City of Lowell

Standard Details

February 2003

STREET DETAILS

NEW NO.	DRAWING TITLE
201	URBAN STREET SECTION
202	CURB AND GUTTER, CURB AND WEEPHOLE
203	CONCRETE VALLEY GUTTER
204	SIDEWALK
205	SIDEWALK DETAILS: OBSTRUCTIONS AND PROTRUDING OBJECTS
206	SIDEWALK ACCESS RAMPS
206-A	SIDEWALK ACCESS RAMPS
207	INTERSECTION AND COMMERCIAL DRIVEWAYS
208	ALLEY
209	CONCRETE PAVEMENT JOINTS
210	CONTRACTION JOINT DETAIL FOR CONCRETE PAVING
211	STREET CUT
212	ASPHALT TABLE
213	SURVEY MONUMENT BOX

SEWER DETAILS

NEW NO.	DRAWING TITLE
301	TRENCH BACKFILL, BEDDING, AND PIPE ZONE
302	CONCRETE CRADLE AND CAP DETAILS
303	PIPE ANCHOR DETAIL
304	CATCH BASIN
305	TYPE '3' CATCH BASIN DETAIL
306	FRAMES AND GRATES - G-1, G-2, TYPE 3
307	AREA DRAINAGE BASIN OR FIELD INLET
308	DITCH INLET
309	BORE CASING DETAIL
310	SUBSURFACE DRAIN DETAIL
311	SHALLOW TRENCH SERVICE CONNECTION, BLOCKING AND MARKERS
312	TYPICAL DEEP TRENCH SERVICE CONNECTIONS
313	CLEANOUT
315	MANHOLE COVER AND FRAME DETAILS
315A	STORM SEWER MANHOLE RING AND COVER
315B	MANHOLE ADJUSTMENT DETAILS
316	MANHOLE
317	FLAT-TOP MANHOLE
318	POLLUTION CONTROL MANHOLE WITH ELBOW
319	MANHOLE BASE SECTION
320	CARRY THROUGH MANHOLE - STORM
321	DETAIL FOR INSIDE DROP CONNECTION FOR MANHOLES
322	DETAIL FOR OUTSIDE DROP CONNECTION FOR MANHOLES
323	LARGE CONCRETE MANHOLE BASES
324	LARGE CAST-IN-PLACE CONCRETE MANHOLE BASES

WATER DETAILS

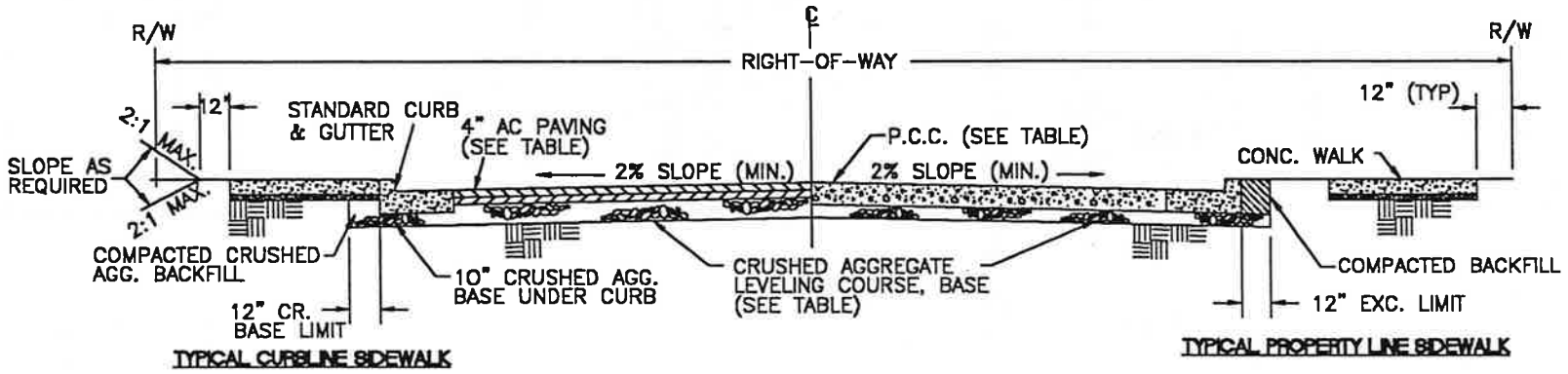
NEW NO.	DRAWING TITLE
401	THRUST BLOCKING
402	HYDRANT INSTALLATION
403	VALVE BOX AND OPERATOR EXTENSION ASSEMBLY
404	TYPICAL MAIN DEAD-END BLOWOFF ASSEMBLY
405	6" BLOWOFF ASSEMBLY
406	COMBINATION AIR-RELEASE AND VALVE ASSEMBLY 2" AND SMALLER
407	3/4" TO 2" WATER METER SETTING DETAIL
408	ROOT BARRIER

LOWELL DETAIL INDEX

DATE: JANUARY 2002 | DRAWING NO. N/A

FILENAME: APWAINDX.DWG

FILENAME: FILENAME



ASPHALT PAVING SECTION

CONCRETE PAVING SECTION

A/C

TYPE STREET	DEPTH A/C	DEPTH 3/4-0" AGG.	DEPTH 1 1/2" AGG.
LOCAL & COLLECTOR	4	2	10
ARTERIAL	4	4	12
TRUCK ROUTE	5	4	14

P.C.C.

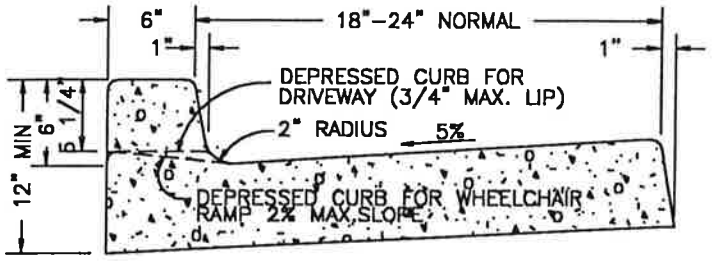
TYPE STREET	DEPTH A/C	DEPTH 3/4-0" AGG.	DEPTH 1 1/2" AGG.
LOCAL & COLLECTOR	6	2	4
ARTERIAL	8	4	6
TRUCK ROUTE	8	4	8

CITY OF LOWELL

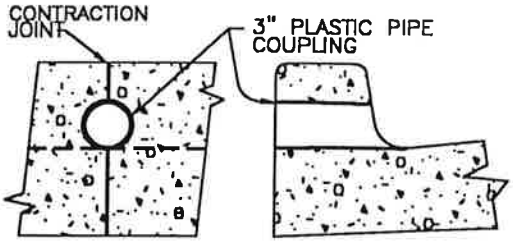
URBAN STREET SECTION

DRAWING NO. 201

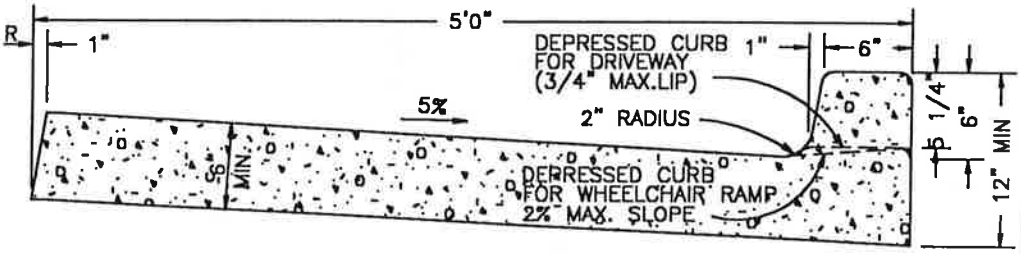
DATE: APRIL 2002



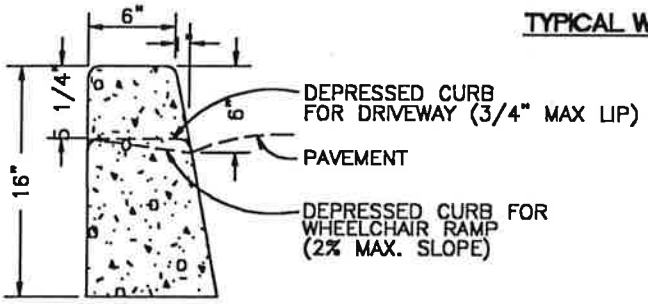
TYPICAL CURB + GUTTER



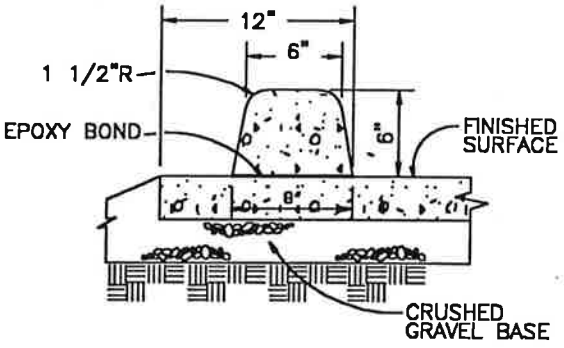
WEEP HOLE THROUGH CURB



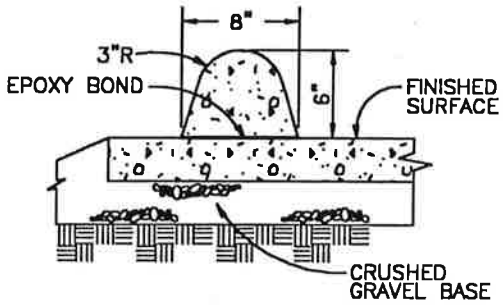
TYPICAL WIDE (5'-0")CURB + GUTTER



TYPICAL STRAIGHT CURB



EXTRUDED CONCRETE BONDED CURB



EXTRUDED AC BONDED CURB

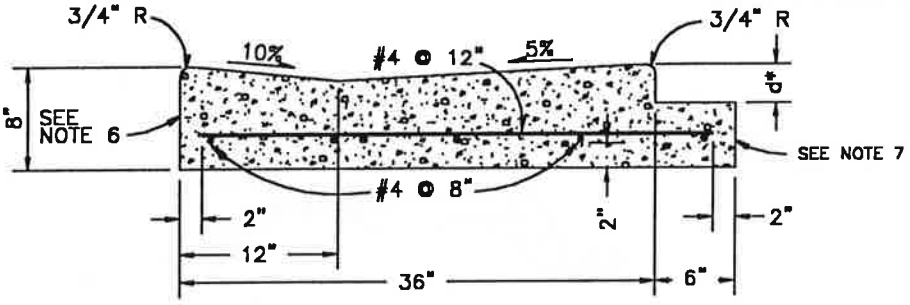
NOTES:

1. ALL RADII SHALL BE 3/4" EXCEPT AS OTHERWISE SHOWN.
2. ISOLATION JOINTS SHALL BE PLACED ONLY AS SPECIFIED.
3. CONTRACTION JOINTS SHALL BE PLACED AT 15' INTERVALS AND SHALL EXTEND AT LEAST 50% THROUGH THE CURB OR CURB AND GUTTER.
4. A CONTRACTION JOINT SHALL BE PLACED ALONG AND OVER WEEP HOLE THROUGH THE CURB AND THROUGH THE SIDEWALK.
5. WHEN SIDEWALKS ARE CONSTRUCTED, EXTEND 3" PIPE TO BACK OF SIDEWALK AND INSTALL COUPLING.

