONSTRUCTION STANDARDS AND DRAWINGS.

G. CONCRETE SHALL BE ODOT QC1, (4000 PSA, 520 LB/CY CEMENT) PROPORTIONING OPTIONS 1,2, & 3 NOT ALLOWED.

H. CONCRETE SHALL CONTAIN 7% ± 2% OF TOTAL AIR.

I. PROPERTY PINS SHALL BE RE-ESTABLISHED AFTER FINISHING OF SIDEWALK.

J. COLD WEATHER POURING WILL NOT BE PERMITTED IF AMBIENT AIR TEMPERATURE IS AT OR BELOW 32°F FOR THE NEXT 72 HOURS AFTER THE PROPOSED POUR DATE. ALL COLD TEMPERATURE POURS ARE TO BE BLANKETED FOR A PERIOD OF NO LESS THAN THREE DAYS FROM THE TIME OF THE POUR. AT NO TIME SHALL THERE BE ANY FROST ON ANY PART OF THE GRAVEL BASE, THE FORMS OR ANY ADJURING MEMBER PRIOR TO POURING THE CONCRETE.

SIDEWALK JOINTS

1. GENERAL: CONSTRUCT ISOLATION, CONSTRUCTION, AND CONTRACTION JOINTS, AND TOOL EDGINGS TRUE TO LINE WITH FACES PERPENDICULAR TO SURFACE PLANE OF CONCRETE. CONSTRUCT TRANSVERSE JOINTS AT RIGHT ANGLES TO CENTERLINE, UNLESS OTHERWISE INDICATED.

    A. WHEN JOINING EXISTING PAVEMENT, PLACE TRANSVERSE JOINTS TO ALIGN WITH PREVIOUSLY PLACED JOINTS, UNLESS OTHERWISE INDICATED.

2. CONSTRUCTION JOINTS: SET CONSTRUCTION JOINTS AT SIDE AND END TERMINATION OF PAVEMENT AND AT LOCATIONS WHERE PAVEMENT OPERATIONS ARE STOPPED FOR MORE THAN ONE-HALF HOUR, UNLESS PAVEMENT TERMINATES AT ISOLATION JOINTS.

3. EXPANSION JOINTS: FORM ISOLATION JOINTS OF PREFORMED JOINT-FILLER STRIPS ABUTTING MANHOLES, STRUCTURES, WALKS, OTHER FIXED OBJECTS, AND WHERE INDICATED. EXPANSION JOINTS SHALL NOT BE PLACED AT THE BUILDING FACE UNLESS DIRECTED BY THE CITY OF HILLSBORO.

    A. LOCATION OF EXPANSION JOINTS AT INTERVALS OF 60', UNLESS OTHERWISE INDICATED.

    B. LOCATE EXPANSION JOINTS ALONG BUILDINGS.

    C. THE EXPANSION JOINT MATERIAL SHALL BE ½" THICK ODOT SPECIFICATIONS.

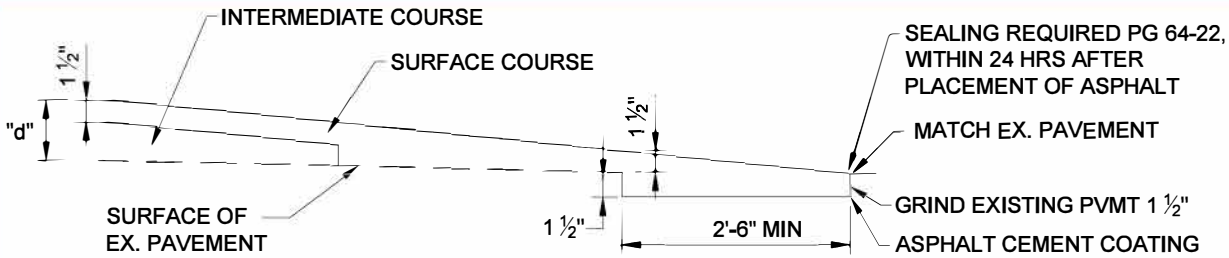
4. CONTRACTION JOINTS: FORM WEAKENED-PLANE CONTRACTION JOINTS, SECTIONING CONCRETE INTO AREAS AS INDICATED IN THE PLANS. CONSTRUCT CONTRACTION JOINTS FOR A DEPTH EQUAL TO AT LEAST ONE-FOURTH OF THE CONCRETE THICKNESS, WHERE INDICATED, AS FOLLOWS:

    A. GROOVED JOINTS: FROM CONTRACTION JOINTS AFTER INITIAL FLOATING BY GROOVING AND FINISHING EACH EDGE OF JOINT WITH GROOVER TOOL TO THE FOLLOWING RAIDIUS. REPEAT GROOVING OF CONTRACTION JOINTS AFTER APPLYING SURFACE FINISHES. ELIMINATE GROOVER OVERFLOW SLURRY MARKS ON CONCRETE SURFACES. QUALITY WORK SHALL BE PERFORMED OR THE NEW SIDEWALK WILL BE REMOVED AND REDONE AT THE CONTRACTOR'S EXPENSE. RADIUS TO BE ¼ INCH (6 MM).

    B. SAWED JOINTS WILL NOT BE PERMITTED.

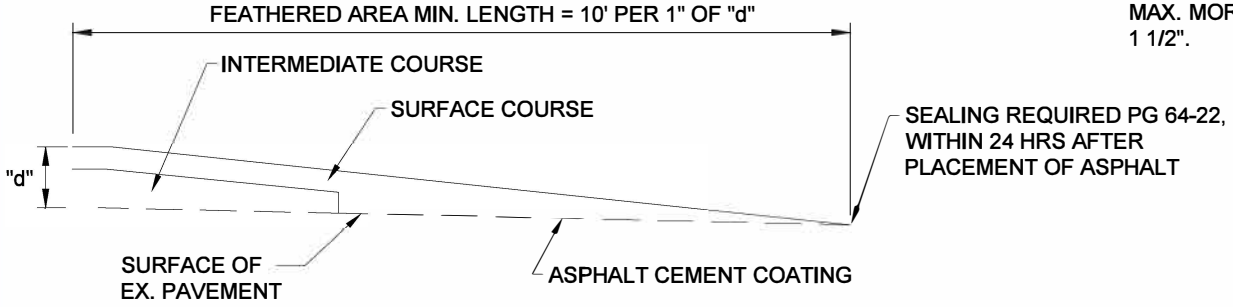
5. EDGING: TOOL EDGES OF JOINTS IN CONCRETE AFTER INITIAL FLOATING WITH AN EDGING TOOL TO A RADIUS OF 1/4 INCH (6MM). REPEAT TOOLING OF EDGES AFTER APPLYING SURFACE FINISHES. ELIMINATE TOOL MARKS (OVERFLOW SLURRY) ON CONCRETE SURFACES.

CITY OF HILLSBORO	CONCRETE SIDEWALK NOTES	REVISIONS:	DATE APPROVED:
			PAGE No. 300-10



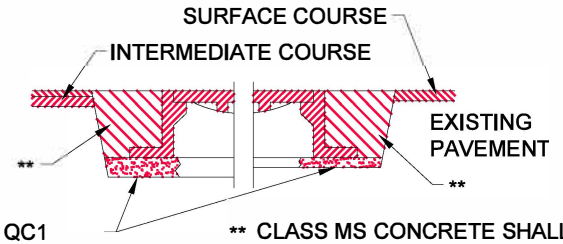
NOTE: MINIMUM LENGTH = 10' PER INCH OF "d".

BUTT JOINT DETAIL



FEATHERING DETAIL

MANHOLES ADJUSTED TO GRADE FOR OVERLAYS

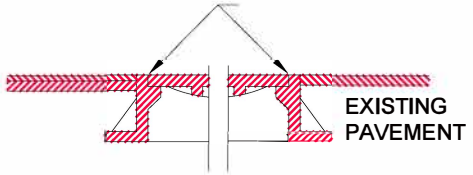


GRADE RINGS, QC1 CONCRETE OR MORTAR, MAX. MORTAR THICKNESS 1 1/2".

** CLASS MS CONCRETE SHALL BE PLACED A MIN. OF 3" BEYOND THE BASE OF THE CASTING. THE WIDTH AT THE TOP SHALL BE ADJUSTED TO CONFORM TO THE MIN. BASE DIAMETER.

USING CONCRETE OR MORTAR

PROVIDE METAL ONE PIECE ADJUSTING RINGS



METAL ONE PIECE ADJUSTING RINGS

NOTES

METAL ONE PIECE ADJUSTING RINGS SHALL:

A. ATTACH SECURELY TO THE EXISTING FRAME BY TACK WELD OR MECHANICAL DEVICES.
B. CONSIST EITHER OF CAST METAL HAVING AN INTEGRAL RIM AND SEAT, OR BE FABRICATED METAL WITH A STURDY CONNECTION BETWEEN THE SEAT AND RIM.
C. PROVIDE AN EVEN SEAT FOR THE MANHOLE COVER.
D. SHALL BE A SOLID ONE PIECE RING ACCEPTABLE TO THE CITY OF HILLSBORO. **ADJUSTABLE DIAMETER MANHOLE RINGS WILL NOT BE ACCEPTABLE**.
E. ANY INSTALLATION UNACCEPTABLE TO THE CITY SHALL BE REPLACED BY THE CONTRACTOR AT THEIR EXPENSE.
F. MONUMENT BOXES SHALL MEET THE REQUIREMENTS OF ODOT ITEM 623 UNLESS OTHERWISE SPECIFIED WITHIN.

CITY OF HILLSBORO	ASPHALT OVERLAY AND MONUMENT	REVISIONS:	DATE APPROVED:
			PAGE No. 300-11

GENERAL

A. ALL STREET CONSTRUCTION SHALL BE IN ACCORDANCE WITH ODOT SPECIFICATIONS LATEST REVISION.
B. CONTRACTOR MUST APPLY FOR NECESSARY PERMITS, FEES WITH THE CITY BEFORE CONSTRUCTION OR DEMOLITION BEGINS.

PAVEMENT REPLACEMENT

A.. IMMEDIATELY AFTER PLACEMENT OF BACKFILL IN EXISTING STREETS, A TEMPORARY PAVEMENT SHALL BE INSTALLED AND THE STREET OPENED. TEMPORARY PAVEMENT SHALL CONSIST OF 8" OF COMPACTED ODOT SPECIFIED 411 BASE AND A SURFACE COURSE APPROVED BY THE CITY. THE SURFACE COURSE KEPT FLUSH WITH THE EXISTING STREET.
B. PERMANENT PAVEMENT REPLACEMENT SHALL BE EQUAL TO OR EXCEED THE EXISTING PAVEMENT (MINIMUM PAVEMENT COMPOSITION, SEE PAGE 300-2).
C. ANY SETTLEMENT OF A TRENCH CAUSING A DEPRESSION SHALL BE REFILLED AS REQUIRED AT THE CONTRACTOR'S EXPENSE. THIS PROVISION APPLIES FOR ONE YEAR PERIOD AFTER THE WORK HAS BEEN ACCEPTED BY THE CITY.
D. ALL TEMPORARY PAVEMENT AND SIDEWALK SHALL BE MAINTAINED BY THE CONTRACTOR OR DEVELOPER AT THEIR OWN EXPENSE IN A SUITABLE AND SAFE CONDITION FOR TRAFFIC UNTIL PERMANENT REPLACEMENT IS MADE OR THE PROJECT IS FINALLY ACCEPTED BY THE CITY. COLD PATCH ALL TRENCHES A MINIMUM OF 4" WHEN FINAL ASPHALT WILL NOT BE REPLACED WITHIN 24 HOURS.

TRAFFIC CONTROL

A.. THE CONTRACTOR SHALL MAINTAIN TRAFFIC CONTROL AT ALL TIMES WITH THE PROPER BARRICADES AS PER THE OHIO MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES. THESE CONTROL DEVICES SHALL BE IN PLACE PRIOR TO ANY WORK COMMENCING.
B. TRAFFIC SHALL BE MAINTAINED AT ALL TIMES UNLESS OTHERWISE APPROVED BY THE CITY.

CURB STAKING AND ROADWAY

A. LINE AND GRADE EVERY 25'-0" ON A CONVENIENT OFFSET.

PAVEMENT (ASPHALT)

A.. THE CONTRACTOR SHALL PROVIDE THE CITY WITH A COPY OF THE NORMAL (MEDIUM TRAFFIC) ODOT 448 JOB MIX FORMULA FOR EACH PLANT THAT PROVIDES HOT MIXED ASPHALT TO THIS PROJECT. ALL MIXES SHALL FOLLOW ODOT JOB MIX FORMULA.
B. ALL WORK SHALL ADHERE TO ODOT'S LASTEST REVISIONS AND TO THE CITY SPECIFICATIONS WHICHEVER IS MORE STRINGENT SHALL PREVAIL UNLESS OTHERWISE APPROVED.
C. PATCHED AREAS SHALL BE SEALED ON THE PERIMETER OF THE PATCH WITH ASPHALT CEMENT.
D. ALL UTILITY ADJUSTMENTS, MANHOLE, WATER VALVES, SHALL BE RAISED TO FINISHED GRADE AFTER THE FINAL ASPHALT COURSE IS LAID. IF SMOOTHNESS DOESN'T MEET THE CITY'S REQUIREMENTS A REPAIR SIMILAR TO MR. MANHOLE SHALL BE USED TO ADJUST THE MANHOLE OR VALVE.
E. ASPHALT CEMENT SHALL BE USED NEXT TO THE LIP OF GUTTER PRIOR TO THE FINAL ASPHALT LIFT BEING PLACED (PG64-22 SEAL).
F. TACK COAT SHALL BE APPLIED PRIOR TO THE PLACEMENT OF THE FINAL LIFT OF ASPHALT IF THE EXISTING ASPHALT LIFT IS DIRTY,OR AFTER TEN DAYS UNLESS OTHERWISE APPROVED. TEMPERATURE MUST BE 50° F OR HIGHER, ALL TACK SHALL BE TRACKLESS.
G. PRIME COAT SHALL BE APPLIED ON NEW AGGREGATE WHEN TEMPERATURE IS 50° F OR HIGHER. ALL DRIVEWAYS SHALL BE PRIMED PRIOR TO PLACEMENT OF ASPHALT UNLESS OTHERWISE APPROVED.
H. NO ASPHALT SHALL BE PLACED OVER EXCAVATED TRENCHES UNTIL IT HAS BEEN COMPACTED AS PER CITY SPECIFICATIONS.
I. FINAL LIFT OF ASPHALT SHALL BE FINISHED TO 1/4" ABOVE THE LIP OF GUTTER.
J. ASPHALT CEMENT SHALL BE USED ON ALL JOINTS AND FEATHERED SURFACES PRIOR TO PLACEMENT OF THE NEXT COURSE OF ASPHALT TO THE ABUTTING JOINT, UNLESS OTHERWISE APPROVED.
K. ALL EDGES TO BE TRIMMED BACK TO SOLID MATERIAL BY SAWING AND BE STRAIGHT AND NEAT AS PER THE CITY'S INSTRUCTIONS.

PERMIT REQUIRED

A RIGHT-OF-WAY PERMIT FOR ANY DIGGING OR EXCAVATING WITHIN A PUBLIC RIGHT-OF-WAY FOR ANY STREET OR ALLEY IS REQUIRED 48 HOURS IN ADVANCE OF THE WORK. IN THE EVENT OF AN EMERGENCY, THE PERMIT APPROVAL REQUIREMENT SHALL BE WAIVED AND THE PROPER APPLICATION MUST BE SUBMITTED AS SOON AS POSSIBLE, BUT NO LATER THAN THE END OF THE FIRST WORKING WEEKDAY AFTER THE START OF WORK. AN EMERGENCY IS DEFINED AS A REPAIR REQUIRED TO PROVIDE SERVICE TO UTILITY CUSTOMERS OR TO MITIGATE A HAZARD, WHICH THREATENS PUBLIC HEALTH OR SAFETY.

CITY ADMIN FORMS ARE AVAILABLE FROM THE CITY DEPARTMENT. THE PERMIT FORM IS TO BE COMPLETED BY THE PERSON OR FIRM PLANNING THE WORK WITHIN THE RIGHT-OF-WAY. ALL FEES MUST BE PAID AND APPROVALS OBTAINED BEFORE ANY WORK IS STARTED. A 72 WORKING HOUR LEAD-TIME IS RECOMMENDED. A PERMIT FEE OF $50 WILL BE REQUIRED OF EACH APPLICANT, INCLUDING CITY DEPARTMENTS.

PERFORMANCE BOND

ANY INDIVIDUAL OR FIRM WHO MAKES APPLICATION FOR A RIGHT-OF-WAY OPENING PERMIT MUST PROVIDE A CURRENT PERFORMANCE BOND TO THE CITY OF HILLSBORO IN THE AMOUNT OF 110% OF THE ESTIMATED COST OF REPAIRS.

NO BOND IS REQUIRED FOR PLUMBERS WHO HOLD A CURRENT PLUMBING LICENSE IN THE CITY OF HILLSBORO AND HAVE A CURRENT PERFORMANCE BOND ON FILE IN THE HEALTH DEPARTMENT.

IN THE EVENT THAT AFTER NOTIFICATION FROM THE CITY ANY CONTRACTOR FAILS TO CORRECT PROBLEMS ASSOCIATED WITH POOR TRENCH REPAIR OR MAINTENANCE WITHIN 24 HOURS OF NOTIFICATION, THE CITY RESERVES EXCLUSIVE RIGHT TO CORRECT THE PROBLEMS AND COLLECT ASSOCIATED COSTS FROM THE PERFORMANCE BOND.

WORK REQUIREMENTS

THE APPLICANT SHALL HAVE SUFFICIENT BARRICADES, WARNING SIGNS, AND LIGHTS DURING THE ENTIRE PERIOD THAT WORK IS BEING PERFORMED AND SHALL ADHERE TO APPLICABLE SECTION OF THE OHIO MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES.

ALL DISTURBED AREAS MUST BE RETURNED TO A CONDITION THAT IS AS GOOD AS OR BETTER THAN THE CONDITION BEFORE THE WORK BEGAN. ALL REPAIRS MUST MEET CITY SPECIFICATIONS. THE PUBLIC WORKS SUPERINTENDENT WILL INSPECT AND APPROVE ALL REPAIRS. THE BOND WILL BE RETURNED AFTER ALL REPAIRS ARE APPROVED, IF APPLICABLE. FOR CLOSURE OF ARTERIALS OR BUSY COLLECTORS THE CITY RESERVES THE RIGHT TO DIRECT CONTRACTOR TO CLOSE THE STREET DURING OFF PEAK TRAFFIC HOURS. CLOSURE MAY OCCUR AT NIGHT OR ON WEEKENDS. CONTRACTOR SHALL PROVIDE ALL TRAFFIC CONTROL ASSOCIATED WITH ROAD CLOSURE. EFFORTS SHALL BE MADE TO MINIMIZE ANY DISTURBANCE TO TREES OR ROOTS. EXCAVATION CAUSING DAMAGE TO TREES WILL RESULT IN REMOVAL AND REPLACEMENT. IF A TREE IS CUT, IT MAY RESULT IN PROPERTY DAMAGE TO THE PROPERTY OWNER, THIS IS THE DECISION OF THE CITY ENGINEER.
THE APPLICANT MUST NOTIFY ALL AFFECTED PROPERTY OWNERS IN WRITING, AND PROVIDE A COPY OF THE NOTIFICATION AND MAILING LIST PRIOR TO THE ENGINEERING DEPARTMENT ISSUING THE PERMIT.

ALL CONTRACTORS WHO PERFORM WORK REQUIRING ENTRY INTO ANY CONFINED SPACE OF A CITY-OWNED UTILITY SHALL COMPLY WITH THE CITY'S CONFINED SPACE ENTRY PROCEDURES AND IN ACCORDANCE WITH ALL OSHA REGULATIONS, IF APPLICABLE, AND APPROVAL FROM THE PUBLIC WORKS SUPERINTENDENT OR DESIGNEE.

MATERIAL SPECIFICATION

ALL WORK SHALL BE IN ACCORDANCE WITH THE ATTACHED DRAWINGS AND SPECIFICATIONS AND APPROVED BY THE ENGINEERING DEPARTMENT PRIOR TO COMMENCEMENT OF WORK.
STREET OPENINGS- THE MATERIAL USED TO FILL IN A DITCH OR A HOLE SHALL BE GRANULAR MATERIAL (#304,#411) OR ODOT ITEM 613 LOW STRENGTH MORTAR BACKFILL. OTHER APPROVED GRANULAR MATERIALS MAY BE USED ONLY UPON THE CONTRACTOR RECEIVING PRIOR WRITTEN APPROVAL FROM THE ENGINEEERING DEPARTMENT IF EXTENUATING CIRCUMSTANCES EXIST. CONTRACTORS CONCERNED WITH THE CONTACT OF THE LOW STRENGTH MORTAR BACKFILL WITH THE FITTINGS AND THE PIPE MAY PLACE A MAXIMUM OF 12 INCHES OF GRANULAR BACKFILL ABOVE THE TOP OF THE PIPE.

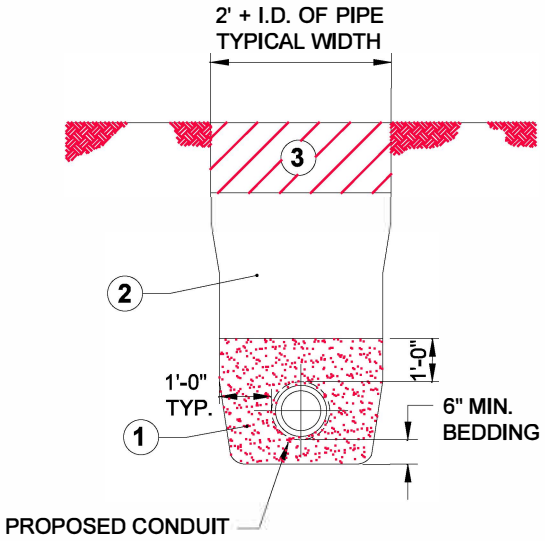
FOR RIGHT-OF-WAY OPENINGS BEYOND THE LIMITS OF THE PAVEMENT THE BACKFILL SHALL BE IN ACCORDANCE WITH 300-14 (2) BACKFILL.
ASPHALT SURFACE SHALL BE PLACED TO A DEPTH AS STATED IN 300-14 (3) PAVEMENT RESTORATION.

CONSTRUCTION

REPAIR AREAS SHALL BE RECTANGULAR IN SHAPE WITH DIMENSIONS AS REQUIRED TO ENVELOP THE SURFACE DETERIORATION. AT THE DIRECTION OF THE CITY THE LIMITS OF THE REPAIRED REPLACEMENT MAY BE EXTENDED AS DEEMED NECESSARY. PAVEMENT SHALL BE REMOVED BY METHODS THAT WILL NOT DAMAGE ADJACENT PAVEMENT.
ALL JOINTS AND VERTICAL FACES SHALL BE SAW CUT, CLEANED AND COATED WITH BITUMINOUS MATERIAL (TACK COAT) PRIOR TO PLACEMENT OF BITUMINOUS CONCRETE.

ALL JOINTS SHALL BE SEALED WITH ASPHALT SEALER AFTER THE FINAL SURFACE MATERIAL IS PLACED.

IF LOW STRENGTH MORTAR BACKFILL IS USED, LOW STRENGTH MOTAR BACKFILL SHALL BE BROUGHT UP UNIFORMLY TO THE FILL LINE SHOWN ON THE PLANS OR THE BOTTOM OF THE EXISTING PAVEMENT.



TRENCH DETAIL

- GRANULAR MATERIAL SHALL BE PLACED IN MAXIMUM 8-INCH LIFTS. FOR GRANULAR EMBANKMENT AND STRUCTURAL BACKFILL, COMPACT EACH LIFT OF MATERIAL USING MECHANICAL DEVICES, HOE RAMS, JUMPING JACKS, HAND DEVICES, VIBRATING PLATES, OR OTHER SIMILAR EQUIPMENT. COMPACTION REQUIREMENTS SHALL BE 98% OF STANDARD PROCTOR CURVE.
- LOW STRENGTH MORTAR BACKFILL SHALL BE FURNISHED AND PLACED AS PER ODOT ITEM 613.

ALL TRENCH EDGES NOT WITHIN THE STREET RIGHT-OF-WAY, NOT UNDER OR WITHIN 5 FEET OF PROPOSED OR EXISTING PAVEMENT, CURB, DRIVEWAYS, ALLEYS, OR WALKS CAN BE BACKFILLED WITH CLEAN NATIVE MATERIAL COMPACTED IN 12 INCH LIFTS. MATERIAL SHALL BE COMPACTED TO 85% OF THE ORIGINAL COMPACTION. NO MATERIAL SHALL BE USED FOR BACKFILLING THAT CONTAINS GRANULAR MATERIAL ROCK OR STONE GREATER THAN 4 INCHES IN DIAMETER.

CONCRETE RESTORATION

ALL CONCRETE DRIVEWAYS, DRIVE APPROACHES, AND SIDEWALKS WITHIN THE STREET RIGHT-OF-WAY, SHALL BE REPLACED WITH ODOT CLASS QC1 OR QCMS CONCRETE FOR THE FOLLOWING:

SIDEWALKS - MINIMUM THICKNESS OF 4 INCHES OF CONCRETE.

- MATCH ORIGINAL WIDTH OF SIDEWALK
- MINIMUM WIDTH OF 4 FEET REQUIRED
- MINIMUM THICKNESS OF 4 INCHES
- DRIVEWAYS AND DRIVE APPROACHES
- RESIDENTIAL: MINIMUM THICKNESS OF 6 INCHES OF CONCRETE
- BUSINESS: MINIMUM THICKNESS OF 8 INCHES OF CONCRETE
- INDUSTRIAL: MINIMUM OF THICKNESS 10 INCHES OF CONCRETE

ALL CONCRETE DRIVEWAYS, DRIVE APPROACHES, AND SIDEWALKS OUTSIDE OF THE STREET RIGHT-OF-WAY SHALL BE REPLACED EQUAL TO THE EXISTING MATERIAL COMPOSITION.

(1) BEDDING

GRANULAR BEDDING MATERIAL SHALL BE CRUSHED STONE OR GRAVEL COMPLYING WITH TYPE 2 BEDDING (#57 OR #67). BEDDING SHALL EXTEND 6 INCHES BELOW THE CONDUIT. BEDDING MATERIAL SHALL EXTEND 12 INCHES ABOVE THE TOP AND TO EACH SIDE OF THE CONDUIT. USE SHOVEL SLICING AND SPUD BARS IN CONJUNCTION WITH THE COMPACTION OPERATIONS TO COMPACT THE MATERIAL AND TO MANIPULATE THE MATERIAL UNDER THE HAUNCH OF THE PIPE.

(2) BACKFILL

ALL TRENCH EDGES WITHIN THE STREET RIGHT-OF-WAY, UNDER OR WITHIN 5 FEET OF PROPOSED OR EXISTING PAVEMENT, CURB, DRIVEWAYS ALLEYS, OR WALKS SHALL BE BACKFILLED WITH EITHER GRANULAR BACKFILL MATERIAL (#304, #411) OR ODOT ITEM 613 LOW STRENGTH MORTAR BACKFILL.

(3) PAVEMENT RESTORATION

IN PAVED AREAS WITHIN THE STREET RIGHT-OF-WAY THE PAVEMENT AND AGGREGATE BASE COMPOSITION SHALL BE PROVIDED EQUAL TO THE EXISTING PAVEMENT BUT IN NO CASE SHALL THE COMPOSITION BE LESS THAN THE FOLLOWING: 1-½ INCHES OF ODOT ITEM 448, SURFACE COURSE, TYPE 1; 2-1/2 INCHES OF ODOT ITEM 448 INTERMEDIATE COURSE, TYPE 2; 10 INCHES OF ODOT ITEM 304 AGGREGATE BASE.

IN ALLEYWAYS AND DRIVEWAYS OUTSIDE OF THE STREET RIGHT-OF-WAY, THE REPLACEMENT OF PAVEMENT AND/OR AGGREGATE SHALL BE EQUAL TO THE EXISTING ALLEYWAY OR DRIVEWAY COMPOSITION. IF THE PERMANENT ASPHALT CANNOT BE APPLIED WITHIN 48 HOURS OF THE INITIAL REPAIR, COLD PATCH SHALL BE APPLIED TO THE TRENCH SURFACE. MINIMUM THICKNESS OF THE COLD PATCH MATERIAL SHALL BE 4 INCHES. SAID MATERIAL SHALL BE REMOVED PRIOR TO THE PLACEMENT OF ODOT ITEM 448.

COMPACTION GUIDELINES

THE CONTRACTOR MAY OPERATE SMALL COMPACTION EQUIPMENT WITH LESS THAN A TOTAL WEIGHT OF 1 TON OVER THE CONDUIT TO COMPACT THE BACKFILL. DO NOT USE HOE RAMS ON TOP OF THE CONDUIT UNTIL 2 FEET OF BACKFILL IS COMPACTED ON TOP OF THE CONDUIT. THE CONTRACTOR MAY OPERATE COMPACTION EQUIPMENT WITH LESS THAN A TOTAL WEIGHT OF 8 TONS, BUT MORE THAN 1 TON, OVER THE CONDUIT AFTER PLACING AND COMPACTING 2 FEET OF BACKFILL. DO NOT OPERATE EQUIPMENT WITH A TOTAL WEIGHT OF 8 TONS OR MORE UNTIL PLACING AND COMPACTING A COVER OF 4 FEET OVER THE TOP OF THE CONDUIT. THE ABOVE RESTRICTIONS APPLY WHEN WORKING WITHIN ONE SPAN ON EACH SIDE OF THE CONDUIT, OR 6 FEET, WHICHEVER IS LESS.

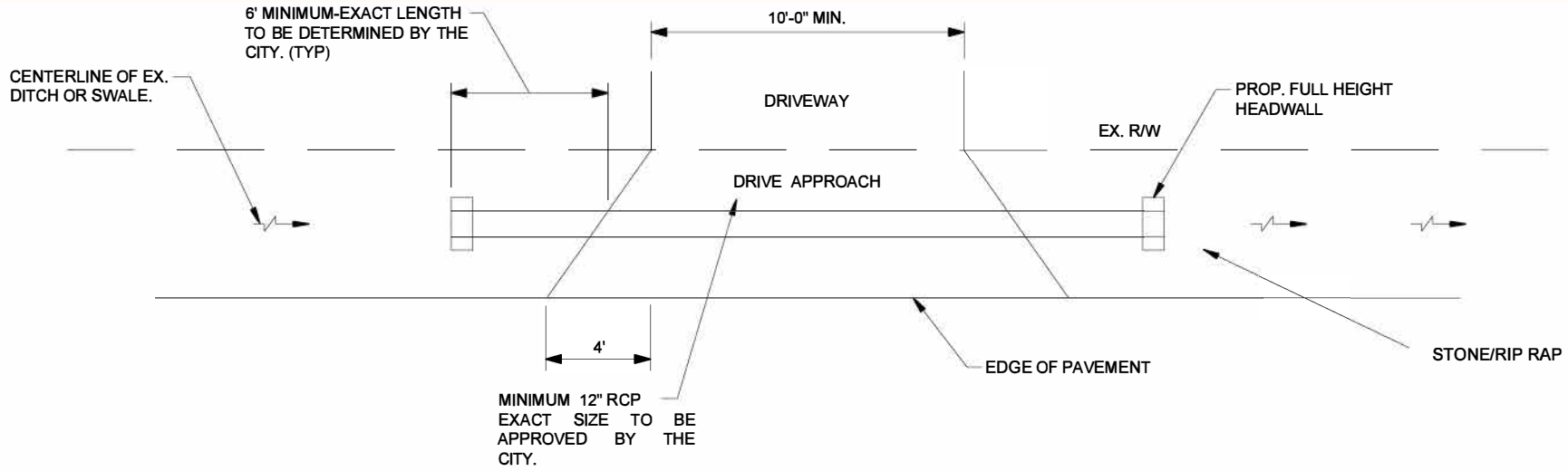
ALL TRENCHES AND EXCAVATION SHALL BE BACKFILLED IMMEDIATELY AFTER THE PLACEMENT OF THE CONDUIT. UNLESS DIRECTED OTHERWISE BY THE CITY ENGINEER. UNDER NO CIRCUMSTANCES SHALL WATER BE PERMITTED TO RISE IN UNBACKFILLED TRENCHES AFTER THE CONDUIT HAS BEEN PLACED.

PERMIT TO BLOCK WAY

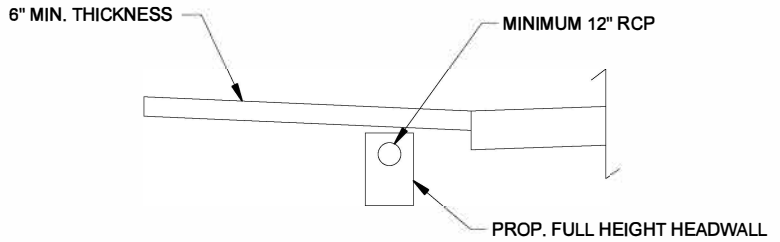
1. NO STREET, ALLEY, PARKING LANE, OR SIDEWALK SHALL BE BLOCKED WITHOUT THE CITY FIRST APPROVING A PERMIT TO BLOCK WAY. APPLICATIONS FOR A PERMIT TO BLOCK WAY CAN BE OBTAINED AT THE CITY OF HILLSBORO ENGINEERING DEPARTMENT OR ONLINE AT THE CITY OF HILLSBORO WEBSITE: WWW.HILLSBOROOHIO.NET
2. APPLICATIONS FOR A PERMIT TO BLOCK WAY SHALL BE SUBMITTED TO THE CITY OF HILLSBORO ENGINEERING DEPARTMENT A MINIMUM OF 3 WORKING DAYS PRIOR TO THE REQUESTED BLOCKAGE.
3. APPLICATION SHALL INCLUDE A DETAILED DRAWING OF THE WORK ZONE LAYOUT AND INCLUDE SIGNAGE, CONES, BARRICADES, BARRELS ETC. ALL WORK ZONES SHALL CONFORM TO THE CURRENT EDITION OF THE OHIO MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES.
4. IT SHALL BE THE APPLICANT/CONTRACTORS RESPONSIBILITY FOR PROVIDING AND MAINTAINING ALL NECESSARY SAFETY MATERIALS FOR THE SET UP OF THE WORK ZONE.
5. THE CITY OF HILLSBORO ENGINEERING DEPARTMENT SHALL INSPECT THE WORK ZONE PERIODICALLY TO ASSURE THE MAINTENANCE OF THE DEVICES.
6. ALL EXCAVATION/ REPAIR SHALL COMPLY WITH RIGHT-OF-WAY OPENING PERMIT REQUIREMENTS.

STREET OR ALLEY CLOSING PERMIT

1. NO STREET, ALLEY OR PARKING LANE SHALL BE CLOSED TO THRU TRAFFIC WITHOUT THE CITY FIRST APPROVING A STREET OR ALLEY CLOSING PERMIT. APPLICATIONS FOR A STREET OR ALLEY CLOSING PERMIT CAN BE OBTAINED AT THE CITY OF HILLSBORO ENGINEERING DEPARTMENT OR ONLINE AT THE CITY OF HILLSBORO WEBSITE: WWW.HILLSBOROOHIO.NET.
2. APPLICATIONS FOR A STREET OR ALLEY CLOSING PERMIT SHALL BE SUBMITTED TO THE CITY OF HILLSBORO ENGINEERING DEPARTMENT A MINIMUM OF 5 WORKING DAYS PRIOR TO THE REQUESTED BLOCKAGE, EXCLUDING WEEKENDS AND HOLIDAYS.
3. APPLICANT SHALL BE RESPONSIBLE FOR NOTIFYING IN WRITING ALL ADJACENT PROPERTY OWNERS TO BE AFFECTED BY THE CLOSURE. THE CITY SHALL RECEIVE A COPY OF THE WRITTEN NOTICE AND A LIST OF THE PROPERTY OWNERS AND THEIR ADDRESS THAT HAVE BEEN NOTIFIED.
4. APPLICATION SHALL INCLUDE A DETAILED DRAWING OF THE WORK ZONE LAYOUT AND INCLUDE SIGNAGE, CONES, BARRICADES, BARRELS ETC. ALL WORK ZONES SHALL CONFORM TO THE CURRENT EDITION OF THE OHIO MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES.
5. IT SHALL BE THE APPLICANT/CONTRACTORS RESPONSIBILITY FOR PROVIDING AND MAINTAINING NECESSARY SAFETY MATERIALS FOR HE SET UP OF THE WORK ZONE.
6. THE CITY OF HILLSBORO ENGINEERING DEPARTMENT SHALL INSPECT THE WORK ZONE PERIODICALLY TO ASSURE THE MAINTENANCE OF THE DEVICES.
7. ALL EXCAVATION/ REPAIR SHALL COMPLY WITH RIGHT-OF-WAY OPENING PERMIT REQUIREMENTS.

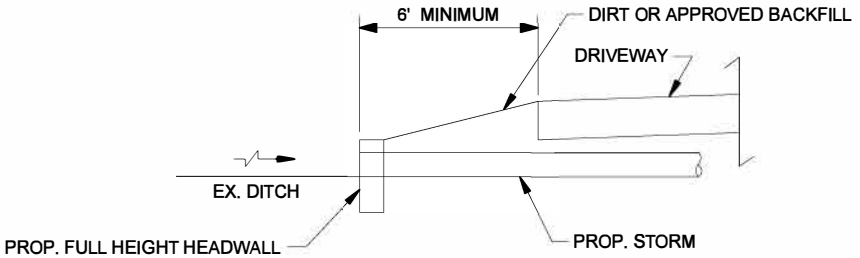


DRIVE WITH CULVERT



NOTES

A. DRIVE APPROACHES SHALL BE CONSTRUCTED PER THE CITY STANDARDS AND APPROVAL
B. ALL NEW CONSTRUCTION OR MODIFICATIONS OF DRIVE APPROACHES REQUIRE A CONCRETE APPROACH, REGARDLESS OF WHETHER THERE IS A SIDEWALK OR NOT. THE NEW APPROACH IS TO GO FROM EDGE OF EXISTING STREET OR PAVEMENT TO THE RIGHT OF WAY OR A MINIMUM OF 6"-0"
C. ANY DRAINAGE ISSUES WILL HAVE TO BE ADDRESSED WHEN A DRIVEWAY IS INSTALLED OR MODIFIED
D. IF THE EXISTING ROADWAY IS DISTURBED DURING CONSTRUCTION THE PROPERTY OWNER WILL BE RESPONSIBLE TO REPAIR ANY DAMAGE THE SATISFACTION O F THE CITY.
E. THE PROPERTY OWNER MUST SUBMIT A DRAWING TO BE APPROVED BY THE CITY PRIOR TO CONSTRUCTION.
F. THE EXACT SIZE AND LOCATION OF THE PROPOSED CULVERT AND HEADWALLS WILL BE DETERMINED BY THE CITY PRIOR TO CONSTRUCTION.



CITY OF HILLSBORO	DRIVE APPROACH WITH CULVERT	REVISIONS:	DATE APPROVED:
			PAGE No. 300-17

500 - General

SEEDING

A. ALL AREAS DESIGNATED FOR SEEDING SHALL HAVE A MINIMUM OF 6" OF TOPSOIL OVER THE ENTIRE AREAS. THE AREA SHALL BE RAKED, ROLLED, AND DRESSED READY FOR SEEDING. NOT STONE OVER 1" IN SIZE PERMITTED.

DRAINS

A. ALL FIELD OR STORM DRAINS WHICH ARE ENCOUNTERED DURING CONSTRUCTION SHALL BE REPAIRED AND PROVIDED WITH UNOBSTRUCTED OUTLETS AS APPROVED AND DIRECTED NY THE CITY AND MARKED ON THE RECORD DRAWINGS.

CONNECTIONS TO EXISTING PIPE

A. WHERE THE PLANS PROVIDE FOR PROPOSED CONDUIT TO BE CONNECTED TO, OR TO CROSS EITHER OVER OR UNDER AN EXISTING SEWER, IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO LOCATE THE EXISTING PIPE BOTH AS TO LINE AND GRADE BEFORE STARING TO LAY THE PROPOSED CONDUIT.

UTILITIES

A. THE MAXIMUM LENGTH OF ANY UTILITY TRENCH TO BE OPEN AT ANY TIME SHALL BE 250' UNLESS OTHERWISE APPROVED.

B. ALL UNDERGROUND UTILITIES ARE TO BE WITHIN THE PUBLIC RIGHT OF WAY.

COMPACTION METHODS

A. FLOODING SHALL NOT BE PERMITTED.

B. MECHANICAL DEVICES, HAND DEVICES VIBRATING PLATES OR OTHER EQUIPMENT APPROVED BY THE CITY IS ACCEPTABLE 1' ABOVE PIPE IN UNIFORM LIFTS OF 12" (LOOSE DEPTH) OF EXISTING NATIVE MATERIAL AND 6" OF GRANULAR BACKFILL. THE HEIGHT OF LIFTS WILL DEPEND UPON THE TYPE OF MECHANICAL EQUIPMENT BEING USED. THE HEIGHT WILL BE 6" FOR HAND OPERATED TOOLS AND UP TO 12" ON EQUIPMENT MOUNTED TOOLS. THE COMPACTION EQUIPMENT SHALL BE CAPABLE OF COMPACTING THE MATERIAL UNDER THE HAUNCH OF HE PIPE.

C. DENSITY FOR THE ABOVE METHODS SHALL BE NO LESS THAN THAT OF THE SURROUNDING GROUND UNLESS OTHERWISE SPECIFIED.

DISPOSAL OF SURPLUS MATERIAL

A. THE CITY MAY AT THEIR DISCRETION REQUIRE THAT SURPLUS MATERIAL BE DEPOSITED AT A LOCATION DESIGNATED WITHIN A TWO-MILE RADIUS OF THE WORK SITE.

TYPICAL NOTES-ALL CONSTRUCTION DRAWINGS.

A. ALL CONSTRUCTION METHODS AND MATERIALS SHALL COMPLY WITH THE CITY ENGINEERING STANDARDS OR ODOT WHICHEVER IS MORE RESTRICTIVE.

B. ALL COMPACTION SHALL MEET THE CITY REQUIREMENTS. IF TESTING OF COMPACTED AREAS IS REQUESTED BY THE CITY, SAID TESTING SHALL BE PERFORMED AT THE EXPENSE OF THE DEVELOPER.

C. THE CITY WILL LOCATE AREAS IN NEED OF UNDERCUTTING UNLESS THE DEVELOPER CHOOSES TO HAVE AT HIS EXPENSE AN INDEPENDENT APPROVED TESTING COMPANY TO DETERMINE UNSUITABLE MATERIAL AREAS THAT NEED UNDERCUTTING.

D. ALL EMBANKMENT AREAS SHALL BE COMPACTED TO A MINIMUM OF 95% OF ASTM D698 STANDARD PROCTOR CURVE AND TESTED TO REPRESENT A DEPTH OF 12" UNLESS OTHERWISE SPECIFIED BY THE CITY.

E. ALL UNPAVED AREAS WITHIN THE STREET RIGHT-OF-WAY SHALL BE SEEDED WITHIN 48 HOURS AFTER THE CURB IS BACKFILLED. STAKED STRAW BALES MAY BE REQUIRED IN ADDITION TO SEEDING CONTROL EROSION IF REQUESTED BY THE CITY.

F. STORM WATER POLLUTION PREVENTION SHOULD BE A HIGH PRIORITY ON ALL CONSTRUCTION PROJECTS. ON ALL PROJECTS WHICH DISTURB AT LEAST 1 ACRE OF SOIL, A NPDES PERMIT IS REQUIRED FROM OEPA AND A COPY OF THE PERMIT MUST BE ON FILE AT THE CITY OFFICE BEFORE CONSTRUCTION BEGINS.

OHIO UTILITIES PROTECTION SERVICE
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CITY OF HILLSBORO

GENERAL NOTES

REVISIONS:

DATE APPROVED:

BORING / JACKING

A. MATERIALS

CASING PIPE SHALL BE WELDED STEEL PIPE CONFORMING TO AWWA C-202

B. INSTALLATION (CASING PIPE)

1. FURNISH PROCEDURE METHODS TO THE CITY FOR APPROVAL.
2. ALL METHODS AND PROCEDURES SHALL BE APPROVED BY THE CITY PRIOR TO CONSTRUCTION.
3. ADEQUATELY SUPPORT ALL TRENCHES AND BORING/ JACKING PITS.
4. INSTALL TO LINE AND GRADE SHOWN.

C. INSTALLATION (CARRIER PIPE)

1. PLACE CONDUITS IN CASING PIPE TO SAME RELATIVE POSITIONS AS ADJACENT DUCT BY USE OF SPACERS.
2. FILL THE SPACE BETWEEN CONDUITS INSIDE THE CASING PIPE WITH CLEAN SAND OR OTHER APPROVED MATERIALS AS APPROVED BY THE CITY.

STEEL CASING PIPE

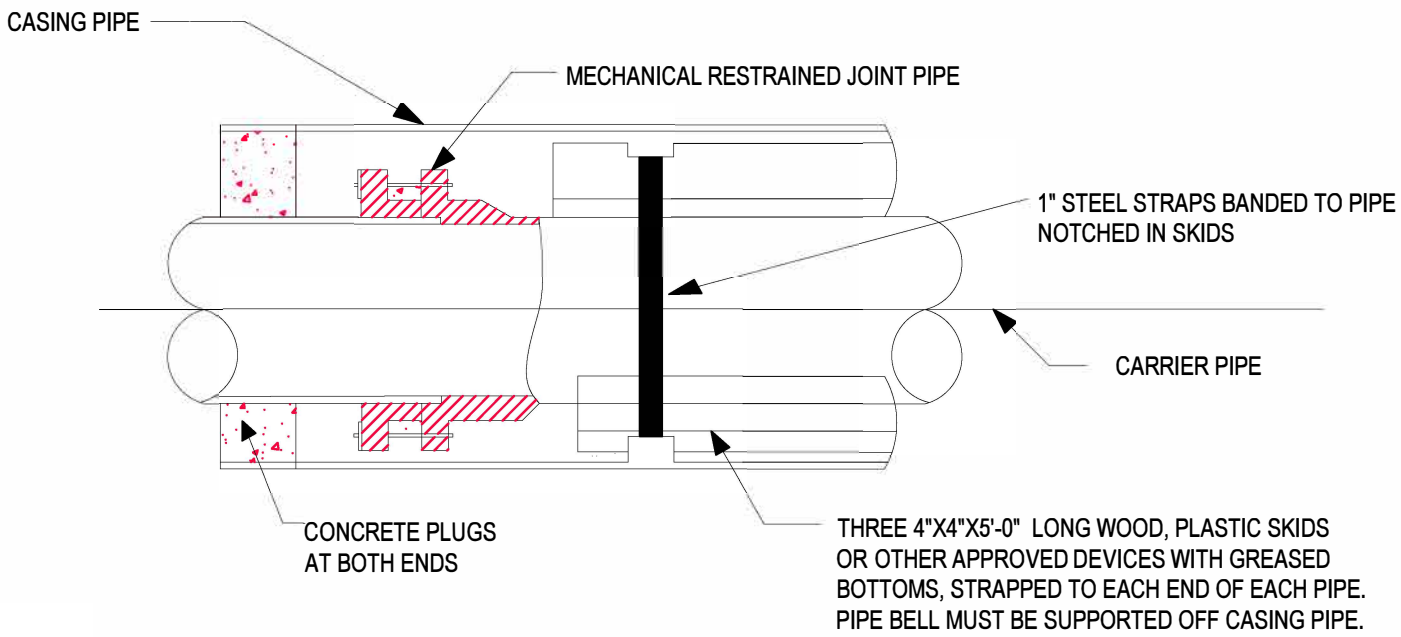
A. STEEL PIPE SHALL HAVE A MINIMUM YIELD STRENGTH OF 35,000 PSI.

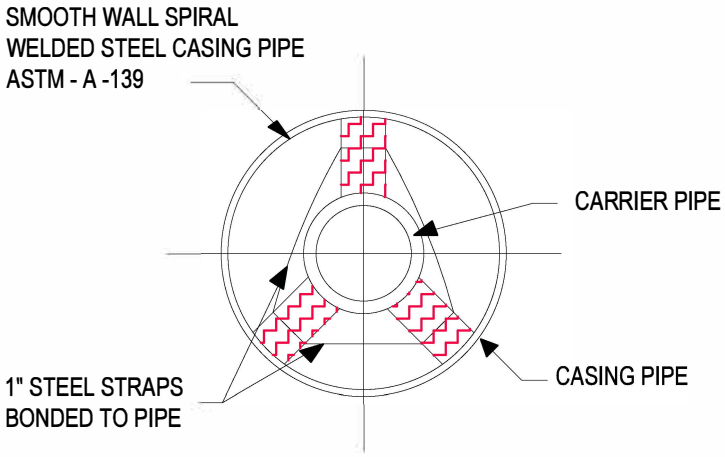
B. JOINTS BETWEEN THE SECTIONS OF PIPE SHALL BE FULLY WELDED AROUND THE COMPLETE CIRCUMFERENCE OF THE PIPE.

C. SIZE- A MINIMUM OF 4" GREATER THAN THE LARGEST OUTSIDE DIAMETER OF THE CARRIER PIPE.

D. A STEEL CASING PIPE WILL BE REQUIRED FOR STORM SEWER, WATERMAIN, AND SANITARY SEWER.

DIAMETER NOMINAL (INCHES)	NOMINAL THICKNESS (INCHES)
10 AND UNDER	0.188
12 & 14	0.250
16	0.281
18	0.312
20&22	0.344
24	0.375
26	0.406
28	0.438
30	0.469
32	0.500
34 & 36	0.532
38	0.562
40	0.594
42	0.625
44 & 46	0.657
48	0.688
50	0.719
52	0.750
54	0.781
56 & 58	0.812
60	0.844
62	0.875
64	0.906
66 & 68	0.938
70	0.969
72	1.000





CITY OF HILLSBORO

CASING PIPE DETAIL

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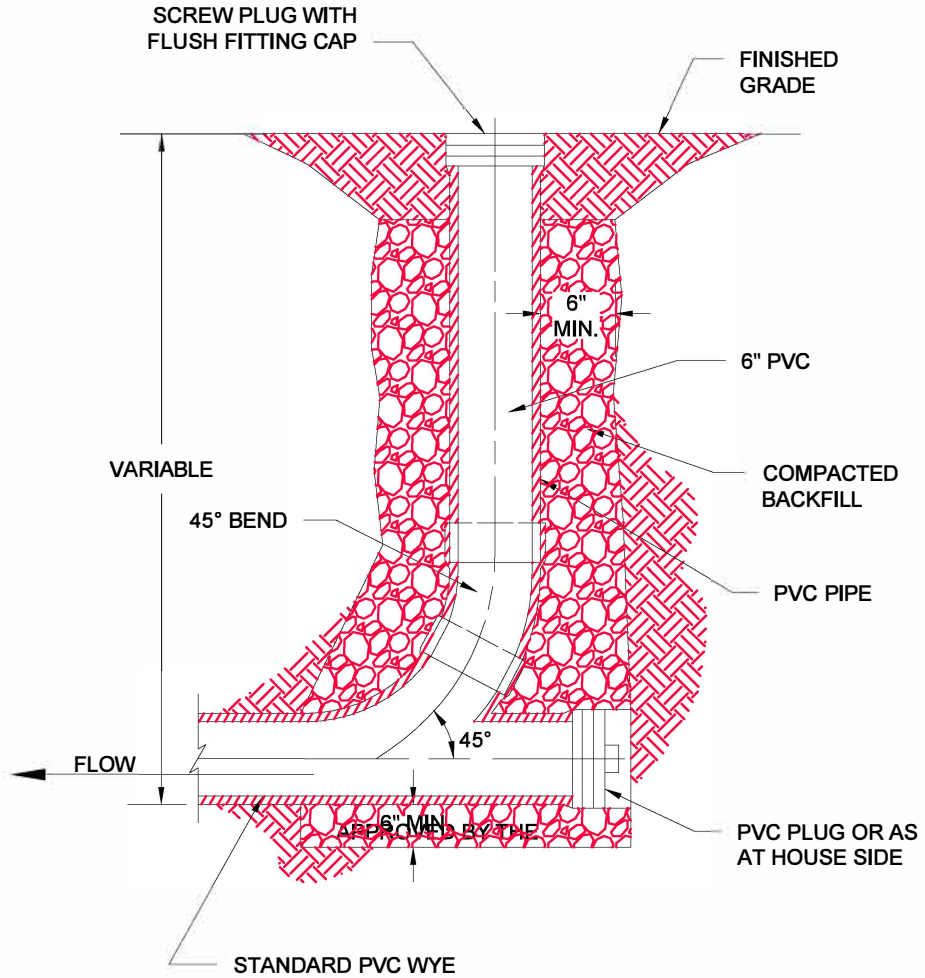

DEMOLITION ABANDONMENT

AT SANITARY LATERALS ONLY

CITY OF HILLSBORO	SANITARY SEWER DEMO ABANDONMENT	REVISIONS:	DATE APPROVED:
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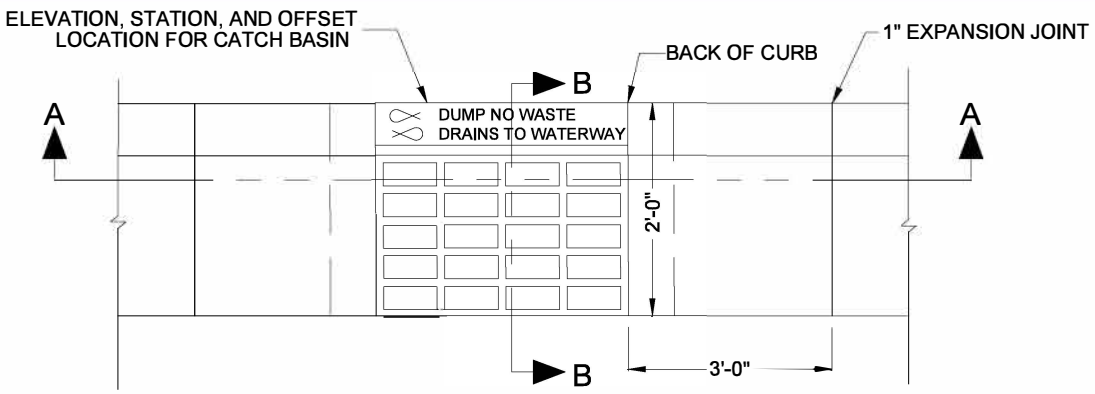
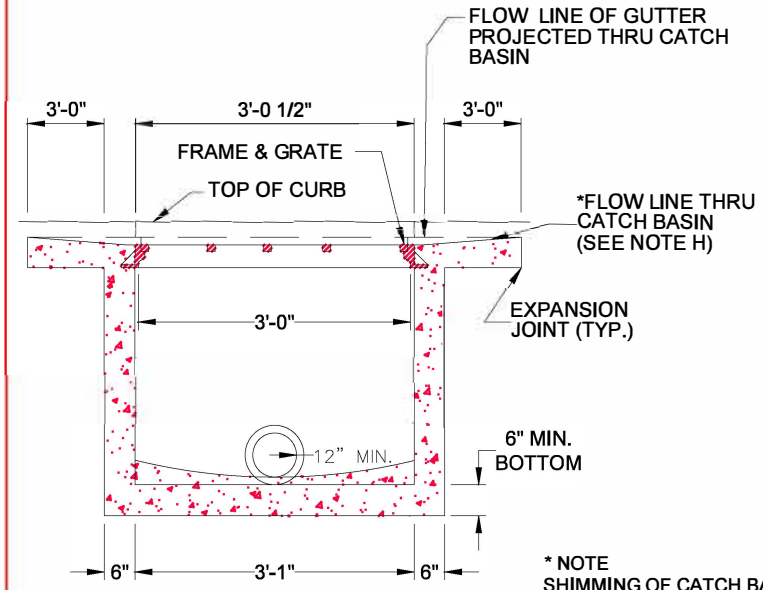
600 – Storm Drainage

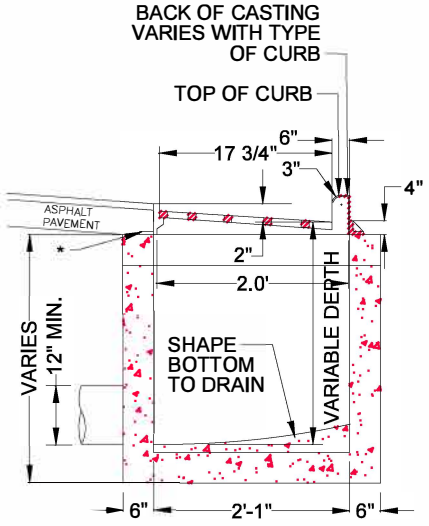


TOP VIEW



SECTION A-A

* NOTE
SHIMMING OF CATCH BASIN FRAME MAY BE REQUIRED TO KEEP LIP OF GUTTER CONSISTENT.



