

CITY OF HARVARD

INDEX OF ENGINEERING STANDARDS

EROSION CONTROL

- (E-1) Typical Section of a Stormwater Detention Pond Overflow Swale
- (E-2) Temporary Siltation Fence Detail
- (E-3) Temporary Triangular Silt Dike
- (E-4) Excelsior Blanket Installation Detail
- (E-5) Temporary Siltation Fabric Installation Between Inlet Frame and Grate
- (E-6) Rock Check Dam Detail
- (E-7) Drainage Swale/Ditch Detail
- (E-8) Type 1 Inlet Filter Assembly

ROADS/SIDEWALKS/MISC.

- (R-0) Miscellaneous Roadway Standards/Notes
- (R-1) Industrial/commercial Driveway Detail
- (R-2) Residential Driveway Approach Detail
- (R-3) Depressed Curb Entrance by Sawing (No Poured-in-Place Depressed Curbs)
- (R-4) Sidewalk Detail
- (R-5) Public Sidewalk and Handicapped Ramp Detail
- (R-6) Depressed Curb for Intersections
- (R-7) Residential Cul-de-sac Design and Construction Detail
- (R-8) Manhole Ramping Detail
- (R-9) Concrete Curb and Gutter Detail
- (R-10) Pavement Removal and Replacement
- (R-11) Parking Lot and Public Street Pavement Section
- (R-12) Pavement Structure and Required Roadway Widths (Edge-to-Edge Widths)
- (R-13) Required Right-of-Way Widths and Minimum Centerline Radius (Horizontal Alignment)
- (R-14) Harvard Street Sign Standards
- (R-15) Bituminous Surface Removal Butt Joint Detail
- (R-16) Benchmark Monument Detail

SANITARY SEWER

- (S-0) Miscellaneous Sanitary Standards/Notes
- (S-1) Building Service Riser Detail - Under 10'
- (S-2) Building Service Riser Detail - Over 10'
- (S-3) Sanitary and Monitoring Manhole Detail
- (S-4) Drop Manhole Detail (Inside Type)
- (S-5) Drop Manhole Detail (Outside Type)
- (S-6) Clean-Out Manhole Detail (Wye w/Plug - Laid Upright)
- (S-7) Clean-Out Manhole Detail (Tee w/Plug - Laid On Side)
- (S-8) Clean-Out Manhole Detail (Tee w/Plug - Laid Upright)
- (S-9) Air Release Manhole Detail
- (S-10) Manholes Frames and Covers (Type 1)

STORM SEWER

- (SS-1) Storm Inlet - Type A
- (SS-2) Catch Basin - Type A
- (SS-3) Catch Basin - Type C
- (SS-4) Omitted
- (SS-5) Restrictor Detail
- (SS-6) Storm Manhole - Type A
- (SS-7) Eccentric Flat Top for Storm Manholes
- (SS-8) Four Foot Inlet with Flat Top Over Existing Pipe
- (SS-9) Restrictor for Watershed Areas Less Than 20 Acres

UTILITY LOCATIONS

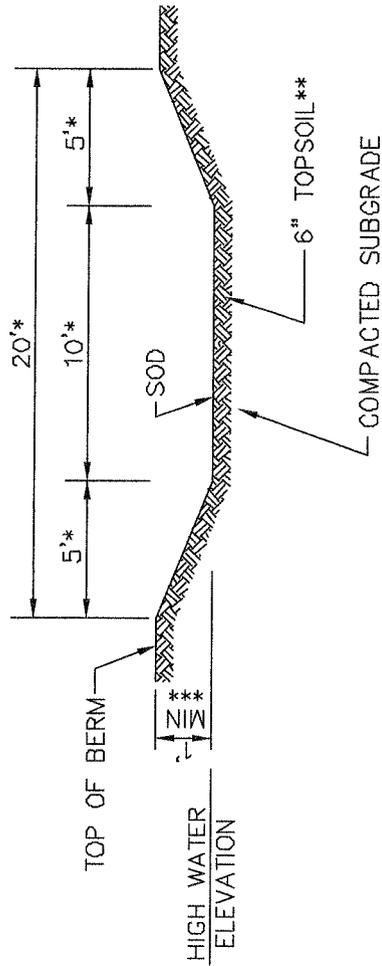
- (U-0) Miscellaneous Utility Notes/Required Easements
- (U-1) Street and Utility Locations (Typical Cross-Section)
- (U-2) Common Trench for Water and Sanitary Sewer Services
- (U-3) Trench Bedding/Backfilling Cross-Section
- (U-4) Water and Sewer Separation Requirements Detail - Page 1 of 2
- (U-5) Water and Sewer Separation Requirements - Page 2 of 2
- (U-6) Water Service and Sanitary Sewer Lot Location Detail
- (U-7) Utility Location Plan for Cul-de-sacs

WATER MAINS AND SERVICES

- (W-0) Miscellaneous Water Standards/Notes
- (W-1) Water Main Pressure Connection Detail
- (W-2) Thrust Block Installation
- (W-3) Curb Box Installation Detail
- (W-4) Water Valve Jumper Detail
- (W-5) Fire Hydrant Installation Detail
- (W-6) Water Main Lowering Detail
- (W-7) Omitted
- (W-8) Standard Valve Vault
- (W-9) Special Hydrant Connection for Limited Access Areas
- (W-10) Chloride Insertion Detail

INSPECTION

- (I-0) Miscellaneous Inspection Notes
- (I-1) Field Quality Control Procedures for Pavement Area Subgrade
- (I-2) Sanitary Sewer Testing Specifications
- (I-3) Water Main Testing Specifications



* DIMENSIONS SHALL BE ADJUSTED ACCORDINGLY TO UPSTREAM OFFSITE CONDITIONS PER THE DESIGN ENGINEER'S DRAINAGE CALCULATIONS.

** IF ADDITIONAL OFFSITE DRAINAGE AREA FLOWS THROUGH THE SITE, SURFACE CONDITION MAY BE 6" TO 8" SIZE RIP RAP. IF ONLY SITE FLOWS THROUGH THE DETENTION AREA THEN SODDING MAY BE SUFFICIENT. THE CONTRACTOR SHALL PROVIDE ADEQUATE EROSION PROTECTION TO KEEP SWALE FROM WASHING OUT.

*** DEPTH SHALL BE IN ACCORDANCE WITH WIER CALCULATIONS PER THE DESIGN ENGINEERS DRAINAGE CALCULATIONS.

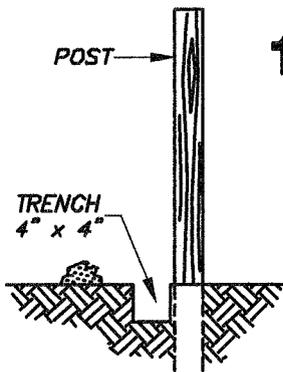
NOTE:
FABRIC COST IS CONSIDERED TO BE INCLUDED WITH THE SQ. YD. UNIT COST OF RIP RAP BEING INSTALLED

CITY OF HARVARD, ILLINOIS PUBLIC WORKS DEPARTMENT APPROVED 02-15-00	NO.	REVISIONS	DATE
		BY	
	1.	CML	1/96
	2.	WJH	9/04
	3.		
	4.		
	5.		

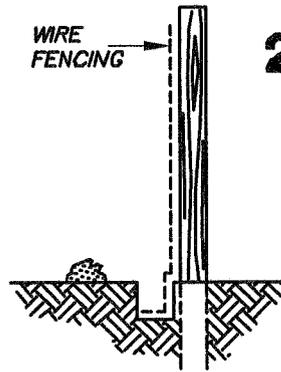
STORM WATER DETENTION POND
OVERFLOW SWALE DETAIL

MAINTENANCE

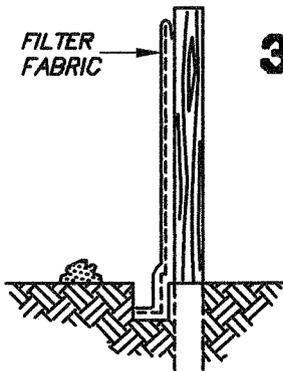
1. Filter barriers shall be inspected immediately after each rainfall and at least daily during prolonged rainfall. Any required repairs shall be made immediately.
2. Should the fabric decompose or become ineffective prior to the end of the expected usable life and the barrier still be necessary, the fabric shall be replaced promptly.
3. Sediment deposits should be removed after each storm event. They must be removed when deposits reach approximately half the height of the barrier.
4. Any sediment deposits remaining in place after the silt fence or filter barrier is no longer required shall be dressed to conform with the existing grade, prepared and seeded.



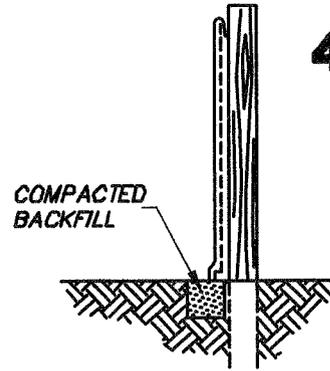
- 1.** SET POSTS AND EXCAVATE A 4" x 4" TRENCH UPSLOPE ALONG THE LINE OF THE POSTS.



- 2.** STAPLE THE WIRE MESH FENCING TO EACH POST

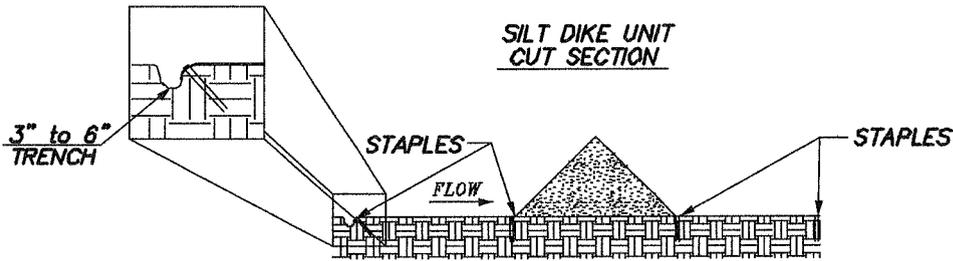
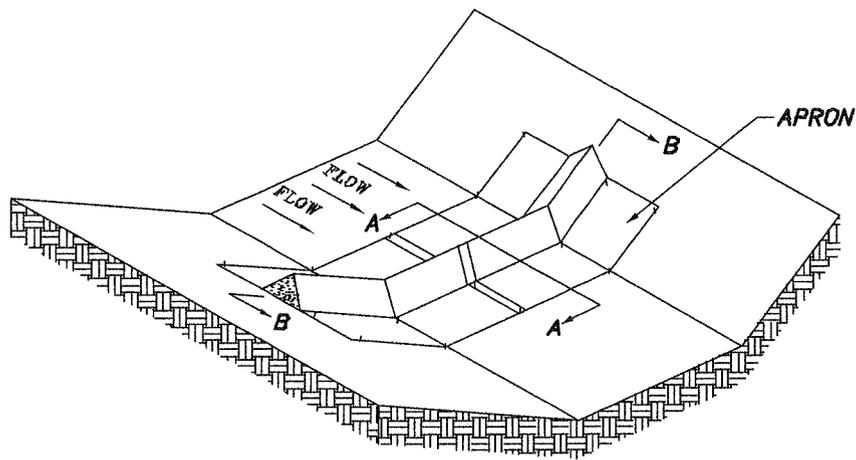


- 3.** ATTACH THE FILTER FABRIC TO THE WIRE FENCING AND EXTEND IT INTO THE TRENCH



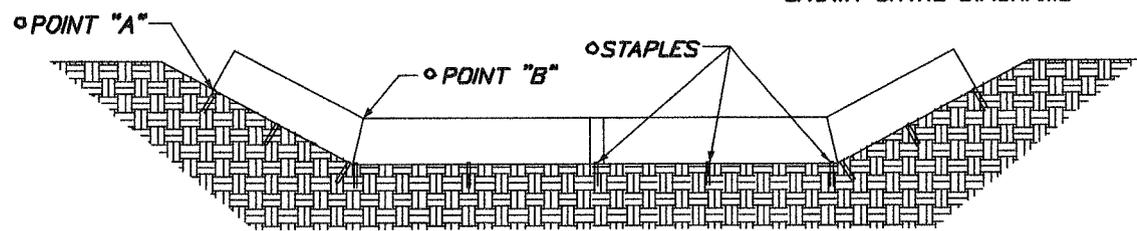
- 4.** BACKFILL THE TRENCH AND COMPACT THE EXCAVATED SOIL

CITY OF HARVARD, ILLINOIS	REVISIONS			
	NO.	BY	DATE	
PUBLIC WORKS DEPARTMENT	1.	CML	1/96	
APPROVED 02-15-00	2.	WJH	9/04	
	3.			TEMPORARY SILTATION FENCE DETAIL
	4.			
	5.			



DETAIL A-A

○ STAPLES SHALL BE PLACED WHERE THE UNITS OVERLAP AND IN THE CENTER OF THE 7' UNIT AS SHOWN ON THE DIAGRAMS



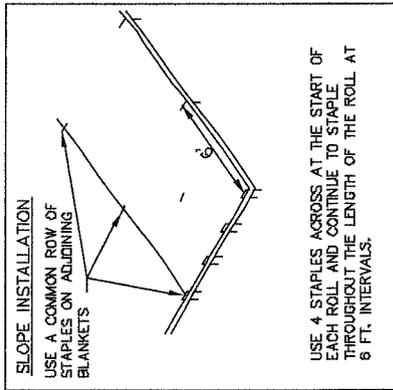
DIKE SECTION DETAIL B-B

○ POINT "A" MUST BE HIGHER THAN POINT "B" TO ENSURE THAT WATER FLOWS OVER THE DIKE AND NOT AROUND THE ENDS.

TEMPORARY SILT DIKES shall be triangular-shaped, having a height of at least eight to ten inches (8" - 10") in the center with equal sides and a sixteen- to twenty-inch (16" - 20") base. The triangular-shaped inner material shall be urethane foam. The outer cover shall be a woven geotextile fabric placed around the inner material and allowed to extend beyond both sides of the triangle two to three (2' - 3') feet. Standard length of each dike will be seven feet (7') unless otherwise indicated on the plans. The Dikes shall be attached to the ground with Wire Staples. The Staples shall be No. 11 gauge wire and be at least six to eight (6" - 8") inches long. Staples shall be placed as indicated on the installation detail.

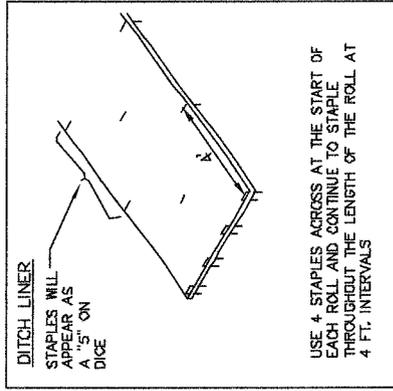
The Contractor shall inspect all dikes after each rainfall event of at least 0.5 inches or greater. Any deficiencies or damage shall be repaired by the Contractor. Accumulated silt or debris shall be removed and relocated as directed by the Engineer. If the Dikes are damaged or inadvertently moved during the silt removal process, the contractor shall immediately replace Dikes after damage occurs.

CITY OF HARVARD, ILLINOIS PUBLIC WORKS DEPARTMENT APPROVED 09-15-04	REVISIONS			TRIANGULAR SILT DIKE INSTALLATION DETAIL
	NO.	BY	DATE	
	1.			
	2.			
	3.			
	4.			
	5.			



SLOPE INSTALLATION
USE A COMMON ROW OF STAPLES ON ADJOINING BLANKETS

USE 4 STAPLES ACROSS AT THE START OF EACH ROLL AND CONTINUE TO STAPLE THROUGHOUT THE LENGTH OF THE ROLL AT 6 FT. INTERVALS.



DITCH LINER
STAPLES WILL APPEAR AS A "J" ON DICE

USE 4 STAPLES ACROSS AT THE START OF EACH ROLL AND CONTINUE TO STAPLE THROUGHOUT THE LENGTH OF THE ROLL AT 4 FT. INTERVALS

STAPLING INSTRUCTIONS FOR AMXCO CURLEX BLANKETS:
USE WIRE STAPLES .091" IN DIAMETER OR GREATER, "J" SHAPED WITH LEGS 6" IN LENGTH AND A 1" CROWN. SIZE AND GAUGE OF STAPLES USED WILL VARY WITH SOIL CONDITIONS. DRIVE STAPLES VERTICALLY INTO THE GROUND. USE FOUR STAPLES ACROSS AT THE START OF EACH ROLL. FOR SLOPE INSTALLATION, CONTINUE TO STAPLE ALONG THE LENGTH OF THE ROLL AT 6 FT. INTERVALS. FOR DITCH LINER, STAPLE ALONG THE LENGTH OF THE ROLL AT 4 FT. INTERVALS. ANOTHER ROW OF STAPLES IN THE CENTER OF EACH BLANKET SHOULD BE ALTERNATELY SPACED BETWEEN EACH SIDE FOR EITHER SLOPE OR DITCH. USE A COMMON ROW OF STAPLES ON ADJOINING BLANKETS.

INSTALLATION INSTRUCTIONS:

PROPERLY PREPARE, FERTILIZE AND SEED AREA TO BE COVERED BEFORE BLANKET IS APPLIED. WHEN THE BLANKET IS UNROLLED, NETTING SHOULD BE ON TOP AND FIBERS IN CONTACT WITH THE SOIL OVER THE ENTIRE AREA. IN DITCHES, APPLY BLANKETS IN THE DIRECTION THE WATER FLOWS, BUTTING THEM AT THE ENDS AND SIDES AND THEN STAPLING. ON SLOPES, APPLY BLANKETS EITHER HORIZONTALLY OR VERTICALLY TO SLOPE, BUTT ENDS AND SIDES AND THEN STAPLE. IT IS NOT NECESSARY TO DIG CHECK SLOTS, ANCHOR DITCHES OR BURY ENDS OF BLANKETS UNLESS CALLED FOR IN DESIGN SPECIFICATIONS.

ROLL SIZE

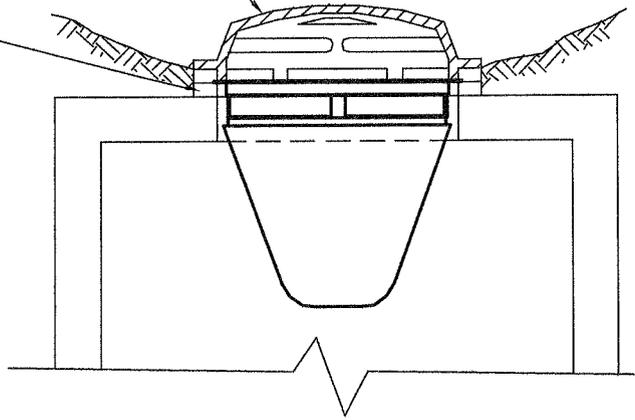
WIDTH 48 IN. (+/- 1 IN.)
LENGTH 180 FT. AVERAGE
WEIGHT PER ROLL 78 lbs. (+/- 10%)
SQUARE YARDS PER ROLL 80 AVERAGE

CITY OF HARVARD, ILLINOIS	NO.	REVISIONS BY	DATE
	1.	CML	1/96
PUBLIC WORKS DEPARTMENT	2.		
	3.		
APPROVED 02-15-00	4.		
	5.		

EXCELSIOR BLANKET INSTALLATION DETAIL

EJIW 6517 GRATE
 TYPE 1 FRAME - OPEN LIDS

MANHOLE
 ADJUSTING
 RINGS



SECTION THROUGH MANHOLE

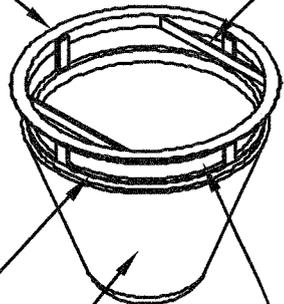
GALVANIZED STEEL FRAME

LIFT HANDLES

STAINLESS STEEL LOCKING BAND

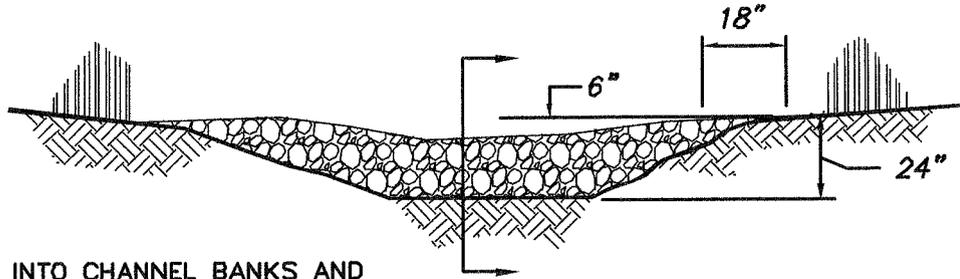
OVERFLOW FEATURE

GEOTEXTILE FILTER BAG
 WITH REINFORCED POLYESTER OUTER MESH



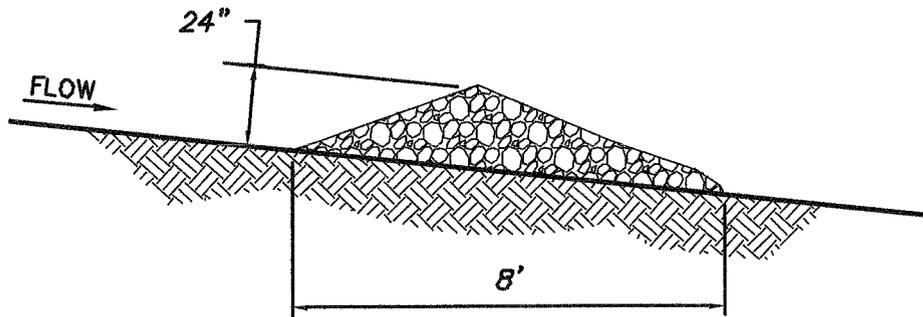
FILTER INSERT

CITY OF HARVARD, ILLINOIS	REVISIONS			TEMPORARY SILTATION FABRIC INSTALLATION BETWEEN INLET FRAME AND GRATE
	NO.	BY	DATE	
PUBLIC WORKS DEPARTMENT	1.			
APPROVED 09-15-04	2.			
	3.			
	4.			
	5.			

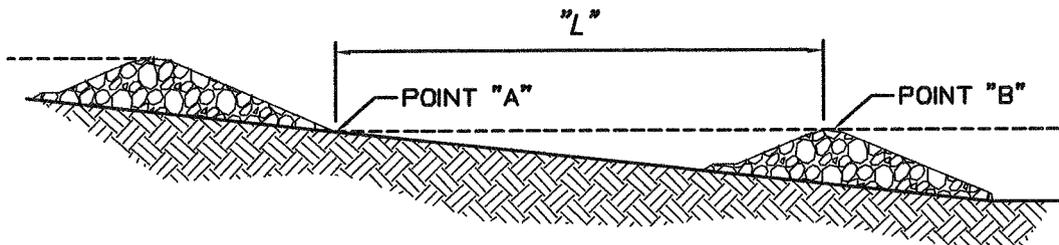


NOTE:
KEY STONE INTO CHANNEL BANKS AND
EXTEND IT BEYOND THE ABUTMENTS A
MINIMUM OF 18" TO PREVENT FLOW
AROUND DAM.

VIEW LOOKING UPSTREAM



SECTION A-A

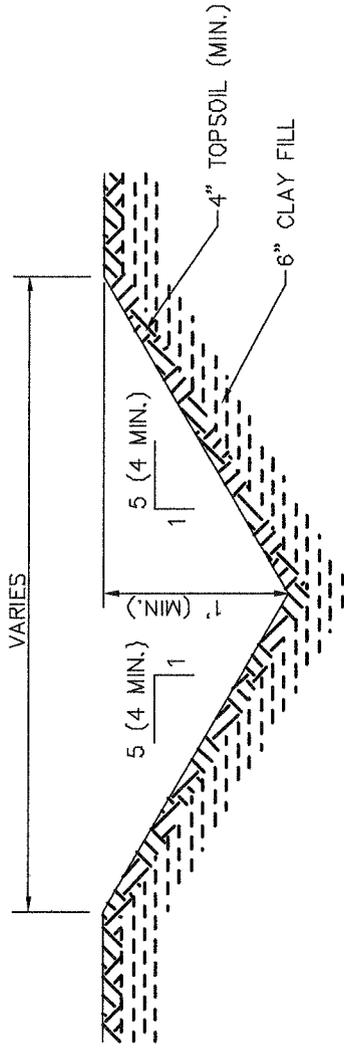


"L" = THE DISTANCE SUCH THAT
POINTS "A" AND "B" ARE OF
EQUAL ELEVATION.

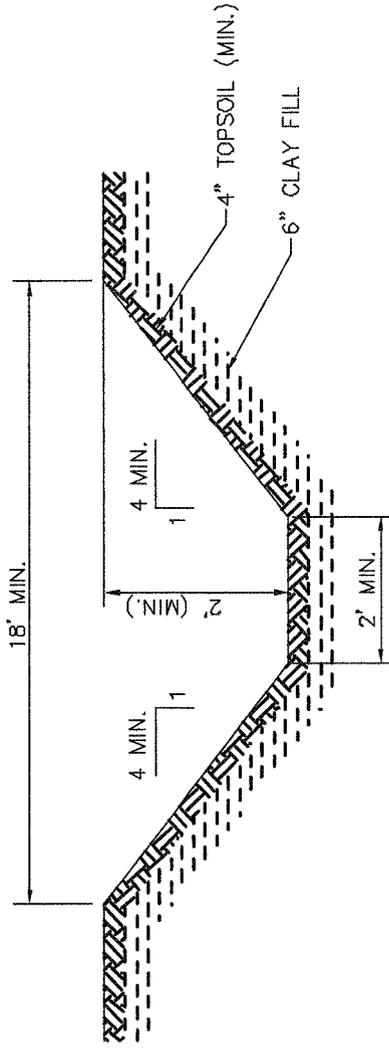
SPACING BETWEEN CHECK DAMS

CITY OF HARVARD, ILLINOIS PUBLIC WORKS DEPARTMENT APPROVED 09-15-04	REVISIONS			ROCK CHECK DAM
	NO.	BY	DATE	
	1.			
	2.			
	3.			
	4.			
	5.			

DRAINAGE SWALE



DRAINAGE DITCH



CITY OF HARVARD, ILLINOIS	NO.	REVISIONS	
		BY	DATE
PUBLIC WORKS DEPARTMENT	1	CML	1/86
APPROVED 02-15-00	2	WJH	9/04

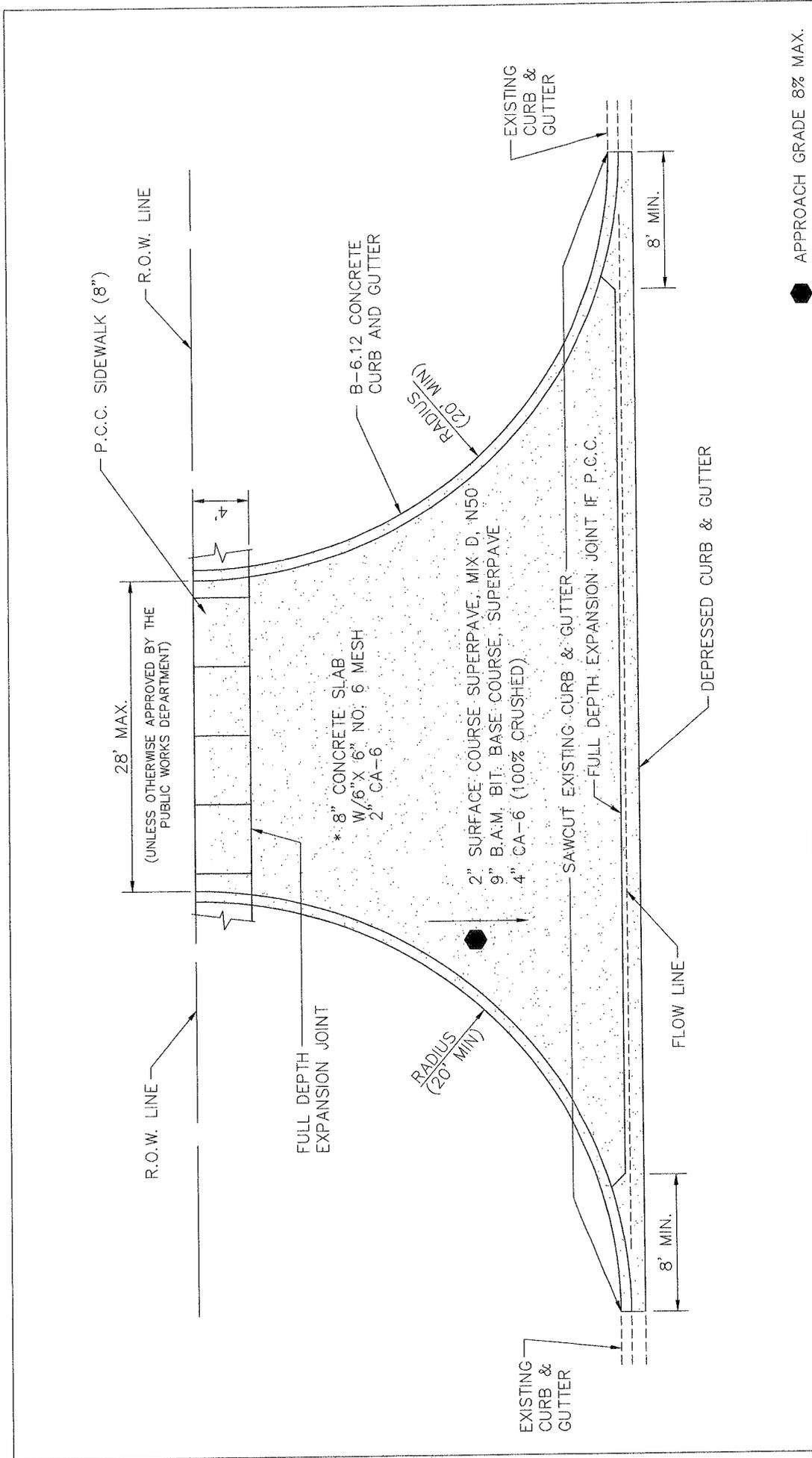
DRAINAGE SWALE DETAIL
DRAINAGE DITCH DETAIL

Miscellaneous Roadway Standards/Notes

1. All connecting roadway gradients with an algebraic difference of greater than 1 percent shall be connected with a vertical curve. All standards contained in AASHTO's "A Policy on Geometric Design of Highways and Streets," latest edition, regarding vertical curves shall be followed. A design speed of 40 mph shall be used on collector commercial/industrial roads and a design speed of 35 mph shall be used on local streets.
2. Street jogs with centerline offsets of less than 150' are not allowed on local roads. Offsets on collector roads are not allowed, and spacing between two cross streets on collector roads shall be no closer than 500'.
3. Gradients of streets shall be at least 0.6 percent and shall not exceed on:
 1. Collector commercial/industrial streets, five (5) percent;
 2. Minor streets, eight (8) percent.
4. Any pavement patches located within intersections will require the entire intersection, to radius returns on all the legs, to be milled and resurfaced with 2" bituminous concrete surface course.
5. Roadway cross-sections showing existing and proposed sections shall be provided at a scale of 1"=2'V, 1"=10'H for any existing roadway reconstruction and at a scale of 1"=5'V, 1"=10'H for new roadways.
6. One copy of the final engineering plans must be submitted to the City in digital format if technology is available. The format shall be a DWG format.
7. All Plats of Subdivision shall be submitted to the City on a 24" x 36" mylar for recording purposes. It shall also be submitted to the City in electronic format on a CD which can be read by an IBM compatible computer in .DWG format if technology is available. All coordinates shall be based upon State Plane Coordinates and shall tie to existing monuments as set by McHenry County and referenced on Control Diagram, dated September 30, 1991 prepared by MSE Surveying, or existing monuments set by the City of Harvard. The following specific electronic layers are required: the boundary, roadway centerline, property lines and roadway right-of-way must each be on a separate layer.
8. A minimum of two (2) permanent concrete bench mark monuments (see standard detail R-16) shall be established in all new residential, commercial, and industrial subdivisions. Number of monuments and monument placement shall be approved by the City Engineer.
9. A qualified soils engineer must certify the acceptability of the subgrade of all subdivision streets prior to placing any base course material. This must be based upon the latest addition of the City of Harvard's specifications "Field Quality Control Procedures for Pavement Area Subgrade." (I-1)

R-O
(1 of 2)

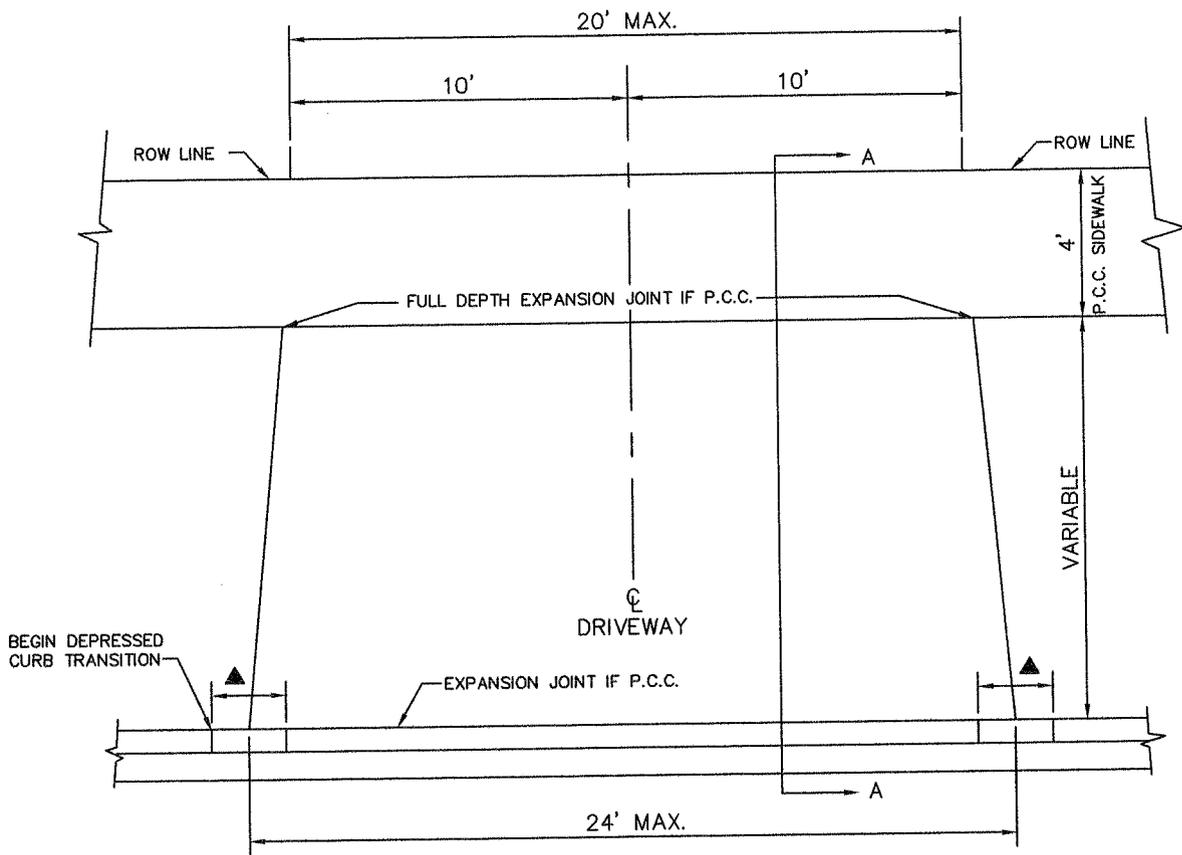
10. Street light standards shall be installed within the street parkways and shall be served by appropriate wiring with connections to a power supply. A street light standard shall be located at each intersection and at the turnaround of every cul-de-sac and elsewhere at intervals of not more than 300'. Street lights shall be City approved with a minimum lighting of 8,150 lumens/150 watt, High Pressure Sodium. A concrete or wooden pole type shall be used, and the light bracket must be a maximum of 8' in length.