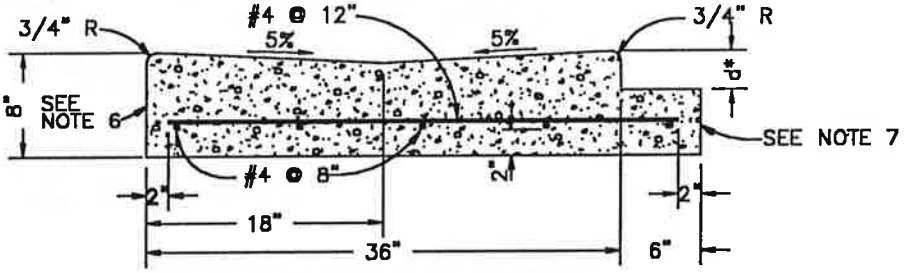
CITY OF LOWELL

CURB AND GUTTER, CURB AND WEEPHOLE

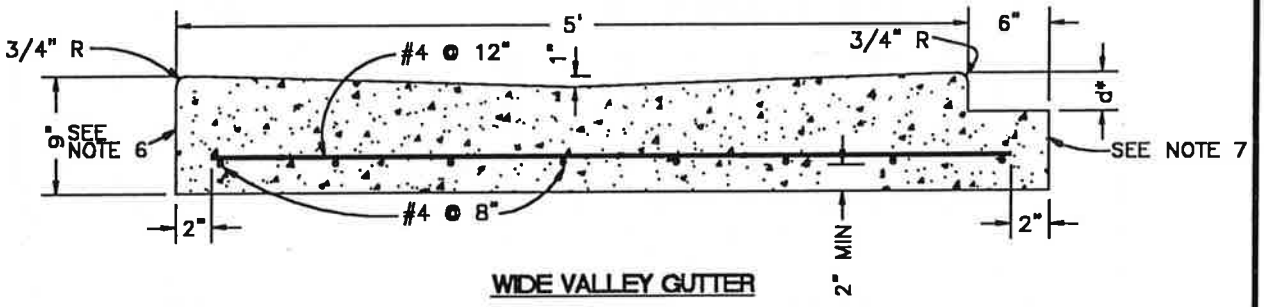
DATE:	DRAWING NO.
APRIL 2002	202



NON-SYMMETRICAL "V" GUTTER



SYMMETRICAL "V" TYPE GUTTER



WIDE VALLEY GUTTER

NOTES:

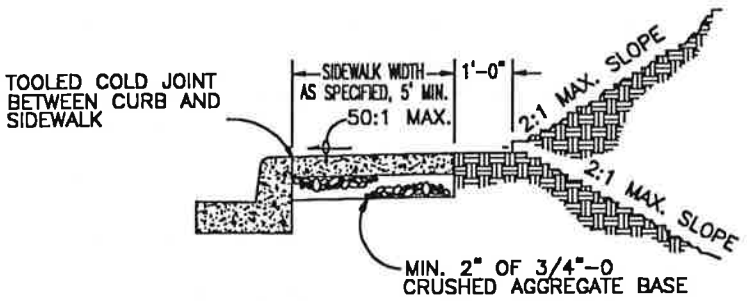
1. d* = THICKNESS OF ASPHALT PAVING.
2. THE CONCRETE SHALL BE CLASS 3300.
3. THE TOTAL WIDTH OF THE NON-SYMMETRICAL "V" GUTTER MAY BE REDUCED TO 30" WHEN CONSTRUCTION WITH A CURB-EXTRUSION MACHINE.
4. CONSTRUCT 6" BENCH MONOLITHICALLY WITH VALLEY GUTTER TO EXTEND UNDER PAVING FOR PAVEMENT SUPPORT.
5. WHEN BENCH IS NOT REQUIRED, CONSTRUCT 1" BATTER ON VERTICAL FACE.
6. PLACE PREMOLDED FILLER AGAINST VERTICAL FACE WHERE VALLEY GUTTER ABUTS CONCRETE.
7. CONSTRUCT 6" x d DEPRESSED BENCH WHERE VALLEY GUTTER ABUTS ASPHALT PAVEMENT.

CITY OF LOWELL

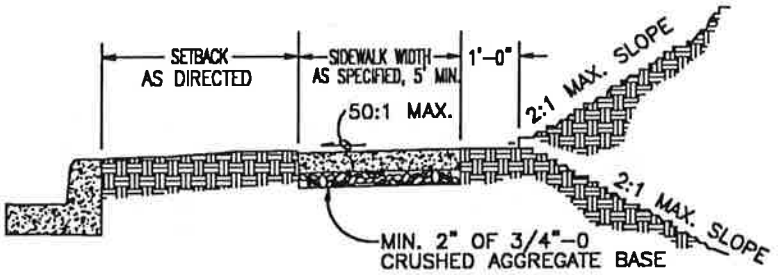
CONCRETE VALLEY GUTTER

DATE:	DRAWING NO.
APRIL 2002	203

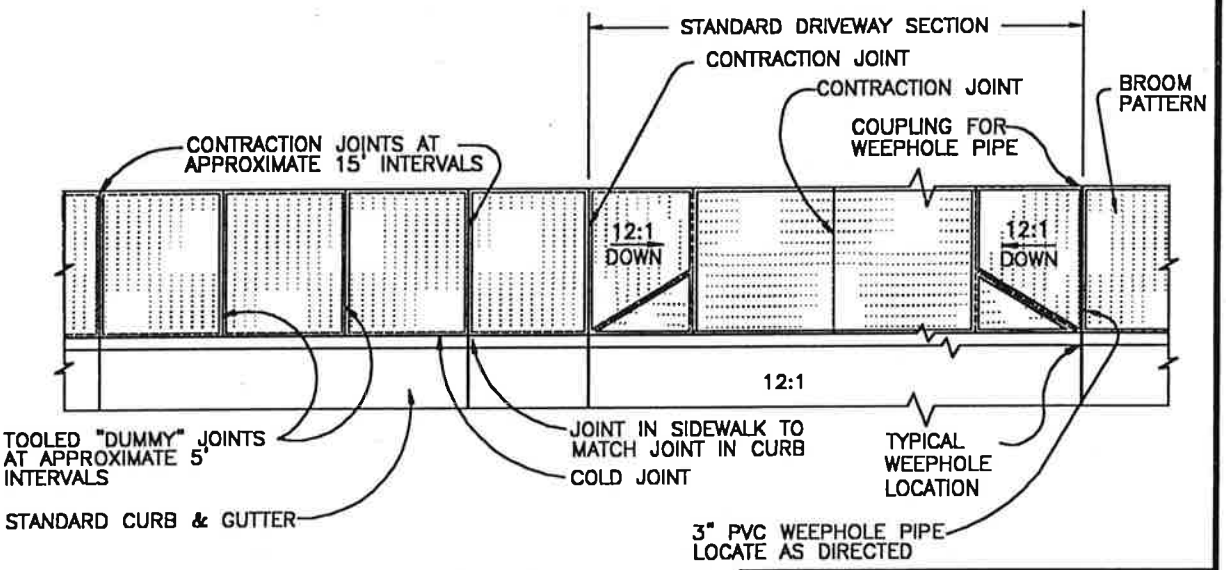
FILENAME: FILENAME



TYPICAL CURB TYPE CROSS SECTION



TYPICAL SETBACK TYPE CROSS SECTION



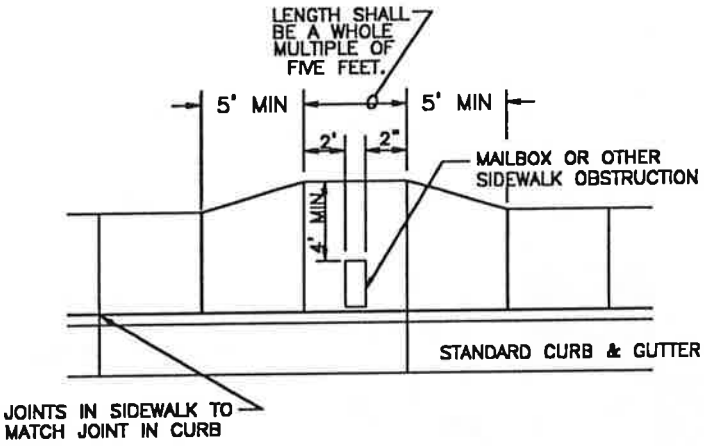
TYPICAL PLAN VIEW

NOTE:

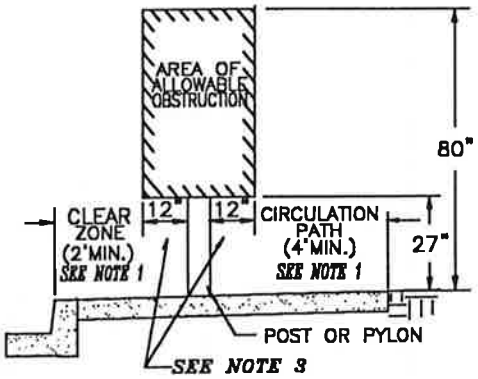
1. SIDEWALKS 8 FEET AND WIDER SHALL HAVE A LONGITUDINAL CONTRACTION JOINT AT THE MIDPOINT.
2. CONCRETE DEPTH FOR STANDARD SIDEWALKS SHALL BE NOMINAL 4" MIN.; THICKNESS IN DRIVEWAY SHALL MATCH EXISTING DRIVEWAY.
3. INSTALL 3" PVC WEEPHOLE PIPES IN SIDEWALKS IN LOCATIONS AS DIRECTED BY THE ENGINEERS. PLACE CONTRACTION JOINT OVER THE TOP OF THE PIPE.

CITY OF LOWELL	
SIDEWALK	
DATE: APRIL 2002	DRAWING NO. 204

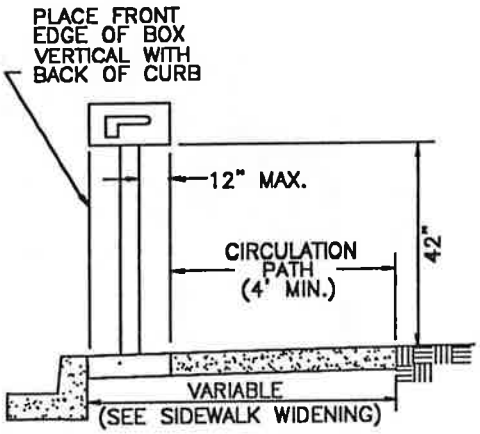
FILENAME: APWA0005.DWG



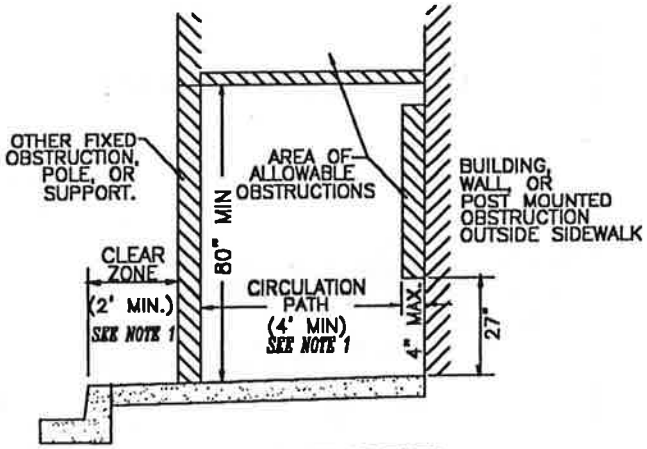
REQUIRED SIDEWALK WIDENING AROUND OBSTRUCTIONS



POST MOUNTED OBSTRUCTION WITHIN SIDEWALK



TYPICAL MAILBOX INSTALLATION



PROTRUDING OBJECTS AND OTHER OBSTRUCTIONS

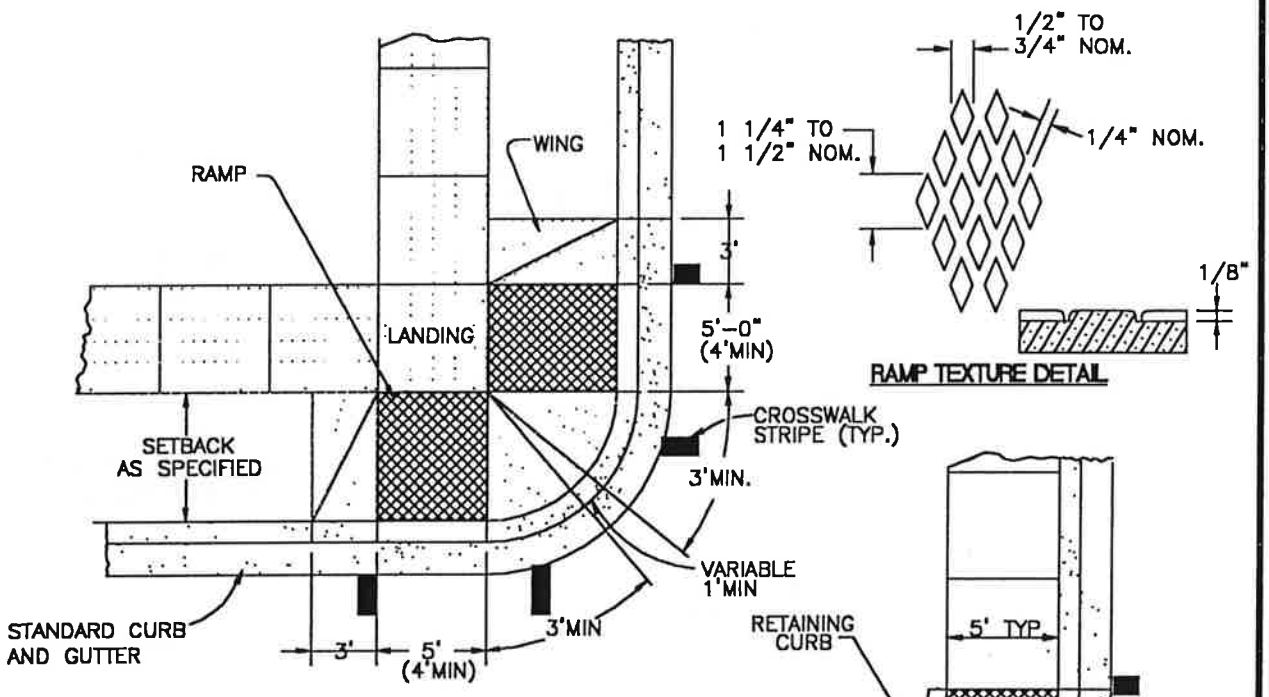
NOTES:

1) CLEAR ZONE AND THE CIRCULATION PATH MAY BE COMBINED PROVIDING A 5 FOOT MINIMUM SIDEWALK WIDTH IS MAINTAINED.
2) DEFLECT SIDEWALK AROUND AREA OF OBSTRUCTION WHEN OVERHANGS EXCEED ALLOWABLE LIMITS.
3) WHEN OBSTRUCTIONS ARE LOCATED WITHIN THE SIDEWALK AREA THE DIMENSION APPLIES IN ALL DIRECTIONS.
4) INSTALL FULL DEPTH EXPANSION JOINT AROUND ALL OBSTRUCTIONS PENETRATING SIDEWALK SURFACE.
5) ON CUL-DE-SACS, PLACE FRONT EDGE OF MAILBOX 6 INCHES BEHIND BACK OF CURB.
6) EXCEPTIONS TO THE REQUIREMENTS IN THIS DRAWING MUST BE APPROVED BY THE ENGINEER AND MUST COMPLY WITH 'AMERICANS WITH DISABILITY ACT.'