SECTION B-B

NOTES

A. AS OF JANUARY 1, 2003 THE FOLLOWING TEXT SHALL BE CAST INTO THE TOP OF THE GRATE: "**DUMP NO WASTE**" AND "**DRAINS TO WATERWAY**".

   TEXT SHALL BE PRINTED IN BOLD, CAPITAL LETTERS WITH A MINIMUM HEIGHT OF ½ INCH. "WATERWAY" MAY BE SUBSTITUTED WITH "STREAM", "RIVER", "LAKE", ETC. ACTUAL PLACEMENT AND LOGO MAY VARY PER MANUFACTURER.

B. CASTING SHALL BE EAST JORDAN 7030 OR NEENAH R-3246 OR EQUIVALENT.

C. FOR TYPE 2 COMBINATION CURB AND GUTTER THE BACK SHALL BE EAST JORDAN TYPE T4, OR NEENAH (3 INCH RADIUS) (R-3246-1).

D. FOR TYPE 1 COMBINATION ROLL CURB AND GUTTER THE BACK SHALL BE EAST JORDAN TYPE T2 OR NEENAH (MOUNTABLE CURB) (R-3246-E OR R-3067C).

E. CATCH BASIN IN DRIVE APPROACHES TO BE AVOIDED, IF POSSIBLE. THE BACKS SHALL BE EAST JORDAN TYPE T3 OR NEENAH (R-3246-1 WITH CURB PLATE OR R3067C).

F. STANDARD GRATE SHALL BE EAST JORDAN TYPE M2, NEENAH TYPE C, OR EQUIVALENT. ALL BAR EDGES TO BE ROUNDED 1/8 INCH RADIUS.

G. CONCRETE, CAST-IN-PLACE, TO BE CLASS QC1. PRECAST CONSTRUCTION PERMITTED AND CONCRETE SHALL MEET THE REQUIREMENTS OF 706.13 WITH 7% ± 2% AIR VOID CONTENT IN THE HARDENED CONCRETE. KNOCKOUTS ARE REQUIRED IN PRECAST CONSTRUCTION. PRECAST WALLS SHALL HAVE A SUFFICIENT AMOUNT OF REINFORCEMENT OT PERMIT SHIPPING AND PLACEMENT WITHOUT DAMAGE.

H. CARE SHALL BE TAKEN WHEN CONNECTING TO AN EXISTING CATCH BASIN TO KEEP OPENING AS MINIMAL AS POSSIBLE. IF POSSIBLE, SAW CUT OR USE ROTARY HAMMER FOR OPENING TO MINIMIZE DAMAGE TO CATCH BASIN. PIPE TO INTRUDE INTO CATCH BASIN 1 INCH ONLY AND PIPE MUST BE CUT PARALLEL TO CATCH BASIN. USE NON-SHRINK GROUT AROUND PIPE TO SEAL BETWEEN PIPE AND CATCH BASIN.

I. DROP FLOW LINE ½ INCH WITHIN BLOCK OUT OF COMBINED CURB AND GUTTER WHILE KEEPING LIP OF GUTTER CONSISTENT WITH TOP OF CURB.

J. ALL GRATES SHALL BE CONSIDERED "BICYCLE SAFE".

CITY OF HILLSBORO	TYPE 1 CATCH BASIN	REVISIONS:	DATE APPROVED:
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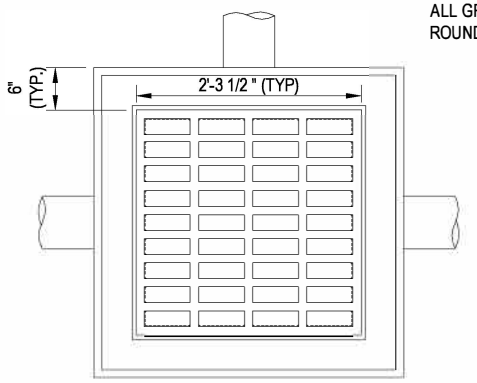
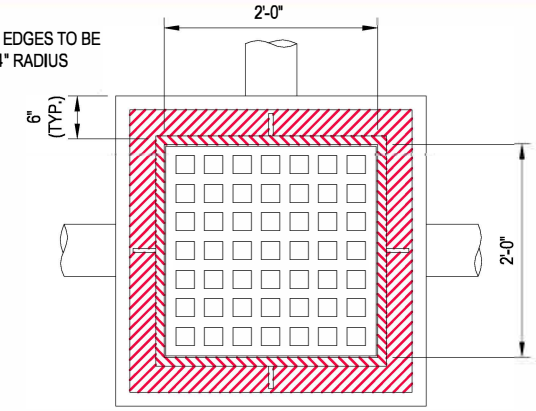
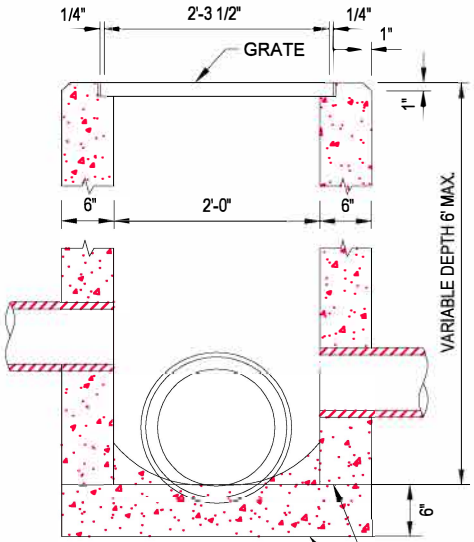


PLAN

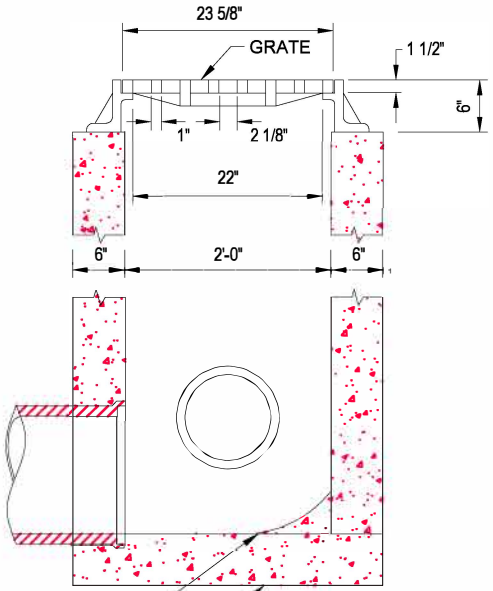
ALL GRATED EDGES TO BE ROUNDED 1/4" RADIUS



PLAN



NONPAVED AREAS



PAVED AREAS

PERMISSIBLE CONSTRUCTION JOINT

BOTTOM SLAB MAY BE CAST SEPARATELY AND THE OUTLET PIPE PLACED ON TOP OF IT WITH THE BOTTOM SHAPED TO DRAIN.

NOTES

A. AS OF JANUARY 1, 2003 THE FOLLOWING TEXT SHALL BE CAST INTO THE TOP OF THE GRATE:

"DUMP NO WASTE" AND "DRAINS TO WATERWAY"

TEXT SHALL BE PRINTED IN BOLD, CAPITAL LETTERS WITH A MINIMUM HEIGHT OF ½ INCH. "WATERWAY" MAY BE SUBSTITUTED WITH "STREAM", "RIVER", "LAKE", ETC. ACTUAL PLACEMENT AND LOGO MAY VARY PER MANUFACTURER.

B. LOCATION AND ELEVATIONS WHEN GIVEN ON THE PLANS IS TOP CENTER OF THE GRATE. WHEN SIDE OPENINGS ARE PROVIDED. ELEVATION SHALL BE THE FLOW LINE OF THE SIDE INLET.

C. GRATE FOR NON-PAVED AREAS SHALL BE EAST JORDAN IRON WORKS 5110 TYPE M3 OR NEENAH CATALOG NO. R-4859-C OR EQUIVALENT.

D. GRATE ELEVATION TO BE PLACED 4 INCH TO 6 INCH BELOW NORMAL DITCH RETURNING TO NORMAL 10' EACH SIDE OF BASIN.

E. PRECAST CONSTRUCTION IS REQUIRED, UNLESS OTHERWISE APPROVED AND CONCRETE SHALL MEET THE REQUIREMENTS OF 706.13 WITH 6±2% AIR VOID CONTENT IN THE HARDENED CONCRETE. KNOCKOUTS SHALL BE PROVIDED IN PRECAST CONSTRUCTION. PRECAST WALLS SHALL HAVE A SUFFICIENT AMOUNT OF REINFORCEMENT TO PERMIT SHIPPING AND PLACEMENT WITHOUT DAMAGE.

F. CATCH BASINS NOT PERMITTED IN PAVEMENT AREAS UNLESS USING A FRAME AND GRATE EQUIVALENT OF NEENAH CATALOG NO. R-3405 OR EAST JORDAN IRON WORKS NO. 5250.

G. FOR PIPES OVER 18" REFER TO ODOT CATCH BASIN 2-3 AND 2-4 FOR SIDE INLETS REFER TO ODOT CATCH BASIN 2-2-A.

H. CARE SHALL BE TAKEN WHEN CONNECTING TO AN EXISTING CATCH BASIN TO KEEP OPENING AS MINIMAL AS POSSIBLE. IF POSSIBLE SAW CUT OR USE ROTARY HAMMER FOR OPENING TO MINIMIZE DAMAGE TO CATCH BASIN 1" ONLY AND PIPE MUST BE CUT PARALLEL TO CATCH BASIN. USE NON-SHRINK GROUT AROUND PIPE TO SEAL BETWEEN PIPE AND CATCH BASIN.

CITY OF HILLSBORO

TYPE 2-2-B CATCH BASIN

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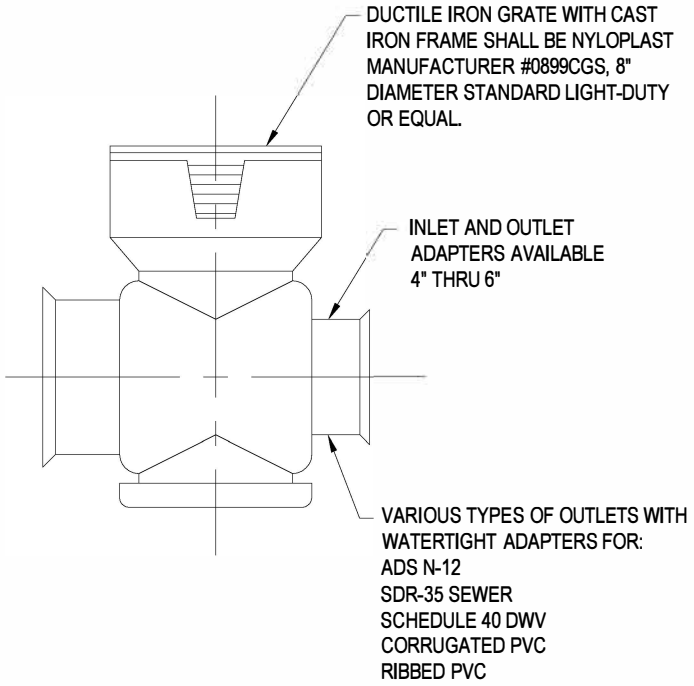
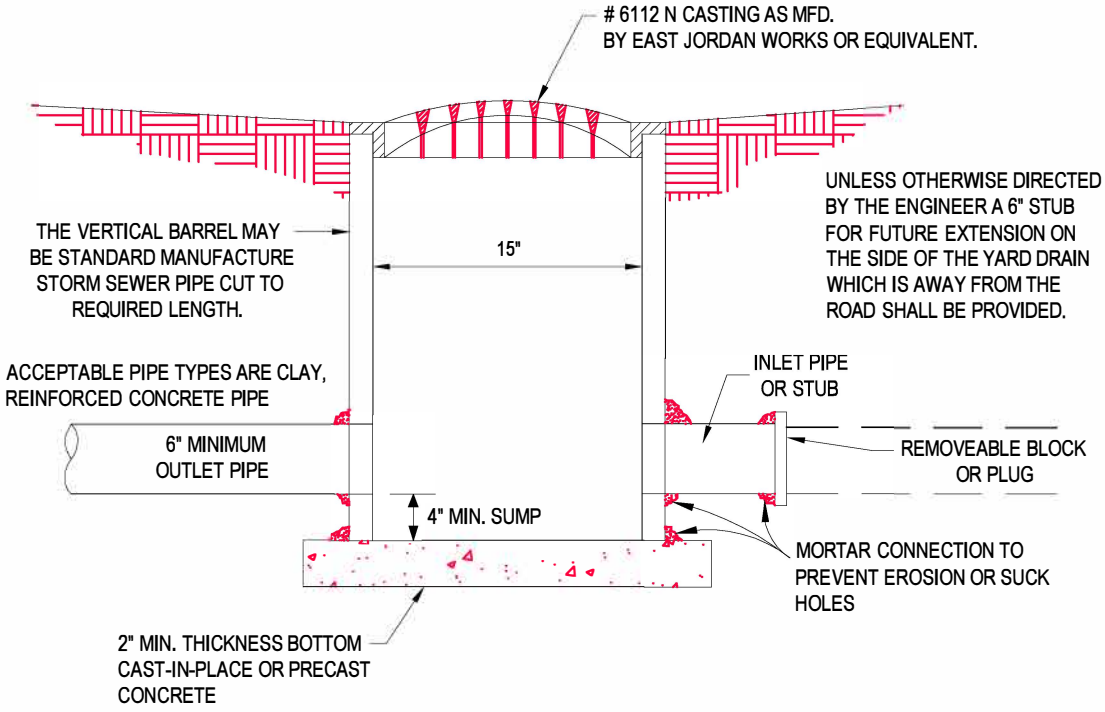


TYPE 2 YARD DRAIN

- STANDARD OR CUSTOM DRAIN BASIN FOR VARIABLE INLET HEIGHT SHALL BE NYLOPLAST MANUFACTURER #2808AG OR EQUAL.

- CONTRACTOR TO INSTALL PER MANUFACTURER'S RECOMMENDATIONS.



TYPE 3 YARD DRAIN

CITY OF HILLSBORO	YARD DRAIN	REVISIONS:	DATE APPROVED:
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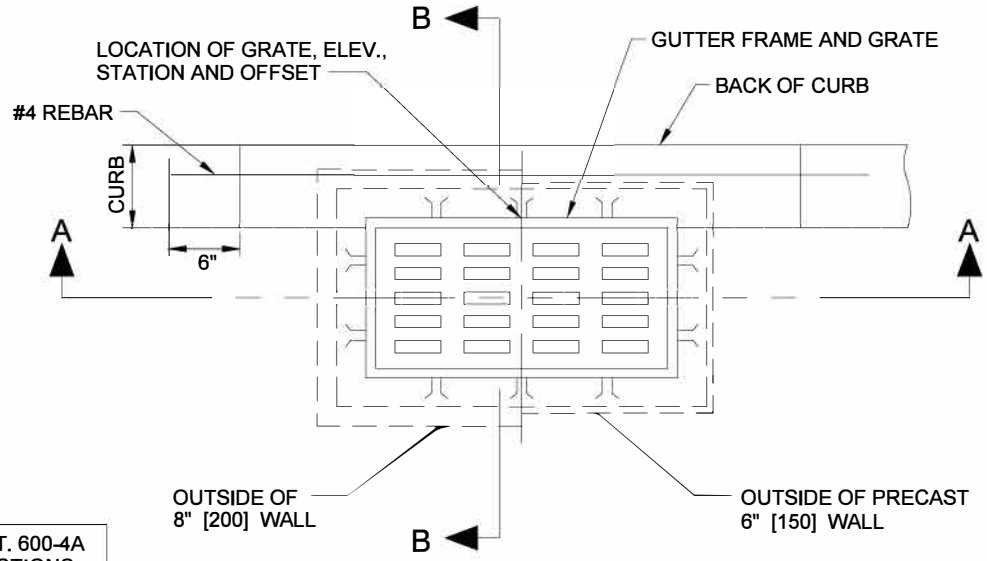
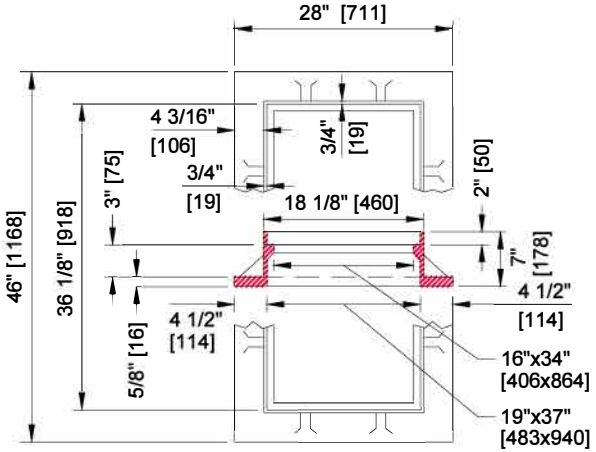


SEE SHT. 600-4A FOR SECTIONS

PLAN OF CATCH BASINS AND PAVEMENT JOINTS



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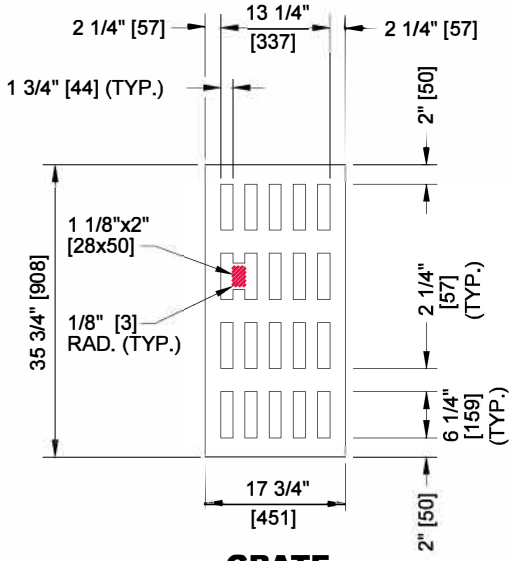

GRATE

NOTES

1. GRATE AND FRAME: AS OF JANUARY 1, 2003 THE FOLLOWING TEXT SHALL BE CAST INTO THE TOP OF THE GRATE: "**DUMP NO WASTE**" AND "**DRAINS TO WATERWAY**".

   TEXT SHALL BE PRINTED IN BOLD, CAPITAL LETTERS WITH A MINIMUM HEIGHT OF ½ INCH. "WATERWAY" MAY BE SUBSTITUTED WITH "STREAM", "RIVER", "LAKE", ETC. ACTUAL PLACEMENT AND LOGO MAY VARY PER MANUFACTURER.
2. THE DESIGN SHALL BE ESSENTIALLY THE SAME AND EQUALLY AS STRONG AS THE ONE SHOWN (SEE CONSTRUCTION INFORMATION TABLE), OR MEET THE REQUIREMENTS OF CMS 711.14. GRATE OPENINGS AND DIMENSIONS SHALL NOT DIFFER FROM THOSE SHOWN HERE UNLESS OTHERWISE SHOWN IN THE PLANS.
3. **BEARING AREAS:** THE FRAME AND GRATE SHALL BE SO FITTED AND FINISHED AS TO PROVIDE A FIRM AND EVEN SEAT FOR ALL PORTIONS OF THE GRATE IN THE FRAME. NO PROJECTIONS SHALL EXIST ON BEARING AREAS OF WITHER CASTING AND THE GRATE SHALL SEAT IN ITS FRAME WITHOUT ROCKING. THE FRAME AND GRATE SHALL BE FITTED, MATCHED, AND MARKED BEFORE DELIVERY TO THE PROJECT.
4. **WALLS:** BRICK OR CAST-IN-PLACE WALLS SHALL HAVE A NOMINAL THICKNESS OF 8" (200). PRECAST WALLS SHALL HAVE A MINIMUM THICKNESS OF 6"(150) AND BE REINFORCED AND SUFFICIENTLY TO PERMIT SHIPPING AND HANDLING WITHOUT DAMAGE.
5. **CONCRETE:** CAST-IN-PLACE CONCRETE SHALL BE ODOT CLASS QC1. PRECAST CONCRETE SHALL MEET THE REQUIREMENTS OF CMS 706.13 AND BE MARKED WITH THE CATCH BASIN NUMBER. THE WALL THICKNESS REDUCTION SHALL BE FROM THE OUTSIDE.
6. **MINIMUM DEPTH:** THE MINIMUM DEPTH SHALL BE THE OUTSIDE DIAMETER (O.D.) OF THE OUTLET PIPE PLUS 15" (380).
7. **OPENINGS**: PIPE OPENINGS SHALL BE THE O.D. OF THE PIPE BEING SUPPLIED PLUS 2" (50) WHEN FABRICATED OR FIELD CUT. FILL ANY VOIDS PER CMS 601.

CITY OF HILLSBORO

TYPE 6 CATCH BASIN

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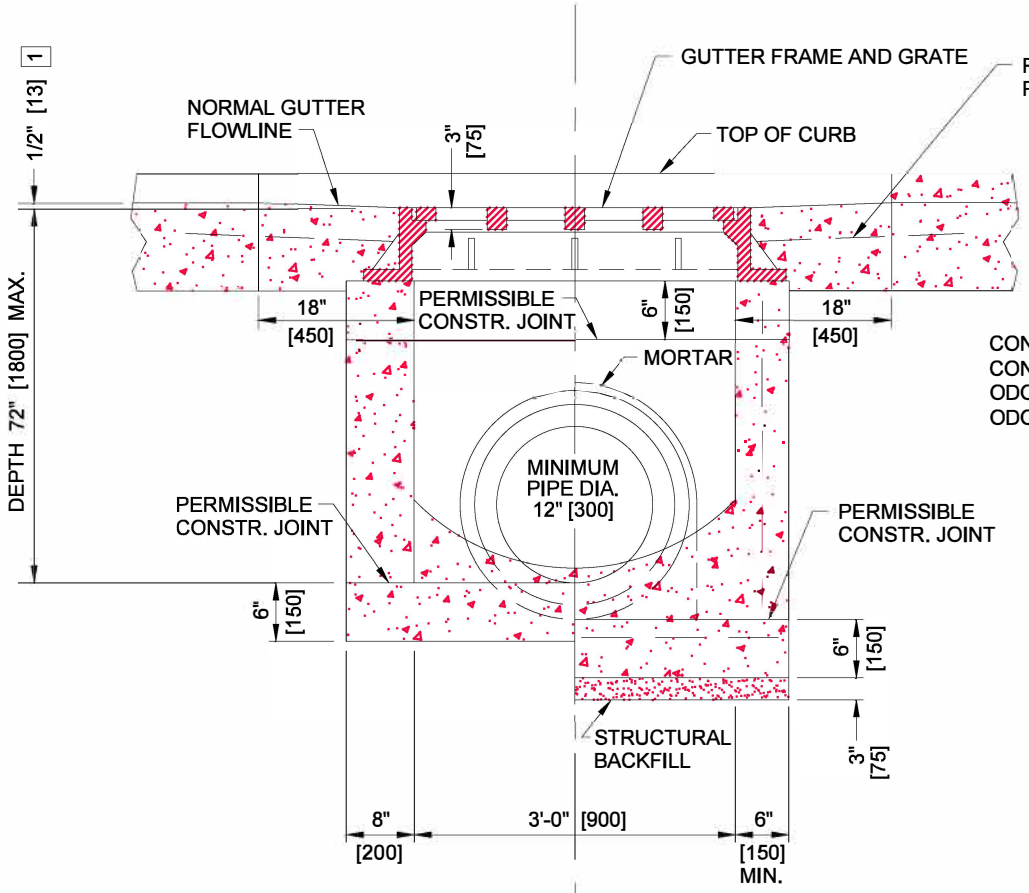
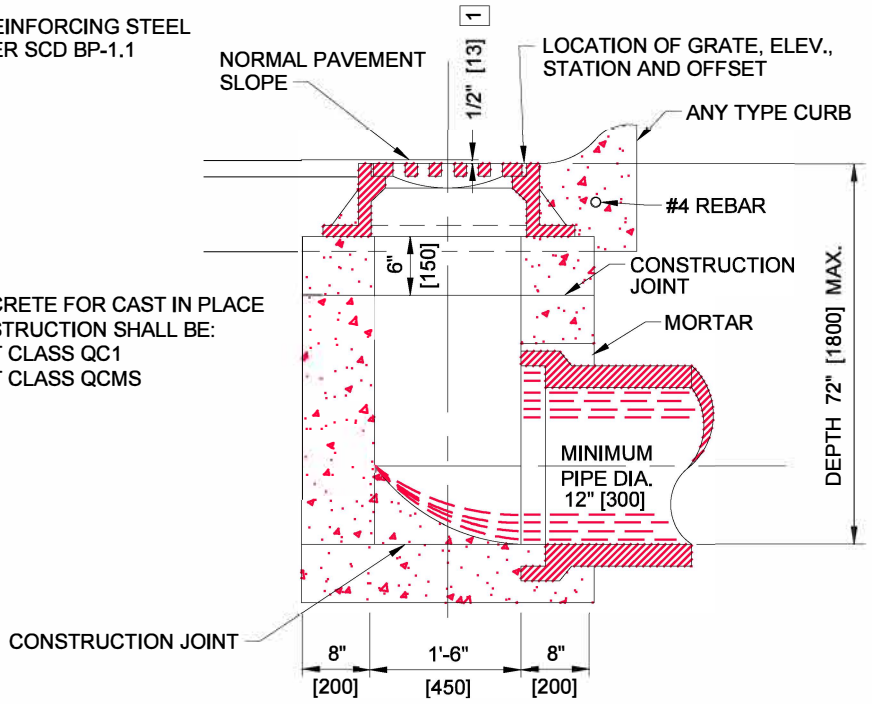


CAST-IN-PLACE CONCRETE | **REINFORCED PRECAST CONCRETE**

SECTION A-A

(SEE SHEET 600-4)



CONCRETE FOR CAST IN PLACE CONSTRUCTION SHALL BE:
ODOT CLASS QC1
ODOT CLASS QCMS

SHOWN WITH CAST-IN-PLACE WALLS

SECTION B-B

(SEE SHEET 600-4)

CITY OF HILLSBORO	TYPE 6 CATCH BASIN	REVISIONS:	DATE APPROVED:
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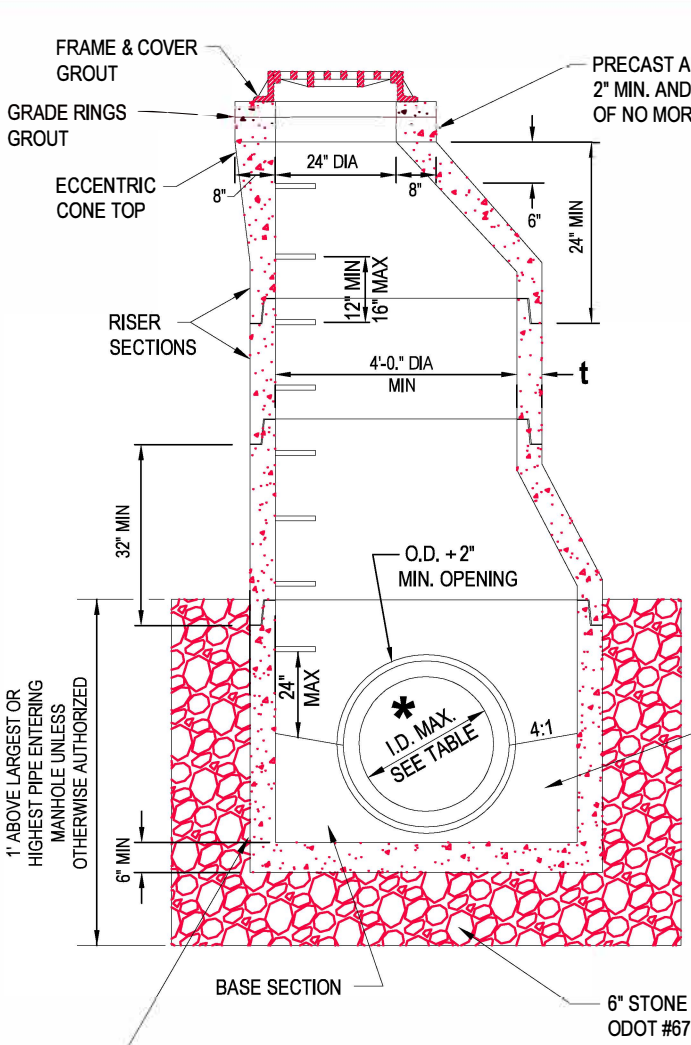
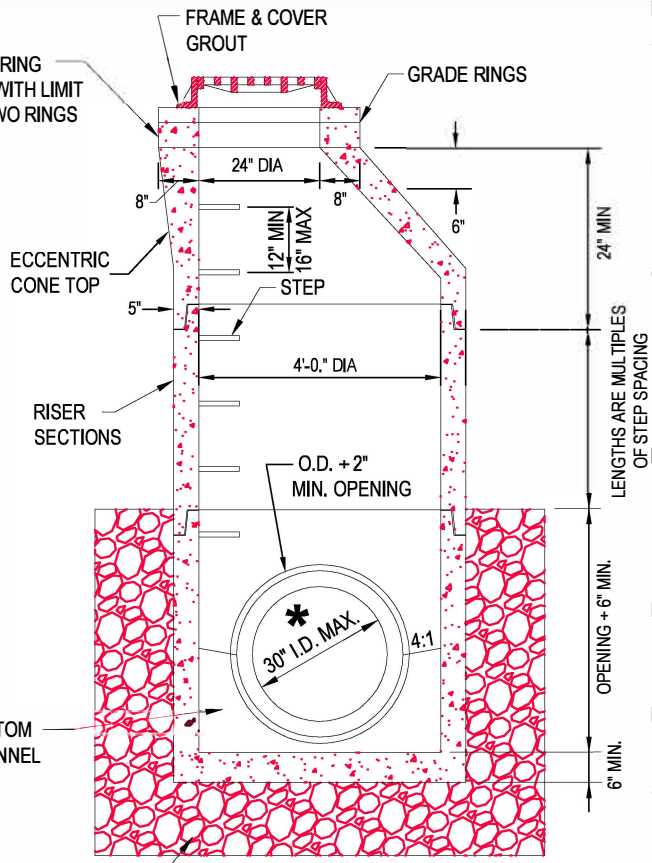


60" TO 96" PRECAST BASE

SEE TABLE FOR MAXIMUM PIPE SIZES

PRECAST OR POURED IN PLACE BASE SECTION WITH 6" GRANULAR BEDDING USE OF BARREL BLOCKS IS CONTINGENT UPON CITY APPROVAL AND THEN ONLY IN SPECIAL CASES.



48" PRECAST BASE

FOR 30" & SMALLER PIPE

* BASE I.D.	MIN "t"	MAX. PIPE SIZE
60"	5"	36"
72"	6"	48"
84"	7"	54"
90"	7 1/2"	60"
96"	8"	60"

NOTE: DUE TO PIPE ORIENTATION, LARGER DIAMETER BASE THAN WHAT IS SPECIFIED TO ACCEPT PIPE MAY BE REQUIRED.

NOTES

A. STORM MANHOLE FRAME AND APPROVED VENTED LID SHALL BE EQUAL OF NEENAH NO. R-1767 OR EAST JORDON IRON WORKS NO 1600.

B. TOP AND TRANSITION (OR REDUCER) SECTIONS MY BE EITHER ECCENTRIC CONE OR FLAT SLAB.

C. OPENINGS IN RISER SECTIONS FOR 18 INCH AND SMALLER INLET PIPES MAY BE PREFABRICATED OR CUT IN THE FIELD PROVIDED THE SIDES OF THE PIPE AT THE SPRING LINE DO NOT PROJECT INTO THE MANHOLE.

D. MATERIALS FOR BASES AND OTHER PRECAST SECTIONS, INCLUDING REINFORCEMENT SHALL COMPLY WITH ODOT REQUIREMENTS OF 706.13 (ASTM C-478).

E. LOCATE THE CENTERLINE OF MANHOLE CONES OVER THE CENTERLINE OF THE MAIN SEWER WHENEVER POSSIBLE.

F. FOR PIPE SIZES LARGER THAN 60 INCHED REFER TO ODOT TYPE 4 TO 5 MANHOLE.

G. NO LATERALS MAY PROTRUDE INTO INTERNAL MANHOLE.

H. MAXIMUM SPACING SHALL BE 400 FEET.

I. WHEN CONNECTING TO AN EXISTING STORM MANHOLE CARE SHALL BE TAKEN TO KEEP OPENING AS MINIMAL AS POSSIBLE. IF POSSIBLE, SAW CUT OR USE ROTARY HAMMER FOR OPENING TO MINIMIZE DAMAGE TO STORM MANHOLE AND PIPE MUST BE CUT PARALLEL TO STORM MANHOLE. USE NON-SHRINK GROUT AROUND PIPE TO SEAL BETWEEN PIPE AND STORM MANHOLE.

J. JOINTS BETWEEN SECTIONS TO BE EITHER MORTAR OR BITUMINOUS PIPE JOINT FILLER (ODOT 706.10)

CITY OF HILLSBORO

TYPE 3 STORM MANHOLE

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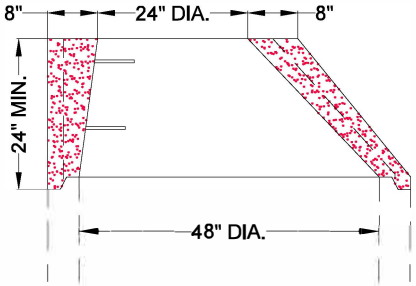
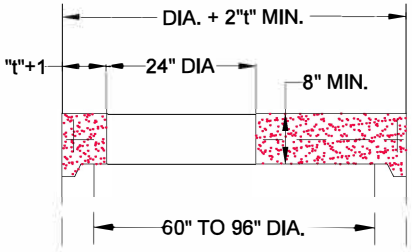
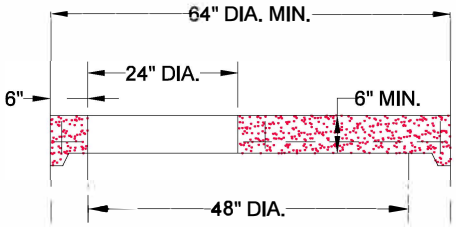


ECCENTRIC CONE TOP

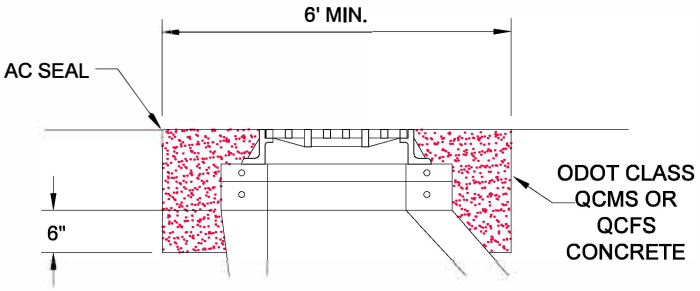


FLAT SLAB TOP

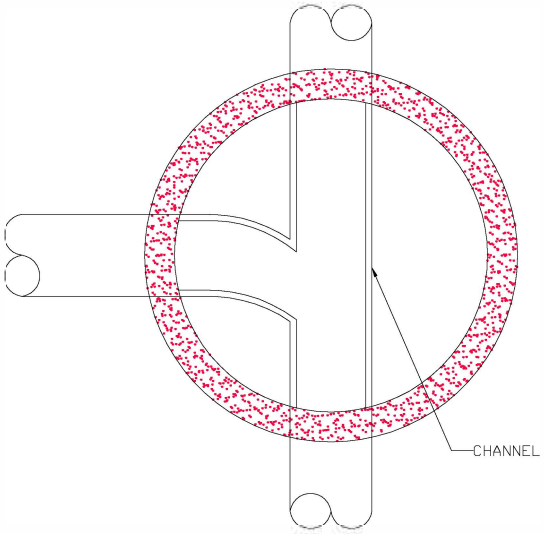
BASE I.D.	MIN. "t"	MAX. PIPE SIZE
60"	5"	36"
72"	6"	48"
84"	7"	54"
90"	7 1/2"	60"
96"	8"	60"



FLAT SLAB TOP

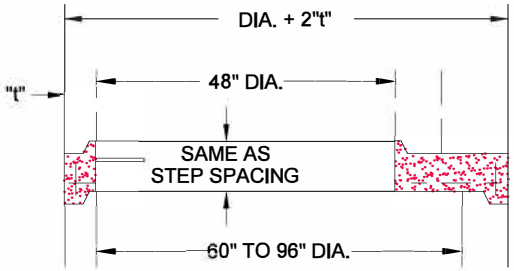


MANHOLE REPAIR CASTING CONSTRUCTION



SECTIONAL PLAN

NOTE:
ALL INVERTS TO BE CHANNELED FOR OPTIMUM FLOW.



FLAT SLAB TRANSITION

NOTES:
1. PRECAST CONCRETE ADJUSTING RINGS - ENCASE WITH CONCRETE 6" DOWN FROM BARREL TOP AND UP TO THE PAVEMENT SURFACE.

2. SET MANHOLE, PRECAST ADJUSTING RINGS AND CASTING. PAVE OVER MANHOLE. EXCAVATE CASTING AND COLLARS AND ENCASE COLLARS AND CASTINGS PER DETAIL.

CITY OF HILLSBORO

TYPE 3 STORM MANHOLE DETAILS

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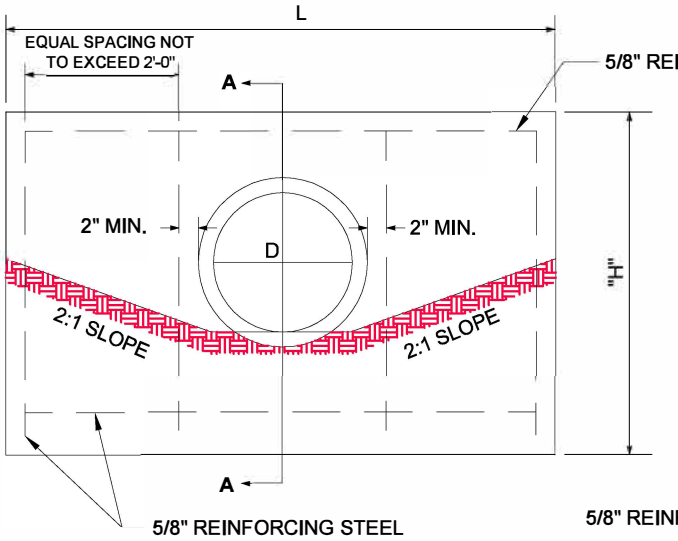

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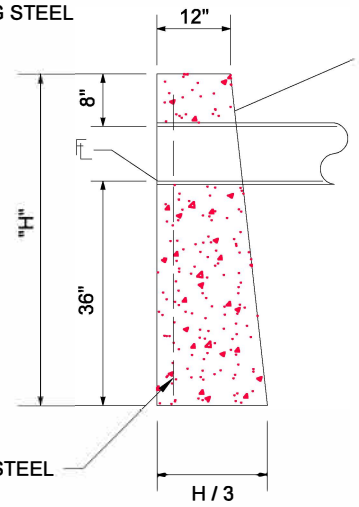
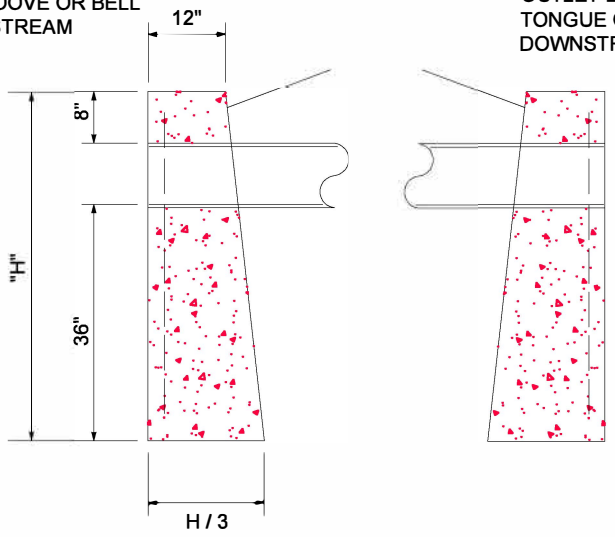


SECTION A-A

INLET END
GROOVE OR BELL
UPSTREAM

OUTLET END
TONGUE OR SPIGOT
DOWNSTREAM



RIGID PIPE

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

NOTES

A. THESE FULL HEIGHT HEADWALLS ARE FOR NON-SKEWED CULVERTS HAVING A DIAMETER OR RISE OF 36 INCHES OR LESS

B. CONCRETE SHALL BE ODOT QCI CONCRETE. REINFORCED STEEL BAR SHALL BE 5/8 INCH ROUND

C. DIMENSIONS AND QUANTITIES ARE SHOWN FOR CIRCULAR SECTIONS ONLY. IT WILL BE NECESSARY TO DETERMINE DIMENSIONS FOR THE HW-1 HEADWALL REQUIRED FOR REINFORCED ELLIPTICAL CONCRETE PIPE OR CORRUGATED METAL PIPE ARCHES IN ACCORDANCE WITH EQUATIONS LISTED ON THIS DRAWING.

D. CHAMFER ALL EXPOSED CORNERS ¾ INCH.

E. WHERE THE SOIL BORINGS INDICATE A BEARING CAPACITY 0 LESS THAN 2600 LBS. PER SQUARE FOOT, IT WILL BE NECESSARY TO INCREASE THE WIDTH OF THE BASE.

F. MINIMUM COVER FOR REINFORCING STEEL SHALL BE 2 INCH.

G. FOR PIPES HAVING A DIAMETER OR RISE OVER 36 INCHES, REFERENCE ODOT HW-3 HEADWALLS FOR FULL HEIGHT HEADWALL.

H. FOR SKEWED CULVERTS HAVING A DIAMETER OR RISE OF 36 INCHES OR LESS, REFERENCE ODOT HW-2 HEADWALLS.

I. HEADWALLS MAY BE PRECAST CONCRETE CONSTRUCTED TO THE ABOVE REQUIREMENTS. GROUT AROUND PIPE AFTER INSTALLATION.

DIMENSIONS			QUANITTIES ONE HEADWALL	
DIAMETER	HIEGHT	LENGTH	CONCRETE CY.	REINFORCING STEEEL 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

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FULL-HEIGHT HEADWALL

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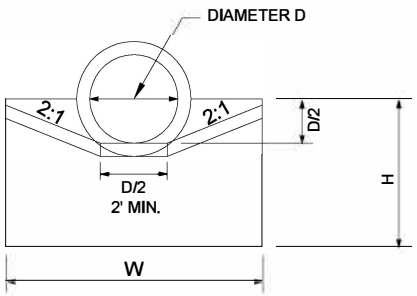
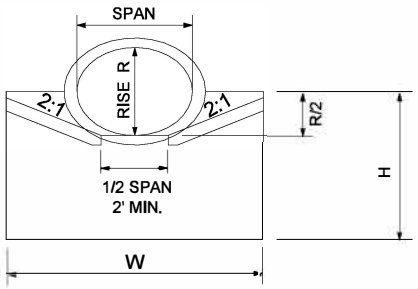
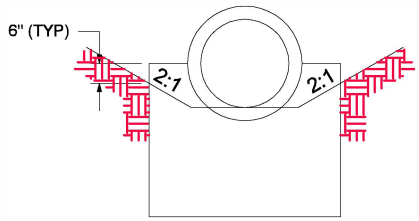


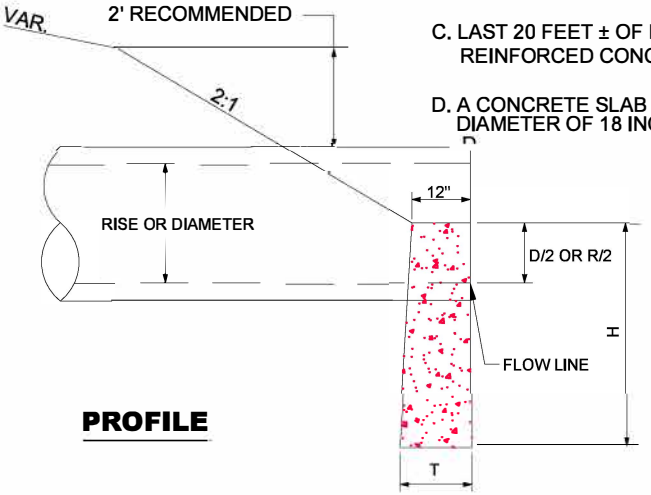
CIRCULAR



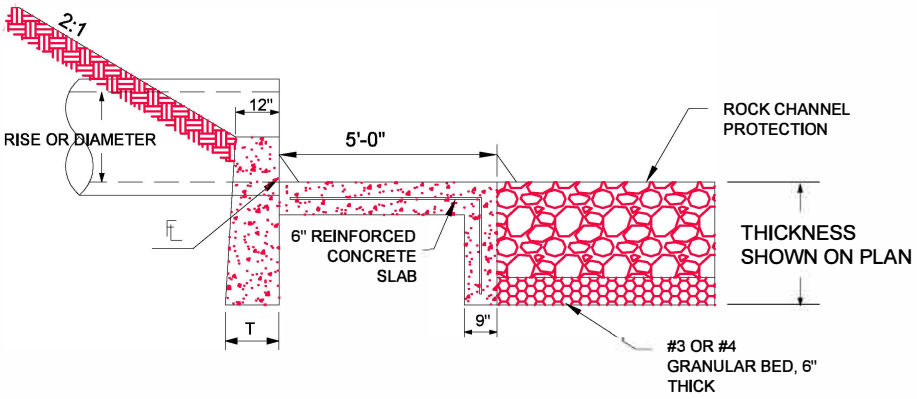
ELLIPTICAL



WIDTH OF PROTECTION SHALL EQUAL
WIDTH OF HEADWALL. MINIMUM WIDTH 4'-0"



PROFILE



OUTLET CHANNEL PROTECTION DETAIL

(CUTOFF WALL DEPTH 2'-6" MINIMUM IS VARIABLE TO MATCH REQUIRED THICKNESS OF ROCK.)

NOTES

A. CONCRETE FOR HEADWALLS SHALL BE ODOT CLASS C. CONCRETE QUANTITIES ARE BASED ON HEADWALLS ONLY.

B. HEADWALLS MAY BE PRECAST CONCRETE CONSTRUCTED TO THE ABOVE REQUIREMENTS. GROUT AROUND PIPE AFTER INSTALLATION.

C. LAST 20 FEET ± OF PIPE BEFORE HEADWALL SHALL BE REINFORCED CONCRETE PIPE.

D. A CONCRETE SLAB IS REQUIRED FOR PIPES WITH A DIAMETER OF 18 INCH AND ABOVE.

HEAD WALL FOR CONCRETE PIPE

CIRCULAR				CONC.	ELLIPITCAL					CONC.
D	W	H	T	S.Y	SPAN	RISE	W	H	T	S.Y
12"	2'-0"	3'-0"	12"	.20	23"	14"	3'-0"	3'-2"	12"	.29
15"	2'-6'	3'-2"	12"	.25	30"	19"	3'-7"	3'-4"	12"	.35
18"	3'-0"	3'-3"	12"	.31	34"	22"	3'-11"	3'-5"	12"	.38
21"	3'-6"	3'-4"	12"	.37	38"	24"	4'-6"	3'-6"	12"	.44
24"	4'-0"	3'-6"	12"	.43	42"	27"	4'-8"	3'-7"	12"	.45
27"	4'-6"	3'-8"	12"	.49	45"	29"	5'-2"	3'-8"	12"	.49
30"	5'-0"	3'-9"	12"	.56	49"	32"	5'-5"	3'-10"	12"	.52
33"	5'-6"	3'-10"	12"	.62	53"	34"	5'-11"	4'-0"	14"	.66
36"	6'-0"	4'-0"	12"	.69	60"	38"	6'-10"	4'-2"	14"	.82
39"	6'-6"	4'-2"	12"	.77	68''	43"	8'-0"	4'-4"	16"	1.01
42"	7'-0"	4'-3"	12"	.84	76"	48"	9'-2"	5'-0"	16"	1.34
48"	8-'0"	4'-6"	14"	1.09	83"	53"	10'-4"	5'-2"	18"	1.65
54"	9'-3"	4'-9"	14"	1.32	91"	58"	11'-6"	5'-5"	18"	1.97
60"	10'-6"	5'-6"	16"	1.93	98"	63"	12'-7"	5'-7"	20"	2.38
66"	11'-9"	5"-9"	18"	2.42	106"	68"	13'-9"	5'-10"	20"	2.69
72"	13'-0"	6'-0"	18"	2.77	113"	72"	14'-9"	6'-0"	22"	3.14
78"	14'-3"	6'-3"	20"	3.37	121"	77"	15'-11"	6'-3"	22"	3.49
84"	15'-6"	6'-6"	22"	4.05	128"	82"	17'-0"	6'-5"	24"	4.04

CITY OF HILLSBORO

HALF-HEIGHT HEADWALL

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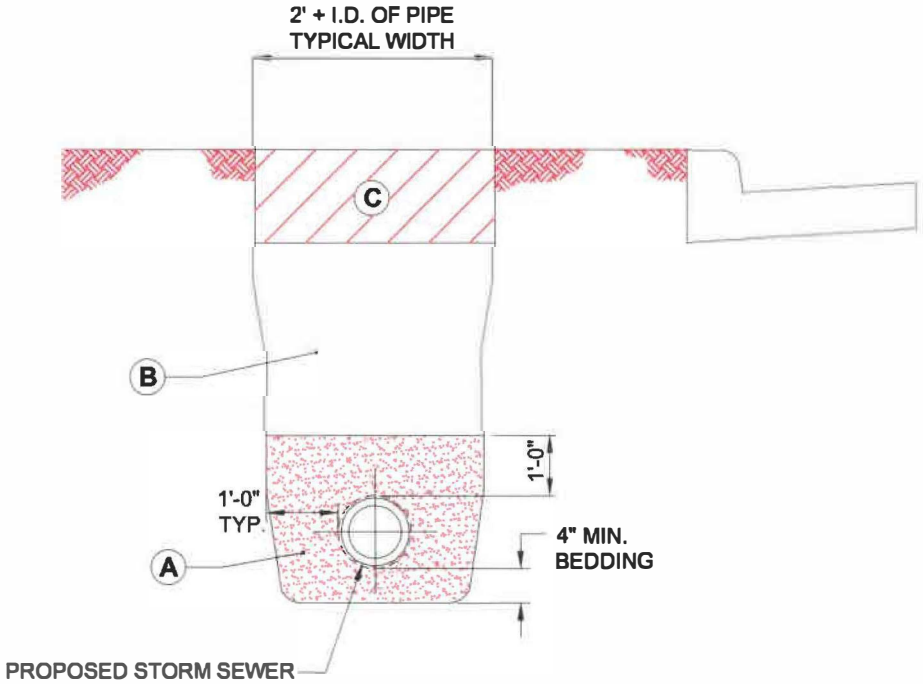
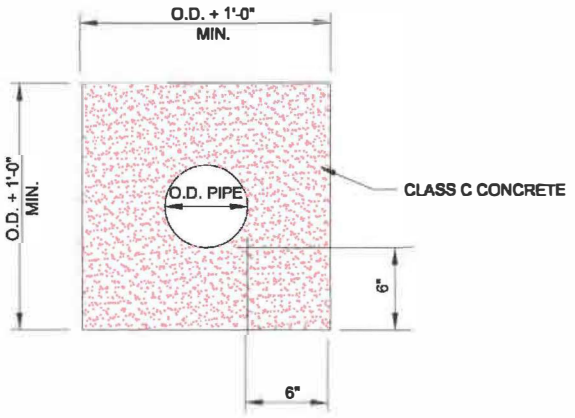


STORM SEWER TRENCH DETAIL

(NON-RIGID PIPE)



CONCRETE ENCASEMENT DETAIL

TRENCH DETAIL NOTES

A. GRANULAR BEDDING SHALL BE CRUSHED STONE OR GRAVEL ODOT 603 TYPE 3 (#57 OR #67), OR OTHER APPROVED EQUIVALENT.

B. ALL TRENCHES OUTSIDE THE RIGHT-OF-WAY FROM PROPOSED OR EXISTING PAVEMENT, CUB, DRIVEWAY, ALLEYS, STONE AREAS OR WALKS CAN BE COMPACTED WITH EXISTING NATIVE MATERIAL IN 12 INCH MAXIMUM LIFTS OR AS APPROVED BY THE CITY. NO MATERIAL SHALL BE USED FOR BACK FILLING THAT CONTAINS STONE, ROCKS, ETC. GREATER THAN 4 INCH DIAMETER. ALL TRENCHES INSIDE THE RIGHT-OF-WAY FROM PROPOSED OR EXISTING PAVEMENT, CURB DRIVEWAYS, ALLEYS, STONE AREAS OR WALKS SHALL BE COMPACTED WITH GRANULAR BACKFILL MATERIAL ODOT 603 TYPE 1 IN 6" MAXIMUM LIFTS.

A DENSITY TEST ON GRANULAR BACKFILL OF 98% OF ASTM D698 STANDARD PROCTOR CURVE MAY BE REQUIRED TO BE PERFORMED BY A COMMERCIAL TESTING LAB SATISFACTORY TO THE CITY.

C. OFF-PAVEMENT AREAS SHALL BE PROVIDED WITH A MINIMUM OF 6 INCH OF TOPSOIL OVER THE COMPACTED MATERIAL AND THEN SEEDED AND MULCHED PER ODOT ITEM 659.

ALL PAVED AREAS WITHIN THE STREET RIGHTY-OF-WAY SHALL FOLLOW THE REQUIREMENTS FO PAGE 300-14 OF THE STANDARD DRAWINGS.

D. THE OPEN ENDS OF ALL PIPES SHALL BE PLUGGED TO THE APPROVAL OF THE CITY BEFORE LEAVING THE WORK FOR THE NIGHT.

CITY OF HILLSBORO

STORM SEWER TRENCH DETAILS

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NOTES:

A. NO WORK SHALL BE APPROVED OR ACCEPTED BY THE CITY UNLESS 2 WORKING DAYS NOTICE OF COMMENCING WORK IS GIVEN TO THE CITY.

B. ALL TEMPORARY PAVEMENT AND SIDEWALK SHALL BE MAINTAINED BY THE CONTRACTOR OR THE DEVELOPER AT HIS OWN EXPENSE IN A SUITABLE AND SAVE CONDITION FOR TRAFFIC UNTIL A PERMANENT REPLACEMENT IS MADE OR THE PROJECT IS FINALLY ACCEPTED BY THE CITY.

C. ALL STORM SEWER CONSTRUCTION SHALL ADHERE TO ODOT SPECIFICATIONS LATEST REVISION OR WITH THE CITY STORM SEWER SPECIFICATIONS, WHICHEVER IS APPLICABLE AND MORE RESTRICTIVE.

D. MASTIC MATERIAL IS REQUIRED ON ALL NON O-RING STORM SEWER AND MANHOLES, UNLESS OTHER WISE APPROVED.

E. WHEN A CASTING IS REMOVED IT REMAINS CITY PROPERTY AND TO BE DELIVERED TO THE CITY SERVICE CENTER, UNLESS OTHERWISE APPROVED.

F. ANY DETAILS OR NOTES NOT DIRECTLY ADDRESSED IN THESE ENGINEERING STANDARDS SHALL BE COORDINATED WITH THE CITY ENGINEERING DEPARTMENT.

G. ALL STORM SEWER SHALL BE INSTALLED USING PIPE LASER INSIDE THE PIPE IF POSSIBLE FOR GRADE AND ALIGNMENT.

UTILITY STAKING

A. OFFSET AND GRADE AT EACH MANHOLE, CATCH BASIN, AND OTHER STRUCTURES. OFFSET AND GRADE 50 FEET AND 100 FEET OUT FROM EACH MANHOLE UNLESS OTHERWISE APPROVED.