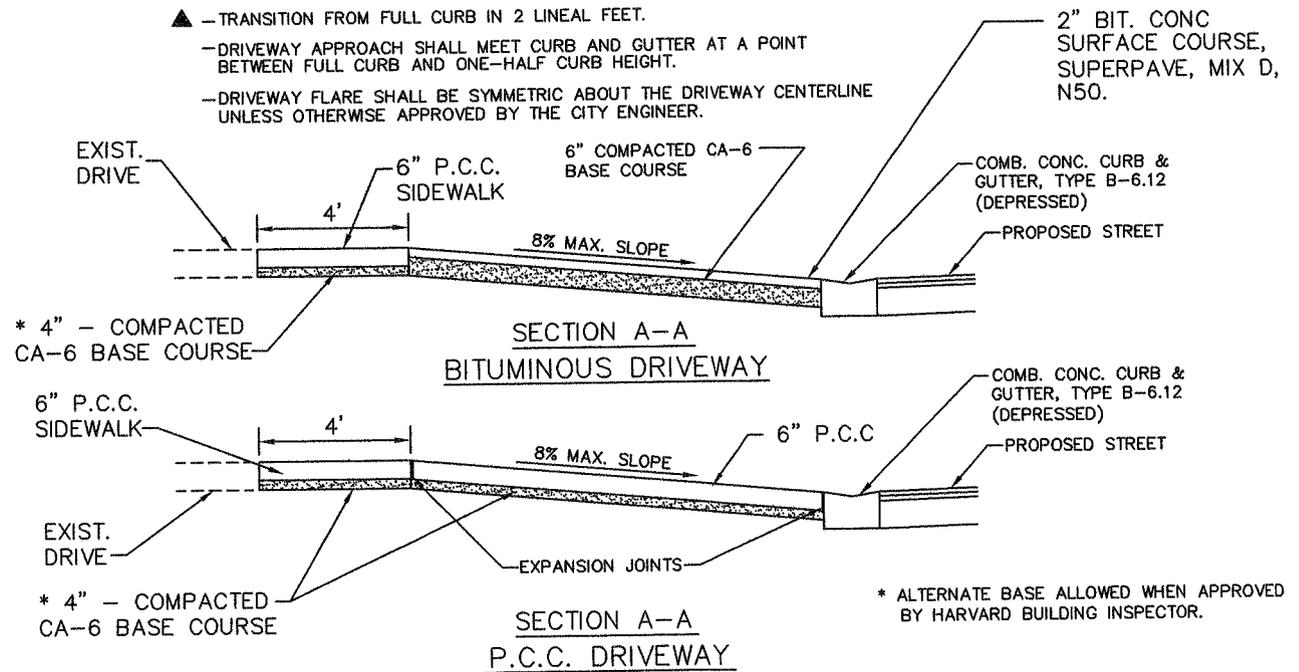
CITY OF HARVARD, ILLINOIS PUBLIC WORKS DEPARTMENT APPROVED 02-08-00	NO.	REVISIONS BY		DATE
		1	LT	
	2			
	3			
	4			
	5			

● APPROACH GRADE 8% MAX.
 * 6" REINFORCED PCC
 PAVEMENT ACCEPTABLE
 WITH 2" CA-6

INDUSTRIAL/COMMERCIAL DRIVEWAY DETAIL

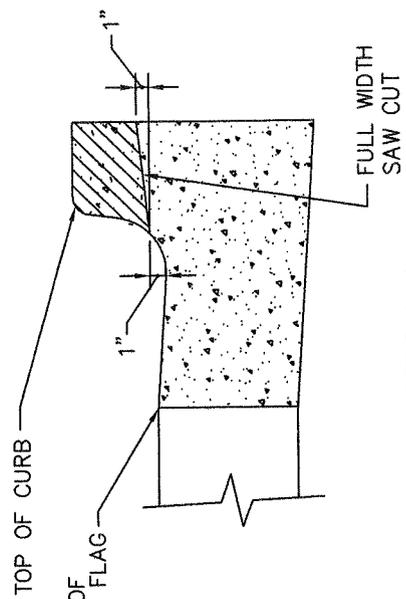


- ▲ - TRANSITION FROM FULL CURB IN 2 LINEAL FEET.
- DRIVEWAY APPROACH SHALL MEET CURB AND GUTTER AT A POINT BETWEEN FULL CURB AND ONE-HALF CURB HEIGHT.
- DRIVEWAY FLARE SHALL BE SYMMETRIC ABOUT THE DRIVEWAY CENTERLINE UNLESS OTHERWISE APPROVED BY THE CITY ENGINEER.



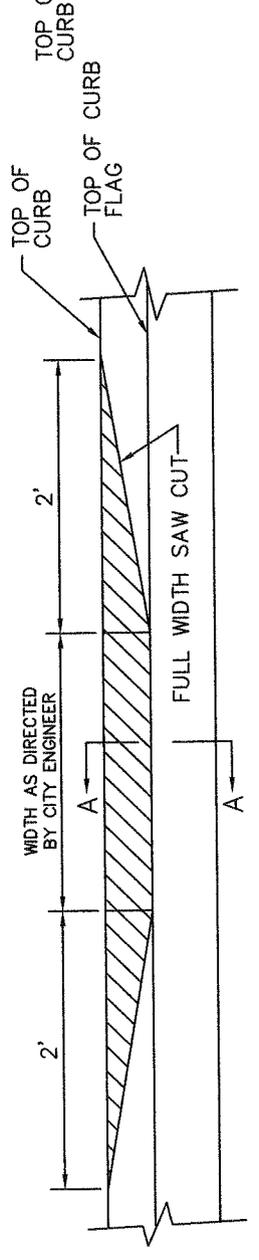
CITY OF HARVARD, ILLINOIS PUBLIC WORKS DEPARTMENT	REVISIONS		
	NO.	BY	DATE
APPROVED 02-15-00	1.	BRL	2/00
	2.	L.T.	9/04
	3.		
	4.		
	5.		

RESIDENTIAL DRIVEWAY
APPROACH DETAIL

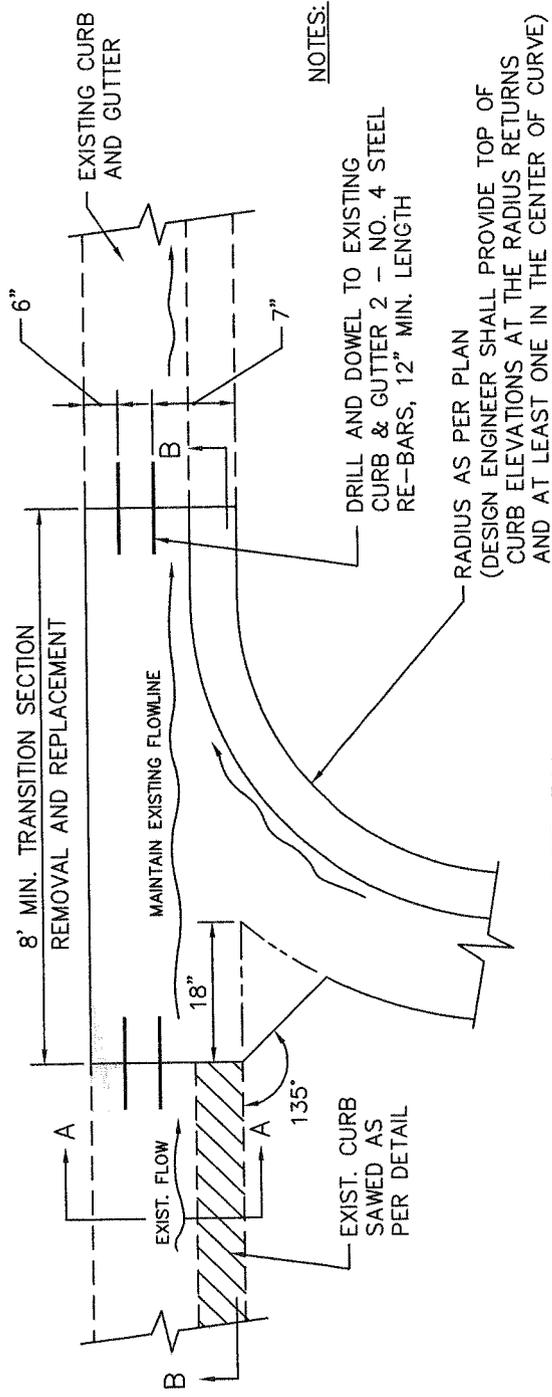


SECTION A-A

- NOTES:
1. PLACE APPROVED SEAL COAT ON AREA THAT HAS BEEN SAWED
 2. APPROVED TRAFFIC CONTROL NECESSARY DURING EXCAVATION/CONSTRUCTION PERIOD.



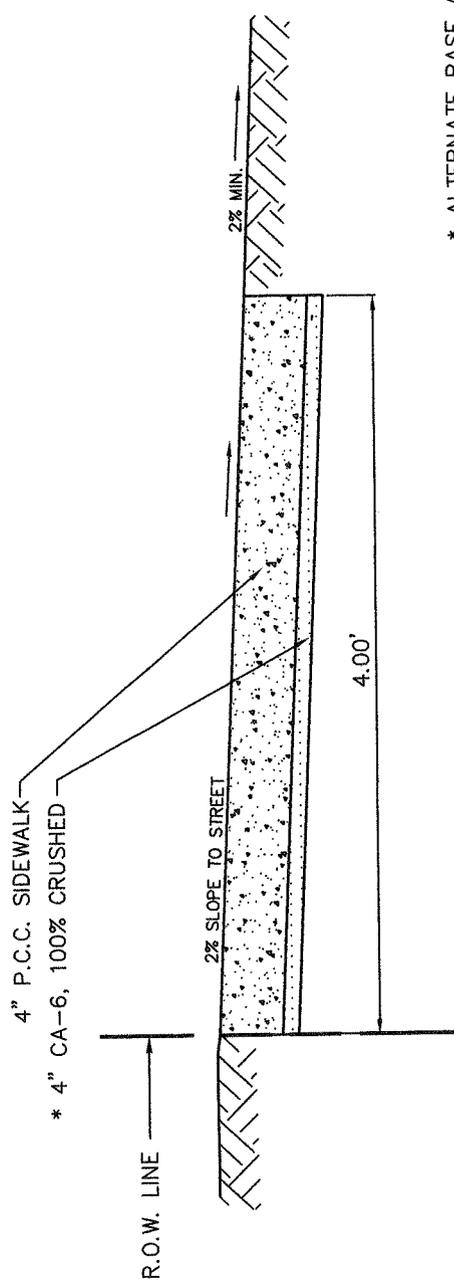
DRIVEWAY OPENING SECTION
(SECTION B-B)



B 6.12 RETURN

CITY OF HARVARD, ILLINOIS PUBLIC WORKS DEPARTMENT APPROVED 02-15-00	NO.	REVISIONS	
		BY	DATE
	1	CML	1/96
	2	MPL	1/99
	3.		
	4.		
	5.		

DEPRESSED CURB ENTRANCE BY SAWING

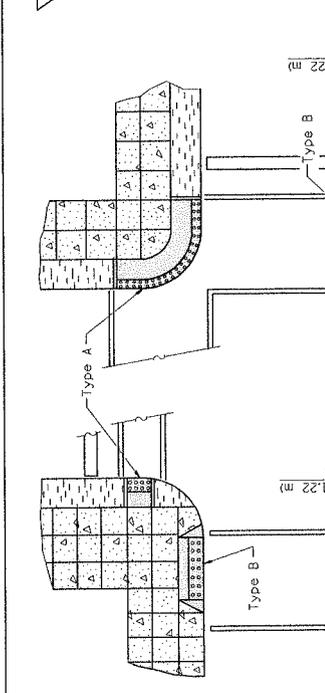
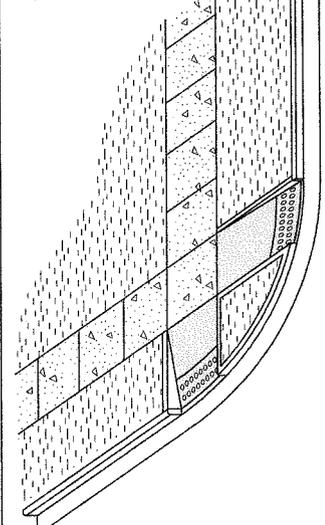
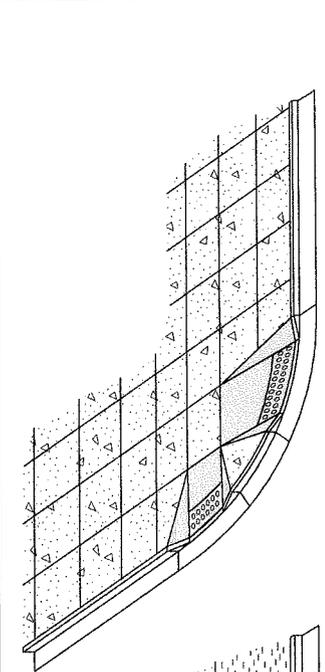


* ALTERNATE BASE ALLOWED WHEN APPROVED BY HARVARD BUILDING INSPECTOR.

NOTES:
 SIDEWALK THROUGH DRIVEWAYS SHALL BE CONSTRUCTED IN ACCORDANCE WITH CITY OF HARVARD DETAIL R-1 OR R-2 AS APPROPRIATE. ALL SIDEWALKS SHALL HAVE CONTRACTION JOINTS AT 5' INTERVALS AND EXPANSION JOINTS AT 25' INTERVALS.

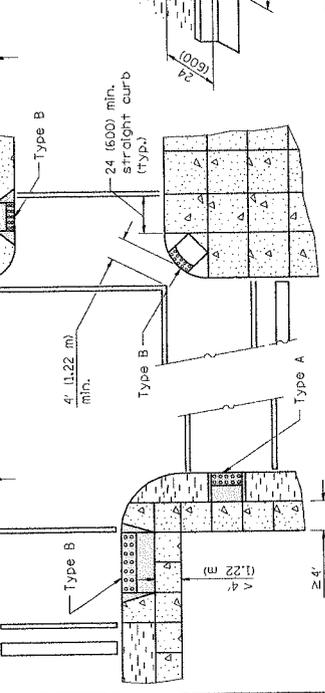
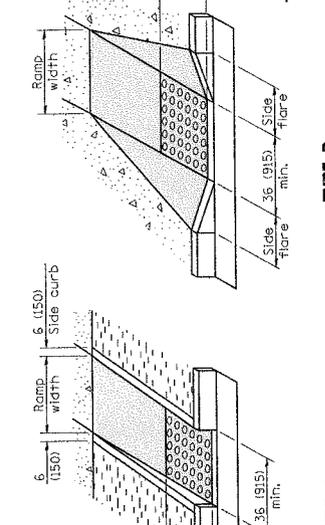
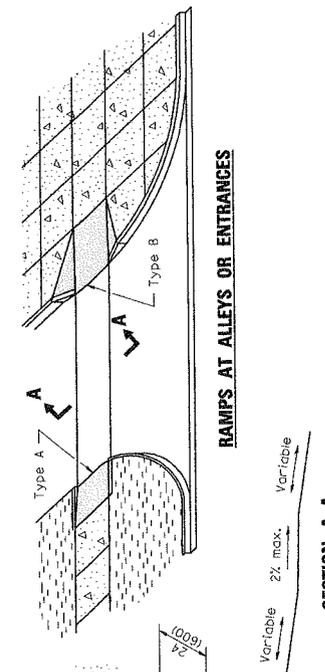
CITY OF HARVARD, ILLINOIS PUBLIC WORKS DEPARTMENT APPROVED 02-15-00	REVISIONS	
	NO.	BY DATE
	1.	L.T. 1/97
	2.	MPL 1/99
	3.	BRL 02/00
	4.	MPL 03/01
	5.	L.T. 9/04

SIDEWALK DETAIL

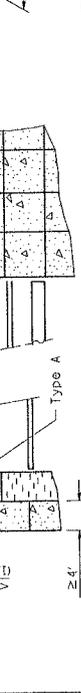


TYPE B RAMPS

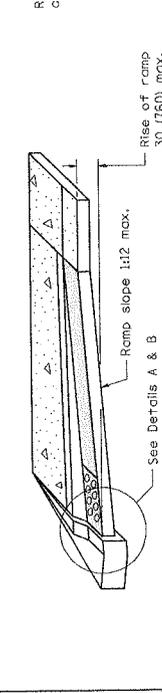
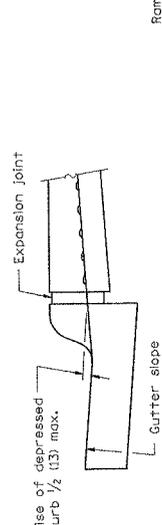
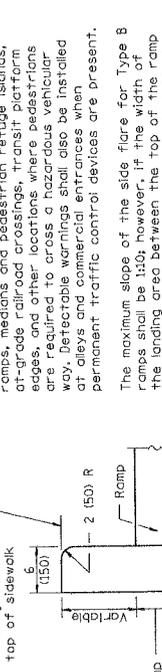
TYPE A RAMPS



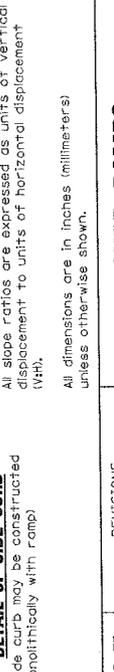
RAMPS AT ALLEYS OR ENTRANCES



RECOMMENDED LOCATION OF RAMPS



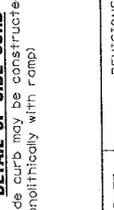
RAMP PROFILE



DETAIL A



DETAIL OF SIDE CURB



(Side curb may be constructed monolithically with ramp)

GENERAL NOTES

Detectable warnings shall be installed at curb ramps, medians and pedestrian refuge islands, at-grade railroad crossings, transit platform edges, and other locations where pedestrian crossings are required to cross a hazardous vehicular way. Detectable warnings shall also be installed at alleys and commercial entrances when permanent traffic control devices are present.

The maximum slope of the side flare for Type B ramps shall be 1:20, however, if the width of the side flare between the top of the ramp and an obstruction is less than 4'-0" (1.22 m) then the maximum slope shall be 1:12.

All slope ratios are expressed as units of vertical displacement to units of horizontal displacement (V:H).

All dimensions are in inches (millimeters) unless otherwise shown.

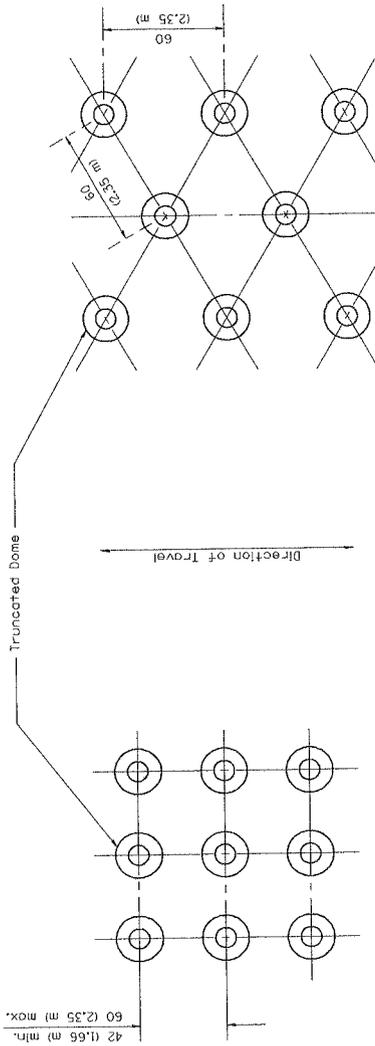
LEGEND

- Sidewalk
- Ramp
- Detectable Warnings
- Non walking area

DATE	REVISIONS
12-4-12	STS

CURB RAMPS FOR SIDEWALKS
(Sheet 1 of 2)

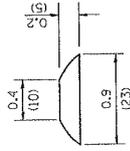
CITY OF HARVARD, ILLINOIS



SQUARE PATTERN
(Parallel Alignment)

TRIANGULAR PATTERN

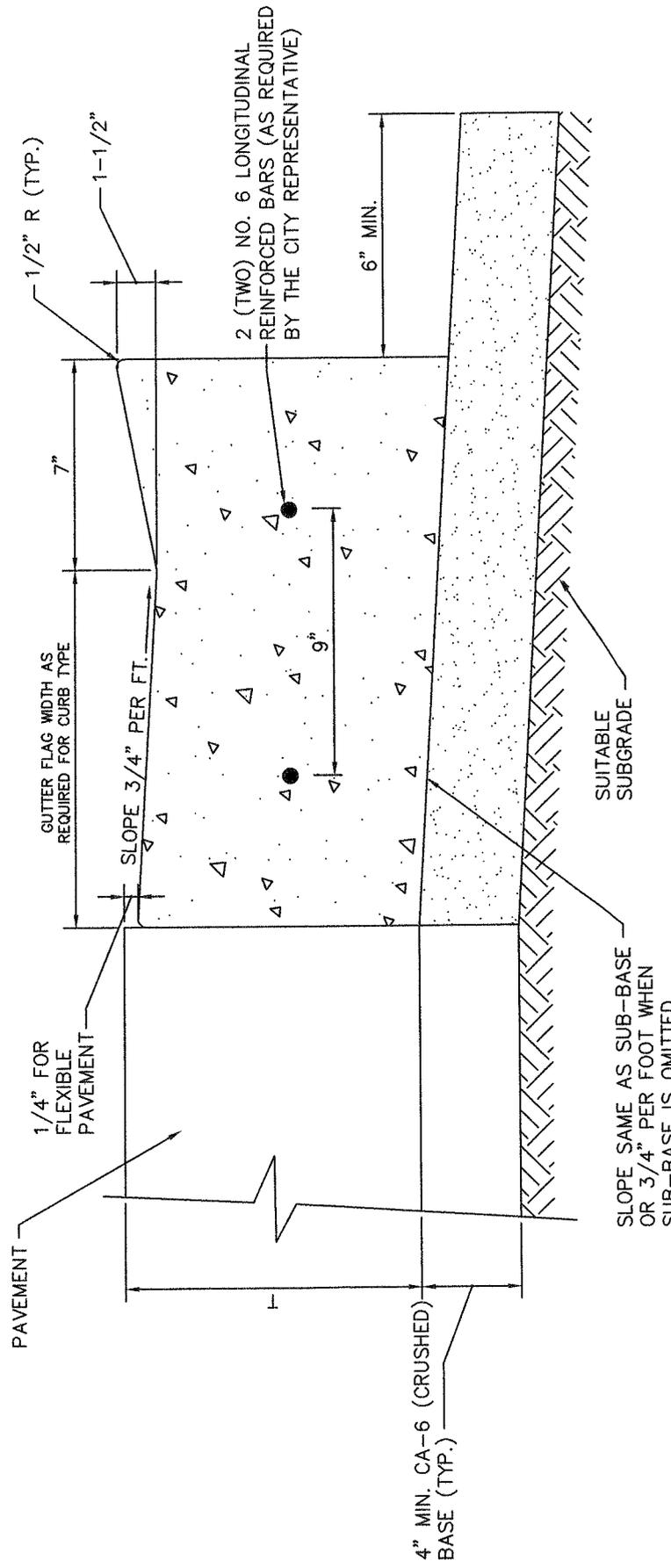
DETECTABLE WARNINGS DETAIL



TRUNCATED DOME DETAIL

**CURB RAMPS
FOR SIDEWALKS**
(Sheet 2 of 2)

CITY OF HARVARD, ILLINOIS

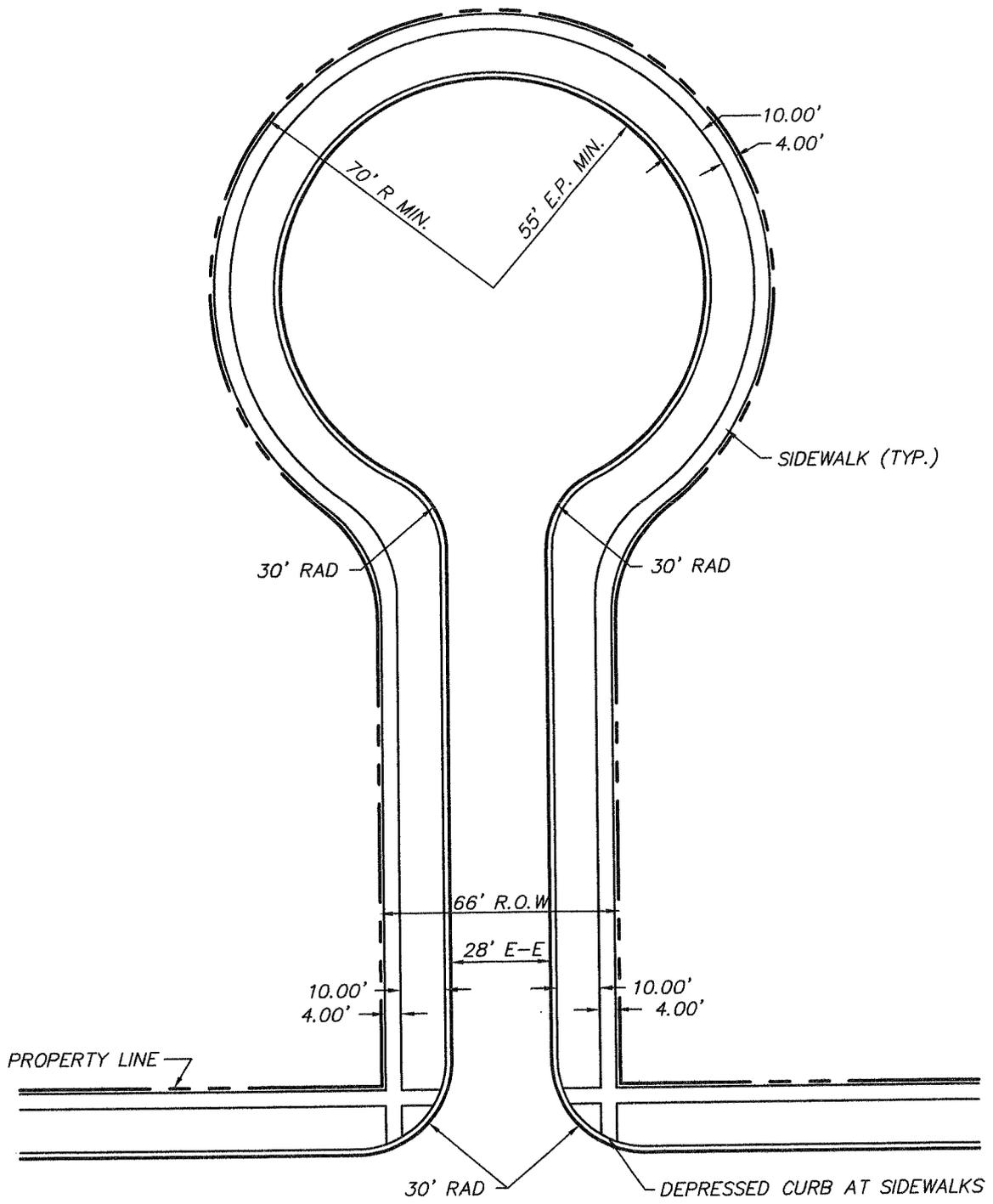


NOTES:

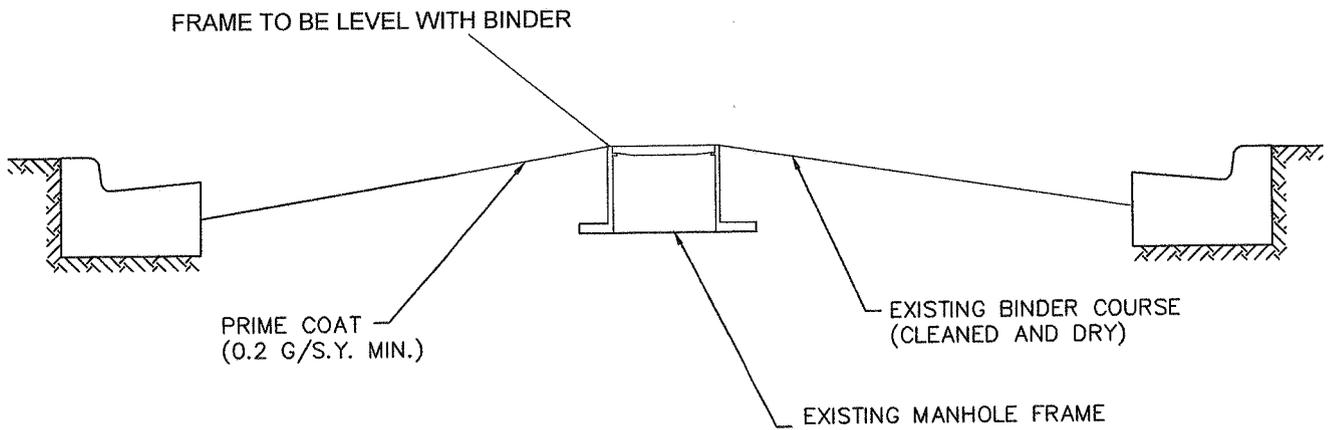
1. THE TOP OF CURBS SHALL BE DEPRESSED WHERE THE CURB AND GUTTER IS CONSTRUCTED ACROSS ALLEYS AND FOR PRIVATE DRIVES OR WHERE DIRECTED BY THE ENGINEER OR PUBLIC WORKS DEPARTMENT.
2. THICKNESS OF PAVEMENT "T" WHEN CURB AND GUTTER IS CONSTRUCTED ADJACENT TO FLEXIBLE PAVEMENT, THE VERTICAL THICKNESS OF THE GUTTER SHALL BE 9 INCHES.

CITY OF HARVARD, ILLINOIS PUBLIC WORKS DEPARTMENT APPROVED 02-15-00	NO.	REVISIONS		DATE
		BY		
	1.	CML		1/96
	2.	L.T.		1/97
	3.	MPL		1/99
	4.	MPL		3/01
	5.			

**DEPRESSED CURB FOR INTERSECTIONS
AND DRIVEWAYS**



CITY OF HARVARD, ILLINOIS	REVISIONS		
	NO.	BY	DATE
PUBLIC WORKS DEPARTMENT	1.	CML	1/96
APPROVED 02-15-00	2.	L.T.	1/97
	3.	MPL	1/99
	4.	MPL	3/01
	5.	WJH	9/04
RESIDENTIAL CUL-DE-SAC DESIGN AND CONSTRUCTION DETAIL			R-7



NOTES:
 INSERT 1.5" CAST METAL RISER TO FRAME PRIOR TO SURFACE COURSE

CITY OF HARVARD, ILLINOIS	REVISIONS			MANHOLE RAMPING DETAIL
	NO.	BY	DATE	
PUBLIC WORKS DEPARTMENT	1.	CML	1/96	
APPROVED 02-15-00	2.	DHP	2/98	
	3.	MPL	1/99	
	4.	BRL	2/00	
	5.			

THICKNESS - T - Thickness of pavement. When curb & gutter is constructed adjacent to flexible pavement, the vertical thickness of the gutter flag shall be 9". Also, tie bars shall be omitted.

DRAINAGE OPENINGS - At all locations where metal casings are to be incorporated in the curb and gutter, a 1" thick preformed joint filler, conforming to the cross sections of the curb and gutter, shall be installed in the curb and gutter a distance of 10 ft. from each side of the metal casing. When the width of the metal casing is less than the width of the curb and gutter, 2 - No. 4 rebar (L = 12" + casting length + 12") shall be incorporated in the continuous portion of concrete gutter in front of the casting.

TRANSITIONS - The transition from full height curb to depressed curb shall be made at the rate of 3" per foot of length or flatter.

JOINTS - In addition to the requirements of Article 606 of the Standard Specifications, joints shall be constructed as follows.

When curb & gutter is constructed adjacent to P.C.C. pavement, contraction joints, spaced at 10' intervals shall be sawcut within 24 hours. Expansion joints shall be installed in the curb and gutter in prolongation with joints in adjacent P.C.C. pavement or base course.

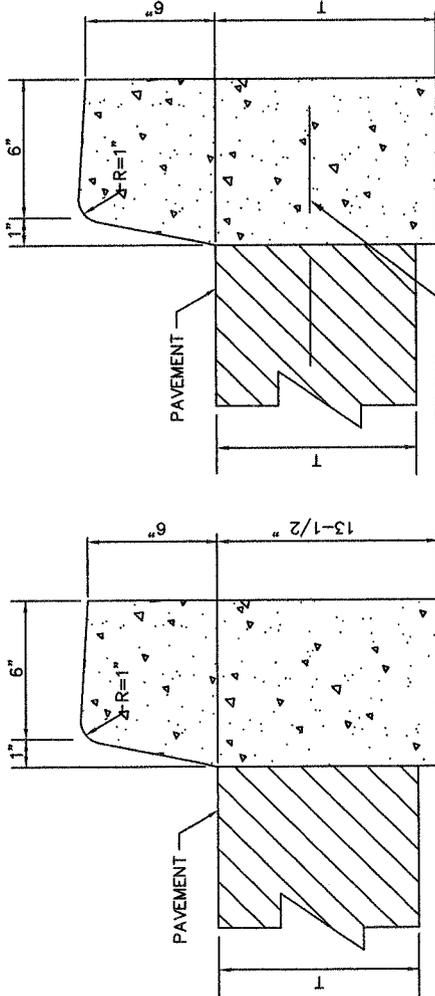
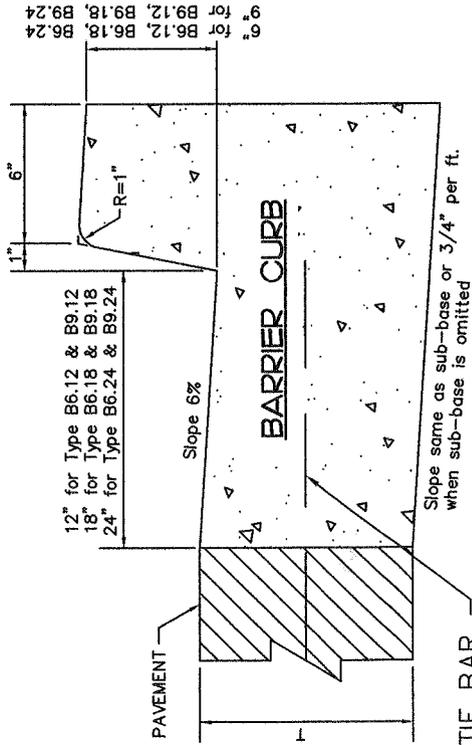
When curb and gutter is constructed adjacent to flexible pavement, a 1" thick preformed expansion joint filler, conforming to the cross section of the curb and gutter shall be installed every 90' max., at points of curvature for short radius curves and at construction joints. Contraction joints shall be sawcut within 24 hours between expansion joints at distances not to exceed 15 feet.

All expansion joints shall be placed 5 feet on either side of every drainage structure located within the curb and gutter.

All expansion joints shall be provided with a 1 1/4 dia. X 18" coated smooth dowel bar conforming to Article 1006.11(b) of the Standard Specifications. The dowel bar shall be fitted with a cap having a pinched stop that will provide 1" of expansion.

Curb & gutter located over utility crossings and at depressions for sidewalks shall be reinforced with 2-no. 4 bars on 12" centers at a length of 20' as approved by the Engineer.

All construction joints shall be provided with 1/2" dia. deformed steel tie bars 30' long conforming to AASHTO M-31 of M-53. Tie bars shall be placed on 9± centers (minimum 2 per joint).



ADJACENT TO FLEXIBLE PAVEMENT

ADJACENT TO P.C.C. PAVEMENT OR P.C.C. BASE COURSE

NO.	REVISIONS BY	DATE
2.	DHP	2/98
3.	JFV	1/99
4.		
5.		