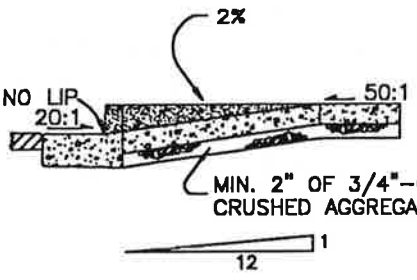
CITY OF LOWELL

SIDEWALK DETAILS:
OBSTRUCTIONS
AND
PROTRUDING OBJECTS

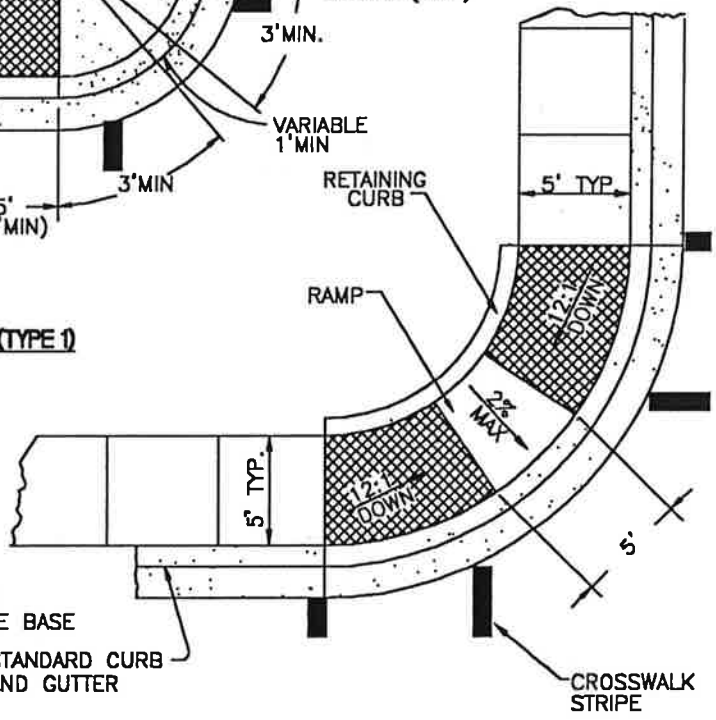
DATE:	DRAWING NO.
APRIL 2002	205



PERPENDICULAR CURB RAMPS (TYPE 1)



TYPICAL SECTION THROUGH RAMP



PERPENDICULAR CURB RAMPS (TYPE 2)

NOTES:

1. THE "AMERICANS WITH DISABILITIES ACT" (ADA) REQUIRES THAT ACCESS RAMPS TO SIDEWALKS CONFORM TO ALL FEDERAL GUIDELINES. EXCEPTIONS TO THE REQUIREMENTS IN THIS DRAWING MUST BE APPROVED BY THE ENGINEER AND MUST COMPLY WITH ADA.
2. NO ABOVE GROUND UTILITIES ARE PERMITTED WITHIN RAMP AREA.
3. LANDINGS SHALL BE PLACED AT THE TOP OF EACH RAMP. LANDING SLOPES SHALL NOT EXCEED 50:1 IN ANY DIRECTION. THE SLOPE OF THE SURFACING AT THE BOTTOM OF THE RAMP SHALL NOT EXCEED 20:1 FOR A DISTANCE OF 2' (SEE TYPICAL SECTION ABOVE).
4. MINIMUM LANDING DIMENSIONS SHALL BE 4' X 4'.
5. RAMP SURFACE SHALL BE TEXTURED WITH RAISED DIAMOND TEXTURE. TEXTURING SHALL BE DONE WITH AN EXPANDED METAL GRATE STAMPED INTO THE CONCRETE.
6. CONCRETE STRENGTH SHALL BE 3300 PSI.

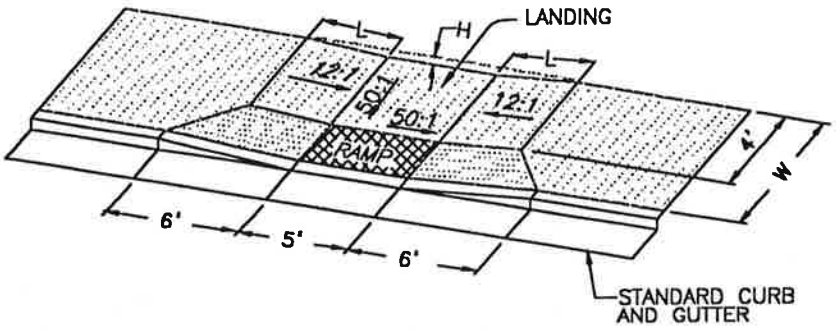
CITY OF LOWELL

SIDEWALK ACCESS RAMPS

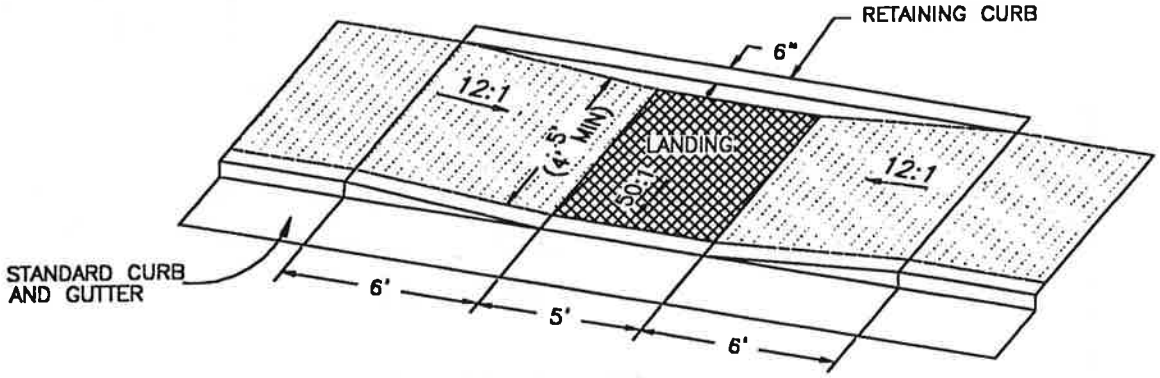
DATE:	DRAWING NO.
APRIL 2002	206

FILENAME: APWA0059.DWG

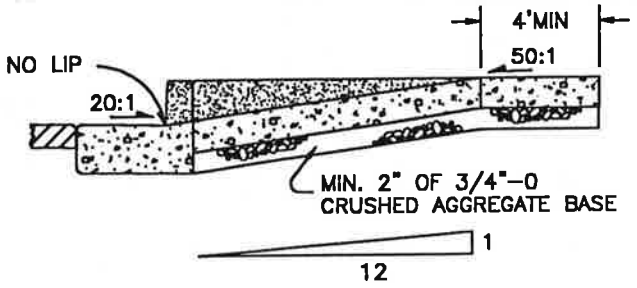
W	L	H
5'	4.36'	7/16"
5.5'	4.05'	13/32"
6'	3.73'	3/8"
6.5'	3.41'	11/32"
7'	3.10'	5/16"
7.5'	2.78'	9/32"
8'	2.46'	1/4"
8.5'	2.15'	7/32"
9'	1.83'	3/16"
9.5'	1.51'	5/32"
10'	1.20'	1/8"
10.5'	0.78'	3/32"



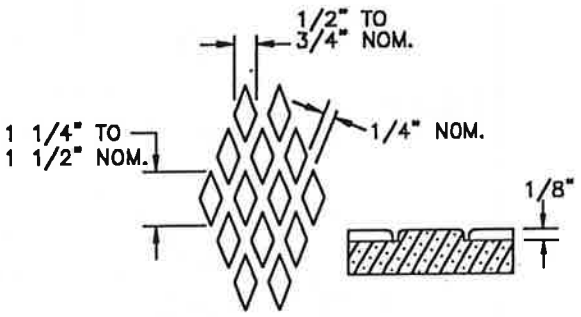
COMBINED CURB RAMP



PARALLEL CURB RAMP



TYPICAL SECTION THROUGH COMBINED CURB RAMP



RAMP TEXTURE DETAIL

NOTES:

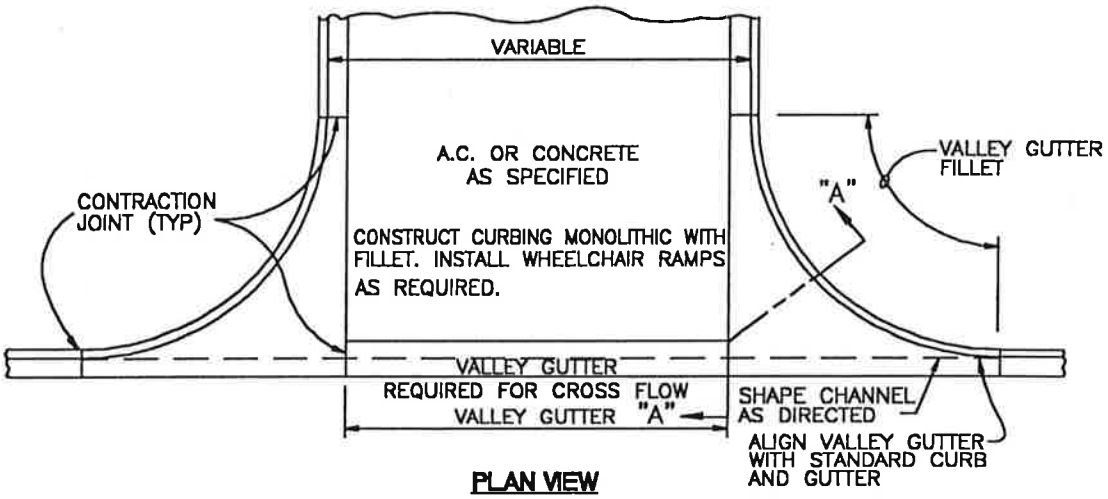
1. THE "AMERICANS WITH DISABILITIES ACT" (ADA) REQUIRES THAT ACCESS RAMPS TO SIDEWALKS CONFORM TO ALL FEDERAL GUIDELINES. EXCEPTIONS TO THE REQUIREMENTS IN THIS DRAWING MUST BE APPROVED BY THE ENGINEER AND MUST COMPLY WITH ADA.
2. NO ABOVE GROUND UTILITIES ARE PERMITTED WITHIN RAMP AREA.
3. LANDINGS SHALL BE PLACED AT THE TOP OF EACH RAMP. LANDING SLOPES SHALL NOT EXCEED 50:1 IN ANY DIRECTION. THE SLOPE OF THE SURFACING AT THE BOTTOM OF THE RAMP SHALL NOT EXCEED 20:1 FOR A DISTANCE OF 2' (SEE TYPICAL SECTION ABOVE).
4. MINIMUM LANDING DIMENSIONS SHALL BE 4'x 4'.
5. RAMP SURFACE SHALL BE TEXTURED WITH RAISED DIAMOND TEXTURE. TEXTURING SHALL BE DONE WITH AN EXPANDED METAL GRATE STAMPED INTO THE CONCRETE.
6. CONCRETE STRENGTH SHALL BE 3300 PSI.