PIPE

A. ALL STORM SEWER PIPE SHALL HAVE A MINIMUM DIAMETER OF 12 INCH UNLESS OTHERWISE APPROVED.

B. TYPES OF PIPE PERMITTED

APPROVED PIPE	ODOT MATERIAL NUMBER
REINFORCED CONCRETE PIPE	706.02
REINFORCED CONCRETE ELLIPTICAL PIPE	706.04
CORRUGATED POLYETHYLENE SMOOTH-LINED PIPE	707.33
POLYVINYL CHLORIDE PLASTIC PIPE	707.41
(NON-PERFORATED)	
POLYVINYL CHLORIDE CORRUGATED	
SMOOTH-INTERIOR PIPE	707.42
POLYVINYL CHLORIDE PROFILE WALL PIPE	707.43
POLYVINYL CHLORIDE SOLID WALL PIPE	707.45

EXISTING TILE HOOKUPS

A. THE DRAINAGE TILE CURRENTLY CONNECTED TO THE EXISTING STORM SEWER SHALL BE CONNECTED TO THE PROPOSED STORM SEWER. ANY DRAINAGE TILE DAMAGED BY THE CONTRACTOR SHALL BE REPLACED BY THE CONTRACTOR TO A CONDITION EQUAL TO OR BETTER THAN ITS ORIGINAL CONDITION. ANYTHING REMOVED, REPLACED, AND/OR CONNECTED TO THE STORM SEWER SHALL BE NOTED ON THE AS-BUILT DRAWINGS AND SHALL BE INSPECTED BY THE INSPECTOR BEFORE THEY ARE COVERED.

B. ALL FIELD OR STORM DRAINS WHICH ARE ENCOUNTERED DURING CONSTRUCTION SHALL BE PROVIDED WITH UNOBSTRUCTED OUTLETS OR PLUGGED AS APPROVED AND DIRECTED BY THE CITY

NOTES

A. TEMPORARY EROSION AND SEDIMENT CONTROL MEASURES SHALL BE PROVIDED FOR ALL CONSTRUCTION PROJECTS HAVING SIGNIFICANT GRADING. THE CONTROLS ARE PROVIDED DURING CONSTRUCTION TO PREVENT SOIL ERODED FROM THE CONSTRUCTION AREA FROM ENTERING ADJACENT WATERWAYS AND PROPERTIES.

B. CONSTRUCTION ITEMS INCLUDE SEDIMENT BASINS, SEDIMENT DAMS, DIVERSION DIKES AND/OR DITCHES AND STRAW BALES OR OTHER FILTER DIKES SHOWN ON ODOT STANDARD DRAWING MC-11. OTHER MISCELLANEOUS EROSION CONTROL MEASURES INCLUDE REPAIR SEEDING AND MULCHING, COMMERCIAL FERTILIZER, WATER AND MOWING AND ROCK CHANNEL PROTECTION, COVERED IN ODOT SPECIFICATION ITEMS 659 AND 601.

C. THE SIZE OF THE ENTIRE DRAINAGE AREA CONTRIBUTING FLOW IS USED TO DETERMINE THE MOST EFFECTIVE EROSION CONTROL METHOD. IN MANY CASES THE MAJOR PORTION OF THE CONTRIBUTING AREA WILL BE BEYOND THE PROJECT LIMITS, AND FOR THOSE CASES IT WILL BE NECESSARY TO CONTROL THE FLOW FROM OUTSIDE BEFORE IT REACHES THE AREA DISTURBED BY PROJECT CONSTRUCTION. FLOW FROM THE AREA DISTURBED BY CONSTRUCTION SHALL BE TREATED PRIOR TO COMBINING IT WITH OFF-PAVEMENT DRAINAGE.

D. EROSION AND SEDIMENT CONTROL MEASURES SHALL BE PROVIDED FOR ALL SUBDIVISIONS AND INDIVIDUAL SITES UNLESS OTHERWISE APPROVED. THE CONTROL MEASURES ARE TO BE PROVIDED DURING CONSTRUCTION TO PREVENT EROSION FROM ENTERING ADJACENT WATERWAYS AND PROPERTIES.

E. THERE SHALL BE ONLY ONE CONSTRUCTION ENTRANCE OFF THE SITE. ENTRANCE TO BE CONSTRUCTED OF 8" OF #2 STONE, 75 FEET LONG BY 20 FEET WIDE. CONTRACTOR TO KEEP MUD OFF EXISTING STREETS. NO EQUIPMENT TO BE PARKED ON EXISTING STREETS. MORE THAN ONE ENTRANCE MUST BE APPROVED BY THE CITY.

PLAN SUBMITTAL

A. ALL SITE PLANS SHALL INCLUDE APPROPRIATE EROSION AND SEDIMENT CONTROL DEVISES AND SHALL BE SUBMITTED TO THE CITY FOR APPROVAL PRIOR TO COMMENCEMENT OF ANY WORK UNLESS OTHERWISE APPROVED. ALL PROJECTS WHICH DISTURB 1 ACRE OR MORE MUST HAVE OEPA EROSION CONTROL APPROVALS.

CONSTRUCTION

A. ALL EROSION AND SEDIMENT CONTROL MUST BE INSPECTED AND APPROVED BY THE CITY UNLESS OTHERWISE APPROVED.

STORM WATER PERMITS

A. ON ALL PROJECTS WHICH DISTURB AT LEAST 1 ACRE OF SOIL, A NPDES PERMIT IS REQUIRED FROM OEPA AND A COPY OF THE PERMIT MUST BE ON FILE AT THE CITY BEFORE CONSTRUCTION BEGINS.

B. EROSION CONTROL SUBMITTALS SHALL BE AS PER THE CURRENT STORM WATER MANAGEMENT ORDINANCE.

CONTROL MEASURES

A. DISTURB ONLY THE AREAS NEEDED FOR CONSTRUCTION.

B. REMOVE ONLY THOSE TREES, SHRUBS, AND GRASSES THAT MUST BE REMOVED FOR CONSTRUCTION; PROTECT THE REST TO PRESERVE THEIR ESTHETIC AND EROSION-CONTROL VALUES.

C. INSTALL SEDIMENT BASINS AND DIVERSION DIKES BEFORE DISTURBING THE LAND THAT DRAINS INTO THEM.

D. INSTALL EROSION AND SEDIMENT CONTROL PRACTICES AS INDICATED IN THE PLAN. THE PRACTICES ARE TO BE MAINTAINED IN EFFECTIVE WORKING CONDITION DURING CONSTRUCTION AND UNTIL THE DRAINAGE AREAS HAVE BEEN PERMANENTLY STABILIZED.

E. TEMPORARILY STABILIZE EACH SEGMENT, GRADED OR OTHERWISE DISTURBED LAND, INCLUDING THE SEDIMENT-CONTROL DEVISES NOT OTHERWISE STABILIZED, BY SEEDING AND MULCHING OR BY MULCHING ALONE. AS CONSTRUCTION IS COMPLETED, PERMANENTLY STABILIZE EACH SEGMENT WITH PERENNIAL VEGETATION STRUCTURAL MEASURES.

F. LEVEL DIVERSION DIKES, SEDIMENT BASINS, AND SILT TRAPS AFTER AREAS THAT DRAIN INTO THEM ARE STABILIZED. ESTABLISH PERMANENT VEGETATION ON THOSE AREAS. SEDIMENT BASINS THAT ARE TO BE RETAINED FOR STORM WATER DETENTION MAY BE SEEDED TO PERMANENT VEGETATION AFTER THEY ARE BUILT.

G. DISCHARGE WATER FROM OUTLET STRUCTURES AT NON-EROSIVE VELOCITIES.

CITY OF HILLSBORO

EROSION CONTROL

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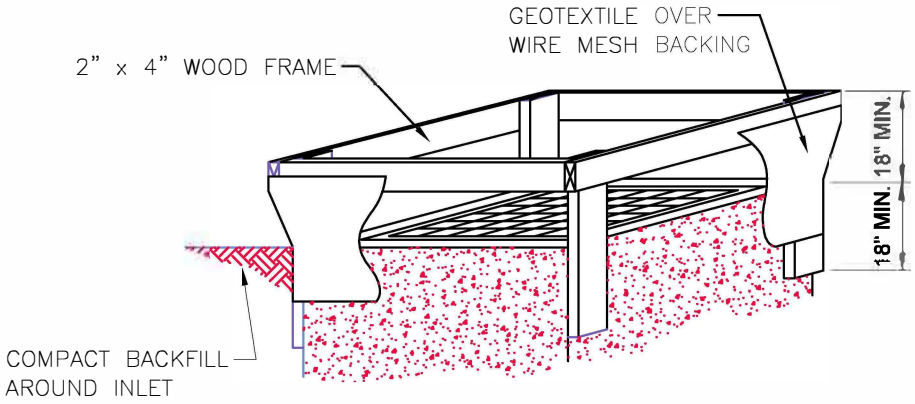


INLET PROTECTION IN SWALES, DITCH LINES OR YARD INLETS

A. INLET PROTECTION SHALL BE CONSTRUCTED EITHER BEFORE UPSLOPE LAND DISTURBANCE BEGINS OR BEFORE THE STORM DRAIN BECOMES OPERATIONAL.

B. THE EARTH AROUND THE INLET SHALL BE EXCAVATED COMPLETELY TO A DEPTH AT LEAST 18 INCHES.

C. THE WOODEN FRAME SHALL BE CONSTRUCTED OF 2 INCH BY 4 INCH CONSTRUCTION GRADE LUMBER. THE 2 FOOT BY 4 FOOT POST SHALL BE DRIVEN 1 FOOT INTO THE GROUND AT FOUR CORNERS OF THE INLET AND THE TOP PORTION OF 2 INCH BY 4 INCH FRAME ASSEMBLED USING THE OVERLAP JOINT SHOWN. THE TOP OF THE FRAME SHALL BE AT LEAST 6 INCHES BELOW ADJACENT ROAD, IF PONDED WATER WOULD POSE A SAFETY HAZARD TO TRAFFIC.

D. WIRE MESH SHALL BE OF SUFFICIENT STRENGTH TO SUPPORT FABRIC WITH WATER FULLY IMPOUNDED AGAINST IT. IT SHALL BE STRETCHED TIGHTLY AROUND THE FRAME AND FASTENED SECURELY TO THE FRAME.

E. GEOTEXTILE SHALL HAVE AN EQUIVALENT OPENING SIZE OF 20-40 SIEVE AND BE RESISTANT TO SUNLIGHT. IT SHALL BE STRETCHED TIGHTLY AROUND THE FRAME AND FASTENED SECURELY. IT SHALL EXTEND FROM THE TOP OF THE FRAME TO 18 INCHES BELOW THE INLET NOTCH ELEVATION. THE GEOTEXTILE SHALL OVERLAY ACROSS ONE SIDE OF THE INLET SO THE ENDS OF THE CLOTH ARE NOT FASTENED TO THE SAME POST.

F. BACKFILL SHALL BE PLACED AROUND THE INLET IN COMPACTED 6 INCH LAYERS UNTIL THE EARTH IS EVEN WITH NOTCH ELEVATION ON ENDS AND TOP ELEVATION ON SIDES.

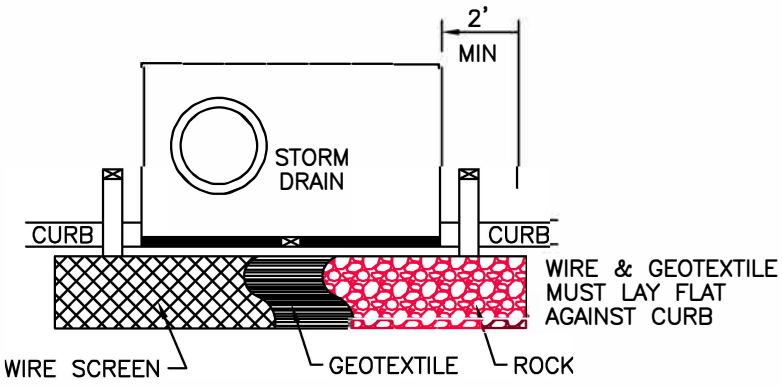
G. A COMPACTED EARTH DIKE OR A CHECK DAM SHALL BE CONSTRUCTED IN THE DITCH LINE BELOW THE INLET IF THE INLET IS NOT IN DEPRESSION AND IF RUNOFF NY PASSING THE INLET WILL NOT FLOW TO A SETTING POND. THE TOP OF EARTH DIKES SHALL BE AT LEAST 6 INCHES HIGHER THAN THE TOP OF THE FRAME

GRAVEL CURB INLET SEDIMENT FILTER NOTES

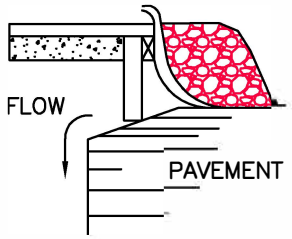
A. HARDWARE CLOTH OR COMPARABLE WIRE MESH WITH ½ INCH OPENINGS SHALL BE PLACED OVER THE CURB INLET OPENING SO THAT AT LEAST 12 INCHES OF WIRE EXTENDS ACROSS THE INLET COVER AND AT LEAST 12 INCHES OF WIRE EXTENDS ACROSS THE CONCRETE GUTTER FROM THE INLET OPENING, AS ILLUSTRATED.

B. STONE SHALL BE PILED AGAINST THE WIRE SO AS TO ANCHOR IT AGAINST THE GUTTER AND INLET COVER AND TO COVER THE INLET OPENING COMPLETELY. ODOT NO. 1 COARSE AGGREGATE SHALL BE USED.

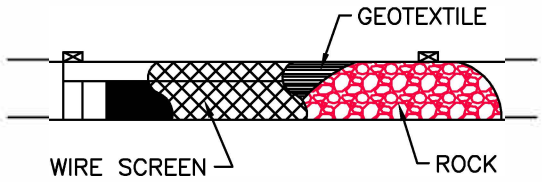
C. IF THE STONE FILTER BECOMES CLOGGED WITH SEDIMENT SO THAT IT NO LONGER PERFORMS ITS FUNCTION, THE STONE MUST BE PULLED AWAY FROM THE CATCH BASIN, CLEANED AND REPLACED.



PLAN VIEW



CROSS SECTION



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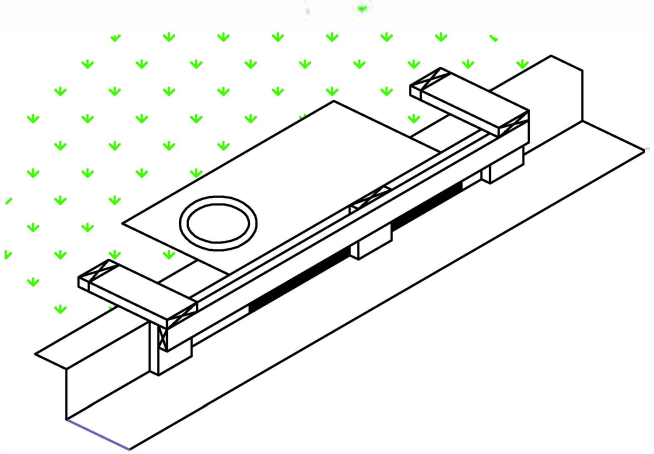

ISOMETRIC

CITY OF HILLSBORO	GEOTEXTILE - STONE INLET PROTECTION FOR CURB INLETS	REVISIONS:	DATE APPROVED:
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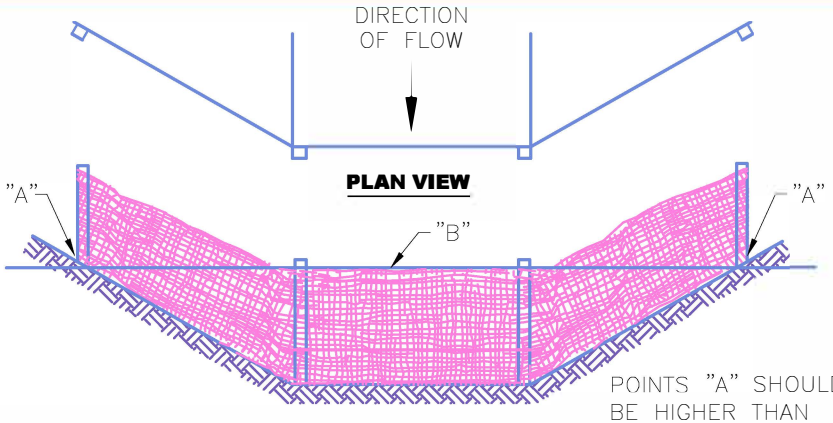
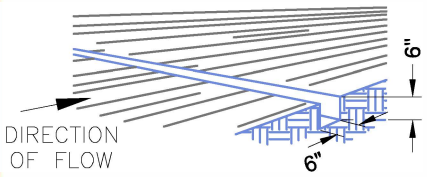
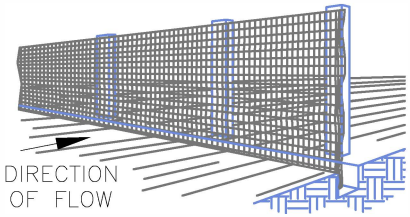


PLACEMENT AND CONSTRUCTION OF DITCH CHECK FILTER FABRIC FENCE



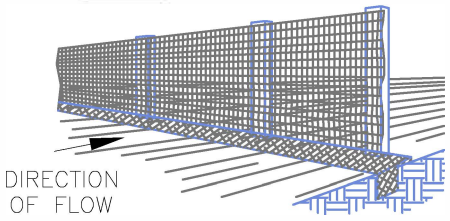
EXCAVATE A 6"X6" TRENCH ALONG THE PROPOSED FENCE LINE.

STEP 1



PLACE FABRIC AND SUPPORT STAKES AND EXTEND FABRIC INTO THE TRENCH.

STEP 2



BACKFILL AND COMPACT THE EXCAVATED SOIL.

STEP 3

PLACEMENT AND CONSTRUCTION OF PERIMETER FILTER FABRIC FENCE

CONSTRUCTION OF A FILTER BARRIER (SILT FENCE)

A. SILT FENCE SHALL BE CONSTRUCTED BEFORE UPSLOPE LAND DISTURBANCE BEGINS.

B. ALL SILT FENCE SHALL BE PLACED AS CLOSE TO THE CONTOUR AS POSSIBLE TO THAT WATER WILL NOT CONCENTRATE AT LOW POINTS IN THE FENCE AND SO THAT SMALL SWALES OR DEPRESSIONS WHICH MAY CARRY SMALL CONCENTRATED FLOWS TO THE SILT FENCE ARE DISSIPATED ALONG ITS LENGTH.

C. TO PREVENT WATER PONDED BY THE SILT FENCE FROM FLOWING AROUND THE ENDS, EACH END SHALL BE CONSTRUCTED UP SLOPE SO THAT THE ENDS ARE AT A HIGHER ELEVATION.

D. WHERE POSSIBLE, SILT FENCE SHALL BE PLACED ON THE FLATTEST AREA AVAILABLE.

E. WHERE POSSIBLE, VEGETATION SHALL BE PRESERVED FOR 5 FEET (OR AS MUCH AS POSSIBLE) UPSLOPE FROM THE SILT FENCE, IF VEGETATION IS REMOVED, IT SHALL BE REESTABLISHED WITHIN 7 DAYS FORM THE INSTALLATION OF THE SILT FENCE.

F. THE HEIGHT OF THE SILT FENCE SHALL BE A MINIMUM OF 16 INCHES ABOVE THE ORIGINAL GROUND SURFACE.

G. THE SILT FENCE SHALL BE PLACED IN A TRENCH CUT A MINIMUM OF 6 INCHES DEEP. THE TRENCH SHALL BE CUT WITH A TRENCHER, CABLE LAYING MACHINE, OR OTHER SUITABLE DEVICE WHICH WILL ENSURE AND ADEQUATELY UNIFORM TRENCH DEPTH.

H. THE SILT FENCE SHALL BE PLACED WITH THE STAKES ON THE DOWNSLOPE SIDE OF THE GEOTEXTILE AND SO THAT 8 INCHES OF CLOTH IS BELOW THE GROUND SURFACE. EXCESS MATERIAL SHALL LAY ON THE BOTTOM OF THE 6 INCH DEEP TRENCH. THE TRENCH SHALL BE BACKFILLED AND COMPACTED.

I. SEAMS BETWEEN SECTIONS OF SILT FENCE SHALL BE OVERLAPPED WITH THE END STAKES OF EACH SECTION WRAPPED TOGETHER BEFORE DRIVING INTO THE GROUND.

J. MAINTENANCE- SILT FENCE SHALL ALLOW RUNOFF TO PASS ONLY AS DIFFUSE FLOW THROUGH THE GEOTEXTILE. ALL THE GAPS AND TEARS IN THE FENCE MUST BE ELIMINATED AND REPAIRED IF RUNOFF OVERTOPS THE SILT FENCE, FLOWS UNDER OR AROUND THE ENDS, OR IN ANY OTHER WAY BECOME AS CONCENTRATED FLOW, ONE OF THE FOLLOWING SHALL BE PREFORMED, AS APPROPRIATE: 1) THE LAYOUT OF THE SILT FENCE SHALL BE CHANGED, 2) ACCUMULATED SEDIMENT SHALL BE REMOVED, OR 3) OTHER PRACTICES SHALL BE INSTALLED.

CRITERIA FOR SILT FENCE MATERIAL

A. FENCE POSTS- THE LENGTH SHALL BE A MINIMUM OF 32 INCHES LONG, WOOD POSTS WILL BE 2 FEET-BY-2 FEET HARDWOOD OF SOUND QUALITY. THE MAXIMUM SPACING BETWEEN POSTS SHALL BE 10 FEET. SILT FENCE FABRIC SHALL BE ODOT TYPE C GEOTEXTILE FABRIC OR AS DESCRIBED BY THE CHART BELOW:

FABRIC PROPERTIES	
MINIMUM TENSILE STRENGTH	120 LBS
MAXIMUM ELONGATION AT 60 LBS	50%
MINIMUM PUNCTURE STRENGTH	50 LBS
MINIMUM TEAR STRENGTH	40 LBS
APPARENT OPENING SIZE	≤ 0.84 MM
MINIMUM PERMITTIVITY	1×10^{2} SEC. $^{-1}$
ULTRAVIOLET EXPOSURE STRENGTH RETENTION	70%

CITY OF HILLSBORO

TEMPORARY EROSION CONTROL SAMPLES

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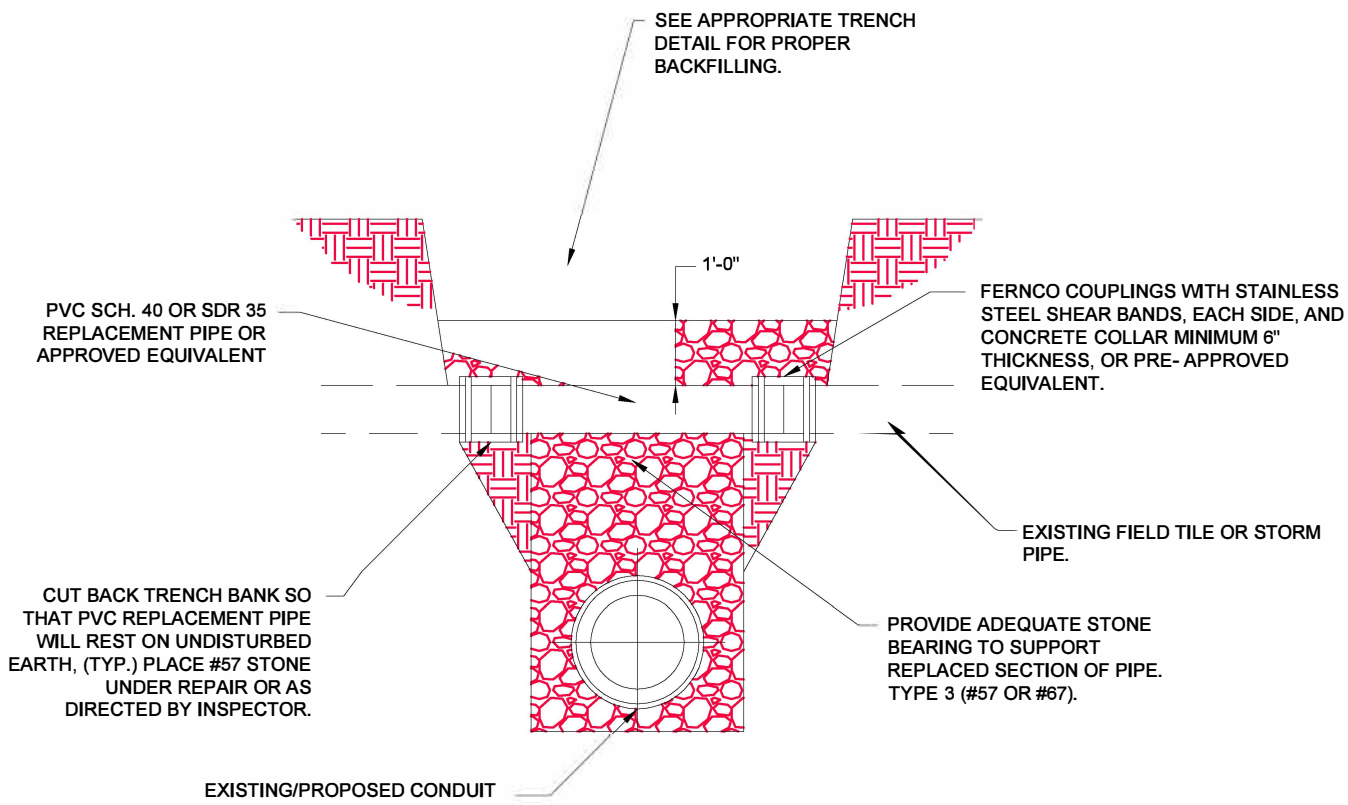

REPAIR OF EXISTING FIELD TILE OR STORM PIPE DETAIL

NOTE:
CONCRETE REPAIRS OR PATCHES ARE UNACCEPTABLE.

CITY OF HILLSBORO	REPAIR OF EXISTING FIELD TILE OR STORM PIPE DETAIL	REVISIONS:	DATE APPROVED:
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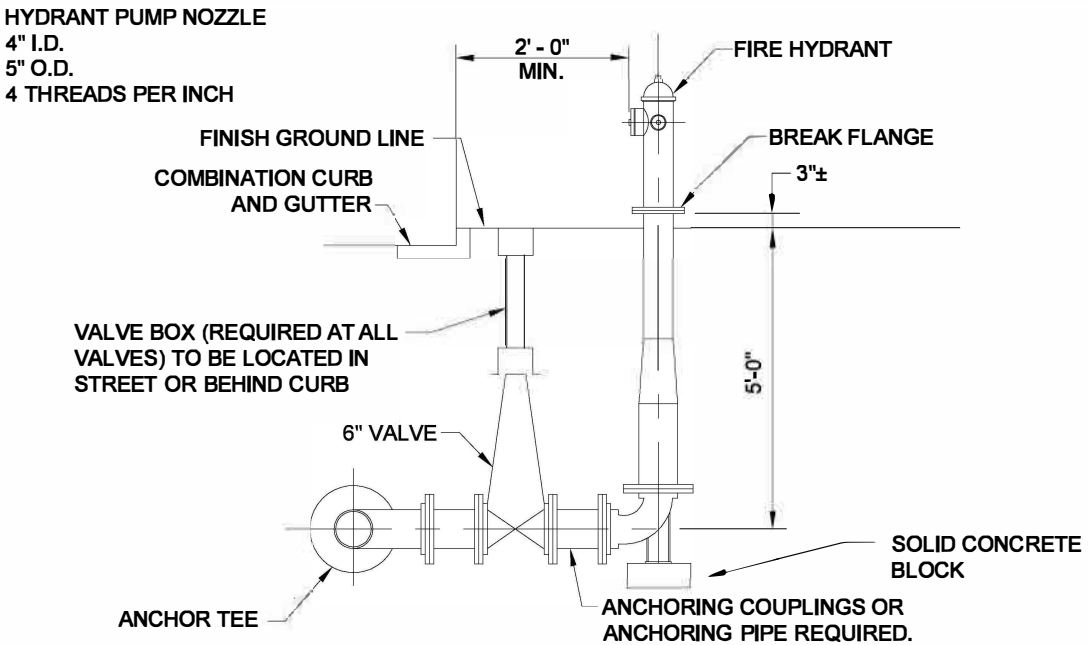
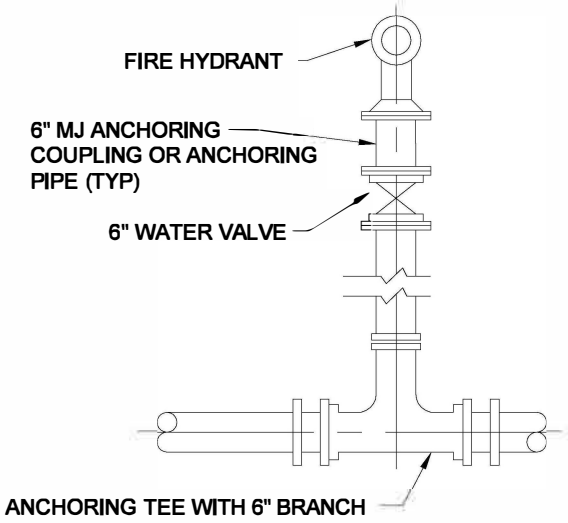
800 – Water Distribution



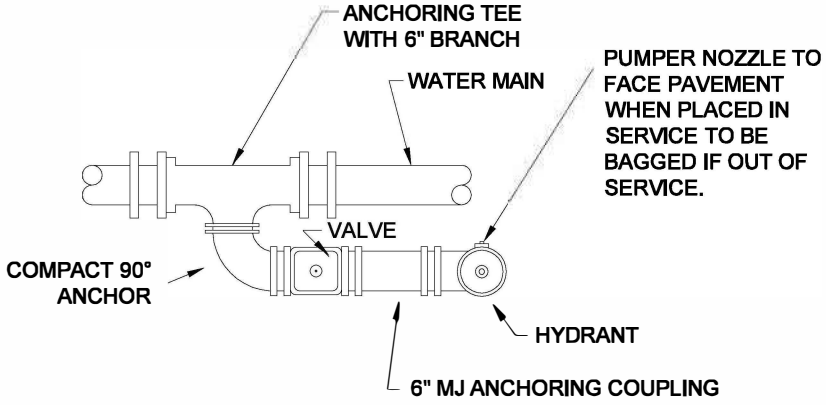
SECTION VIEW



BASIC TEE DETAIL PLAN

NOTES

A. FIRE HYDRANTS-MUELLER CENTURION, OR APPROVED EQUAL ,NO. A-423; MECHANICALJOINT; TWO 2-1/2 INCH HOSE NOZZLE WITH NATIONAL STANDARD THREAD CONNECTIONS; PUMPER NOZZLE TO BE 5" STORTZ MANUFACTURED BY HARRINGTON OR APPROVED EQUAL.
B. GATE VALVES SHALL BE AWWA C-515, RESILIENT WEDGE, NON-RISING STEM, MECHANICAL JOINT, 150 PSI WORKING PRESSURE, CCW TO OPEN WITH ARROW INDICATING OPEN DIRECTION, MUELLER OR EQUIVALENT.
C. VALVE BOXES SHALL BE 3-PIECE, ADJUSTABLE 36 INCH TO 48 INCH. 5-1/4 INCH ADJUSTABLE SHAFT, 6 INCH DIAMETER NOMINAL, ADJUSTABLE SCREW TYPE, COVER MARKED "WATER", DOMESTICE MADE ONLY.
D. ALL FITTINGS TO BE MEGALUG RESTRAINED AND THRUST BLOCKED.
E. ALL FITTINGS TO BE AWWA C-153 DUCTILE IRON, COMPACT.
F. ALL VALVES AND HYDRANTS SHALL OPEN LEFT BY TURNING IN A COUNTER CLOCKWISE DIRECTION.
G. CONTRACTOR TO FACE HYDRANT AS REQUIRED BY THE CITY
H. WATER MAIN SHALL BE DUCTILE IRON PIPE CLASS 52 CEMENT LINED, AWWA C-151, WITH MECHANICAL JOINTS.
I. THE LAYING OF PIPE ON EXISTING DIRT WITH THE BELLS CUT OUT SHALL NOT BE PERMITTED.
J. THE OPEN ENDS OF ALL PIPES AND SPECIAL CASTINGS SHALL BE PLUGGED OR OTHERWISE CLOSED WITH A WATERTIGHT PLUG TO THE APPROVAL OF THE CITY BEFORE LEAVING THE WORK FOR THE NIGHT.
K. THE FIRE DEPARTMENT SHALL COMPLETE A FUNCTION/FLOW TEST PRIOR TO BEING PLACED INTO SERVICE.
L.. ALL FIRE HYDRANTS MUST BE THRUST BLOCKED.



SPECIAL MECHANICAL JOINT
HYDRANT TEE DETAIL PLAN

CITY OF HILLSBORO	FIRE HYDRANT	REVISIONS:	DATE APPROVED:
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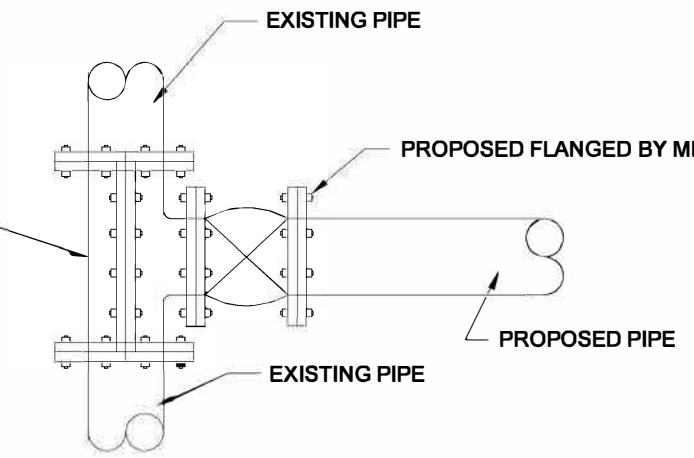


TAPPING SLEEVE AND VALVE DETAIL

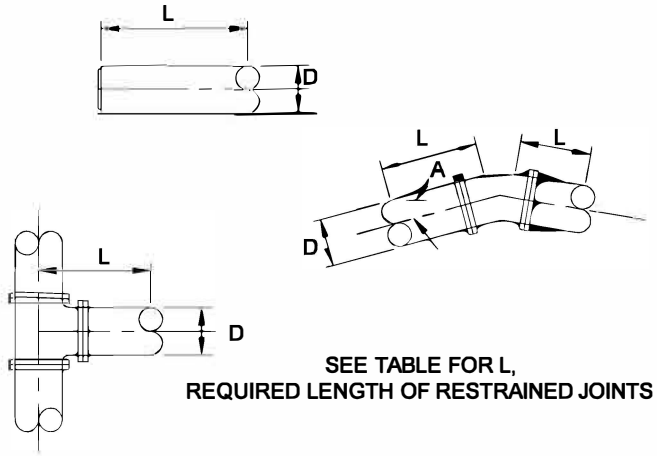
NOTES

A. ALL JOINTS TO BE RESTRAINED.

B. BELL JOINT RESTRAINTS - USE FIELD LOCK BY U.S. PIPE OR APPROVED EQUIVALENT.

C. MECHANICAL JOINT RESTRAINTS - EBAA IRON MEGALUG RETAINER GLAND OR EQUIVALENT.

D. CONTRACTOR TO USE RESTRAINED JOINTS AND THRUST BLOCKING.



SEE TABLE FOR L,
REQUIRED LENGTH OF RESTRAINED JOINTS

REQUIRED LENGTH OF RESTRAINED JOINTS IN FEET									
	D-DIAMETER OF PIPE								
A ~ DEGREEE OF DEFLECTION		4"	6"	8"	10"	12"	16"	20"	24"
	11 ¼"	20	20	20	20	20	20	20	20
	22 ½"	20	20	20	20	20	20	20	20
	45'	20	20	20	20	20	20	20	20
	90'	20	25	33	40	47	60	72	85
	TEE	20	25	33	40	47	60	72	85
	END	20	25	33	40	47	60	72	85

DESIGN PARAMETERS

LAYING CONDITIONS - TYPE 5
SOIL DESIGNATION - SILT
DEPTH OF COVER - 4'-6"
DESIGN PRESSURE - 80 PSI
SAFETY FACTOR - 1.50
BARE PIPE
THIS CHART AND PARAMETERS WILL BE UTILIZED UNLESS APPROVED BY THE UTILITY DIRECTOR..

REQUIRED LENGTH OF RESTRAINED FIELD LOCK OR MEGALUG JOINTS FOR WATER MAINS

CITY OF HILLSBORO

RESTRAINING JOINTS AND TAPPING SLEEVE FOR WATER MAINS

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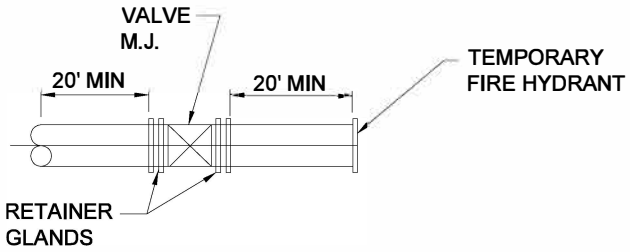
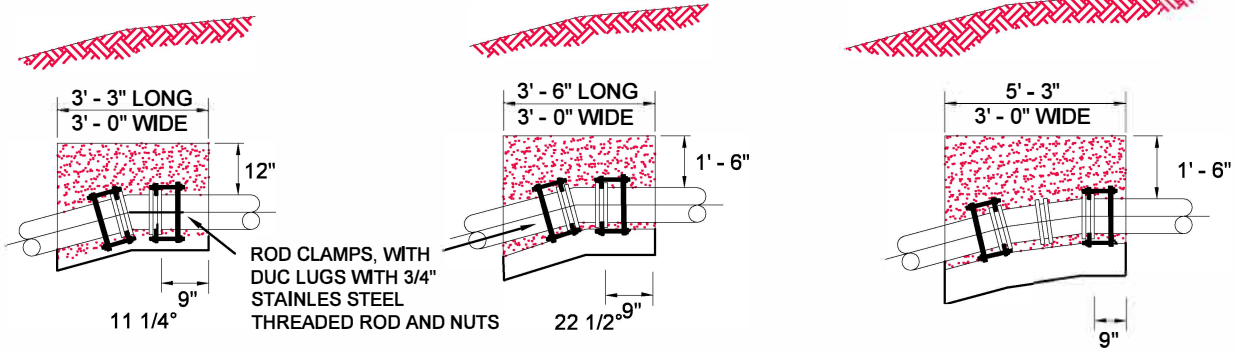
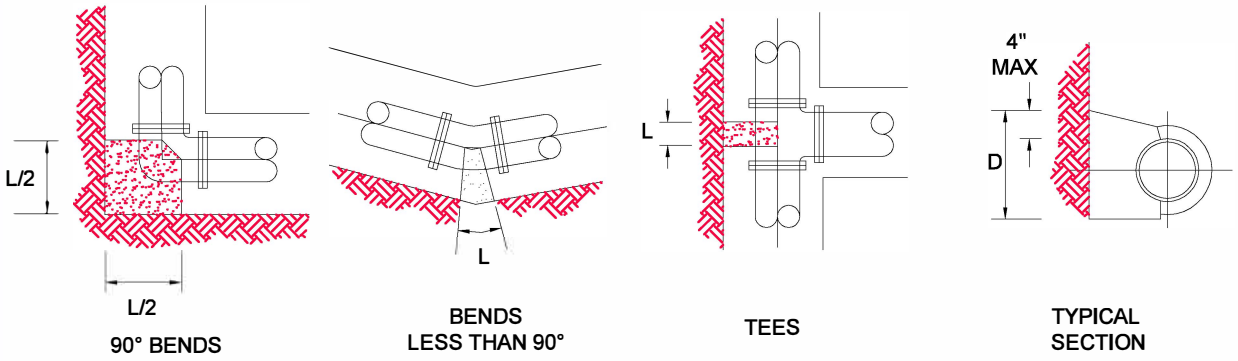


DETAIL - END OF WATER LINE



CONCRETE BLOCKING FOR VERTICAL BENDS



CONCRETE BLOCKING FOR HORIZONTAL BENDS

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"	9"	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"	6"						
8"	14"	8"	18"	12"				
12"	9"	12"	18"	12"	24"	18"		
16"	8"	16"	14"	16"	28"	16"	30"	26"

NOTES

A. CARE SHALL BE TAKEN TO KEEP CONCRETE AWAY FROM MECHANICAL JOINTS BY PLACING VISQUEEN OR OTHER PREAPPROVED MATERIAL OVER PIPE BEFORE PLACING OF CONCRETE. BOLTS SHALL NOT BE ENCASED IN CONCRETE.

B. CONCRETE FOR BLOCKING VALVES AND FITTINGS SHALL CONFORM TO SECTION ODOT 499 QCI CONCRETE, ALLOW 72 HOURS FOR SETTING OF CONCRETE PRIOR TO FILLING WATER MAIN.

C. CONTRACTOR SHALL USE THE THRUST BLOCKS AS SHOWN.

D. ALL VERICAL THRUST BLOCK IS TO BE ACCOMPANIED WITH ROD CLAMPS AND DUC LUGS WITH 3/4" STAINLESS STEEL THREADED RODS.

CITY OF HILLSBORO

CONCRETE BLOCKING FOR WATER MAINS

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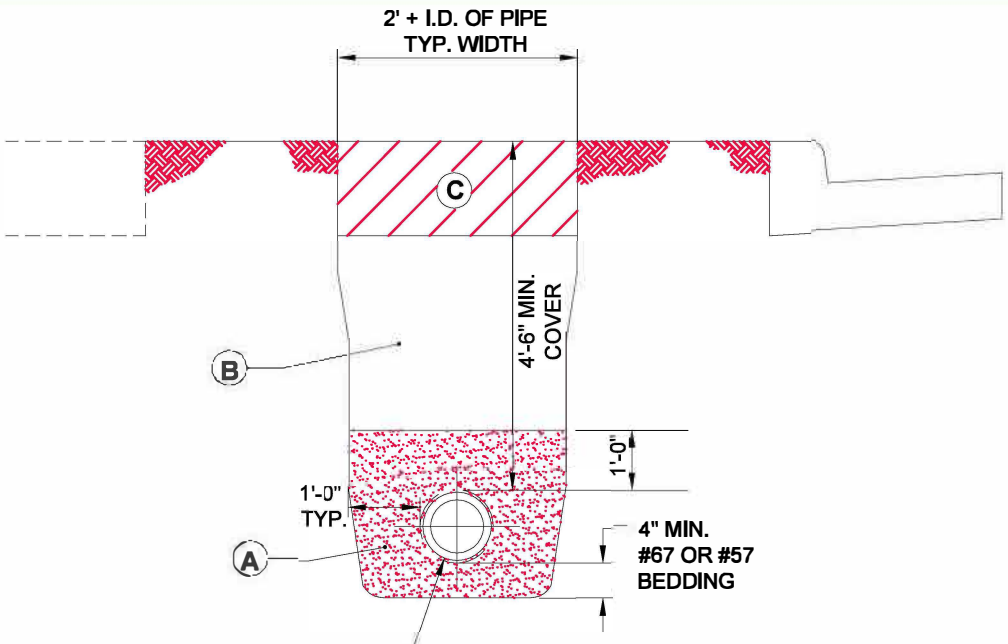

WATER MAIN TRENCH DETAIL

WATER MAIN CROSSING SEPARATION

WHENEVER A SANITARY SEWER AND WATER LINE MUST CROSS, THE SEWER SHALL BE LAID AT SUCH AN ELEVATION THAT THE CROWN OF THE SEWER IS AT LEAST 18 INCHES BELOW THE BOTTOM OF THE WATER LINE. IF IT IS ABSOLUTELY IMPOSSIBLE TO MAINTAIN THE 18-VERTICAL SEPARATION, THE SANITARY SEWER SHALL BE CONSTRUCTED WITH WATER LINE TYPE MATERIALS WHICH WILL BE CONSTRUCTED WITH WATER LINE TYPE MATERIALS WHICH WILL WITHSTAND A 50 PSI PRESSURE TEST. THESE REQUIREMENTS WILL EXTEND FOR A DISTANCE OF 10 FEET, MEASURED PERPENDICULAR ON BOTH SIDES OF THE WATER LINE.

AT CROSSINGS, THE WATER MAIN SHALL HAVE A MINIMUM VERTICAL DISTANCE OF 18 INCHES FROM STORM AND SANITARY SEWERS. ALSO ONE FULL LENGTH OF WATER MAIN SHALL BE LOCATED SO THE JOINTS ARE AS FAR FROM THE STROM SANITARY SEWERS AS POSSIBLE.

TRENCH DETAIL NOTES

A. GRANULAR BEDDING SHALL BE CRUSHED STONE OR GRAVEL, (#57 OR #67) OR OTHER APPROVED EQUIVALENT.

B. ALL TRENCHES OUTSIDE THE RIGHT-OF-WAY FROM PROPOSED OR EXISTING PAVEMENT, CURB, DRIVEWAYS, ALLEYS, STONE AREAS OR WALKS CAN BE COMPACTED WITH EXISTING NATIVE MATERIAL IN 12 INCH MAXIMUM LIFTS OR AS APPROVED BY THE CITY NO MATERIAL SHALL BE USED FOR BACK FILLING THAT CONTAINS STONE, ROCKS, ETC., GREATER THAN 4 INCH DIAMETER.
ALL TRENCHES INSIDE THE RIGHT-OF-WAY FROM PROPOSED OR EXISTING PAVEMENT, CURB, DRIVEWAYS, ALLEYS, STONE AREAS OR WALKS SHALL BE COMPACTED WITH GRANULAR BACKFILL MATERIAL #304, #411 IN 6 INCH MAXIMUM LIFTS.
A DENSITY TEST ON GRANULAR BACKFILL OF 98% OF ASTMA D698 STANDARD PROCTOR CURVE MAY BE REQUIRED TO BE PERFORMED BY A COMMERCIAL TESTING LAB SATISFACTORY TO THE CITY.

C. OFF-PAVEMENT AREAS SHALL BE PROVIDED WITH A MINIMUM OF 6 INCHES OF TOPSOIL OVER THE COMPACTED MATERIAL AND THEN SEEDED AND MULCHED PER ODOT ITEM 659.
ALL PAVED AREAS WITHIN THE STREET RIGHT-OF-WAY SHALL FOLLOW THE REQUIREMENTS OF PAGES 300-15 OF THE STANDARD DRAWINGS.

D. THE OPEN ENDS OF ALL PIPES SHALL BE PLUGGED WITH A WATER TIGHT PLUG TO THE APPROVAL BY THE CITY BEFORE LEAVING THE WORK FOR THE NIGHT.

CITY OF HILLSBORO	WATER MAIN TRENCH DETAIL	REVISIONS:	DATE APPROVED:
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MATERIAL SPECIFICATIONS

A. WATER MAIN SHALL BE AWWA C-900 PVC PIPE CLASS 52 FOR 4 INCH TO 16 INCH AND CLASS 54 FOR 20 INCH AND GREATER, SLIP JOINT-ON JOINT AND RUBBER GASKETS.

B. BELL JOINT RESTRAINTS- USE FIELD LOCK BY U.S. PIPE OR APPROVED EQUAL.

C. MECHANICAL JOINT RESTRAINTS- EBAA IRON MEGALUG RETAINER GLAND OR EQUAL.

D. FIRE HYDRANTS- MUELLER CERTURION No. A-423 MECHANICAL JOINT; TWO 2 ½ INCH HOSE NOZZLES WITH NATIONAL STANDARD THREAD CONNECTIONS; PUMPER CONNECTION TO BE A 5" STORTZ ; TO OPEN; NON DRAINING; BREAK FLANGES 3 INCHES ABOVE GRADE.COLORS OF HYDRANTS WILL BE RED WITH A WHITE CAP,AND A BLUE RING AROUND BONNETFLANGE, TO INDICATE THAT IT IS NON-DRAINING.

E. GATE VALVES (THRU 10 INCHES)- AWWA C-515, RESILIENT WEDGE , NON-RISING STEM, MECHANICAL JOINT, 350 PSI WORKING PRESSURE, CCW TO OPEN, OPEN LEFT WITH ARROW INDICATING OPEN DIRECTION.

F. VALVE BOXES- 3-PIECE CAST IRON 6 INCH DIAMETER NOMINAL, ADJUSTABLE SCREW TYPE, COVER MARKED "WATER" DOMESTIC MADE ONLY.

G. SERVICE LINE- TYPE "K" COPPER TUBE WITH COMPRESSION OR FLARED TYPE FITTINGS. ALL FITTINGS TO BE LEAD FREE.

H. CURB STOP- BRASS CONFORMING TO AWWA C-800, 300 PSI RATED (FORD, MUELLER, CUMBRIDGE OR MCDONALD)

I. CURB BOXES-2 ½ INCH SCREW TYPE, BUFFALO STYLE CAST IRON LID WITH PENTAGON HEAD PLUG EM2-45-67, ONLY IN APPROVED SITUATIONS. METER PITS ONLY IN NEW CONSTRUCTION.

J. ALL SERVICE CONNECTIONS REQUIRE A METER AND OUTSIDE METER PIT (FOR NEW CONSTRUCTION)

K, VALVE SIZING

- 2 INCH TO AND INCLUDING 10 INCH TO BE A GATE VALVE OPENING LEFT
- 12 INCHES AND LARGER-TO BE A GATE VALVE OPENING LEFT

HYDROSTATIC TEST

A. AFTER THE PIPE HAS BEEN LAID AND BLACKFILLED, ALL NEWLY LAID PIPE OR VALVED SECTION, SHALL BE SUBJECTED TO HYDROSTATIC PRESSURE DN LEAKAGE TEST. ALL WATER MAINS MUST BE HYDROSTATICALLY TESTED (AWWA C-600). THE TEST MUST BE PERFORMED BY THE CONTRACTOR IN THE PRESENCES OF A REPRESENTATIVE OF THE CITY OF HILLSBORO. THE LEAKAGE TEST PRESSURE SHALL BE NOT LESS THAN 200 PSI FOR MAINS ADN 150 PSI FOR COPPER SERVICES. THE DURATION OF THE LEAKAGE TEST SHALL NOT BE LESS THAT 2 HOURS. HYDROSTATIC PRESSURE SHALL BE APPLIED BY MEANS OF A PUMP TAKING WATER FROM AN AUXILIARY SUPPLY. ALL PIPING MUST BE PROPERLY FILLED AND FLUSHED TO DISPEL ALL AIR AND DEBRIS BEFORE THE TEST IS MADE USING POTABLE WATER.

B. LEAKAGE IS DEFINED AS THE QUANITY OF WATER TO BE SUPPLIED INT THE NEWLY LAID PIPE, OR ANY VALVE SECTION THEREOF, NECESSARY TO MAINTAIN THE SPECIFIED LEAKAGE TEST PRESSURE AFTER THE PIPE HAS BEEN FILLED WITH WATER AND THE AIR EXPELLED.

C. DURING THE HYDROSTATIC TEST, A THOROUGH EXAMINATION OF ALL PIPING, FITTINGS, VALVES, AND HYDRANTS SHALL BE PERFORMED. LEAKING JOINTS SHALL BE TIGHTENED AND THE TEST SHALL BE REPEATED UNTIL SATISFACTORY RESULTS ARE OBTAINED. CRACKED OR OTHERWISE DEFECTIVE MATERIAL SHAL BE REMOVED AND REPLACED AND THE TEST SHALL BE REPEATED UNTIL SATISFACTORY RESULTS ARE OBTAINED.

DISINFECTION

A AFTER SATISFACTORY HYDROSTATIC TESTING, THE COMPLETED WATER WORK SHALL BE DISINFECTED IN ACCORDANCE WITH AWWA C-651 BY THE CONTRACTOR, WITH THE CITY OF HILLSBORO OVERSEEING, BY MEANS OF LIQUID SODIUM HYDROCHLORIDE INJECTION, AFTER INJECTION TEST SHOULD INDICATE 50 PARTS PER MILLION (PPM) OR HIGHER OF CHLORINE. THE RESIDUAL AFTER 24 HOURS MUST BE 25 PPM OR HIGHER.

B. CHLORINATION TAPS SHALL BE WITH 18 INCHES FROM THE END OF THE PIPE OR VALVE

C. MAINTAIN PIPES FREE OF DIRT AND FOREIGN MATTER DURING CONSTRUCTION BY DEWATERING TRENCH AND SEALING OPEN PIPE BARRELS. THIS IS ALSO A REQUIREMENT IF REPAIRS OCCUR.

D. DECHLORINATE WATER WITH APPROVED AWWA METHOD APPROVED BY THE CITY OF HILLSBORO.

E. WATER SAMPLES- PERFORM BACTERIOLOGICAL TEST PER AWWA C-651. THIS TEST WILL BE PERFORMED BY PER CITY SCHEDULED PERMITS. AT LEAST ONE SET OF SAMPLES SHALL BE COLLECTED FROM EVERY 1,200 FEET OF NEW WATER MAIN, PLUS ONE SET FROM THE END OF THE LINE AND AT LEAST ONE SET FROM EACH BRANCH. TWO CONSECUTIVELY NEGATIVE RESULTS WILL CONSTITUTE A PASSABLE TEST. THE CONTRACTOR SHALL FURNISH ALL REQUIRED TESTING APPENDAGES OR EXCAVATION NEEDED BY THE CITY.

F. ADDITIONAL TESTING SHALL BE AT THE CONTRACTORS EXPENSE AND CANNOT CREATE OVERTIME COST UNLESS CONTRACTOR IS WILLING TO PAY FOR IT.

G. ALL CONNECTIONS FROM PROPOSED TO EXISTING MAINS ARE TO BE HAND SWABBED WITH LIQUID SODIUM HYDROCHLORIDE.

ALLOWABLE LEAKAGE PER 1000 FT (305M) OF PIPELINE (GPH+)

AVG. TEST PRESSURE	NOMINAL PIPE DIAMETER - INCHES									
(PSI) BAR	6	8	10	12	14	16	18	20	24	30
250 (17)	0.71	0.95	1.19	1.42	1.66	1.90	2.14	2.37	2.85	3.56
225 (16)	0.68	0.90	1.13	1.35	1.58	1.80	2.03	2.25	2.70	3.38
200 (14)	0.64	0.85	1.06	1.28	1.48	1.70	1.91	2.12	2.55	3.19
175 (12)	0.59	0.80	0.99	1.19	1.39	1.59	1.79	1.98	2.38	2.98
150 (10)	0.55	0.74	0.92	1.10	1.29	1.47	1.66	1.84	2.21	2.76
120 (9)	0.50	0.67	0.84	1.01	1.18	1.34	1.51	1.68	2.01	2.52

CITY OF HILLSBORO

WATER MAIN MATERIAL AND TESTING

REVISIONS:

DATE APPROVED:

NOTES

A. NO WORK SHALL BE APPROVED OR ACCEPTED BY THE **CITY** UNLESS 2 WORKING DAYS NOTICE OF COMMENCING WORK IS GIVEN TO THE **CITY**, ALL WORK MUST BE PRE-APPROVED.

B. ALL TEMPORARY PAVEMENT AND SIDEWALK SHALL BE MAINTAINED BY THE CONTRACTOR OR THE DEVELOPER AT HIS OWN EXPENSE IS A SUITABLE AND SAFE CONDITION FOR TRAFFIC UNTIL PERMANENT REPLACEMENT IS MADE OR THE PROJECT IS FINALLY ACCEPTED BY THE **CITY**, UNLESS OTHERWISE APPROVED.

C. THE MINIMUM LENGTH OF PIPE NIPPLES SHALL BE 18 INCHES UNLESS OTHERWISE APPROVED BY THE **CITY.**

D. ALL CUSTOMERS SHALL MEET BACKFLOW PREVENTION REQUIREMENTS AS PER **CITY O**F HI**LLSBORO** STANDARDS.

E. ALL WATERLINE CONSTRUCTION INCLUDING EXTENSIONS ON PRIVATE PROPERTY SHALL FOLLOW H**IGHLAND** COUNTY PLUMBING REGULATIONS, ODOT 638 AND,OR AWWA STANDARDS WHICHEVER IS MORE RESTRICTIVE AS DETERMINED BY THE **CITY** AND THE COUNTY INSPECTOR.