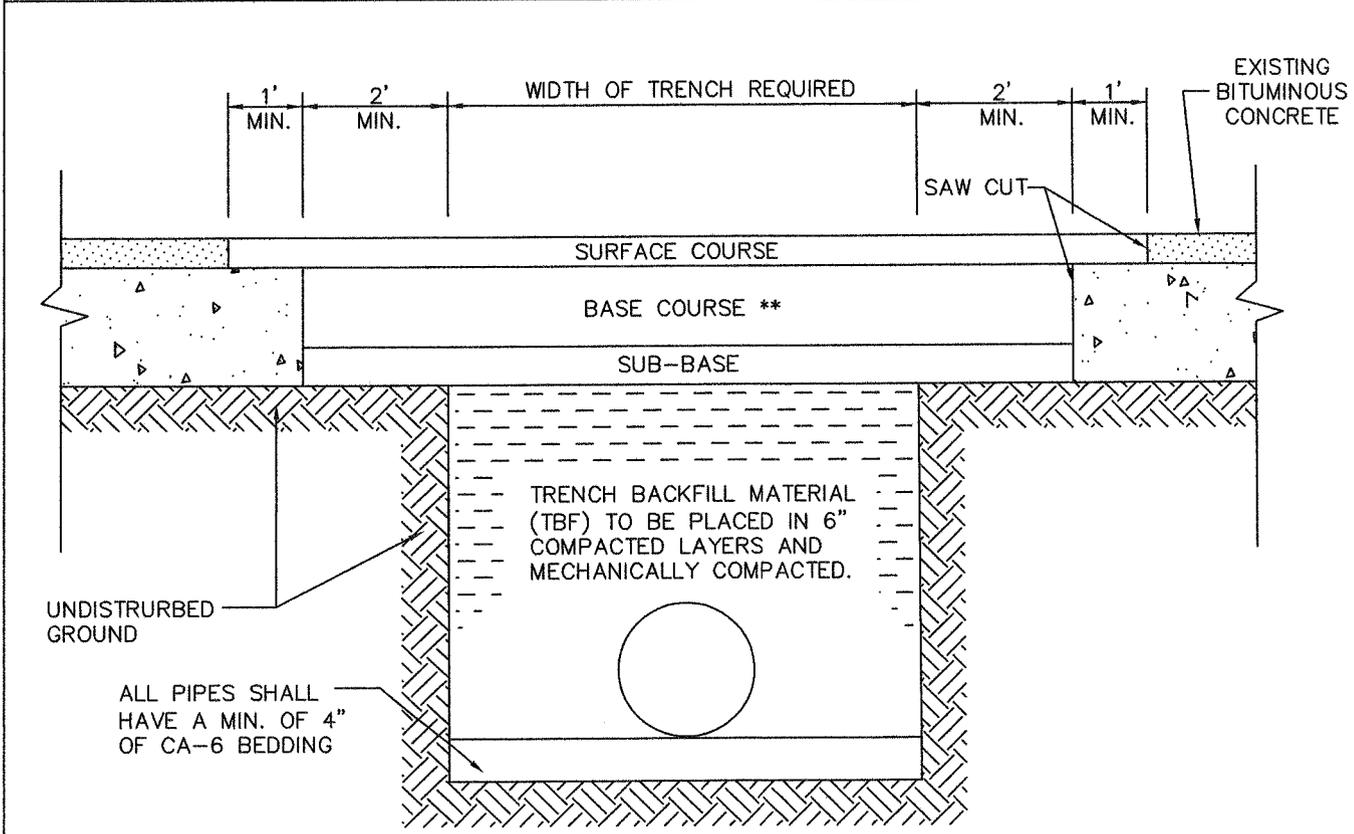
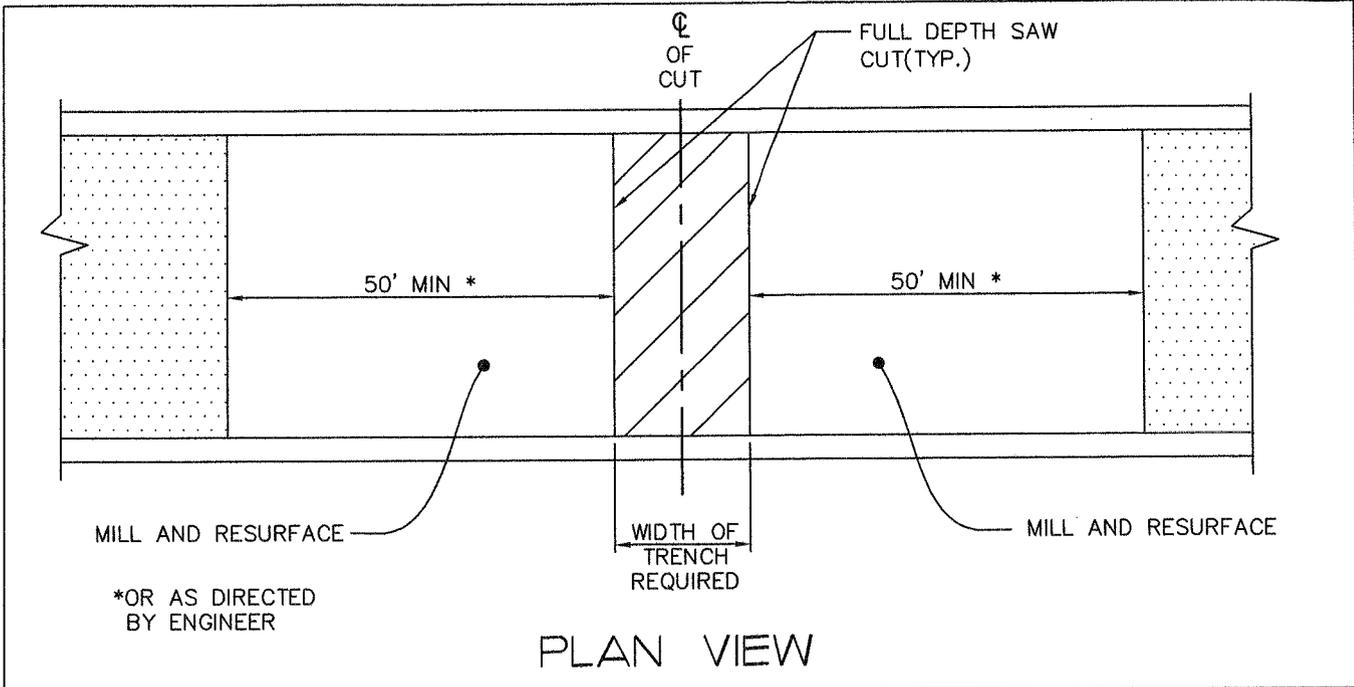
CITY OF HARVARD, ILLINOIS

PUBLIC WORKS DEPARTMENT

APPROVED 02-15-00

CONCRETE CURB AND GUTTER DETAIL

(WATER & SANITARY SERVICES REQUIRED TO BE MARKED ON CURB FACE WITH AN "S" & "W")

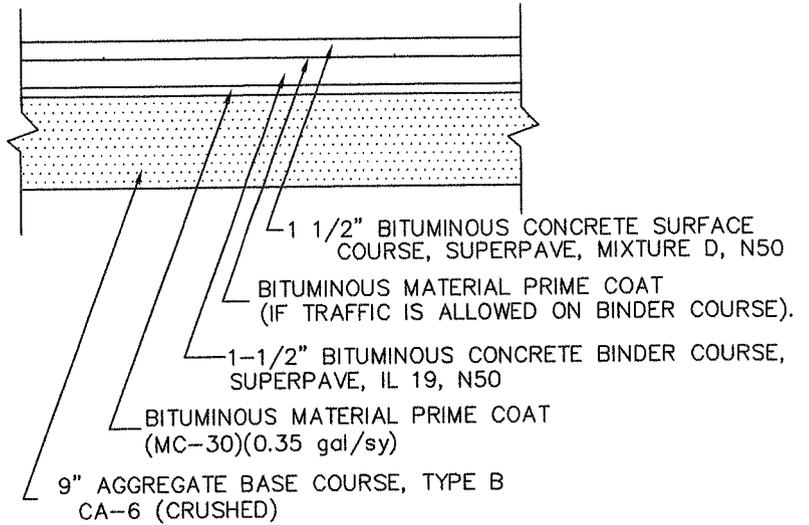


** BASE COURSE THICKNESSES SHALL BE IN ACCORDANCE WITH DETAIL R-1

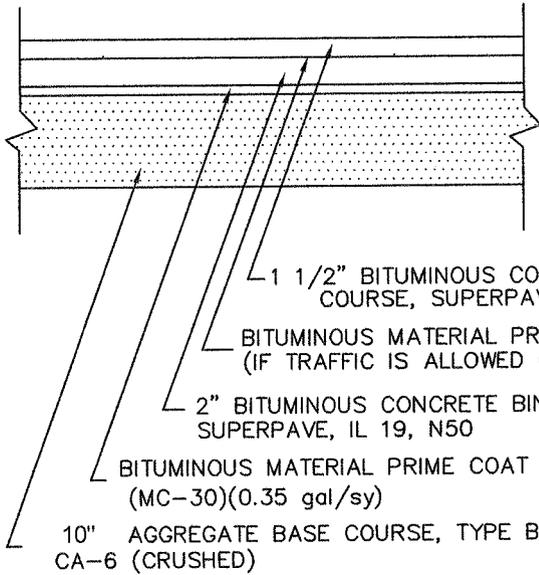
CITY OF HARVARD, ILLINOIS	REVISIONS		
	NO.	BY	DATE
PUBLIC WORKS DEPARTMENT	1.	CML	1/96
APPROVED 02-15-00	2.	L.T.	1/97
	3.	MPL	1/99
	4.	MPL	3/01
	5.	WJH	9/04

PAVEMENT REMOVAL AND REPLACEMENT

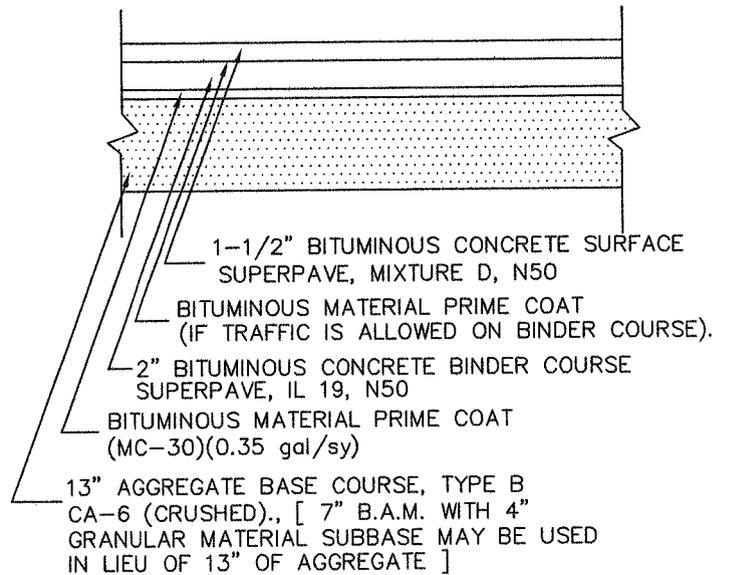
NOTE: EXISTING AGGREGATE (GRAVEL) DRIVEWAYS WITHIN PUBLIC R.O.W. SHALL BE REPLACED WITH BITUMINOUS PAVEMENT PER DETAIL R-2



PARKING LOT PAVEMENT SECTION



RESIDENTIAL STREET PAVEMENT SECTION



INDUSTRIAL/COMMERCIAL PAVEMENT SECTION

CITY OF HARVARD, ILLINOIS PUBLIC WORKS DEPARTMENT APPROVED 02-15-00	REVISIONS		
	NO.	BY	DATE
	1.	CML	1/96
	2.	L.T.	1/97
	3.	JFV	1/99
	4.	WJH	7/99
	5.	L.T.	9/04

PARKING LOT & PUBLIC STREET PAVEMENT SECTIONS

Pavement Structure		
Material	Residential Subdivisions	Industrial/Commercial Subdivisions
Crushed Stone/Crushed Gravel (CA-6)	10"	13"
Binder Course	2"	2"
Surface Course	1 ½"	1 ?"
PCC Pavement (on 4" crushed gravel base)	6"	8"

Required Roadway Widths (edge-to-edge widths)		
Type of Street	Residential Subdivisions	Industrial/Commercial Subdivisions
Major Street	4-12' lanes with median	
Collector	36'	39'
Local	28'	31'
Cul-de-sac	55' Radius (with island)*	60' Radius
Half Streets	Not Allowed	Not Allowed

*See detail R-7

Required Right-of-Way Widths		
Type of Street	Residential Subdivision	Industrial/Commercial Subdivision
Major Street	100'	100'
Collector	70'	80'
Local	66'	70'
Cul-de-Sacs	66' (140' dia)	70' (150' dia)
Half Streets	Not Allowed	Not Allowed
Utility Easement	15'	15'

Minimum Centerline Radius (Horizontal Alignment)		
Type of Street	Residential Subdivision	Industrial/Commercial Subdivision
Collector Street	300'	350'
Local Street	250'	300'

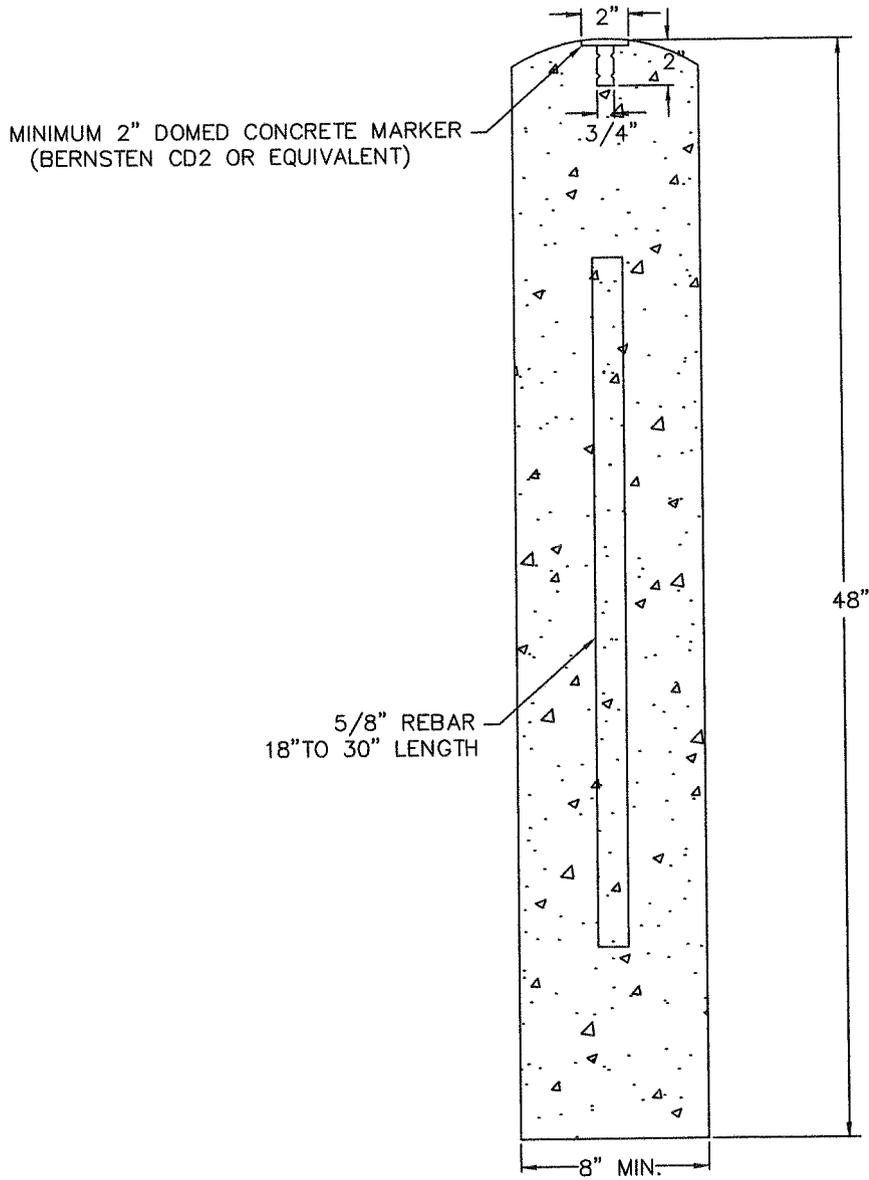
Street Sign Standards

Street Name Signs

- All street name signs shall be two (2) sided with green background and white 4" letters and 2" compass.
- Signs shall be .080 aluminum.
- Letters shall be silk screened or baked on.
- Die cast aluminum post cap 2" diameter with 90° cross piece.
- Posts shall be 10' galvanized steel 2" O.D. x .065 wall (2" pipe)

Traffic Control Signs

- All signs shall be HIP (high intensity prismatic) grade and conform with MUTCE guidelines
Street signs shall be extruded aluminum.
- Stop signs shall be 30" x 30".
- Posts shall be green, U-channel posts, 10', two (2) lbs./ft.



NOTES

1. MONUMENT COORDINATES SHALL BE ESTABLISHED USING NAD83 (1986 OR 1997)
2. MONUMENT ELEVATION SHALL BE ESTABLISHED USING NAVD88

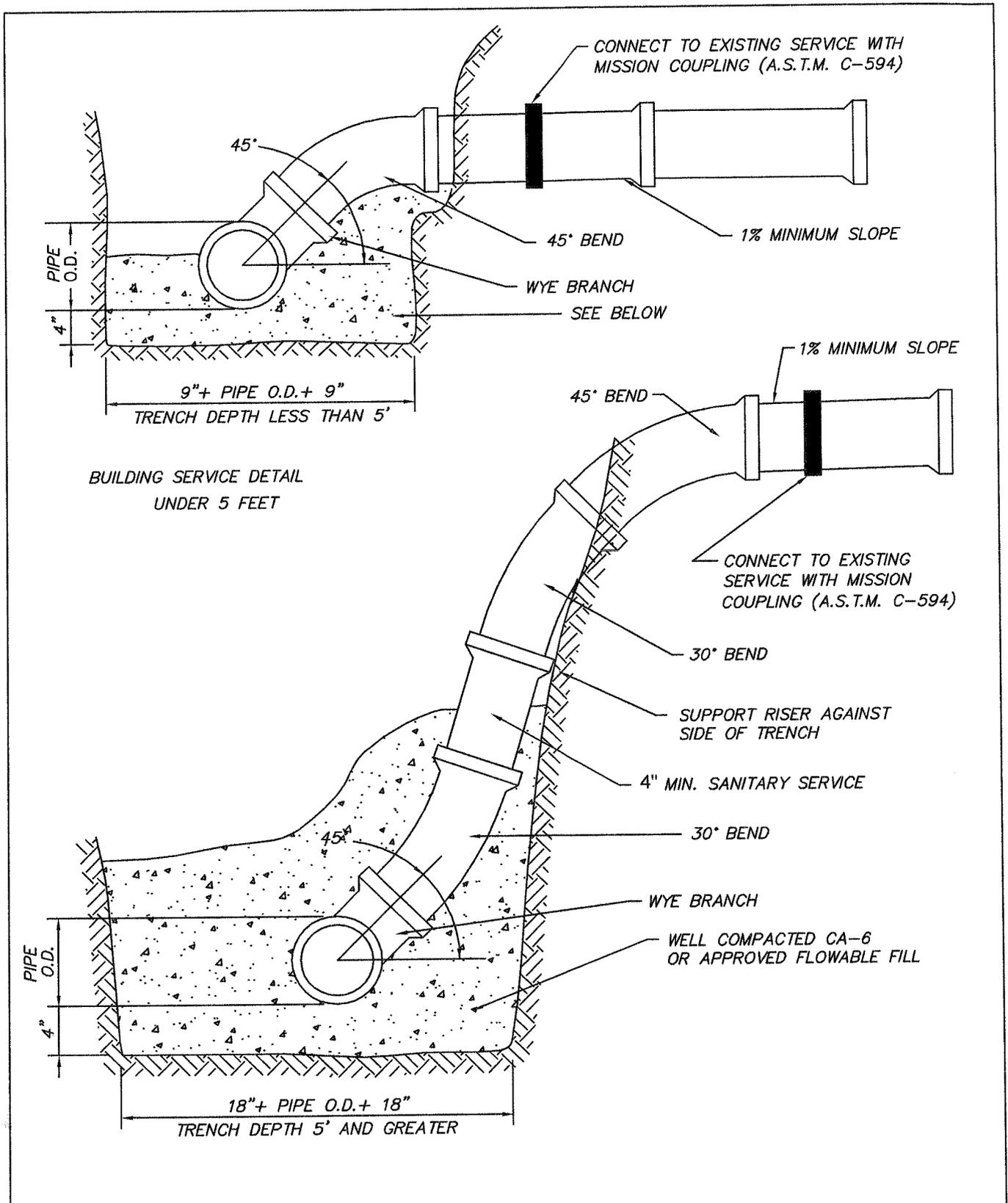
CITY OF HARVARD, ILLINOIS	REVISIONS		
	NO.	BY	DATE
PUBLIC WORKS DEPARTMENT	1.		
APPROVED 02-15-00	2.		
	3.		
	4.		
	5.		

BENCHMARK MONUMENT

R-16

Miscellaneous Sanitary Standards/Notes

1. When existing stubs are not available, all service connections to mainline sewers shall consist of the following:
 1. If existing sewer is PVC pipe, the mainline sewer shall be cut and a wye section with chamfer shall be installed with non-sheer mission coupling placed over connection points;
 2. If existing sewer is clay pipe, the above method may be used a saddle connection may be used or as directed by the City Inspector;
 3. Dissimilar pipe material must only join at manhole structures unless otherwise approved by City Engineer; and
 4. Sanitary services must be a minimum of 4".



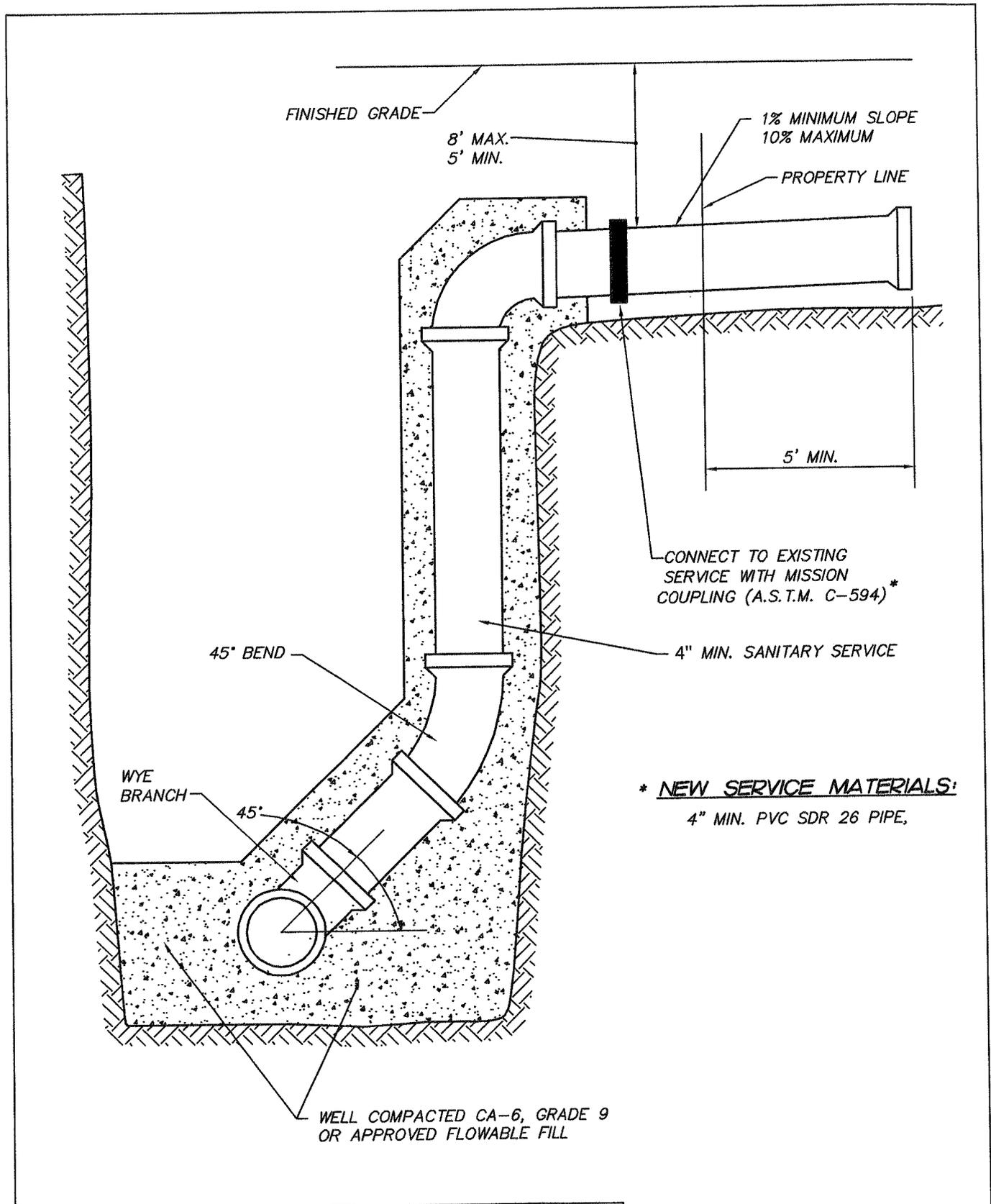
BUILDING SERVICE DETAIL
UNDER 5 FEET

SDR 26 PVC
SEWER PIPE PER ASTM D-3034
CELL CLASS 12454B

NO SERVICE CONNECTIONS
DIRECTLY INTO MANHOLE

CITY OF HARVARD	REVISIONS		
	NO.	BY	DATE
PUBLIC WORKS DEPARTMENT	1.	CML	1/96
APPROVED 02-15-00	2.	LT	1/97
	3.	DHP	1/98
	4.	MPL	1/99
	5.	WJH	9/05

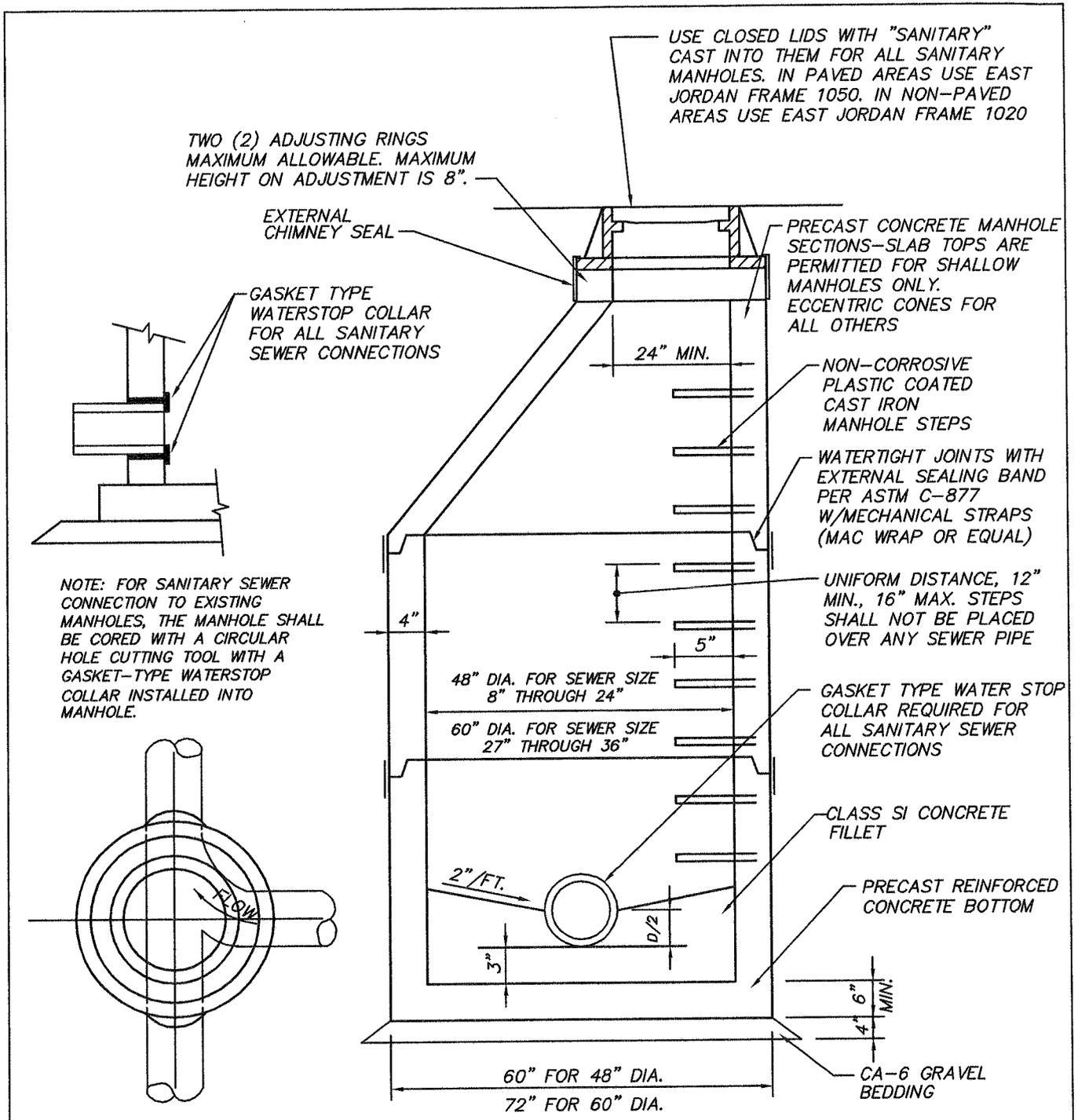
BUILDING SERVICE RISER
10 FEET AND UNDER



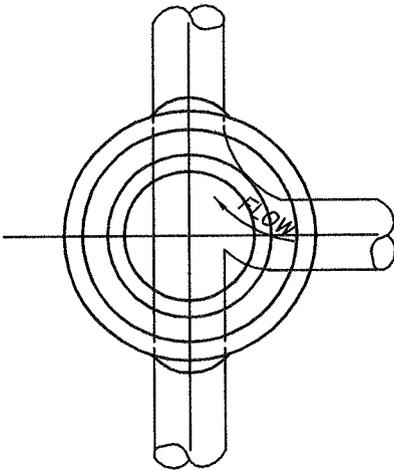
*** NEW SERVICE MATERIALS:**
 4" MIN. PVC SDR 26 PIPE,

CITY OF HARVARD	REVISIONS		
	NO.	BY	DATE
PUBLIC WORKS DEPARTMENT	1.	CML	1/96
APPROVED 02-15-00	2.	DHP	1/98
	3.	MPL	1/99
	4.	WJH	9/04
	5.	WJH	9/05

BUILDING SERVICE RISER
 OVER 10 FEET



NOTE: FOR SANITARY SEWER CONNECTION TO EXISTING MANHOLES, THE MANHOLE SHALL BE CORED WITH A CIRCULAR HOLE CUTTING TOOL WITH A GASKET-TYPE WATERSTOP COLLAR INSTALLED INTO MANHOLE.



PLAN VIEW

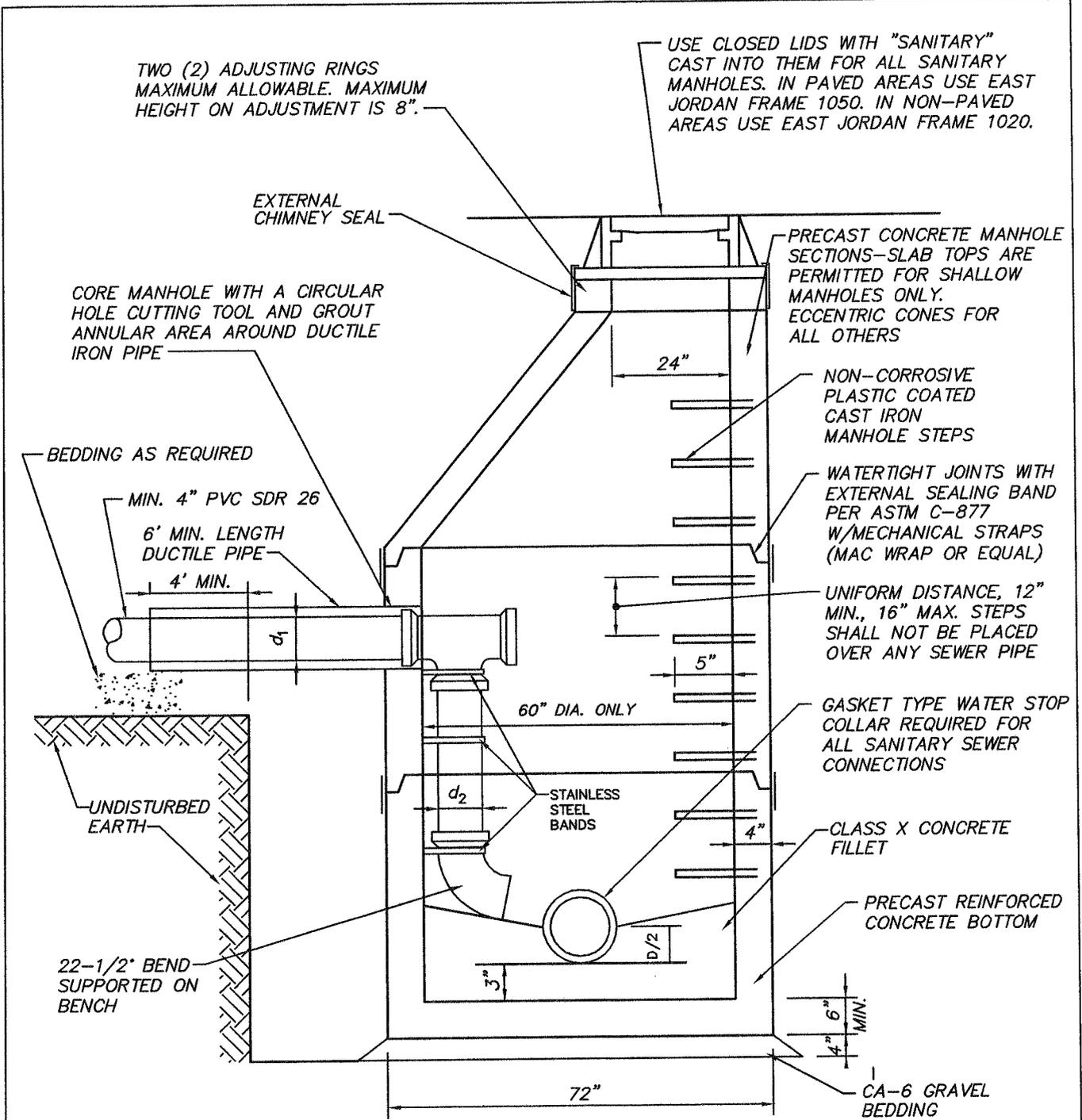
USE DROP CONNECTIONS FOR ANY SANITARY SEWER PIPE ENTERING TWO (2) FEET OR MORE ABOVE THE LOWEST PIPE INVERT. SEE STANDARD INSIDE DROP MANHOLE FOR DETAIL.

MONITORING MANHOLES: 1. MUST BE LOCATED ON USERS PREMISES UNLESS OTHERWISE DIRECTED BY THE CITY. 2. FLOW MEASUREMENT DEVICES TO BE INCORPORATED INTO MANHOLE CONSTRUCTION AS REQUIRED BY THE CITY ENGINEER.