CITY OF LOWELL

SIDEWALK ACCESS RAMPS

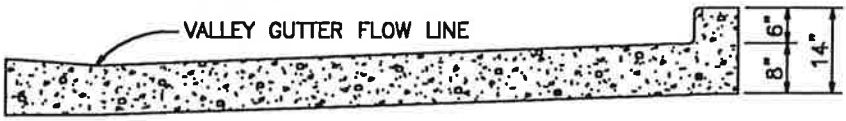
DATE: APRIL 2002

DRAWING NO. 206A

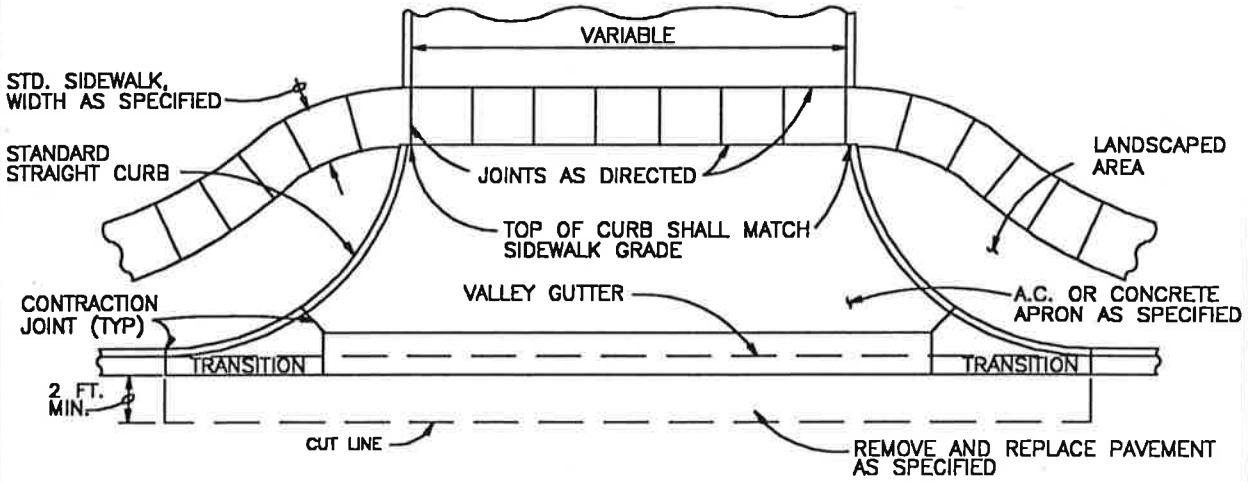


PLAN VIEW

VALLEY GUTTER ACROSS INTERSECTION



SECTION "A-A"



PLAN VIEW

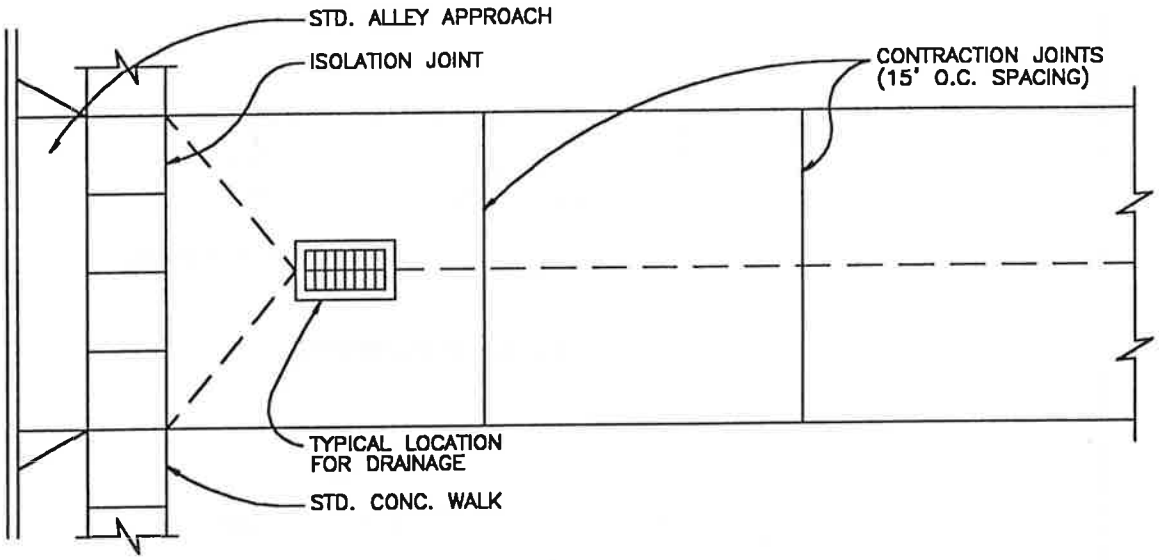
COMMERCIAL DRIVEWAY APPROACH

NOTES:

1. ORDER OF CONSTRUCTION:
   - A. CONSTRUCT VALLEY GUTTER AND TRANSITION SECTIONS.
   - B. CONSTRUCT 8" SIDEWALK ACROSS DRIVEWAY AREA.
   - C. CONSTRUCT APRON.
   - D. PCC APRONS SHALL BE JOINTED IN ACCORDANCE WITH DRAWING 212.
2. CONCRETE SHALL BE CLASS 3300.
3. CONSTRUCT 3/4"-0 AGGREGATE BASE 2" THICK FOR CONCRETE DRIVEWAYS AND 6" THICK FOR AC DRIVEWAYS.

CITY OF LOWELL	
INTERSECTION AND COMMERCIAL DRIVEWAYS	
DATE: APRIL 2002	DRAWING NO. 207

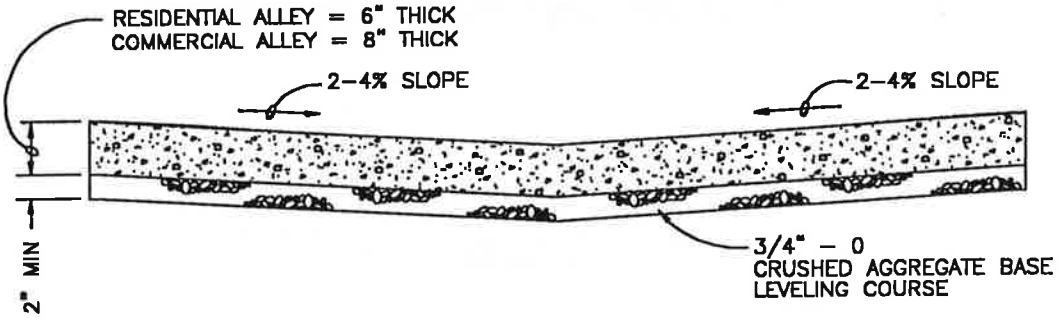
FILENAME: FILENAME



NOTES:

1. ALL EDGES SHALL BE TOOLED WITH 1/2" RADIUS.
2. CONCRETE STRENGTH SHALL BE 3300 PSI.

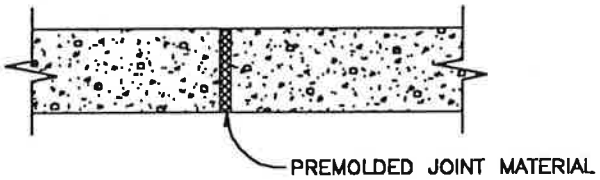
PLAN



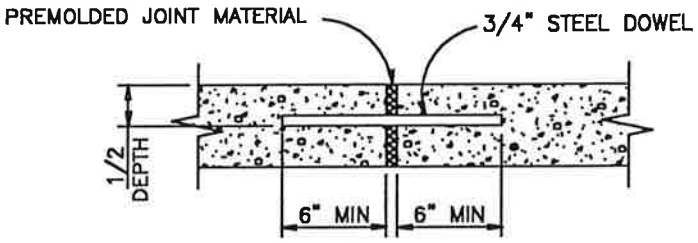
TYPICAL ALLEY (INVERTED CROWN) SECTION

CITY OF LOWELL	
ALLEY	
DATE: APRIL 2002	DRAWING NO. 208

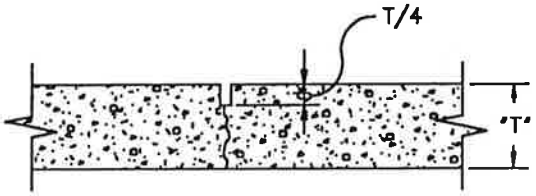
FILENAME: APWA0009.DWG



TYPICAL ISOLATION (EXPANSION) JOINT



TYPICAL ISOLATION (EXPANSION) JOINT WITH DOWEL



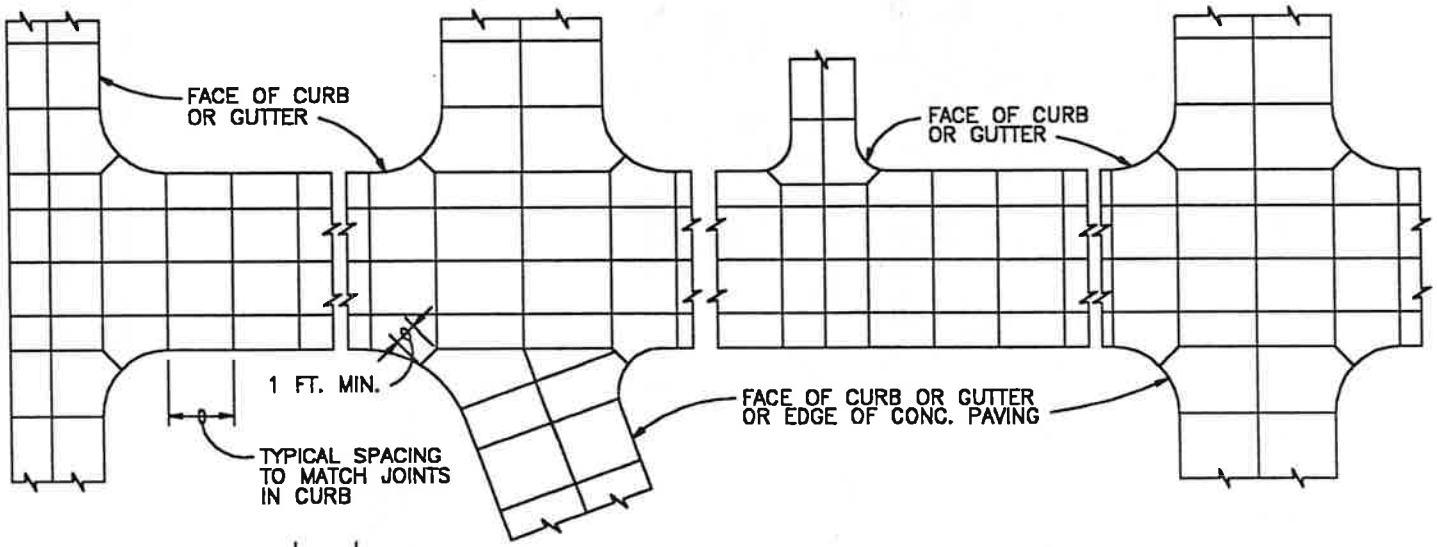
TYPICAL CONTRACTION JOINT

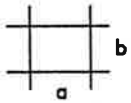
NOTE:
ALL JOINTS TO BE TOOLED WITH 1/2" RADIUS UNLESS SAWCUT

CITY OF LOWELL	
CONCRETE PAVEMENT JOINTS	
DATE: APRIL 2002	DRAWING NO. 209

FILENAME: APWA0051.DWG

FILENAME: APWA0011.DWG



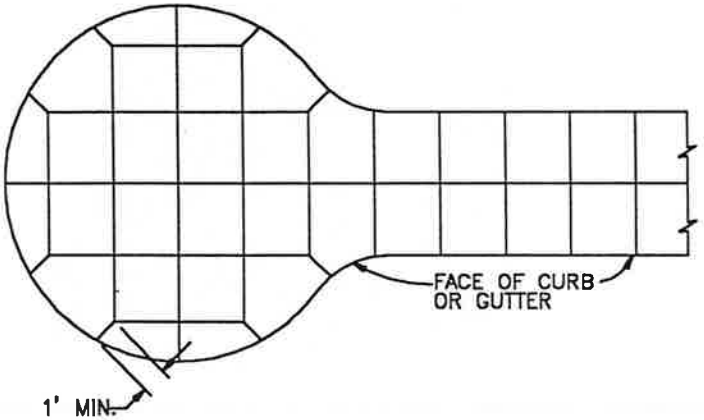


a/b=1.25 MAXIMUM

JOINT SPACING

NOTES:

1. ALL TRANSVERSE CONTRACTION JOINTS SHALL MATCH AND ALIGN WITH JOINTS IN CURB AND GUTTER UNLESS PAVING AND CURBS ARE SEPARATED BY AN ISOLATION JOINT. JOINTS IN CUL DE SAC CURB SHOULD BE PLANNED TO MATCH JOINT PATTERN IN PAVING.
2. MAXIMUM JOINT SPACING IN FEET SHALL BE 30x THE THICKNESS IN INCHES.
3. SPECIAL TREATMENT WILL BE REQUIRED FOR JOINTING ADJACENT TO MANHOLES, VAULTS, OR OTHER STRUCTURES INTRUDING INTO PAVING SURFACE.