F. OPERATION OF **CITY** FIRE HYDRANTS, VALVES, METERS, SERVICES, STOPS AND ALL OTHER MECHANICAL INFRASTRUCTURE ITEMS IS STRICTLY PROHIBITED ACCORDING TO ORDINANCE 53.41

G. ALL WATER MAINS SHALL HAVE A MINIMUM DEPTH OF 4 1/2' AND A MAXIMUM DEPTH OF 6 FEET FROM TOP OF PIPE TO THE SURFACE, UNLESS REQUIRED BY DESIGN.

H. SERVICE LINE AND METER SETTING INSTALLATIONS AND ALL ASSOCIATED COSTS, INCLUDING ALL MATERIALS, PERMITS, LABOR, EXCAVATION, EQUIPMENT, AND ALL METERS TWO INCHES AND LARGER, AND DETECTOR CHECK METERS ARE THE RESPONSIBILITY OF THE CUSTOMER. ACCORDING TO **CITY** ORDINANCE 53.44-C

PIPE

A. ALL PIPE FITTINGS SHALL BE DUCTILE IRON.

B. WATER MAIN MINIMUM SIZE UNLESS OTHERWISE APPROVED
- RESIDENTIAL 8"
- COMMERCIAL 10"
- INDUSTRIAL 12"

6" MAY BE CONSIDERED FOR LOOPING PURPOSES IN RESIDENTIAL AREAS.

C. DEADENDS ARE NOT PERMITTED AND MUST BE LOOPED UNLESS THEY ARE DEEMED UNPRACTICAL BY THE **CITY** ENGINEERING DEPARTMENT AFTER A REVIEW OF WATER MAIN DESIGN. WHEN APPROVED, THEY SHALL BE TERMINATED WITH A FIRE HYDRANT AT THE END

EXCAVATION AND PIPE LAYING

A. THE OPEN ENDS OF THE ALL PIPES SHALL BE CLOSED WITH A WATERTIGHT PLUG WITH THE APPROVAL OF THE **CITY** BEFORE LEAVING THE WORK FOR THE NIGHT AND AT OTHER TIMES OF INTERRUPTION OF THE WORK.

STORAGE AND HANDLING OF MATERIALS

A. PIPE FITTINGS, VALVES FIRE HYRDANTS AND OTHER MATERIALS MUST BE PROPERLY STORED ON THE JOB SITE. PROPER TOOLS FOR THE SAFE AND CONVENIENT HANDLING AND PLACING OF PIPE AND FITTINGS SHALL BE USED. CARE SHALL BE TAKEN TO PREVENT DAMAGE COATINGS OF THE PIPE AND FITTINGS, AND ANY DAMAGE SHALL BE REMEDIED AS DIRECTED. NO DAMAGED OR DEFECTIVE PIPE OR FITTINGS SHALL BE USED.

B. PIPES AND FITTINGS SHALL BE THOROUGHLY CLEANED BEFORE THEY ARE USED, AND SHALL BE KEPT CLEAN UNTIL WORK IS COMPLETED BY USING WATER TIGHT PLUGS ON OPEN ENDS OF PIPES IN THE GROUND.

FITTINGS, VALVES AND HYDRANTS

A. FITTINGS OR SPECIALS IN SIZES 12 INCH THROUGH 48 INCH SHALL CONFORM TO ALL REQUIREMENTS OF AWWA C-153, FITTINGS AND SPECIALS 12 INCHES AND SMALLER SHAL BE CLASS 250. LARGER FITTINGS AND SPECIALS SHALL BE CLASS 150. FITTINGS AND SPECIALS SHALL HAVE MECHANICAL JOINTS AND SHALL DUCTILE IRON. CLUSTER VALVES WHENEVER POSSIBLE UNLESS APPROVED BY THE **CITY.**

B. MAXIMUM SPACING UNLESS OTHERWISE APPROVED.

	HYDRANTS	VALVES
SINGLE AND TWO FAMILY RESIDENTIAL	300'	900'
INDUSTRIAL, COMMERCIAL & MULTI-FAMILY	300'	500'

C. ALL TEES AND CROSSES SHALL BE VALVED IN EACH DIRECTION UNLESS OTHERWISE APPROVED.

D. NO VALVE SHALL BE OPERATED BY PERSONNEL OTHER THAN A REPRESENTATIVE EMPLOYED BY THE **CITY.**

E. ALL FITTINGS MUST BE DOMESTIC MADE ONLY.

UTILITY STAKING

A. OFFSETS EVERY 25 FEET ON CURVES, OFFSETS EVERY 100 FEET ON STRAIGHT SECTIONS. FLOW LINE OF WATER MAIN (CUT) MARKED EVERY 100 FEET AND OFFSETS SHALL BE CLEARLY MARKED AND EVERY HYDRANT WITH TOP OF CURB ELEVATION.

CITY OF HILLSBORO

MISCELLANEOUS WATER NOTES

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NOTES

A. METER PIT TO BE LOCATED AS DIRECTED BY THE CITY.

B. METER SET FEE TO BE PAID PRIOR TO METER INSTALLATION.

C. UNSATISFACTORY INSTALLATION WILL RESULT IN WATER NOT BEING TURNED ON.

D. METER PIT LID MUST BE FLUSH WITH FINISHED GRADE. IF FRAME OF METER LID IS SHOWING, POSSIBILITY OF FREEZING OF METERS AND SERVICE LINES IS INCREASED. CITY'S RESPONSIBILITY STOPS AT THE CURB STOP OR METER PIT.

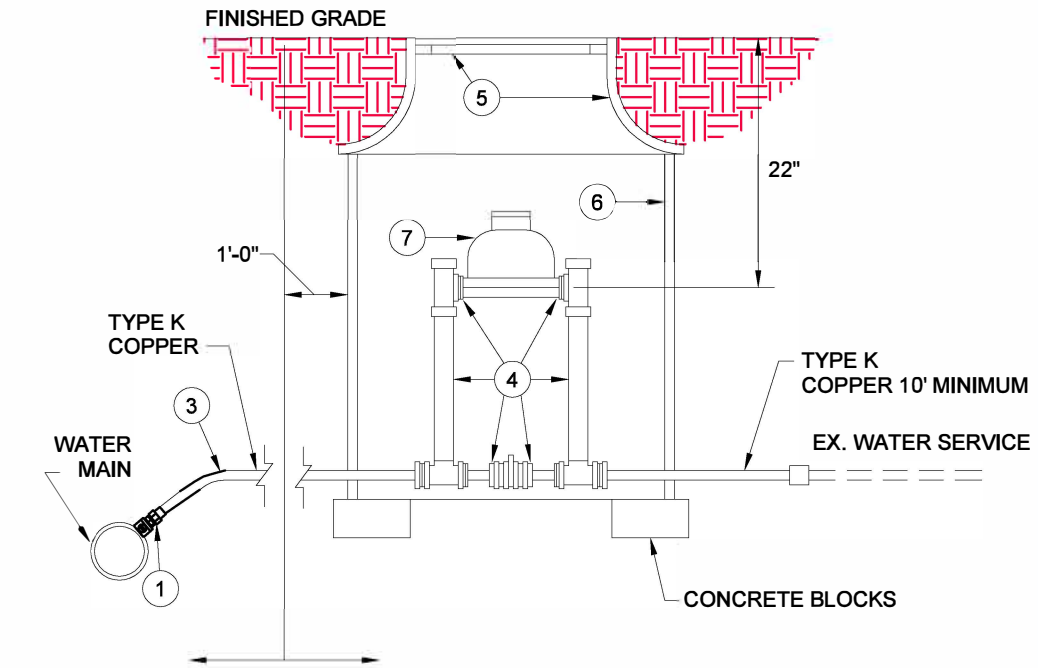
E. SINGLE CHECK ANGLE VALVE ON OUTLET SIDE OF METER.

WATER PIT NOTES FOR 2" SERVICE

1. CORPORATION STOP-FORD METER BOX FB-600NL
2. TUBE NUT-MUELLER 3H-15430.
3. COPPER TUBE 2 INCH TYPE "K OR AQUA MINE.
4. ASSEMBLY METER SETTTER VBB77-95251-003-NL W/ BYPASS FORD METER BOX COMPANY (AS PER CITY SPECS)
5. METER BOX COVER, 20 INCH MINIMUM LID OPENING, MC36 MONITOR COVER, WITH A 21- 15/16" X 40K TRUMBULL MANUFACTURING POLY LID
6. METER BOX, HANCOR PIPE OF EQUIVALENT, 36 INCH DIAMETER x 36 INCH HIGH x 2 INCH WALL.
7. IF METER IS REMOVED FROM PREMISES; THE OWNER MUST PAY FOR NEW METER AND SET UP FEE. METER SHALL BE A NEPTUNE METER. THIS METER IS THE PROPERTY OWNERS RESPONSIBILITY, ALLOW SIX WEEKS FOR METER SET AND METER.
8. WATER SERVICE SHALL BE MINIMUM OF 18 INCHES ABOVE THE CROWN OF THE SANITARY SEWER MAIN WHERE THE WATER SERVICE CROSSES THE SEWER MAIN. WATER SERVICE MAY BE LAID ON BENCH IN THE SEWER LATERAL TRENCH IF CROWN IS AT LEAST 18 INCHES BELOW INVERT OF WATER SERVICE, AND THE MINIMUM DISTANCE BETWEEN THE WATER SERVICE AND THE SEWER LATERAL IS 5 FEET.
9. ALL EXISTING WATER MAIN AND SERVICE TO REMAIN ACTIVE UNTIL NEW MAIN HAS BEEN PLACED INTO SERVICE.
10. ALL CURB BOXES OR METERS PITS SHALL BE SET IN THE RIGHT OF WAY ON THE HOUSE SIDE BEHIND THE CURB, AS SHOWN IN PLANS.

NOTE: LID LOCKING BOLT MUST HAVE A STANDARD 27/32 INCH PENTAGON HEAD.

SUBSTITUTION OF MATERIALS LISTED MAY BE MADE ONLY IF APPROVED BY THE CITY OF HILLSBORO.



METER PIT DETAIL FOR 2"

COMPLETE METER INSTALLATION MUST COMPLY WITH THE CITY OF MT. ORAB SPECIFICATIONS

CITY OF HILLSBORO

2" METER PIT INSTALLATION

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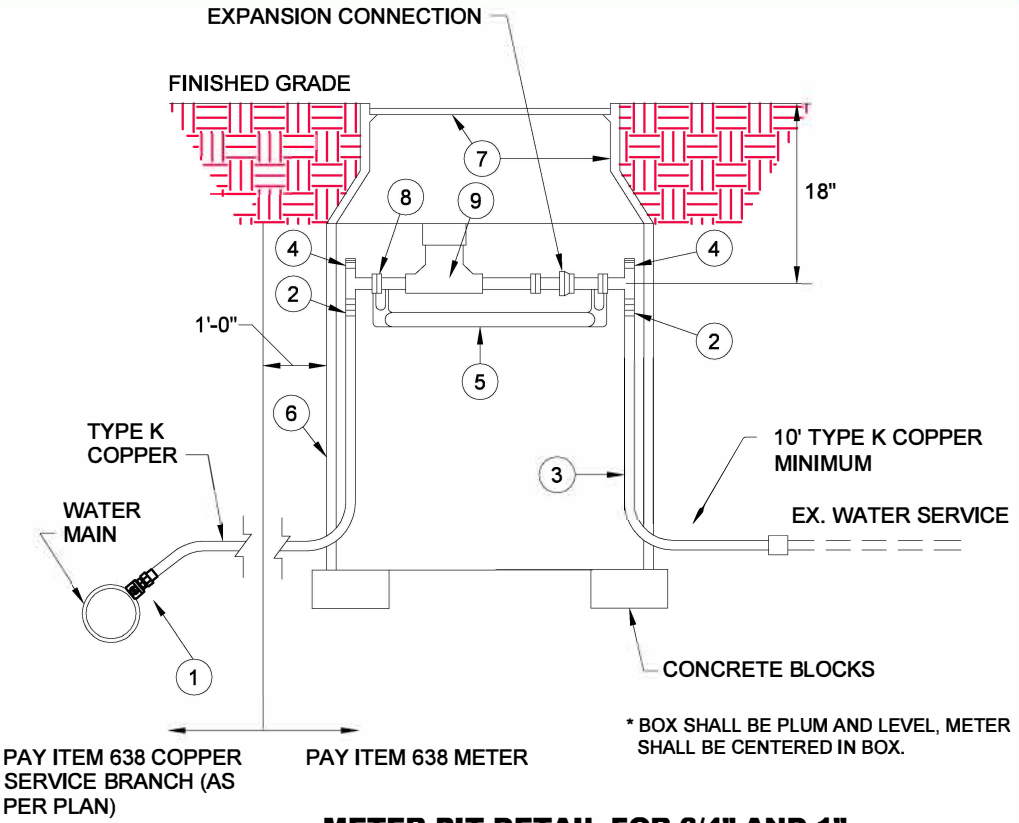
WATER PIT NOTES FOR 3/4" and 1" SERVICES

1. CORPORATION STOP-FORD METER BOX FB-600NL.
2. TUBE NUT-FORD METER BOX COMPANY.
3. COPPER TUBE 2 INCH TYPE "K OR AQUA MINE.
4. YOKE ANGLE VALVE-FORD METER BOX COMPANY.
5. YOKE-FORD METER BOX COMPANY, 500 SERIES.
6. METER BOX- HANCORE DUAL WALL PIPE (BOX MUST BE 18" X 36" FOR 5/8" X 3/4" METER AND 24" X 36" FOR 1" OR DUAL METERS)
7. METER BOX COVER, FORD A32 11 1/2" LID HOLE SIZE FOR A TILE SIZE OF 18", EXT-1 EXTENSION RING FOR A 24" TILE. LID SHALL BE TRUMBULL MANUFACTURING, 167-0074 PENTAGON BOLT, 167-3009 WASHER, 1859 WORM GEAR, STYLE "P", MS, WIDE PLAIN WASHERS, 167-5764 12-1/4" OD METER LID POLYPROPYLENE, M5X 8X12 MACHINE SCREW.
   NOTE. METER BOX COVER IS A INSIDE DIMENSION, THE LID SIZE IS 1" LARGER.
8. LOCKING NUT-FORM METER BOX COMPANY.
9. IF METER IS REMOVED FROM THE PREMISES THEN THE OWNER MUST PAY FOR A NEW METER AND A METER SET UP FEE.
10. WATER SERVICE SHALL BE A MINIMUM OF 18" ABOVE THE CROWN OF THE SANITARY SEWER MAIN WHERE THE WATER SERVICE CROSSES THE SEWER MAIN. WATER SERVICE MAY BE LAID ON BENCH IN THE SEWER LATERAL TRENCH IF CROW IS AT LEAST 18" BELOW THE INVERT OF THE WATER SERVICE AND THE SEWER LATERAL IS 5"-0".
11. ALL EXISTING WATER MAIN AND SERVICES TO REMAIN ACTIVE UNTIL NEW MAIN HAS BEEN PLACED INTO SERVICE.
12. CURB OR METERS SHALL BE SET IN THE CURB LAWN OR BEHIND BOX, AS SHOWN IN PLANS.
13. ANGLE CARTRIDGE STYLE DUAL CHECK VALVE ASSE 1024 METER YOKE INLET BY FLARE COPPER OUTLET- FORD METER BOX HHCA92 OR APPROVED EQUAL (CUSTOMER SIDE ONLY) SEE*

* OHIO PLUMBING CODE: SEC. 607.3.2. "BACKFLOW PREVENTION DEVICE OR CHECK VALVE" SPECIFIES THAT "WHERE A BACKFLOW PREVENTION DEVICE, CHECK VALVE, OR OTHER DEVICE IS INSTALLED ON A WATER SUPPLY SYSTEM UTILIZING STORAGE WATER HEATING EQUIPMENT SUCH THAT THERMAL EXPANSION CAUSES AN INCREASE IN PRESSURE, A DEVICE FOR CONTROLLING PRESSURE SHALL BE INSTALLED."



METER PIT DETAIL FOR 3/4" AND 1"

NOTES

A. LID LOCKING BOLT MUST HAVE A STANDARD 27/32" PENTAGON HEAD.

B. SUBSTITUTION OF MATERIALS LISTED MY BE MADE ONLY IF PRE-APPROVED BY THE CITY OF HILLSBORO UNDERGROUND UTILITIES DEPARTMENT.

C. NO PLASTIC OR SOLDERED JOINTS IN METER PIT.

D. ALL BRASS FITTINGS TO BE FOR, MUELLER, A.Y. MCDONALD, CAMBRIDGE OR APPROVED DOMESTIC FITTINGS. CONNECTION MUST BE LEAK FREE AND INSPECTED BY THE UNDERGROUND UTILITIES DEPARTMENT.

E. FLARE OR COMPRESSION MAY BE USED.

F. DO NOT CROSS COPPER TUBING IN METER PIT.

G. THE LID TO WATER PIT MUST BE LEVEL WITH FINISH GRADE PRIOR IN INSTALLING WATER METER. METER PIT MUST BE NOT LESS THAN 3'0" FROM THE FLAIR OF A DRIVEWAY OR APPROACH

CITY OF HILLSBORO

3/4" AND 1" METER PIT INSTALLATION

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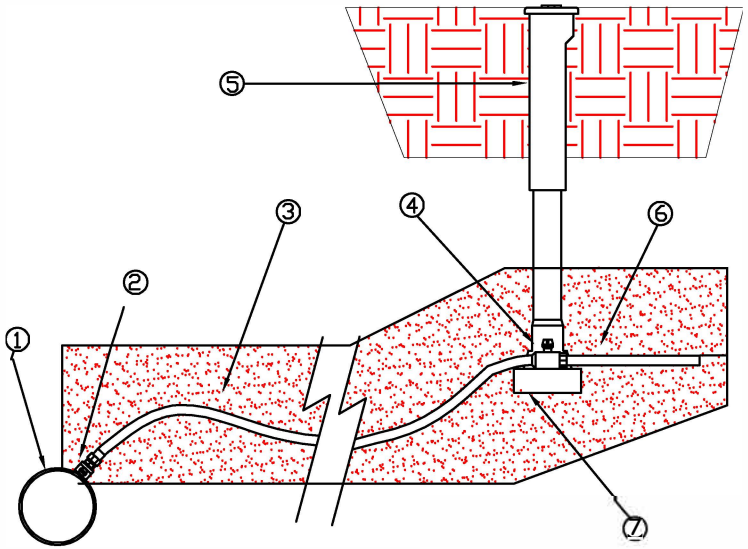
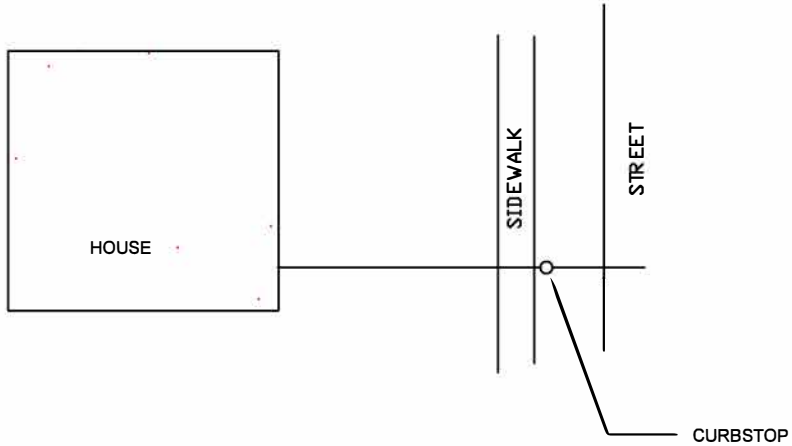


1. WATER MAIN
2. CORPORATION STOP FORD FB-600NL
3. TYPE 1" K-COPPER
4. CURB STOP
5. CURB BOX 2 ½" 94 E
6. 10' OF 1" SERVICE EXTENSION
7. CONCRETE BLOCK

NOTES:

1. ENSURE CURB BOX IS PLUMB OVER CURB STOP AFTER BACKFILLING AROUND CURB BOX.
2. CURB BOX FLUSH WITH FINAL GRADE.
3. COPPER SERVICE LINE IS BE BEDDED AND COVERED WITH NO LESS THAN 12 INCHES OF SAND.



CITY OF HILLSBORO

CURB STOP ASSEMBLY

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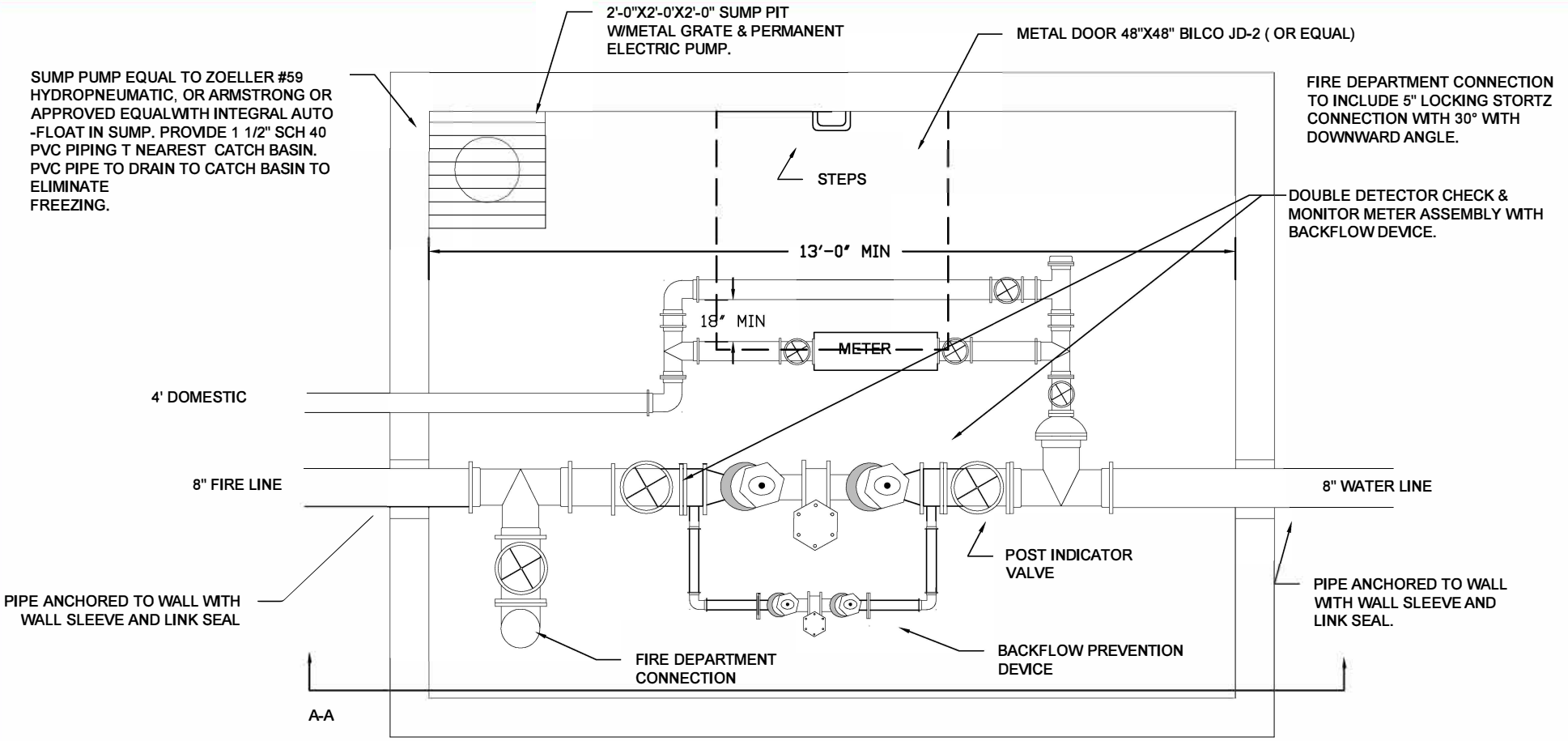

NOTE;
METER IS 2" AND DOMESTIC LINE IS 4". METER SPREAD SHALL BE 17"

1. PIT SHALL BE MASONRY EITHER PRECAST OR POURED IN PLACE WITH QC1, VAULT WILL HAVE A MINIMUM OF 6'-0" CLEAR HEIGHT.
2. AUTOMATIC SUMP PUMP WITH MINIMUM DISCHARGE OF UP TO 500 GPH IS REQUIRED.
3. STEPS SHALL BE PLASTIC 12" O.C. AS MANUFACTURED BY MA INDUSTRIES (PS1-PF) OR EQUAL.
4. ALL PIPE SHALL HAVE MIN 48" COVER ADN MINIMUM 18" FROM FLOOR.
5. NO FIELD SOLDERED JOINTS IN THE PIT.
6. ALL FIRE LINE PIPE SHALL BE D.I. CLASS 51 WITH FLANGED END TO OUTLET VALVE OF DOUBLE DETECTOR CHECK ASSEMBLY.
7 ALL FIRE LINE VALVES SHALL BE FLANGED ENDED, HANDWHEEL OPERATED, RISING STEM OS&Y, OPEN IN SAME DIRECTION AND MUST BE CLOSED RIGHT.
8. AN OEPA APPROVED DOUBLE DETECTOR CHECK VALVE ASSEMBLY SHALL BE FITTED WITH NECESSARY SCH40 BRASS PLUMBING, MANUFACTURER APPROVED DETECTOR CHECK METER , AND OEPA APPROVED BACKFLOW ASSEMBLY. SEE LATEST OEPA BACKFLOW PREVENTION PUBLICATION.
9. ALL DOMESTIC PIPING SHALL BE DCI CL 51 OR BRASS FOR 3" AND LARGER . SAME SIZE DIAMETER BY-PASS REQUIRED ON 2" AND LARGER SERVICE LINES
10. METER SHALL BE SENSUS OMINI C2, FOLLOW RECOMMENDED MANUFACTURERS SPECIFICATIONS OF SIZES BASED ON WATER LINE SIZE.

CITY OF HILLSBORO

COMBINATION FIRE LINE/DOMESTIC WATER METER PIT

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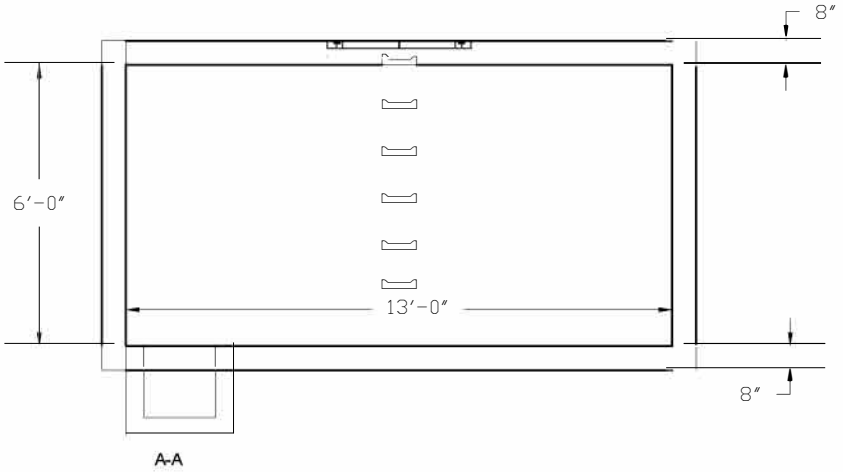
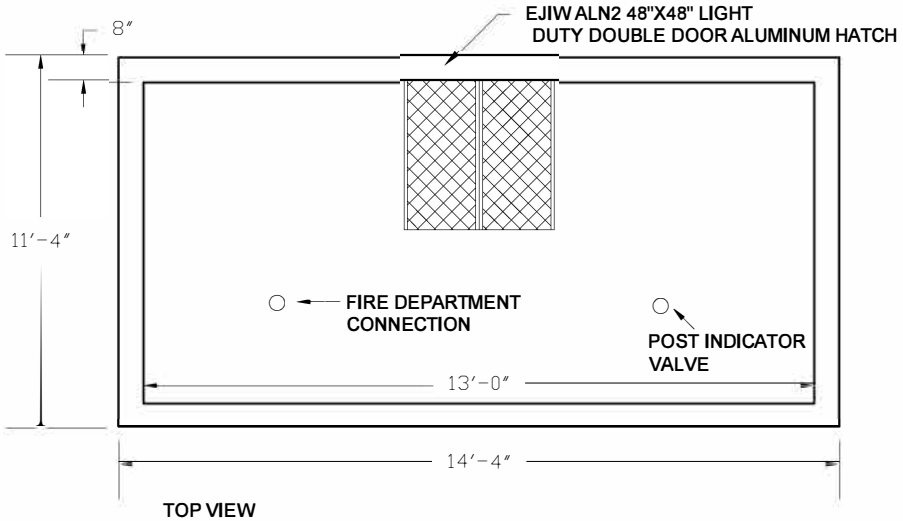
CONTINUED

10. METER FLANGED END MUST BE UNI-FLANGED
11. ALL DOMESTIC VALVES SHALL BE FLANGED END, HAND WHEEL OPERATED, RISING STEM, OS&Y RESILIENT WEDGE GATE TYPE FOR 3" OR LARGER AND FULL PORT BALL WITH PADLOCK WINGS FOR 2" AND SMALLER.
12. DOMESTIC WATER METER SHALL BE SUPPLIED BY THE CONTRACTOR TO BE INSTALLEDD WITH OTHER PIPING FOR PROPER ALIGNMENT.
13. MONITOR METER MUST BE APPROVED BY CITY, IF NOT PURCHASED FROM THE CITY. METER MUST READ IN GALLONS AND MUST BE A SENUS TYPE C-2 METER WITH A T-2 LENGTH.





TOP VIEW

REINFORCEMENT:

BASE SLAB #4 BARS @ C.C.E.W. WITH 1 1/2" COVER TOP LAYER OF QC1 CONCRETE.
WALLS- #4 BARS @ 12" C.C.E.W. CENTERED IN WALLS
TOP SLAB- #4 BARS @ 10 C.C.E.W. TOP AND BOTTOM LAYERS WITH 1 1/2" COVER OF QC1 CONCRETE.

NOTES:
1. ALL LINK SEALS ARE TO BE SUPPLIED AND INSTALLED BY CONTRACTOR.
2. HOLE SIZES TO BE 4" LARGER THAN DUCTILE IRON PIPE FOR PROPER LINK SEAL INSTALLATION.

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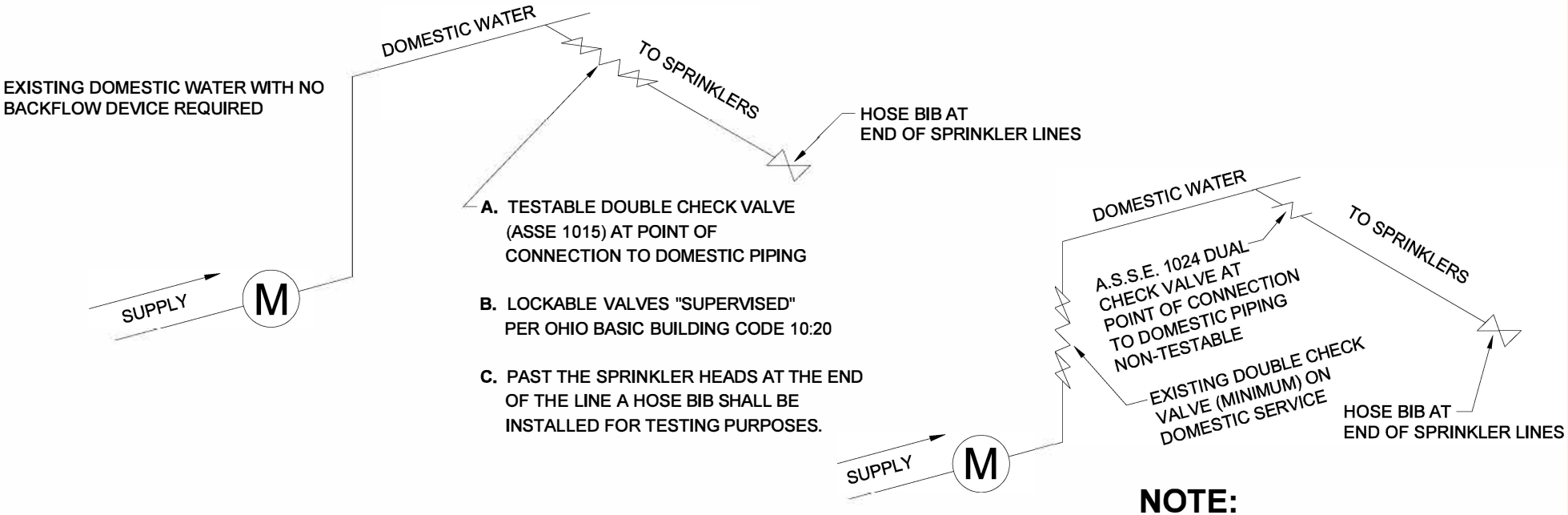
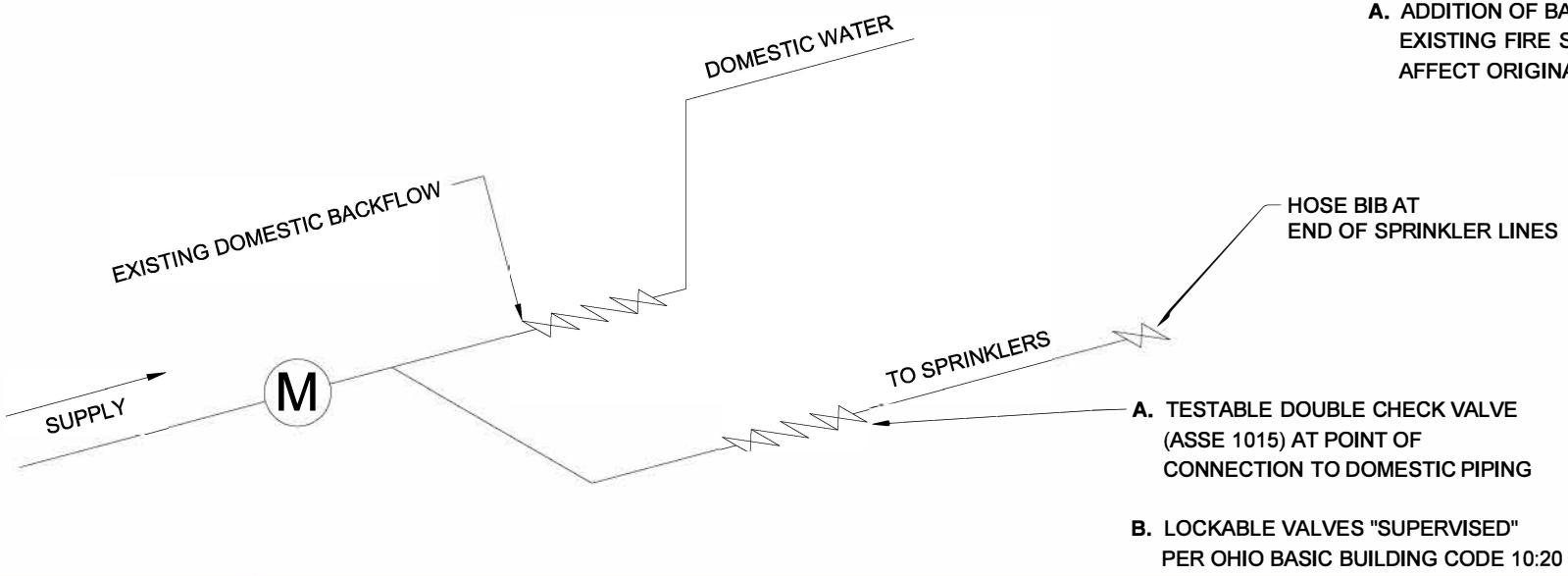


NOTE:

A. ADDITION OF BACKFLOW DEVICE ONTO EXISTING FIRE SUPPRESSION SYSTEM WILL AFFECT ORIGINAL FLOW CALCULATION



CITY OF HILLSBORO	LIMITED AREA SPRINKLER SYSTEM DETAIL	REVISIONS:	DATE APPROVED:
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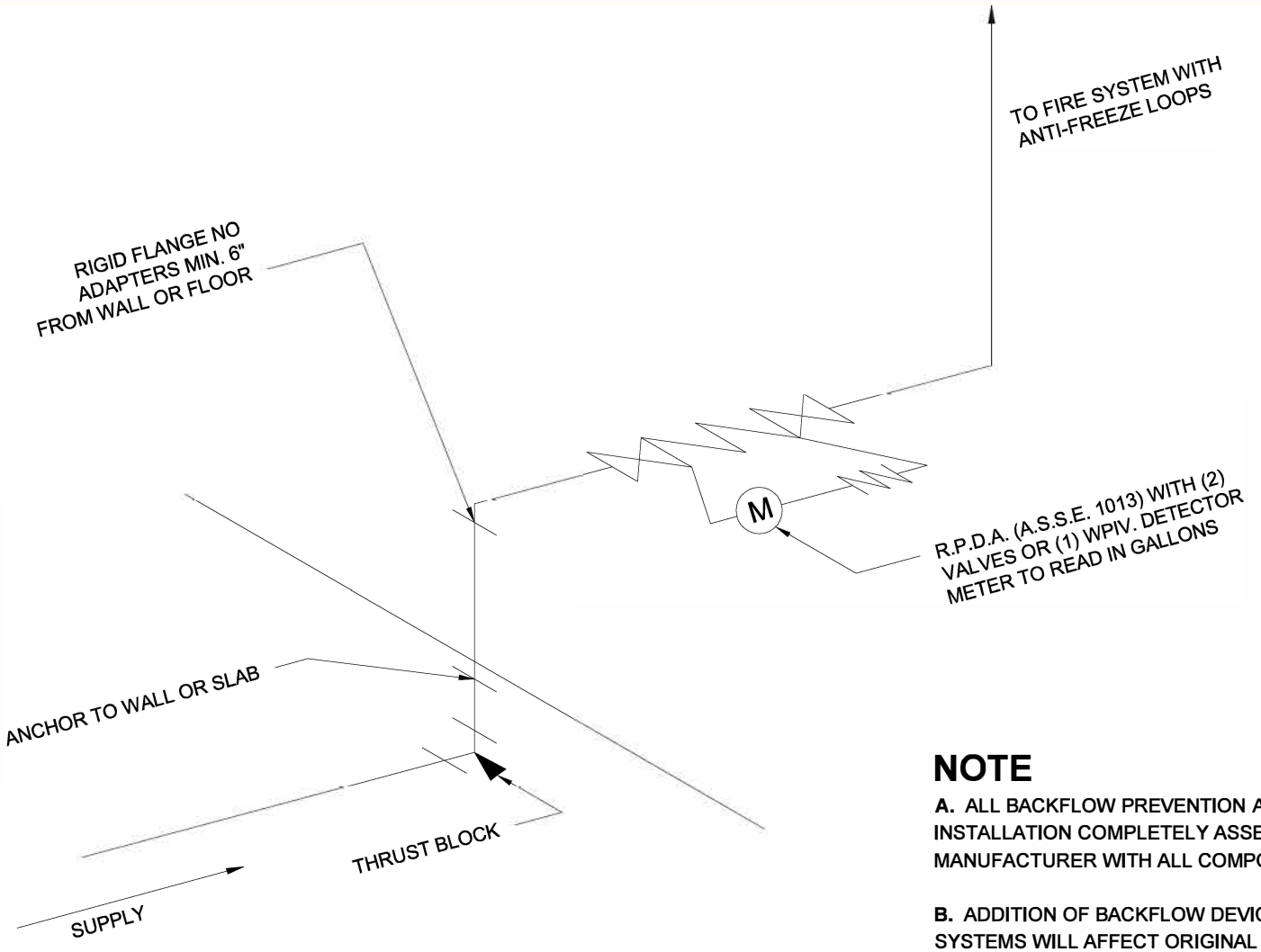

NOTE

A. ALL BACKFLOW PREVENTION ASSEMBLIES SHALL BE DELIVERED FOR INSTALLATION COMPLETELY ASSEMBLED BY THE ORIGINAL MANUFACTURER WITH ALL COMPONENTS AS APPROVED.

B. ADDITION OF BACKFLOW DEVICE ONTO EXISTING FIRE SUPPRESSION SYSTEMS WILL AFFECT ORIGINAL FLOW CALCULATIONS.

C. CLASS 53 DUCTILE IRON TO VALVE. ALL JOINTS RESTRAINED.

D. BACKFLOW REGULATIONS SHALL BE PER EPA'S CURRENT REGULATIONS.

CITY OF HILLSBORO	REDUCED PRESSURE DETECTOR ASSEMBLY	REVISIONS:	DATE APPROVED:
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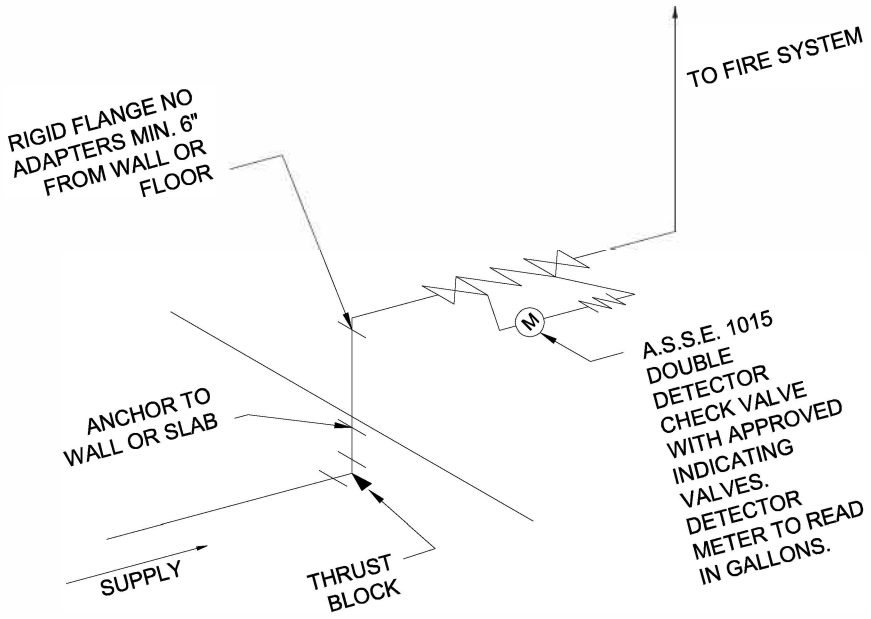

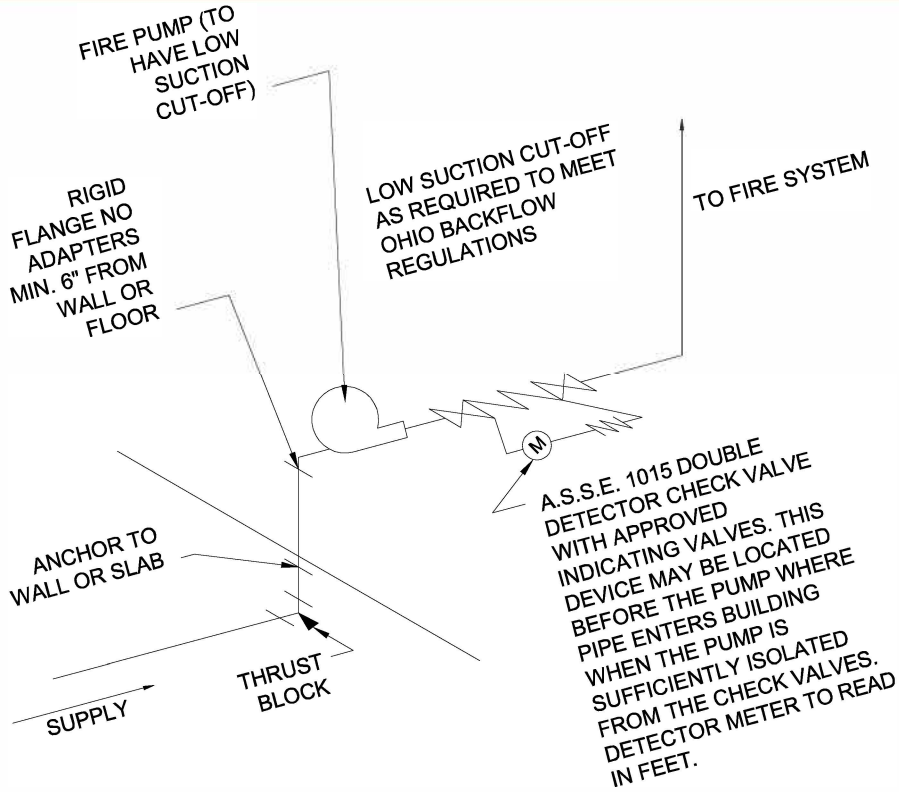

NOTE

A. ALL BACKFLOW PREVENTION ASSEMBLIES SHALL BE DELIVERED FOR INSTALLATION COMPLETELY ASSEMBLED BY THE ORIGIONAL MANUFACTURER WITH ALL COMPONENTS AS APPROVED.

B. CLASS 53 DUCTILE IRON TO VALVE. ALL JOINTS RESTRAINED.

C. BACKFLOW REGULATIONS SHALL BE PER EPA'S CURRENT REGULATIONS.

CITY OF HILLSBORO	DOUBLE DETECTOR CHECK VALVE ASSEMBLY DETAIL	REVISIONS:	DATE APPROVED:
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NOTES

A. SEE "STANDARDS FOR TAPS, SERVICES ADN METERS" FOR TYPICAL NOTES.

B. BACKFLOW PREVENTION DEVICE REQUIRED TO MEET CURRENT EPA REGULATIONS.

C. PROVIDE APPROVED DRAIN FOR IRRIGATION SYSTEM.

D. ALTERNATE DESIGNS MUST BE SUBMITTED FOR APPROVAL.

E. THE METER PIT MUST BE BROUGHT UP TO FINISH GRADE.

F. NO OUTLETS ARE ALLOWED BETWEEN METER AND THE BACKFLOW PREVENTER OR HOSE BIBB VACUUM BREAKER WITH THE EXCEPTION OF ONE SCREW PLUG -IN TAP FOR WINTERZING/DRAINAGE PURPOSES.

G. THE UNDERGROUND WATER SERVICE SHALL BE K-COPPER UP TO THE BACKFLOW PREVENTER OR HOSE BIBB VACUUM BREAKER.

H. THE INSTALLATION SHALL BE INSPECTED BY THE CITY.

INSTRUCTIONS FOR THE INSTALLATION OF IRRIGATION METERS AND BACKFLOW PREVENTERS FOR IRRIGATION SYSTEMS.

A. MAKE A DRAWING OF THE PROPOSED IRRIGATION SYSTEM, THIS DRAWING IS TO BE APPROVED BY THE CITY.

B. ALL WORK SHALL BE DONE IN ACCCORDANCE WITH THE CITY STANDARDS FOR "TAPS, SERVICES AND METERS".

C. GET NECESSARY PERMITS.
   1. TAPPING PERMIT

D. THE CONTRACTOR MUST BE REGISTERED WITH THE HIGHLAND COUNTY HEALTH DEPARTMENT.

   1. THE CONTRACTOR MUST OBTAIN A PERMIT TO INSTALL AND PAY ALL APPLICABLE FEES TO THE COUNTY HEATH DEPARTMENT PRIOR TO INSTALLATION.

   2. A PLUMBER WITH AN OHIO LICENSE /BACKFLOW CERTIFICATION MUST BE OBTAINED TO INSTALL AND TEST BACKFLOW DEVICES.

E. AFTER THE BACKFLOW PREVENTERS HAVE BEEN INSTALLED, PLEASE FILL OUT THE FORMS COMPLETELY WITH THE OWNER/LEASE HOLDER'S, ADDRESS (WHERE THE BACKFLOW PREVENTER WAS INSTALLED) , LOCATION OF THE BACKLFOW PREVENTER , SIZE, MAKE, MODEL TEST RESULTS BY A LICENCED PLUMBER, ANNUAL TEST RESULTS THERE AFTER, AND SERIAL NUMBER OF THE BACKFLOW PREVENTER. PLEASE RETURN THE COMPLETED FORMS TO THE CITY AND HIGHLAND COUNTY HEALTH DEPARTMENT.

F. CONTACT THE CITY UNDERGROUND UTILITY DEPARTMENT AFTER THE WORK HAS BEEN COMPLETED. BACKFLOW PREVENTERS HAVE TO BE INSPECTED BY THE CITY.

G. SEPORATE VALVES, ONE BEFORE AND AFTER, MUST BE PLACED NEAR THE BACKFLOW PREVENTER WHENEVER THE EXISTING BACKFLOW IS REMOVED.

CITY OF HILLSBORO	STANDARD INSTALLATION FOR IRRIGATION METERS AND BACKFLOW PREVENTER	REVISIONS:	DATE APPROVED:
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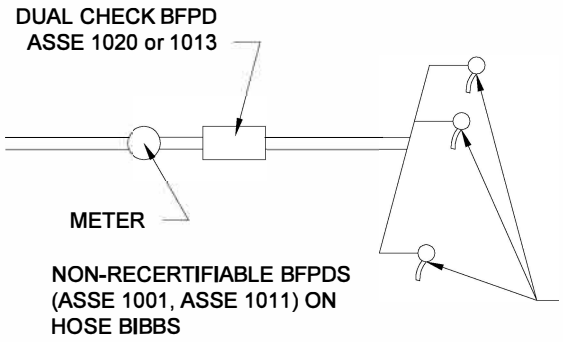
HOSE BIBB



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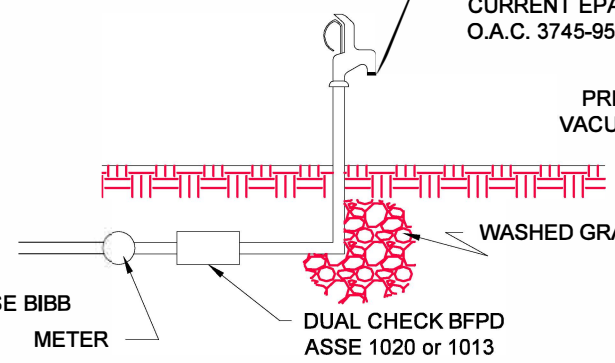
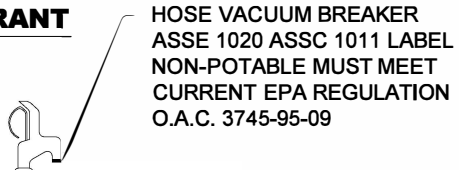
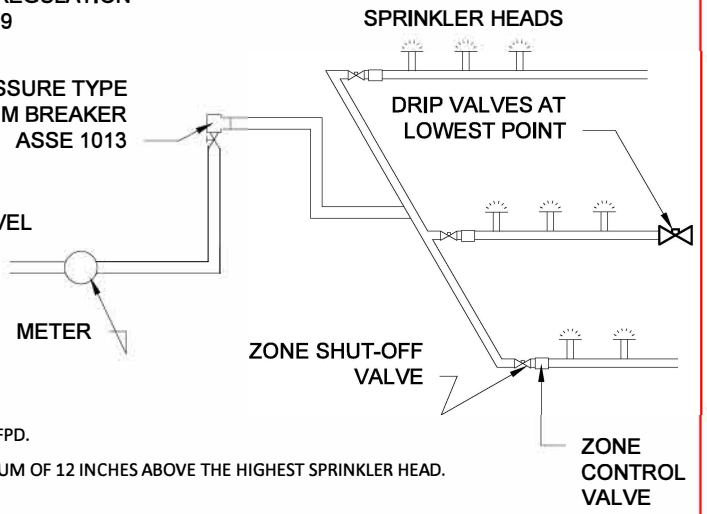


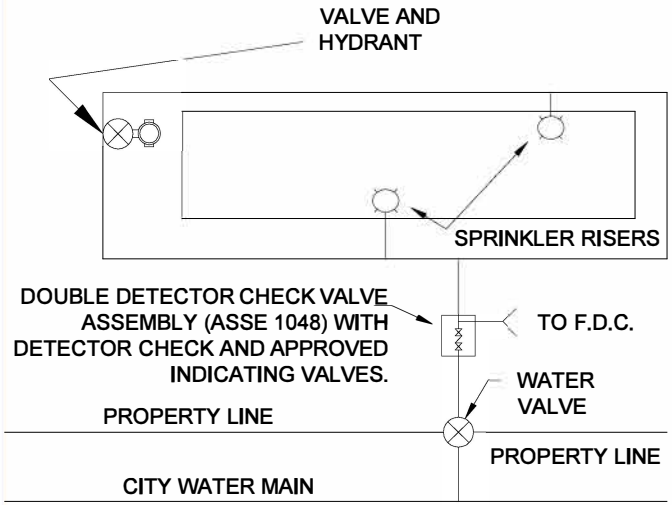
YARD HYDRANT



SPRINKLER SYSTEM



YARD MAIN SYSTEM ARRANGEMENT



CONDITIONS

A. SHUT-OFF VALVES ARE ALLOWED DOWNSTREAM OF THE BFPD.

B. THE PRESSURE TYPE VACUUM BREAKER MUST BE A MINIMUM OF 12 INCHES ABOVE THE HIGHEST SPRINKLER HEAD.

NOTES

A. SEE "STANDARDS FOR TAPS, SERVICES AND METERS" FOR TYPICAL NOTES.

B. BACKFLOW PREVENTION DEVICE IS REQUIRED TO MEET CURRENT EPA REGULATIONS.

C. PROVIDE APPROVED DRAIN FOR IRRIGATION SYSTEM.

D. ALTERNATE DESIGNS MUST BE SUBMITTED FOR APPROVAL.

E. THE CURB BOX MUST BE BROUGHT UP TO FINISH GRADE.

F. NOT OUTLETS ARE ALLOWED BETWEEN METER AND THE BACKFLOW PREVENTER OR HOSE. BIBB VACUUM BREAKER WITH THE EXCEPTION OF ONE SCREW PLUG-IN TAP FOR WINTERIZING/DRAINAGE PURPOSES.

G. THE UNDERGROUND WATER SERVICE SHALL BE K-COPPER UP TO THE BACKFLOW PREVENTER OR HOSE BIBB VACUUM BREAKER.

H. THE INSTALLATION SHALL BE INSPECTED BY THE CITY.

REQUIREMENTS FOR YARD HYDRANTS (O.A.C 3745-95-09)

A. YARD HYDRANTS WITH WEEP HOLES ARE PROHIBITED

B. SANITARY YARD HYDRANTS THAT DO NOT HAVE WEEP HOLES, SUCH AS THOSE THAT MEET THE REQUIREMENTS OF THE "AMERICAN SOCIETY OF SANITARY ENGINEERS (ASSE) STANDARD 1057", PERFORMANCE REQUIREMENTS FOR FREEZE RESISTANT YARD HYDRANTS WITH BACKFLOW PROTECTION (2001).

ARE NOT PROHIBITED PROVIDED:

1) THE DEVICE IS ACCEPTABLE TO THE PUBLIC WATER SYSTEM TO WHICH IT WILL BE CONNECTED.

2) ALL OF THE BACKFLOW AND CROSS-CONNECTION REQUIREMENTS OF THIS CHAPTER OF THE ADMINISTRATIVE CODE ARE MET .