ALL PRECAST CONCRETE STRUCTURES MUST CONFORM TO AASHTO M199

CITY OF HARVARD	REVISIONS		
	NO.	BY	DATE
PUBLIC WORKS DEPARTMENT	1.	CML	1/96
APPROVED 02-15-00	2.	MPL	1/99
	3.	L.T.	9/04
	4.		
	5.		

SANITARY & MONITORING
MANHOLE DETAIL



TWO (2) ADJUSTING RINGS
 MAXIMUM ALLOWABLE. MAXIMUM
 HEIGHT ON ADJUSTMENT IS 8".

USE CLOSED LIDS WITH "SANITARY"
 CAST INTO THEM FOR ALL SANITARY
 MANHOLES. IN PAVED AREAS USE EAST
 JORDAN FRAME 1050. IN NON-PAVED
 AREAS USE EAST JORDAN FRAME 1020.

EXTERNAL
 CHIMNEY SEAL

CORE MANHOLE WITH A CIRCULAR
 HOLE CUTTING TOOL AND GROUT
 ANNULAR AREA AROUND DUCTILE
 IRON PIPE

PRECAST CONCRETE MANHOLE
 SECTIONS—SLAB TOPS ARE
 PERMITTED FOR SHALLOW
 MANHOLES ONLY.
 ECCENTRIC CONES FOR
 ALL OTHERS

BEDDING AS REQUIRED

NON-CORROSIVE
 PLASTIC COATED
 CAST IRON
 MANHOLE STEPS

MIN. 4" PVC SDR 26

6' MIN. LENGTH
 DUCTILE PIPE
 4' MIN.

WATERTIGHT JOINTS WITH
 EXTERNAL SEALING BAND
 PER ASTM C-877
 W/MECHANICAL STRAPS
 (MAC WRAP OR EQUAL)

UNIFORM DISTANCE, 12"
 MIN., 16" MAX. STEPS
 SHALL NOT BE PLACED
 OVER ANY SEWER PIPE

UNDISTURBED
 EARTH

60" DIA. ONLY

GASKET TYPE WATER STOP
 COLLAR REQUIRED FOR
 ALL SANITARY SEWER
 CONNECTIONS

STAINLESS
 STEEL
 BANDS

CLASS X CONCRETE
 FILLET

22-1/2° BEND
 SUPPORTED ON
 BENCH

PRECAST REINFORCED
 CONCRETE BOTTOM

CA-6 GRAVEL
 BEDDING

72"

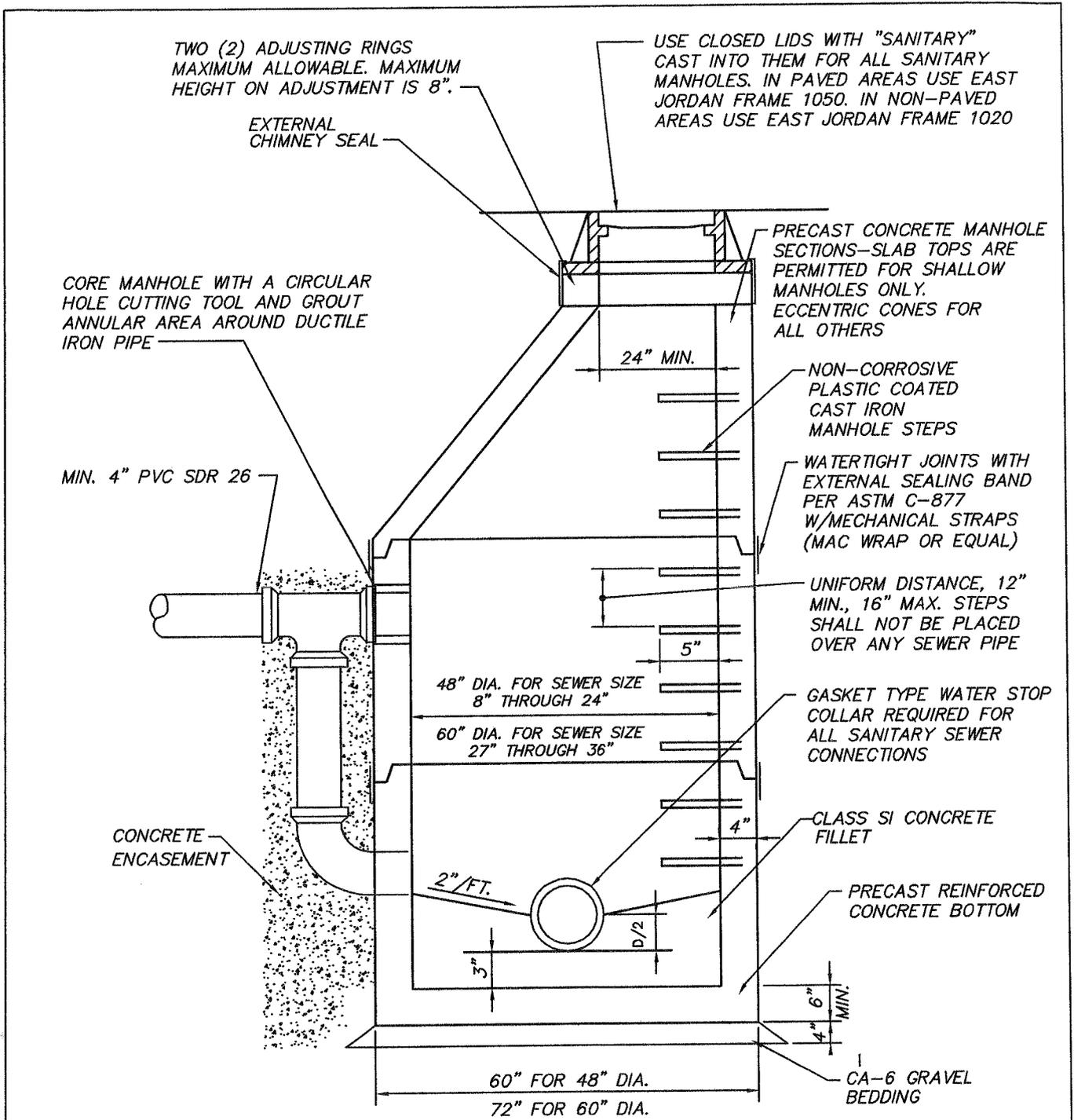
1. STAINLESS STEEL BANDS WILL BE SECURED TO THE MANHOLE WITH NON-CORROSIVE FASTENERS AND STAINLESS STEEL BOLTS.
2. ONE STAINLESS STEEL BAND WILL BE REQUIRED ON EACH FITTING AND EVERY 18".
3. THE DROP PIPE WILL BE PLACED IN THE MANHOLE SO AS NOT TO INTERFERE WITH USE OF THE STEPS.

4. $d_2 = d_1$.

5. ALL PRECAST CONCRETE STRUCTURES MUST CONFORM TO AASHTO M199

CITY OF HARVARD PUBLIC WORKS DEPARTMENT APPROVED 02-15-00	REVISIONS		
	NO.	BY	DATE
	1.	CML	1/96
	2.	DHP	1/98
	3.	MPL	1/99
4.	L.T.	9/04	
5.			

DROP MANHOLE DETAIL
 INSIDE TYPE



TWO (2) ADJUSTING RINGS
 MAXIMUM ALLOWABLE. MAXIMUM
 HEIGHT ON ADJUSTMENT IS 8".

USE CLOSED LIDS WITH "SANITARY"
 CAST INTO THEM FOR ALL SANITARY
 MANHOLES. IN PAVED AREAS USE EAST
 JORDAN FRAME 1050. IN NON-PAVED
 AREAS USE EAST JORDAN FRAME 1020

EXTERNAL
 CHIMNEY SEAL

CORE MANHOLE WITH A CIRCULAR
 HOLE CUTTING TOOL AND GROUT
 ANNULAR AREA AROUND DUCTILE
 IRON PIPE

PRECAST CONCRETE MANHOLE
 SECTIONS—SLAB TOPS ARE
 PERMITTED FOR SHALLOW
 MANHOLES ONLY.
 ECCENTRIC CONES FOR
 ALL OTHERS

MIN. 4" PVC SDR 26

NON-CORROSIVE
 PLASTIC COATED
 CAST IRON
 MANHOLE STEPS

WATERTIGHT JOINTS WITH
 EXTERNAL SEALING BAND
 PER ASTM C-877
 W/MECHANICAL STRAPS
 (MAC WRAP OR EQUAL)

UNIFORM DISTANCE, 12"
 MIN., 16" MAX. STEPS
 SHALL NOT BE PLACED
 OVER ANY SEWER PIPE

48" DIA. FOR SEWER SIZE
 8" THROUGH 24"

60" DIA. FOR SEWER SIZE
 27" THROUGH 36"

GASKET TYPE WATER STOP
 COLLAR REQUIRED FOR
 ALL SANITARY SEWER
 CONNECTIONS

CONCRETE
 ENCASEMENT

CLASS SI CONCRETE
 FILLET

PRECAST REINFORCED
 CONCRETE BOTTOM

2"/FT.

1
 CA-6 GRAVEL
 BEDDING

60" FOR 48" DIA.
 72" FOR 60" DIA.

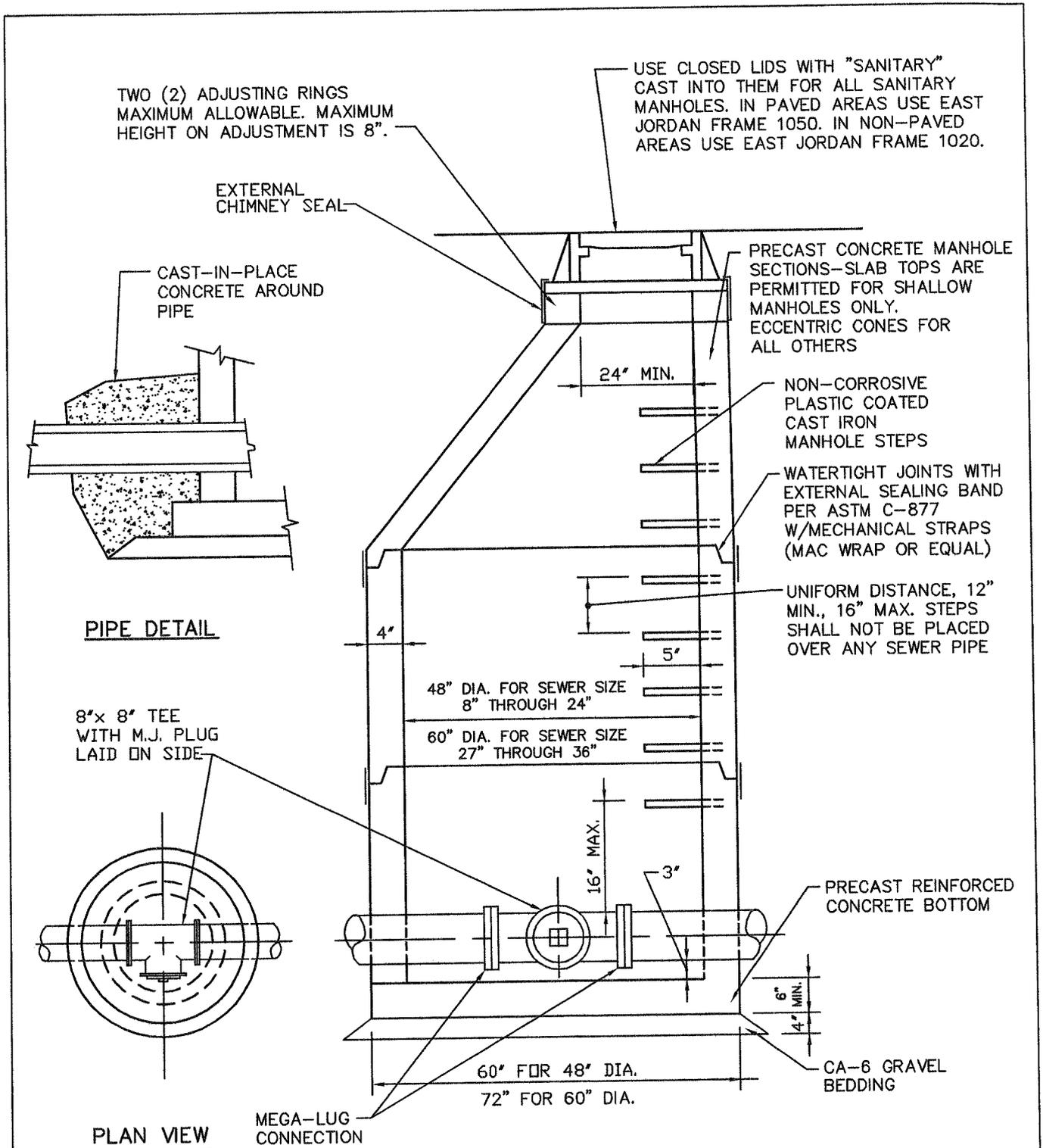
USE DROP CONNECTIONS FOR ANY SANITARY
 SEWER PIPE ENTERING TWO (2) FEET OR
 MORE ABOVE THE LOWEST PIPE INVERT.
 SEE STANDARD INSIDE DROP MANHOLE
 FOR DETAIL.

MONITORING MANHOLES: 1. MUST BE LOCATED
 ON USERS PREMISES UNLESS OTHERWISE
 DIRECTED BY THE CITY. 2. FLOW MEASUREMENT
 DEVICES TO BE INCORPORATED
 INTO MANHOLE CONSTRUCTION AS REQUIRED
 BY THE CITY ENGINEER.

CITY OF HARVARD PUBLIC WORKS DEPARTMENT APPROVED 02-15-00	REVISIONS		
	NO.	BY	DATE
	1.	CML	1/96
	2.	MPL	1/99
	3.	L.T.	9/04
	4.		
	5.		

ALL PRECAST CONCRETE STRUCTURES
 MUST CONFORM TO AASHTO M199

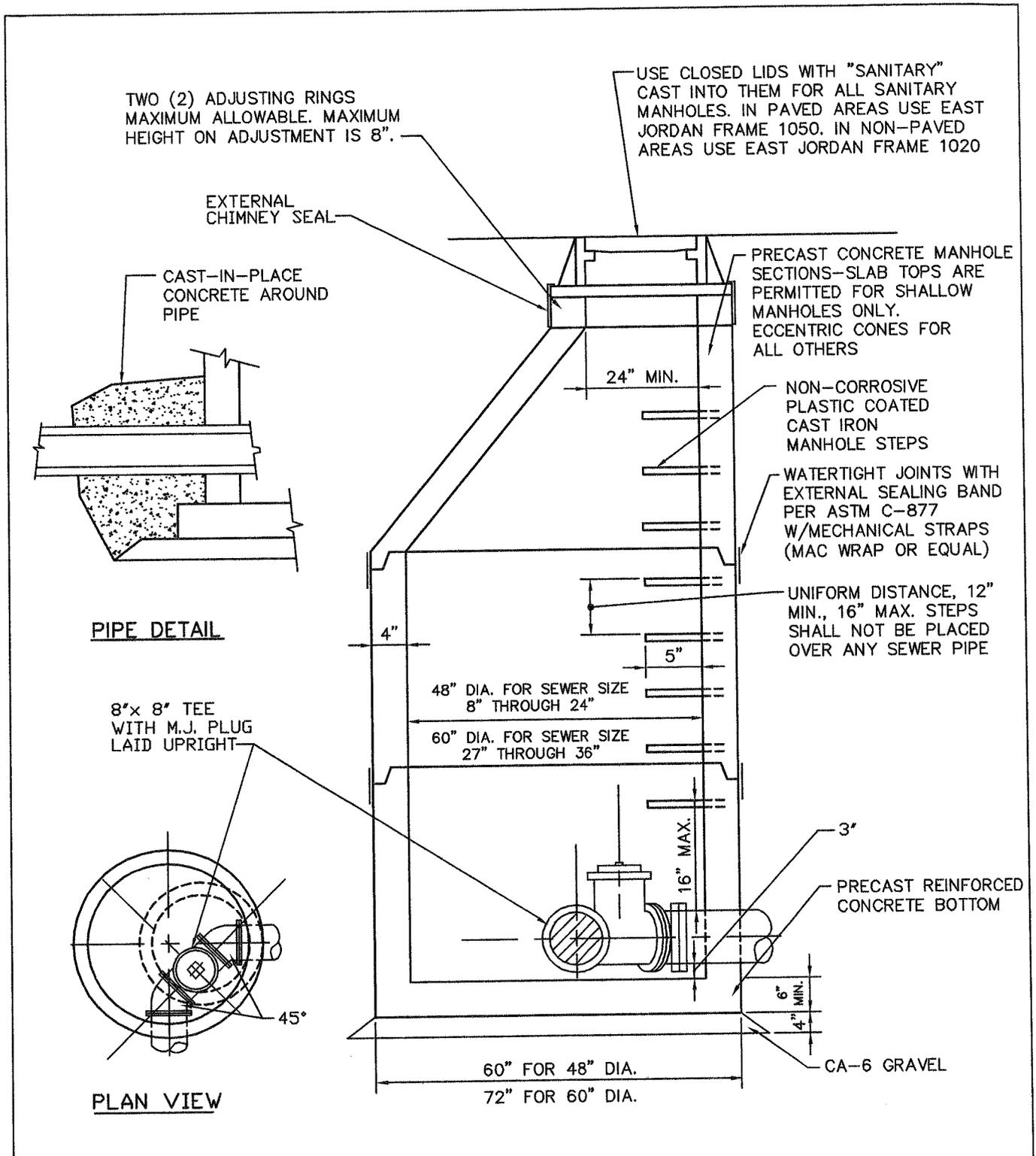
DROP MANHOLE DETAIL
 OUTSIDE TYPE



CITY OF HARVARD	REVISIONS		
	NO.	BY	DATE
PUBLIC WORKS DEPARTMENT	1.	CML	1/96
APPROVED 02-15-00	2.	MPL	1/99
	3.	WJH	9/04
	4.		
	5.		

ALL PRECAST CONCRETE STRUCTURES
MUST CONFORM TO AASMT0 M199

CLEAN-OUT MANHOLE DETAIL
TEE W/ PLUG-LAID ON SIDE



TWO (2) ADJUSTING RINGS
 MAXIMUM ALLOWABLE. MAXIMUM
 HEIGHT ON ADJUSTMENT IS 8".

USE CLOSED LIDS WITH "SANITARY"
 CAST INTO THEM FOR ALL SANITARY
 MANHOLES. IN PAVED AREAS USE EAST
 JORDAN FRAME 1050. IN NON-PAVED
 AREAS USE EAST JORDAN FRAME 1020

EXTERNAL
 CHIMNEY SEAL

CAST-IN-PLACE
 CONCRETE AROUND
 PIPE

PRECAST CONCRETE MANHOLE
 SECTIONS-SLAB TOPS ARE
 PERMITTED FOR SHALLOW
 MANHOLES ONLY.
 ECCENTRIC CONES FOR
 ALL OTHERS

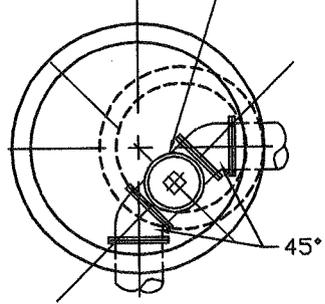
NON-CORROSIVE
 PLASTIC COATED
 CAST IRON
 MANHOLE STEPS

WATERTIGHT JOINTS WITH
 EXTERNAL SEALING BAND
 PER ASTM C-877
 W/MECHANICAL STRAPS
 (MAC WRAP OR EQUAL)

UNIFORM DISTANCE, 12"
 MIN., 16" MAX. STEPS
 SHALL NOT BE PLACED
 OVER ANY SEWER PIPE

PIPE DETAIL

8"x 8" TEE
 WITH M.J. PLUG
 LAID UPRIGHT

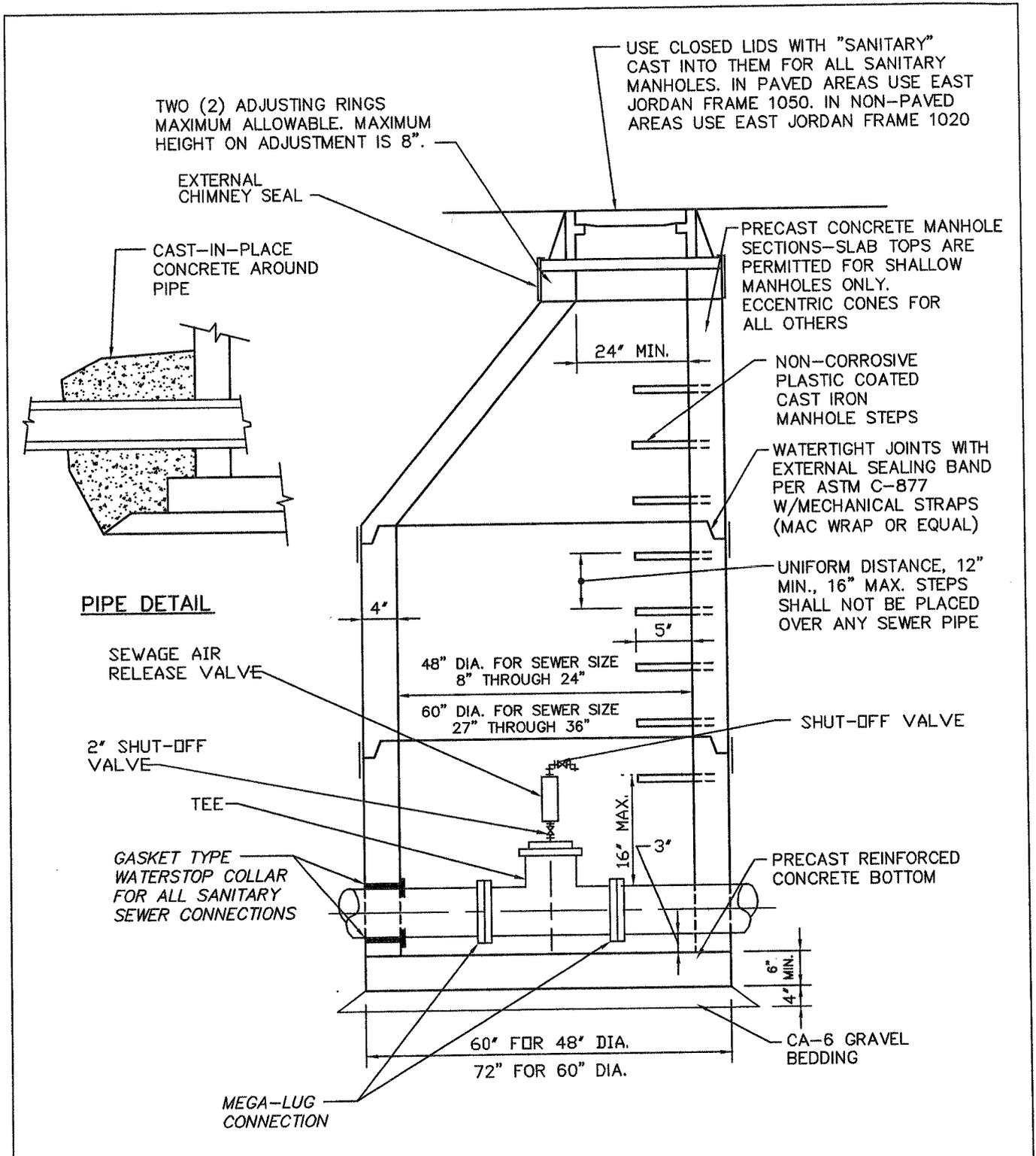


PLAN VIEW

ALL PRECAST CONCRETE STRUCTURES
 MUST COMFORM TO AASHTO M199

CITY OF HARVARD	REVISIONS		
	NO.	BY	DATE
PUBLIC WORKS DEPARTMENT	1.	CML	1/96
APPROVED 02-15-00	2.	LT	1/97
	3.	DHP	1/98
	4.	MPL	1/99
	5.	L.T.	9/04

CLEAN-OUT MANHOLE DETAIL
 TEE W/ PLUG-LAID UPRIGHT



USE CLOSED LIDS WITH "SANITARY" CAST INTO THEM FOR ALL SANITARY MANHOLES. IN PAVED AREAS USE EAST JORDAN FRAME 1050. IN NON-PAVED AREAS USE EAST JORDAN FRAME 1020

TWO (2) ADJUSTING RINGS MAXIMUM ALLOWABLE. MAXIMUM HEIGHT ON ADJUSTMENT IS 8".

EXTERNAL CHIMNEY SEAL

CAST-IN-PLACE CONCRETE AROUND PIPE

PRECAST CONCRETE MANHOLE SECTIONS—SLAB TOPS ARE PERMITTED FOR SHALLOW MANHOLES ONLY. ECCENTRIC CONES FOR ALL OTHERS

NON-CORROSIVE PLASTIC COATED CAST IRON MANHOLE STEPS

WATERTIGHT JOINTS WITH EXTERNAL SEALING BAND PER ASTM C-877 W/MECHANICAL STRAPS (MAC WRAP OR EQUAL)

UNIFORM DISTANCE, 12" MIN., 16" MAX. STEPS SHALL NOT BE PLACED OVER ANY SEWER PIPE

PIPE DETAIL

SEWAGE AIR RELEASE VALVE

2" SHUT-OFF VALVE

TEE

GASKET TYPE WATERSTOP COLLAR FOR ALL SANITARY SEWER CONNECTIONS

SHUT-OFF VALVE

PRECAST REINFORCED CONCRETE BOTTOM

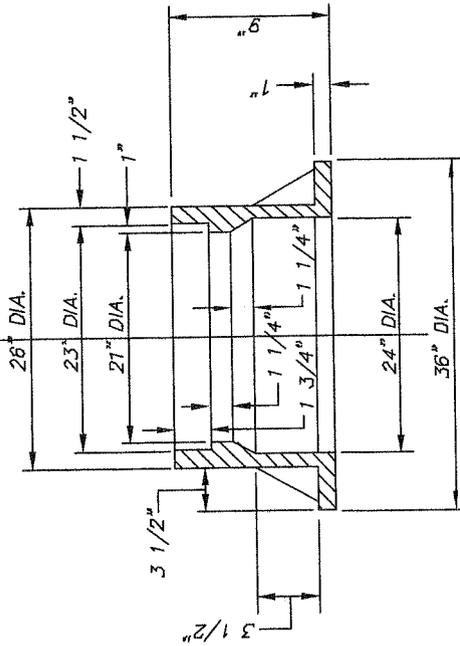
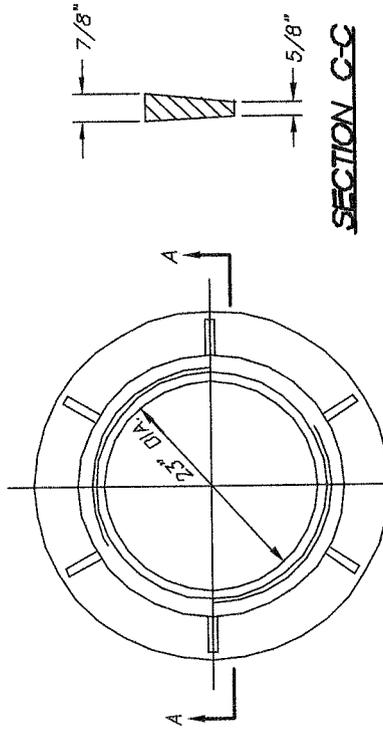
CA-6 GRAVEL BEDDING

MEGA-LUG CONNECTION

ALL PRECAST CONCRETE STRUCTURES MUST CONFORM TO AASHTO M199

CITY OF HARVARD, ILLINOIS PUBLIC WORKS DEPARTMENT APPROVED 02-15-00	REVISIONS		
	NO.	BY	DATE
	1.	CML	1/96
	2.	MPL	1/99
	3.	WJH	9/04

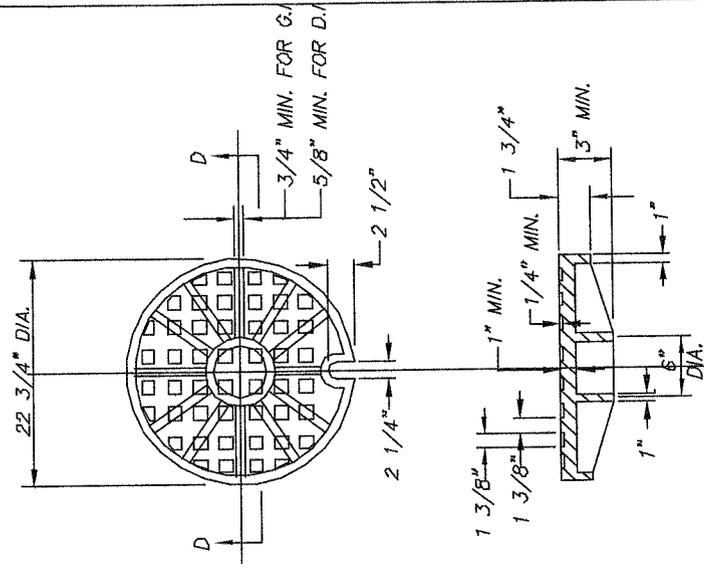
AIR RELEASE MANHOLE DETAIL



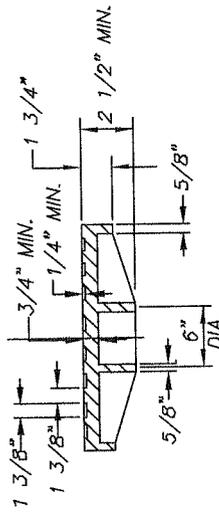
SECTION B-B
CAST OPEN LID
WT. 116 LBS.

THE OPEN AND CLOSED LIDS MAY BE MADE OF EITHER GRAY IRON, OR DUCTILE IRON, CONFORMING TO THE STANDARD SPECIFICATIONS. DUCTILE IRON CASTING SHALL BE GRADE 60-40-18, AND SHALL BE PROOF LOADED IN ACCORDANCE WITH FEDERAL SPECIFICATIONS RR-F-621 B, SECTION 3.8. THE PROOF LOAD SHALL BE 25,000 LBS. ON A 9" X 9" CAST BLOCK.

SECTION A-A CAST FRAME GRAY IRON
WT. 390 LBS



SECTION D-D OF GRAY IRON LID
WT. 150 LBS

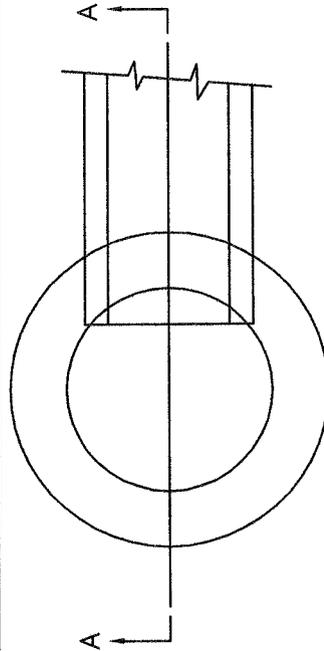


SECTION D-D OF DUCTILE IRON LID
WT. 115 LBS.
CAST CLOSED LID

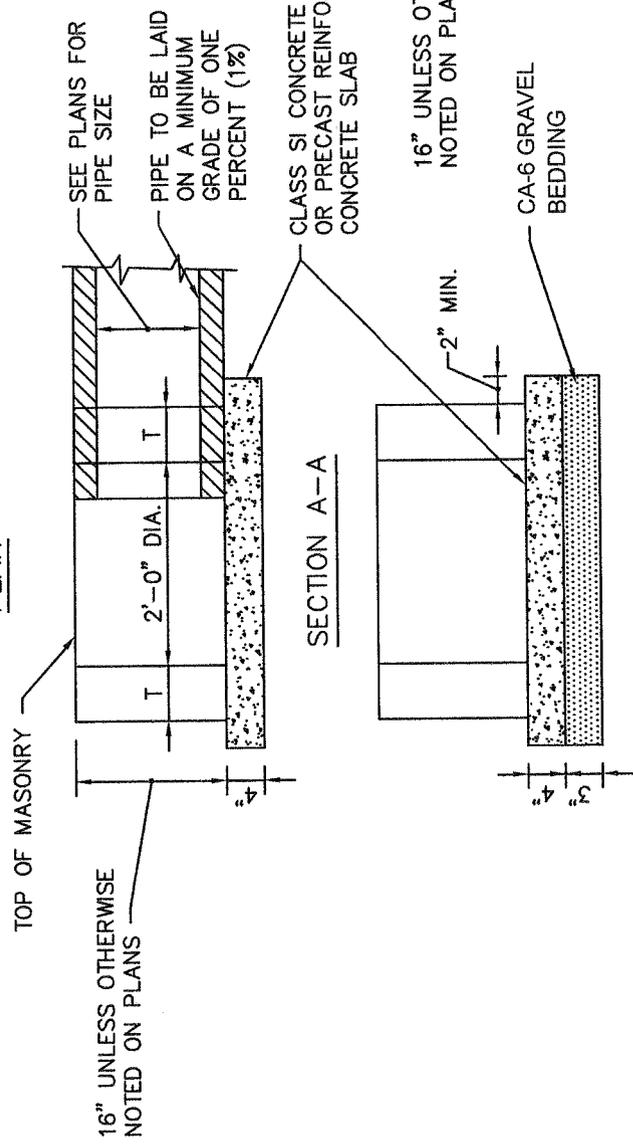
USE CLOSED LIDS WITH "SANITARY" CAST INTO THEM FOR ALL SANITARY MANHOLES. IN PAVED AREAS USE EAST JORDAN FRAME 1050. IN NON-PAVED AREAS USE EAST JORDAN FRAME 1020

CITY OF HARVARD PUBLIC WORKS DEPARTMENT APPROVED 1-19-99	REVISIONS	
	NO.	DATE
	1.	1/96
	2.	1/97
	3.	
	4.	
	5.	

MANHOLE FRAMES & COVERS (TYPE 1)



PLAN



SECTION A-A

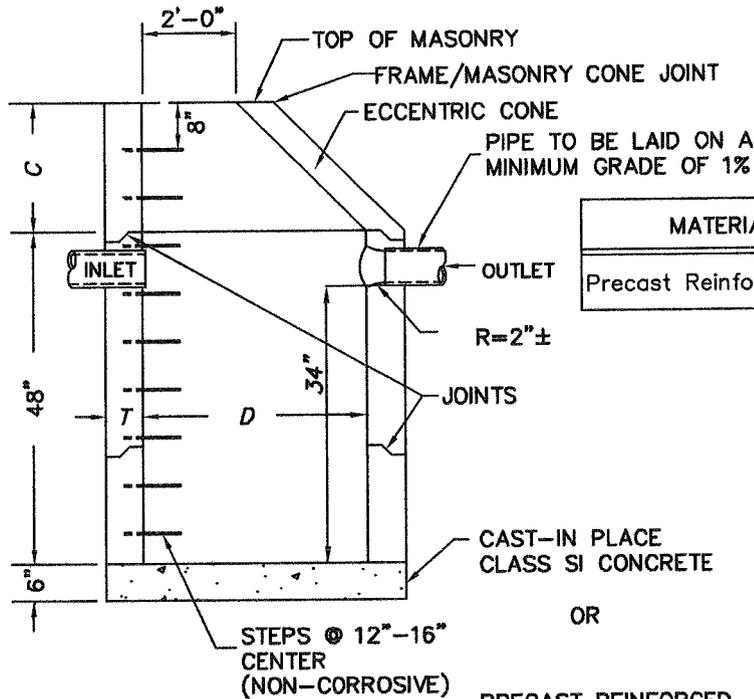
CASTING SCHEDULE	
LOCATION	EJW
B OR M6.12 C&G	7210
DEPRESSED CURB	7210 M3
PAVED	1050
NON-PAVED	1020

MATERIALS FOR WALLS	
PRECAST REINFORCED CONCRETE SECTIONS	T
	3"

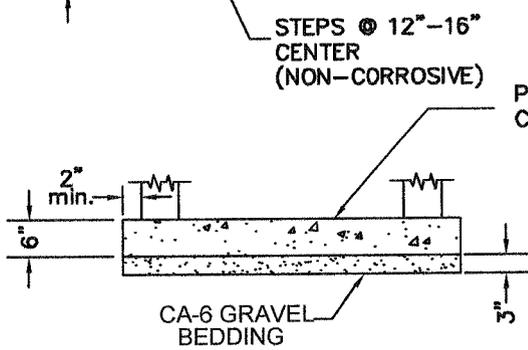
IN ADDITION TO THE REQUIREMENTS OF ART. 602 OF THE STANDARD SPECIFICATIONS, THE CONTRACT UNIT PRICE FOR INLET, TYPE A SHALL INCLUDE THE SAND CUSHION, WHEN REQUIRED, AND FURNISHING AND COMPACTING OF THE SPECIFIED BACKFILL MATERIAL.