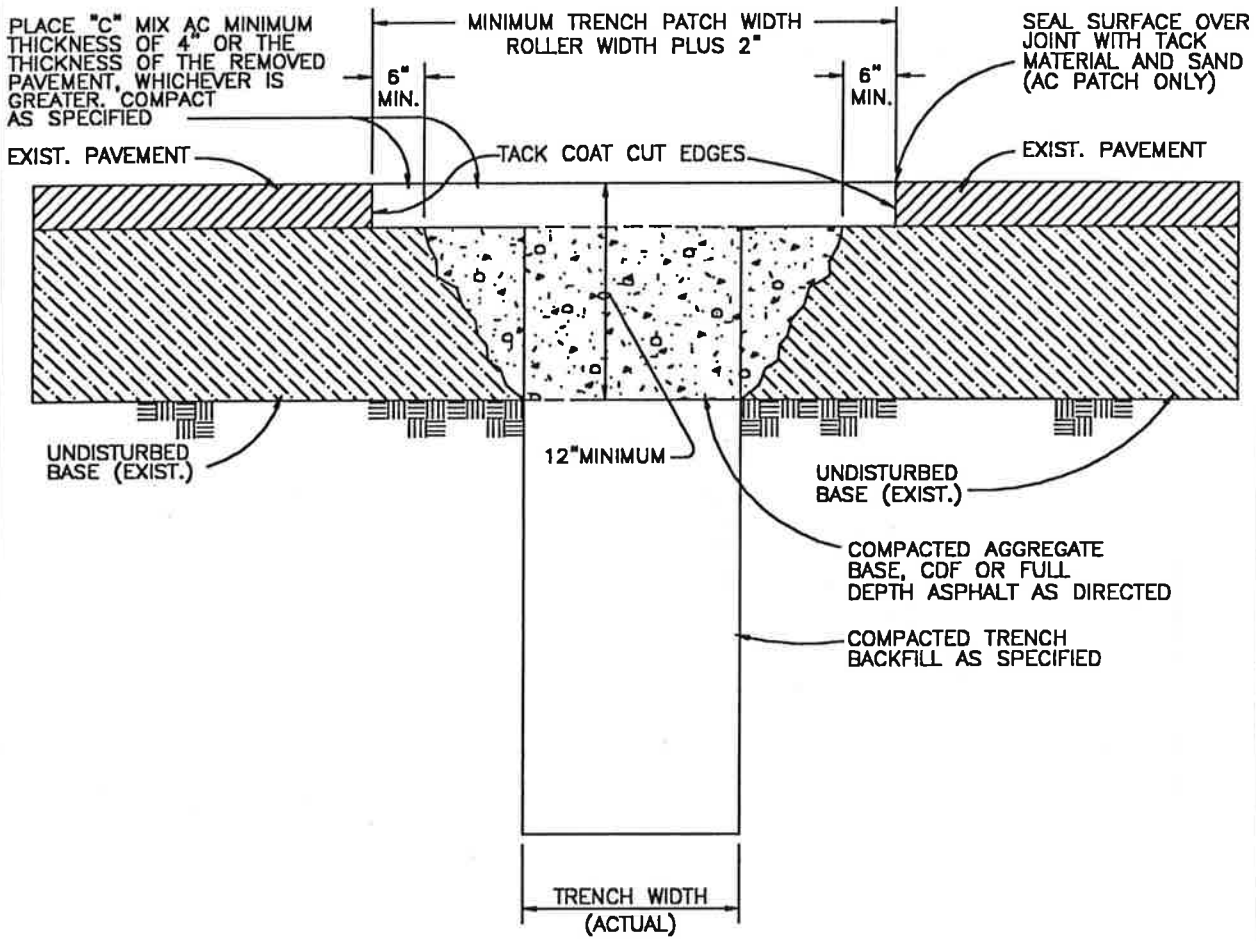


CITY OF LOWELL

CONTRACTION JOINT DETAIL FOR CONCRETE PAVING

DATE: APRIL 2002

DRAWING NO. 210



NOTES:

1. ALL EXISTING AC OR PCC PAVEMENT SHALL BE SAWCUT PRIOR TO REPAVING.
2. CONCRETE PAVEMENT SHALL BE REPLACED WITH CONCRETE TO A MINIMUM THICKNESS OF 6" OR TO THE THICKNESS OF REMOVED PAVEMENT, WHICHEVER IS GREATER.
3. IF EXISTING BASE MATERIAL IS CTB OR ATB, THEN REPLACEMENT BASE MATERIAL SHALL MATCH EXISTING.

CITY OF LOWELL	
STREET CUT	
DATE: APRIL 2002	DRAWING NO. 211

FILENAME: APWA0013.DWG

1 Mixed–in Prime Only
2 Diluted with Water
3 Slurry Mix
4 Rubber Asphalt Compounds
5 Diluted with Water By the Manufacturer
6 MS–2 Only
7 For use in Cold Climates
9 Emulsified asphalts shown are AASHTO and ASTM grades and may not include all grades produced in all geographical areas.
10 Evaluation of emulsified asphalt–aggregate system required to determine the proper grade of emulsified asphalt to use.

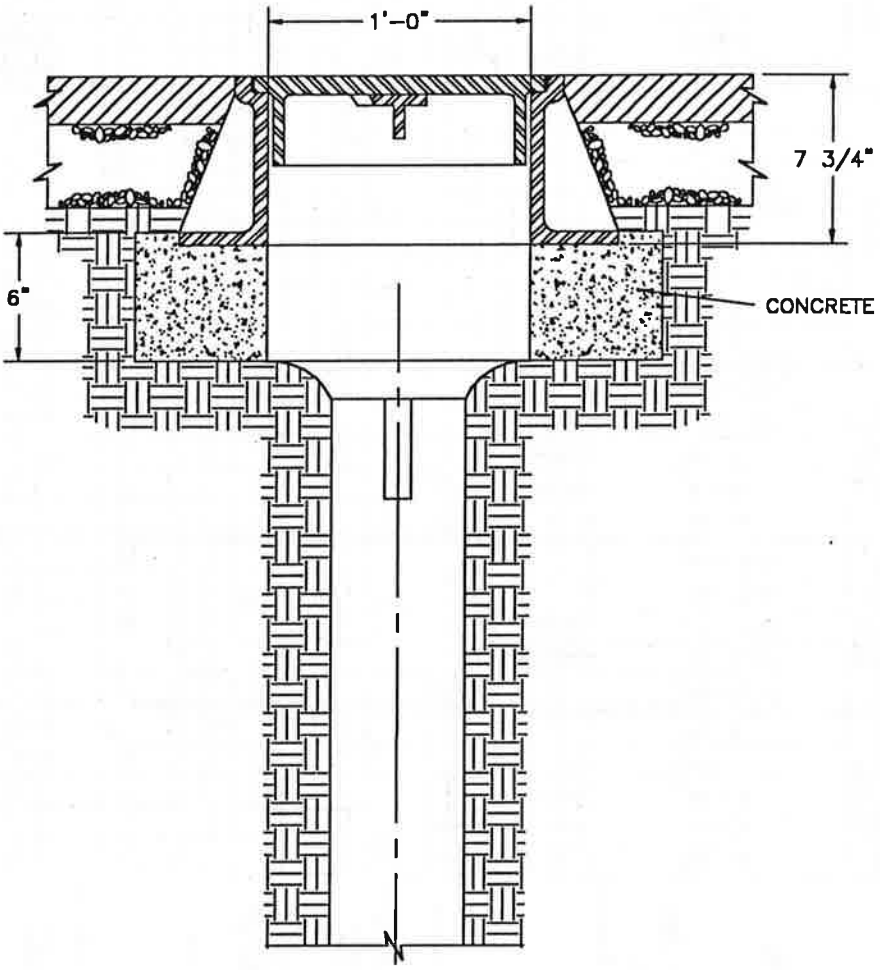
TYPE OF CONSTRUCTION	ASPHALT CEMENTS															EMULSIFIED ASPHALTS													
	VISCOSITY GRADED ORIGINAL					VISCOSITY GRADED RESIDUE					PENETRATION GRADED					ANIONIC								CATIONIC					
	AC–40	AC–20	AC–10	AC–5	AC–2.5	AR–16000	AR–8000	AR–4000	AR–2000	AR–1000	40–50	60–70	85–100	120–150	200–300	RS–1	RS–2	MS–1, HFMS–1	MS–2, HFMS–2	MS–2h,HFMS–2h	HFMS–2s	SS–1	SS–1h	CRS–1	CRS–2	CMS–2	CMS–2h	CSS–1	CSS–1h
ASPHALT–AGGREGATE MIXTURES																													
ASPHALT CONCRETE AND HOT LAID PLANT MIX																													
Pavement Base and Surfaces																													
Highways	X	X	X	X	x7	X	X	X	X	x7	X	X	X	X	x7														
Airports		X	X	X			X	X				X	X	X															
Parking Areas	X	0	0			X	0	0			X	0	0																
Driveways		0	X				0	X				0	X																
Curbs		0					0					0																	
Industrial Floors	X	X				X	X				X	X																	
Blocks	X					X					X																		
Groins	X	X				X	X				X	X																	
Dam Facings	0	0				0	0				0	0																	
Canal and Reservoir Linings	X	X				X	X				X	X																	
COLD–LAID PLANT MIX [10]																													
Pavement Base and Surfaces																													
Open–Graded Aggregate																			X	X						X	X		
Well–Graded Aggregate																					X	X	X					X	X
Patching, Immediate Use																						X	X						
Patching, Stockpile																													
MIXED–IN–PLACE (ROAD MIX)[10]																													
Pavement Base and Surfaces																													
Open–Graded Aggregate																			X	X						X	X		
Well–Graded Aggregate																					X	X	X					X	X
Sand					X										X						X	X	X					X	X
Sandy Soil					X										X						X	X	X					X	X
Patching, Immediate Use																					X	X	X					X	X
Patching, Stockpile																													
RECYCLING																													
Hot–Mix			X	X	X			X	X	X			X	X	X														
Cold–Mix [10]					X					X					X				X	X	X	X	X					X	X
ASPHALT–AGGREGATE APPLICATIONS																													
SURFACE TREATMENTS																													
Single Surface Treatment				X	X									X	X	X	X							X	X				
Multiple Surface Treatment				X	X									X	X	X	X							X	X				
Aggregate Seal				X	X				X					X	X	X	X	X						X	X				
Sand Seal																X	X	X						X	X				
Slurry Seal																						X	X					X	X
ASPHALT APPLICATIONS																													
SURFACE TREATMENT																													
Fog Seal																		x5				x2	x2					x2	x2
Prime Coat																			x1			x1	x1			x1		x1	x1
Tack Coat																X						x2	x2	X				x2	x2
Dust Laying																		x5				x2	x2					x2	x2
Mulch																						x2	x2						
MEMBRANE																													
Canal and Reservoir Linings	X										X																		
Embankment Envelopes	X	X				X	X				X	X																	
CRACK FILLING																													
Asphalt Pavements																						x3	x3					x3	x3
Portland Cement Concrete Pavements	x4					x4					x4																		

CITY OF LOWELL

ASPHALT TABLE

DATE: APRIL 2002

DRAWING NO. 212



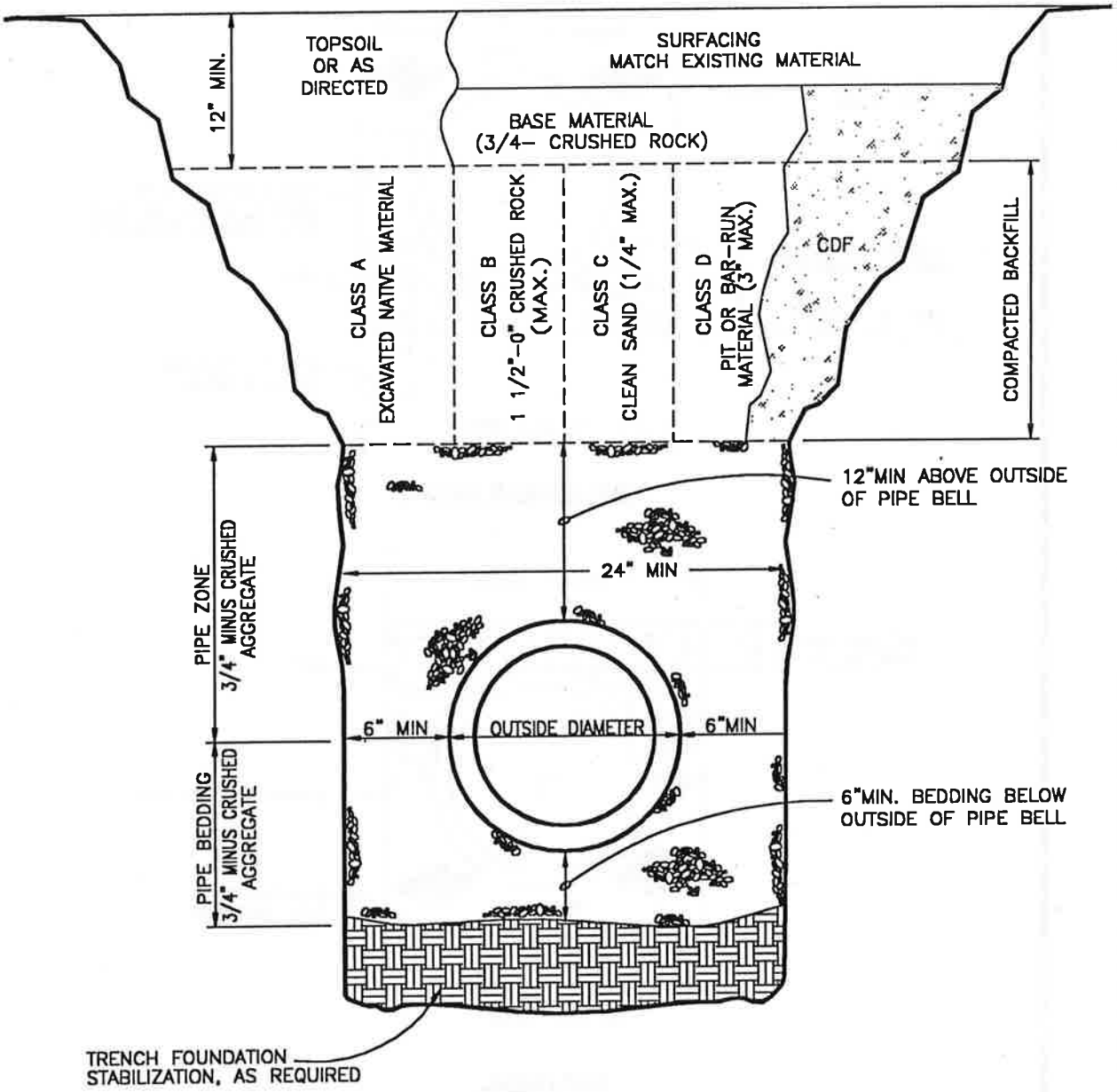
ELEVATION

NOTES:

1. CONCRETE SHELL BE CLASS 3000.
2. FRAME AND COVER SHALL BE CAST IRON OR ALUMINUM.
3. COVER SHALL HAVE "MONUMENT" CAST INTO TOP.