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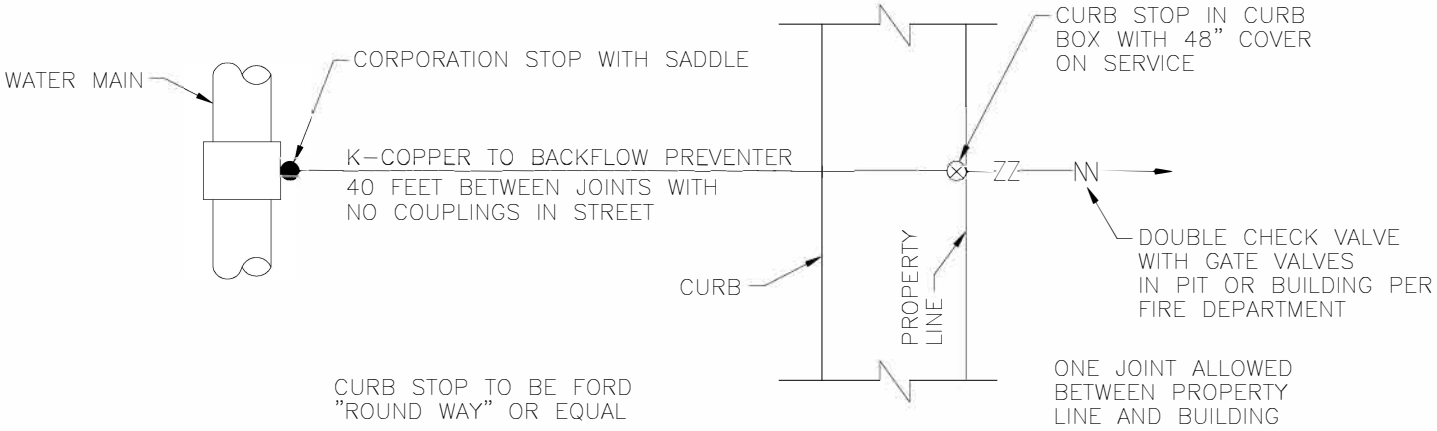
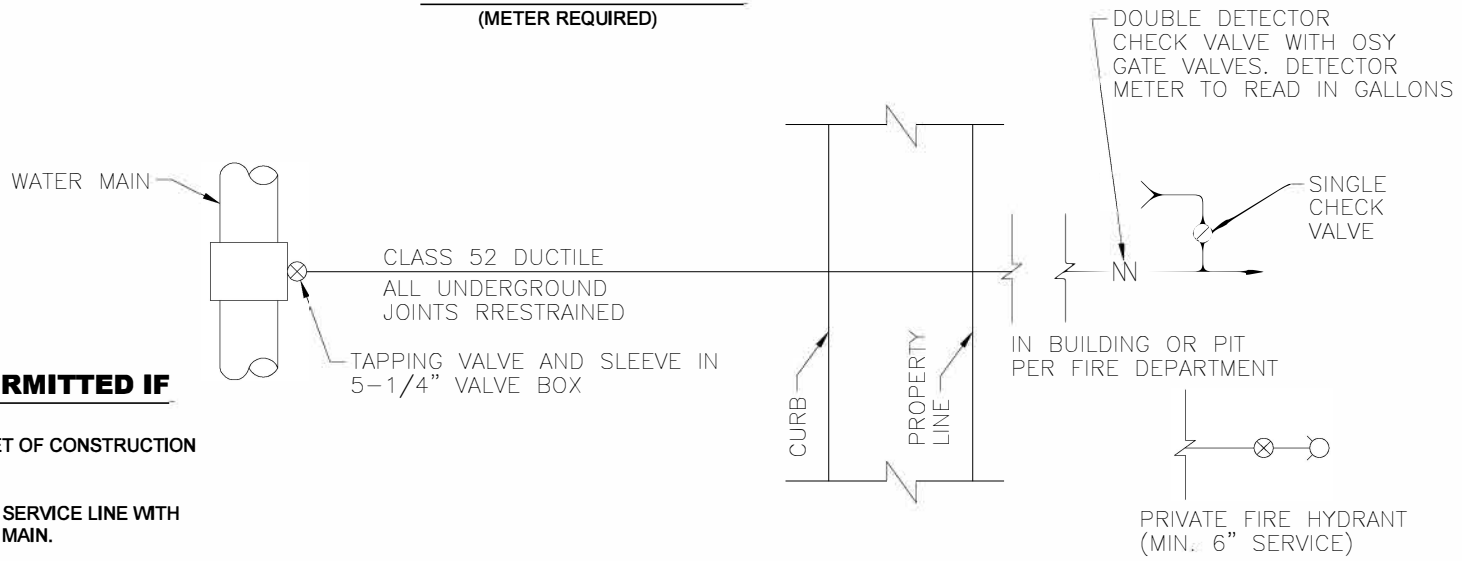


2" FIRE LINE SERVICE

(METER REQUIRED)



SERVICE TEES ARE PERMITTED IF

A. SHOWN ON AND APPROVED SET OF CONSTRUCTION DRAWINGS.

B. 4 INCH MINIMUM BRANCH AND SERVICE LINE WITH GATE VALVE WITHIN 3 FEET OF MAIN.

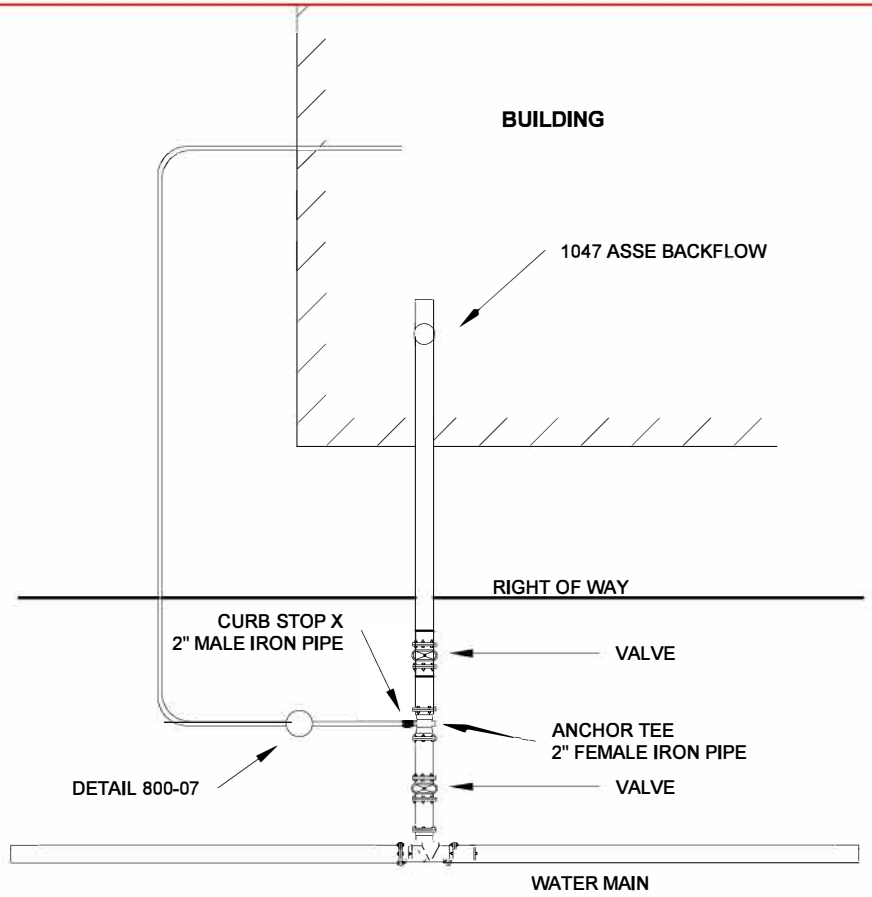
C. 6 INCH FIRE LINE MAY HAVE A ONE-INCH DOMESTIC TAP AND 8 INCH FIRE LINE MAY HAVE A 2 INCHES DOMESTIC TAP. ALL DOMESTIC TAPS MUST BE INSTALLED BEFORE THE FIRE SPRINKLER RISER.

4" AND LARGER FIRE LINE SERVICE

(METER REQUIRED)

WALL/POST INDICATOR VALVES SHALL BE ADDED ON PREMISES AT FIRE DEPARTMENT REQUEST

CITY OF HILLSBORO	2" FIRE LINE AND 4" AND LARGER FIRE LINE	REVISIONS:	DATE APPROVED:
			PAGE No. 800-15



REVIEW AND FEES

A. FIVE SETS OF SITE PLANS SHALL BE SUBMITTED TO THE CITY UNDERGROUND UTILITY DEPARTMENT TO BE REVIEWED. FIRE DEPARTMENT, ELECTRICAL DISTRIBUTION, CITY ENGINEER, AND THE PLANNNG COORDINATOR WILL REVIEW PLANS.

TESTING

A. THE CITY FIRE DEPARTMENT PERSONNEL WILL CONDUCT SELECTIVE FIRE HYDRANT TESTING FOR RESIDUAL PRESSURE. THE TESTING IS DONE ANNUALLY OR WHENEVER NEEDED. PROCEDURES OF THE HYDRANT FLOW TEST ARE FOLLOWED FROM THE FOURTH EDITION OF THE IFSTA MANUAL "WATER SUPPLIES FOR FIRE PROTECTION". TESTING PROCEDURES ARE ON FILE AT THE MAIN FIRE STATION . ALSO SEE PAGE 800-5

GENERAL NOTES

A. FIRE LINE AND HYDRANT INSTALLATION, TESTING AND MATERIALS SHALL BE THE SAME SPECIFICATIONS AS STATED IN THE CONSTRUCTION STANDARDS AND DRAWINGS. THESE CONSTRUCTION STANDARDS AND DRAWINGS SHALL ALSO BE FOLLOWED FOR WATERLINE EXTENSIONS ON PRIVATE PROPERTY THAT WILL PROVIDE FIRE LINE OR DOMESTIC WATER SERVICE.

B. CITY OF HILLSBORO LINE REVIEW FORMS SHALL BE COMPLETED WITH TWO SETS OF PLANS FURNISHED TO THE CITY UNDERGROUND UTILITIES DEPARTMENT.

C. CITY OF HILLSBORO CERTIFIED I.S.O. TEST SHALL BE NOT BE CERTIFIED TO THE STATE OF OHIO UNTIL THE FOLLOWING ITEMS HAVE BEEN COMPETED.
   1. ONE SET OF DRAWINGS FURNISHED TO THE ENGINEERING DEPARTMENT.
   2. FIRE LINE INSTALLATION FORM SHALL BE COMPLETE .

D. NO ADDITIONAL BOOSTER PUMPS SHALL BE INSTALLED FOR THE DOMESTIC LINE.

ALL MAINTENANCE SHOULD COMPLY WITH THE MOST CURRENT OHIO FIRE CODE AND NFPS 25.

E. FIRE LINE MAINTENANCE SHALL BE PERFORMED BY A CERTIFIED FIRE LINE CONTRACTOR THROUGH THE OFFICE OF THE STATE FIRE MARSHALL.

F. TESTING OF FIRE LINES SHALL BE PERFORMED BY A STATE APPROVED FIRE LINE INSTALLER.

E. A CERTIFIED FIRE LINE CONTRACTOR LICENSED THROUGH THE OFFICE OF THE STATE FIRE MARSHALL SHALL PERFORM THE WORK.

SPRINKLER NOTES

A. SUBMIT TO; HIGHLAND COUNTY BUILDING DEPARTMENT AND PAINT CREEK FIRE DEPARTMENT.
B. HYDRAULIC CALCULATIONS FROM THE SPRINKLER SYSTEM DESIGNER SHALL BE SUBMITTED TO THE FIRE DEPARTMENT, WITH SITE PLAN FOR REVIEW.
C. INSTALLATION OF A FLOW SENSOR MONITOR WILL BE REQUIRED TO REPORT TO AN APPROVED MONITORING SYSTEM. (I.E. POLICE, PRIVATE STATION)
D. THERE SHALL BE AN EXISTING OR NEW HYDRANT INSTALLED WITHIN 100 FEET OF THE SIAMESE CONNECTION AND NO CLOSER THAN 25 FEET OF A BUILDING. EXCEPTIONS MUST BE SUBMITTED TO THE CITY FIRE PROTECTION OFFICIALS.
E. A 6 INCH FIRE LINE MAY HAVE A ONE-INCH MAXIMUM DOMESTIC TAP AND AN 8 INCH FIRE LINE MAY HAVE A 2 INCH MAXIMUM DOMESTIC TAP. ALL DOMESTIC TAPS MUST BE INSTALLED BEFORE THE FIRE SPRINKLER RISER.

CITY OF HILLSBORO

2 INCH DOMESTIC FIRE COMBINATION

REVISIONS:

DATE APPROVED:

NOTES

A. THE FIRE LINE SHALL BE DEFINED AS " THE LINE FROM THE RISER INSIDE THE BUILDING TO THE FIRST VALVE ON THE SYSTEM"

B. MINIMUM FIRE LINE SIZE SHALL BE 6 INCHES

C. A 1 INCH DOMESTIC TAP CAN BE MADE ON A 6 INCH FIRE LINE AND A 2 INCH DOMESTIC TAP ON A 8 INCH FIRE LINE. TAP MUST BE MADE PRIOR TO BACKFLOW PREVENTOR.

D. A FIRE HYDRANT SHALL BE INSTALLED WITH 100 FEET OF THE STORTZ CONNECTION.

E. FIRE LINE CHANGES SHALL BE BASED ON SIZE OF RISER.

F. CONTRACTOR SHALL INSTALL A REDUCED PRESSURE PRINCIPLE BACKFLOW PREVENTER ON FIRE LINE PRIOR TO RISER.

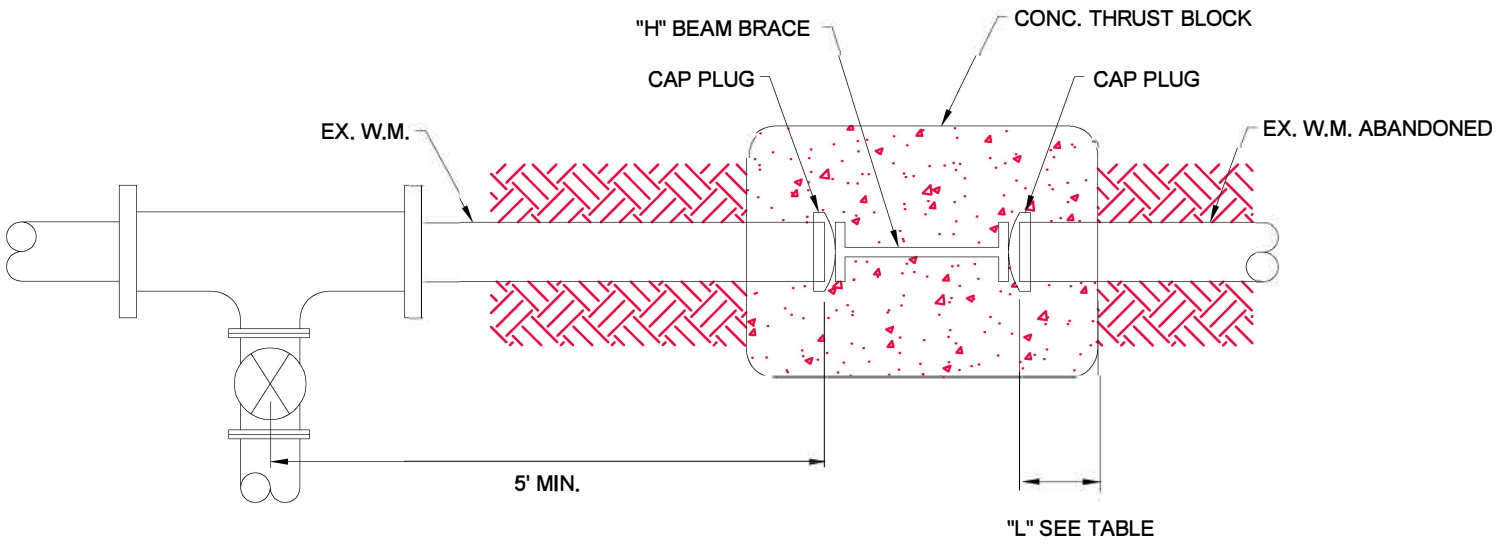
G. LIMITED AREA SPRINKLERS SHALL BE CONNECTED BEFORE METER.

H. DOMESTIC SERVICE SHALL INCLUDE BACKFLOW PREVENTOR PRIOR TO METER. WATER METER SHALL HAVE A BYPASS AND STRAINER.

I. ALL MATERIAL AND CONSTRUCTION METHODS SHALL CONFORM TO THE CITY STANDARDS.

J. PRIVATE WATER MAIN SHALL REMAIN PRIVATE UNLESS ACCEPTED BY THE CITY AND AN EASEMENT IS GRANTED.

K. ALL FIRE LINES SHALL BE TESTED AT 200 PSI . SEE HYDROSTATIC TEST ON PAGE 800-5 FOR ADDITIONAL REQUIREMENTS. FIRE DEPARTMENT OR THE UNDERGROUND UTILITIES DEPARTMENT IS TO WITNESS THE TEST.



DIA.	4"	6"	8"	10"	12"	16"	20"	24"
"L"	12	26	38	48	66	98	125	145

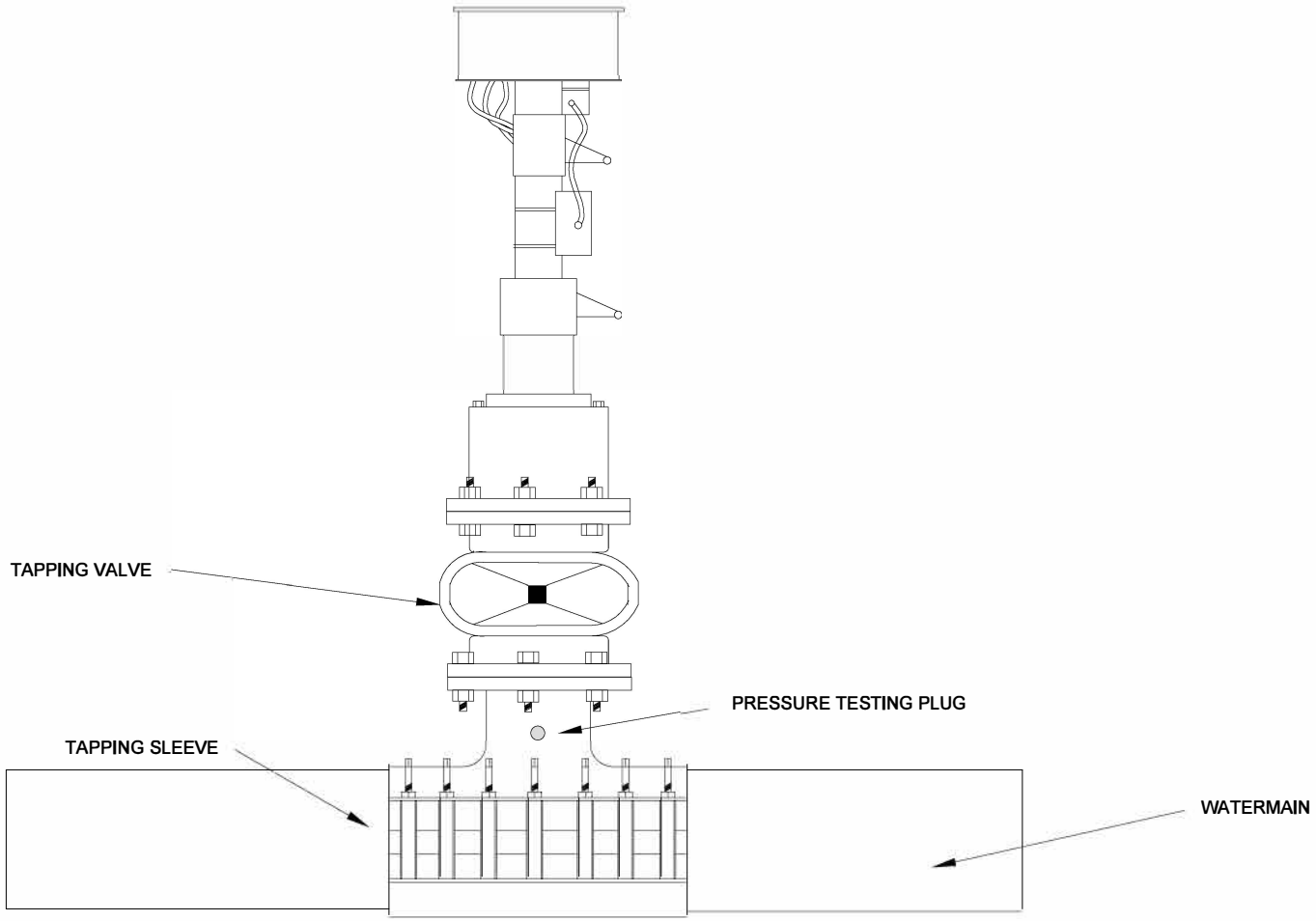
CITY OF HILLSBORO

TYPE III - CUT & PLUG DETAIL

REVISIONS:

DATE APPROVED:

PAGE No.
800-18



- THE PRESURE TEST SHALL BE PERFORMED UNDER THE DIRECT SUPERVISION OF THE CITY OF HILLSBORO UNDERGROUND UTILITIES REPRESENTATIVE.
- THE TEST SHALL BE FOR FIVE (5) MINUTES AT 150PSI FOR CAST IRON PIPE AND 200PSI DUCTILE IRON PIPE.
- FOLLOW MANUFACTURES RECOMMENDATIONS FOR TORQUE SETTINGS ON TAPPING SLEEVE.

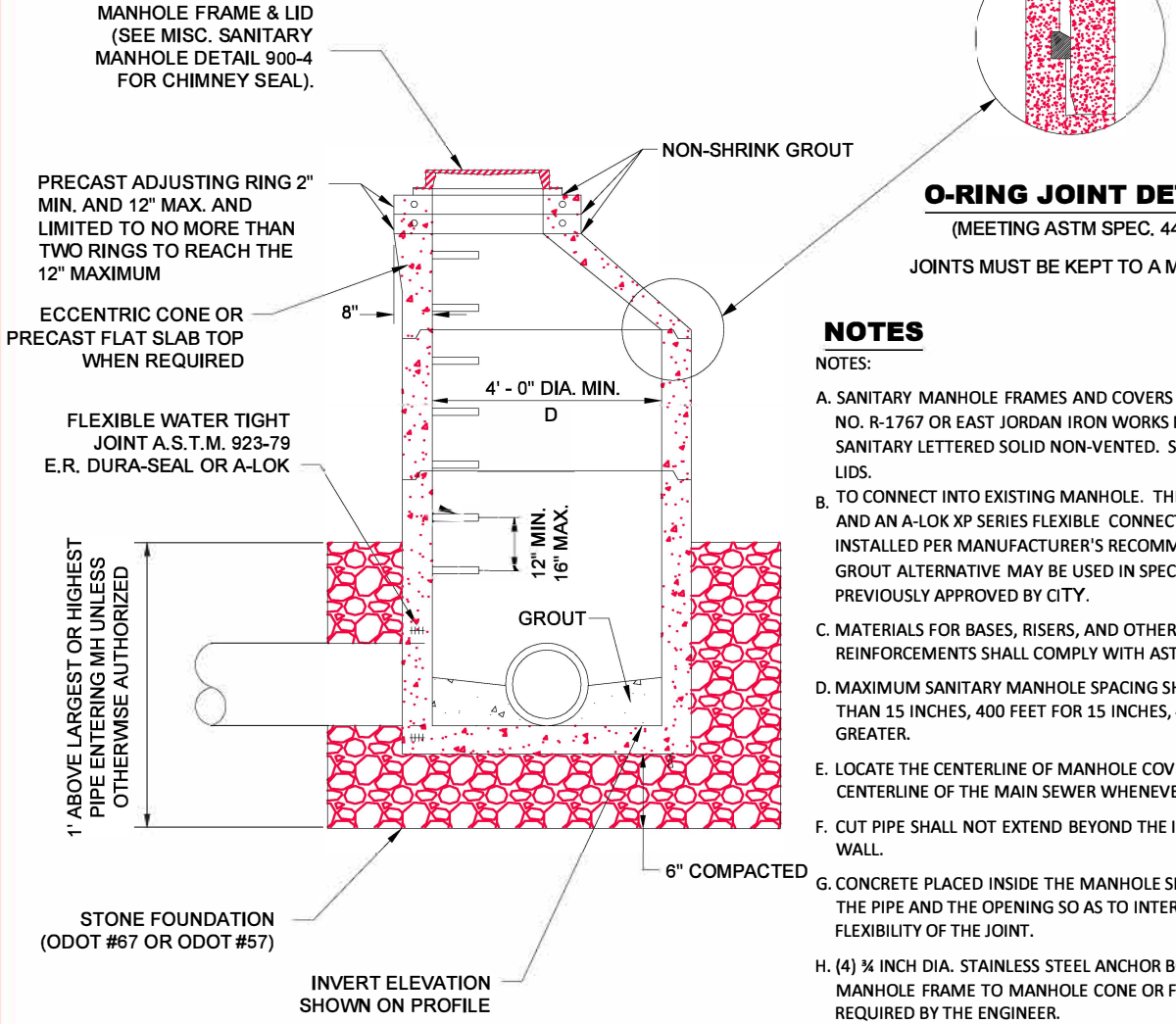
CITY OF HILLSBORO

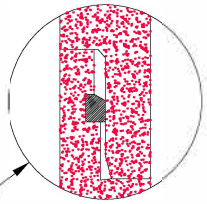
TAPPING SLEEVE AND VALVE HYDROSTATIC TEST

REVISIONS:

DATE APPROVED:

900 – Sanitary Sewers

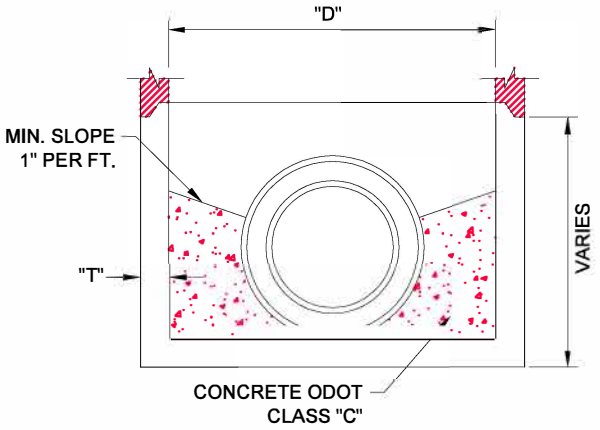




O-RING JOINT DETAIL

(MEETING ASTM SPEC. 443)

JOINTS MUST BE KEPT TO A MINIMUM.



PRECAST BASE SECTION

PIPE SIZE	T	D
24" & UNDER	5"	48"
27" & ABOVE	6"	60"

NOTES

NOTES:

A. SANITARY MANHOLE FRAMES AND COVERS SHALL BE EQUAL TO NEENAH NO. R-1767 OR EAST JORDAN IRON WORKS NO. 1600. LID SHALL BE SANITARY LETTERED SOLID NON-VENTED. SELF-SEALING AND NON-BOLTED LIDS.

B. TO CONNECT INTO EXISTING MANHOLE. THE MANHOLE SHALL BE CORED AND AN A-LOK XP SERIES FLEXIBLE CONNECTOR OR EQUIVALENT SHALL BE INSTALLED PER MANUFACTURER'S RECOMMENDATIONS. NON-SHRINK GROUT ALTERNATIVE MAY BE USED IN SPECIAL CIRCUMSTANCES WHEN PREVIOUSLY APPROVED BY CITY.

C. MATERIALS FOR BASES, RISERS, AND OTHER PRECAST SECTIONS, INCLUDING REINFORCEMENTS SHALL COMPLY WITH ASTM C-478.

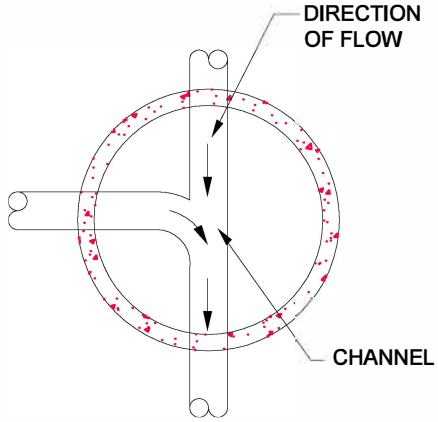
D. MAXIMUM SANITARY MANHOLE SPACING SHALL BE 350 FEET FOR LESS THAN 15 INCHES, 400 FEET FOR 15 INCHES, 400 FEET FOR 15 INCHES AND GREATER.

E. LOCATE THE CENTERLINE OF MANHOLE COVERS AT 90° OVER THE CENTERLINE OF THE MAIN SEWER WHENEVER POSSIBLE.

F. CUT PIPE SHALL NOT EXTEND BEYOND THE INSIDE FACE OF THE MANHOLE WALL.

G. CONCRETE PLACED INSIDE THE MANHOLE SHALL NOT BE PLACED BETWEEN THE PIPE AND THE OPENING SO AS TO INTERFERE IN ANY WAY WITH THE FLEXIBILITY OF THE JOINT.

H. (4) ¾ INCH DIA. STAINLESS STEEL ANCHOR BOLTS AND NUTS TO FASTEN MANHOLE FRAME TO MANHOLE CONE OR FLAT LID SECTION WHEN REQUIRED BY THE ENGINEER.



THE FLOW CHANNEL THROUGH MANHOLES SHALL BE MADE TO CONFORM IN SHAPE, SLOPE AND SMOOTHNESS TO THAT OF THE SEWERS.

STANDARD INVERT CHANNEL

ALL INVERTS TO BE CHANNELED FOR OPTIMUM FLOW.

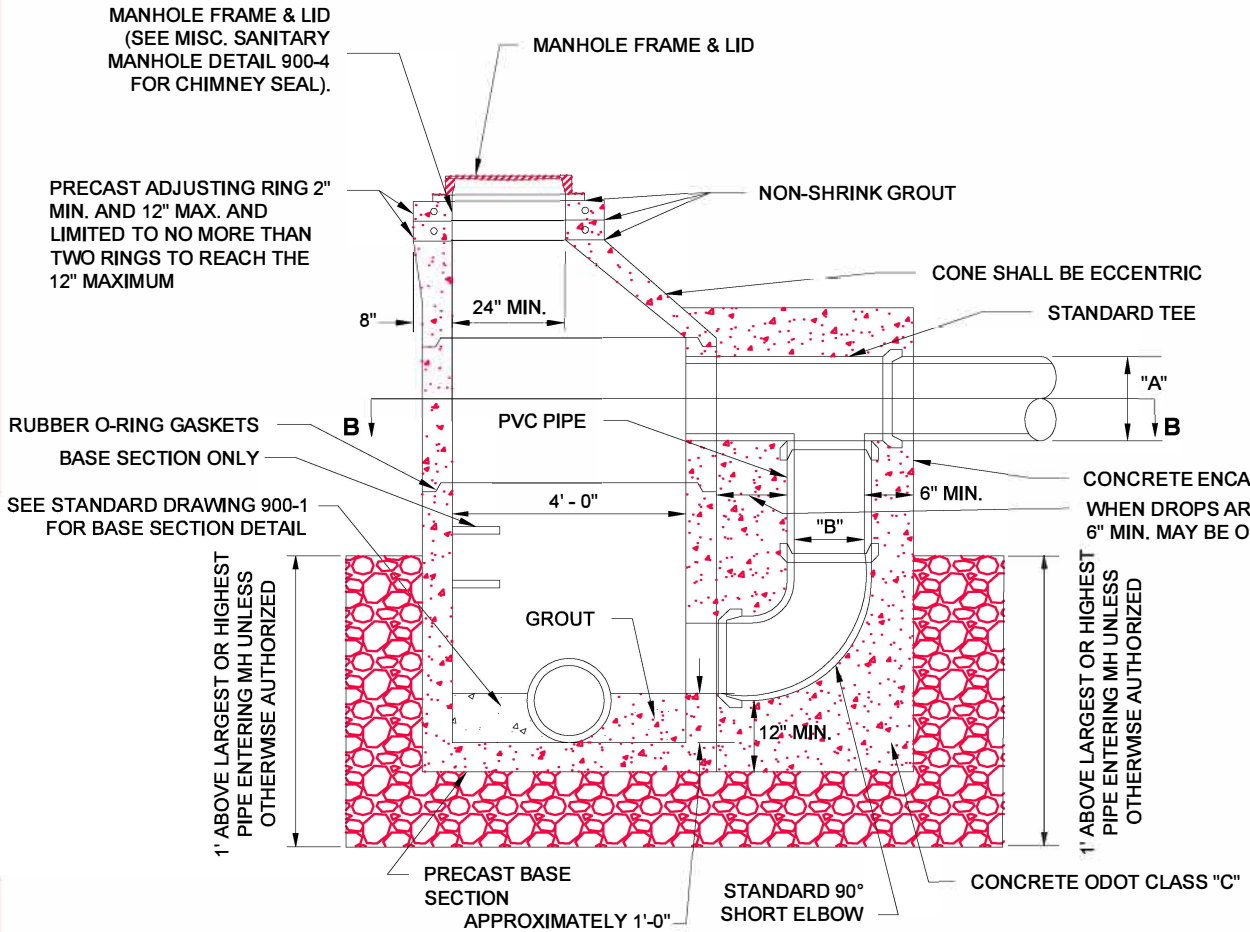
CITY OF HILLSBORO

TYPE 3 SANITARY MANHOLE

REVISIONS:

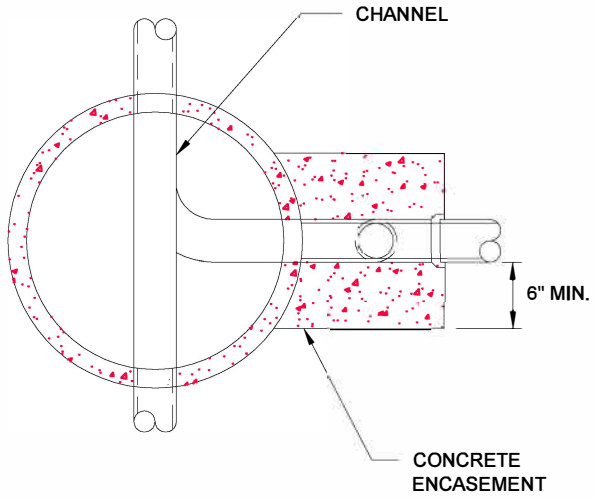
DATE APPROVED:

PAGE No. 900-1



"A"	"B"
8", 10", & 12"	8"
15" & 18"	10"
21" & 24"	12"

DROP CONNECTION MANHOLE



SECTION B-B

NOTES

A. LOCATE THE CENTERLINE OF MANHOLE COVERS AT 90° OVER THE CENTERLINE OF THE MAIN SEWER WHENEVER POSSIBLE.

B. TYPE D MANHOLE SHALL BE USED WHERE THE DIFFERENCE IN INVERT ELEVATIONS IS GREATER THAN 2 FEET.

C. ALL NOTES AND ASTM REFERENCES ON THE TYPE 3 SANITARY MANHOLE SHALL APPLY ON THE TYPE D SANITARY DROP MANHOLE.

CITY OF HILLSBORO

TYPE 2 SANITARY DROP MANHOLE

REVISIONS:

DATE APPROVED:

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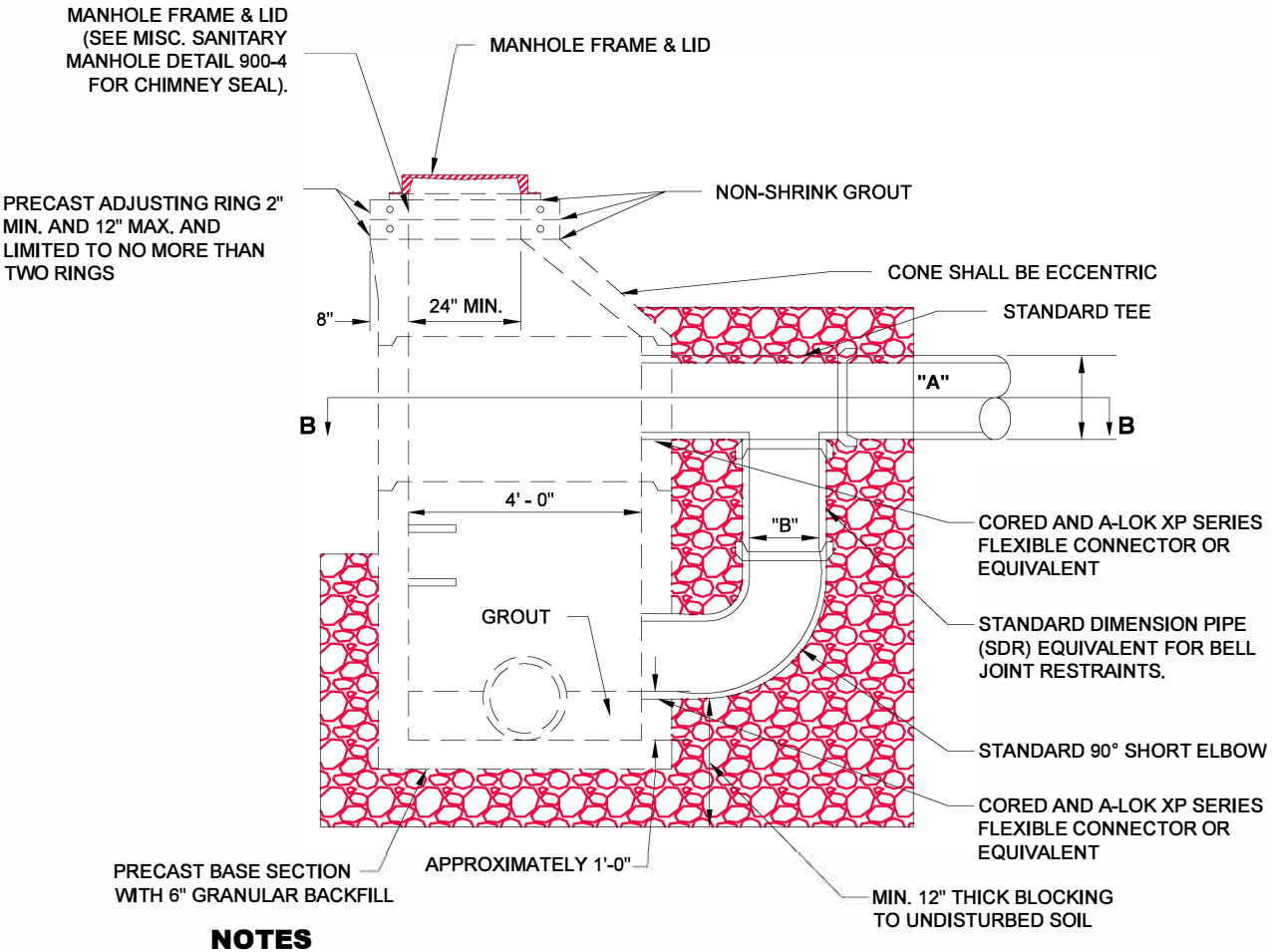
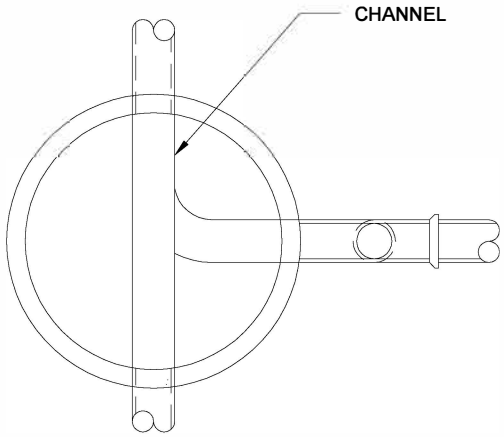


"A"	"B"
8", 10", & 12"	8"
15" & 18"	10"
21" & 24"	12"

DROP CONNECTION MANHOLE



SECTION B-B

NOTES

A. SANITARY DROP MANHOLE SHALL BE USED WHERE THE DIFFERENCE IN INVERT ELEVATIONS IS GREATER THAN 2 FEET.

B. ALL NOTES AND ASTM REFERENCES ON THE TYPE 3 SANITARY MANHOLE SHALL APPLY ON THE SANITARY DROP ON EXISTING MANHOLE.

C. ALL NOTES AND ASTM REFERENCES ON THE TYPE D SANITARY DROP MANHOLE SHALL APPLY ON THE SANITARY DROP ON EXISTING MANHOLE.

D. STANDARD DIMENSION PIPE (SDR) SHALL BE ANCHORED TO THE OUTSIDE OF THE EXISTING MANHOLE. 3/4 INCH STAINLESS STEEL STRAPPING WITH 24 INCHES ON CENTER WITH STAINLESS ANCHORING.

CITY OF HILLSBORO

SANITARY DROP ON EXISTING MANHOLE

REVISIONS:

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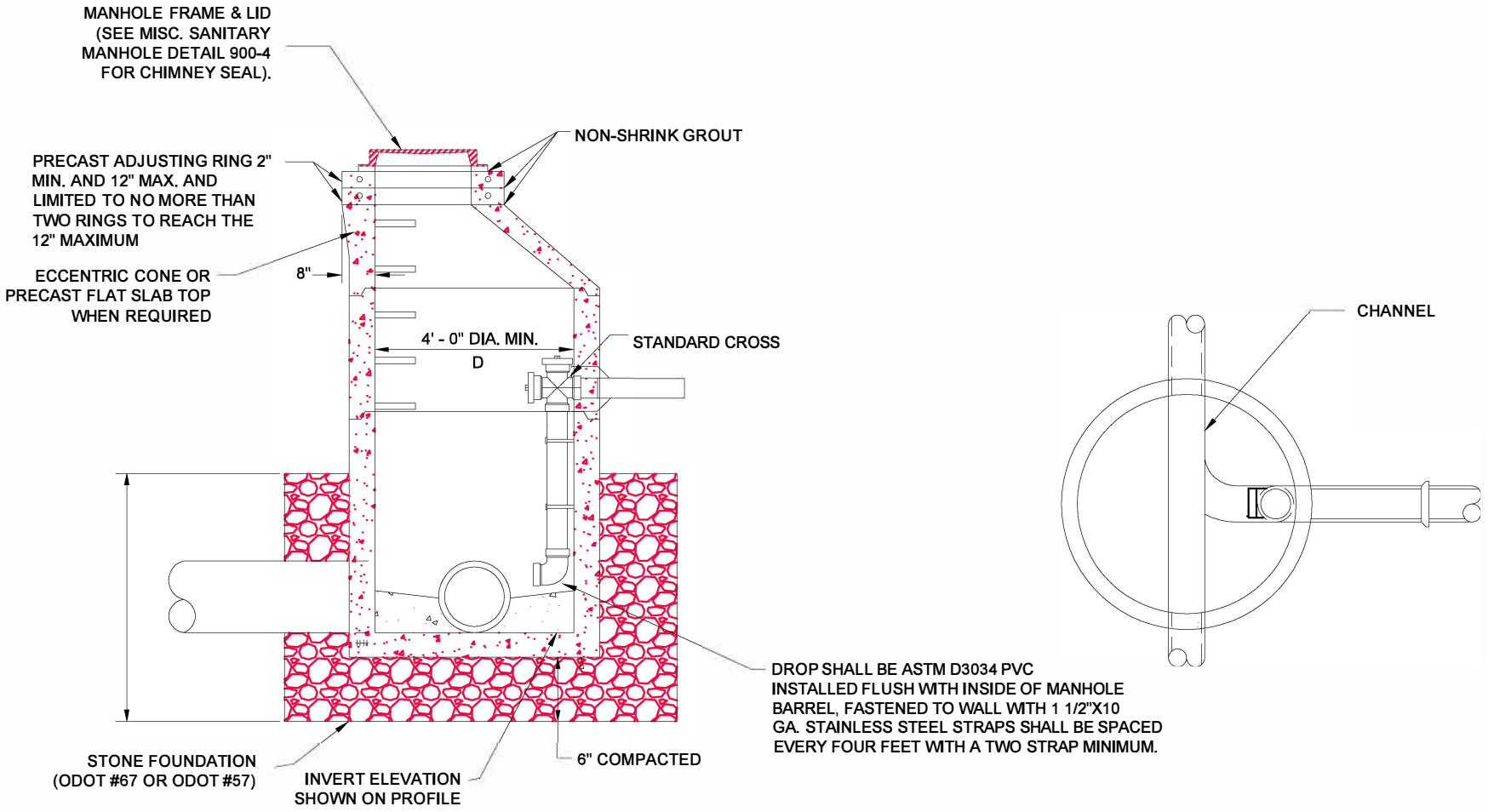
PAGE No.
900-3



NOTES

1. THE USE OF INSIDE DROP MANHOLES WILL REQUIRE APPROVAL OF THE CITY ENGINEER. THE USE OF INSIDE DROP MANHOLES WILL BE LIMITED TO ONLY SINGLE FAMILY AND MULTI-FAMILY RESIDENCES FOR CONNECTIONS TO EXISTING DEEP SANITARY SEWER SYSTEMS. NOT APPLICABLE TO COMMERCIAL OR INDUSTRIAL APPLICATIONS.
2. ONLY ONE INSIDE DROP CONNECTION ALLOWED PER MANHOLE. PIPE INVERT ELEVATIONS SHALL BE AS SHOWN ON THE PLANS.
3. MINIMUM MANHOLE DIAMETER WITH INSIDE DROP CONNECTION SHALL BE 48 INCHES.
4. MAXIMUM DROP PIPE DIAMETER SHALL BE 6 INCHES.
5. DROP MUST BE OPPOSITE OF THE LADDER STEPS.

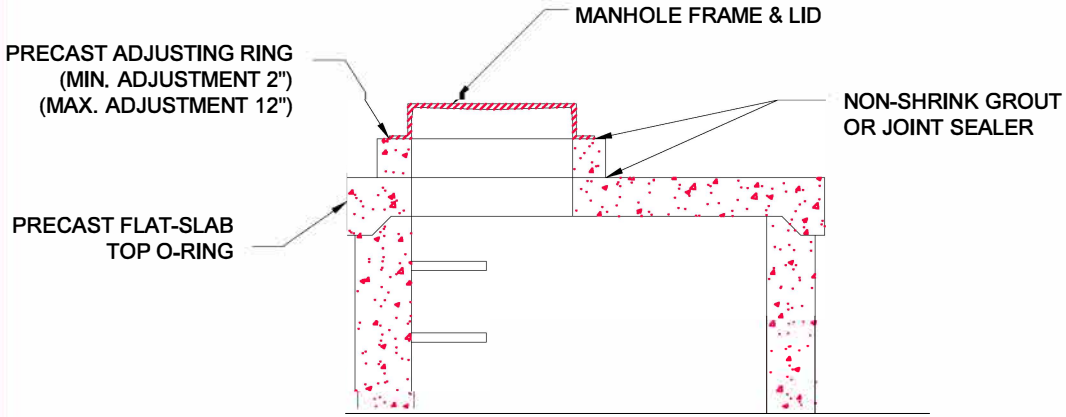
CITY OF HILLSBORO

SANITARY MANHOLE INSIDE DROP

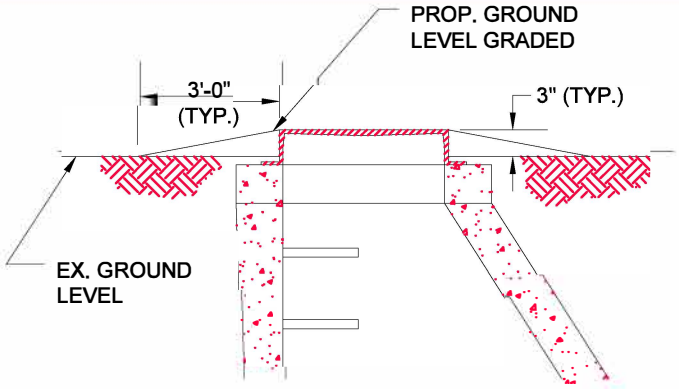
REVISIONS:

DATE APPROVED:

PAGE No.
900-3A



FLAT TOP SLAB

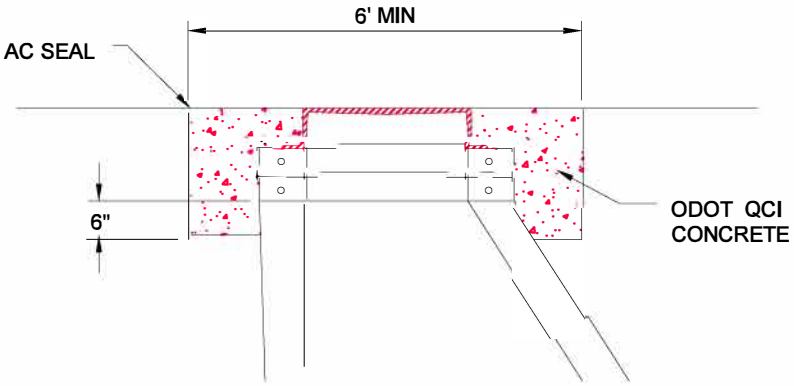


TYPICAL OFF STREET MANHOLE GRADING

NOTES

A. MANHOLE STEPS SHALL BE SECURELY INSTALLED INTO EACH MANHOLE SECTION, BY THE MANUFACTURER, PRIOR TO DELIVERY TO THE JOB SITE.

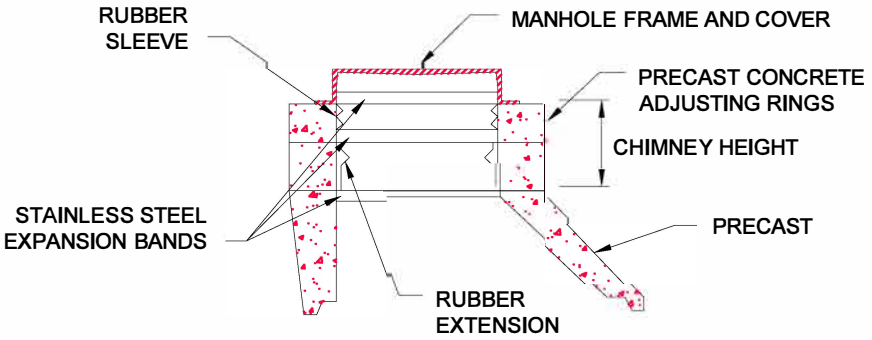
B. MANHOLE STEPS SHALL BE PF-1 STEP BY M.A. INDUSTRIES OR EQUIVALENT.



MANHOLE REPAIR CASTING CONSTRUCTION

NOTES

1. PRECAST CONCRETE ADJUSTING RINGS-ENCASE WITH CONCRETE 6 INCHES DOWN FROM BARREL TOP AND UP TO THE PAVEMENT SURFACE.
2. SET MANHOLE, PRECAST CONCRETE ADJUSTING RINGS AND CASTING AND PAVE OVER MANHOLE, THEN DIG OUT. ENCASE COLLARS AND CASTING AS PER DETAIL WITH CONCRETE.



INTERNAL MANHOLE CHIMNEY SEAL

(REQUIRED BY ALL SANITARY APPLICATIONS)
USE CRETEX SPECIALITY PRODUCTS OR EQUAL .

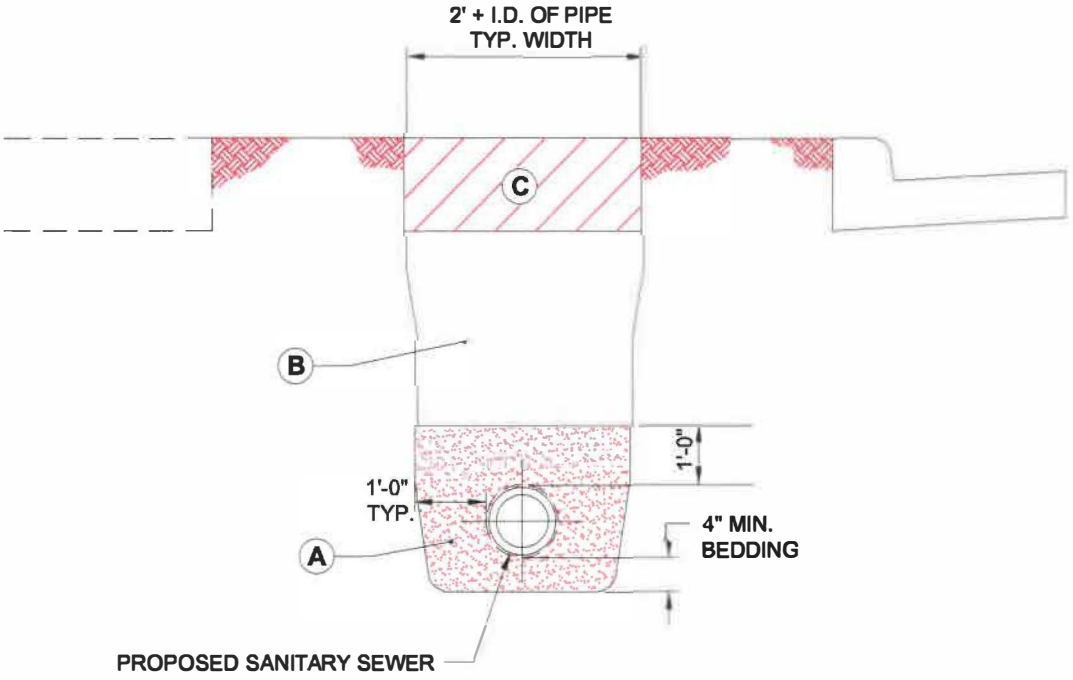
CITY OF HILLSBORO

MISCELLANEOUS SANITARY MANHOLE DETAILS

REVISIONS:

DATE APPROVED:

PAGE No.
900-4



SANITARY SEWER TRENCH DETAIL

SHOWN AS "OFF ROAD" APPLICATION

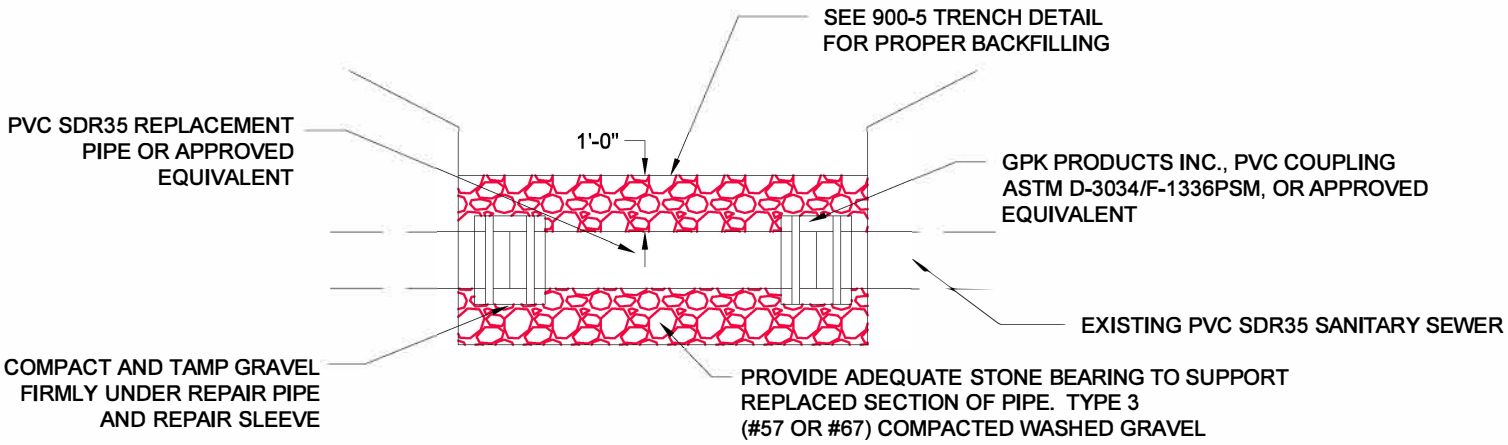
TRENCH DETAIL NOTES

A. GRANULAR BEDDING SHALL BE CRUSHED STONE OR GRAVEL, (#57 OR #67), OR OTHER APPROVED EQUIVALENT.

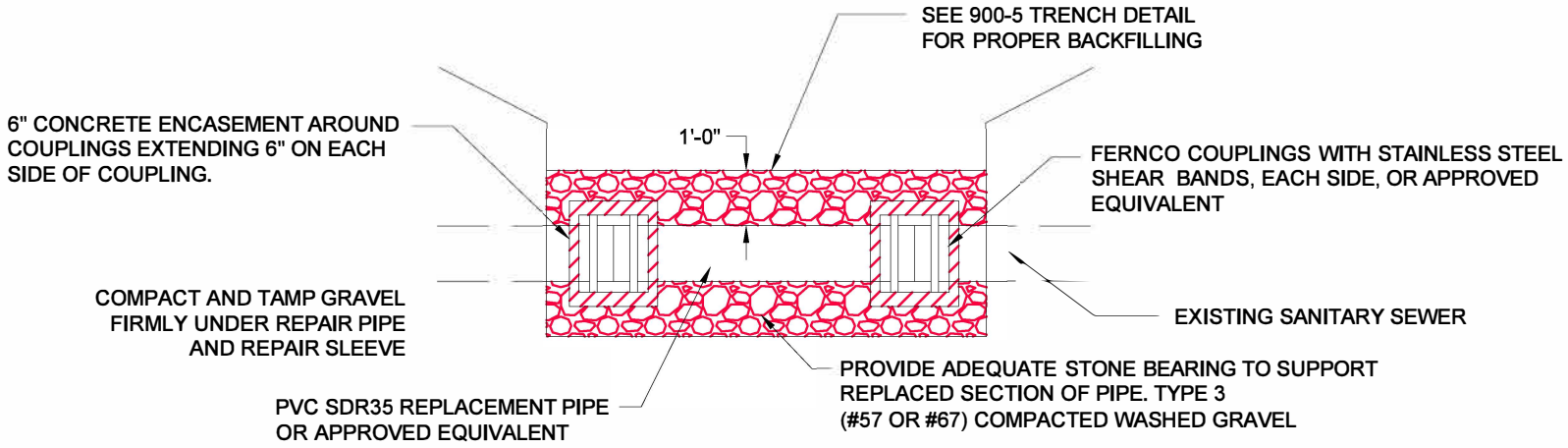
B. ALL TRENCHES OUTSIDE THE RIGHT-OF-WAY FROM PROPOSED OR EXISTING PAVEMENT, CURB, DRIVEWAYS, ALLEYS, STONE AREAS OR WALKS CAN COMPACTED WITH EXISTING NATIVE MATERIAL IN 12 INCH MAXIMUM LIFTS OR AS APPROVED BY THE CITY. NO MATERIAL SHALL BE USED FOR BACK FILLING THAT CONTAINS STONE, ROCKS, ETC., GREATER THAN 4 INCH DIAMETER.
ALL TRENCHES INSIDE THE RIGHT-OF-WAY FROM PROPOSED OR EXISTING PAVEMENT, CURB, DRIVEWAYS, ALLEYS, STONE AREAS OR WALKS SHALL BE COMPACTED WITH GRANULAR BACKFILL MATERIAL TYPE 1 IN 6 INCH MAXIMUM LIFTS.
A DENSITY TEST ON GRANULAR BACKFILL OF 98% OF ASTM D698 STANDARD PROCTOR CURVE MAY BE REQUIRED TO BE PERFORMED BY A COMMERCIAL TESTING LAB SATISFACTORY TO THE CITY.