CITY OF HARVARD, ILLINOIS PUBLIC WORKS DEPARTMENT APPROVED 02-15-00	NO.	REVISIONS	
		BY	DATE
	1	CML	1/96
	2	DHP	2/98
	3	MPL	1/99
	4	BRL	2/00
	5	WJH	9/04

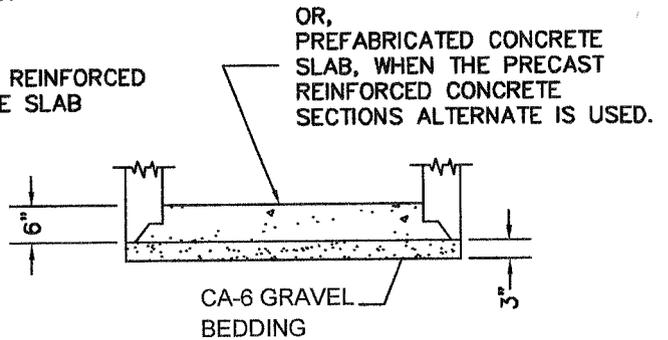
STORM INLET TYPE A



MATERIALS FOR WALLS	D	C	T
Precast Reinforced Concrete Sections	4'-0"	2'-6"	4"
	5'-0"	3'-9"	5"



OR
 PRECAST REINFORCED
 CONCRETE SLAB



All Catch Basins shall be 4'-0" in diameter unless otherwise noted on plans.

In addition to the requirements of Art. 602.15 of the standard Specifications the contract unit price for Catch Basins, Type A shall include the sand cushion when required, furnishing and placing steps when required, and furnishing and compacting the specified backfill material.

Dimension "C" for Precast Reinforced Concrete sections may vary from the dimension given to plus 6 inches.

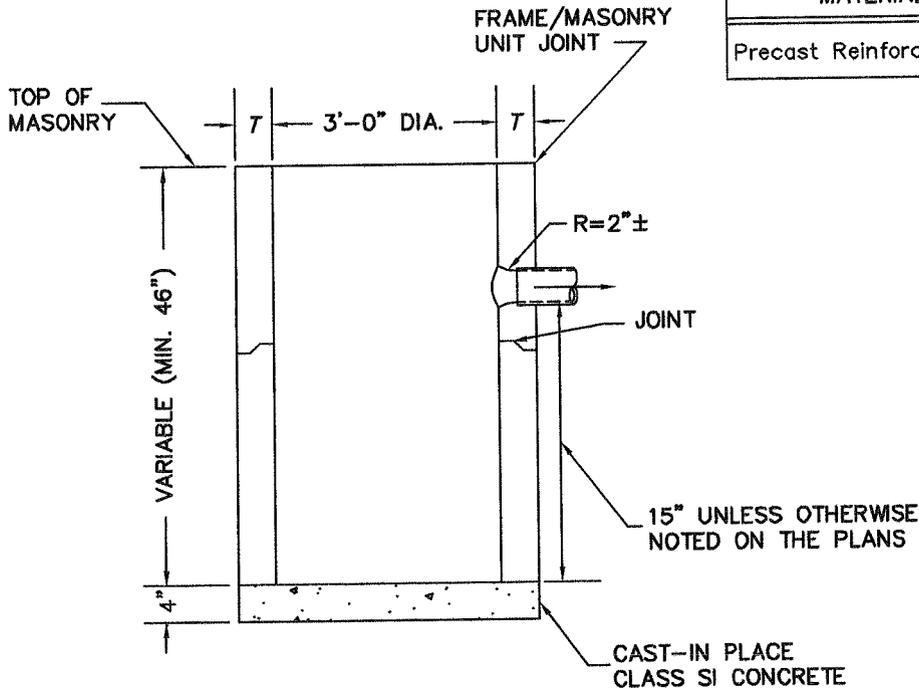
Joints are to be made watertight with external sealing bands per ASTM C-877 w/mechanical straps. (Mac Wrap or equal).

All Precast Concrete Structures must conform to AASHTO M199

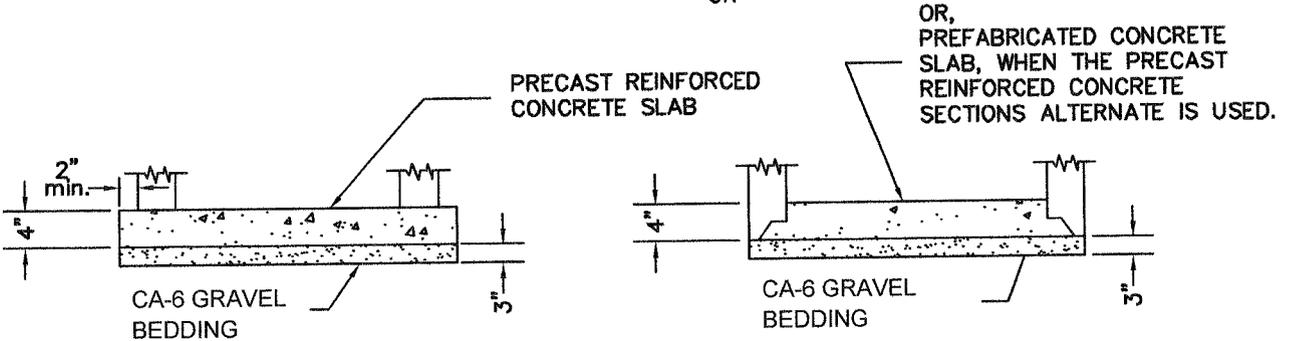
CITY OF HARVARD, ILLINOIS PUBLIC WORKS DEPARTMENT	REVISIONS		
	NO.	BY	DATE
APPROVED 02-15-00	1.	CML	1/96
	2.	L.T.	1/97
	3.	MPL	1/99
	4.	BRL	2/00
	5.	WJH	9/04

CATCH BASIN
TYPE A

MATERIALS FOR WALLS	T
Precast Reinforced Concrete Sections	3"



OR



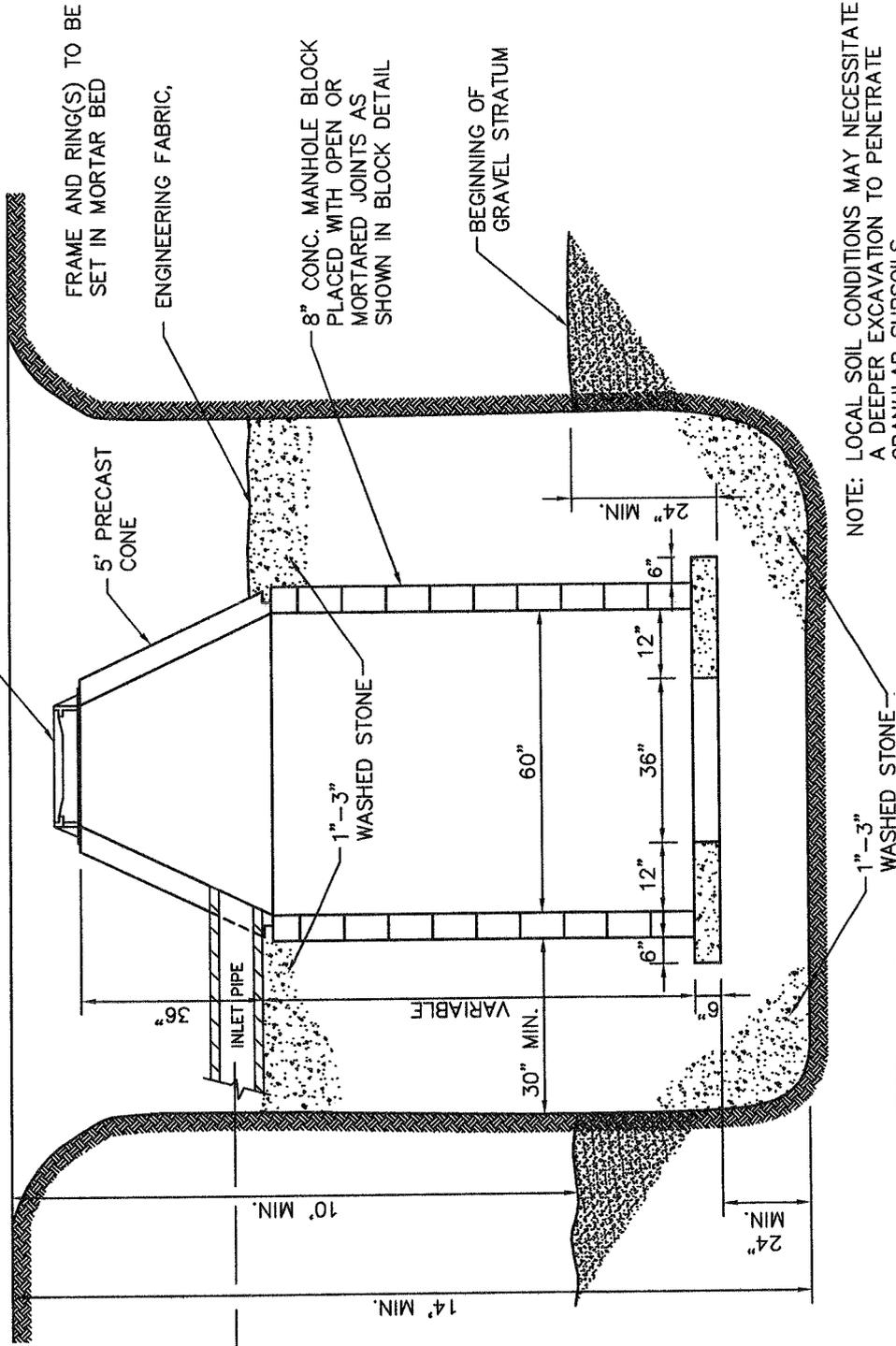
In addition to the requirements of Art. 602.15 of the standard Specifications the contract unit price for Catch Basins, Type C shall include the sand cushion when required, and furnishing and compacting the specified backfill material.

External chimney seal to be installed on catch basin frame/masonry unit joint. (Not required for storm manholes in grassy areas).

All Precast Concrete Structures must conform to AASHTO M199

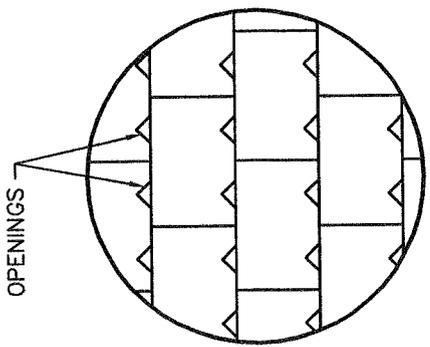
CITY OF HARVARD, ILLINOIS	REVISIONS			CATCH BASIN TYPE C
	NO.	BY	DATE	
PUBLIC WORKS DEPARTMENT	1.	CML	1/96	
APPROVED 02-15-00	2.	BRL	2/00	
	3.	WJH	9/04	
	4.			
	5.			

EAST JORDAN 1050 FOR PAVED AREA
 EAST JORDAN 1020 W/CLOSED LID FOR NON-PAVED AREA



NOTE: LOCAL SOIL CONDITIONS MAY NECESSITATE A DEEPER EXCAVATION TO PENETRATE GRANULAR SUBSOILS.
 ALL DRYWELLS TO BE DESIGNED BY ENGINEER BASED ON SOIL REPORT AND APPROVED BY THE CITY ENGINEER PRIOR TO PLACEMENT.

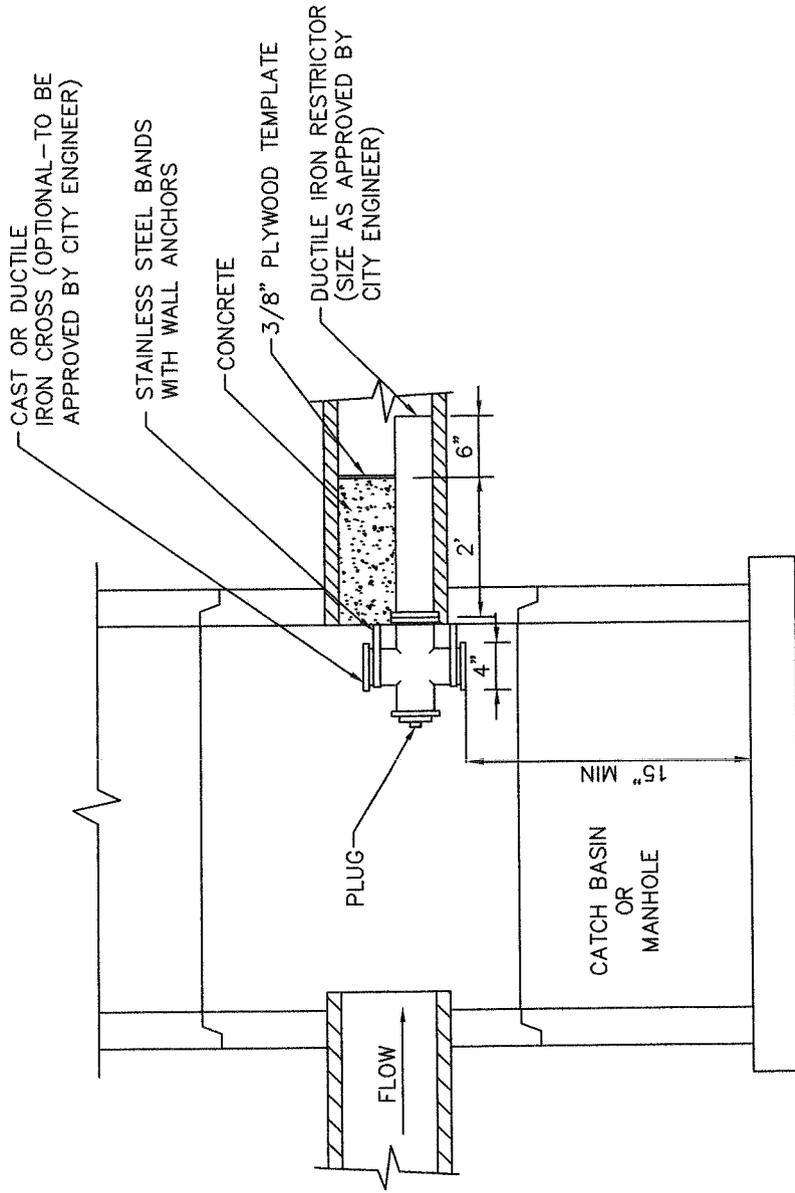
TO CATCH BASIN
 ALL DRYWELLS SHALL
 PRECEDED BY A
 CATCH BASIN



NO.	REVISIONS		DATE
	BY	DATE	
1.	W/H	9/04	
2.			
3.			
4.			
5.			

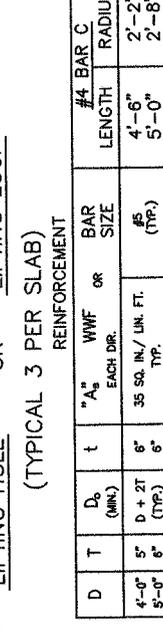
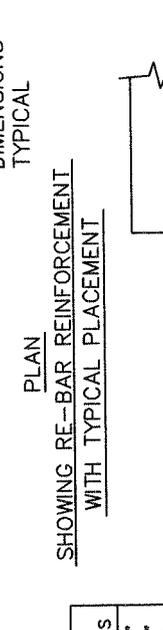
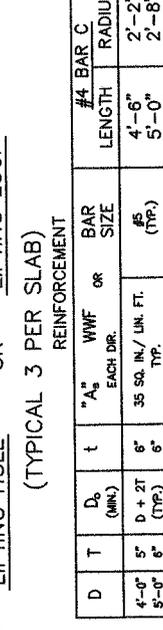
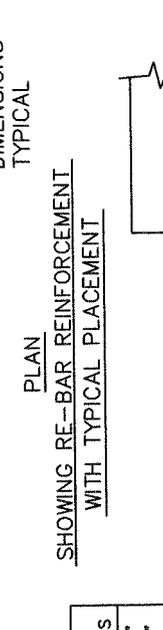
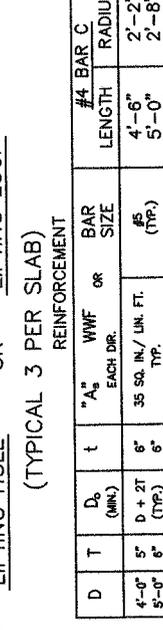
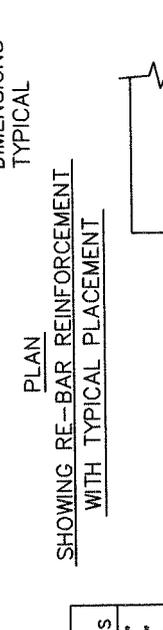
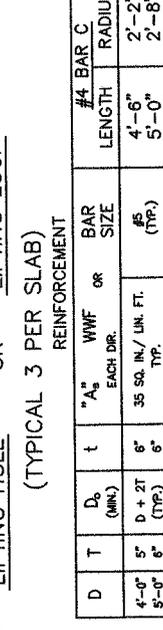
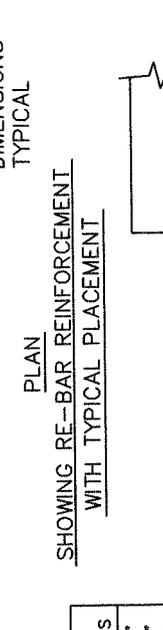
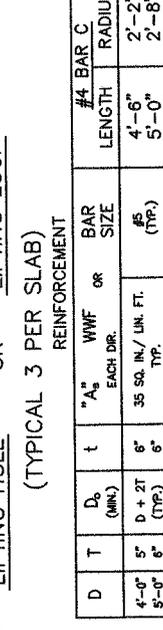
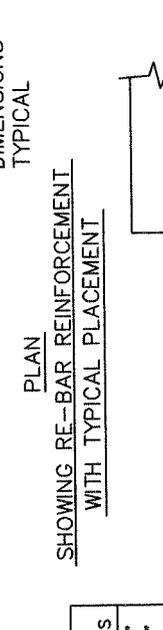
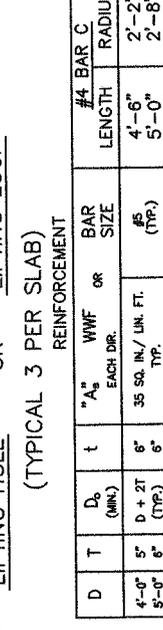
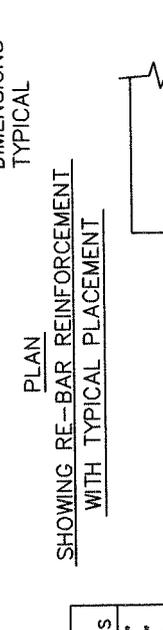
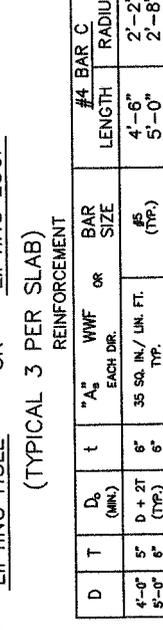
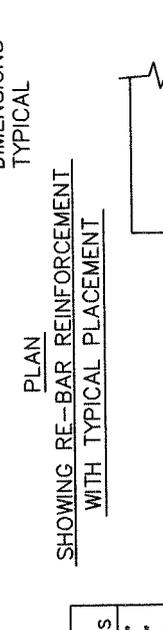
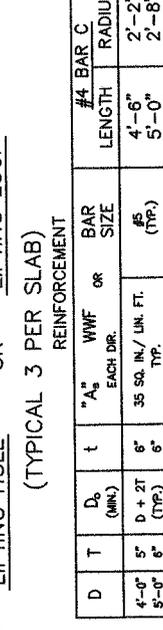
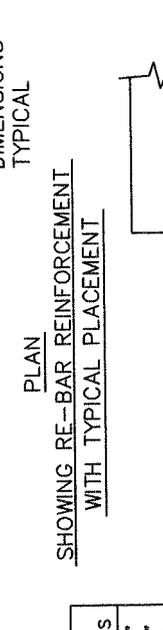
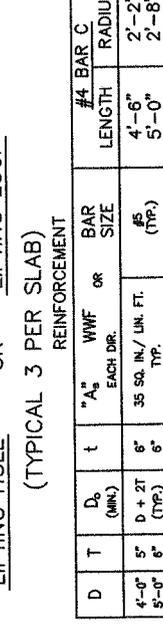
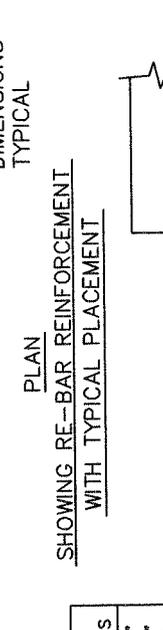
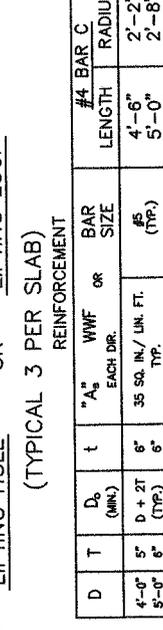
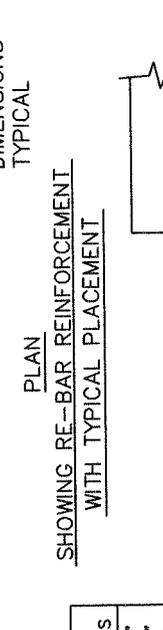
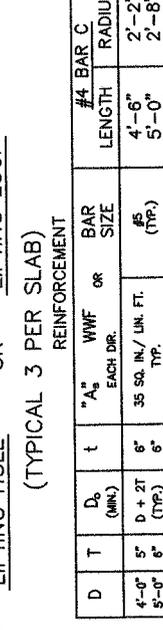
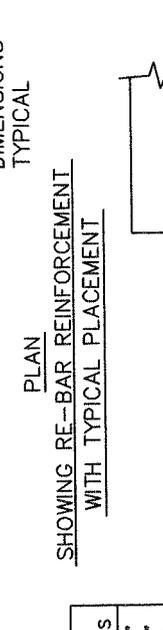
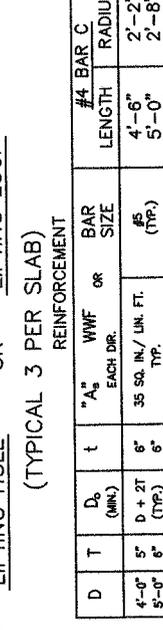
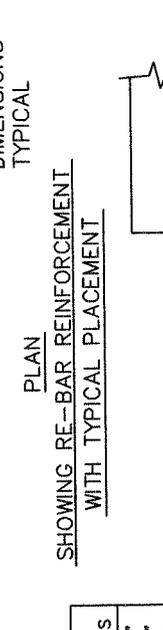
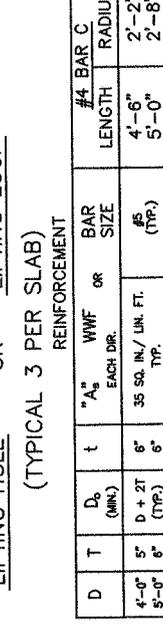
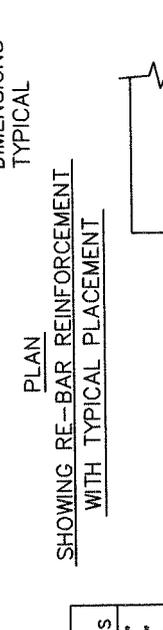
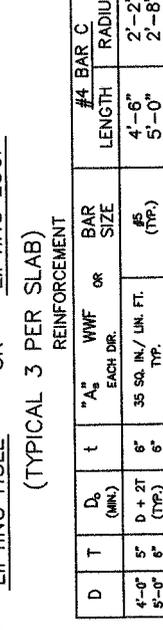
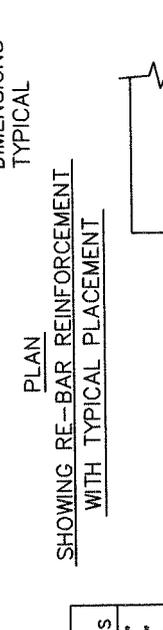
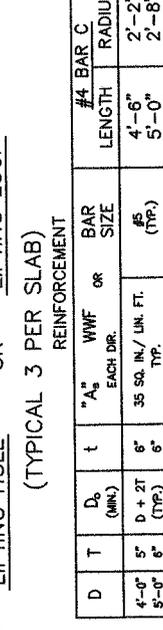
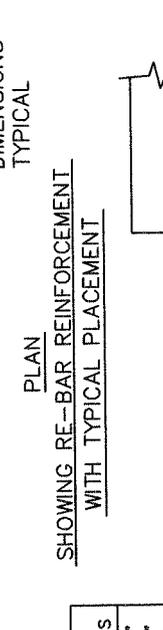
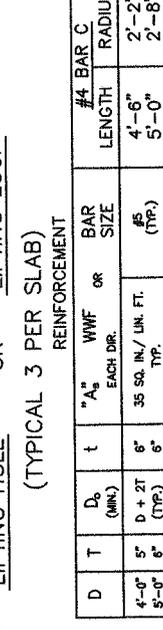
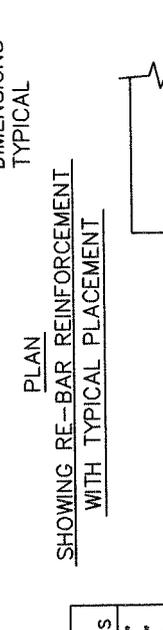
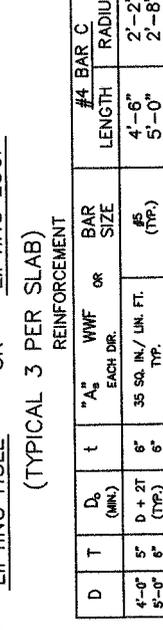
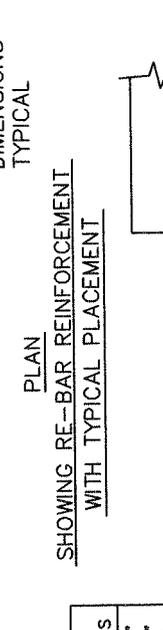
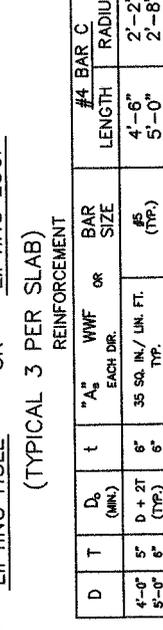
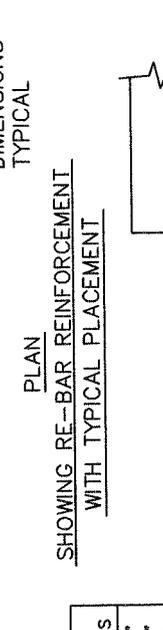
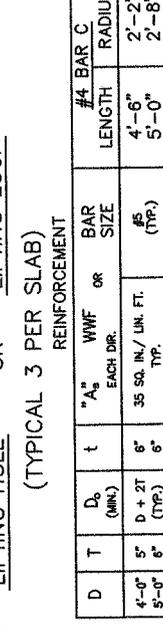
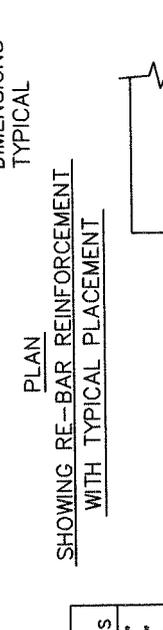
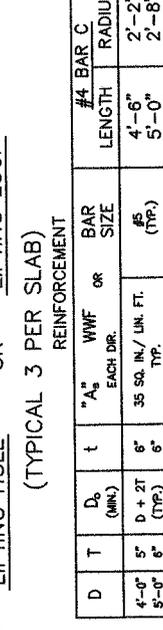
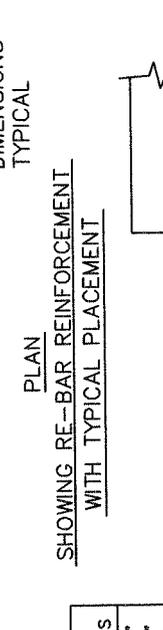
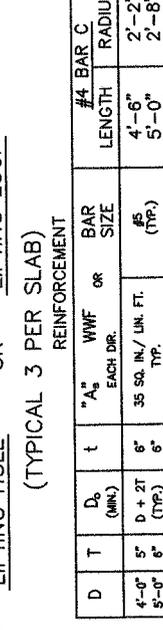
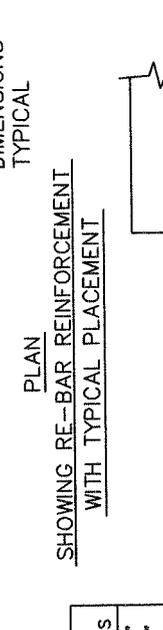
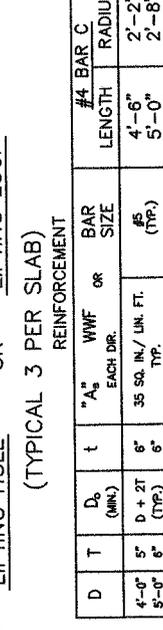
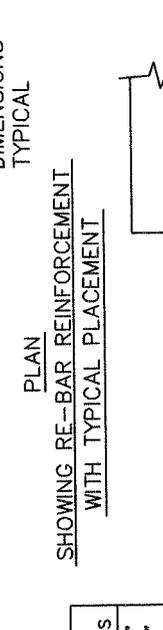
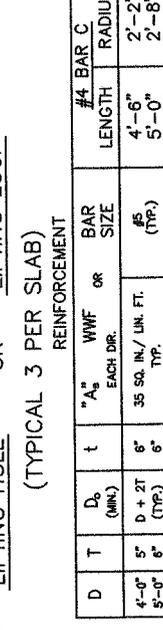
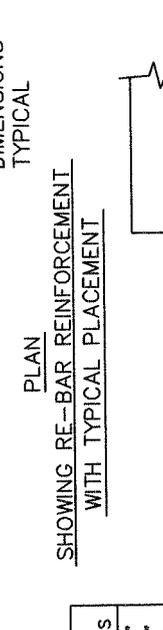
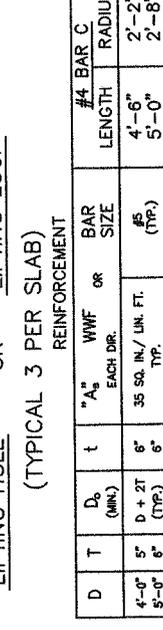
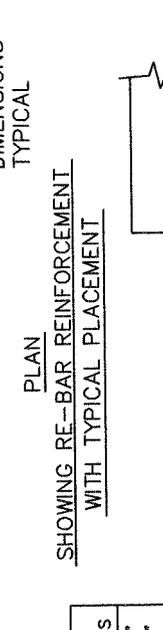
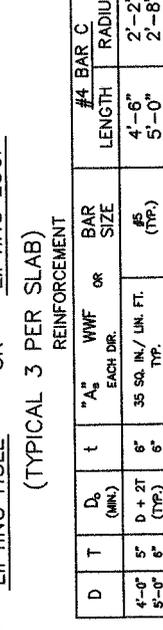
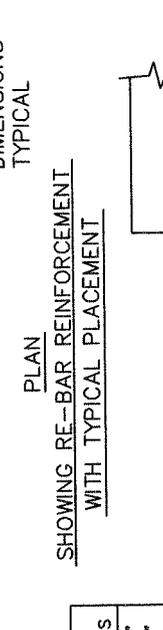
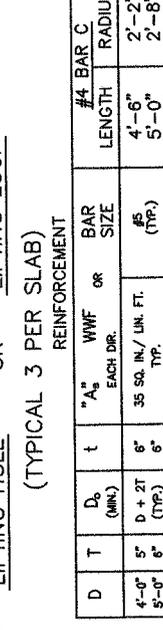
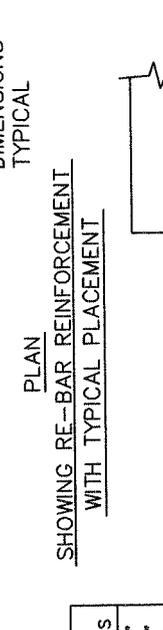
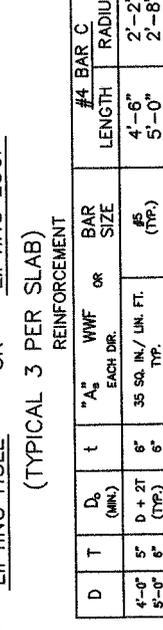
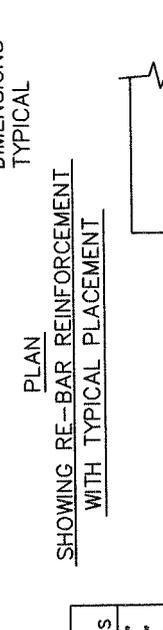
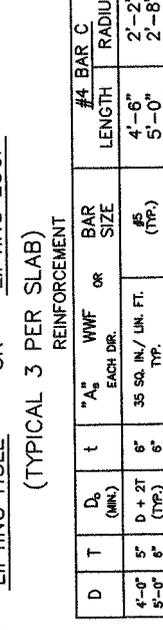
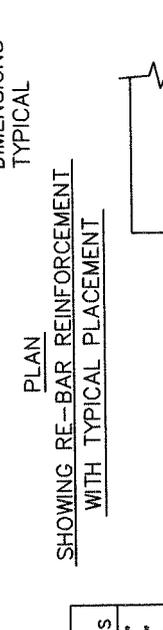
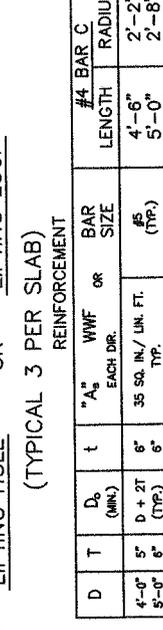
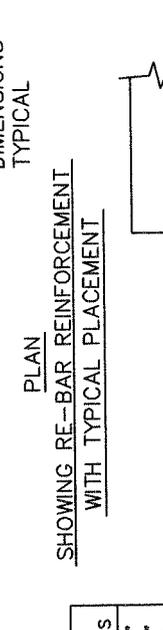
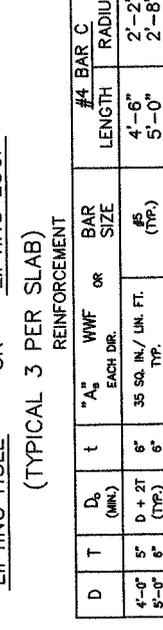
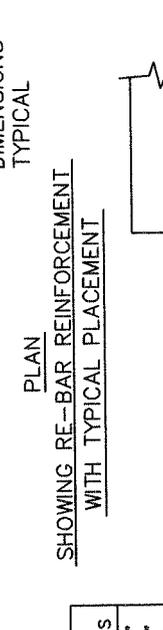
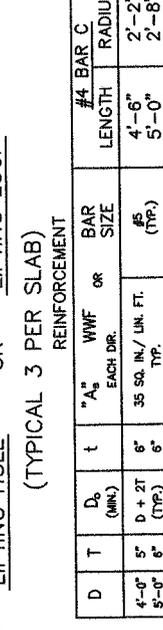
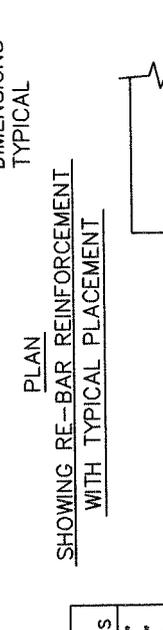
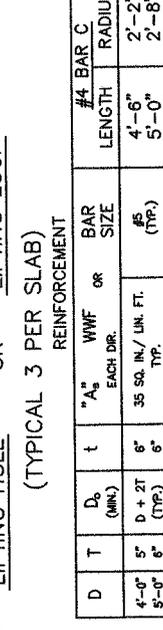
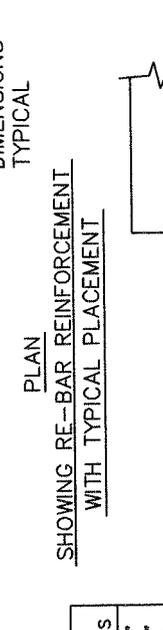
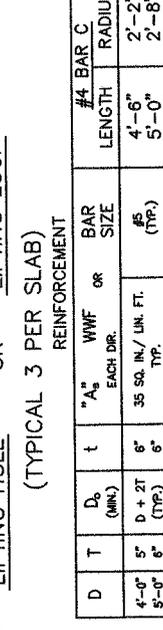
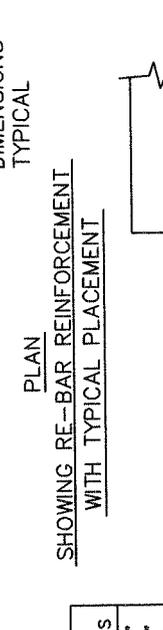
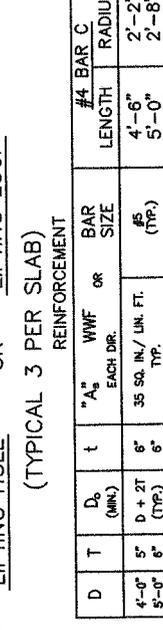
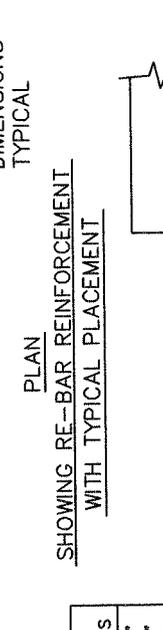
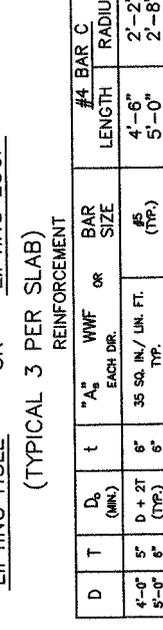
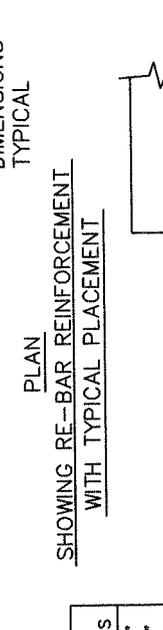
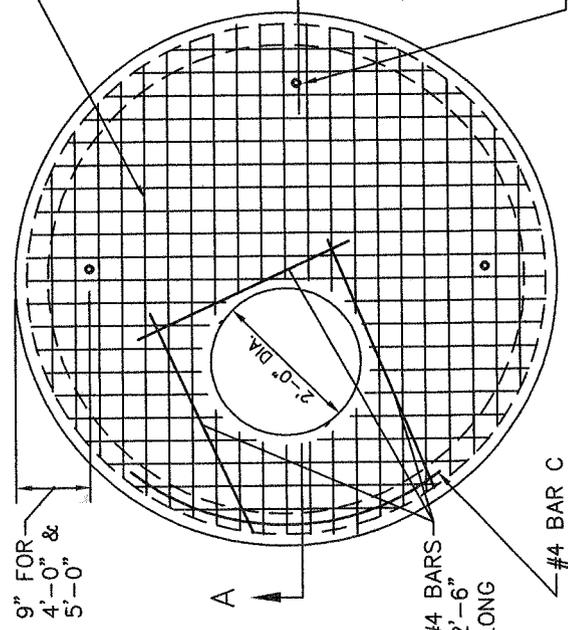
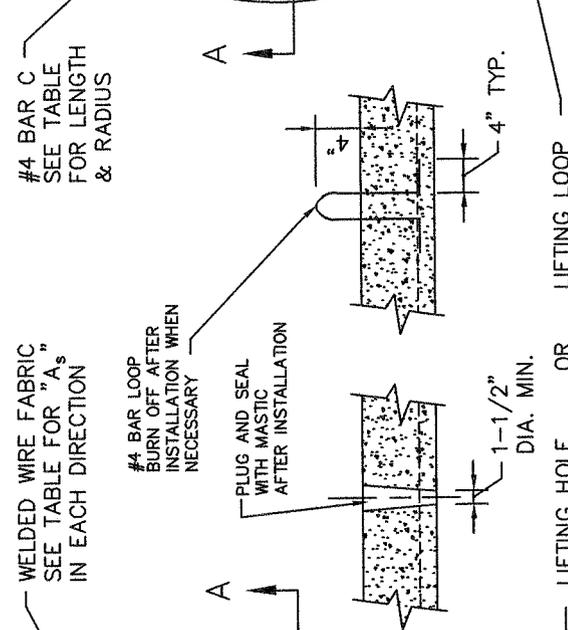
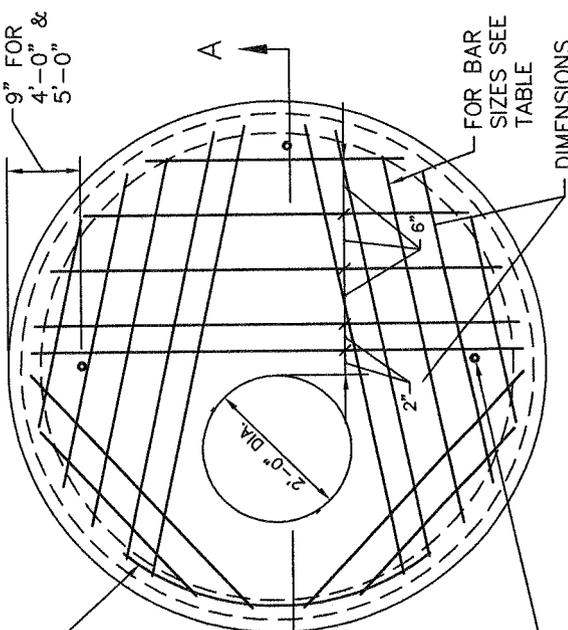
CITY OF HARVARD
 PUBLIC WORKS DEPARTMENT
 APPROVED 02-15-00