CITY OF LOWELL	
SURVEY MONUMENT BOX	
DATE: APRIL 2002	DRAWING NO. 213

FILENAME: FILENAME



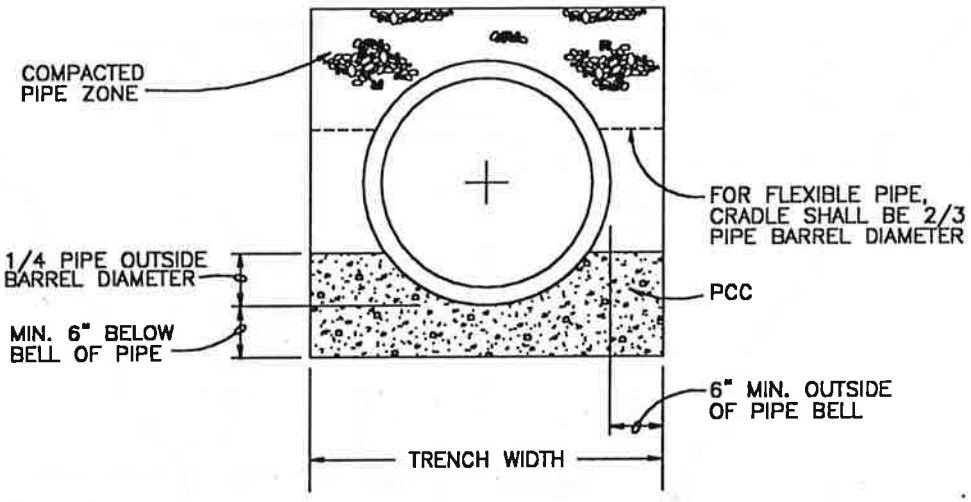
NOTE:
SURFACING OF PAVED AREAS SHALL COMPLY WITH STREET CUT STANDARD DRAWING.

CITY OF LOWELL

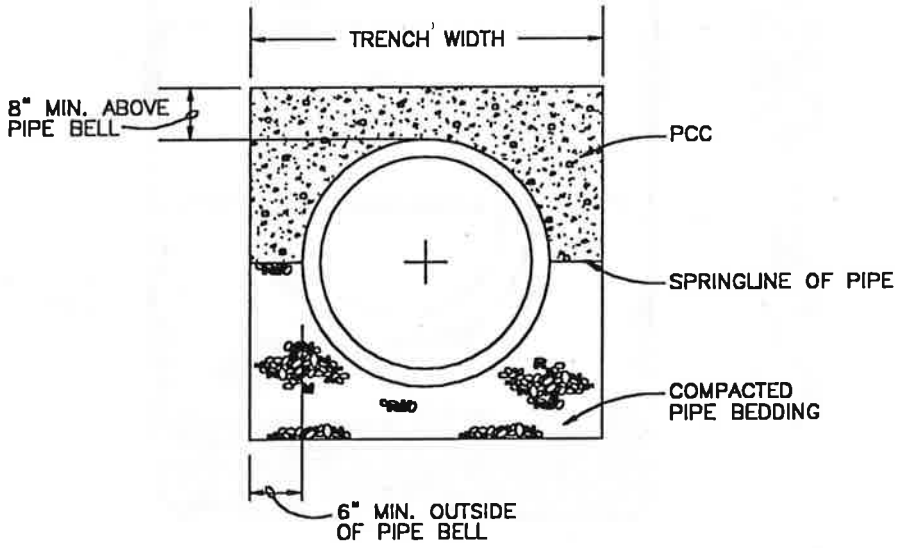
TRENCH BACKFILL, BEDDING, AND PIPE ZONE

DATE:	DRAWING NO.
APRIL 2002	301

FILENAME: APWA0015.DWG



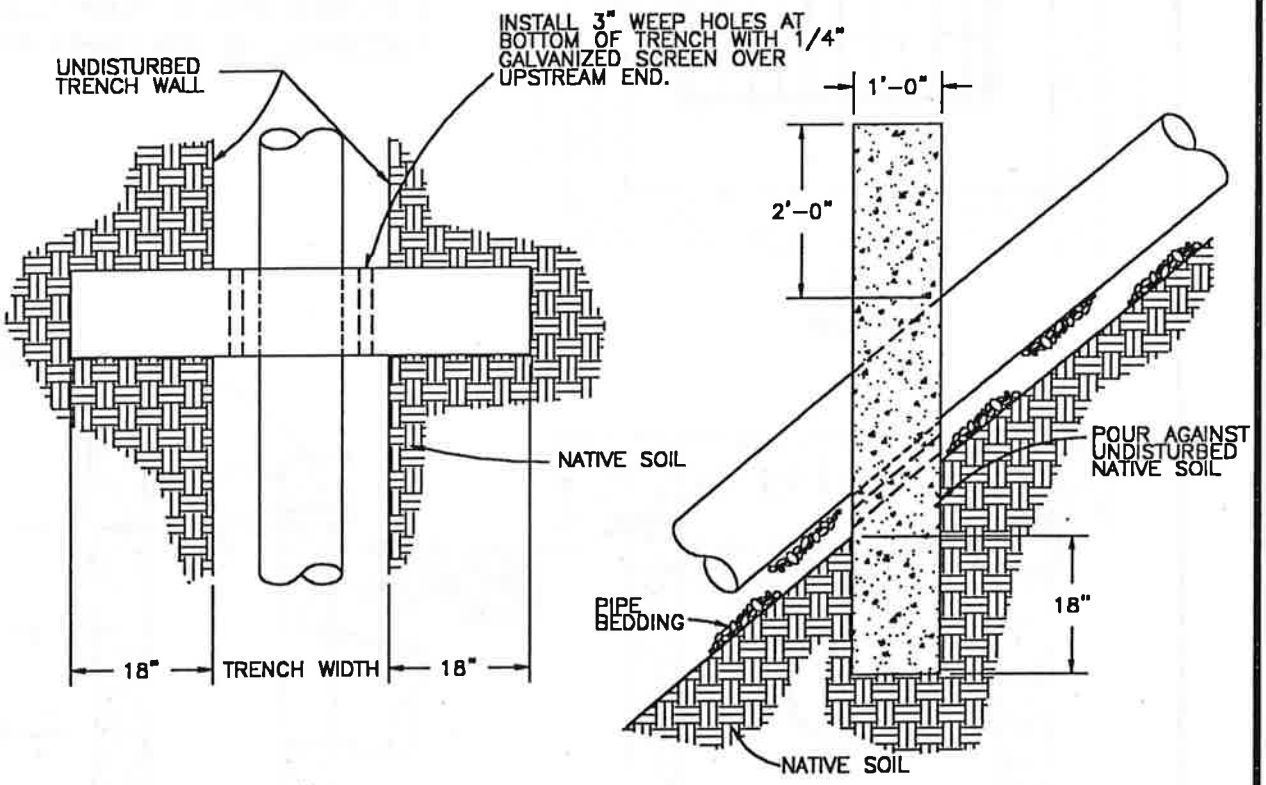
ENCASEMENT DETAIL



CAP DETAIL

NOTE:
THE CONCRETE SHALL BE CLASS 2000 MINIMUM.

CITY OF LOWELL	
CONCRETE CRADLE AND CAP DETAILS	
DATE: APRIL 2002	DRAWING NO. 302



NOTES:

1. CONCRETE ANCHOR WALLS (CLASS 3000) SHALL BE CONSTRUCTED USING FORMS WHEN SEWERS, STORM DRAINS, AND OTHER PIPELINES ARE CONSTRUCTED WITH SLOPES 20 PERCENT OR GREATER. REMOVE FORMS PRIOR TO BACKFILLING TRENCH.
2. SPACING OF ANCHOR WALLS SHALL BE:

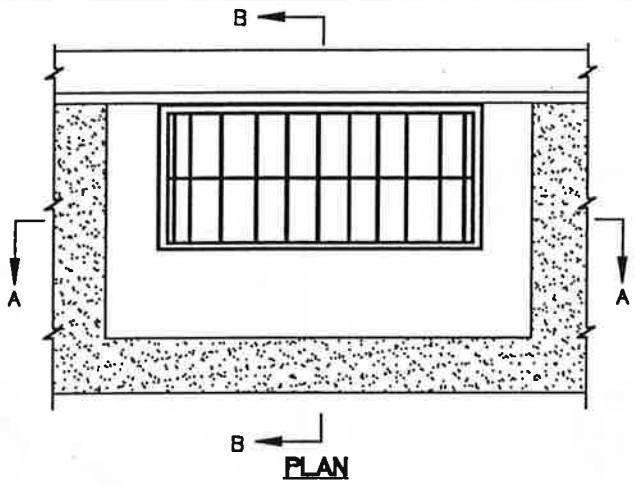
SLOPE:	SPACING:
20–34%	35 FEET
35–50%	25 FEET
50+ %	15 FEET OR CONCRETE ENCASEMENT

CITY OF LOWELL

PIPE ANCHOR DETAIL

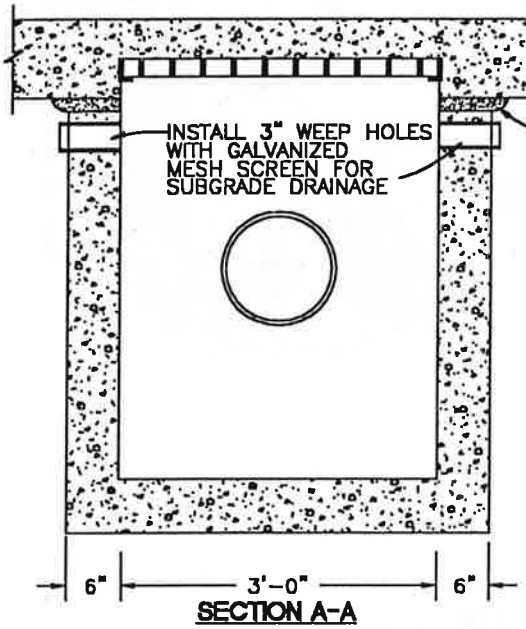
DATE:	DRAWING NO.
APRIL 2002	303

FILENAME: APWA0017.DWG

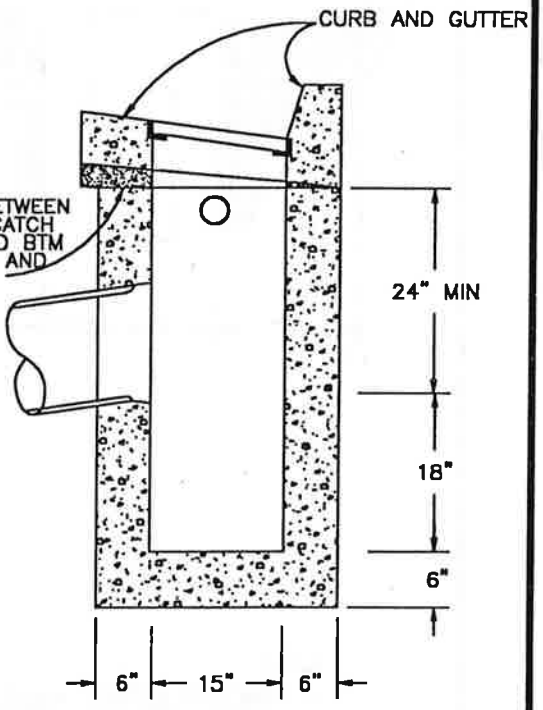


PLAN

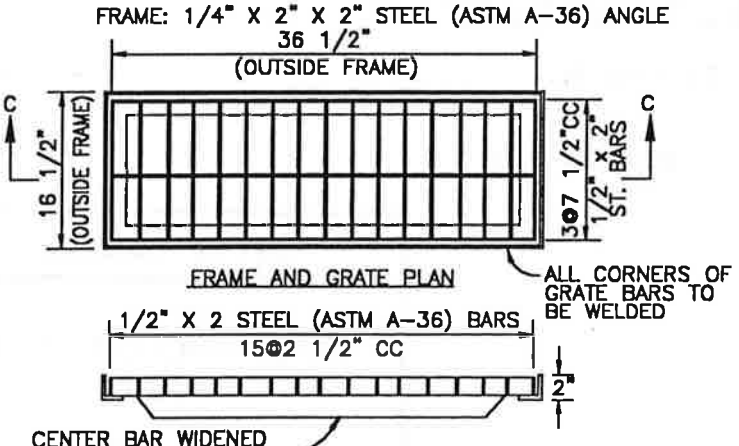
NOTES:
1. PRECAST BASE WALLS MAY BE A MINIMUM OF 4" THICK.
2. CONCRETE SHALL BE CLASS 3000.
3. APPROVED CAST IRON FRAMES AND GRATES MAY BE ACCEPTED.