C. OFF-PAVEMENT AREAS SHALL BE PROVIDED WITH A MINIMUM OF 6 INCHES OF TOPSOIL OVER THE COMPACTED MATERIAL AND THEN SEEDED AND MULCHED PER ODOT ITEM 659. IN PAVEMENT AREAS SHALL FOLLOW MISCELLANEOUS ROADWAY NOTES SHOWN ON PAGE 300-14.

D. THE OPEN ENDS OF ALL PIPES SHALL BE PLUGGED TO THE APPROVAL OF THE CITY BEFORE LEAVING THE WORK FOR THE NIGHT.



REPAIR OF EXISTING PVC SDR35 SANITARY SEWER



REPAIR OF EXISTING SANITARY SEWER OTHER THAN PVC

CITY OF HILLSBORO	REPAIR OF EXISTING SANITARY SEWER PIPE DETAIL	REVISIONS:	DATE APPROVED:
			PAGE No. 900-6

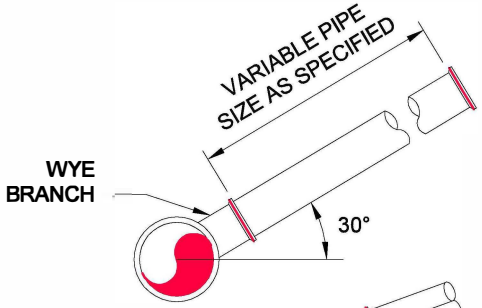
NOTES

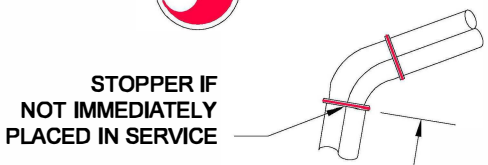
A. RISER PIPE TO BE BEDDED SOLIDLY AGAINST UNDISTURBED GROUND. ALSO, TEE MAY BE SUBSTITUTED FOR WYE BRANCH IF SPECIFIED.

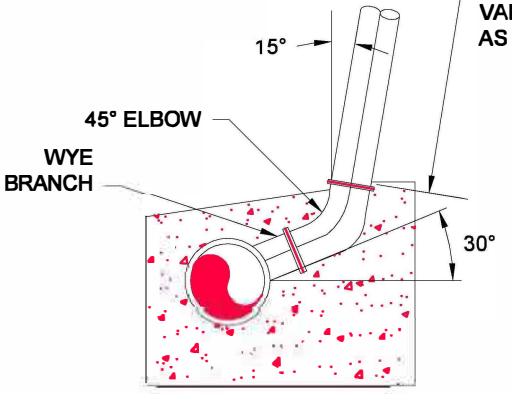
B. RISER PIPE TO BE INSTALLED SO THAT CONNECTING SERVICE SHALL HAVE A MINIMUM DEPTH OF 10 FEET AT THE PROPERTY LINE UNLESS OTHERWISE DIRECTED BY THE CITY.

C. CONCRETE ENCASEMENT AND BLOCKING REQUIRED IF DEPTH OF CONNECTION IS 12 FEET OR GREATER.

D. EACH SANITARY LATERAL MUST BE IN SEPARATE TRENCHES.

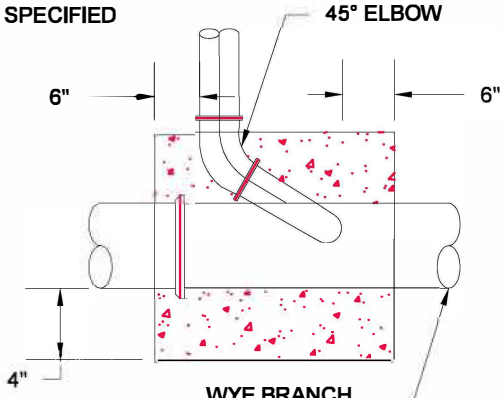






CONCRETE ENCASEMENT AND BLOCKING ODOT QCI CONCRETE

VARIABLE PIPE SIZE AS SPECIFIED



SERVICE RISER

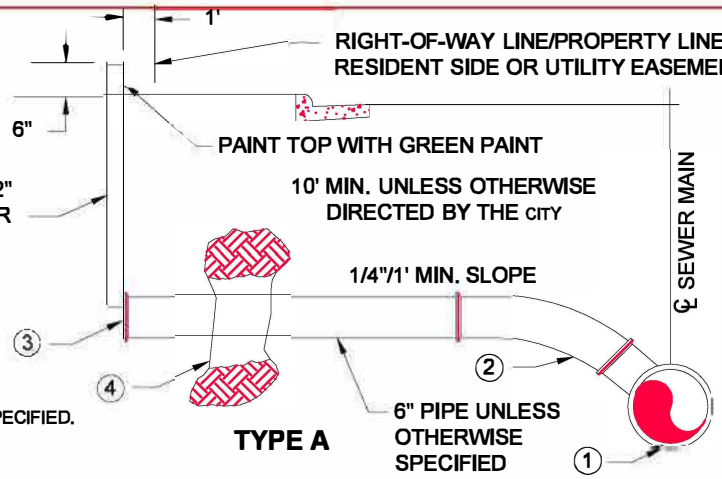
(1) 6" WYE-ROTATE 30° FROM HORIZONTAL UNLESS OTHERWISE SPECIFIED.

(2) 6" 1/8 BEND OR 1/16 BEND AS NEEDED.

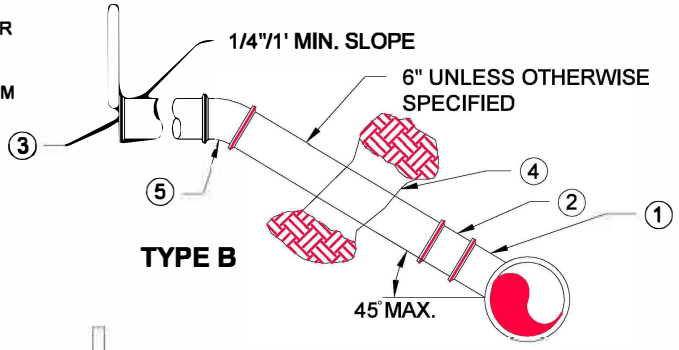
(3) CAP UNLESS JOINING EXISTING SERVICE LATERAL.

(4) BED PIPE WITH 8" GRANULAR MATERIAL AND BACKFILL WITH GRANULAR MATERIAL TO 12" ABOVE PIPE. #57 OR #67.

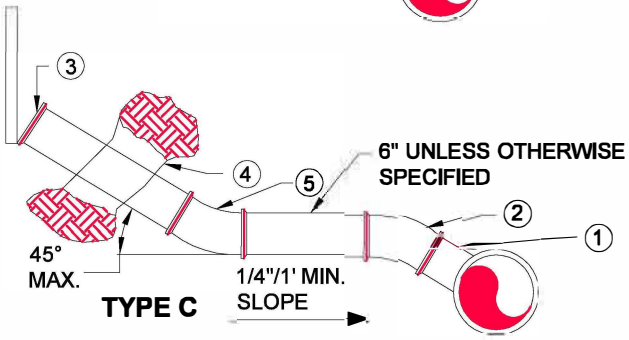
(5) EXACT MEASUREMENTS MUST BE PROVIDED SHOWING DISTANCE FROM NEAREST MANHOLE, LENGTH OF LATERAL, BENDS, AND THE END OF LATERAL ELEVATION RELATIVE TO THE BACK OF CURB ELEVATION OR SOME OTHER REFERENCE POINT EASILY RECOVERED.



TYPE A



TYPE B



TYPE C

SERVICE LATERAL

CITY OF HILLSBORO	SERVICE RISER AND SERVICE LATERAL FOR NEW CONSTRUCTION ONLY	REVISIONS:	DATE APPROVED:
			PAGE No. 900-7

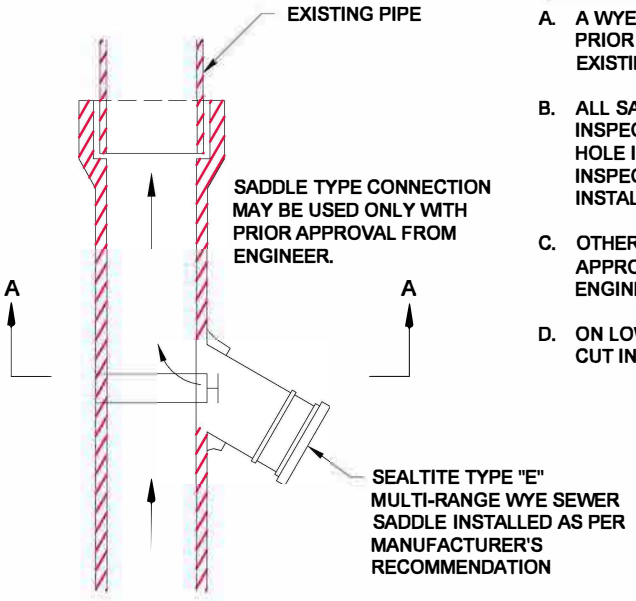
NOTES

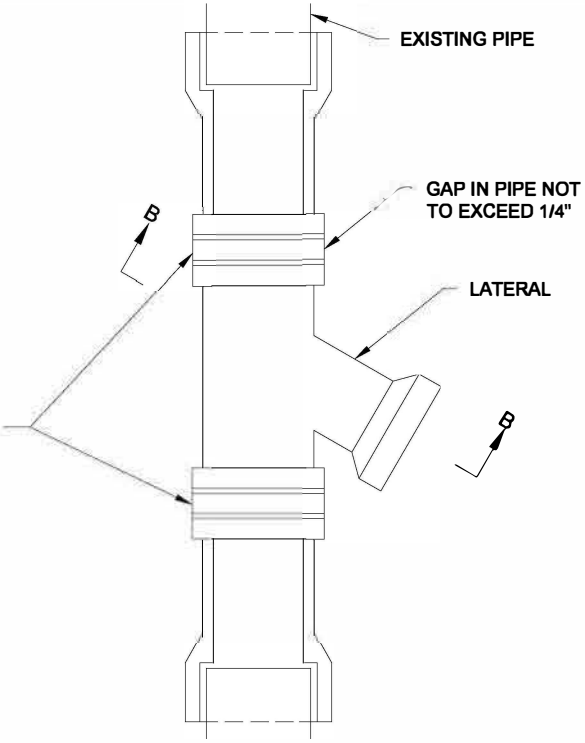
A. A WYE MAY BE CUT IN OR SADDLE WITH PRIOR APPROVAL PLACED ONLY IF AN EXISTING LATERAL IS NOT PROVIDED.

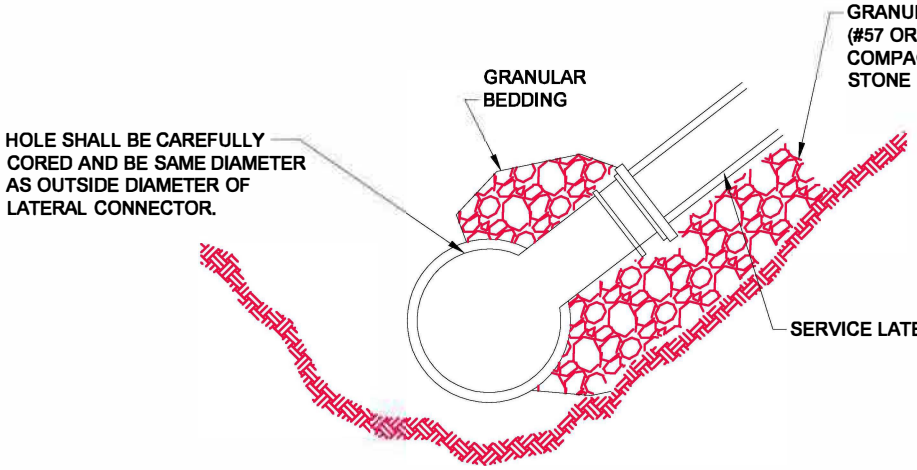
B. ALL SADDLES AND CUTTING IN WYES MUST BE INSPECTED PRIOR TO COVERING, AND THE HOLE IN THE EXISTING PIPE SHALL BE INSPECTED AND APPROVED PRIOR TO INSTALLATION.

C. OTHER SADDLE TYPES THAT MAY BE APPROVED ON CASE-BY-CASE BASIS BY ENGINEERING.

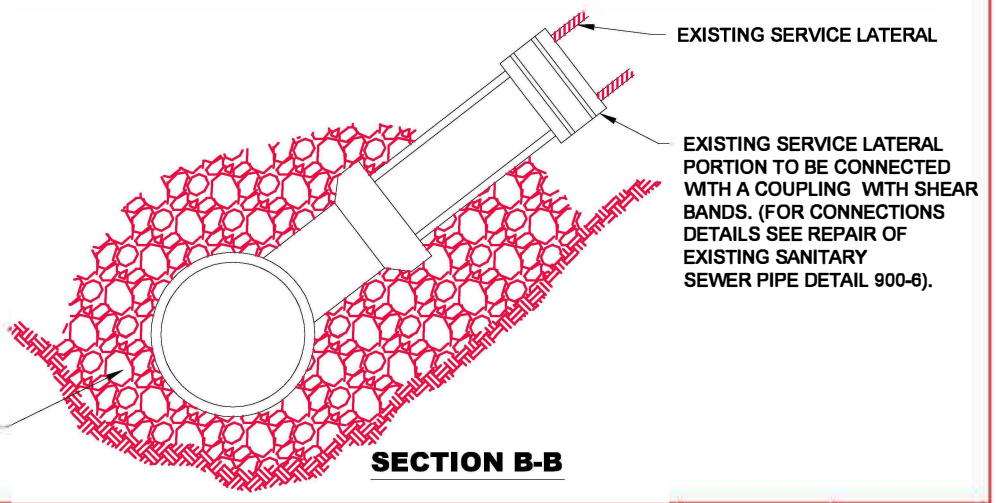
D. ON LOW FLOW AND PVC PIPE SDR 35 USE CUT IN WYE ONLY.







SECTION A-A



SECTION B-B

CITY OF HILLSBORO

SANITARY SEWER SADDLE DETAILS

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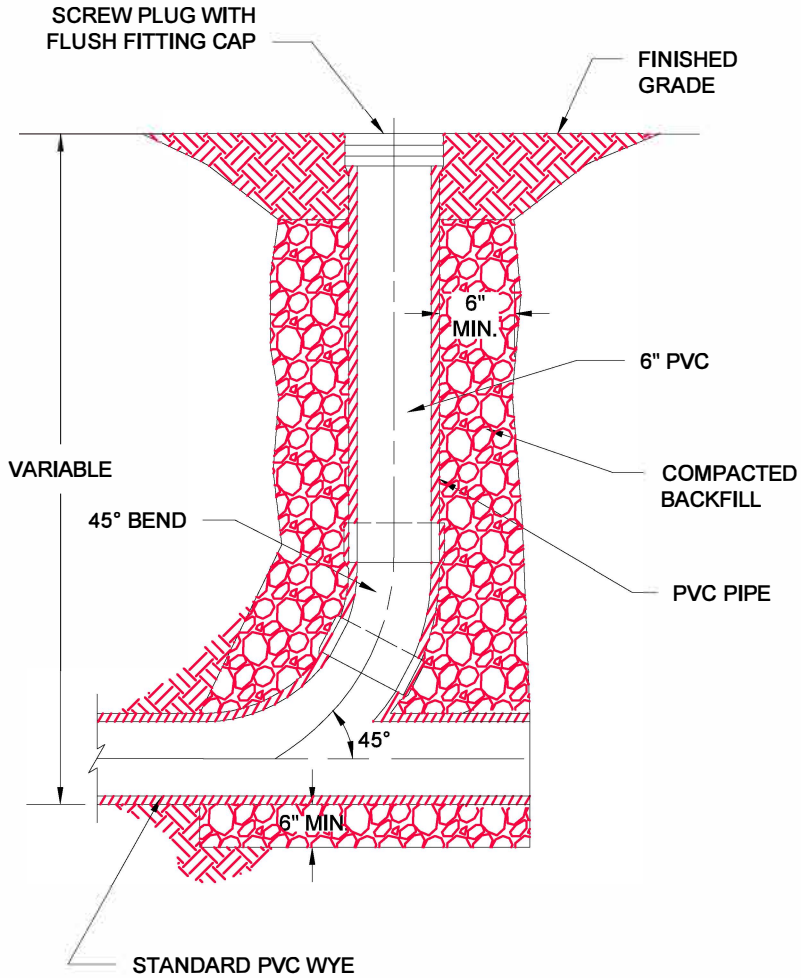

CLEANOUT DETAIL

AT SANITARY LATERALS ONLY

CITY OF HILLSBORO	SANITARY SEWER CLEANOUT DETAIL	REVISIONS:	DATE APPROVED:
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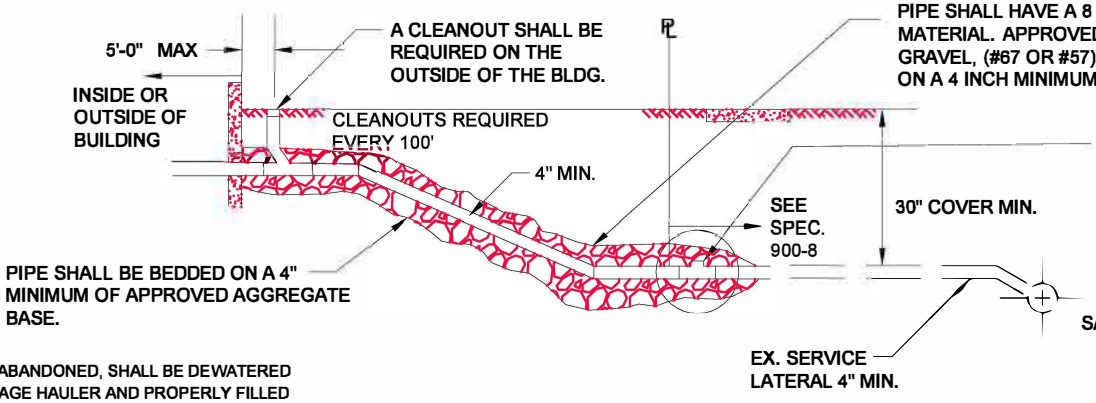

NOTES

PIPE SHALL HAVE A 8 INCH MINIMUM COVER OF APPROVED AGGREGATE MATERIAL. APPROVED AGGREGATE MATERIAL SHALL BE CRUSHED STONE OR GRAVEL, (#67 OR #57) OR OTHER APPROVED EQUAL. PIPES SHALL BE BEDDED ON A 4 INCH MINIMUM OF APPROVED AGGREGATE BASE..

A TEST TEE IS TO BE INSTALLED AT THE PROPERTY LINE. THE TEE SHALL BE INSTALLED INTO THE END OF THE EXISTING SERVICE LATERAL. IF THERE IS NO EXISTING SERVICE LATERAL AND ONE MUST BE INSTALLED, THEN THE TEST SHALL EXTEND FROM THE BUILDING TO THE SANITARY SEWER MAIN, UNLESS OTHERWISE APPROVED.

NOTES:

A. SEPTIC TANKS, WHEN ABANDONED, SHALL BE DEWATERED BY AN ACCEPTED SEWAGE HAULER AND PROPERLY FILLED WITH GRANULAR MATERIAL. DRAIN HOLES SHALL BE BROKEN OUT ON THE BOTTOM AND SIDES OF THE TANK WHEN DIRECTED BY THE **CITY**.

B. ROOF DOWNSPOUTS EXTERIOR FOUNDATION DRAINS, AREA WAY DRAINS OR OTHER SURFACE RUNOFF OR GROUNDWATER SHALL NOT BE CONNECT TO THE SANITARY SEWER MAIN.

C. BASEMENT FLOOR DRAINS AND SUMP PUMPS, THAT CARRY GRAY WATER, SHALL BE CONNECTED TO THE SANITARY SEWER. FOUNDATION DRAINS AND ALL OTHER SUMP PUMPS, EXCEPT AS NOTED ABOVE ARE TO BE CONNECTED TO THE STORM SEWER OR DISCHARGED ONTO THE GROUND.

D. ANY INDIVIDUAL OR FIRM INSTALLING SEWER CONNECTIONS SHALL BE APPROVED BY THE **CITY**.

E. BEFORE BEGINNING WORK, A SEWER TAP PERMIT MUST BE OBTAINED FROM THE ENGINEERING DEPARTMENT AND APPLICABLE FEES MUST BE PAID. ALSO OBTAIN A PLUMBING PERMIT FOR BUILDING SEWER OR LATERAL FROM THE HEALTH DEPARTMENT.

F. WHEN THE BUILDING CONNECTION MUST ENTER INTO A PAVED PORTION OF THE STREET SIDEWALK OR ALLEY, A RIGHT-OF-WAY OPENING PERMIT MUST BE OBTAINED FROM THE **CITY** STREET DEPARTMENT BEFORE BEGINNING WORK.

G. A PERMIT TO BLOCK WAY OR STREET AND ALLEY CLOSING PERMIT SHALL ALSO BE OBTAINED FROM THE ENGINEERING DEPARTMENT.

H. WATER SERVICES SHALL BE A MINIMUM OF 10 FEET MEASURED HORIZONTALLY FROM THE SEWER SERVICE AND SHALL BE A MINIMUM OF 18 INCHES ABOVE THE CROWN (WHENEVER POSSIBLE) OF THE SANITARY SEWER MAIN WHERE THE WATER SERVICE CROSSES THE SEWER MAIN.

PIPE

A. THE PIPE MATERIAL SHALL BE PVC SDR 35 OR SCHEDULE 40 UTILIZING PURPLE PRIMER, OR AN APPROVED EQUIVALENT.

B. PIPE SIZES FOR BUILDING CONNECTIONS SHALL BE 4 INCH MINIMUM FOR SINGLE RESIDENCE AND 6 INCH MINIMUM FOR ALL OTHER USES. THE LATERALS SHALL BE RUN TO WITHIN 3' OF THE OUTSIDE OF THE BUILDING.

INSPECTION

A. A TAP INSPECTION SHALL BE REQUIRED ON ALL NEW BUILDING CONNECTIONS AND ALSO ON THE REPLACEMENT OF EXISTING BUILDING CONNECTIONS.

B. WHEN THE BUILDING SEWER IS READY FOR INSPECTION, THE PLUMBING INSPECTOR SHALL BE GIVEN 24 HOURS ADVANCE NOTICE. THE PIPE SHALL BE LEFT UNCOVERED UNTIL AN INSPECTION HAS BEEN MADE AND APPROVED. THE ENGINEERING DEPARTMENT INSPECTOR SHALL INSPECT ALL TAPS TO PROPERTY LINE. THE PLUMBING DEPARTMENT INSPECTOR SHALL INSPECT FROM THE PROPERTY LINE TO 3 FEET OUTSIDE OF BUILDING.

C. ANY NEW BUILDING CONNECTION INSTALLED WITHOUT AN INSPECTION SHALL RESULT IN NO ISSUANCE OF A WATER METER FOR THE BUILDING. IF THIS OCCURS, THE ENTIRE LATERAL SHALL BE UNCOVERED SO THAT A PROPER INSPECTION CAN BE MADE.

D. NO TAP FEE IS REQUIRED IF AN OLD BUILDING SEWER IS TO BE REUSED. AN INSPECTION WILL BE REQUIRED. THE PLUMBING INSPECTOR SHALL INSPECT THE ENTIRE BUILDING CONNECTION FROM THE CLEANOUT TO THE PROPERTY LINE CONNECTION. THE LATERAL SHALL BE INSPECTED FROM THE PROPERTY LINE TO THE SEWER MAIN BY THE WASTEWATER DEPARTMENT.

E. IF A SADDLE HAS BEEN APPROVED, THE INSPECTOR SHALL BE PRESENT WHILE THE SANITARY SEWER MAIN IS BEING CUT INTO A SADDLE MAY BE USED WHERE A TEE OR WYE IS NOT PRESENT FOR LATERAL CONNECTION.

TESTING

A. THE ONSITE LICENSED PLUMBER SHALL BE RESPONSIBLE FOR THE TESTING FROM THE CONNECTION TO THE EXISTING SERVICE LATERAL TO THE CLEANOUT.

B. ALL NEW BUILDING CONNECTIONS SHALL BE BY AIR WITH 4 PSA PRESSURE.

C. THE SEWER TEST SHALL BE FROM THE CLEANOUT TO THE PROPERTY LINE CONNECTION OR TO THE MAIN SEWER, WHICHEVER IS APPLICABLE.

D. WHEN A SUBSTANTIAL AMOUNT OF AN EXISTING LATERAL IS REPLACED, THE NEW PORTION OF THE LATERAL SHALL REQUIRE A TEST UNLESS OTHERWISE APPROVED.

PIPE LAYING

A. THE OPEN ENDS OF ALL PIPES SHALL BE PLUGGED OR OTHERWISE CLOSED WITH A WATERTIGHT PLUG TO THE APPROVAL OF THE **CITY** BEFORE LEAVING THE WORK SITE FOR THE NIGHT.

B. THE JOINING OF PIPE WITH CONCRETE SHALL NOT BE ACCEPTED.

C. BEFORE MAKING A CONNECTION TO AN EXISTING SEWER OR SERVICE LATERAL, THE CONTRACTOR SHALL CHECK THE EXISTING PIPE BY UTILIZING A DYE TEST TO SEE THAT THE EXISTING PIPE IS CONNECTED TO THE SANITARY SEWER MAIN.

D. IN THE CASE WHERE A 90° CORNER IS REQUIRED IN THE BUILDING CONNECTION LINE, TWO 45° BENDS SHALL BE USED IN LIEU OF A 90° BEND.

E. THE BUILDING CONNECTION LINE SHALL BE LAID IN AS STRAIGHT A LINE, FORM THE BUILDING TO THE EXISTING LATERAL AS POSSIBLE.

F. ALL NEW CONSTRUCTION SHALL HAVE SANITARY LATERALS INSTALLED.

G. MINIMUM SLOPE OF SANITARY LATERAL SHALL BE 1% GRADE (1/8 INCH PER FOOT) MAXIMUM SLOPE (SEE 900-7)

CITY OF HILLSBORO

BUILDING CONNECTION DETAIL

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LOW PRESSURE AIR TEST

A. AFTER BACKFILLING, THE AIR TEST SHALL BE CONDUCTED BETWEEN TWO CONSECUTIVE MANHOLES. ALL PIPE OUTLETS MUST BE PLUGGED IN THE SECTION BEING TESTED WITH A SUITABLE TEST PLUGS. ONE OF THE PLUGS USED AT A MANHOLE MUST BE TAPPED AND EQUIPPED FOR AN AIR INLET CONNECTION FOR FILLING THE LINE FROM THE AIR COMPRESSOR. AIR SHALL BE SUPPLIED SLOWLY TO THE TEST UNTIL THE INTERNAL PRESSURE REACHES APPROXIMATELY 4 PSI. IF THE PIPE IS BELOW EXISTING GROUNDWATER LEVEL, THE INTERNAL PRESSURE SHALL BE INCREASED BY THE AVERAGE BACK PRESSURE OF ANY GROUNDWATER THAT MAY BE OVER THE PIPE, BUT IN NO CASE SHOULD THE INTERNAL PRESSURE EVER EXCEED 5 PSI.

B. AT LEAST 2 MINUTES SHALL BE ALLOWED FOR THE AIR PRESSURE TO STABILIZE, WHEN THE PRESSURE HAS STABILIZED AND IS AT OR ABOVE 3.5 PSI, THE AIR SUPPLY SHALL BE DISCONNECTED AND TIMING SHALL BEGIN WITH A STOP WATCH. THE STOP WATCH SHALL BE ALLOWED TO RUN UNTIL THE PRESSURE HAS DROPPED 1.0 PSI, IF THE TIME SHOWN ON THE STOP WATCH IS GREATER THAN THE SPECIFIED MINIMUM TIME, THE SECTION SHALL BE CONSIDERED TO HAVE PASSED THE TEST. THE TIME MAY INTERPOLATED FROM THE FIGURES LISTED BELOW

PIPE DIA (IN.)	100FT.	150FT.	200FT	250FT	300FT.	350FT.	400FT.
4	1:53	1:53	1:53	1:53	1:53	1:53	1:53
6	2:50	2:50	2:50	2:50	2:50	2:50	2:51
8	3:47	3:47	3:47	3:47	3:48	4:26	5:04
10	4:43	4:43	4:43	4:57	5:56	6:55	7:54
12	5:40	5:40	5:42	7:08	8:33	9:48	11:24
15	7:05	7:05	8:54	11:08	13:21	15:35	17:48
18	8:30	9:37	12:49	16:01	19:41	22:26	25:38
21	9:55	13:05	17:27	21:49	26:11	30:32	34:54
24	11:24	17:57	22:48	28:30	34:11	39:53	45:35

SPECIFICATION TIME FOR LENGTH (L) SHOWN (MIN SEC)

DEFLECTION TEST

A. DEFLECTION TEST SHALL BE PERFORMED BY THE CONTRACTOR ON ALL FLEXIBLE PIPE. THE TEST SHALL CONDUCTED AFTER THE FINAL BACKFILL HAS BEEN IN PLACE AT LEAST 30 DAYS TO PERMIT STABILIZATION OF THE SOIL -PIPE SYSTEM.

B. NO PIPE SHALL EXCEED A DEFLECTION OF 5%, IF DEFLECTION EXCEEDS 5% REPLACEMENT OR CORRECTION SHALL BE ACCOMPLISHED IN ACCORDANCE WITH THE REQUIREMENTS OF APPROVING AGENCY.

C. THE RIGID BALL OR MANDREL USED FOR THE DEFLECTION TEST SHALL HAVE A DIAMETER NOT LESS THAT 95% OF THE BASE INSIDE DIAMETER OR AVERAGE INSIDE DIAMETER OF THE PIPE DEPENDING ON WHICH IS MANUFACTURED. THE PIPE SHALL BE MEASURED IN COMPLIANCE WITH ASTM D-2122 STANDARD TEST METHOD OF DETERMINING DIMENSIONS OF THERMOPLASTIC PIPE AND FITTINGS. THE TEST SHALL BE PERFORMED WITH MECHANICAL PULLING DEVICES.

DEPTH (FT)	48 TIME	60 SECONDS	72
8 OR LESS	20	26	33
10	25	33	41
12	30	39	49
14	35	46	57
16	40	52	67
18	45	59	73
20	50	65	81
22	55	72	89
24	59	78	97
26	64	85	105
28	69	91	113
30	74	98	121

MINIMUM TEST TIMES FOR VARIOUS MANHOLE DIAMETERS

MANHOLE VACUUM TEST

ALL SANITARY SEWER MANHOLES SHALL BE VACUUM TESTED BY THE CONTRACTOR USING THE FOLLOWING PROCEDURES FROM ASTM C-1244.

A. PREPARATION OF THE MANHOLE
   1. ALL LIFT HOLES SHALL BE PLUGGED.
   2. ALL PIPES ENTERING THE MANHOLE SHALL BE TEMPORARILY PLUGGED TAKING CARE TO SECURELY BRACE THE PIPES AND PLUGS TO PREVENT FROM BEING DRAWN INTO THE MANHOLE.

B. PROCEDURE
   1. THE FIRST HEAD SHALL BE PLACED AT THE TOP OF THE MANHOLE IN THE CASTING IN ACCORDANCE WITH THE MANUFACTURE'S RECOMMENDATIONS.
   2. A VACUUM OF 10 INCHES OF MERCURY (4.9 PSI) SHALL BE DRAWN ON TH MANHOLE, THE VALVE ON THE VACUUM LINE OF THE TEST HEAD CLOSED, AND THE VACUUM PUMP SHUT OFF. THE TIME SHALL BE MEASURED FOR THE VACUUM TO DROP TO 9 INCHES OF MERCURY (4.4PSI)
   3. THE MANHOLE SHALL PASS IN THE TIME FOR THE VACUUM READING TO DROP FROM 10 INCHES OF MERCURY (4.9 PSI) MEETES OR EXCEEDS THE VALUES INDICATED ON THE TABLE.
   4. IF THE MANHOLE FAILS THE INITIAL TEST, NECESSARY REPAIRS SHALL BE MADE BY AN APPROVED METHOD. THE MANHOLE SHALL BE RETESTED UNTIL A SATISFACTORY TEST IS OBTAINED.

ALL TESTS SHALL BE WITNESSED BY A CITY OF HILLSBORO ENGINEERING DEPARTMENT REPRESENTATIVE

CITY OF HILLSBORO

SANITARY SEWER TESTING NOTES

REVISIONS:

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SEWER TELEVISING STANDARDS

A. ALL SEWER TELEVISING CONTRACTORS SHALL BE CERTIFIED BY NASSCO FOR PIPELINE ASSESMENT AND CERTIFICATION.
B. SANITARY TELEVISING WORK SHALL COMPLY WITH NASSCO STANDARDS.
C. ALL TELEVISING WORK SHALL BE COMPLETED IN COLOR WITH THE PROPER AMOUNT OF ILLUMINATION TO CLEARLY SHOW THE ENTIRE PIPE DIAMETER.
D. THE CAMERA SHALL BE OF THE PAN AND TILT TYPE
F. AT THE START OF THE TELEVISING PROCESS, THE DVD
   1. DATE/TIME
   2. OPERATOR AND COMPANY NAME
   3. SEWER PROJECT NAME
   4. ADDRESS OR INTERSECTION OF MANHOLE WORKING ON
   5. DIRECTION OF TELEVISING
   6. COUNTER SETTING.
G.. THE DVD MUST SHOW THE COUNTER RECORDING THROUGHOUT THE TELEVISING PROCESS.
H. THE DVD SHALL SHOW THE CLOCK POSITION AND DISTANCE FROM THE MANHOLE FOR EACH LATERAL
I. THE OPERATOR SHALL PAN EACH SEWER JOINT AND NOTE ANY DEFICIENCIES ON THE MAIN SCREEN.
J. THE OPERATOR SHALL POSITION THE CAMERA TO LOOK UP EACH LATERAL CONNECTION.
K. AT NO TIME SHALL THE OPERATOR ALLOW THE CAMERA HEAD TO BE SUBMERGED.
L. THE OPERATOR SHALL NOTE ANY DEFICIENCIES ON THE MAIN SCREEN.
M. THE OPERATOR SHALL KEEP AN ACCURATE LOG CONSISTING OF THE FOLLOWING;
   1. DIAGRAM OF SEWER FROM MANHOLE TO MANHOLE SHOWING DIRECTION OF FLOW.
   2. SHALL NOTATE ALL SEWER LATERALS WITH CLOCK POSITIONS AND DISTANCE FROM MANHOLES
   3. DEFICIENCIES IN THE SEWER PIPE INCLUDING BELLIES
   4. SPECIAL NOTES DESCRIBING AREAS OF CONCERN.
   5. ANY DEFICIENCIES NOTED SHALL ACCOMPANY A DIGITAL PHOTO ATTACHED ON INCLUDED IN THE REPORT.

STANDARDS FOR BELLIES/DIPS IN SEWER MAINS

SANITARY SEWERS SHALL BE DECLARED AS "NOT APPROVED" IF DIPS/BELLIES IN THE MAIN LINE EXCEEDS THE FOLLOWING CRITERIA
MAXIMUM ALLOWABLE BELLIES IN PIPE (INCHES)

SLOPE	8"	10"	12"	15"	18"	21"	24"	>27"
0.10%	2"	2.5"	3"	4"	4"	4"	4.5"	5"
0.12%	2"	2.5"	3"	4"	4"	4"	5"	5"
0.15%	2"	2.5"	3"	3.5"	3.5"	4"	4"	4"
0.22%	2"	2.5"	3"	3"	3.5"	3.5"	3.5"	4"
0.28%	2"	2"	2"	2"	2.5"	2.5"	3"	3"
0.40%	2"	2"	2"	2"	2"	2.5"	2.5"	2.5"
0.60%	1"	1"	1"	1"	1"	1"	1"	1"
1.00%	0"	0"	0"	0"	0"	0"	0"	0"

SEWER TELEVISING PROCEDURES FOR NEW SEWER CONSTRUCTION

A. THE SANITARY SEWER SHALL BE COMPLETELY CLEAN AND FREE OF DEBRIS USING A HIGH PRESSURE JET RODDER CAPABLE OF SCOURING THE PIPE WALLS.
B. ALL DEBRIS SHALL BE VACUUMED OUT OF THE SEWER MAIN.
C. ONCE CLEANING HAS BEEN COMPLETED, THE CONTRACTOR SHALL RUN CLEAR WATER IN THE NEW SEWER MAIN TO FILL ANY POTENTIAL BELLIES IN THE LINE. THE CONTRACTOR SHALL CALCULATE THE VOLUME GALLON CAPACITY OF THE SEWER MAIN AND SHALL USE THAT MUCH WATER TO FILL POTENTIAL DIPS/BELLIES.
D. THE CONTRACTOR SHALL MAKE SURE THAT THERE IS NO FLOW EMANATING UPSTREAM. IF SO THE CONTRACTOR SHALL STOP THIS FLOW DURING THE TELEVISING PROCESS.
E. THE CONTRACTOR SHALL TELEVISE THE SEWER FOLLOWING THE TELEVISING STANDANDRS.

SEWER TELEVISING PROCEDURES FOR SEWER RECONSTRUCTION PROJECTS

A. BEFORE COMMENCEMENT OF THE CLEANING PROCESS, THE TELEVISING CONTRACTOR SHALL NOTIFY ADJACENT AND AFFECTED PROPERTY OWNERS BY GOING DOOR TO DOOR AND NOTIFYING THEM OF THE POSSIBILITY OF SEWER BACKUP DURING THE CLEANING PROCESS.
B. THE SANITARY SEWER SHALL BE COMPLETELY CLEAN AND FREE OF DEBRIS USING A HIGH PRESSURE JET RODDER CAPABLE OF SCOURING THE PIPE WALLS.
C. ALL DEBRIS SHALL BE VACUUMED OUT OF THE SEWER MAIN.
D. ONCE CLEANING HAS BEEN COMPLETED, THE CONTRACTOR SHALL BAG THE UPSTREAM MANHOLE AND PUMP THE SEWAGE FLOW DOWNSTREAM AND SHALL MAINTAIN PUMPING DURING THE TELEVISING PROCESS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY SEWER FLOODINGS AS A RESULT OF THEIR ACTIVITIES.

E. AFTER THE PUMP BYPASS HAS BEEN ESTABLISHED, THE CONTRACTOR SHALL RUN CLEAR WATER IN THE RECONSTRUCTED SEWER MAIN TO FILL ANY POTENTIAL BELLIES IN THE LINE. THE CONTRACTOR SHALL CALCULATE THE VOLUME GALLON CAPACITY OF THE SEWER MAIN AND SHALL USE THAT MUCH WATER TO FIILL POTENTIAL DIPS/BELLIES.

F. THE CONTRACTOR SHALL TELEVISE THE SEWER FOLLOWING THE TELEVISING STANDARDS

PASSING SANITARY SEWER

A. THE CITY WILL NOT PASS OR ACCEPT THE SANITARY SEWER FOR FINAL PAYMENT WITHOUT HAVING A PASSING DVD AND LOG OF THE SANITARY SEWER TELEVISING FOLLOWING THE STANDARDS PREVIOUSLY DESCRIBED.

B. ALL TELEVISING WORK SHALL BE AT THE CONTRACTORS EXPENSE.

C. THE CITY RESERVES THE RIGHT TO FINAL RE-TELEVISING AT THE CONTRACTORS EXPENSE IF DEFICIENCIES ARE NOTED ON THE INITIAL TELEVISING WORK AND AFTER THE CONTRACTOR MAKES THE NECESSARY REPAIRS.

NOTES

A. NO WORK SHALL BE APPROVED OR ACCEPTED BY THE CITY UNLESS 2 WORKING DAYS NOTICE OF COMMENCING WORK IS GIVEN TO THE CITY.

B. ALL TEMPORARY PAVEMENT AND SIDEWALK SHALL BE MAINTAINED BY THE CONTRACTOR OR DEVELOPER AT HIS OWN EXPENSE IN A SUITABLE AND SAFE CONDITION FOR TRAFFIC UNTIL PERMANENT PLACEMENT IS MADE OR THE PROJECT IS FINALLY ACCEPTED BY THE CITY.

C. ROOF DRAINS, FOUNDATION DRAINS, SUMP PUMPS, AND ALL OTHER CLEAR WATER CONNECTIONS TO THE SANITARY SEWER SYSTEM ARE PROHIBITED.

D. WHEN A SEWER IS TO BE EXTENDED AT THE DOWNSTREAM MANHOLE OR FIRST MANHOLE IS THE NEW LINE, IT SHALL BE PLUGGED BEFORE CONSTRUCTION BEGINS. NO PLUGS SHALL BE REMOVED UNTIL CONSTRUCTION IS COMPLETED AND SOIL IS STABILIZED AND THEN ONLY AS DIRECTED BY THE CITY .

E. CONSTRUCTION OF SANITARY SEWERS SHALL INCLUDE THE CITY DYE TESTING AS DETERMINED BY THE CITY OF ALL PIPES TO BE CONNECTED TO THE NEW SEWER PRIOR TO BACKFILLING.

F. WHEN A CASTING OR OTHER PUBLIC PROPERTY IS ABANDONED IT REMAINS CITY PROPERTY, UNLESS OTHERWISE DIRECTED.

G. SANITARY SEWERS MUST HAVE EPA PLAN APPROVAL OR ANY SANITARY SEWER THAT IS RELOCATED OR RESIZED.

EXCAVATION AND PIPE LAYING

A. THE LAYING OF THE PIPE SHALL COMMENCE AT THE LOWEST POINT, THE THE BELL END LAID UPGRADE. THE PIPE SHALL BE CENTERED IN THE TRENCH AND ALL PIPE SHALL BE LAID WITH ENDS ABUTTING AND TRUE TO LINE AND GRADE.

B. LASER SHALL BE USED INSIDE THE PIPE.

UTILITY STAKING

A. LASER METHOD- OFFSET AND GRADE AT EACH MANHOLE, OFFSET AND GRADE 50 FEET AND 100 FEET OUT FROM EACH MANHOLE UNLESS OTHERWISE APPROVED.

TESTING- ALL PHASES PERFORMED BY CONTRACTOR OR DEVELOPER

A. BEFORE ANY SEWER LINE IS PLACED INTO SERVICE OR ACCEPTED BY THE CITY, IT SHALL BE SUBJECTED TO AND PASS LOW PRESSURE AIR TEST. EACH RUN BETWEEN MANHOLES, WITH SERVICE LATERALS STUBBED INTO PROPERTY LINES, SHALL BE TESTED BEFORE BEING ACCEPTED. THE CONTRACTOR OR DEVELOPER SHALL FURNISH ALL EQUIPMENT AND MATERIAL NECESSARY TO CONDUCT THIS TEST. THE TRENCH SHALL BE COMPLETELY BACKFILLED BEFORE TESTING.

B. SEE SANITARY SEWER TESTING NOTES (PAGE 900-11)

C. BEFORE FINAL ACCEPTANCE BY THE CITY AND BEFORE ANY SERVICE LINE IS PUT INTO USE, ALL SANITARY SEWER AND MANHOLES SHALL BE THOROUGHLY CLEANED OF ALL FOREIGN MATTER BY USE OF A SEWER-JET OR EQUAL, TYPE OF EQUIPMENT BY THE CONTRACTOR. SEWER JET PROCEDURE MUST BE PERFORMED BEFORE CONTRACTOR T.V. TESTS THE PIPE.

D. SEE SANITARY SEWER TESTING NOTES (PAGE 900-12)

HOUSE CONNECTIONS

A. NO SERVICE LINE SHALL BE ALLOWED TO CONNECT DIRECTLY INTO A MANHOLE, SUBJECT TO APPROVAL BY THE CITY IN SPECIFIC CASES.

B. THE ENDS OF ALL SERVICES LINES OR TEES SHALL BE ACCURATELY LOCATED, MAPPED AND GIVEN TO THE CITY WITHIN 15 DAYS AFTER INSTALLATION.

C. BEFORE MAKING A CONNECTION TO AN EXISTING SEWER TAP OR SEWER LATERAL, THE CONTRACTOR SHALL CHECK THE EXISTING PIPE BY UTILIZING A SEWER EEL, STRAP, OR A ROD TO SEE THAT THE EXISTING PIPE IS CONNECTED TO THE MAIN SEWER. IF NEEDED, THE CONTRACTOR MAY NEED TO USE A HYDRAULIC SEWER CLEANER.

D. LATERALS FROM THE MAIN TO THE PROPERTY LINE SHALL BE 6 INCHES MINIMUM WITH CLEANOUT AT THE PROPERTY LINE.

E. A RIGHT-OF-WAY PERMIT TO OPEN INTO, ALTER, OR DISTURB ANY PUBLIC SEWER MUST BE OBTAINED.

F. IN THE DEMOLITION OF EXISTING BUILDING, ALL ABANDONED SEWER LATERALS SHALL BE CAPPED AT THE OWNER'S EXPENSE.

PIPE

A. ALL MAINLINE PIPE AND SPECIALS SHALL BE PVC SDR-35 UNLESS OTHERWISE APPROVED BY THE CITY. MINIMUM DIAMETER OF PIPE SHALL BE 8 INCHES.

B. DUCTILE IRON PIPE WILL BE USED IN STREAM CROSSINGS AND WHERE MAXIMUM SEPARATION CANNOT BE MAINTAINED OR WHEN THE DEPTH OF SEWER EXCEEDS 25 FEET.

C. ALL JOINTS SHALL BE OF THE BELL AND SPIGOT TYPE, THE BELLS BEING FORMED INTEGRALLY WITH THE PIPE. THE BELL SHALL CONTAIN A FACTORY INSTALLED ELECTROMETRIC GASKET WHICH IS POSITIVELY RETAINED. NO SOLVENT CEMENT JOINTS WILL BE PERMITTED IN FIELD CONSTRUCTION EXCEPT AS SPECIFICALLY AUTHORIZED BY THE CITY.

FLEXIBLE PIPES	MATERIAL SPECIFICATIONS	JOINT SPECIFICATIONS
POLYVINYL CHLORIDE	ASTM D-3034 (SDR-35) PIPE STIFFNESS= 46 PSI	ELASTOMERIC GASKET ASTM D-3212
DUCTILE IRON	ANSI A-21.51 & AWWA C-151	ANSI A-21.11 AWWA C-111

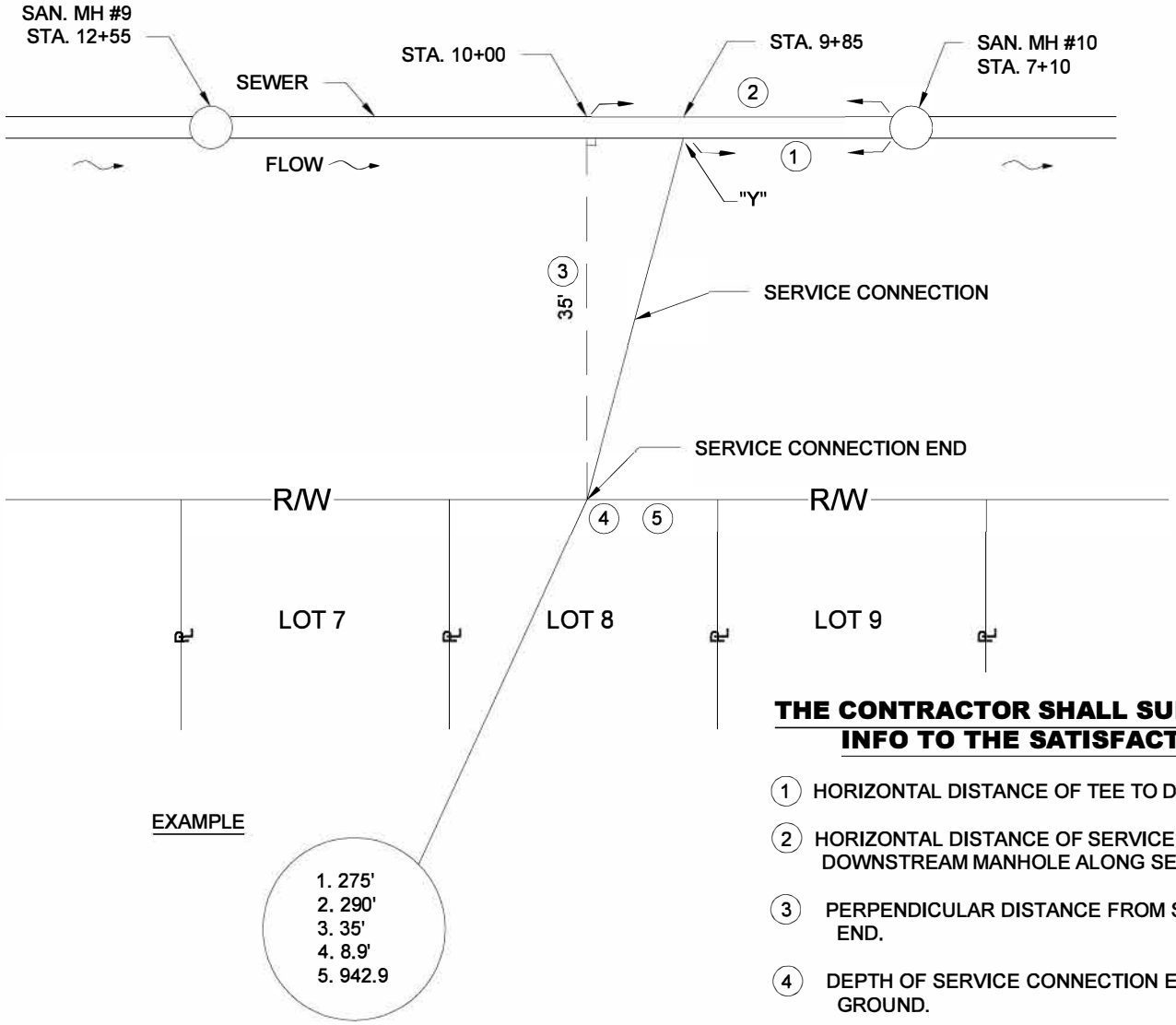
1. SDR= OUTSIDE DIAMETER DIVIDED BY WALL THICKNESS.
2. THE SPECIFICATIONS ABOVE SHALL BE THOSE MOST RECENTLY ADOPTED BY THE APPROPRIATE STANDARDS SETTING ORGANIZATION.

CITY OF HILLSBORO

MISCELLANEOUS SANITARY SEWER NOTES

REVISIONS:

DATE APPROVED:



THE CONTRACTOR SHALL SUPPLY THE FOLLOWING INFO TO THE SATISFACTION OF THE CITY

1. HORIZONTAL DISTANCE OF TEE TO DOWNSTREAM MANHOLE.
2. HORIZONTAL DISTANCE OF SERVICE CONNECTION END TO DOWNSTREAM MANHOLE ALONG SEWER.
3. PERPENDICULAR DISTANCE FROM SEWER TO SERVICE CONNECTION END.
4. DEPTH OF SERVICE CONNECTION END FLOW LINE TO ORIGINAL GROUND.
5. ELEVATION OF SERVICE CONNECTION END FLOW LINE.
6. ELEVATION OF BACK OF CURB OR SOME OTHER REFERENCE POINT ABOVE LATERAL.

CITY OF HILL BORO	SERVICE CONNECTION LOCATION REFERENCE	REVISIONS:	DATE APPROVED:
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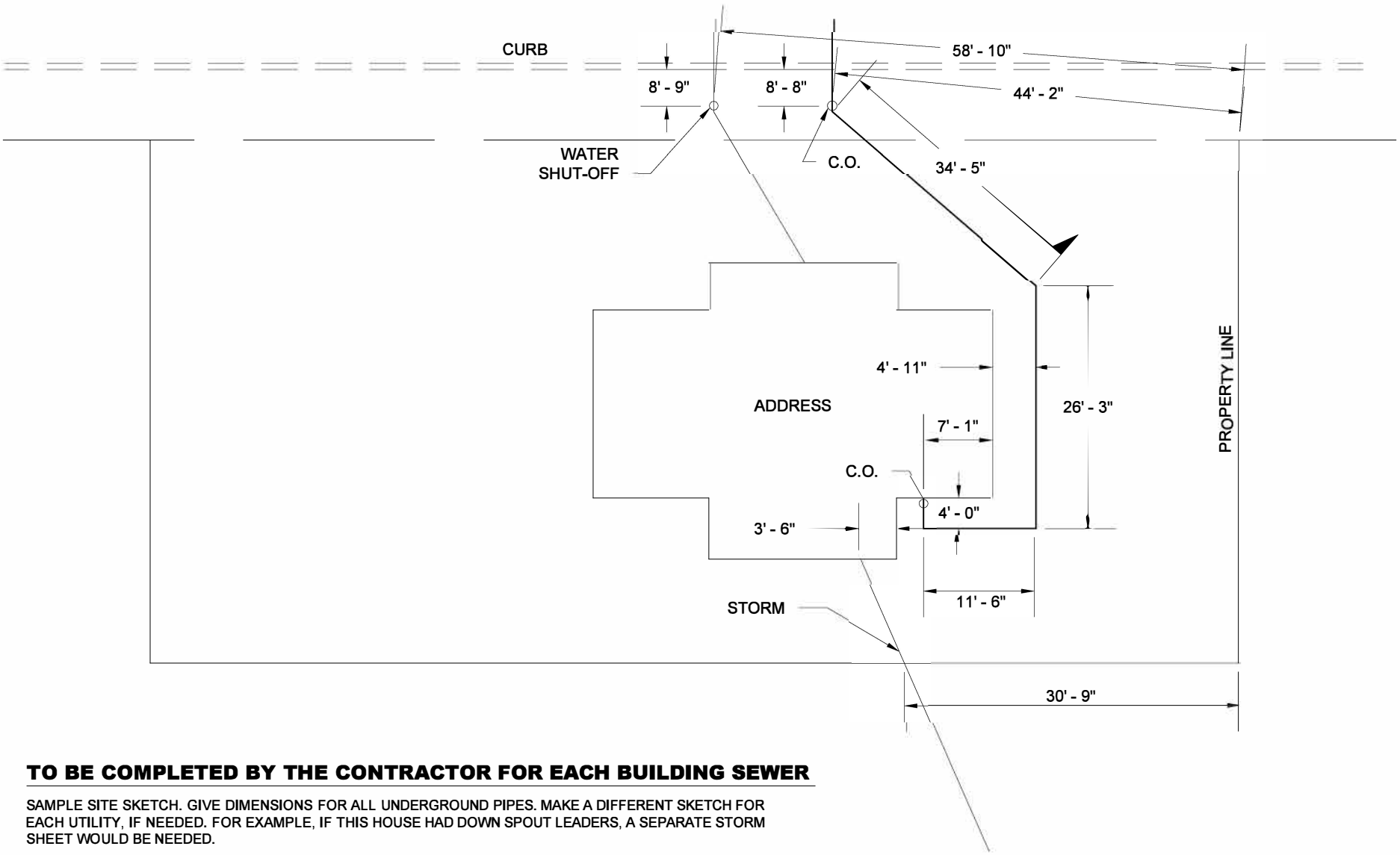


TO BE COMPLETED BY THE CONTRACTOR FOR EACH BUILDING SEWER

SAMPLE SITE SKETCH. GIVE DIMENSIONS FOR ALL UNDERGROUND PIPES. MAKE A DIFFERENT SKETCH FOR EACH UTILITY, IF NEEDED. FOR EXAMPLE, IF THIS HOUSE HAD DOWN SPOUT LEADERS, A SEPARATE STORM SHEET WOULD BE NEEDED.