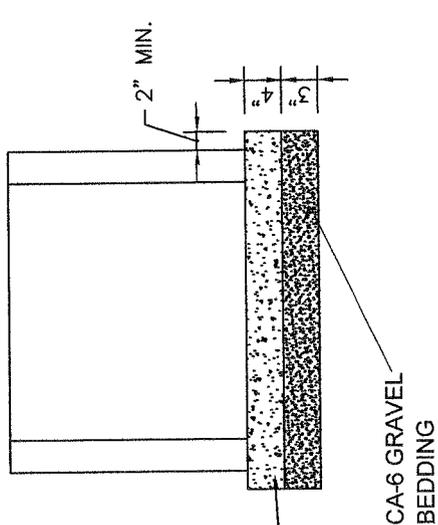
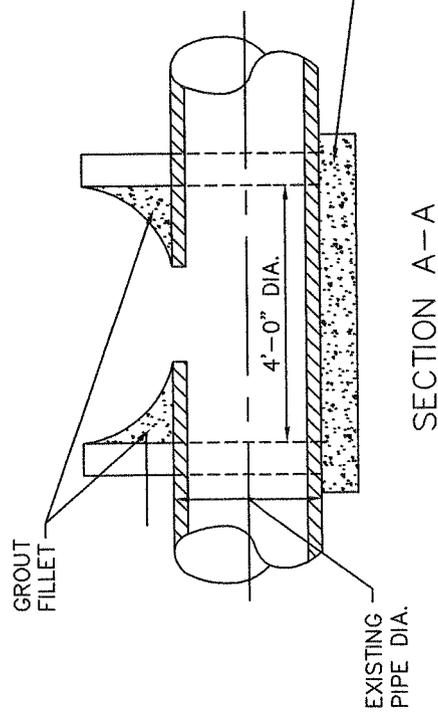
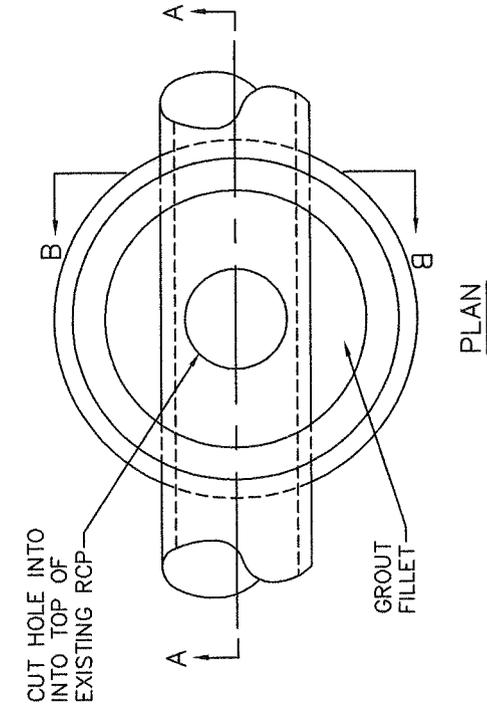
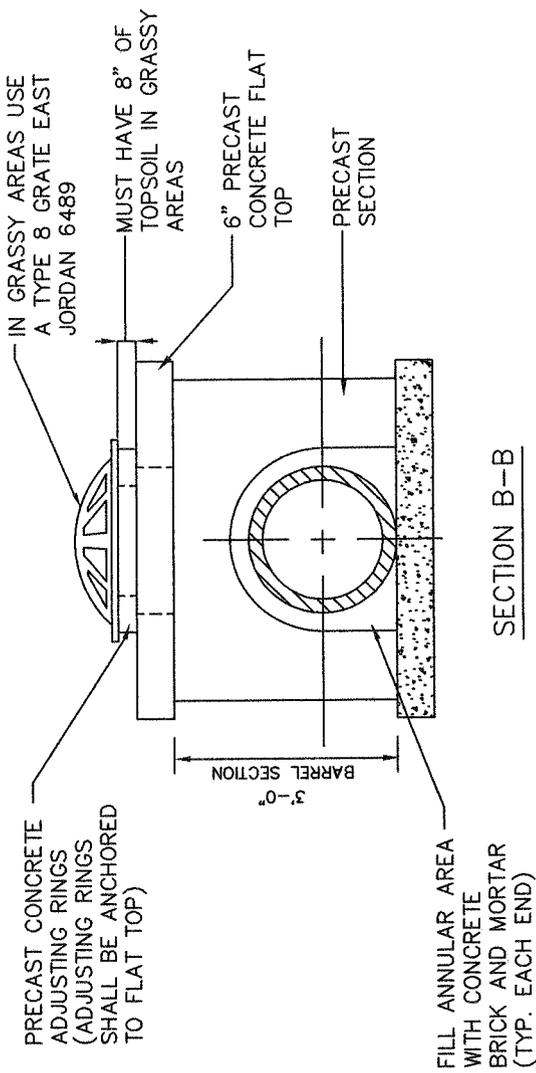
DRYWELL DETAIL



CITY OF HARVARD, ILLINOIS	NO.	REVISIONS	
		BY	DATE
PUBLIC WORKS DEPARTMENT APPROVED 02-15-00	1	CML	1/96
	2	L.T.	1/97
	3.		
	4.		
	5.		

RESTRICTOR DETAIL

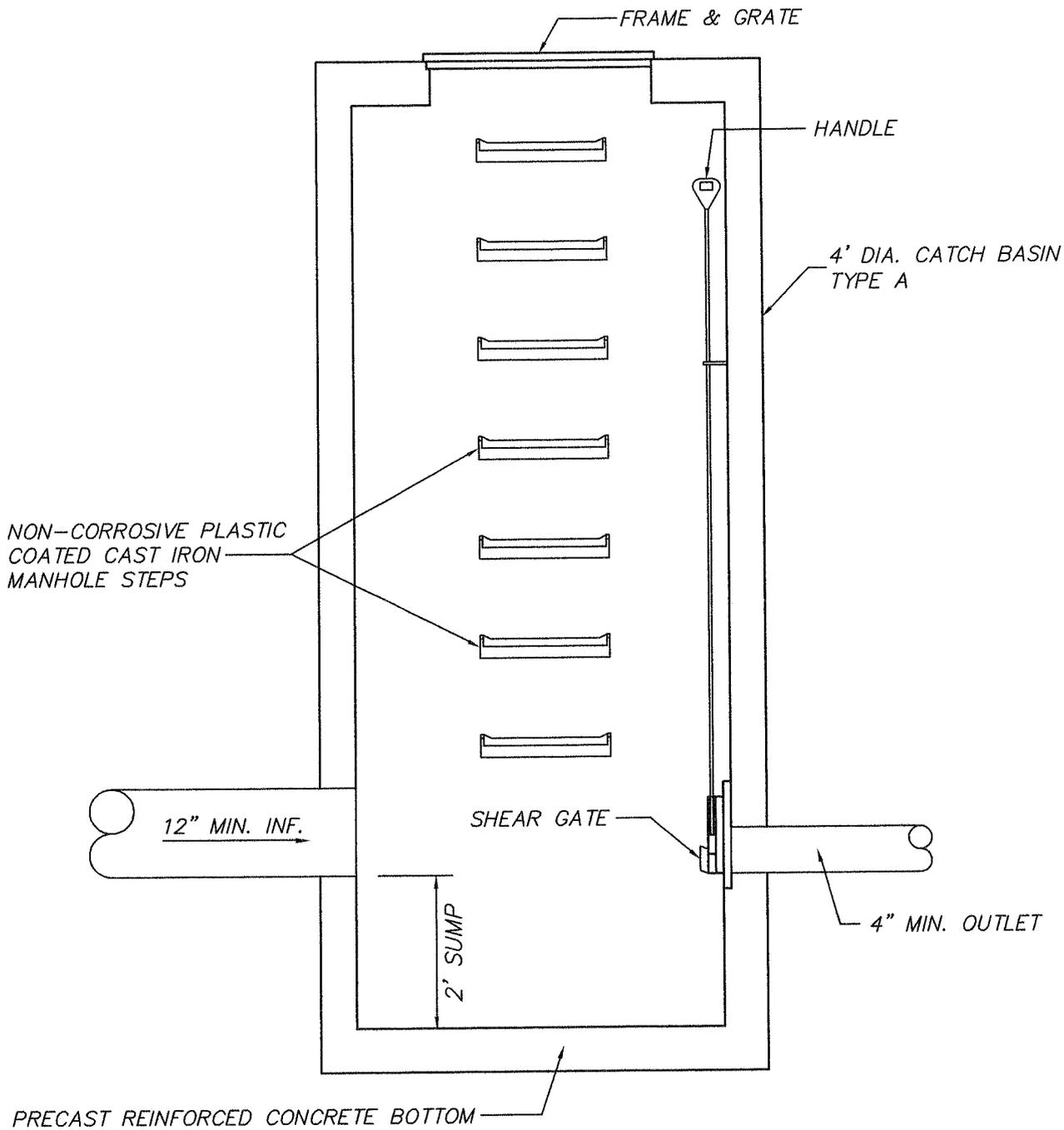




CITY OF HARVARD, ILLINOIS	REVISIONS	
	NO.	DATE
PUBLIC WORKS DEPARTMENT	1	CML 1/96
	2	L.T. 1/97
	3	DHP 2/98
	4	MPL 1/99
	5	

APPROVED 02-15-00

4' INLET WITH FLAT TOP OVER EXISTING PIPE

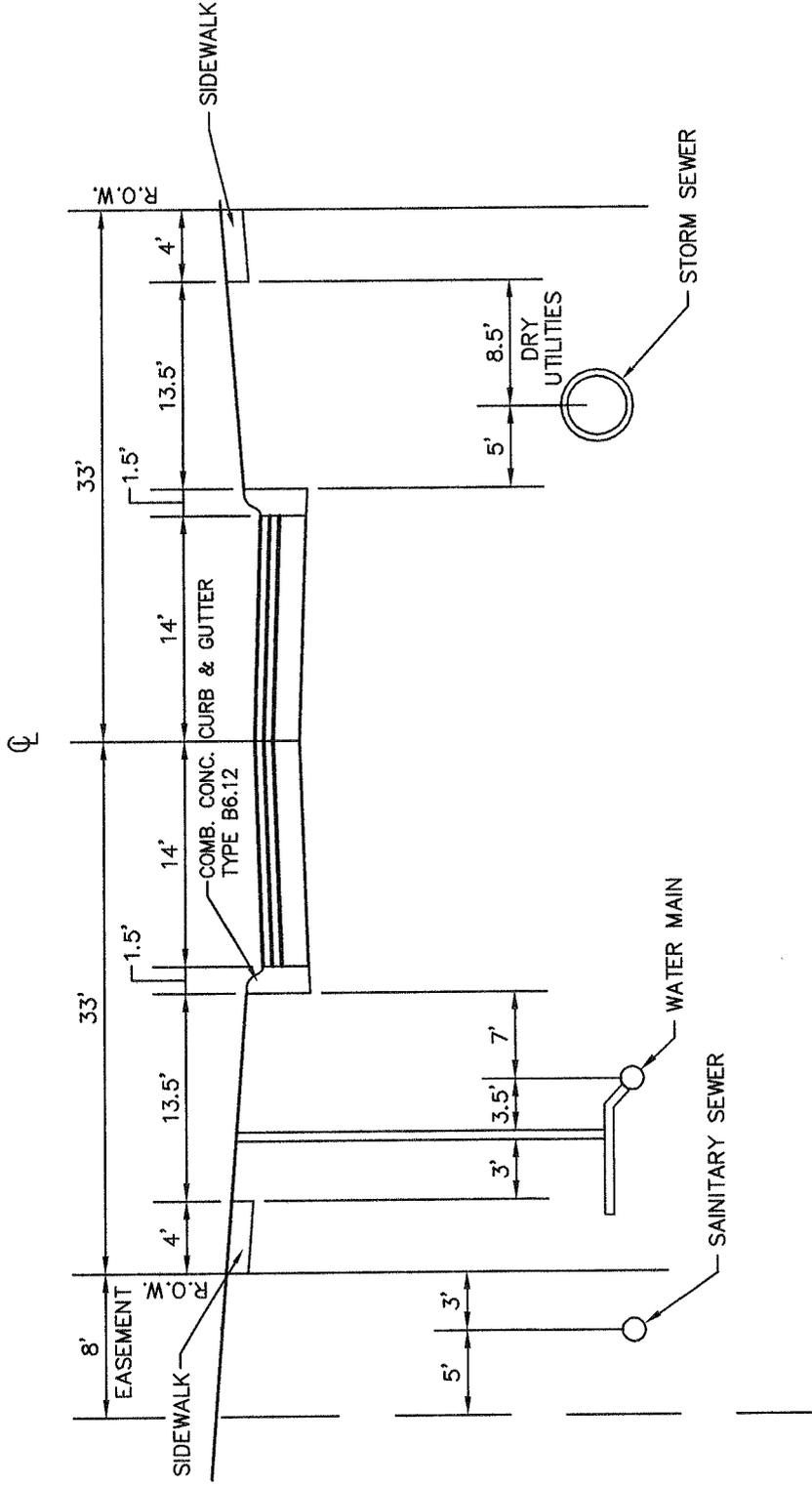


NOTES:

1. WATERSHED AREAS GREATER THAN 10 AC. SHOULD MEET 2 YEAR AND THE 100 YEAR RELEASE RATE. ENGINEER TO DESIGN THE TWO STAGE STRUCTURE.
2. WATERSHED AREAS GREATER THAN 3 AC. BUT LESS THAN 10 AC. SHOULD HAVE A 3" ORIFICE.
3. WATERSHED AREAS LESS THAN 3 AC. MUST HAVE ORIFICE DESIGNED TO MEET 100 YEAR (0.15 CFS/AC.) RELEASE RATE, OR MIN. 1.5" ORIFICE WHICHEVER IS GREATER.
4. THE MIN. ORIFICE SIZE WITHIN THE SHEAR GATE SHOULD BE 1.5"

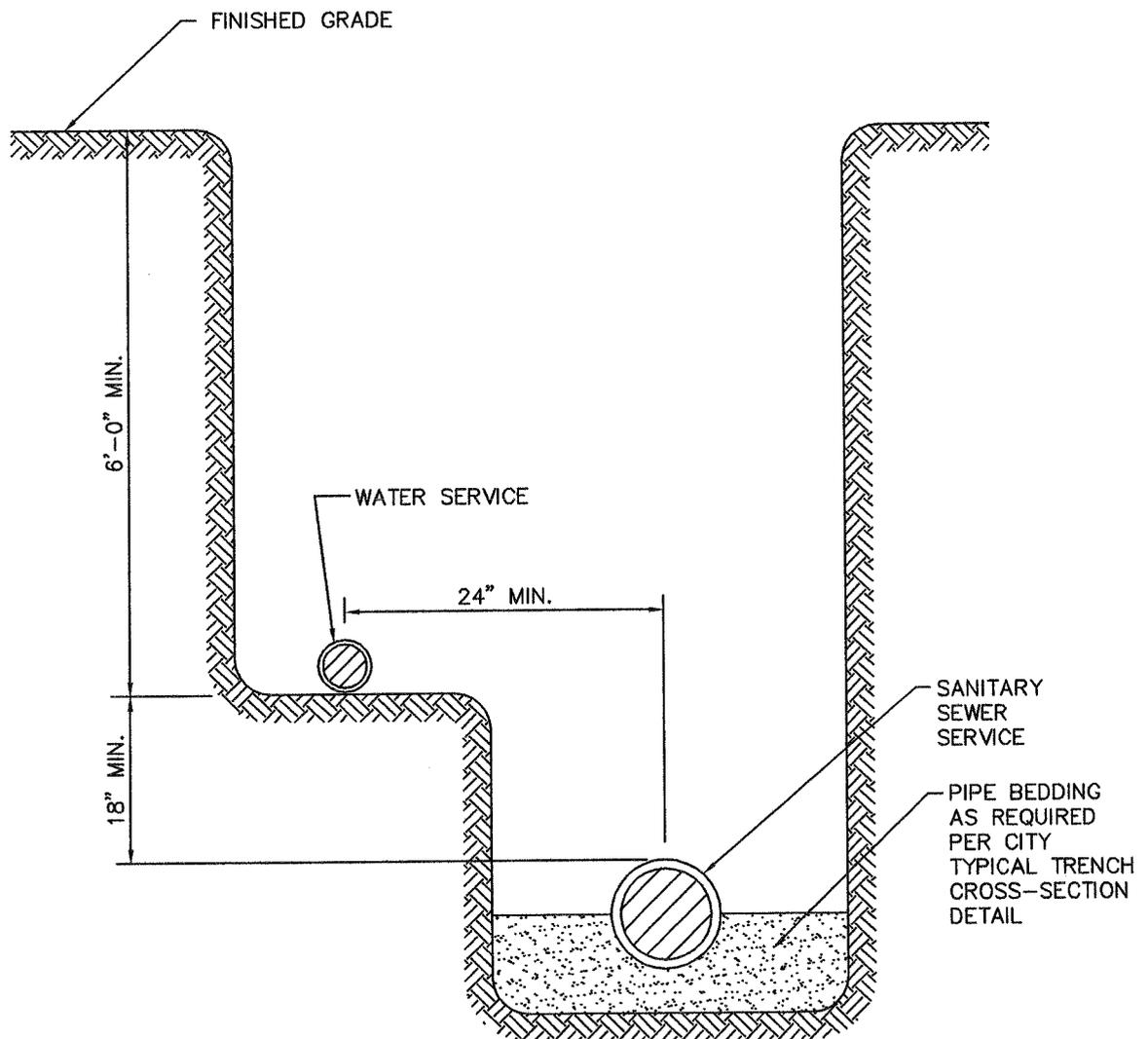
CITY OF HARVARD	REVISIONS			RESTRICTOR FOR WATERSHED AREAS LESS THAN 20 ACS.
	NO.	BY	DATE	
PUBLIC WORKS DEPARTMENT	1.			
APPROVED 02-15-00	2.			
	3.			
	4.			
	5.			

- NOTES:
1. GRANULAR TRENCH BACKFILL (CA-6) TO BE USED UNDER ALL PAVED AREAS AND WITHIN 2' OF ALL PAVED AREAS, INCLUDING SIDEWALKS.
 2. SEE THE APPLICABLE SPECIFICATION OR STANDARD FOR EACH ITEM SHOWN IN THIS STANDARD.
 3. NO SIDEWALK/DRIVEWAY SHALL BE LOCATED WITHIN 2' OF BUFFALO BOX FOR WATERMAIN.



CITY OF HARVARD, ILLINOIS	REVISIONS	
	NO.	DATE
PUBLIC WORKS DEPARTMENT	1	WJH 9/04
APPROVED 09-15-04	2.	
	3.	
	4.	
	5.	

LOCAL ROAD UTILITY TYPICAL SECTION

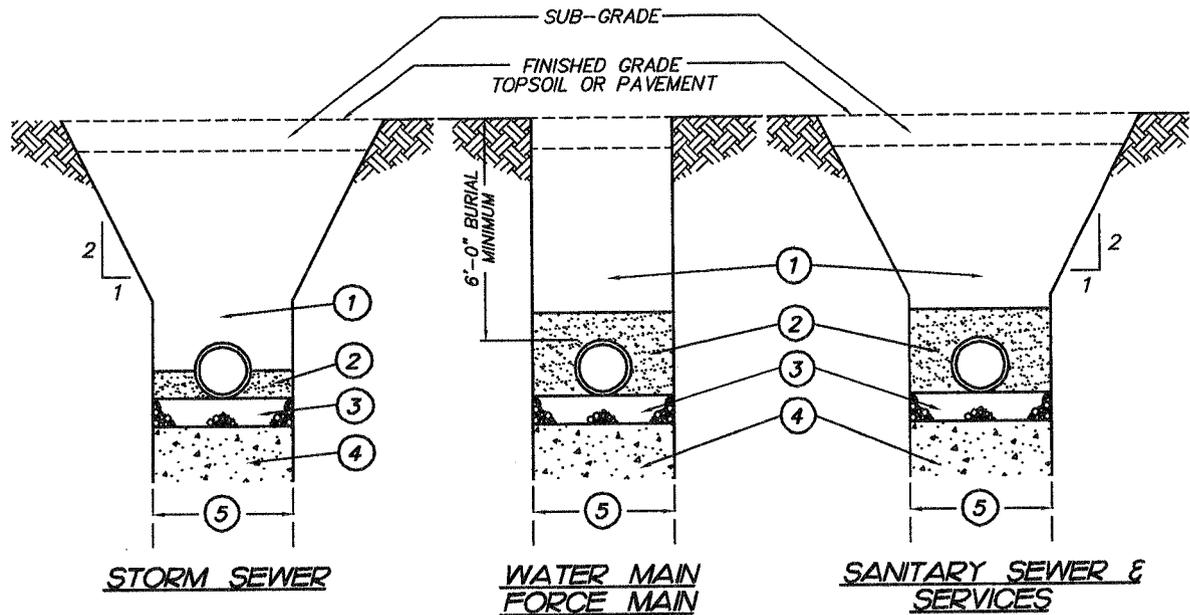


THE WATER SERVICE PIPING AND BUILDING SEWER PIPING MAY BE INSTALLED IN A COMMON TRENCH PROVIDED THAT THE WATER SERVICE PIPE IS PLACED ON A SHELF A MINIMUM OF EIGHTEEN (18) INCHES ABOVE AND TWENTY-FOUR (24) INCHES HORIZONTALLY FROM THE BUILDING SEWER PIPING. SUCH INSTALLATION SHALL USE, FOR A BUILDING SEWER MATERIAL LISTED IN EXHIBIT G, TABLE D FOR A BUILDING DRAIN. (SEE CITY PLUMBING CODE).

CITY OF HARVARD, ILLINOIS PUBLIC WORKS DEPARTMENT	REVISIONS		
	NO.	BY	DATE
APPROVED 02-15-00	1.	CML	1/96
	2.		
	3.		
	4.		
	5.		

COMMON TRENCH FOR WATER
& SANITARY SEWER SERVICES

U-2



- ① Trench backfill under pavement, curb and gutter as indicated in road subgrades and within 2 feet of any proposed curb and gutter or sidewalk. Mechanically compact all backfill of excavated materials. Refer to trench backfill special provisions for materials and compaction requirements.
- ② SANITARY SEWER (PVC, DP), WATER MAIN FORCE MAIN
Course gravel, gradation CA-6 (CL2) to 12" above top of pipe.
- ② SANITARY SEWER (PVC)
Compacted crushed stone, gradation CA-6 (CL-1B) or course gravel, gradation CA-6 (CL2) to 12" above top of pipe (also see note #1 below).
- ② STORM SEWER
Compacted crushed stone, gradation CA-6 (CL-1B) or course gravel, gradation CA-6 (CL2) to spring line of pipe
- ③ 4" compacted crushed stone, gradation CA-6 (CL-1B) or course gravel, gradation CA-6 (CL2)
- ④ Unsuitable material to be removed where directed by Engineer and replaced with suitable material and compacted.
- ⑤ Trench Width - Pipe O.D. + 12" minimum
Pipe O.D. + 18" maximum

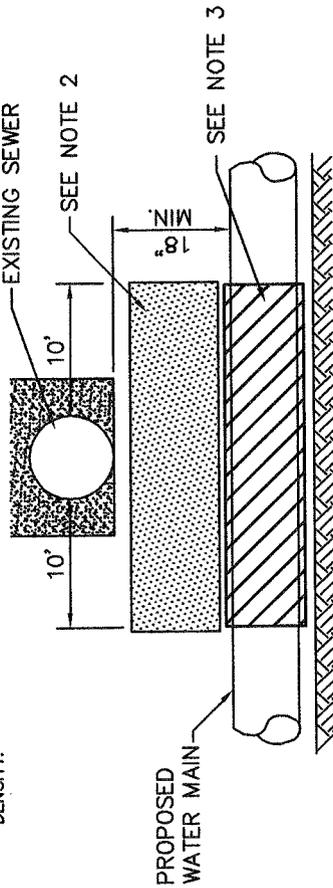
NOTES:

- 1. PVC pipe conforming to the SDR specified in the plans shall be installed to the latest revised specification requirements of ASTM D-2321-89 using either compacted Class IB or Class II granular embedment materials for bedding, haunching and initial backfill of 12 inches over the top of pipe to provide the necessary support for the pipe so that the maximum deflection does not exceed 5% of the pipe's original internal diameter.
- 2. All CA-6 to be IDOT approved or meet IDOT specifications.

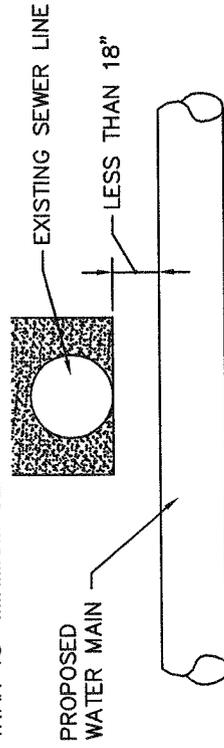
CITY OF HARVARD, ILLINOIS PUBLIC WORKS DEPARTMENT	REVISIONS			TRENCH BEDDING/BACKFILLING CROSS SECTION
	NO.	BY	DATE	
APPROVED 02-15-00	1.	CML	1/96	
	2.	MPL	1/99	
	3.	MPL	3/01	
	4.	WJH	9/04	
	5.			

PROPOSED WATER MAIN BELOW EXISTING SEWER LINE WITH 18" MINIMUM SEPARATION.

- NOTES:
1. OMIT SELECT GRANULAR CRADLE AND GRANULAR BACKFILL TO ONE (1) FOOT OVER TOP OF PIPE AND USE SELECT EXCAVATED MATERIAL (CLASS IV) AND COMPACT FOR 10 FEET ON EITHER SIDE OF SEWER LINE.
 2. IF SELECT GRANULAR BACKFILL EXISTS, REMOVE WITHIN WIDTH OF EXISTING SEWER LINE TRENCH AND REPLACE WITH SELECT EXCAVATED MATERIAL (CLASS IV) AND COMPACT.
 3. PROVIDE ADEQUATE SUPPORT FOR EXISTING SEWER LINE TO PREVENT DAMAGE DUE TO SETTLEMENT.
 4. CLASS IV MATERIAL SHALL BE COMPACTED TO 95% OF STANDARD PROCTOR MAXIMUM DENSITY.



PROPOSED WATER MAIN BELOW EXISTING SEWER LINE WITH LESS THAN 18" MINIMUM SEPARATION.



NOT ALLOWED

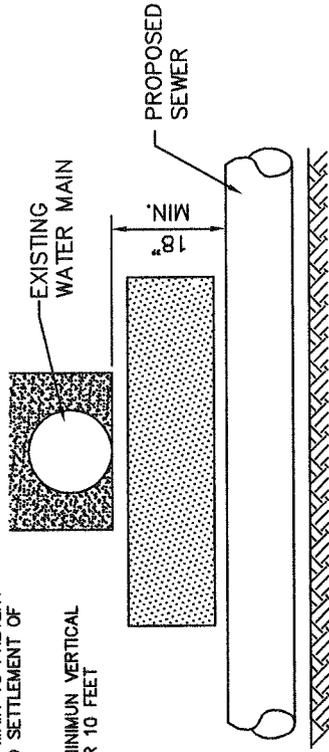
MUST MAINTAIN 18" VERTICAL SEPARATION
SEE THE STANDARD SPECIFICATIONS FOR WATER AND SEWER
▲ MAIN CONSTRUCTION IN ILLINOIS - SEE LATEST EDITION

CITY OF HARVARD, ILLINOIS	NO.	REVISIONS	
		BY	DATE
PUBLIC WORKS DEPARTMENT	1	CML	1/96
	2	WJH	9/04
	3.		
	4.		
	5.		

APPROVED 02-15-00

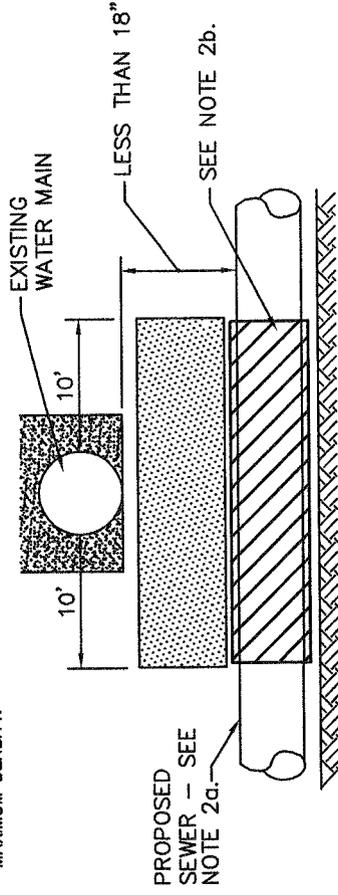
PROPOSED SEWER LINE BELOW EXISTING WATER MAIN WITH 18" MINIMUM SEPARATION.