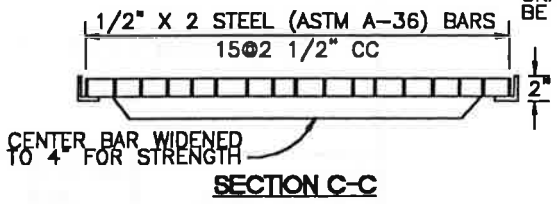
SECTION A-A



SECTION B-B

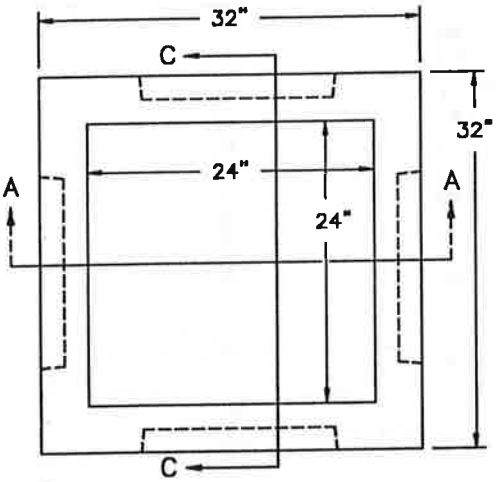


FRAME AND GRATE PLAN

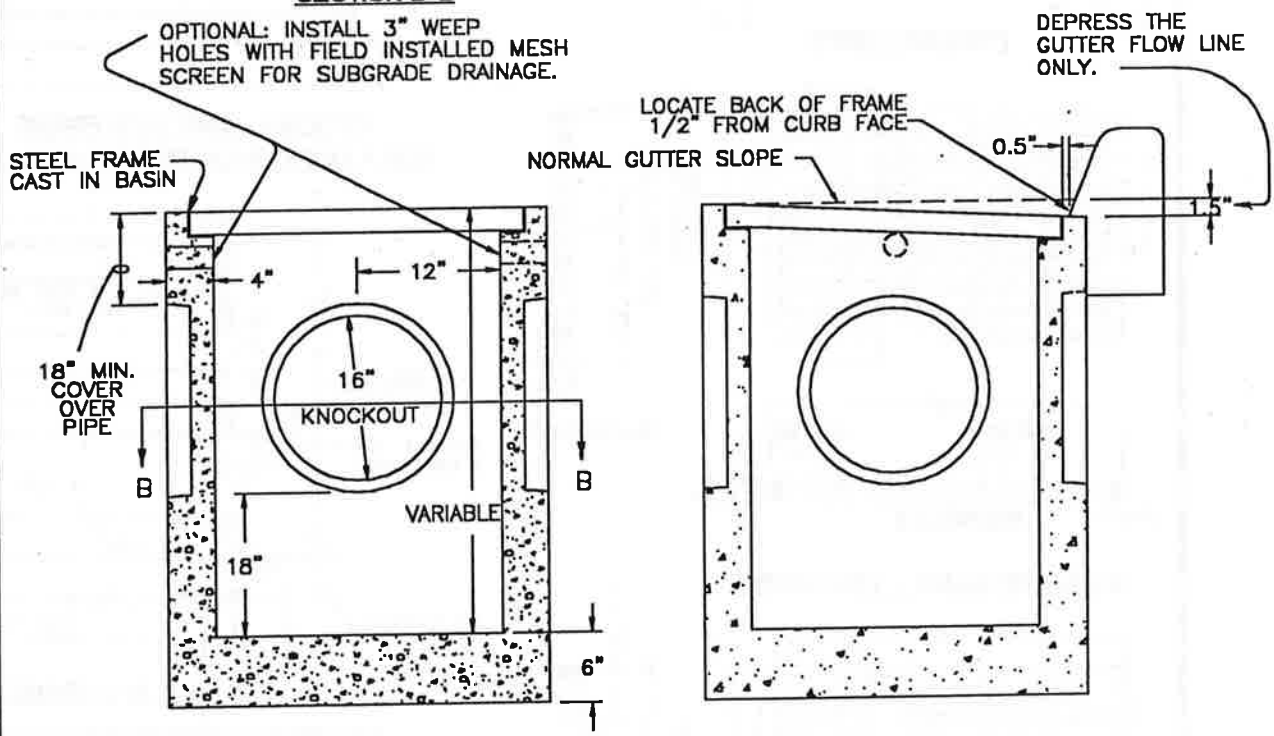


SECTION C-C

CITY OF LOWELL	
CATCH BASIN	
DATE: APRIL 2002	DRAWING NO. 304



SECTION B-B



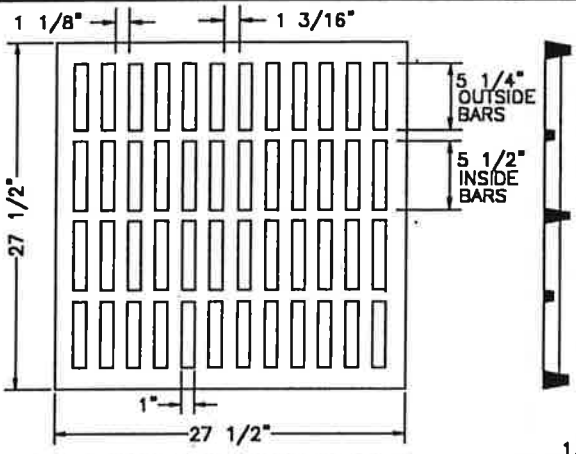
SECTION A-A

SECTION C-C

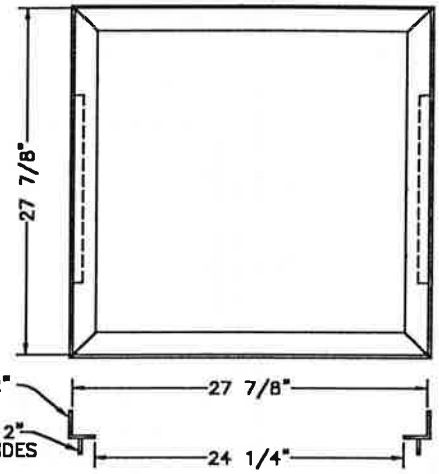
NOTES:

1. CATCH BASIN & GRATE SHALL MEET H20 LOADING
2. CONCRETE STRENGTH SHALL BE 3000 PSI
3. PRECAST WALLS SHALL BE A MINIMUM OF 4" THICK.
4. SEE DRW 305B FOR FRAME AND GRATE
5. DEPRESS GUTTER FLOWLINE AND TRANSITION GUTTER AS SHOWN IN DRW. 305C PERSPECTIVE VIEW.

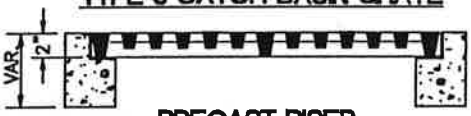
CITY OF LOWELL	
TYPE '3' CATCH BASIN DETAIL	
DATE: APRIL 2002	DRAWING NO. 305



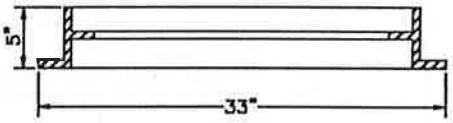
TYPE 3 CATCH BASIN GRATE



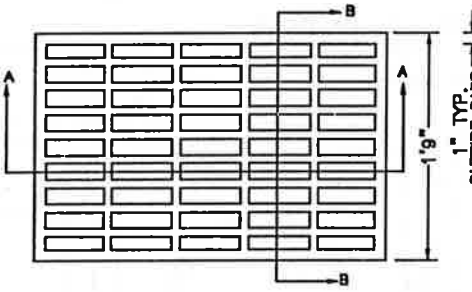
TYPE 3 FRAME - STEEL



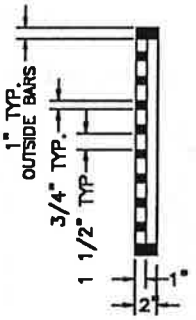
PRECAST RISER



OPTIONAL CAST IRON FRAME
FOR A MORTAR-ON TYPE 3 CATCH BASIN

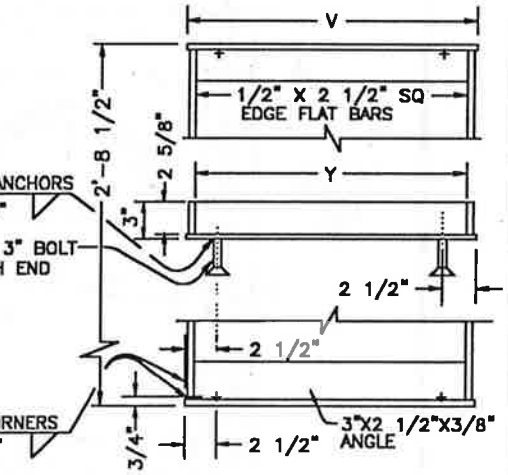


SECTION A-A



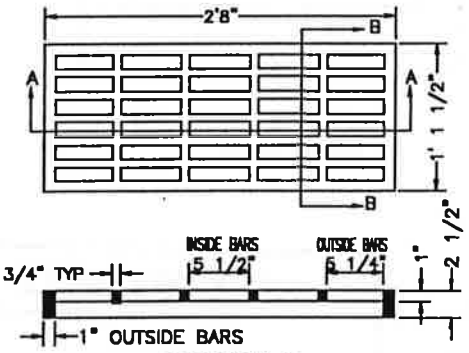
SECTION B-B

G-1 CATCH BASIN - 1 EACH/UNIT

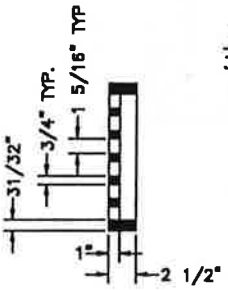


G-1 AND G-2 FRAME

INLET TYPE	V	Y
G-1, CG-1	1'-10 3/4"	1'-9 3/8"
G-2, CG-2	2'-4 3/4"	2'-3 3/8"