CITY OF HILLSBORO	SERVICE CONNECTION LOCATION REFERENCE (BUILDING IN PLACE)	REVISIONS:	DATE APPROVED:
			PAGE No. 900-15

MAINTENANCE OF FLOW IN EXISTING SEWERS AND DRAINS

1.01 SCOPE OF WORK

A. FURNISH ALL LABOR, MATERIALS, EQUIPMENT AND INCIDENTALS REQUIRED TO MAINTAIN WASTEWATER AND /OR STORM DRAINAGE FLOW IN ALL PUBLIC AND PRIVATE PIPES, INCLUDING INDIVIDUAL SERVICE CONNECTIONS, DURING CONSTRUCTION.

B. CONSTRUCT AND MAINTAIN ALL TEMPORARY BYPASS SEWERS AND DRAINS AND BE RESPONSIBLE FOR ALL BYPASS PUMPING OF SEWAGE AND DRAINAGE THAT MAY BE REQUIRED TO PREVENT BACKING UP OF SEWAGE AND ALLOW FOR PROPER INSPECTION, REHABILITATION, TESTING, OR DRAINAGE DURING PIPE REPLACEMENT, INSTALLATION OF NEW PIPE LINING, OR RELATED REHABILITATION WORK. THE CONTRACTOR SHALL IMMEDIATELY REMOVE AND DISPOSE OF ALL OFFENSIVE MATTER SPILLED DURING THE BYPASS PUMPING AT HIS OWN EXPENSE.

1.02 SUMITTALS

A. THE CONTRACTOR SHALL SUBMIT TO THE ENGINEER A SCHEDULE TO COMPLETE THE WORK. IT WILL INCLUDE THE SEQUENCING AND COORDINATION OF PIPELINE CLEANING, INSPECTION, REHABILITATION, CONSTRUCTION, TESTING, MAINHOLE REHABILITATION, AND THE HANDLING OF WASTEWATER FLOW AND DRAINAGE DURING THESE ACTIVITIES.

B. THE CONTRACTOR SHALL SUBMIT TO THE ENGINEER, FOR APPROVAL, A DETAILED WRITTEN PLAN OF ALL METHODS OF FLOW MAINTENANCE TEN (10) DAYS IN ADVANCE OF FLOW INTERRUPTION. ALL PROCEDURES FOR MAINTAINING FLOWS, INCLUDING WEEKEND OPERATIONS AND OTHER EXTENDED PERIODS OF TIME, MUST MEET THE APPROVAL OF THE ENGINEER.

1.03 EXECUTION

WHEN THE BYPASS PUMPING IS REQUIRED THE CONTRACTOR SHALL SUPPLY ALL NECESSARY PUMPS, PIPING, CONNECTIONS, AND TEMPORARY POWER REQUIRED TO DIVERT THE FLOW OF SEWAGE OR DRAINAGE AROUND THE AREA IN WHICH WORK IS BEING PERFORMED. THE BYPASS SYSTEM SHALL BE OF SUFFICIENT CAPACITY TO HANDLE EXISTING FLOWS PLUS ADDITIONAL FLOW THAT MAY OCCUR DURING A RAIN EVENT

A. THE CONTRACTOR SHALL SUPPLY COMPLETELY REDUNDANT BYPASS PUMPING FOR CAPACITY IN THE EVENT OF PUMP FAILURE.

B. INFLATABLE PLUGS OR TEMPORARY DAMS MAY BE INSTALLED IN THE SANITARY OR STORM DRAINAGE SYSTEM TO TEMPORARILY BLOCK THE FLOW ON THE SUCTION SIDE OF THE BYPASS PUMPING SETUP.

C. THE SUCTION OR DISCHARGE PIPING OR TUBING FROM A BYPASS PUMPING SETUP SHALL NOT ADVERSELY INTERFERE WITH PEDESTRIAN OR VEHICULAR TRAFFIC.

D. DISCHARGE FROM THE BYPASS PUMPING SETUP SHALL BE BELOW GROUND AND PREFERABLY INTO THE NORMAL FLOW PATH OF THE RECEIVING SANITARY SEWER TO DEDUCE ODORS

E . ALL FLOWS FROM ALL PUBLIC, PRIVATE, COMMERCIAL, AND INDUSTRIAL USERS SHALL BE HANDLED WITHOUT INTERRUPTION BY THE CONTRACTOR DURING REHABILITATION OF THE SANITARY OR STORM DRAINAGE SYSTEM.

F. THE CONTRACTOR SHALL BE REQUIRED TO REPAIR AT HIS OWN EXPENSE ANY DAMAGE TO PUBLIC PROPERTY, PRIVATE PROPERTY, OR THE SANITARY AND STORM DRAINAGE SYSTEM CAUSED BY HIS OPERATIONS.

G. THE CONTRACTOR SHALL NOT BE PERMITTED TO OVERFLOW, BYPASS, PUMP OR BY ANY OTHER MEANS CONVEY DRAINAGE TO ANY LAND,STREET, STORM DRAIN OR WATER COURSE.

EXHIBIT B

CITY OF HILLSBORO

Construction Design Criteria

CITY OF HILLSBORO
DESIGN CRITERIA

TABLE OF CONTENTS

800.00 Water Distribution

900.00 Sanitary Sewers

City of Hillsboro
DESIGN CRITERIA REGISTRATION

Name: _____

Title: _____

Firm/Organization: _____

Address: _____

Telephone: _____

CHANGE OF ADDRESS CARD for receiving updates of the City of Hillsboro Design Criteria.

(OLD INFORMATION)

Name: _____

Title: _____

Firm/Organization: _____

_____

Telephone: _____

(NEW INFORMATION)

Name: _____

Title: _____

Firm/Organization: _____

_____

Telephone: _____

FOREWORD

This manual has been prepared to aid engineers and Developers in the preparation of development plans and engineering design and to inform interested persons of the procedures and standards for the City of Hillsboro, Ohio. It is also intended to be used during reconstruction or replacement of existing facilities or utility construction within the City right-of-way. The rules, standards, specifications, criteria, etc. are to supplement any applicable Zoning Regulations and the City of Hillsboro Subdivision Regulations.

It is not the intent of this manual to take away from the designing engineer any responsibility for the technical adequacy of this design or freedom to use his engineering judgment and discretion. It is recognized that matters of engineering design cannot be set out in writing to cover all situations, however, the design standards as set out herein represent good engineering practice. Any design methods or criteria different than that listed will receive consideration for approval, provided the proposed variances and the reasons for their use are submitted to the City.

The City, at any time during design or construction, shall have the authority to modify any engineering or construction detail, whenever required for the protection of the public interest.

Though the City has no jurisdiction in areas outside of the City limits, the City strongly recommends that any development constructed within close proximity of the City be designed and constructed to these standards. This will help ensure that, if the development is brought into the City, the development will be accepted by the City without additional upgrades.

The City, at their discretion, may request that infrastructure and utility facilities in any particular development be installed to accommodate future expansion within the City. If this is requested, the City will evaluate the Developer's eligibility to be compensated for the cost difference to oversize particular infrastructure items per the Subdivision Regulations of the City.

REFERENCES

The City of Hillsboro Design Criteria and Construction Standards and Drawings are to be used to supplement the following references. Whenever there are differences in these references and the Design Criteria and Construction Standards and Drawings, the more restrictive or higher standard shall apply as determined by the City.

- Ohio Department of Transportation (ODOT), latest versions
  - ⇒ Construction and Material Specifications
  - ⇒ Location and Design Manuals
    - Volume 1 - Roadway Design
    - Volume 2 - Drainage Design
  - ⇒ Standard Construction Drawings
  - ⇒ Standard Design Drawings
  - ⇒ Supplemental Specifications
  - ⇒ Traffic Control for Uniform Control Devices

- American Association of State Highway and Transportation Officials (AASHTO), latest version
  - ⇒ A Policy on Geometric Design of Highways and Streets

- Great Lakes Upper Mississippi River Board (GLUMRB) (Ten State Standards), latest version
  - ⇒ Recommended Standards for Wastewater Facilities
  - ⇒ Recommended Standards for Water Works

100.00 GENERAL PROVISIONS

100.1 General

A. The Design Criteria and Construction Standards and Drawings along with 100% performance surety and 10% maintenance surety shall apply to all public improvement construction projects that will eventually be taken over by the City of Hillsboro. The 100% performance surety and 10% maintenance surety shall follow the regulations in the City of Hillsboro Subdivision Regulations even if the improvements are not part of a major subdivision.

B. The Developer/Owner shall design and construct improvements not less than the standards outlined in the City of Hillsboro's Subdivision Regulations and this document. The work shall be done under City supervision and shall be completed within the time fixed or agreed upon by the City of Hillsboro.

C. It is the responsibility of the Developer/Owner and his engineer to investigate local conditions that may require additional improvements.

D. In the event any conflicting standards are encountered, the more restrictive shall apply as determined by the City of Hillsboro.

E. Upon request of the Developer/Owner or his representative, the City will evaluate requests to provide open excavation of existing utilities to allow accurate elevation information.

100.2 Construction Procedures and Materials

A. PRE-CONSTRUCTION MEETING

A pre-construction meeting with the City is required. The Developer/Owner, his contractor, his engineer, and representatives from utility companies involved shall be present at the meeting. It shall be the Developer/Owner's responsibility to arrange the preconstruction meeting.

B. MATERIALS

Unless otherwise noted, all work and materials shall conform to the Ohio Department of Transportation (ODOT) Construction and Material Specifications and the Construction Standards and Drawings of the City of Hillsboro, Ohio.

C. INSPECTIONS

1. Periodic inspection during the installation of improvements shall be made by the City to ensure conformity with the approved plans and specifications as required by these and other regulations. The Developer/Owner shall notify proper administrative officials at least 24 hours before each phase of the improvement is ready for inspection.

Inspections shall be at a minimum as follows:

a) Sanitary Sewer
   1) Sanitary pipe and manhole installation
   2) Lateral location and inspection of all sewers
   3) Proper backfill installation
   4) Air test sanitary lines
   5) Vacuum test manholes
   6) Deflection test on PVC sewers

b) Water Main
   1) Pipe installation
   2) Hydrant installation
   3) Valve installation
   4) Service installation
   5) Proper backfill installation
   6) Restraining glands and/or blocking installation
   7) Pressure test
   8) Disinfection
   9) Hydrant and valve operation (by Fire Department)
   10) Hydrant assembly location and grade (by Fire Department)

c) Storm Sewer
   1) Manhole and Catch Basin installation
   2) Storm sewer pipe installation
   3) Field tile connections
   4) Proper backfill installation
   5) Headwall installation

d) Roadway
   1) Street excavation operations
   2) Subgrade preparation
   3) Subgrade undercutting
   4) Subbase installation
   5) Curbing installation
   6) Sidewalk and approach installation
   7) Pavement installation

2. The absence or presence of an inspector during construction shall not relieve the Developer/Owner or contractor from full responsibility for compliance with plans, specifications, and City requirements.

3. Weight and delivery tickets shall be furnished to the City to substantiate the type, quantity, and size of material used.

D. RESPONSIBILITY

All work shall be under the control and supervision of the Developer/Owner until written final approval is given by the City.

E. FINAL INSPECTION

Upon completion of all the improvements, the Developer/Owner shall request, in writing, a final inspection by the City. The final inspection shall be performed by officials from the City with the Developer/Owner. The Developer/Owner's Engineer and the Developer/Owner's Contractor will be present.

F. UTILITY COORDINATION

Coordination of utility location/installation such as electric, gas, telephone, and cable television shall be the responsibility of the Contractor, Developer, or Owner in accordance with plans approved by the City.

CONSTRUCTION INSPECTION

PROJECT _____

DATE _____ INSPECTOR _____

This list could vary depending upon the types of construction included in the project. A typical list would require a 24-hour notice for inspections at the following points:

√	DESCRIPTION	REMARKS
A.	**PRIOR TO INSPECTION**	
	Review plans, special provisions, construction & materials manual & specifications that apply to your	
	Discuss your responsibility & authority with the project engineer.	
	Discuss notification, changes, connections, delays, rejections, and tolerances.	
B.	**PRE-CONSTRUCTION CONFERENCE**	
	Attendees: Owner/Administrator, Developer/Owner, his Contractor, his Engineer, and representatives from Utility Companies	
	Discuss phasing & schedules	
	Discuss materials	
	Discuss coordination	
	Discuss safety (public & job)	
	Discuss responsibilities	
C.	**SANITARY SEWER & LATERALS TO R/W**	
	Check pipe type & quality	
	Trench condition	
	Bedding	
	Proper initial backfill	
	Proper backfill	
	Prohibit groundwater from entering sanitary	
	Straight alignment & joints	
	Wye installation & location	
	Air test, mainline & laterals	
	Mandral test on PVC	

√	DESCRIPTION	REMARKS
D.	**SANITARY MANHOLE**	
	Check type & condition	
	Steps condition & alignment	
	Cone type & condition	
	Raisers recast/mastic	
	Casting - rim & lid	
	Proper pipe connection	
	Installation with O-rings	
	Installation on good base	
	Proper backfill, compacted granular under or near roadway	
	Vacuum test	
	Rim & risers to properly finish grade	
	Chimney Seal	
E.	**WATER MAIN**	
	Type & condition	
	Valve, type & condition	
	Hydrant, type & condition	
	Trench condition	
	Pipe alignment & joints	
	Air release valves	
	Isolation Valve installation & location	
	Hydrant assembly installation & location (by Fire Dept.)	
	Restrained as needed	
	Bedding	
	Initial backfill compacted granular	
	Proper backfill - compacted granular under or near roadway	
	Pressure test	
	Purification test	
	Valve & hydrant operation (by Fire Dept.)	
	Laterals: Corp Stop K-Copper Curb Stop	
F.	**STORM SEWER**	
	Check pipe type, size, & quality	
	Check catch basin & grate type, size, & quality	
	Check manhole type, size, & quality	
	Trench condition	
	Bedding	
	Proper initial backfill	
	Proper backfill, compacted granular under or near roadway	
	Straight alignment & joint sealing	
	Proper connection to catch basin & manholes	
	C.B. set in good horizontal & vertical alignment with curbs	
	Slope & grade: Review control stakes & adjacent terrain for drainage	
	Field tile & other pipes reconnected & noted on plans	

√	DESCRIPTION	REMARKS
G.	**ROADWAY**	
	Subgrade:	
	All topsoil removed in roadway	
	Compacted granular or clay fill only	
	Proper cross slope	
	Proper elevation	
	Free of roots, large stones, & excess dust	
	Proper compaction	
	Proofroll or density test, if soft undercut and/or underdrains	
	Measure elevation and cross slope	
	Subbase:	
	Proper material	
	Compacted in appropriate layers	
	Proofroll or density test, if soft undercut and/or tensar	
	Protect subgrade from being rutted or damaged	
	Proofroll subbase before prime coat	
	Measure elevation & cross slope	
	Surface; Pavement	
	Appropriate moisture & temperature conditions	
	Visual inspection of material (be aware of acceptable temperature range of mix &	
	Proper distribution & roller	
	Proper prime coat	
	Lay in proper layer	
	Watch joints, lapps, and around manholes, valves, etc.	
	Seal against concrete curbs, etc.	
	Measure elevation & cross slope	
	Keep traffic off for 24 hours, if possible	
	Pavement coring after base course asphalt is placed	
	Calculate any assessment for deficient asphalt and aggregate base	
	Surface; Concrete	
	Appropriate moisture and temperature conditions	
	Forms are set with reasonable conformance to grade & alignment	
	Forms are supported on thoroughly-compacted material	
	Appropriate consolidation of concrete	
	Check reinforcement	
	Check dowels	
	Check for expansion joints	
	Observe mix and placement	
	Observe finishing procedures	
	Needs curing as soon as possible	
	Observe saw joints	
	Note when forms are removed	

√	DESCRIPTION	REMARKS
H.	**FIXED STRUCTURES, CURBS, SIDEWALK, HEADWALL, ETC.**	
	Check proper concrete mix	
	Appropriate moisture & temperature conditions	
	Check all underground portions	
	Check backfill, operation & material	
	Check subgrade, proofroll, or density check	
	Check subbase under curbs	
	Review requirements for reinforcing steel	
	Check all reinforcement	
	Check all dowels	
	Check for expansion joints	
	Be aware of time concrete was batched & allowable time for placement	
	Observe mix & placement	
	Observe finishing procedure	
	Needs curing material ASAP	
	If required, check cold weather protection	
	Needs saw joints ASAP	
	Note when forms are removed	
	Backfill as soon as possible	
I.	**MISCELLANEOUS**	
	Keep daily logs	
	Pre-mark all existing utilities	
	Reconnect all existing utilities	
	Mark ends of all laterals in field (Contractor's	
	Mark ends of all laterals on plans	
	Restoration	
	Grade to drain	
	Check trench settlement	
	Seeding & Mulching	
	Erosion Control	
	Inlets	
	Outlets	
	Curb lines	
	Ditches	
	Basins	
	Final check for debris & flow	
	Sanitary sewer	
	Storm sewer manhole & catch basin	
	Curb lines	

100.3 Submission of Plans

A. CONSTRUCTION DRAWINGS

1. Complete construction drawings on 24" x 36" signed and approved by a registered engineer shall be made for all new streets, utilities and other improvements to be constructed in any development in the City. Said drawings are to be approved by the City before any construction may begin.

2. Plan line weights and style, topographic symbols, etc. shall conform to the plan requirements as established in ODOT's Location and Design Manual.

3. Submission of plans shall comply with Planning Commission regulations and the City of Hillsboro's Subdivision Regulations and Zoning Ordinance.

B. STANDARD TITLE BLOCK

All plan sheets shall display a standard title block containing the following:

1. Name, address, telephone number, and fax number (logo optional)
2. Plan sheet number
3. Development name
4. Sheet title
5. Date
6. Revision block
7. Drawn by
8. Checked by

C. REQUIRED PLAN LAYOUT ORDER

1. Title Sheet
2. Final Plat
3. Schematic Plan
4. Typical Sections
5. General Notes
6. General Details
7. Site Grading and Erosion Control Plan
8. Erosion Control Details
9. Miscellaneous Details (example: Pump Station, Intersection Plan)
10. Plan and Profile
11. Cross-Sections
12. Detention Basin Plan and Details
13. Off-Site Utilities Plan and Profile

1. TITLE SHEET

   a) Title of Project, City, County, Township, and State
   b) Index of sheets and sheet numbering
   c) Vicinity map with north arrow and project site call-out
   d) City of Hillsboro Construction Standards and Drawings reference
   e) Underground utilities note (O.U.P.S.)
   f) Signature and stamp
   g) Date of finished plans
   h) Project description
   i) Approval plan signatures of the City Engineer. The following statement shall be placed above the approval signature: "The City of Hillsboro signatures on this plan signify only concurrence with the general purpose and location of the proposed improvement. All technical details remain the responsibility of the Professional Engineer who prepared and certified these plans."
   j) Name, address, telephone number, and fax number of firm that prepared plans.

2. FINAL PLAT

   a) Copy of approved final plat with signatures
   b) See Subdivision Regulations

3. SCHEMATIC PLAN - LARGE SCALE LAYOUT OF SITE

   a) At a measurable scale to show the whole site on one sheet (max. scale 1" = 100').
   b) Show existing and proposed right-of-way, property lines and roadway, lot numbers, street names, existing adjoining property lines, and owners.
   c) Show proposed utilities and numbering of sanitary and storm manholes and catch basins.
   d) Stationing of intersections and streets.
   e) Multi-baseline legend (street number, stationing, description, etc.)
   f) North arrow and scale.
   g) Benchmarks and locations.
   h) Centerline stationing.
   i) Overall plan view of the development depicting the layout of the proposed sanitary sewer, water, and drainage network. Plans should include all manholes, pipes, other structures, and the plan and profile sheet on which they are located.
   j) Plan and Profile Sheet reference.

4. TYPICAL SECTIONS

   a) Detailed labeling.
   b) Legend of pavement composition.
   c) Limiting stations for each section.
   d) Dimensioning, pavement, curb and gutter, curb lawn, sidewalk, right-of-way, and pavement slopes.

5. GENERAL NOTES

   All notes necessary for construction which are not defined clearly elsewhere within the plans.

6. GENERAL DETAILS

   a) All details necessary for construction except those City of Hillsboro Construction Standards and Drawings referenced on the title sheet.
   b) Modified City of Hillsboro Construction Standards and Drawings shall be redrawn for approval.

7. SITE GRADING PLAN AND EROSION CONTROL

   a) Site Grading Plan

      1) A final site grading plan must be included with the construction drawings and approved by the City.
      2) Proposed 1' contours showing all lots having proper drainage.
      3) Proposed building pad elevation
         .

   b) Storm Water Pollution Prevention Plan

      A Storm Water Pollution Prevention Plan will be required to be included with construction drawings and approved by the City. This plan shall follow OEPA and NPDES permit requirements and shall be submitted to the OEPA prior to construction.

      1) Show and label existing and proposed 1' contours.
      2) Proposed storm manholes, catch basins, pipes, etc., labeled and numbered.
      3) Concentrated flows.
      4) Property lines and rights-of-way, lot numbers and property owners.
      5) Proposed/existing roadways.
      6) Proposed diversions and erosion control (Example: diversion ditches, fabric fence, straw bales, sediment basin).
      7) Erosion control construction sequence list.
      8) Limits of grading.
      9) Proposed storm sewer pipe flows and capacities.
      10) Sediment basin location.
      11) North arrow and scale.
      12) At a measurable scale to show the whole site on one sheet (maximum scale 1" = 100').

8. EROSION CONTROL DETAILS

   Any details necessary for construction except those City of Hillsboro Construction Standards and Drawings referenced on the title sheet.

9. MISCELLANEOUS DETAILS (Example: Pump Station, Intersection Plan, etc.)

   Plans shall include a detailed drawing with all proper labeling and dimensioning.

10. PLAN AND PROFILE

a) The plan and profile shall be at a scale of 1" = 50' horizontal, 1" = 10' vertical.
b) Plan and profile sheets shall show all necessary data in sufficient detail for the complete construction of all work and improvements to be made in the plat.
c) All grade elevations shall be based on U.S.G.S. and City of Hillsboro datum.
d) Plan and profile sheets will be required for all off-site utility extensions.
e) More specifically, all plans and profile sheets must show and include the following items:

10A. <u>General - Plan</u>

a) Show all proposed lots, streets and curbs, etc.
b) Show all existing pavements, headwalls, piers, utilities, mailboxes, trees, etc. (existing infrastructure may be shown in lighter text and no less than 80% shading).
c) Typical street and curb sections.
d) Construction notes.
e) Structural details.
f) North arrow (preferably up or to the right) and scale (horizontal and vertical).
g) Street names.
h) Centerline stations and ticks every 100' (south to north and west to east where possible).
i) Easements for utilities and storm drainage.
j) Lot numbers, dimensions, and frontage.
k) Curb radius at intersections with back of curb elevations at quarter points (if not covered in separate intersection detail).
l) Curve data: radius, delta, chord length, chord bearing, arc length, station of PC, PT, PCC, PI, PRC.
m) Sheet reference.
n) Plat phase lines (boundary lines) show stations.
o) Dimension and station of utility locations.
p) Centerline bearings and/or intersecting centerline angles.
q) Final monument box callouts set at PC, PT, PCC, PI, PRC (in pavement) intersections.
r) Drive apron stationing and width callout.
s) Show all existing features within 50' of right-of-way.
t) Proposed electric, telephone, gas, cable locations, and easements.
u) Proposed light pole layout and electric feed.
v) Match lines with stationing.
w) Intersection elevation for proper storm water drainage.
x) Benchmarks

10B. General - Profile

a) Existing centerline and proposed centerline profile.
b) Label proposed centerline grades (minimum grade 0.50%).
c) Show all mainline existing utilities.
d) Existing and proposed grade elevations every 25' (existing elevation on bottom of sheet and proposed elevation on top of sheet. Note as to centerline or top of curb.)
e) Show and label all vertical curves (Stations, elevations, length).

10C. Storm Sewer - Plan

a) Show and station, with offsets, the proposed storm sewers: manholes, laterals, catch basins, headwalls, etc.
b) Label each pipe size and type.
c) Number proposed storm manholes and catch basins.

10D Storm Sewer - Profile

a) Show length of span, size, grade, and class and/or type of proposed pipe.
b) Label existing pipe size and type.
c) Existing and proposed storm.

1) Label existing and proposed mainline storm water manholes, junction boxes, catch basins, etc., and show centerline of streets and stations of each.
2) Show invert elevations of all pipe at manholes, headwalls, junction boxes, catch basins, etc.
3) Show elevation on top of manhole or catch basin.
4) Number proposed storm manholes and catch basins.

10E. Water - Plan

a) Show and station with offsets the proposed waterline, laterals, deflection points, hydrants, valves, etc.
b) Label pipe size, tees, crosses, etc.
c) Station and offset above items.
d) Indicate the testing requirements for fire protection and water services.

10F. Water - Profile

a) Show length, size, depth, and class and/or type of pipe.
b) Show deflection points.
c) Show stations and any critical elevations for above items.
d) Label minimum/maximum coverage of water main.

10G. Sanitary Sewer - Plan

a) Show sanitary sewers, manholes, laterals, cleanouts, etc. with station and offset labeled.
b) Label each pipe size.
c) Number proposed sanitary manholes and cleanouts.
d) Proposed lateral locations.

10H. Sanitary Sewer - Profile

a) Show length of span, size, grade, and class and/or type of proposed pipe.
b) Show existing sanitary.
c) Show invert elevation of all pipe at manholes.
d) Show top elevations of manholes.
e) Number proposed sanitary manholes and cleanouts.

11. CROSS-SECTIONS

a) The cross-sections shall be at a scale of 1" = 10' horizontal, 1" = 10' vertical.
b) Cross-sections shall be every 50' and at other critical areas.
c) Show all existing utilities with labels.
d) Show all proposed utilities with labels.
e) Show all proposed and existing roadway sections with existing and proposed centerline elevations.
f) Cross-section at each drive and intersection roadway (for reconstruction project and projects where drive locations are predetermined).

12. DETENTION BASIN PLAN AND DETAILS

Detailed site plan including storm water calculations, inlet and outlet elevations, top of bank elevations, and emergency overflow elevations.

13. OFF-SITE UTILITIES PLAN AND PROFILE

Refer to Plan and Profile.

CONSTRUCTION PLANS
CHECKLIST

PROJECT _____ DATE_____

√	DESCRIPTION	REMARKS
	C. REQUIRED PLAN LAYOUT ORDER	
	Title Sheet	
	Final Plan	
	Schematic Plan	
	Typical Sections	
	General Notes	
	General Details	
	Site Grading and Erosion Control Plan	
	Erosion Control Details	
	Misc. Details (e.g. pump station, intersection plan)	
	Plan and Profile	
	Cross-Sections	
	Detention Basin Plan and Details	
	Off-Site Utilities Plan and Profile	
	GENERAL	
	Acceptable natural drainage and erosion control	
	Right-of-way widths meet minimum criteria	
	Pavement widths	
	Radius of curvature	
	Horizontal visibility	
	Vertical alignment and visibility	
	Grades	
	Cul-de-sacs	
	Turn around radius, right-of-way, and pavement	
	Dead-end streets	
	Alignment of intersection	
	Space of intersection relative to difference in road classifications	
	Avoidance of multiple intersection	
	Pavement and right-of-way of intersection	
	Streets for commercial developments	
	Repair of pavements	
	Streets for industrial development	
	Lengths of blocks meet minimum criteria	
	Crosswalks	
	Street Monuments	
	Subgrade	
	Base Course	

√	DESCRIPTION	REMARKS
	GENERAL (Cont.)	
	Surface Course	
	Grading Plan	
	Storm drainage system type	
	Manholes	
	Catch basins	
	Headwalls	
	Sufficient easements for utilities or open drainage	
	Other utilities	
	Underground utilities	
1.	**TITLE SHEET**	
	Title of Project, City, County, Township, and State	
	Index of sheets and sheet numbering	
	Vicinity map with north arrow and project site callout	
	City of Hillsboro Construction Standards and Drawings reference	
	Underground utilities note (O.U.P.S.)	
	Signature and stamp	
	Date of finished plans	
	Project description	
	Approval plan signatures	
	Name, address, telephone number, and fax number of firm that prepared plans	
2.	**FINAL PLAT**	
	Copy of approved final plat with signatures	
	See Subdivision Regulations	
3.	**SCHEMATIC PLAN - LARGE SCALE LAYOUT OF THE SITE**	
	At a measurable scale to show the whole site on one sheet (max. scale 1" = 100').	
	Show existing and proposed right-of-way, property lines and roadway, lot numbers, street names, existing adjoining property lines and owners.	
	Show proposed utilities and numbering of sanitary and storm manholes and catch basins.	
	Stationing of intersections and streets.	
	Multi-baseline legend (street number, stationing, description, etc.).	
	North arrow and scale.	
	Benchmarks and locations.	
	Centerline stationing.	
	Overall plan view of the development depicting the layout of the proposed sanitary sewer and drainage network. Plans should include all manholes, pipes, other structures, and the plan and profile sheet on which they are located.	
	Plan and Profile sheet reference	

√	DESCRIPTION	REMARKS
4.	**TYPICAL SECTIONS**	
	Detailed labeling.	
	Legend of pavement composition.	
	Limiting stations for each section.	
	Dimensioning, pavement, curb and gutter, curb lawn, sidewalk, right-of-way, and pavement slopes.	
5.	**GENERAL NOTES**	
	All notes necessary for construction which are not defined clearly elsewhere within the plans.	
6.	**GENERAL DETAILS**	
	All details necessary for construction except those City of Hillsboro Constructions Standards and Drawings referenced on title sheet.	
	Modified City of Hillsboro Construction Standards and Drawings shall be redrawn for	
7.	**SITE GRADING PLAN AND EROSION**	
	A final site grading plan must be included with the construction drawings and approved by the City.	
	Proposed 1' contours showing all lots having proper drainage.	
	Proposed building pad.	
	A Storm Water Pollution Prevention Plan will be required to be included with the construction drawings and approved by the City. This plan shall follow the OEPA and NPDES permit requirements and shall be submitted to and approved by the OEPA prior to construction.	
	Show and label existing and proposed 1' contours.	
	Proposed storm manholes, catch basins, pipes, etc., labeled and numbered.	
	Concentrated flows.	
	Property lines and rights-of-way, lot numbers, and property owners.	
	Proposed/existing roadways.	
	Proposed diversions and erosion control (e.g. diversion ditches, fabric fence, straw bales, sediment basins.)	
	Erosion control construction sequence list.	
	Limits of grading.	
	Proposed storm sewer pipe flows and capacities.	
	Sediment basin location.	
	North arrow and scale.	
	At a measurable scale to show the whole site on one sheet. (Maximum scale 1" = 100')	
8.	**EROSION CONTROL DETAILS**	
	Any details necessary for construction except those City of Hillsboro Construction Standards and Drawings referenced on title sheet.	

√	DESCRIPTION	REMARKS
9.	**MISC. DETAILS (e.g. pump station, intersection plan, etc.)**	
	Plans shall include a detailed drawing with all proper labeling and dimensioning.	
10.	**PLAN AND PROFILE**	
	Use a scale of 1" = 20' horizontal, 1"=5' vertical.	
	Show all necessary data in sufficient detail for the complete construction of all work and improvements to be made in the plat.	
	All grade elevations shall be based on U.S.G.S. and City of Hillsboro datum.	
	Plan and profile sheets are required for all off-site utility extensions.	
10A.	**GENERAL – PLAN**	
	Show all proposed lots, streets, and curbs, etc.	
	Show all existing pavements, headwalls, piers, utilities, mailboxes, trees, etc. (existing infrastructure may be shown in lighter text and no	
	Typical street and curb sections.	
	Construction notes.	
	Structural details.	
	North arrow (preferably up or to the right) and scale (horizontal and vertical).	
	Street names.	
	Centerline stations and ticks every 100' (south to north and west to east where possible).	
	Easements for utilities and storm drainage.	
	Lot numbers, dimensions, and frontage.	
	Curb radius at intersections with back of curb elevations at quarter points (if not covered in separate intersection detail).	
	Curve data: radius, delta, chord length, chord bearing, arc length, station of PC, PT, PCC, PI, PRC.	
	Sheet reference.	
	Plat phase lines (boundary lines) show stations.	
	Dimension and station of utility locations.	
	Centerline bearings and/or intersecting centerline	
	Final monument box callouts set at PC, PT, PCC, PI, PRC (in pavement) intersections.	
	Drive apron stationing and widths callout.	
	Show all existing features within 50' of right-of-way.	
	Proposed electric, telephone, gas, cable locations, and easements.	
	Proposed light pole layout and electric feed.	
	Match lines with stationing.	
	Intersection elevation for proper storm water drainage.	
	Benchmarks.	

√	DESCRIPTION	REMARKS
10B.	**GENERAL - PROFILE**	
	Existing centerline and proposed centerline profile.	
	Label proposed centerline grades (minimum grade 0.50%).	
	Show all mainline existing utilities.	
	Existing and proposed grade elevations every 25' (existing elevation on bottom of sheet and proposed elevation on top of sheet. Note as to centerline or top of curb.)	
	Show and label all vertical curves (stations, elevations, length).	
10C.	**STORM SEWER - PLAN**	
	Show and station, with offsets, the proposed storm sewers: manholes, laterals, catch basins, headwalls, etc.	
	Label each pipe size and type.	
	Number proposed storm manholes and catch basins.	
10D.	**STORM SEWER - PROFILE**	
	Show length of span, size, grade, and class and/or type of proposed pipe.	
	Label existing pipe size and type.	
	Label existing and proposed mainline storm water manholes, junction boxes, catch basins, etc., and show centerline of streets and stations of each.	
	Show invert elevations of all pipe at manholes, headwalls, junction boxes, catch basins, etc.	
	Show elevation on top of manhole or catch basin.	
	Number proposed storm manholes and catch basins.	
10E.	**WATER - PLAN**	
	Show and station, with offsets, the proposed waterline, laterals, deflection points, hydrants,	
	Label pipe size, tees, crosses, etc.	
	Station and offset above items.	
	Indicate the testing requirements for fire protection and water services.	
10F.	**WATER - PROFILE**	
	Show length, size, depth, and class and/or type of pipe.	
	Show deflection points.	
	Show stations and any critical elevations for above items.	
	Label minimum/maximum coverage of water main.	

√	DESCRIPTION	REMARKS
10G.	**SANITARY SEWER - PLAN**	
	Show sanitary sewers, manholes, laterals, cleanouts, etc. with station and offset labeled.	
	Label each pipe size.	
	Number proposed sanitary manholes and cleanouts.	
	Proposed lateral locations.	
10H.	**SANITARY SEWER - PROFILE**	
	Show length of span, size, grade, and class and/or type of proposed pipe.	
	Show existing sanitary.	
	Show invert elevation of all pipe at manholes.	
	Show top elevations of manholes.	
	Number proposed sanitary manholes and cleanouts.	
11.	**CROSS-SECTIONS**	
	Cross-sections shall be at a scale of 1”=5’ horizontal, 1”=5’ vertical.	
	Cross-sections shall be every 50’ and at other critical areas.	
	Show all existing utilities with labels.	
	Show all proposed utilities with labels.	
	Show all proposed and existing roadway sections with existing and proposed centerline elevations.	
	Cross-section at each drive and intersection roadway (for reconstruction projects and project where drive locations are predetermined).	
12.	**DETENTION BASIN**	
	Detailed site plan including inlet and outlet elevations, top of bank elevations and emergency overflow elevations.	
13.	**OFF-SITE**	
	Refer to Plan and Profile.	

100.4 Record Drawings (As-Builts)

A. Record Drawings (As-Builts) Requirements

1. At the completion of construction, the original tracings shall be revised as necessary to provide "Record Drawings". This work shall be done by the Developer/Owner's Engineer, who was responsible for setting grades and staking for improvements. The "Record Drawings" shall include the following information:

   a) Location of all water and sanitary services as well as storm outlets if provided.
   b) Final elevations and locations of the following:

      1) Storm sewer inlets, outlets, and manholes with all inverts
      2) Drainage swales, detention basins including structures with all elevations and capacity recalculated
      3) Sanitary sewer manholes and inverts and lateral locations
      4) Curb, gutter, and centerline elevations at locations where they are ended for future roadway extensions.

   c) The location of any additional improvements, construction as additions, or changes to the approved plans, such as tapping sleeves, blind taps, joint clamps, or any other field change item.
   d) The original tracings and a copy of the revised computer drawings transferable to electronic media downloadable by the City.

2. Maintenance Surety and Certificate of Completion shall not be released until satisfactory Record Drawings (As- Builts) are delivered to the City.

200.1 DEFINITIONS

Interpretation of Terms or Words

Regardless of capitalization, definitions are standard for the intent of these Design Criteria.

AASHTO
American Association of State Highway and Transportation Officials

ANSI
American National Standards Institute

ASCE
American Society of Civil Engineers

ASTM
American Society for Testing and Materials

AVERAGE DAILY FLOW
The total quantity of liquid tributary to a point divided by the number of days of flow measurement.

AWWA
American Water Works Association

BEDDING
The earth or other materials on which a pipe or conduit is supported.

BUILDING SEWER
A pipe conveying wastewater from a single building to a common sewer or point of immediate disposal.

CATCH BASIN
A structure intended to collect surface runoff and direct it into the storm sewer system.

COLLECTOR SEWER
A sewer normally less than 15 inches in diameter that receives wastewater from the sanitary laterals and transports it to the interceptor sewer.

COMBINED SEWER
A sewer intended to receive both wastewater and storm or surface water.

CROSS-CONNECTION
A connection or a potential connection between any part of a potable water system and any other environment containing other substances in a manner that, under any circumstances, would allow such substances to enter the potable water system. Other substances may include gases, liquids, or solids, such as chemicals, water products, steam or water from other sources (potable or non-potable).

CULVERT
A structure which allows surface runoff to flow through a roadway fill or similar obstruction of open flow. Culverts may be corrugated metal pipe, reinforced concrete, etc.

CURB INLET
A specialized catch basin (see catch basin) designed to collect runoff from pavement with curbing.

DESIGN STORM
The expected frequency of the storm for which the capacity of a structure will be equaled or exceeded. The capacity of a storm sewer designed for a 10-year design storm has a 1 in 10 chance of being equaled or exceeded in any given year.

DETENTION/RETENTION
The term detention/retention basin refers to the use of a storm water storage facility which will store storm water and release it at a given rate. The objective of a detention/retention facility is to regulate the rate of runoff and control the peak discharges to reduce the impact on the downstream drainage system.

Type of Storm Water Storage Facilities:

A. Detention Basin or Dry Basin - Dry basins are surface storage areas created by constructing a typical excavated or embankment basin.

B. Retention Basins or Ponds - Retention basins are permanent ponds where additional storage capacity is provided above the normal water level.

C. Parking Lot Storage - Parking lot storage is a surface storage facility where an inlet is undersized causing shallow ponding to occur in specific graded areas of the parking lot.

D. Subsurface Storage - Subsurface storage is a structure constructed below grade for the specific purpose of detaining storm water runoff.

E. Green Storm water Practice – A storm water management facility that reduces discharge during and after precipitation events by requiring collected runoff to either soak into the ground and/or be consumed by evapotranspiration, thereby retaining storm water pollutants in the facility. Examples include, but are not limited to, green roofs, bioretention, and porous pavements.

DISCHARGE
The amount of flow carried by a culvert or storm sewer, normally measured in cubic feet per second.

DRAINAGE AREA
The area, in acres, which drains to a particular catch basin, culvert, or similar structure.

DROP MANHOLE
A manhole installed in a sewer where the elevation of the incoming sewer considerably exceeds that of the outgoing sewer; a vertical waterway outside the manhole is provided to divert the wastewater from the upper to the lower level so that it does not fall freely into the manhole except at peak rate of flow.

EARTH-DISTURBING ACTIVITY
Any grading, excavating, filling or other alteration of the earth's surface where natural or manmade ground cover is destroyed and which may result in or contribute to erosion and sediment pollution.

ENERGY GRADIENT
The slope of the energy line of a body of flowing water with reference to a datum plane.

ENERGY GRADIENT LINE
The line representing the gradient which joins the elevation of the energy head.

ENERGY HEAD
The height of the hydraulic grade line above the centerline of a conduit plus the velocity head of the mean velocity of the water in that section.

ENERGY LINE
A line joining the elevation of the energy heads; a line drawn above the hydraulic grade line by a distance equivalent to the velocity head of the flowing water at each section along a stream, channel, or conduit.

EROSION

A. The wearing away of the land surface by running water, wind, ice, or other geological agents, including such processes as gravitational creep.

B. Detachment and movement of soil or rock fragments by wind, water, ice, or gravity.

C. Erosion includes:

1. Accelerated erosion: Erosion much more rapid than normal, natural or geologic erosion, primarily as a result of the influence of the activities of man.
2. Floodplain erosion: Abrading and wearing away of the nearly level land situated on either side of a channel due to overflow flooding.
3. Gully erosion: The erosion process whereby water accumulates in narrow channels during and immediately after rainfall or snow or ice melt and actively removes the soil from this narrow area to considerable depths such that the channel would not be obliterated by normal smoothing or tillage operations.
4. Natural erosion (geological erosion): Wearing away of the earth's surface by water, ice, or other natural environmental conditions of climate, vegetation, etc., undisturbed by man.
5. Normal erosion: The gradual erosion of land used by man which does not greatly exceed natural erosion.

6. Rill erosion: An erosion process in which numerous small channels only several inches deep are formed; occurs mainly on recently disturbed soils.
7. Sheet erosion: The removal of a fairly uniform layer of soil from the land surface by wind or runoff water.

EXFILTRATION
The quantity of wastewater which leaks to the surrounding ground through unintentional openings in a sewer. Also, the process whereby this leaking occurs.

FIRE HYDRANT
A fixture installed throughout water distribution systems to provide water for fire-fighting needs.

GRASSED WATERWAY
A broad or shallow natural course or constructed channel covered with erosion-resistant grasses or similar vegetative cover and used to conduct surface water.

HEADWALL
A structure placed at the ends of a culvert to prevent movement of the culvert and reduce erosion.

HEADWATER
The vertical distance from a culvert invert at the entrance to the water surface upstream from the culvert.

INFILTRATION
The discharge of ground waters into sewers, through defects in pipe lines, joints, manholes, or other sewer structures.

INFILTRATION/INFLOW
A combination of inflow wastewater volumes in sewer lines with no way to distinguish either of the two basic sources, and with the same effect as surcharging capacities of sewer systems and other sewer system facilities.

INFLOW
The discharge of any kind of water into sewer lines from such sources as roof leaders, cellars, sump pumps and yard-area drains, foundation drains, commercial and industrial so-called "clean water" discharges, drains from springs and swampy areas, etc. It does

not "infiltrate" the system and is distinguished from such wastewater discharge, as previously defined.

INLET CONTROL
A situation where the discharge capacity of a culvert is controlled at the culvert entrance by the depth of headwater and the entrance geometry, including the area, shape, and type of inlet edge.

INTERCEPTOR SEWER
A sewer which receives the flow from collector sewers and conveys the wastewater to treatment facilities.

JOINTS
The means of connecting sectional lengths of storm sewer pipe into a continuous sewer line using various types of jointing materials with various types of pipe formation.

JURISDICTION
Any governmental entity, such as town, City, county, sewer district, sanitary district or authority, or other multi-community agency which is responsible for and operates sewer systems, pumping facilities, regulator-overflow structures, and wastewater treatment works.

MAIN
The large water-carrying pipe to which individual user services are connected. Mains are normally connected to each other in a grid type system.

MANHOLE
An opening in a sewer provided for the purpose of permitting a person to enter or have access to the sewer.

MANNING ROUGHNESS COEFFICIENT
The roughness coefficient in the Manning Formula for determination of the discharge coefficient in the Chezy Formula. Roughness coefficient (n) of channel is based on actual tests typically provided in standard tables.

METER
The flow-measuring device installed at each service on a distribution system to measure the amount of water consumed by users at that service.

NORMAL DEPTH
The depth at which water will flow in a pipe or channel by virtue of its slope and roughness, based on the Manning Formula.

OEPA
Ohio Environmental Protection Agency.

OUTLET CONTROL
A situation where the discharge capacity of a culvert is controlled by the barrel of the culvert, rather than the inlet.

OVERFLOW
A pipe line or conduit device, together with an outlet pipe, which provides for the discharge of a portion of sewer flow into receiving water or other points of disposal.

PEAK
The maximum quantity that occurs over a relatively short period of time. Also called peak demand or peak load.

RAINFALL INTENSITY
The amount of rain falling over a specified period of time. Rainfall intensity is usually measured in inches per hour.

RATIONAL FORMULA
The method used to determine the amount of runoff from a specified area of known surface characteristics.

RECORD DRAWING
A survey shown on a plan or drawing prepared by a Registered Surveyor in Ohio indicating the actual dimensions, elevations, and locations of any structures, underground utilities, swales, storm water facilities, and sewage treatment facilities after construction is completed.

RUNOFF COEFFICIENT
A coefficient used in the Rational Formula to express the ratio of runoff to rainfall.

SANITARY WASTEWATER

A. Domestic wastewater with storm and surface water excluded.

B. Wastewater discharging from the sanitary conveniences of dwellings (including apartment houses and hotels), office buildings, industrial plants, or institutions.

C. The water supply of a community after it has been used and discharged into a sewer.

SEDIMENT
Solid material both mineral and organic, that is in suspension, is being transported, or has been moved from its site of origin by wind, water, gravity, or ice, and has come to rest on the earth's surface above or below sea level.

SEDIMENT BASIN
Barrier, dam, or other suitable detention facility built across an area of waterflow to settle and retain sediment carried by the runoff waters.

STORM WATERCONTROL PLAN
A written description, acceptable to the approving agency, of methods for controlling sediment pollution from accelerated erosion on a development area required to apply for Ohio EPA's General Permit Authorization for Storm Water Discharge Associated with Construction Activity Under the National Pollutant Discharge Elimination System.

SEDIMENT POLLUTION
Wind or water erosion of the soil or the degradation of the waters of the state by soil sediment in conjunction with land grading, excavating, filling, or other soil-disturbing activities on land used or being developed for commercial, industrial, residential, or other purposes.

SERVICE
The pipe carrying water to individual houses or other users on a distribution system.

TAILWATER
The vertical distance from a culvert invert at the outlet to the water surface downstream from the culvert.

TIME OF CONCENTRATION
The time required for water to flow from the hydrologically remote point of a basin to the outlet or collection point being analyzed. The time of concentration is the maximum time for water to travel through the watershed, which is not always the maximum distance from the outlet to any point in the watershed. The time of concentration for all drainage design for areas larger than 20 acres should be computed using the TR-55 method.

WATER RESOURCE
Any natural or unnatural body of water, swale, ditch, conduit, pond, lake, etc. that receives or transports storm water runoff.

300.00 ROADWAYS

300.01 General

All street design and layout shall follow the City of Hillsboro Construction Standards and Drawings, the Ohio Department of Transportation (ODOT) Location and Design Manual, Volume One, Roadway Design, latest version, and AASHTO. The most restrictive shall apply as determined by the City Engineering Department. These criteria cover design factors and provide guidelines for evaluations of plans and specifications by the City department having jurisdiction over the review of the plans and specifications. The design shall be consistent with the requirements of AASHTO and ODOT.

600.00 STORM DRAINAGE

600.1 General

The purpose of the regulation is to establish practical uniform design of storm sewers and retention/detention facilities for the City and to prevent the undue polluting of public waters by sediment from accelerated soil erosion and accelerated storm water runoff caused by earth-disturbing urban areas. Control of such pollution will promote and maintain the health, safety, and general well-being of all life and inhabitants herein the City.

Criteria herein cover design factors and provide guidelines for evaluation of plans and specifications by the City department having jurisdiction over the review of plans and specifications. These design criteria are also intended to conform to the standard drawings for storm sewers. Storm sewer design should follow these criteria first and secondly the Ohio Department of Transportation Location and Design, Volume Two, Drainage Design, if appropriate.

Neither submission of a plan under provisions of this article nor compliance with provisions of these regulations shall relieve any person from responsibility for damage to any person or property otherwise imposed by law, nor imposed any liability upon the City or its appointed representative for damage to any person or property.

If any clause, section, or provision of this resolution is declared invalid or unconstitutional by a court of competent jurisdiction, validity of the remainder shall not be affected thereby.

600.2 Soil Sediment Pollution Control Regulations

A. SCOPE

This shall apply to earth-disturbing activities on areas of land used or being developed for commercial, industrial, residential, recreational, public service, or other non-farm purposes which are within the City unless otherwise excluded within or unless expressly excluded by state law. A copy of the OEPA Notice of Intent (NOI) is to be supplied whenever one acre or more is disturbed.

B. STORM WATER CONTROL PLAN

Whenever one acre or more is disturbed, the City of Hillsboro requires that a storm water Control Plan be developed and implemented according to the requirements set forth in the most recent version of the Ohio Environmental Protection Agency's General Permit Authorization for Storm Water Discharges Associated with Construction Activity Under the National Pollutant Discharge Elimination System. The submittal shall also include applicable detention/retention basin calculations and pipe network flow calculations. Plans must include the following notes:

1. At the end of construction, all storm water pipes, basins, channels, etc. shall be cleaned out of all sediment accumulation and restored to the original design as shown per these plans.
2. Forty-eight hours prior to any earth disturbance work, the Contractor shall notify the City Engineer.
3. All mud/dirt tracked onto roads from the site, due to construction, shall be promptly removed at the end of the day.
4. No construction shall commence until all City of Hillsboro permits and connection fees have been issued as required.
5. Erosion control practices made of straw are not prohibited.
6. Clearing, grading, and equipment storage is prohibited within twenty-five feet of a ditch, channel, wetland,stream or other water feature's high water mark unless otherwise approved by the City Engineer.
7. Construction projects scheduled to last six months or more shall not use silt fence as perimeter protection; instead, Filltrex erosion control sock or similar protection shall be used.
8. Dewatering discharges shall not be directed into the City of Hillsboro's storm water system without prior approval of the Underground Utility Director.

C. SITE GRADING PLAN

Site grading plans shall be prepared with 1 foot existing and proposed contours showing all lots or lots having proper drainage. Site grading plans for developments shall also have proposed building pad elevations to ensure proper drainage of the development. Individual site plans within a development must conform to the subdivision drainage site plan.

600.3 Adequate Drainage Outlet

Surface water runoff from a development shall be drained offsite in accordance with the City of Hillsboro Design Criteria and Construction Standards and Drawings to an adequate outlet(s). The City Engineer shall approve the location of the outlet(s). The outlet(s) may consist of a ditch, stream, storm sewer, excluding a field tile, or approved detention basin having sufficient capacity to accommodate the surface water runoff in a reasonable manner that does not cause erosion or degradation of existing facilities. The Developer shall submit in writing evidence indicating the adequacy of the outlet(s) to at least and through the first drainage structure offsite of the proposed improvement. The City Engineer shall review and determine the adequacy of the drainage outlet and reserves the right to require the outlet(s) to be cleaned, reconstructed, and/or replaced as deemed necessary.

An adequate outlet is defined as an outlet functioning as designed and able to carry the existing flows as well as the proposed flows in the post development condition as described herein.

The lack of an adequate drainage outlet may be cause for disapproval of the plan.

600.4 Storm Sewer and Inlet Grate Design

An adequate storm drainage system shall be constructed for all proposed developments. Natural drainage areas should be closely followed.

Outlets for the storm water runoff for development upstream of the proposed developments must be provided. All storm sewer calculations must be submitted to the City before any approvals will be given.

Storm runoff from urban areas may constitute a large volume of flow. The rational method is the preferred method for estimating storm runoff for areas less than or equal to 200 acres.

Once the runoff is determined, the Manning Formula is the preferred method to calculate the capacity of the storm sewer pipes. Storm sewer shall be designed based on the full flow capacity of all pipes being able to carry at least the runoff from a 5-year storm event.

Also, the Hydraulic Grade Line (HGL) should be checked to ensure that a 25-year storm event will not cause ponding water at catch basins and manholes.

The drainage area(s) (watershed area) shall be determined by a review of, but not limited to, the sources listed below. Watershed area(s) are subject to the approval of the City Engineer. Existing watershed boundaries shall be maintained.

1. Contour Map: U.S. Geological Survey quadrangle (7.5 minute series) maps or other topographic contour map

2. Field investigation

3. Soil Survey of HIghland County, Ohio, USDA

4. Others approved for use by the City Engineer

Other methods for determination of peak runoff rates may be used upon approval from or by request of the City Engineer.

The design of storm sewers in the City shall be outlined as follows:

A. Prepare a contour map of the drainage area including the surrounding area, drainage limits, and direction of surface flow.

B. Divide the area into the subareas tributary to the proposed sewer inlets. These inlets should be located at reversals of road grade from negative to positive and at street intersections. A maximum distance of 300 feet between catch basins will be allowed along long street grades.

C. Determine the acreage and imperviousness of each area.

D. Calculate the required capacity of each inlet using the appropriate time of concentration, the tributary area and the rational method.

E. Beginning at the highest elevation, compute the flow to be carried by each line. The time of concentration for each line other than the first in a series is the sum of the time of concentration to the inlet next upstream and the flow time in the connecting pipe. Where more than two lines meet, the time of concentration to be used for the succeeding line is the longest time in the lines meeting. Each line will thus require calculation of time of concentration, tributary area (all upstream areas), and flow.

F. Select tentative pipe sizes and grades using the Manning Formula. Each line must be selected in order since the time of concentration for subsequent lines will be dependent upon the time of flow in all upstream lines.

G. Minimum cover requirements specified by ASTM specifications must be met.

H. Figure 6.4, Computation for Storm Sewer Design, may be used for storm sewer calculation.

600.5 Minimum Diameter

The minimum diameter of storm sewer pipe shall be 12 inches. The diameter shall be increased as necessary according to the design analysis.

600.6 Minimum Cover

The minimum cover over storm sewer pipe shall be 2 feet unless otherwise approved by the City Engineer. Cover is measured from the top of pipe to the finished grade directly above the pipe.

600.7 Minimum Slope

The minimum recommended slope for storm sewers shall be 0.10 feet per 100 feet, unless a greater slope is required to obtain the minimum mean velocity. Culverts may be installed on flatter grades as approved by the City Engineer.

600.8 Minimum Velocity

The absolute minimum mean velocity for all storm sewers shall be 2.0 feet per second when flowing full based on Manning's Formula using an "n" value of 0.013. Use of other "n" values will be considered if deemed justifiable on the basis of extensive field data. The desirable minimum velocity is 3.0 feet per second based on the same criteria.

600.9 Maximum Velocity

The maximum velocity of all storm sewers shall be 10 feet per second. If the velocity is greater than 10 feet per second, provisions should be made to protect against displacement and erosion of the pipe or as approved by the City Engineer.

600.10 Maximum Headwater

The maximum allowable headwater depth for culverts shall be 1 foot below pavement surfaces and/or finish floor elevations.

600.11 Manholes

Manholes or inlets shall be installed at the end of each line except at the discharge end; at all changes in grade, size, and alignment; and at all pipe intersections. Manholes shall be installed at distances not greater than 400 feet. Intervals of more than 400 feet may be approved in sewers 42 inches and larger. Manholes may be either poured-in-place or precast concrete. Concrete construction shall conform to ASTM C-478. Any changes of manhole or inlet placement shall be approved by the City Engineer.

The flow channel through manholes should be made to conform in shape, slope, and smoothness to that of the sewers.