- NOTES:
1. PROVIDE ADEQUATE SUPPORT FOR EXISTING WATER MAIN TO PREVENT DAMAGE DUE TO SETTLEMENT OF SEWER TRENCH.
 2. MAINTAIN 18" MINIMUM VERTICAL SEPARATION FOR 10 FEET HORIZONTALLY.



PROPOSED SEWER LINE BELOW EXISTING WATER MAIN WITH LESS THAN 18" SEPARATION.

- NOTES:
1. OMIT SELECT GRANULAR CRADLE AND GRANULAR BACKFILL TO ONE (1) FOOT OVER TOP OF PIPE AND USE SELECT EXCAVATED MATERIAL (CLASS IV) AND COMPACT FOR 10 FEET ON EITHER SIDE OF WATER MAIN.
 - 2a. CONSTRUCT 10 FEET OF PROPOSED SEWER WITH WATERMAIN QUALITY PIPE AND PRESSURE TEST, OR;
 - b. USE 10 FEET OF CASING FOR PROPOSED SEWER AND SEAL ENDS OF CASING.
 3. POINT LOADS SHALL NOT BE ALLOWED BETWEEN SEWER OR SEWER CASING AND WATER MAIN.
 4. PROVIDE ADEQUATE SUPPORT FOR EXISTING WATER MAIN TO PREVENT DAMAGE DUE TO SETTLEMENT OF SEWER TRENCH.
 5. CLASS IV MATERIAL TO BE COMPACTED TO 95% OF STANDARD PROCTOR MAXIMUM DENSITY.



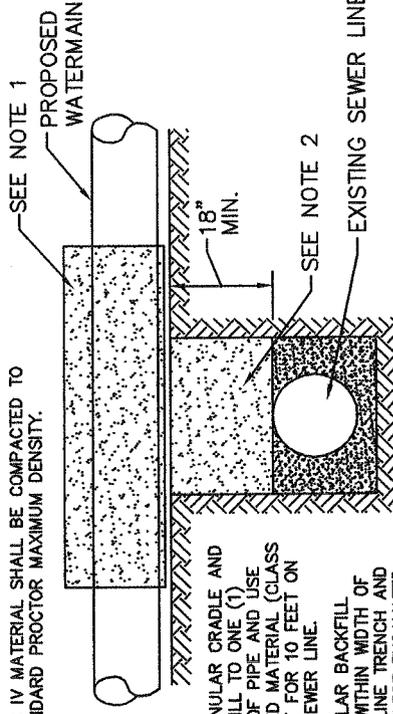
WATER AND SEWER SEPARATION REQUIREMENTS DETAIL

EXISTING WATERMAIN BELOW PROPOSED SEWER LINE WITH 18" MINIMUM SEPARATION.

EXISTING WATERMAIN BELOW PROPOSED SEWER LINE WITH LESS THAN 18" SEPARATION.

PROPOSED WATERMAIN ABOVE EXISTING SEWER LINE WITH 18" MINIMUM SEPARATION.

NOTE: CLASS IV MATERIAL SHALL BE COMPACTED TO 95% OF STANDARD PROCTOR MAXIMUM DENSITY.



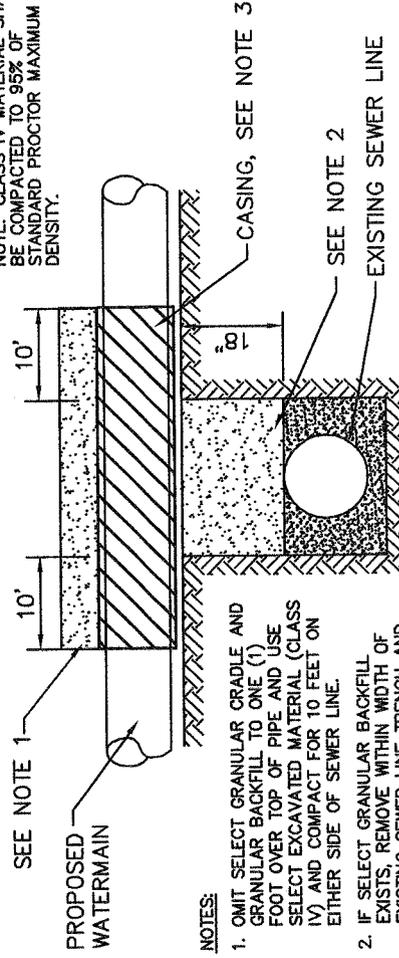
NOTES:

1. OMIT SELECT GRANULAR CRADLE AND GRANULAR BACKFILL TO ONE (1) FOOT OVER TOP OF PIPE AND USE SELECT EXCAVATED MATERIAL (CLASS IV) AND COMPACT FOR 10 FEET ON EITHER SIDE OF SEWER LINE.
2. IF SELECT GRANULAR BACKFILL EXISTS, REMOVE WITHIN WIDTH OF EXISTING SEWER LINE TRENCH AND REPLACE WITH SELECT EXCAVATED MATERIAL (CLASS IV) AND COMPACT.

DELETED
1/19/99

PROPOSED WATER MAIN ABOVE EXISTING SEWER LINE WITH LESS THAN 18" SEPARATION.

NOTE: CLASS IV MATERIAL SHALL BE COMPACTED TO 95% OF STANDARD PROCTOR MAXIMUM DENSITY.



NOTES:

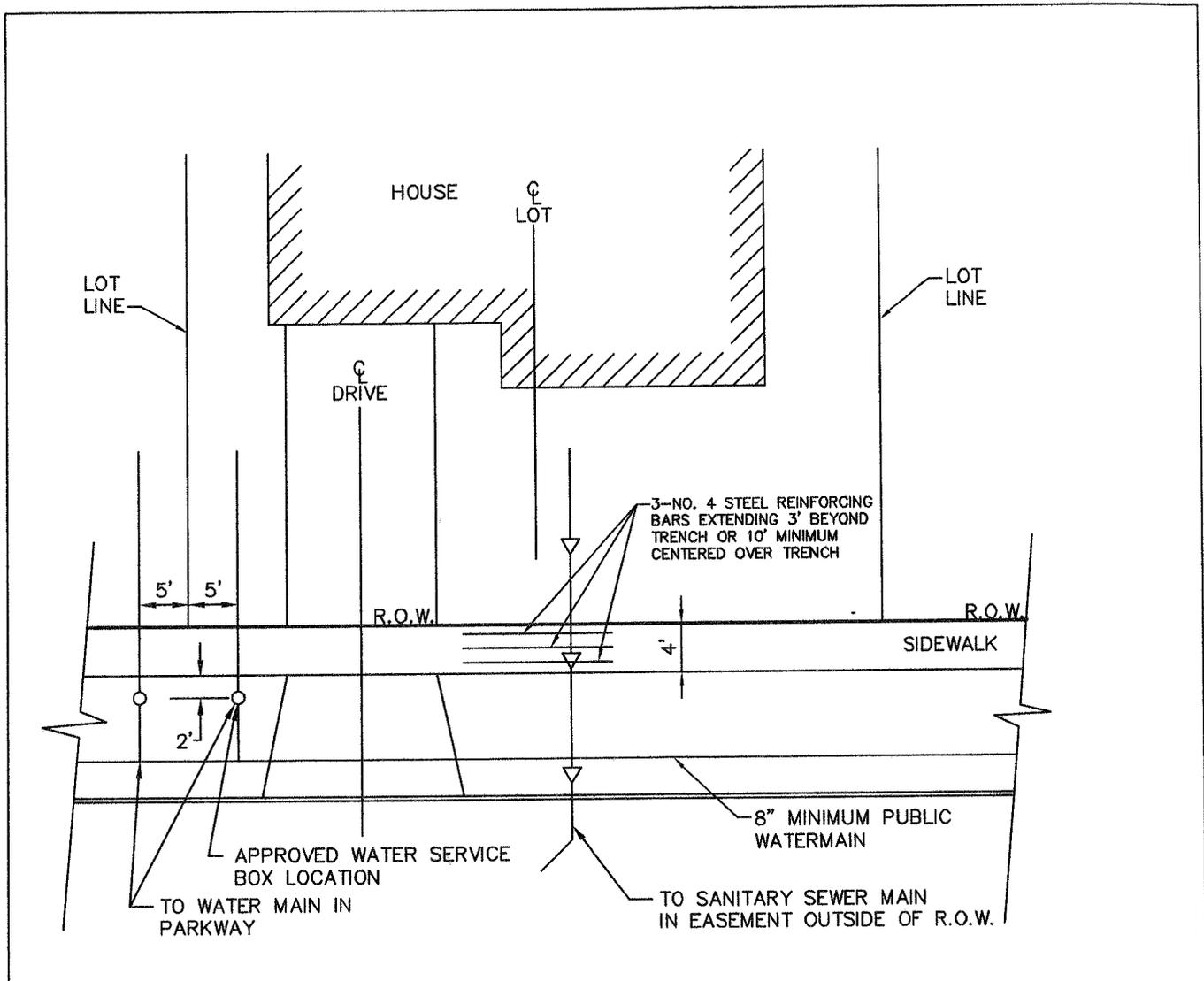
1. OMIT SELECT GRANULAR CRADLE AND GRANULAR BACKFILL TO ONE (1) FOOT OVER TOP OF PIPE AND USE SELECT EXCAVATED MATERIAL (CLASS IV) AND COMPACT FOR 10 FEET ON EITHER SIDE OF SEWER LINE.
2. IF SELECT GRANULAR BACKFILL EXISTS, REMOVE WITHIN WIDTH OF EXISTING SEWER LINE TRENCH AND REPLACE WITH SELECT EXCAVATED MATERIAL (CLASS IV) AND COMPACT.

3. USE A CASING FOR PROPOSED WATER MAIN AND SEAL ENDS OF CASING.
4. POINT LOADS SHALL NOT BE ALLOWED BETWEEN WATER MAIN OR WATERMAIN AND SEWER.

▲ SEE THE STANDARD SPECIFICATIONS FOR WATER AND SEWER MAIN CONSTRUCTION IN ILLINOIS - LATEST EDITION

CITY OF HARVARD, ILLINOIS PUBLIC WORKS DEPARTMENT APPROVED 02-15-00	NO.	REVISIONS	
		BY	DATE
	1.	CML	1/96
	2.	MPL	1/99
	3.		
	4.		
	5.		

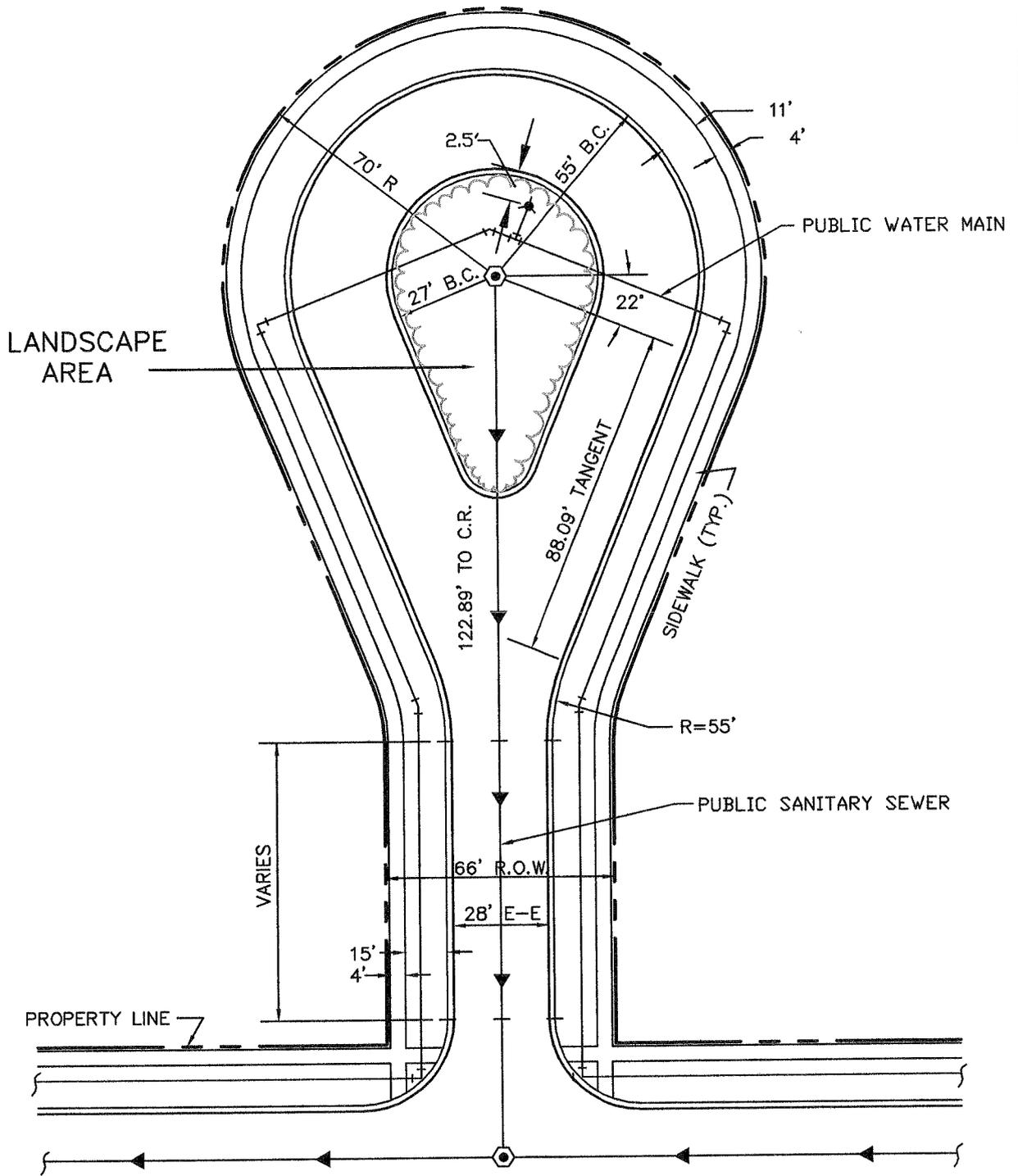
WATER AND SEWER SEPARATION REQUIREMENTS DETAILS



NOTES:

1. WATER SHUTOFF BOX MAY NOT BE LOCATED IN PROPOSED DRIVEWAY. THE RELOCATED BOX SHALL BE LOCATED 5' OFF OF PROPERTY LINE PER DETAIL ABOVE.
2. IF WATER SHUTOFF BOX RELOCATION IS REQUIRED IT SHALL BE DONE AS FOLLOWS:
 WATER MAIN SHALL BE RE-TAPPED OUT OF PROPOSED DRIVEWAY LOCATION. A CONTINUOUS LENGTH OF COPPER (NO COUPLINGS) SHALL BE RUN FROM THE NEW CORPORATION STOP TO THE RELOCATED SHUTOFF BOX. THE ABANDONED CORPORATION STOP SHALL BE CAPPED ACCORDING TO WATER DEPARTMENT STANDARDS.
3. FOR FAR SIDE SERVICE CONNECTIONS CONSULT THE PUBLIC WORKS DEPARTMENT.
4. NO SANITARY SEWER SERVICE CONNECTIONS DIRECTLY INTO MANHOLES

CITY OF HARVARD, ILLINOIS	REVISIONS			WATER SERVICE AND SANITARY SEWER LOT LOCATION DETAIL
	NO.	BY	DATE	
PUBLIC WORKS DEPARTMENT	1.	CML	1/96	
APPROVED 02-15-00	2.	L.T.	1/97	
	3.	DHP	2/98	
	4.	MPL	1/99	
	5.	WJH	9/04	

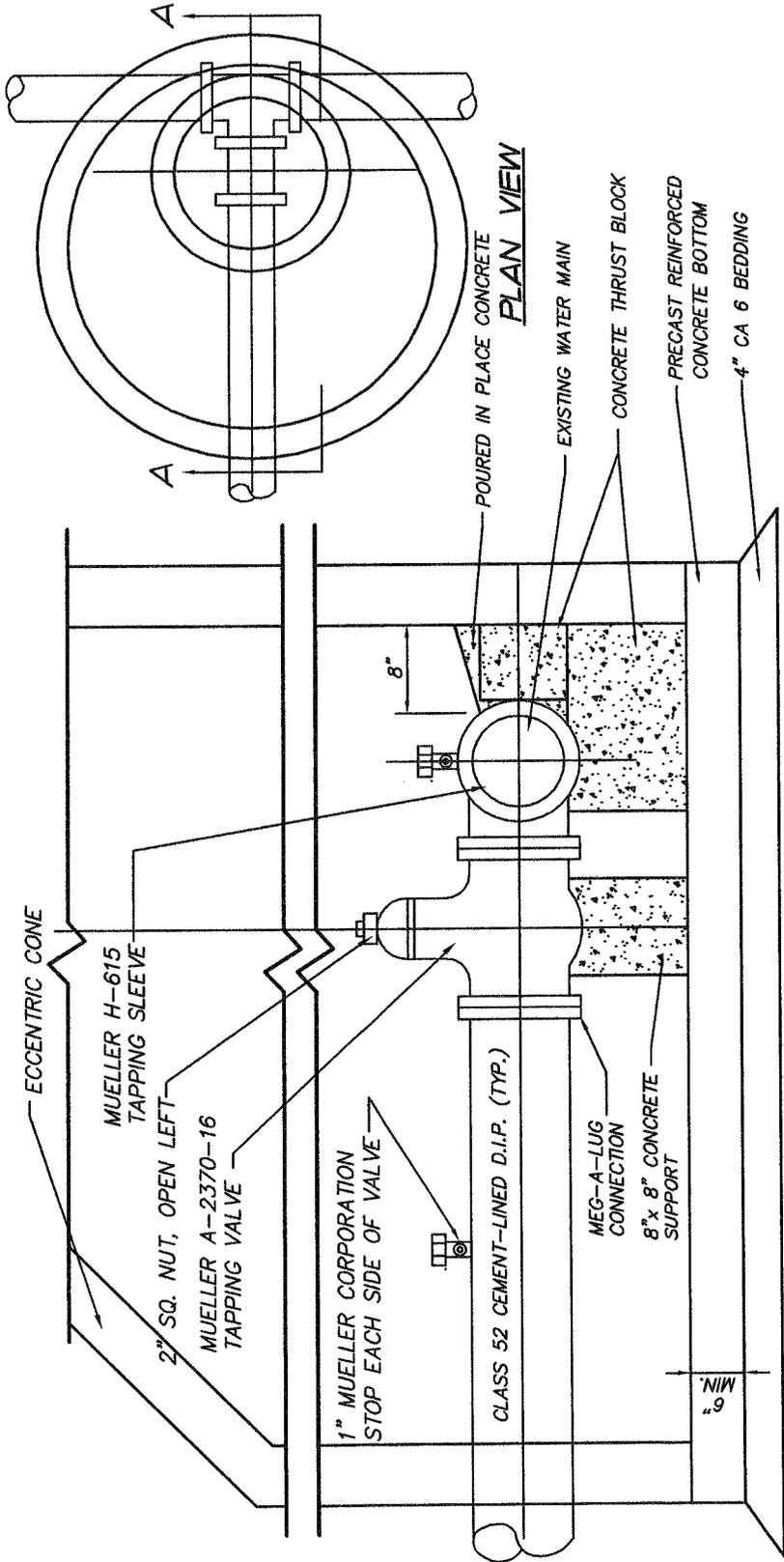


CITY OF HARVARD, ILLINOIS PUBLIC WORKS DEPARTMENT	REVISIONS		
	NO.	BY	DATE
APPROVED 02-15-00	1.	CML	1/96
	2.	L.T.	1/97
	3.	MPL	3/01
	4.		
	5.		

UTILITY LOCATION PLAN
FOR CUL-DE-SACS

Miscellaneous Water Standards/Notes

1. Water transmission mains shall be a minimum of 8" in diameter, shall include installation of shutoff valves and fire hydrants, and shall be free from dead-end mains whenever possible.
2. After completion of all water mains and installation of all fire hydrants within a subdivision, a flow test shall be performed at the point in the subdivisions farthest away from the existing City water main. The flow test shall provide information regarding static pressure, residual pressure and flow rate, and the information shall be supplied to the City.
3. Any water service line repair must include repairing the service within the City right-of-way up to the water main trunk line. Also, complete restoration of the parkway, including topsoil, seed, and any sidewalk repair, must be completed to the satisfaction of the Engineer, unless otherwise authorized by the City.
4. AWWA- C-909 Polyvinyl Chloride pipe is an approved alternative for water main, all fittings and appurtenances and installation procedure must be approved prior to use. HDPE plastic service SDR-9, 200 psi, CTS is also an option for services under 3" in diameter, and must be installed per AWWA standards with sand bedding and backfill.



PLAN VIEW

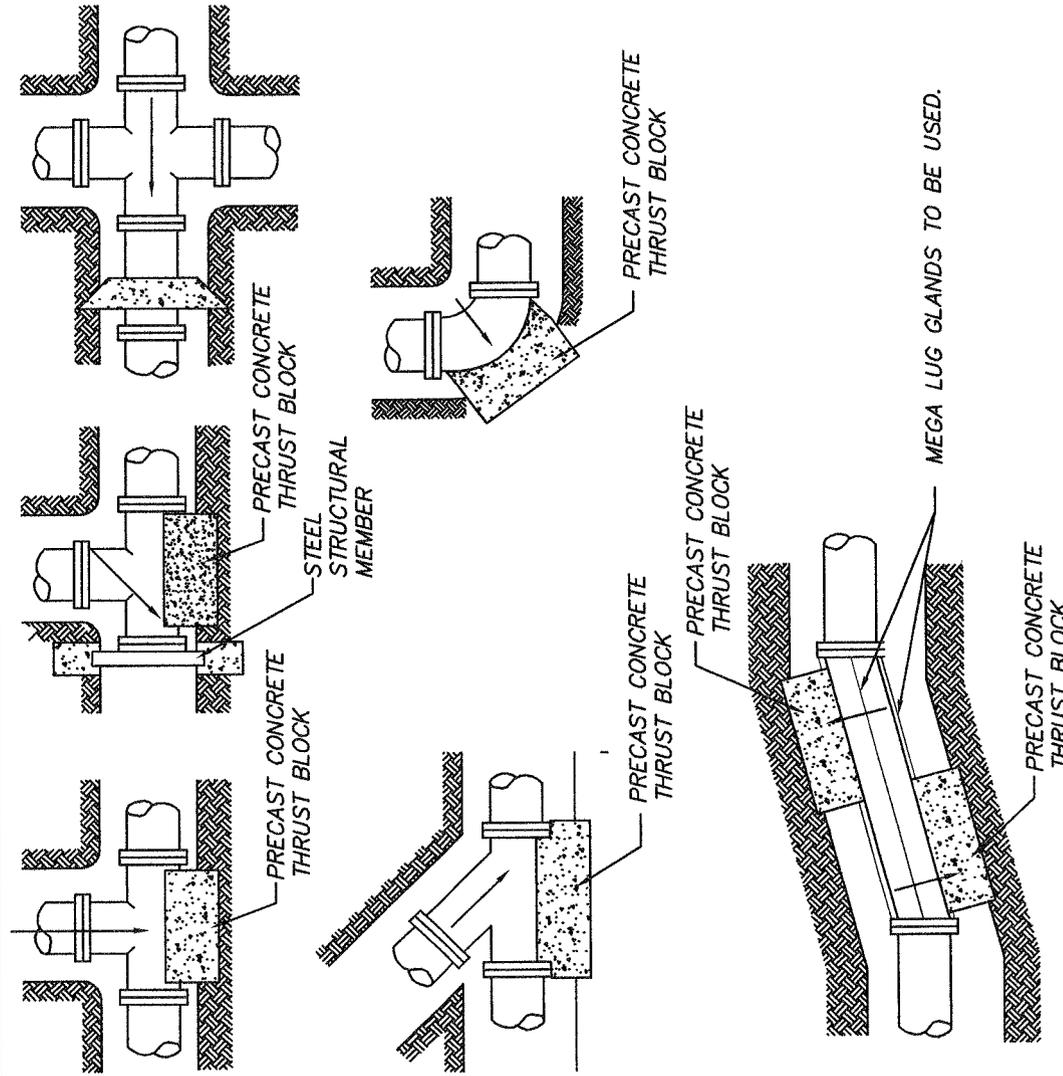
SECTION A-A

NOTES:
 C.I. MANHOLE FRAME AND COVER EAST JORDAN 1050 WITH STANDARD DUTY, NON-ROCKING TYPE LIDS (EAST JORDAN 1020 MAY BE USED IN GRASSY AREAS). ADJUSTING RING HEIGHT NOT TO EXCEED 8" ALL JOINTS ARE TO BE MADE WATERTIGHT WITH EXTERNAL SEALING BANDS PER ASTM C-877 WITH MECHANICAL STRAPS (MAC WRAP OR EQUAL). STANDARD VALVE VAULT SPECIFICATIONS REQUIRE ECCENTRIC CONES (SEE SEPARATE DETAIL).

ALL PRECAST CONCRETE STRUCTURES MUST CONFORM TO AASHTO M199

CITY OF HARVARD, ILLINOIS PUBLIC WORKS DEPARTMENT APPROVED 02-15-00	NO.	REVISIONS		DATE
		BY		
	1	CML		1/96
	2	WJH		9/04
	3.			
	4.			
	5.			

WATER MAIN PRESSURE CONNECTION DETAIL



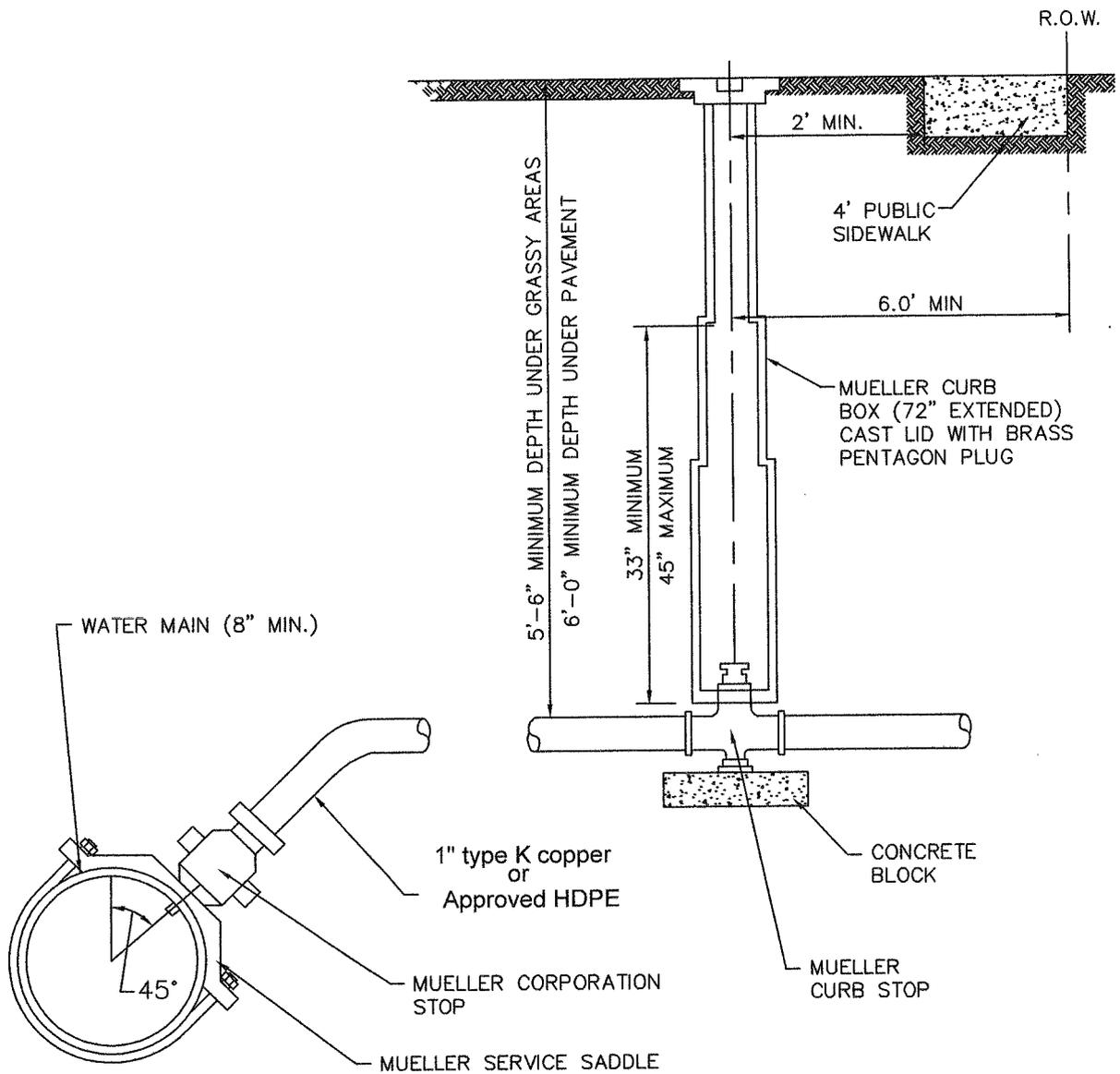
BEARING AREA (SQ. FT.)

PIPE SIZE	TEE/PLUG	90°	45°	22-1/2°	11-1/4°
6	4	2	1	1	1
8	6	4	3	1	1
10	7	5	3	2	1
12	8	6	4	3	2
14	12	9	6	4	3
16	15	12	7	5	3
18	18	15	9	5	4
24	40	30	15	10	5

ALL BLOCKING MUST BEAR ON UNDISTURBED EARTH.
 ALL BENDS OR ELBOWS GREATER THAN AND INCLUDING 11-1/4° SHALL HAVE THRUST BLOCKING.

CITY OF HARVARD, ILLINOIS PUBLIC WORKS DEPARTMENT APPROVED 02-15-00	NO.	REVISIONS	
		BY	DATE
	1	CML	1/96
	2	BRL	2/00
	3	WJH	9/04
	4		
	5		

THRUST BLOCK INSTALLATION DETAIL

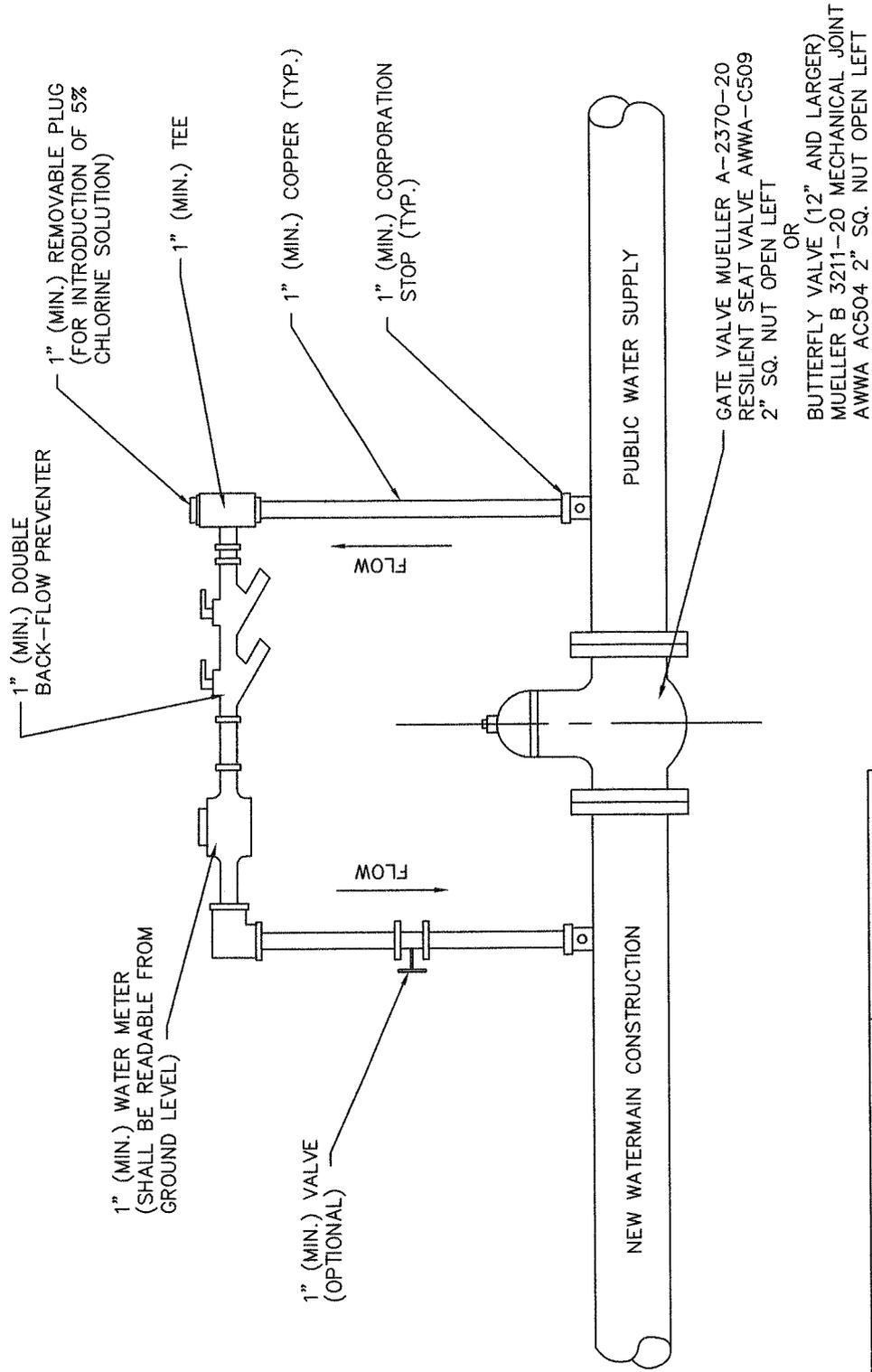


NOTES:

1. NO CORPORATION STOPS, SERVICE COPPERS, OR CURB BOXES MAY BE LOCATED UNDER PAVED AREAS INCLUDING DRIVES AND SIDEWALKS.
2. ALL WATER MAIN HARDWARE SHALL BE MUELLER.
3. SERVICE TO BE CONTINUOUS WITHOUT JOINTS FROM CORPORATION STOP TO CURB STOP.
4. MULTIPLE TAPS INTO MAIN SHALL BE NO CLOSER THAN 2' APART.
5. TRENCH FROM MAIN TO BACK OF SIDEWALK TO BE COMPACTED TRENCH BACKFILL.