All manhole covers shall be adjusted to grade by the use of no more than 12 inches of precast adjusting collars.

Manholes shall be consistent with those shown in the standard drawings.

600.12 Manhole Minimum Diameter

Manholes shall be constructed large enough to allow access to all sewers. The minimum diameter of manholes shall be 48 inches. Where large sewers require the use of manholes with diameters greater than 48 inches, the manhole shall be returned to the 48-inch diameter as soon as practical above the sewer crown. Manhole openings of 24 inches or larger are recommended for easy access with safety equipment and to facilitate maintenance.

600.13 Catch Basins

Curb inlets shall be placed at all low points, points of change to a flatter street grade, the dead end of descending streets, and at the Point of Curvature and Point of Tangency of all intersection radius curves where the street grade descends toward the radius curve and at all intersections. The basis for the design and spacing of curb inlets shall conform to the Bureau of Roads Hydraulic Engineering Circular No. 12, "Drainage of Highway Pavements".

Under normal conditions, curb inlets shall be placed on both sides of the street at intervals indicated by the street grade. Approximate spacing ranges from 150 feet to 300 feet maximum with an average of 250 feet spacing under normal conditions for the spread of flow-in gutters.

Catch basins not placed in the street shall be selected and placed so that they blend with the surrounding and not appear unsightly.

Curb inlets shall be placed on the property lines if at all possible. Driveway cuts shall not be placed at curb inlets.
Catch basin types shall be consistent with the types shown in the standard drawings.

600.14 Basis of Culvert Design

The basis of design for street and roadway culverts shall be the Ohio Department of Transportation's Location and Design Manual, Volume Two, Drainage Design.

Hydraulic analysis of culverts may also be performed utilizing Hydraulic Design Series No. 5, Hydraulic Design of Highway Culverts, Federal Highway Administration and Computer Program HY-8.

Design shall be based on a 25-year storm for full flow capacity and an overtopping capacity of at least a 100-year storm.

Culvert flow type must be determined for each culvert design. There are 2 types of culvert flow: Inlet Control and Outlet Control. This must be determined to help ensure proper culvert design.

Maximum allowable headwater shall be 1 foot below the low edge of the pavement. However, the designer should generally limit the maximum 100-year headwater depth to twice the diameter or rise of the culvert.

Tailwater conditions shall also be analyzed for all culverts. In some locations, a high tailwater will control the operation of the culvert. This condition can greatly effect the capacity and headwater of the culvert and shall be checked to help determine upstream design storm and storm water elevations.

600.15 Open Drainage Ditches

The basis of design for drainage ditches shall follow the *Grassed Swale* design criteria in the most current version of Ohio Department of Natural Resources Rainwater and Land Development Manual. Calculations of open ditch capacity should be provided to the reviewing agency along with the construction drawings.

600.16 Channel Protection

Channel protection material shall be placed at pipe outlets and other areas of high velocity flow to prevent erosion. The type, location and depth of the protective material shall adhere to the most current version of Ohio Department of Natural Resources Rainwater and Land Development Manual.

600.17 Storm Water Detention/Retention Size Requirements

It is recognized that in order to better serve the long-range interests of the City and the surrounding area, comprehensive basin-wide planning for runoff control should be formulated, adopted, and implemented. Comprehensive planning is far more beneficial than small, on-site detention areas, although on-site detention does provide protection and is acceptable for compliance.

Excluding development of a single family home not associated with a Planned Unit Development, all proposed developments which would increase the amount of onsite impervious area shall submit storm water detention calculations described herein. At the discretion of the City Engineer, proposed developments showing a required detention volume less than 1000 cubic feet may be exempted from the detention requirements. The Village reserves the option to require more stringent detention requirements based upon the estimated capacity of the existing storm sewers. All calculations must be submitted to the City for approval.

Design of storm water detention/retention facilities shall adhere to the following:

A. The Critical Storm for each specific development drainage area shall be determined according to the Ohio Storm Water Control Guidebook (ODNR, 1980)

B. Critical Storm calculations shall meet the following standards:

1. Calculations shall be based on the entire contributing watershed to the development area.
2. Curve numbers for the pre development condition may reflect any curve number from 10 years preceding application

C. The peak discharge rate of runoff from the Critical Storm and all more frequent storms occurring under post development conditions shall not exceed the peak discharge rate of runoff from a 1-year, 24-hour storm occurring on the same development drainage area under pre development conditions.

D. The peak discharge rate of runoff from storms of less frequent occurance (longer return periods) than the Critical Storm, up to the 100-year, 24-hour storm shall have peak runoff discharge rates no greater than the peak runoff rates from equivalent size storms under pre development conditions. The 1-, 2-, 5-, 25-, 50-, and 100-year storms shall be considered in designing a facility to meet this requirement.

E. Storage volume shall not be less than the storm runoff created by the post-developed site during a 100-year storm event.

An emergency overflow from the basin to a major storm system must be provided to protect the facility and adjacent properties. The designer should investigate the capacity of the downstream drainage facilities to determine if they will be adequate to handle the design flow from this particular development. If the downstream facilities are inadequate, it may be necessary to provide on-site retention or ponding basins to limit the flow to an amount which the downstream system can accept.

600.18 Detention Basin/Retention Basin Guidelines

A. RECOMMENDATIONS FOR DRY DETENTION BASINS

1. Where water quality during dry weather periods in a small basin would be a potential problem due to lack of adequate dry weather flow, direct pollution from surface water runoff, or high nutrients in the flow; the basin should be designed to remain dry except when in flood use.

2. Concrete low flow channels are prohibited unless the channel terminates a minimum of 30 feet from the basin's outlet. All basin inlets, including the end of concrete low flow channels, shall have an appropriately sized apron of stone to slow and disperse the storm water.

3. The detention basin may be designed to have a multi-purpose function. Recreational facilities, aesthetic qualities, wildlife habitat, etc., as well as flood water storage should be considered in planning the basin. Developers are encouraged to consider creating basins with bio retention features.

4. Side slopes shall be 3:1 or flatter.

5. There shall be a minimum of a 3-foot berm at 2% between right-of-way and top basin slopes.

B. RECOMMENDATIONS FOR BASINS CONTAINING PERMANENT WATER

1. In order to provide better management for water quality, retention basins containing permanent lakes should have a water area of at least one-half acre. The lake area should be an average depth of 5 feet to inhibit weed and insect growth. A system to augment storm flows into the lake with water from other sources should be provide to enhance the water quality, if necessary. These systems would include the use of public water supplies or wells on site.

2. In excavated lakes, the underwater side slopes in the lake should be stable.

3. A safety ledge 4 feet to 6 feet in width is recommended and should be installed in all lakes approximately 18 inches to 24 inches below the permanent water level to provide a footing if people fall into the water. In addition, there shall be a minimum of a 5 ft. berm at 2% slope beginning at least 1 foot above normal pond elevation. The slope between 2 ledges should be stable and of a material which will prevent erosion due to wave action (see Figure 6.6). Walkways consisting of a non-erosive material should be provided in areas where extensive population use tramples growth. One area in particular would be along the shoreline of a heavily fished lake. Side slopes above the berm shall be 3:1 or flatter.

4. Side slopes of the pool shall be 2:1 or flatter.

5. To obtain additional recreational benefits from developed water areas and provide for insect control, ponds may be stocked with fish. For best results, stocking should follow recommendations for warm water sport fishing by the Ohio Department of Conservation, Division of Fisheries, or similar organizations.

6. Periodic maintenance will be required in lakes to control weed and larval growth. The basin should also be designed to provide for the easy removal of sediment which will accumulate in the lake during periods of basin operation. A means of maintaining the designed water level of the lake during prolonged periods of dry weather is also recommended. One suggested method is to have a water hydrant near the pond site.

7. No rubble or construction refuse shall be disposed of at any time.

8. No pond with a permanent water elevation shall be placed within 1 mile of a runway approach or landing approach to an airport.

C. RECOMMENDATIONS COMMON TO EITHER DRY DETENTION BASINS OR RETENTION BASINS WITH PERMANENT WATER

1. All basins shall have an emergency overflow.

2. All excavated spoils should be spread so as to provide for aesthetic and recreational features such as sledding hills, sports fields, etc. Slopes of 6 horizontal to 1 vertical are recommended except where recreation uses call for steeper slopes. Even these features should have a slope no greater than 3 horizontal to 12 vertical for safety, minimal erosion, stability, and ease of maintenance.

3. When conduits are used for the outlet of the reservoir, they shall be protected by bar screens or other suitable provisions so that debris or similar trash will not enter the City storm water system.

4. Safety screens should also be provided for any pipe or opening to prevent children or large animals from crawling into the structures. For safety, a suggested maximum opening is 6 inches.

5. Grass or other suitable vegetative cover should be maintained throughout the entire reservoir area.

6. Debris and trash removal and other necessary maintenance should be performed in accordance to the Operation and Maintenance Agreement described herein.

D. INSPECTION OF BASINS

1. Prior to issuance of a Certificate of Completion, record drawings will be submitted for all basins to assure compliance with all applicable requirements.

2. The City may inspect all private detention basins and if problems exist, report these to the owner. The owner shall be given a reasonable amount of time to correct the problem, weather permitting.

3. The City shall perform such work as it deems necessary and charge owner if the owner fails to correct the problem.

DI. DETENTION BASIN OWNERSHIP

1. Detention basin maintenance and ownership shall remain private.

2. Owners will be responsible for routine maintenance of the development detention basin located on their lots. Grass mowing, ornamental landscaping, and fencing are considered routine maintenance. No activity which will interrupt the operation of the detention basin will be allowed. No accessory buildings or gardens will be permitted. The City will be responsible for major erosion control and fixed structures such as piping, manholes, and inlets, if covered under petition. This statement shall be added to each deed of transfer.

DII. SUBMERGED OUTLETS

Submerged outlets may be permitted provided a manhole is constructed between the outlet at the retention pond and the main storm system. This manhole must also be after the last pavement crossing. The invert elevation of the pipe into this manhole

will be at least 1 foot above the normal pool elevation. The slope of the basin at the outlet shall be no flatter than 2:1 to avoid siltation at the outlet. The manhole shall have a grated casting or, in some cases, may require being a manhole with a catch basin with windows frame and top.

G. OUTLET MATERIAL

Outlet structure materials shall be reinforced concrete and/or RCP pipe. Stainless steel plates shall be used if orifice size is smaller than available RCP sizes.

H. OPERATION AND MAINTENANCE AGREEMENT

Storm water facilities are infrastructure that requires maintenance. The City will not be responsible for maintaining private infrastructure. Prior to issuance of a Certificate of Certification, a signed Operation and Maintenance Agreement shall be submitted to the City by the party responsible for post construction operation and maintenance of the storm water facility. At a minimum, the Inspection and Maintenance Plan shall include a method and frequency for the following activities:

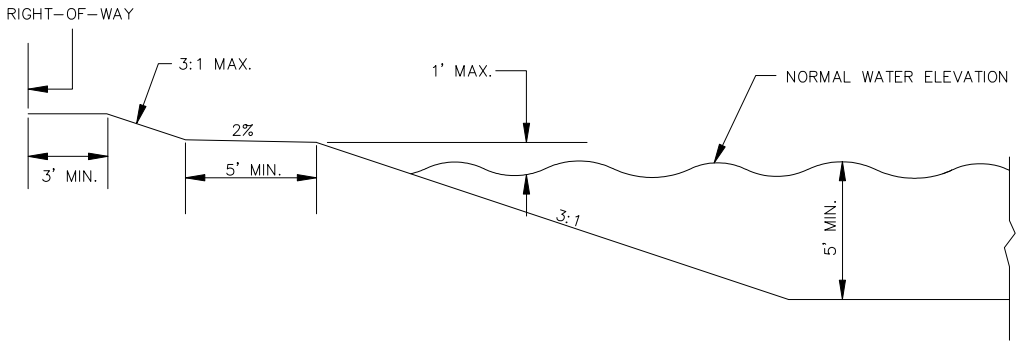
1. Inspection of all permanent structures,
2. Debris/clogging control through appropriate removal and disposal,
3. Vegetation control (mowing, harvesting, eradication of undesirable plants),
4. Erosion repair,
5. Non-routine maintenance should include pollutant and sediment removal and the "rejuvenation" or replacement of filters and appropriate soils, and
6. Disposal of collected pollutants, sediments, and filter media in accordance with local, state, and federal regulations.
7. Inspection and Maintenance Plans shall include language affirming the following:

    a. The City of Hillsboro has the authority and right to enter upon the development area to conduct inspections as necessary to verify that the storm water management practices are being maintained and operated in accordance with this regulation.
    b. Notice that the City of Hillsboro maintains public records of the results of site inspections for the period of time specified in the City of Hillsboro's record retention schedule, shall inform the site owner(s) or organization responsible for maintenance (by written notice served on the tax mailing address for the subject land) of the inspection results, and shall specifically indicate any corrective actions required to bring the storm water practices into proper working condition.
    c. If the City of Hillsboro notifies the site owner(s), or other entity responsible for maintenance, of maintenance deficiencies that require correction, the specific corrective actions shall be taken within thirty (30 days of the service of the notice; unless the City Engineer grants an extension of time to complete correcting deficiencies due to the impracticality of completing the correction of deficiencies within thirty (30) days.
    d. Maintenance deficiencies not corrected within thirty (30) days may be declared a public nuisance in accordance with Chapter 1323 of Hillsboro's codified ordinances.
    e. The method of funding long-term maintenance and inspections of all storm water management practices, facilities and improvements.

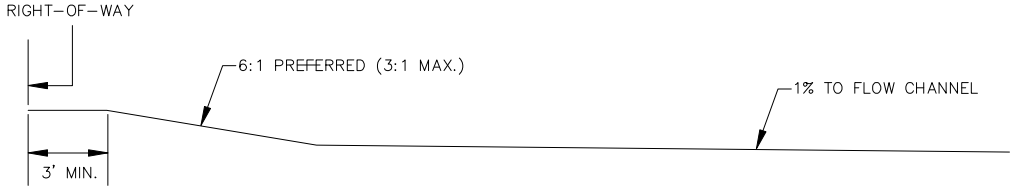
Figure 6.6

SLOPE DESIGN FOR STORM WATER STORAGE FACILITIES

RETENTION POND



DETENTION BASIN OR DRY BASIN



LOW FLOW CHANNEL–PAVED 0.5% GRADE MINIMUM TO 1% GRADE, REQUIRED

ALTERNATE–UNDERDRAINS WITH SOD IN LOW FLOW CHANNEL 1% GRADE OR GREATER

AS–BUILTS ARE REQUIRED.

600.19 Flood Routing Path

A. CAPACITY

The flood routing path is that part of the major storm drainage system that carries the runoff that exceeds the capacity of the designed drainage facilities. The major storm drainage system shall have the capacity to carry runoff from a storm with a return period of not less than 100 years without causing significant threat to property or public safety.

B. SURFACE FLOOD ROUTING PATHS

Generally, it is not economically feasible to size a storm sewer system to collect and convey more than the frequent storm runoff. Essentially, the complete drainage system of an urban area contains two separate drainage elements. While the storm sewers belong to the initial system, surface drainage ways must be provided for the major flow from more intense storms.

C. INTENT IN PROVIDING FLOOD ROUTING PATHS

The intent of planning for the major drainage element is to ensure storm water runoff which exceeds the capacity of the initial drainage system has a route to follow which will not cause a major loss of property or any loss of life. It should be remembered that the major drainage system exists even when it is not planned for and whether or not development exists in respect to it.

D. STREET RIGHTS-OF-WAY

Street rights-of-way are common choice for conveying major drainage flows. Such use must be anticipated when the street layout is established. Side and rear lot lines offer one alternative to the street. The problem with this alternative is the possibility of individual property owners encroaching on the major drainage easement. Rarely is the problem recognized until the frequent rainstorm occurs and the major system fails to operate properly.

Where the street is designated as the major drainage way, the depth of flow shall not exceed 12 inches at the gutter line for local and collector streets and the crown for arterial streets. The same maximum depth criteria will apply where a major drainage way crosses the street. Where a major drainage way is located outside a street right-of-way, easements shall be provided. All major storm routing easements shall be shown on the grading plan.

E. MULTI-PURPOSE FLOOD ROUTING PATHS

In order to protect the integrity of the non-street drainage rights-of-way, the consultant is encouraged to design flood routing paths for multi-purpose functions. Pedestrian and bicycle paths lend themselves naturally to this application. Linear parks aligned along the major drainage corridor are also very effective, but usually require greater width than would normally be necessary for drainage purposes.

F. MAJOR STORM RUNOFF

The major storm runoff is routed through the drainage system to determine if the combined capacity of the flood routing path and storm sewer system is sufficient.

600.20 Site Grading

A. CUTS AND FILLS

No land shall be graded, cut, or filled so as to create a slope exceeding a vertical rise of 1 foot for each 2½ feet of horizontal distance between abutting lots, unless a retaining wall of sufficient height and thickness is provided to retain the graded bank. Major cuts, excavation, grading, and filling, where the same material changes the site and its relationship with surrounding areas, shall not be permitted as such excavation, grading, and filling will result in a slope exceeding a vertical rise of 1 foot for each 2½ feet of horizontal distance between abutting lots or between adjoining tracts of land, except where adequate provision is made to prevent slides and erosion by cribbing and retain walls.

B. COMPACTION OF FILL

All fill shall be compacted to a density of 95% or greater. Inspection of fill shall be conducted by the City Engineer.

C. RETAINING WALLS

Retaining walls may be required whenever topographic conditions warrant or where necessary to retain fill or cut slopes within the right-of-way. Such improvements shall require the approval of the City Engineer.

D. FILLING OF EXISTING AREAS

No existing area shall be filled or graded to adversely affect adjoining properties, as determined by the City Engineer.

600.21 Runoff from Upstream Drainage Areas

The runoff from drainage areas upstream of the proposed development or improvement must be considered when designing a Storm Water Control Plan.

600.22 Runoff from Contiguous Properties

All site drainage shall be contained on-site. No land altering activity shall disperse runoff into areas adjacent to the area experiencing development.

600.23 Drainage Easement Criteria

A. An adequate easement shall be required along any storm sewer to be publically dedicated at project completion and not already within the street right-of-way. The easement shall be of sufficient width to allow cleaning, widening, deepening, and replacing or otherwise general maintaining of such drainage course.

Easements for flood routes (100-year) shall be established to 1 foot above the 100-year storm elevation.

B. When it is required to convey subsurface drainage or surface water outside the limits of the proposed improved area in order to discharge into an approved adequate outlet, it shall be the responsibility of the Developer to obtain easements or rights-of way for construction and maintenance of said drainage course.

C. All drainage easements shall be shown on the final plat and the "Final Engineering and Construction Plan". The drainage easements shall be recorded for public use, and the maintenance of such drainage courses shall be the responsibility of the property owners receiving direct benefit therefrom, unless otherwise provided. Drainage easement widths shall conform to the City Engineer's supplement to these Standards.

D. Where no direct access is provided to a drainage feature, an adequate access easement shall also be provided. The minimum width of any such easement shall be 15 feet.

Minimum Permanent Easement Width for all Storm Sewers

Depth (Feet)	Total Min. Width	* Min. Dist. C.L. Offset	Total Min. Width	* Min. Dist. C.L. Offset	Total Min. Width	* Min. Dist. C.L. Offset	Total Min. Width	* Min. Dist. C.L. Offset
	12-inch		**15-inch**		**18-inch**		**21-inch**	
2	25	10	--	--	--	--	--	--
3	30	11	30	12	30	12	30	12
4	30	12	30	12	30	12	30	12
5	30	12	30	12	30	12	30	12
6	30	12	40	12	40	12	40	12
7	40	12	40	12	40	12	40	12
8	40	12	40	12	40	12	40	12
9	40	12	40	12	40	12	40	12
10	40	12	40	13	45	13	45	13
	24-inch		**27-inch**		**30-inch**		**36-inch**	
3	30	12	--	--	--	--	--	--
4	30	12	30	12	30	12	30	13
5	30	12	30	12	30	12	40	13
6	40	12	40	12	40	12	40	13
7	40	12	40	13	40	13	40	13
8	40	13	40	13	40	13	40	13
9	40	13	45	13	45	13	45	13
10	45	13	45	13	45	13	45	13
11	45	13	45	13	45	13	45	13
	42-inch		**48-inch**		**54-inch**		**60-inch**	
5	35	13	35	13	--	--	--	--
6	35	13	35	13	35	14	35	14
7	35	13	35	13	35	14	35	14
8	45	13	45	14	45	14	45	14
9	45	14	45	14	45	14	45	14
10	45	14	45	14	45	14	45	14
11	45	14	45	14	55	14	55	15
12	55	14	55	14	55	14	55	15

*Minimum distance from centerline of pipe to either side of easement. Table values are in feet unless otherwise noted.

800.00 WATER DISTRIBUTION

800.1 General

The following Design criteria are summarized herein to establish practical, uniform design of water distribution systems for the City. These criteria cover design factors and provide guidelines for evaluation of plans and specifications by the City departments having jurisdiction over the review of plans and specifications. These design criteria are also intended to conform to the standard drawings for water systems. All improvements to the water distribution system shall be coordinated with the City Engineer's Office and the Superintendent of the Water Treatment Plant and/ or public works.

800.2 Basis of Design

The basis of design for water distribution systems shall be the Hazen-Williams Equation, an empirical formula for estimating pipe flow:

$$V = 1.318CR^{0.63}S^{0.54}$$

V = Velocity in feet per second
C = Roughness Coefficient
R = Hydraulic Radius (pipe diameter in feet for pipes flowing full) in feet
S = Head loss per unit length of pipe

Distribution systems shall be designed for the estimated maximum day rate of flow, or the fire flow plus the estimated average day rate of flow, whichever is more demanding. Selection of a roughness coefficient shall be coordinated through the City Engineer.

800.3 Minimum Pressure

The minimum desirable pressure in the water distribution system, at times of no fires, shall be 50 pounds per square inch in all mains, and 8 pounds per square inch at the most remote house fixture in the system. The minimum fire flow for design purposes shall be 600 gallons per minute at a residual pressure of 20 pounds per square inch.

800.4 Maximum Velocity

The maximum velocity of the water in the system shall be 10 feet per second.

800.5 Water Mains

The value of C to be used in the Hazen-Williams Equation shall be C=130. The minimum size of water mains shall be 6 inches in diameter. Dead-ending mains shall be minimized by looping of all mains. In the event the City permits a dead-end, they should be provided with a fire hydrant for flushing purposes.

The minimum depth of water mains shall be 4 feet, 6 inches from the top of the pipe to the finished grade elevation. The maximum depth of water mains shall be 6 feet from the top of the main to the finished grade elevation, except where utilities must be underpassed or as directed by the City.

800.6 Water Service Lines

The value of C to be used in the Hazen-Williams Equation shall be C = 130. The minimum diameter of service lines shall be 1 inch. Table 8.1 lists required minimum service sizes as determined by residential population. Fire hydrant services shall have a minimum diameter of 6 inches, but shall be no larger than the water main. For all ¾-inch through 2-inch services, a corporation stop shall be installed on the main at a 45° angle above horizontal. For services larger than 2 inches, a tapping sleeve and valve must be installed.

TABLE 8.1

MINIMUM SIZE -- WATER SERVICES AND METERS
RESIDENTIAL AREAS

No. of Families	Service Size (inches)	Meter Size (inches)
1	3/4	5/8 x 3/4
2-5	1	1
6-8	1-1/2	1 1/2
9-12	2	1 1/2
13-20	2	2
21-50	4	3
51-115	4	4

800.7 Meter Installation

When not completed by the City Water Department, meter installation for individual services shall be consistent with the standard drawings. Table 8.2 lists required meter sizes as determined by Maximum Flow Demand for Commercial-Industrial Applications. Meters must be installed prior to connecting the service to the main and before service starts. No common meters will be approved. All plans shall indicate meter and service stop location with a note stating "Location shall be coordinated with City Water Dept.

TABLE 8.2

METER SIZE FOR COMMERCIAL-INDUSTRIAL APPLICATIONS

Maximum Flow Demand (GPM)	Meter Size (inches)
20	5/8 x 3/4
30	3/4
50	1
100	1 1/2
160	2
320	3
500	4
1000	6

800.8 Backflow Prevention

As a condition for water service, all commercial, industrial and residential services as required by the Ohio Environmental Protection Agency shall be protected from backflow and/or backsiphonage. Additionally, all cross connections to auxiliary potable or non-potable or hazardous water systems as outlined in Ohio EPA regulations Chapter 3745-95 or the latest revision thereof, must be protected in a manner approved by the City.

A. GENERAL PROVISIONS

1. Boiler Heating Systems

   All boiler heating systems shall be protected at a minimum with a device conforming to ASSE 1013. Additionally, all protected water heating systems whether domestic, HVAC or process shall be protected from thermal expansion through installation of a device for controlling pressure as specified in Ohio Plumbing Code: Sec. 607.3.2.

2. Lawn Irrigation Systems

   All connections made to lawn irrigation systems shall be protected at a minimum with a device conforming to ASSE 1015 or ASSE 1020. All connections made to lawn irrigation systems where chemicals are added shall be protected at a minimum with a device conforming to ASSE 1013.

3. Use of Yard Hydrants

   The use of yard hydrants having drip-openings below ground surface connected to the City public water supply is prohibited unless such hydrants are fitted with approved devices to prevent the entrance of ground water into chambers connected with the public water supply. The following models are approved for installation and do not require the use of a backflow prevention assembly.

   - American, Model 126 & 226
   - Eclipse Freeze Flow Model
   - Murdock Accello (Sanitary Post Type)
   - Woodford, Model S3 & Model S4
   - Campbell J3
   - Simmons 6804

4. Auxiliary Water Supplies

   An auxiliary water supply for domestic, process or fire protection may only be interconnected with the consumer's piping through the means of an approved interchangeable connector. Approved interchangeable connectors include swing connectors and four-way valves. If the use of an interchangeable connector is approved by the Public Work's Superintendent, then an approved containment principle reduced pressure backflow preventer must be installed at the water meter and on the leg prior to the interchangeable connector that is supplying water from the consumer's water distribution system.

   Any premises that have an auxiliary water supply on or available to the premises must have a containment reduced pressure principle backflow prevention assembly installed at the water meter even though there is no intent to interconnect the two sources. This requirement also applies to private wells used for non-potable applications.

   In a residential application the public water service shall not be interconnected with an auxiliary water supply under any condition.

5. Temporary Water Service

   All temporary water services for construction or any other purpose shall be protected with a means of backflow prevention with prior approval from the Public Work's Superintendent.

6. Booster Pumps

   All booster pumps, domestic or fire protection, shall be installed and maintained in strict conformance with Ohio Administrative Code 3745-95-07.

B. APPROVED DEVICES

All backflow prevention assemblies must be listed on the Ohio Environmental Protection Agency's most current list of approved devices, be approved by the City and meet the requirements listed below prior to installation.

1. ASSE 1015 – Double Check Valve Assembly (3/4" – 2")

   A double check valve assembly shall be installed as required by the Water System Superintendent at each location. The body of the assembly shall be constructed of cast bronze. The assembly shall consist of two positive seating check modules with captured springs and rubber seat discs. The check module seats and seat discs shall be replaceable. Service of all internal components shall be top entry through access cover(s) secured with stainless steel bolts. The assembly shall also include two resilient seated isolation valves and four top mounted resilient seated test cocks. All connections to the body shall be NPT. The assembly shall meet the requirements of ASSE Std. 1015 and AWWA Std. C510. The double check valve assembly shall be a:

   - Watts Regulator Company Series 007
   - Febco Series 850
   - Or approved equal

2. ASSE 1013 – Reduced Pressure Principle Assembly (3/4" – 2")

   A reduced pressure zone assembly shall be installed as required by the Water System Superintendent at each location where a potential health or system hazard exists to prevent backflow due to backsiphonage and/or backpressure. The body of the assembly shall be constructed of cast bronze. The assembly shall consist of a pressure differential relief valve located in a zone between two positive seating check valves. Backsiphonage protection shall include a provision to admit air directly into the reduced pressure zone via a separate channel from the water discharge channel, or directly into the supply pipe via a separate vent. The assembly shall include two tightly closing shutoff valves before and after the assembly, test cocks and a protective strainer upstream of the No.1 shutoff valve. All bolts used to secure access covers shall be stainless steel. All connections to the body shall be NPT. The assembly shall meet the requirements of ASSE Std. 1013 and AWWA Std. C511-92. The reduced pressure principle assembly (RPZ) shall be a:

   - Watts Regulator Company Series 909QTS
   - Febco Series 825Y
   - or approved equal

3. ASSE 1020 – Anti-Siphon Pressure Vacuum Breaker (3/4" – 2")
   An anti-siphon pressure vacuum breaker assembly shall be installed as required by the Public Work's Superintendent at each location to prevent back siphonage of contaminated water into the City of Hillsboro Public Water System. This assembly is not to be used where there is a possibility that a back pressure condition may develop. The body of the assembly shall be constructed of cast bronze. The assembly will incorporate an acetal bonnet with silicone rubber O ring seal and silicone rubber seat disc. The valve shall have replaceable seats. Check assembly shall be guided over its full stroke by "V" notched guides. The assembly shall include two tightly closing shutoff valves before and after the assembly and test cocks. All bolts used to secure access covers shall be stainless steel. All connections to the body shall be NPT. The assembly shall meet the requirements of ANSI/ASSE Std. 1020. The anti-siphon pressure vacuum breaker assembly shall be a:
   - Watts Regulator Company Series 800M4QT
   - Febco Series 765
   - or approved equal

4. ANSI A112.1.2 – Air Gap Separation (All Sizes)
   An air gap separation shall be installed as required by the Public Work's Superintendent at each location to prevent cross-connection contamination where the potential for severe health risks including death or significant morbidity. This separation shall be an unobstructed vertical distance through the atmosphere and shall be equal to two times the effective diameter of the water supply outlet piping, but not less than one inch. For installations where the outlet is a distance of twice the effective opening from a wall or obstruction, the air gap vertical separation shall be extended to three times the effective opening. For installations where the outlet is near two intersecting walls, the air gap vertical separation shall be extended to four times the effective opening. Air gap vertical separation shall be measured from the lowest point of the outlet to the flood rim level of the vessel being filled. Air gaps shall not be installed in area where toxic gases are present and may be drawn into the supply piping. All air gap separations shall meet the requirements of ANSI Std. A112.1.2.

5. Domestic and Irrigation Service Protection in Excess of 2"

   All domestic and irrigation containment devices in excess of 2" shall be approved through the Public Work's Superintendent on a case-by case basis.

6. Fire Protection System Devices (All Sizes)
   All fire protection and private fire hydrant mains shall be protected from backflow and backsiphonage conditions with a minimum of an ASSE 1048, Double Detector Check Assembly. All fire protection and private fire hydrant mains determined by the Public Work's Superintendent to be of high hazard to the potable water supply shall be protected at a minimum of an ASSE 1047, Reduced Pressure Detector Assembly. All backflow prevention assemblies

installed on fire protection or private fire hydrant mains are subject to the approval of the City of Hillsboro Fire Chief.

a) ASSE 1048 – Double Detector Check Assembly (All Sizes)

A Double Detector Check Assembly shall be installed on all fire protection systems and private fire hydrant mains as required after determination of the degree of hazard by the Public Work's Superintendent is less than high. The backflow preventer shall be a complete assembly including UL listed resilient seated OSY shutoff valves and four test cocks. The test cocks located on the backflow preventer shall be mounted at the top of the valve to reduce clearance problems and to assist in the evacuation of air from the assembly. The assembly shall consist of two independently operating modular poppet-type check valves. The check valves shall utilize captured springs and shall have replaceable seats. The check valves shall be double- guided, both along the outside edge of the check module and through the center stem assembly. The seats shall be replaceable without the use of special tools. Seat retention shall be accomplished by the use of an interlocking bayonet-style cage and the use of threaded seats or seat screws is prohibited. Access to the internal check assemblies shall be through a single top entry cover. The cover shall be secured by stainless steel bolts. The unit shall be FM approved with FM approved resilient seated shutoff valves. The assembly shall include an auxiliary bypass line consisting of an approved ASSE 1015 – Double Check Valve Assembly and an approved water meter registering in gallons. The assembly shall be approved under the requirements of ASSE Std. 1048 and AWWA Std. C510-92. The Double Detector Check Assembly shall be a:

- Watts Regulator Company Series 007DCDA or 709DCDA
- Febco Series 856
- Ames 3000SS
- or approved equal

b) ASSE 1047 – Reduced Pressure Detector Assembly (All Sizes)

A Reduced Pressure Detector Assembly shall be installed on all fire protection systems and private fire hydrant mains as required after determination of the degree of hazard by Public Work's Superintendent is high. The unit shall be a complete assembly including UL listed and FM approved OSY shutoff valves and four test cocks. The test cocks located on the backflow preventer shall be mounted at the top of the valve to reduce clearance problems and to assist in the evacuation of air from the assembly. Backsiphonage protection shall include a provision to admit air directly into the reduced pressure zone via a separate channel from the water discharge channel, or directly into the supply pipe via a separate vent. All bolts used to secure access covers shall be stainless steel. The assembly shall include an auxiliary bypass line consisting of an approved ASSE 1013 – Reduced Pressure Principle Assembly and an approved water meter registering in gallons. The assembly shall be approved under the requirements of ASSE Std. 1047 and AWWA Std. C511-92. The

Reduced Pressure Detector Assembly shall be a:

- Watts Regulator Company Series 909RPDA
- Febco Series 826YD
- Ames 5000SS
- or approved equal

C. INSTALLATION

Upon approval of the Public Work's Superintendent to install a backflow prevention assembly, the City shall allow the specified device to be installed by a competent installer that is competent and licensed to install backflow prevention devices as prescribed by the Ohio Department of Commerce. All installations shall be performed at the consumer's expense.

1. ASSE 1015 / ASSE 1048 – Double Check Valve Assembly / Double Detector Check Assembly (All Sizes)

   All domestic, irrigation, fire protection and private fire hydrant main double check valve assemblies and double detector check assemblies shall be installed at the consumer's expense by those installers registered with the Ohio Department of Commerce only after the approval of the Public Work's Superintendent. All double check valve assemblies and double detector check assemblies shall be installed according to the manufacturer's installation recommendations. Unless otherwise noted, all double check valve assemblies shall be installed in a horizontal position. All double check valve assemblies and double detector check assemblies shall be installed in a location that is not susceptible to freezing conditions and is easily accessible by City Water System Staff to inspect the said assembly at all times. All double check valve assemblies and double detector check valve assemblies shall be installed at a minimum of 12" and a maximum of 36" from the floor. All test cocks shall be pointed toward the inside of the room if side mounted. All double check valve assemblies and double detector check valve assemblies shall be installed downstream of the water meter and upstream of the first fixture as to serve as a containment device. Any bypass, manifold, parallel, dual or tandem setting shall be protected with equal or greater protection as the domestic, irrigation or fire service. Initial testing of the said assembly shall be performed at the time of installation by the installer upon installation and a report shall be submitted to the Public Work's Superintendent within 30 days of installation. All double detector check assembly installations for the purpose of fire protection are subject to the approval of the City of Hillsboro Fire Chief.
2. ASSE 1013 / ASSE 1047 - Reduced Pressure Principle Assembly / Reduced Pressure Detector Assembly (All Sizes)

   All domestic, irrigation, fire protection and private fire hydrant main reduced pressure principle assemblies and reduced pressure detector assemblies shall be installed at the consumer's expense by those installers registered with the Ohio Department of Commerce only after the approval of the Public Work's Superintendent. All reduced pressure principle assemblies and reduced pressure detector assemblies shall be installed according to the manufacturer's

installation recommendations. Unless otherwise noted, all reduced pressure principle assemblies and reduced pressure detector assemblies shall be installed in a horizontal position. All reduced pressure principle assemblies and reduced pressure detector assemblies shall be installed in a location that is not susceptible to freezing conditions and is easily accessible by City Water System Staff to inspect the said assembly at all times. All reduced pressure principle assemblies and reduced pressure detector assemblies shall be installed in an area that is not susceptible to flooding or toxic gases. All reduced pressure principle assemblies and reduced pressure detector assemblies shall be installed at a minimum of 12" and a maximum of 36" from the floor. All test cocks shall be pointed toward the inside of the room if side mounted. All reduced pressure principle assemblies and reduced pressure detector assemblies shall have a permanent air gap separation affixed to the relief valve port. All reduced pressure principle assemblies and reduced pressure detector assemblies shall be installed downstream of the water meter and upstream of the first fixture as to serve as a containment device. Any bypass, manifold, parallel, dual or tandem setting shall be protected with equal or greater protection as the domestic, irrigation or fire service. Initial testing of the said assembly shall be performed at the time of installation by the installer upon installation and a report shall be submitted to the Public Work's Superintendent within 30 days of installation. All reduced pressure detector check assembly installations for the purpose of fire protection are subject to the approval of the City of Hillsboro Fire Chief.

3. ASSE 1020 – Anti-Siphon Pressure Vacuum Breaker (All Sizes)

   All domestic and irrigation anti-siphon pressure vacuum breaker assemblies shall be installed at the consumer's expense by those installers registered with the Ohio Department of Commerce only after the approval of the Public Work's Superintendent. All anti-siphon pressure vacuum breaker assemblies shall be installed according to the manufacturer's installation recommendations. All anti-siphon pressure vacuum breaker assemblies shall be installed in an upright position. All anti-siphon pressure vacuum breaker assemblies shall be installed in a location or manner that is not susceptible to freezing conditions and is easily accessible by City Water System Staff to inspect the said assembly at all times. All anti-siphon pressure vacuum breaker assemblies shall be installed in an area that is not susceptible to flooding or toxic gases. All anti-siphon pressure vacuum breakers shall be installed at a minimum of 12" above the highest point of downstream usage or elevated piping. All anti-siphon pressure vacuum breaker assemblies shall be installed in a manner and conditions where the potential for backpressure does not exist. All anti-siphon pressure vacuum breaker assemblies shall be installed with a shut-off upstream and downstream of the body. All test cocks shall be pointed in a manner as to allow for ease of testing the said assembly. All anti-siphon pressure vacuum breaker assemblies shall be installed downstream of the water meter and upstream of the first fixture as to serve as a containment device. Any bypass, manifold, parallel, dual or tandem setting shall be protected with equal or greater protection as the domestic or irrigation service. Initial testing of the said assembly shall be performed at the time of installation by the installer upon installation and a report shall be submitted to the Water

System Superintendent within 30 days of installation.

4. ANSI A112.1.2 – Air Gap Separation (All Sizes)

All domestic, irrigation and fire service air gap separations shall be installed at the consumer's expense by those installers registered with the Ohio Department of Commerce only after the approval of the Public Work's Superintendent. All air gap separations shall be installed according to Public Work's 112.1.2. The distance of the air gap separation shall be the unobstructed vertical distance through the atmosphere and shall be determined by the minimum effective diameter of the water supply outlet piping. All air gap separations shall be installed in a location or manner that is not susceptible to freezing conditions and is easily accessible by City Water System Staff to inspect the said separation at all times. All air gap separations shall be installed in an area that is not susceptible to flooding or toxic gases. All air gap separation outlets shall be solid piping and not have any threaded or other means of attaching hoses or additional piping to defeat the separation. All air gap separations shall be installed downstream of the water meter and upstream of the first fixture as to serve as a containment device. Any bypass, manifold, parallel, dual or tandem setting shall be protected with equal protection as the domestic, irrigation or fire service. The required separation shall be determined by the Public Work's Superintendent and initial testing shall be performed by the installer upon installation and a report shall be submitted to the Public Work's Superintendent within 30 days of installation.

D. INSPECTION, TESTING, AND MAINTENANCE

All backflow prevention assemblies including air gap separations shall be tested and certified upon installation as a condition of water service. This testing shall be performed by a competent individual who is certified by the Ohio Department of Commerce to test backflow prevention devices. All backflow prevention assemblies shall also be retested annually between July 1 and September 31 by an individual meeting the previously stated requirements. Upon testing the said device, a backflow prevention device inspection form shall be submitted to the Public Work's Superintendent within 30 days. All backflow prevention devices shall be dismantled, inspected internally, and rebuilt every 36 months from the time of installation. Failure to follow this testing procedure as prescribed may result in termination of water service until correction.

900.00 SANITARY SEWERS

900.1 General

The following Design Criteria are summarized herein to establish practical, uniform design of sanitary sewers within the City of Hillsboro, Ohio. These criteria cover design factors and approved guidelines for evaluation of plans and specifications by the City departments having jurisdiction over the review of plans and specifications. These design factors are consistent with the requirements of the OEPA. If these design criteria should conflict in the future with the requirements of the OEPA, these criteria shall be modified to conform to their requirements. These design criteria are also intended to conform to the standard drawings for sanitary sewers.

900.2 Minimum Velocity

All sanitary sewers shall be designed to give a mean velocity of at least 2.0 feet per second, when flowing full, based on Manning's Formula using an "n" value of 0.013. Use of other "n" values will be considered, if deemed justifiable, on the basis of extensive field data.

900.3 Maximum Velocity

The maximum velocity shall be 15 feet per second. If the velocity is greater than 15 feet per second, provisions should be made to protect against displacement. The provisions will be concrete collars, anchoring, and ductile iron pipe.

900.4 Minimum Grades

All sanitary sewers shall be designed to give a mean velocity of at least 2.0 feet per second when flowing full based on Manning's Formula. Values of "n" to be used with the Manning Formula vary from 0.010 to 0.015 with 0.013 recommended. Use of "n" values other than 0.013 may be considered if justified. Use of formulas other than Manning's Formula may be accepted. If plans are recommended for approval with a slope less than the minimum, the consulting Engineer must show justification for the recommendation and obtain approval from OEPA. See Table 9.1.

TABLE 9.1

REQUIRED MINIMUM SLOPE

Based on "n" Value of 0.013
Sewer Sizes - 8 through 36 inches

Sewer Size	Minimum Slope in Feet Per 100 Feet
8	0.40
10	0.28
12	0.22
15	0.15
18	0.12
21	0.10
24	0.08
27	0.067
30	0.058
36	0.046

900.5 Sanitary Sewers

The minimum size of sanitary sewer mains shall be 8 inches. All commercial sewer laterals shall be 6 inches (i.e.private lateral sewers for apartments, camps, schools, restaurants, and other semi-public operations), provided their hydraulic capacity is not exceeded because of short run-off periods (high peak flows). In multi-tenant buildings, individual services shall be provided to a common pipe, then to the main. All laterals are property owners responsibility to the center of mains.

The lateral connections shall be premium joint construction and should be made of the same material as the street sewer whenever possible to minimize infiltration from the connection between the street main and house lateral. When joint material and/or dimensions are not compatible, a commercial adapter shall be provided.

900.6 House Laterals

Four-inch sewer pipe may be used for house connections. The cover over the lateral coming out of the house shall be a minimum depth of 3 feet. The house connections shall be of premium joint construction and made of PVC schedule 40 pipe or SDR-35 and include back water valves. Cleanouts for laterals longer than 100 feet are required outside all structures or units. Individual meters shall be used for separate sanitary sewers. When joint material and/or dimensions are not compatible, a commercial adapter shall be provided. A copy of an ordinance or regulation requiring this type of construction must be on file with OEPA district office or submitted with all sewer plans to receive approval.

900.7 Invert Drop in Manhole

When a smaller sewer discharges into a larger one, the invert of the larger sewer should be lowered sufficiently to maintain the same energy gradient. An approximate method for securing this result is to place the 0.8 depth point of both sewers at the same

elevation or matching the top elevation of the pipes. When a larger sewer discharges into a smaller, the invert of the smaller should not be raised to maintain the same energy gradient.

900.8 Illegal Connections

Roof drains, foundation drains, sump pumps, yard drains, and all other clear water connections to the sanitary sewer are prohibited.

There shall be no physical connection between a public or private potable water supply system and a sewer or appurtenances thereto which would permit the passage of any sewage or polluted water into the potable supply.

900.9 Utility Separations

Sanitary sewers and sewage forcemains should be laid with at least a 10-foot horizontal and 18-inch vertical separation from any water main. This is enforceable for both main line and laterals. If a repair occurs with both water and sanitary in the same trench, the City will allow the utilities to remain in the same trench.

If it is impossible to maintain the 18-inch vertical separation when the sewer is laid closer than 10 feet to the water main, the sanitary sewer should be constructed of (or encased in) water main type materials (ductile iron is preferred) which will withstand a 50 psi water pressure test.

If a sewage forcemain is laid closer than 10 feet to a water main, in no case should the sewage forcemain be laid such that the crown of the sewage forcemain is less than 18 inches below the water main.

Sewers (or sewage forcemain) may be laid closer than 10 feet to a water main if it is laid in a separate trench and elevation of the crown of the sewer (or sewer forcemain) is at least 18 inches below the bottom of the water main

900.10 Crossing Utilities

Whenever a sanitary sewer and water main must cross, the sewer shall be laid at such an elevation that the crown of the sewer is at least 18 inches below the bottom of the water main. If it is absolutely impossible to maintain the 18-inch vertical separation, the sanitary sewer should be constructed of water main type material which will withstand a 50 psi water pressure test for a distance of 10 feet on both sides of the water main.

Whenever a sewage forcemain and water main must cross, the sewage forcemain is at least 18 inches below the bottom of the water main.

900.11 Manholes

Manholes shall be installed at the end of each line, at all changes in grade, size, alignment, and at all pipe intersections. Manholes shall be installed at a distance not greater than 400 feet for 8-inch to 15-inch and 350 feet for 15-inch or greater. Greater spacing may be allowed in larger sewers and in those carrying a settled effluent. Water-

tight castings are to be non-vented. Vented manholes will be determined by the Utility Supervisor.

The flow channel through manholes should be made to conform in shape, slope, and smoothness to that of the sewers.

All manhole covers shall be adjusted to grade by the use of no more than 12 inches of precast concrete adjusting collars. Metal adjustment rings will not be allowed. In areas outside the pavement, the manhole casting should be adjusted so that the top is slightly above grade to prevent the entrance of the surface water off pavement

900.12 Manhole Minimum Diameter

Manholes shall be constructed large enough to allow access to the sewer. The minimum diameter of manholes shall be 48 . Where manhole diameters of greater than 48 inches are used to accommodate the sewer pipes, the manhole shall be returned to a 48-inch diameter as soon as practical above the sewer crown. Manhole openings 24 inches or larger are recommended for easier access with safety equipment to facilitate maintenance.

900.13 Manhole Water Tightness

Manholes shall be constructed to permit casting adjustments by use of cast-in-place or precast concrete adjusting collars not to exceed 12 inches in height. Solid manhole covers shall be used in all pavement locations. In other areas, the manhole casting shall be adjusted so the top of the manhole cover is slightly above grade to prevent the entrance of the surface water. In areas subject to flooding, secured watertight and solid manhole covers should be used. All manhole covers, seating frames, and adapter rings shall be machined to a firm and even bearing to provide a true fit into the frames. Manholes shall be installed with chimney seals and water tight dishes.

Inlet and outlet pipes should be joined to the manhole with a gasketed and/or flexible watertight connection meeting ASTM Specification C-443. Where three or more manholes in sequence are to be constructed with solid, watertight covers, adequate ventilation shall be provided.

900.14 Flow Channel

The invert of the lowest pipe entering manhole shall be at least 3 inches (75 mm) above the top of the base slab so that the sewer flow channel maybe installed and shaped. The flow channel through manholes should be made to conform in shape, slope, and smoothness to that of the sewers.

Cut pipe shall not extend beyond the inside face of the manhole wall. Concrete placed inside the manhole to form the channel through the manhole shall not be placed between the pipe and the opening so as to interfere in any way with the flexibility of the joint.

900.15 Drop Manholes

Drop manholes shall be used when the invert of the inflow sewer is 2 feet or higher than the manhole invert. When this difference of elevation is less than 2 feet, the manhole invert shall be filled and channeled to prevent solids deposition.

Ductile iron pipe on "deep" manholes will be as directed by the City Engineer. Pre-cast drop structure at the base is required.

Due to the unequal earth pressure that would result from the backfilling operation in the vicinity of the manhole, the entire outside drop connection shall be encased in concrete.

Drop manholes shall be constructed with outside drop connection.

900.16 Test Inspection

The leakage and deflection tests are to be carried out by the contractor after 30 days of installation and witnessed and certified by the City officials and/or their representative.

900.17 Railroad and Highway Crossings

When boring is required, the casing pipe shall be designed to meet the requirements of the local authority having jurisdiction and in compliance with the City of Hillsboro Construction Standards and Drawings. The size of the casing pipe shall be at least 4 inches greater than the largest outside diameter of the sewer pipe, joints, or couplings.

900.18 Stream Crossings

A. LOCATION OF SEWERS IN STREAMS

1. Cover depth

The top of all sewers entering or crossing streams shall be at a sufficient depth below the natural bottom of the stream bed to protect the sewer line. In general, the following cover requirements must be met:

a) One foot of cover where the sewer is located in rock
b) Three feet of cover in other material. In major streams, more than 3 feet of cover may be required
c) In paved stream channels, the top of the sewer line should be placed below the bottom of the channel pavement.

Less cover will be approved only if the proposed sewer crossing will not interfere with the future improvements to the stream channel. Reasons for requesting less cover shall be provided in the project proposal.

2. Horizontal Location

Sewers located along streams shall be located outside of the stream bed and

sufficiently removed therefrom to provide for future possible stream widening and to prevent pollution by siltation during construction.

3. Structures

The sewer outfall, headwalls, manholes, gate boxes, or other structures shall be located so they do not interfere with the free discharge of flow through the stream.

4. Alignment

Sewer crossing streams should be designed to cross the stream as nearly perpendicular to the stream flow as possible and shall be free from change in grade. Sewer systems shall be designed to minimize the number of stream crossings.

B. CONSTRUCTION

1. Materials

Sewers entering or crossing streams shall be constructed of ductile iron pipe with mechanical joints; otherwise they shall be constructed so they will remain watertight and free from changes in alignment or grades. Material used to backfill the trench shall be stone, course aggregate, washed gravel, or other materials which will not readily erode, cause siltation, damage pipe during placement, or corrode the pipe.

2. Siltation and Erosion

Construction methods that will minimize siltation and erosion shall be employed. The design engineer shall include in the project specifications the method(s) to be employed in the construction of sewers in or near streams.
Such methods shall provide adequate control of siltation and erosion by limiting unnecessary excavation, disturbing or uprooting trees and vegetation, dumping of soil or debris, or pumping silt-laden water into the stream. Specifications shall require that cleanup, grading, seeding, and planting or restoration of all work areas shall begin immediately. Exposed areas shall not remain unprotected for more than 7 days.

900.19 Sewage Pumping Stations

A. General

1. When sewage pump stations are required, they shall be designed and installed per the following standards:

a) Great Lakes Upper Mississippi River Board (GLUMRB) (Ten States Standards) “Recommended Standards for Wastewater Facilities”, latest version.
b) Ohio Environmental Protection Agency’s latest requirements.

c) City of Hillsboro Design Criteria and Standard Construction Drawings.
d) All other applicable codes and regulations.

2. Flooding

The wastewater pumping station structures and electrical and mechanical equipment shall be protected from physical damage by the 100-year flood. Wastewater pumping stations should remain fully operational and accessible during the 25-year flood. Regulations of state and federal agencies regarding flood plain obstructions shall be followed.

B. Pump Station Type & Standard Requirements

Listed below are the standard requirements for pump stations in the City of Hillsboro. However, it is realized that certain situations may require other types of pump stations. It is highly recommended that early preliminary pumping station plans be submitted to the City for their approval prior to beginning final engineering.

2. Smith and Loveless Dog House Pump Stations

3. Electrical Installation

a) All electrical installations and components shall be designed and installed per the National Electric Code (NEC) and all other electrical codes.
b) All equipment and components shall be housed in NEMA 4X stainless steel enclosures.
c) Controls and other equipment shall be Square D, Allen Bradley, or equivalent, as approved by the City.
d) The cabinet shall be provided with a removable backplate on which all the components shall be mounted, with the exception of the H-O-A switches. The pump run lights shall be located on the outside door of the enclosure.
e) The pump control panel shall contain a circuit breaker, magnetic starter, hand-and-off-auto-selector-switch, run light, and seal leak indicating light for each pump.

f) There shall be furnished atop the control panel enclosure, a high water alarm flashing red light.
g) Ronk transfer switch and generator receptacle compatible with City of Hillsboro equipment shall be provided.

4. Liquid Level Control

Pumps shall be controlled by an electronic pressure switch.

5. Alarm Appurtenances

a) Alarm signal shall be initiated by liquid level control system and mercury type float switches which shall be connected to a telemetering alarm system.
b) Power failure relay: Provide relay with N.O. contacts for hook up to a telephone line to be de-energized and contacts closed when power to station is interrupted.
c) High wet well level alarm: Provide high water alarm for hook up to the telemetering system.

6. Guide System

a) System Design

1) Permit removal of pumping units for inspection or service without dewatering wet well or interrupting operation of other pump equipment.
2) Pumps, when lowered into place, to be automatically connected to discharge piping with positive seal.
3) Incorporate fabricated aluminum access frame with provisions for mounting guide rails and hooks to retain pump cables.

b) Guide Rails

Two lengths of stainless steel pipe with pilots; 2-inch Schedule 40, stainless steel (304) size per pump manufacturer's recommendation. Top and bottom pilots shall be Class 30 cast iron with flake glass/polyester coating.

c) Pump Guides

1) Fabricated from bronze for spark proof operation.
2) Attached to pump volute with 316 stainless steel hex head cap screws.

d) Lift Chain

Lift chain shall be 304 stainless steel, size to support pump with a 4 to 1 safety factor.

7. Wet Well Structure

a) The wet well shall be constructed of precast concrete sections conforming to ASTM C-478.

b) Wet Well Access

The door shall be of aluminum construction and have a handle, latch in the open position, and have a hasp for padlock. Surface shall be non- skid, diamond tread.

c) Vent

A vent with screen shall be installed in the top slab.

d) Hoist Stand

A hoist stand to fit existing pump hoist shall be mounted to the top slab to assure easy pump removal.

8. Piping and Valves

a) Materials

All piping and fittings beginning after the hydraulic sealing flange unit shall be 4-inch diameter ductile iron pipe with flanged joints. Pipe joints shall be flanged and conform with ANSI Specification A21.10 (AWWA C110) for cast iron pipe flanges and flanged fittings, Class 125.

b) Valves

1) Check valves to be 4" with outside lever and weight. Valves to be rated for 175 psi water working pressure and 350 psi hydrostatic test pressure.
2) Eccentric plug valve to be 4", specifically designed for sewage applications with 100% port opening. Valve to have cast iron with Buna-N rubber coating to minimize wear and corrosion. Seat rings to seal at 175 psi. Valves to have flanged ends (ANSI B16.1) and nut operator.
3) A guide disconnect assembly as shown on the plans shall be installed in the valve pit.

900.20 Forcemains

A. VELOCITY AND DIAMETER

At design pumping rates, a cleansing velocity of at least 2 feet per second should be maintained. The minimum forcemain diameter for raw wastewater shall be 4 inches.

B. AIR AND VACUUM RELIEF VALVE

An air relief valve shall be placed at high points in the forcemain to prevent air locking. Vacuum relief valves may be necessary to relieve negative pressures on forcemains. The forcemain configuration and head conditions should be evaluated as to the need for and placement of vacuum relief valves. Forcemains shall be installed to keep high points and low points to a minimum.

C. TERMINATION

Forcemains should enter the gravity sewer system at a point not more than 2 feet above the flow line of the receiving manhole.

D. PIPE AND DESIGN PRESSURE

Pipe and joints shall be equal to water main strength material suitable for design conditions. The forcemain, reaction blocking, and station piping shall be designed to withstand water hammer pressures and associated cyclic reversal of stresses that are expected with the cycling of wastewater pump stations.

E. DESIGN FRICTION LOSSES

Friction losses through forcemains shall be based on the Hazen-Williams formula o r other acceptable methods. When the Hazen-Williams formula is used, the value of "C" shall be 100 for unlined iron or steel pipe for design. For other smooth pipe materials such as PVC, lined ductile iron, etc., a higher "C" value not to exceed 120 may be allowed for design.

F. IDENTIFICATION

Where forcemains are constructed of material which might cause the forcemain to be confused with potable water mains, the forcemain shall be appropriately identified.

G. LEAKAGE TESTING

Leakage tests shall be required per the water main testing requirements as shown in the City of Hillsboro Construction Standards and Drawings.