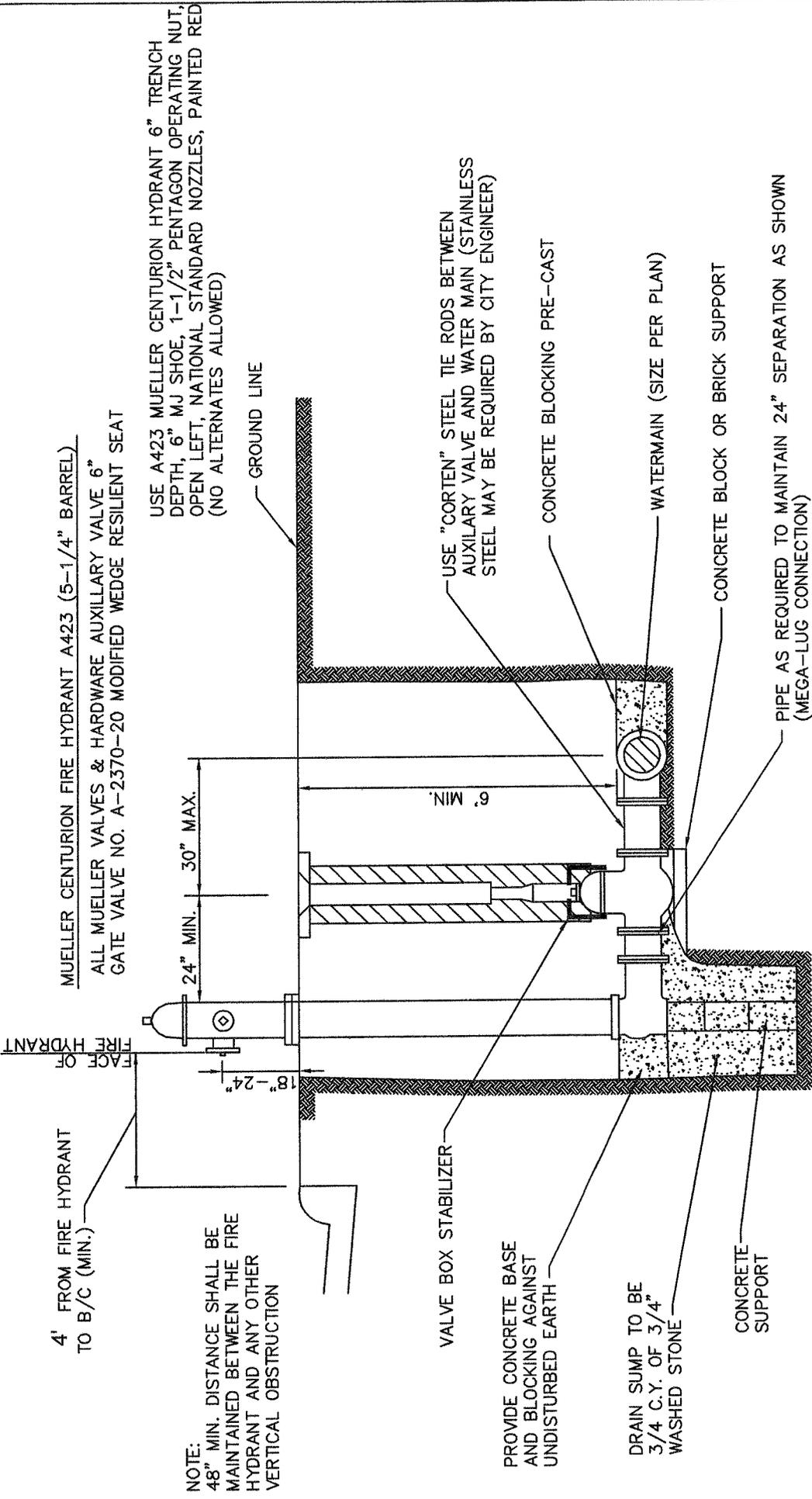
CITY OF HARVARD, ILLINOIS PUBLIC WORKS DEPARTMENT APPROVED 02-15-00	REVISIONS		
	NO.	BY	DATE
	1.	CML	1/96
	2.	L.T.	1/97
	3.	DHP	2/98
	4.	MPL	1/99
	5.		

CURB BOX INSTALLATION
DETAIL



CITY OF HARVARD, ILLINOIS	REVISIONS	
	NO.	BY DATE
PUBLIC WORKS DEPARTMENT	1	CML 1/96
APPROVED 02-15-00	2.	
	3.	
	4.	
	5.	

WATER VALVE JUMPER DETAIL



MUELLER CENTURION FIRE HYDRANT A423 (5-1/4" BARREL)
 ALL MUELLER VALVES & HARDWARE AUXILIARY VALVE 6"
 GATE VALVE NO. A-2370-20 MODIFIED WEDGE RESILIENT SEAT

USE A423 MUELLER CENTURION HYDRANT 6" TRENCH
 DEPTH, 6" MJ SHOE, 1-1/2" PENTAGON OPERATING NUT,
 OPEN LEFT, NATIONAL STANDARD NOZZLES, PAINTED RED
 (NO ALTERNATES ALLOWED)

USE "CORTEN" STEEL TIE RODS BETWEEN
 AUXILIARY VALVE AND WATER MAIN (STAINLESS
 STEEL MAY BE REQUIRED BY CITY ENGINEER)

CONCRETE BLOCKING PRE-CAST

WATERMAIN (SIZE PER PLAN)

CONCRETE BLOCK OR BRICK SUPPORT

PIPE AS REQUIRED TO MAINTAIN 24" SEPARATION AS SHOWN
 (MEGA-LUG CONNECTION)

4' FROM FIRE HYDRANT
 TO B/C (MIN.)

NOTE:
 48" MIN. DISTANCE SHALL BE
 MAINTAINED BETWEEN THE FIRE
 HYDRANT AND ANY OTHER
 VERTICAL OBSTRUCTION

VALVE BOX STABILIZER

PROVIDE CONCRETE BASE
 AND BLOCKING AGAINST
 UNDISTURBED EARTH

DRAIN SUMP TO BE
 3/4 C.Y. OF 3/4"
 WASHED STONE

CONCRETE
 SUPPORT

NO.	REVISIONS	
	BY	DATE
1	CML	1/96
2	L.T.	1/97
3	WJH	9/04
4		
5		

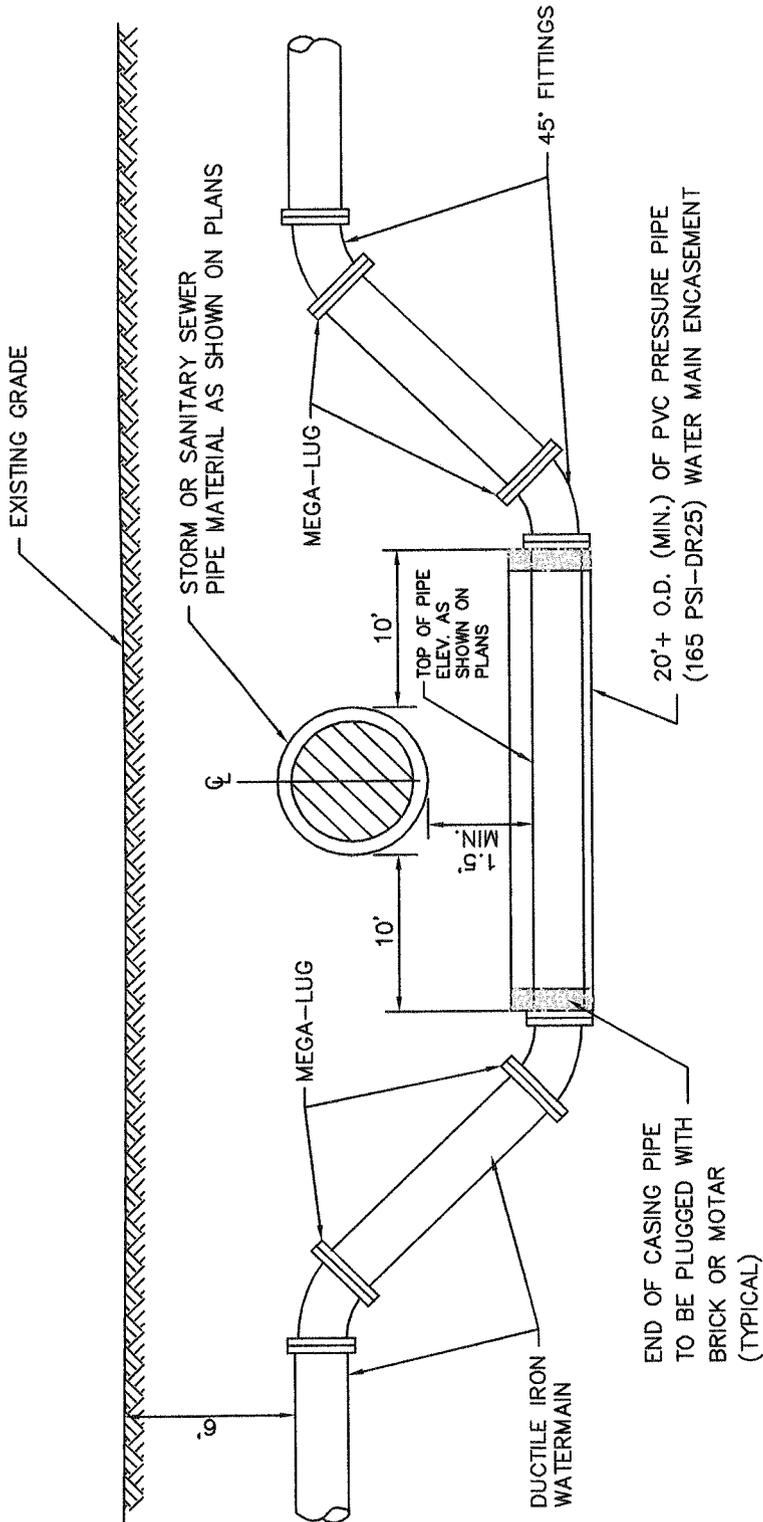
CITY OF HARVARD, ILLINOIS

PUBLIC WORKS DEPARTMENT

APPROVED 02-15-00

NOTE: FIRE HYDRANTS SHALL BE PLACED A MAXIMUM OF 300 FEET
 APART. LOCATION OF HYDRANTS MUST BE APPROVED BY CITY
 ENGINEER OR PUBLIC WORKS DEPARTMENT.

FIRE HYDRANT INSTALLATION DETAIL



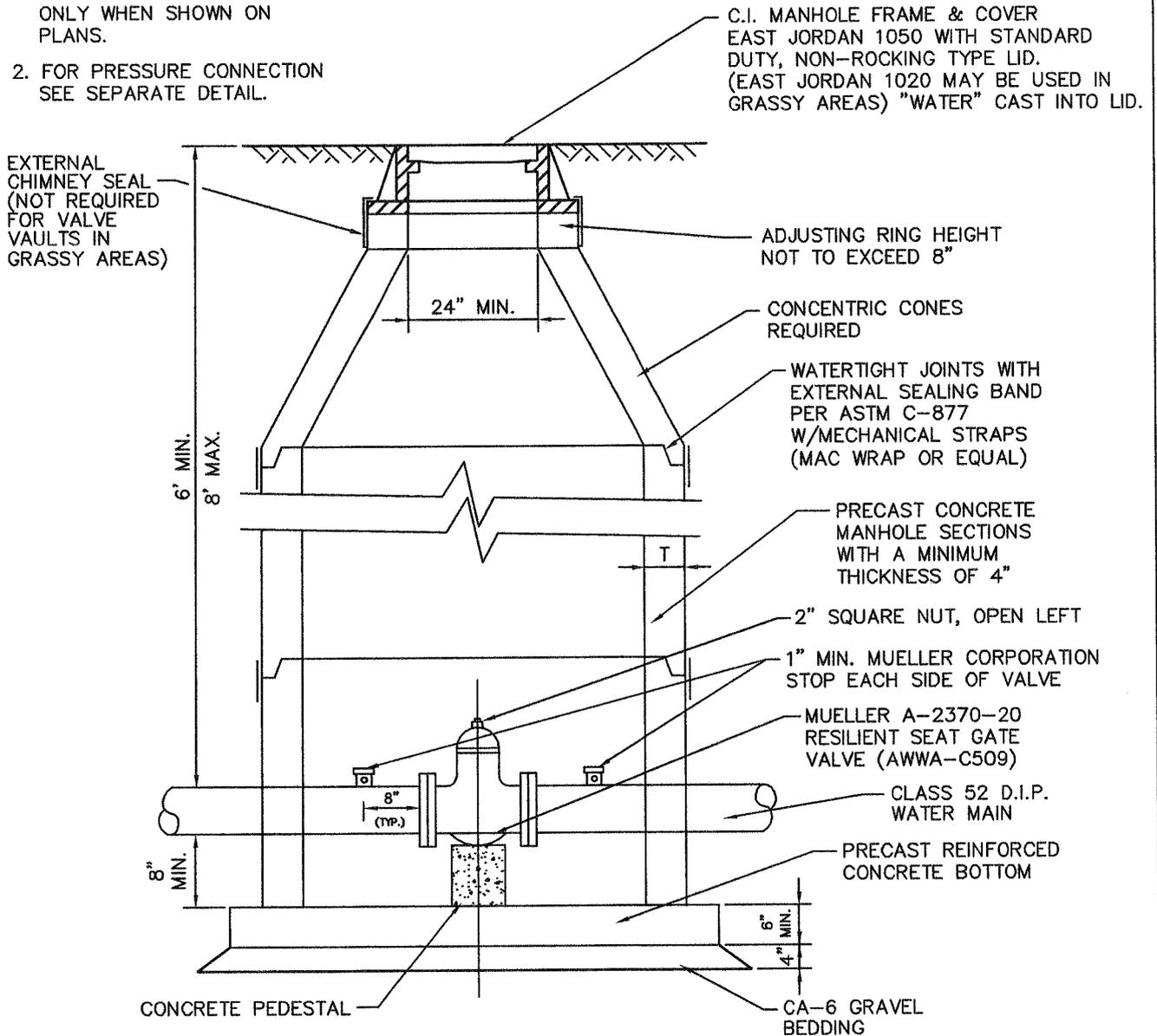
CITY OF HARVARD, ILLINOIS PUBLIC WORKS DEPARTMENT APPROVED 02-15-00	REVISIONS	
	NO.	BY DATE
	1	CMIL 1/96
	2	WJH 7/99
	3	WJH 9/04
	4	
	5	

WATER MAIN LOWERING DETAIL

DIAMETER OF WATER MAIN	D	T
8 INCHES AND UNDER	4'-0"	4"
10 INCHES AND OVER	5'-0"	5"

NOTES:

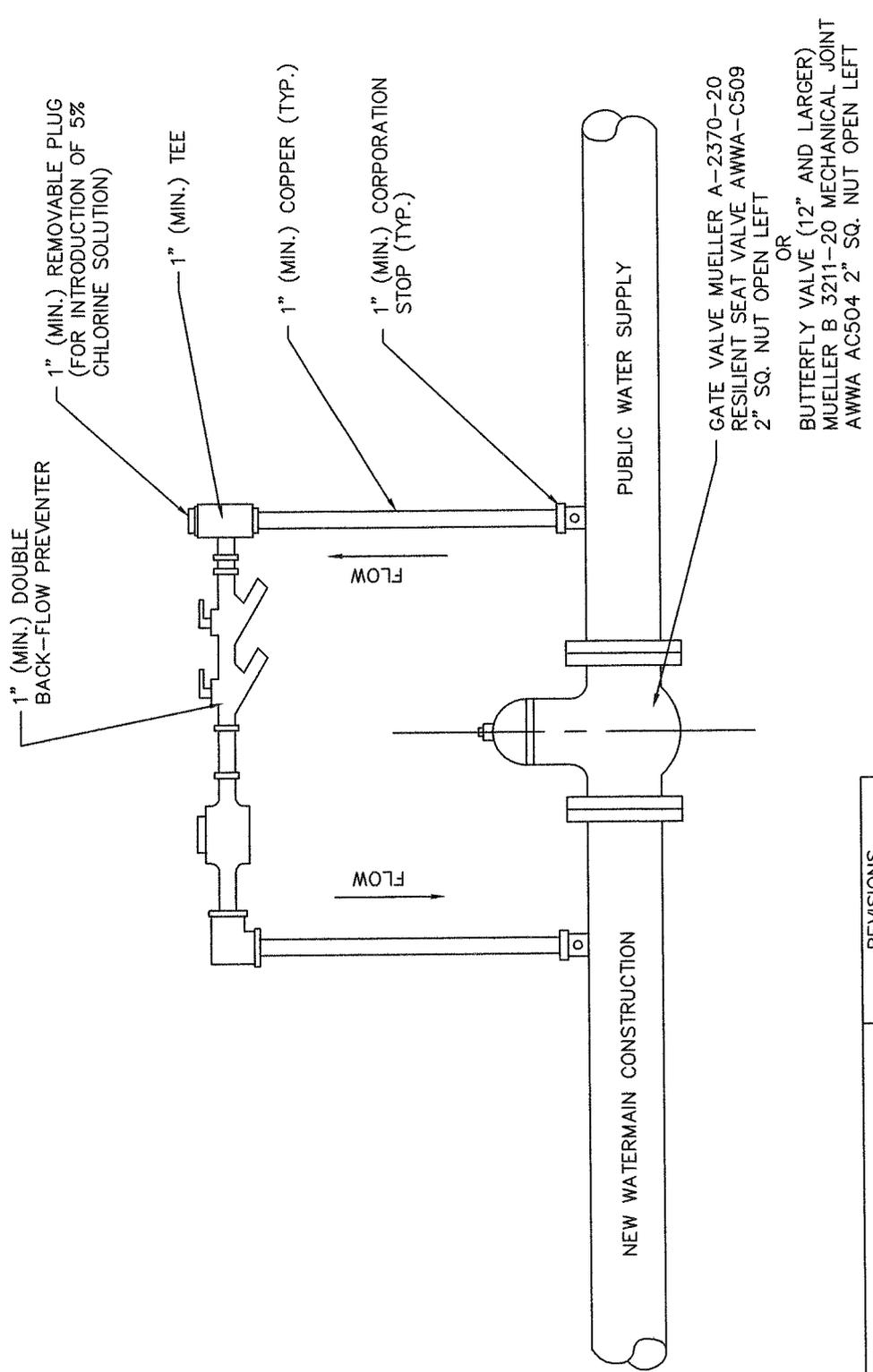
1. DRAIN FOR VALVE VAULT SHALL BE CONSTRUCTED ONLY WHEN SHOWN ON PLANS.
2. FOR PRESSURE CONNECTION SEE SEPARATE DETAIL.



CITY OF HARVARD, ILLINOIS PUBLIC WORKS DEPARTMENT	REVISIONS		
	NO.	BY	DATE
APPROVED 02-15-00	1.	CML	1/96
	2.	MPL	1/99
	3.	WJH	7/99
	4.	WJH	9/04
	5.		

ALL PRECAST CONCRETE STRUCTURES MUST COMFORM TO AASHTO M199

STANDARD VALVE VAULT



CITY OF HARVARD, ILLINOIS	REVISIONS	
	NO.	DATE
PUBLIC WORKS DEPARTMENT		
APPROVED 02-15-00		

CHLORIDE INSERTION DETAIL

Inspection Notes

1. All new developments will be required to hire a soil engineer who will certify that all roadways are constructed in accordance with the City of Harvard's specification "Field Quality Control Procedures for Pavement Area Subgrade."
2. Upon completion of all sanitary sewer and storm sewer, the sewer shall be videotaped and two (2) copies of the tape shall be supplied to the City.

**Field Quality Control Procedures
For Pavement Area Subgrade**

The following procedures are recommended in order to prepare the subgrade for the project.

- A. The work area will first be stripped of vegetation or, in cut areas, excavated to a Design Subgrade Elevation as shown on the plans.
 - 1. The subgrade after cut will be proof rolled to verify a stable subgrade as directed by the Soils Engineer.
 - 2. A series of test pits may be needed as directed by the Soils Engineer to verify additional undercut as predicted or estimated by Boring Logs and the Earthwork Undercut Plan.

Proof rolling procedures will be as follows:

 - a. Two (2) to four (4) passes with a 25 ton rubber tire roller or equivalent;
 - b. Concentrate additional passes in areas that exhibit instability as directed by the Soils Engineer.
- B. Unstable and unsuitable subgrade materials will be removed to the depth encountered as directed by the Soils Engineer.
 - 1. Materials at undercut subgrade elevation should:
 - a. Have an unconfined compressive strength (Qu) of 2.0 tsf minimum, or cone index of 250 minimum;
 - b. Contain no foreign materials or have organic contents in excess of six (6) percent total organic matter as determined by the Wet Combustion Method (AASHTO T-194); or maximum dry densities less than 105 pcf as determined by AASHTO T-180 (ASTM D-1557);
 - c. Be able to support necessary construction equipment without severe rutting or deflection.
- C. At undercut subgrade elevation, the upper 8" of soil shall be scarified or disced and recompacted to 95 percent of the Maximum Dry Density as defined by AASHTO T-180 (ASTMD-1557), prior to remedial work fill placement.
- D. Proof rolling of the prepared undercut subgrade will be done if required by the Soils Engineer to further verify a stable subgrade prior to fill placement.
- E. Roadway FILL shall be placed in successive horizontal lifts of not more than 6" in loose depth (cohesive material), or not more than 9" in loose depth (porous granular material).
- F. The upper 8" of subgrade in areas not undercut shall also be scarified and recompacted to 95 percent of the maximum Dry Density as defined by AASHTO T-180 (ASTM D-1557), prior to placement of subsequent lift of FILL material.
- G. Once the existing subgrade is stabilized, FILL can be placed and compacted in lifts to design subgrade elevation. All roadway FILL materials shall be compacted to 95 percent of AASHTO T-180 (ASTM D-1557).
- H. When the work listed in the steps above has been completed, the subgrade will be checked by proof rolling and approved by the City before construction of the subbase, base course, or pavement is started. The City will make the determination as to whether areas failing this proof roll require additional drying and recompaction or whether the soil conditions warrant more extensive treatment.

Sanitary Sewer Testing Specifications

TESTING AND INSPECTION FOR ACCEPTANCE OF SANITARY SEWERS

Testing and inspection of sanitary sewers for acceptability shall be conducted by:

- Exfiltration of air under pressure
- Deflection of flexible thermoplastic pipe
- Televising

The method(s) of testing shall be specified in the Special Provisions or on the plans.

TESTING TECHNIQUE

All Testing Methods: All wyes, tees and stubs shall be plugged with flexible jointed caps, or acceptable alternate, securely fastened to withstand the internal test pressure. Such plugs or caps shall be readily removable.

1. Air Testing Method Procedures: The section of sewer to be tested shall have been trench backfilled and cleared. Pneumatic plugs (having a sealing length equal to or greater than the diameter of the pipe to be tested) placed in both ends of the pipe to be tested shall be inflated to 25 psig. The sealed sewer pipe shall then be pressurized to 4 psig above the average back pressure of groundwater over the sewer pipe and the air pressure allowed to stabilize for at least two minutes.

After the stabilization period the line shall be pressurized to 3.5 psig and the time in minutes measured for pressure to drop to 2.5 psig. If groundwater is present, the air pressure within shall be increased to 3.5 psig above the level of the groundwater and the drop of one pound of air pressure measured in minutes.

Air testing techniques shall be in accordance with the latest ASTM standard practice for testing sewer lines by low-pressure air test method for the appropriate pipe material, except that the time shall not be less than that shown in the Air Test Table contained in Section 31-1.11 C of the Standard Specifications for Water and Sewer Main Construction.

2. Deflection Testing for Flexible Thermoplastic Pipe:

- a. The pipeline shall be tested for excess deflection by pulling a "go - no go" mandrel through the pipe from manhole to manhole. The mandrel shall be sized in accordance with Section 31-1.11 C (4) and as specified in the Special Provisions. A "deflectometer" may also be used to check and record deflection.
- b. Wherever possible and practical, the testing shall initiate at the downstream lines and proceed towards the upstream lines.
- c. Where deflection is found to be in excess of Allowable Testing Limits, the Contractor shall excavate to the point of excess deflection and carefully compact around the point where excess deflection was found. The line shall then be retested for deflection. However, should after the initial testing the deflected pipe fail to return to the original size (inside diameter), the line shall be replaced.

AIR TEST TABLE

SPECIFICATION TIME (MIN:SEC) REQUIRED FOR PRESSURE DROP FROM 3? TO 2? PSIG
WHEN TESTING ONE PIPE DIAMETER ONLY

Length of Sewer Pipe in Feet	PIPE DIAMETER, INCHES								
	4	6	8	10	12	15	18	21	24
25	0:04	0:10	0:18	0:28	0:40	1:02	1:29	2:01	2:38
50	0:09	0:20	0:35	0:55	1:19	2:04	2:58	4:03	5:17
75	0:13	0:30	0:53	1:23	1:59	3:06	4:27	6:04	7:55
100	0:18	0:40	1:10	1:50	2:38	4:08	5:56	8:05	10:34
125	0:22	0:50	1:28	2:18	3:18	5:09	7:26	9:55	11:20
150	0:26	0:59	1:46	2:45	3:58	6:11	8:30		
175	0:31	1:09	2:03	3:13	4:37	7:05			
200	0:35	1:19	2:21	3:40	5:17				12:06
225	0:40	1:29	2:38	4:08	5:40			10:25	13:36
250	0:44	1:39	2:56	4:35			8:31	11:35	15:07
275	0:48	1:49	3:14	4:43			9:21	12:44	16:38
300	0:53	1:59	3:31				10:12	13:53	18:09
350	1:02	2:19	3:47			8:16	11:54	16:12	21:10
400	1:10	2:38			6:30	9:27	13:36	18:31	24:12
450	1:19	2:50			6:48	10:38	15:19	20:50	27:13
500	1:28			5:14	7:34	11:49	17:01	23:09	30:14

Water Main Testing Specifications

WATER SERVICE CONNECTION

The service pipe shall be laid in the trench sufficiently weaving to allow not less than one foot extra length in its entire length.

A curb stop shall be furnished and installed for each service at a location shown on the plans, specified or as directed by the City. A cast iron service box shall be furnished and installed over the curb stop and held in a truly vertical position, until sufficient backfill has been placed to insure permanent vertical alignment of the box. The top of the box shall be adjusted and set flush with the established ground surface grade.

After the pipe has been laid and partly backfilled as specified herein, all newly laid pipe or any valved sections of it shall, unless otherwise expressly specified, be subjected to a hydrostatic pressure equal to 50 percent more than the operating pressure at the lowest elevation of the pipe section, but not to exceed the pressure rating of the type of pipe specified. The duration of each pressure test shall be for a period of not less than one hour and not more than six hours. The basic provisions of AWWA C-600 and C-603 shall be applicable, if specified.

Each section of pipe to be tested, as determined by the City, shall be slowly filled with water, and the specified test pressure shall be applied by means of a pump connected to the pipe in a satisfactory manner. The pump pipe connection and all necessary apparatus including gauges and meters shall be furnished by the Contractor. Before applying the specified test pressure, all air shall be expelled from the pipe.

DISINFECTION OF WATER MAINS

Water main disinfection will be in accordance with the State of Illinois Rules and Regulations Title 35, Subtitle F, Chapter 11, section 652.203 of the Technical Policy Statement.

FLUSHING

Sections of pipe to be disinfected shall first be flushed to remove any solids or contaminated material that may have become lodged in the pipe. If no hydrant is installed at the end of the main, then a tap should be provided large enough to develop a velocity of at least two and five-tenths (2.5) feet per second in the main. A 2 1/2 inch hydrant opening will, under normal pressures, provide this velocity in pipe sizes up to and including 12 inches.

All taps 2 inches in size and smaller required for chlorination or flushing purposes, or for temporary or permanent release of air shall be provided for by the Contractor as part of the construction of water mains. Taps larger than 2 inches shall be paid for as a bid item or as an extra.

PRESSURE AND LEAKAGE TEST

Test pressure shall not be less than 1.25 times the working pressure at the highest point along the test section. Test pressure shall not exceed pipe or thrust-restraint design pressures. The hydrostatic test shall be of at least 2-h duration. Test pressure shall not vary by more than ± 5 psi (34.5 kPa) for the duration of the test.

Valves shall not be operated in either direction at a differential pressure exceeding the rated valve working pressure. Use of a test pressure greater than the rated valve pressure can result in trapped test pressure between the gates of a double-dise gate valve. For tests at these pressures, the test setup should include a provision, independent of the valve, to reduce the line pressure to the rated valve pressure on completion of the test. The valve can then be opened enough to equalize the trapped pressure with the line pressure, or fully opened if desired.

The test pressure shall not exceed the rated pressure of the valves when the pressure boundary of the test section includes closed, resilient-seated gate valves or butterfly valves.

PRESSURIZATION

After the pipe has been laid, all newly laid pipe or any valved section thereof shall be subjected to a hydrostatic pressure of at least 1.5 times the working pressure at the point of testing. Each valved section of pipe shall be slowly filled with water, and the specified test pressure (based on the elevation of the lowest point of the line or section under test and corrected to the elevation of the test gauge) shall be applied by means of a pump connected to the pipe. Valves shall not be operated in either the opening or closing direction at differential pressures above the rated pressure. It is good practice to allow the system to stabilize at the test pressure before conducting the leakage test.

AIR REMOVAL

Before applying the specified test pressure, air shall be expelled completely from the section of piping under test. If permanent air vents are not located at all high points, corporation cocks shall be installed at such points so that air can be expelled as the line is filled with water. After all the air has been expelled, the corporation cocks shall be closed and the test pressure applied. At the conclusion of the pressure test, the corporation cocks shall be removed and plugged or left in place as required by the specifications.

EXAMINATION

All exposed pipe, fittings, valves, hydrants, and joints shall be examined carefully during the test. Any damage or defective pipe, fittings, valves, hydrants, or joints that are discovered following the pressure test shall be repaired or replaced with sound material, and the test shall be repeated until satisfactory results are obtained.

LEAKAGE DEFINED

Leakage shall be defined as the quantity of water that must be supplied into the newly laid pipe or any valved section thereof to maintain pressure within 5 psi (34.5 kPa) of the specified test pressure after the pipe has been filled with water and the air has been expelled. Leakage shall not be measured by a drop in pressure in a test section over a period of time.

ALLOWABLE LEAKAGE

No pipe installation will be accepted if the leakage is greater than that determined by the following formula:

In inch-pound units,

$$L = \frac{SD\sqrt{P}}{133,200}$$

Where:

- L = allowable leakage, in gallons per hour
- S = length of pipe tested, in feet
- D = nominal diameter of the pipe, in inches
- P = average test pressure during the leakage test, in pounds per square inch (gauge)

In metric units,

$$L_m = \frac{SD\sqrt{P}}{715,317}$$

Where:

- LM = allowable leakage, in liters per hour
- S = length of pipe tested, in meters
- D = nominal diameter of the pipe, in millimeters
- P = average test pressure during the leakage test, in kPa

These formulas are based on an allowable leakage of 11.85 gpd/mi/in. (1.079 L/day/km/mm) of nominal diameter at a pressure of 150 psi (1034 kPa).

When testing against closed metal-seated valves, an additional leakage per closed valve of 0.0078 gal/b/in. (1.2 mL/b/mm) of nominal valve size shall be allowed. When hydrants are in the test section, the test shall be made against the main valve in the hydrant.

ACCEPTANCE OF INSTALLATION

Acceptance shall be determined on the basis of allowable leakage. If any test of laid pipe discloses leakage greater than that specified, repairs or replacements shall be accomplished in accordance with the specifications.

All visible leaks are to be repaired regardless of the amount of leakage.

REQUIREMENT OF CHLORINE

Before being placed into service, all new mains and repaired portions of, or extensions to existing mains shall be chlorinated so that the initial chlorine residual is not less than 50 mg/l and that a chlorine residual of not less than 25 mg/l remains in the water after standing 24 hours in the pipe.

FORM OF APPLIED CHLORINE

Chlorine shall be applied by one of the following methods, subject to approval by the Engineer.

1. LIQUID CHLORINE

A chlorine gas-water mixture shall be applied by means of a solution-feed chlorinating device, or the dry gas may be fed directly through proper devices for regulating the rate of flow and providing effective diffusion of the gas into the water within the pipe being treated. Chlorinating devices for feeding solutions of the chlorine gas, or the gas itself, must provide means for preventing the backflow of water into the chlorine.

2. CHLORINE-BEARING COMPOUNDS IN WATER

A mixture of water and high-test calcium hypochlorite (65-70% Chlorine) may be substituted for the chlorine gas water mixture. The dry powder shall first be mixed as a paste and then thinned to a one percent chlorine solution by adding water to give a total quantity of seven and five-tenths (7.5) gallons of water per pound of dry powder. This solution shall be injected in one end of the section of main to be disinfected while filling the main with water in the amounts as shown in the table which follows:

Chlorine Requirements to Produce to mg/l
Concentration in 100 Foot of Pipe - By Diameter

Pipe Size Inches	100% Chlorine, Lb.	1% Chlorine Solution, Gals.
4	0.027	0.33
6	0.061	0.73
8	0.108	1.30
10	0.170	2.04
12	0.240	2.88

3. Tablet disinfection is best suited to short extensions (up to 2,500 feet) and smaller diameter mains (up to 12 inches). Since preliminary flushing must be eliminated in using this method, it should be utilized only when scrupulous cleanliness has been used in construction. It shall not be used if trench water or foreign material has entered the main or if the water is below 41 °F.

Tablets should be placed in each section of pipe, hydrants, hydrant branches, and other appurtenances. Tablets must be at the top of the main and shall be attached by an adhesive, such as Permatex No. 1 or any alternative approved by the City. Tablets in joints between pipe sections, hydrants, hydrant branches, or appurtenances are to be crushed and placed inside the annular space, rubbed like chalk in butt ends of sections to coat them if the type of assembly does not permit crushing.

FORM OF APPLIED CHLORINE (Cont.)

In filling a section of piping with water when using the tablet method, water velocity shall be less than one foot per second.

Number of 5-Grain Hypochlorite Tablets Required for a Dosage of 50 MG/L per Length of Pipe Section

<u>Pipe Size</u> Inches	<u>Length of Pipe Section (Foot)</u>				
	Up to 13	18	20	30	40
2	1	1	1	1	1
4	1	1	2	2	2
6	2	2	3	3	4
10	3	5	7	7	9
12	5	6	10	10	14

POINT OF APPLICATION

The preferred point of application of the chlorinating agent is at the beginning of the pipe line extension or any valved section of it, and through a corporation stop inserted in the pipe. Refer to W-10, Chlorine Insertion Detail.

1. The contractor shall provide and install corporation cocks with a copper tube goose-neck assembly for the purpose of sample collection. Fire hydrants will not be used as sample points. Corporation cocks will be located at a point not more than 10 feet from the beginning of the new main and approximately every 1000 feet thereafter. Branch and dead end mains less than 1000 feet shall also have corporation cocks not more than 10 feet from the end of main. The Water Superintendent may require additional corporation cocks at various locations depending on the configuration of the system. All contractors are advised to contact the Water Superintendent prior to installing corporation cocks for testing.
2. Water from the existing distribution system shall be made to flow at a constant rate into the new main.
3. At a point not more than 10 feet downstream from the beginning of the new main the water entering the new main will receive a dose of chlorine fed at constant rate such that the water will have not less than 25 mg/l free chlorine.

PREVENTING REVERSE FLOW

Valves shall be manipulated so that the strong chlorine solution in the line being treated will not flow back into the line supplying the water. Refer to W-10, Chlorine Insertion Detail.

RETENTION PERIOD

Chlorine application shall not cease until the entire main is filled with heavily chlorinated water. The chlorinated water shall be retained in the main for at least 24 hours. At the end of the 24 hour period, the treated water in all portions of the main shall have a residual of not less than 10 mg/l free chlorine.

CHLORINATING VALVES AND HYDRANTS

In the process of chlorinating newly laid pipe, all valves or other appurtenances shall be operated while the pipe line is filled with the chlorinating agent and under normal operating pressure.

FINAL FLUSHING AND TESTING

Following chlorination, all treated water shall be thoroughly flushed from the newly laid pipe at its extremity until the replacement water throughout its lengths shows upon test, a chlorine residual of less than 1 mg/l. The environment to which the chlorinated water is to be discharged shall be the City sanitary sewer system. In the event chlorine is normally used in the source of supply, then the tests shall show a residual of not in excess of that carried in the system.

Twenty-four hours after the final flush and before the water main is placed into service, two sets of samples, twenty-four hours apart, shall be collected from approved sample points. Each sample will be tested for bacterial quality, and show the absence of coliform organisms. If all samples tested for bacterial quality are satisfactory, the main may be placed into service.

If at any sample point the bacterial quality is unsatisfactory, that sample point will be required to resample. The system may be flushed prior to resampling. Resampling will consist of two consecutive samples collected twenty-four hours apart. Each sample will be tested for bacteria quality and show the absence of coliform organisms. If all samples tested for bacterial quality are satisfactory the main may be placed in service.

All system flushing, chlorine injecting and sampling will be performed in the presence of the Water Superintendent or a designated City employee. All samples will be delivered to a certified laboratory of the City's choice by a City employee.

REPETITION OF FLUSHING AND TESTING

Should the initial treatment result in an unsatisfactory bacterial test, the original chlorination procedure shall be repeated by the Contractor until satisfactory results are obtained.