SECTION A-A



SECTION B-B

G-2 CATCH BASIN 2 EACH/UNIT

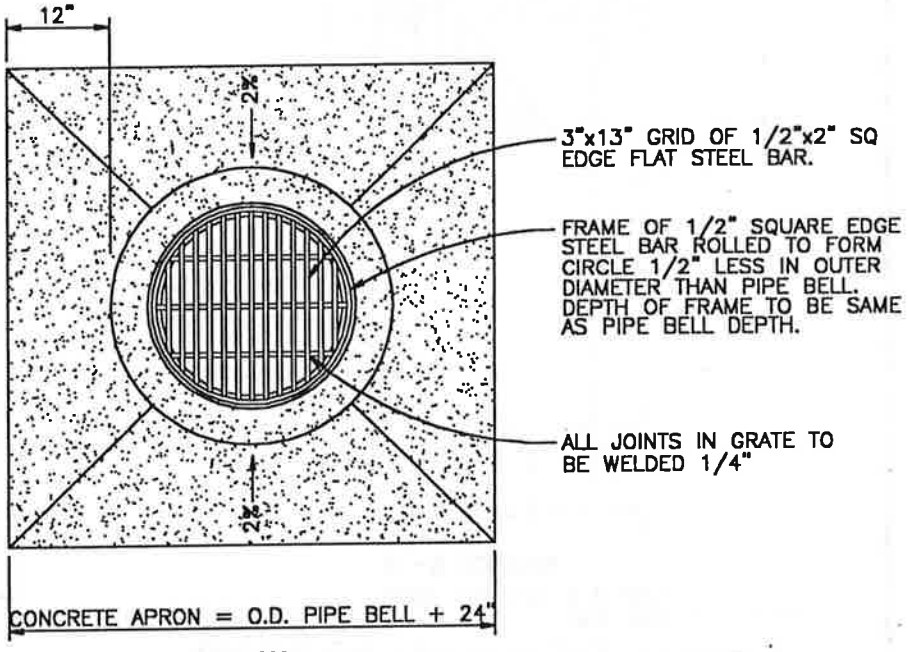
CAST IRON GRATES

NOTES:
CATCH BASIN, FRAME AND GRATES SHALL MEET H20 LOADING

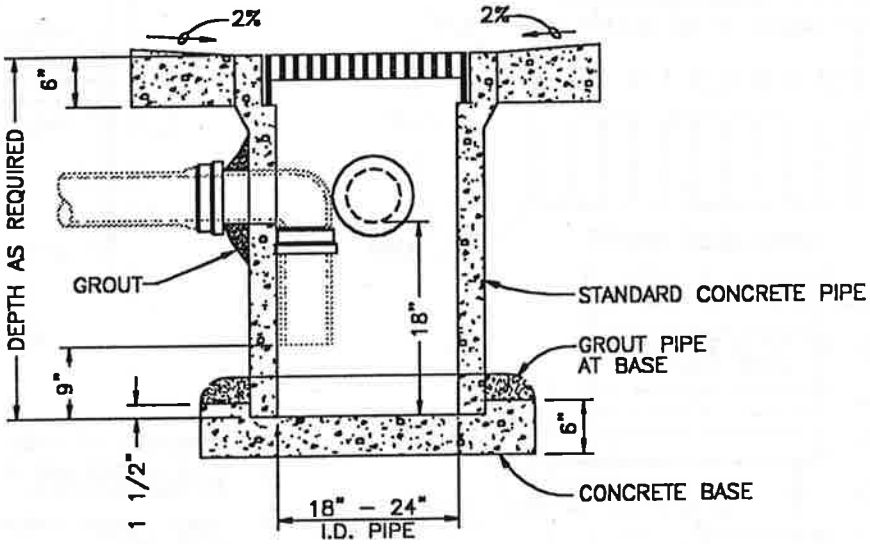
CITY OF LOWELL

FRAMES AND GRATES
G-1, G-2, TYPE 3

DATE:	DRAWING NO.
APRIL 2002	306



PLAN



SECTION A-A

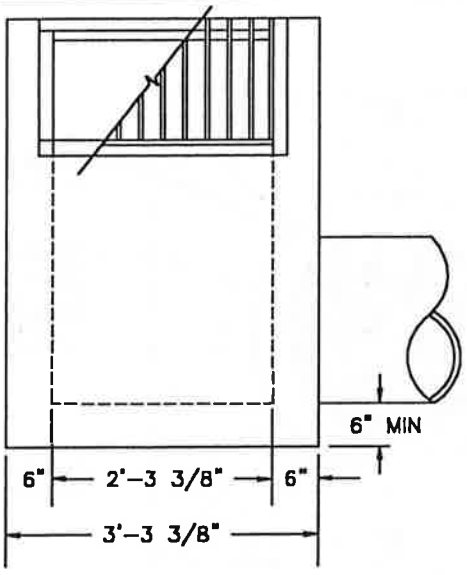
NOTES:

1. GRATES SHALL BE CONSTRUCTED FOR BICYCLE SAFETY.
2. PRECAST CONCRETE CATCH BASINS MAY BE USED WHEN SPECIFIED OR APPROVED.
3. NOT FOR USE IN VEHICULAR TRAFFIC AREAS.

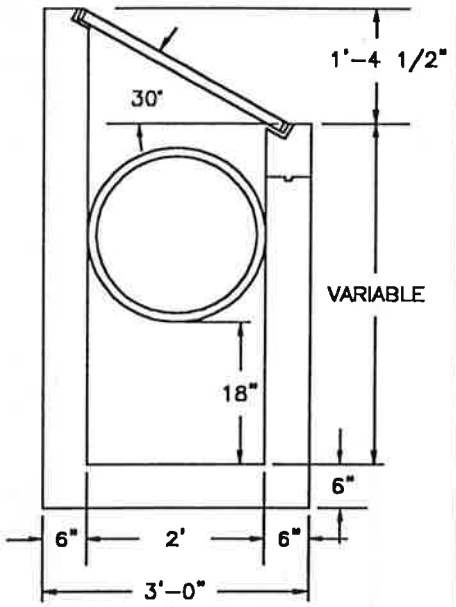
CITY OF LOWELL

AREA DRAINAGE BASIN OR FIELD INLET

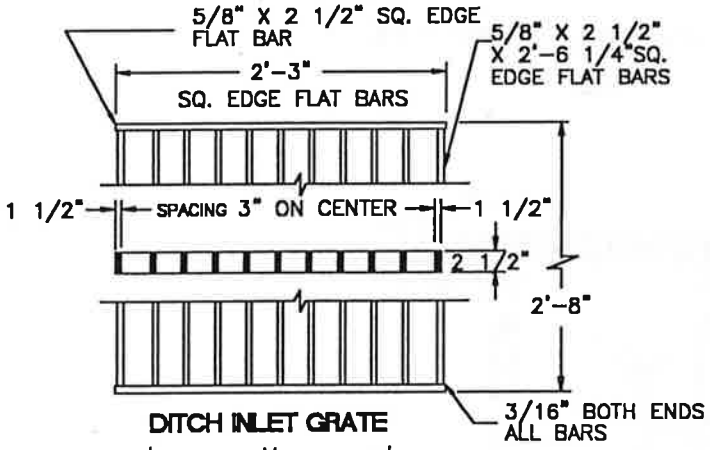
DATE:	DRAWING NO.
APRIL 2002	307



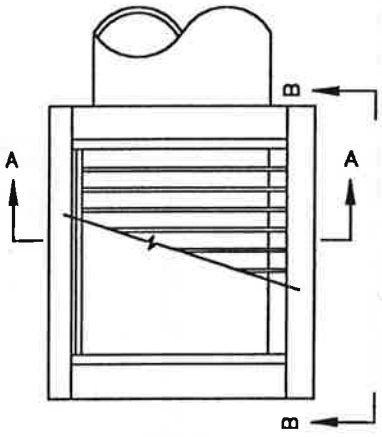
SECTION B - B



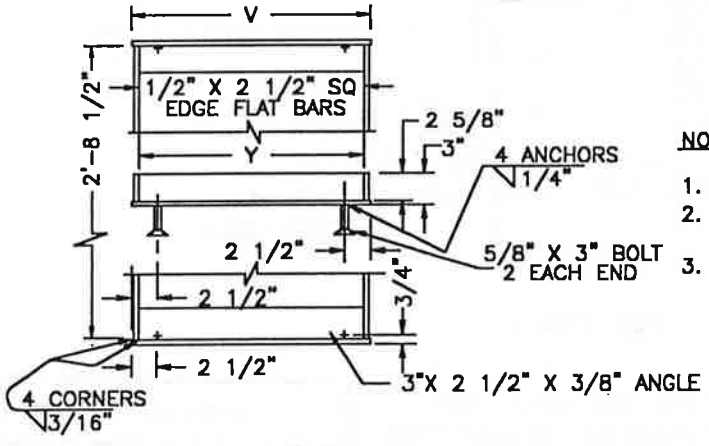
SECTION A - A



DITCH INLET GRATE



PLAN



NOTES:

1. CONCRETE STRENGTH SHALL BE 3000 PSI.
2. G-2 GRATES MAY BE USED IF APPROVED BY THE ENGINEER.
3. INSIDE FRAME DIMENSIONS: 2'-3 3/8", 2'-8 1/2".

NOTE:
3/8" CROSS BARS SHALL BE FLUSH WITH THE GRATE SURFACE AND MAY BE FILLET WELDED, RESISTANCE WELDED OR ELECTROFORGED TO BEARING BARS.

DITCH INLET FRAME

INLET TYPE	V	Y	Y_1	NO. OF BARS	TYPE
D	2'-4 3/4"	2'-3 3/8"	2'-3"	9	1

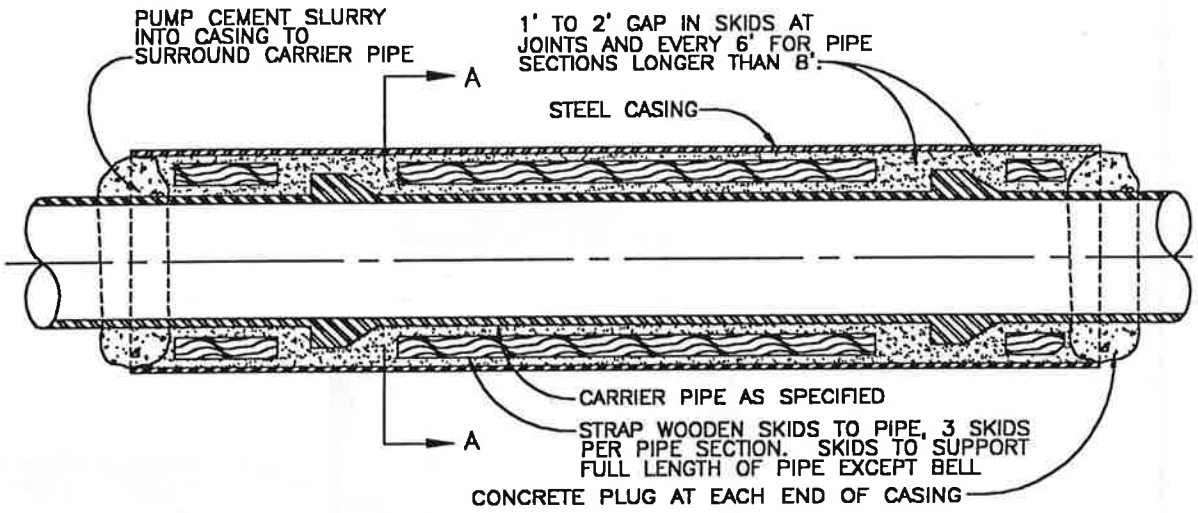
CITY OF LOWELL

DITCH INLET

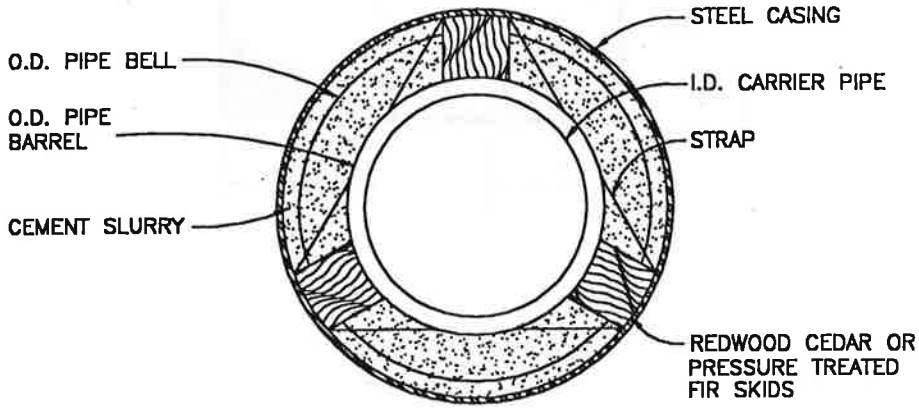
DATE: APRIL 2002

DRAWING NO. 308

FILENAME: APWA0054.DWG



PLAN

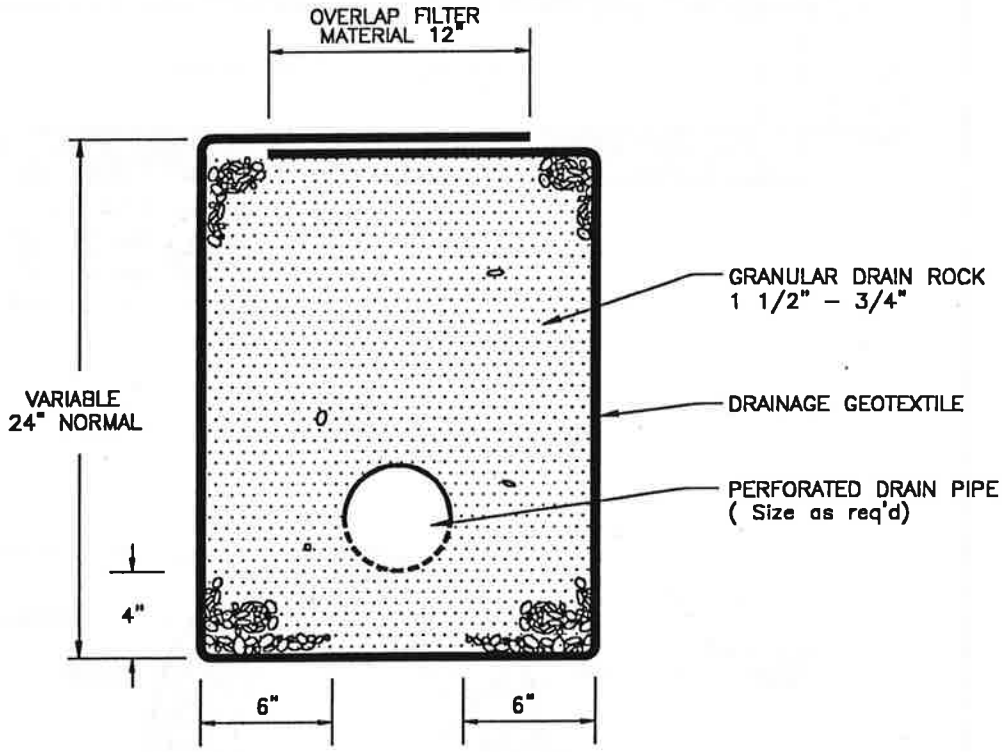


SECTION A-A

NOTE:
PLUG ENDS OF CASING WITH CONCRETE.

CITY OF LOWELL	
BORE CASING DETAIL	
DATE: APRIL 2002	DRAWING NO. 309

FILENAME: APWA0022.DWG

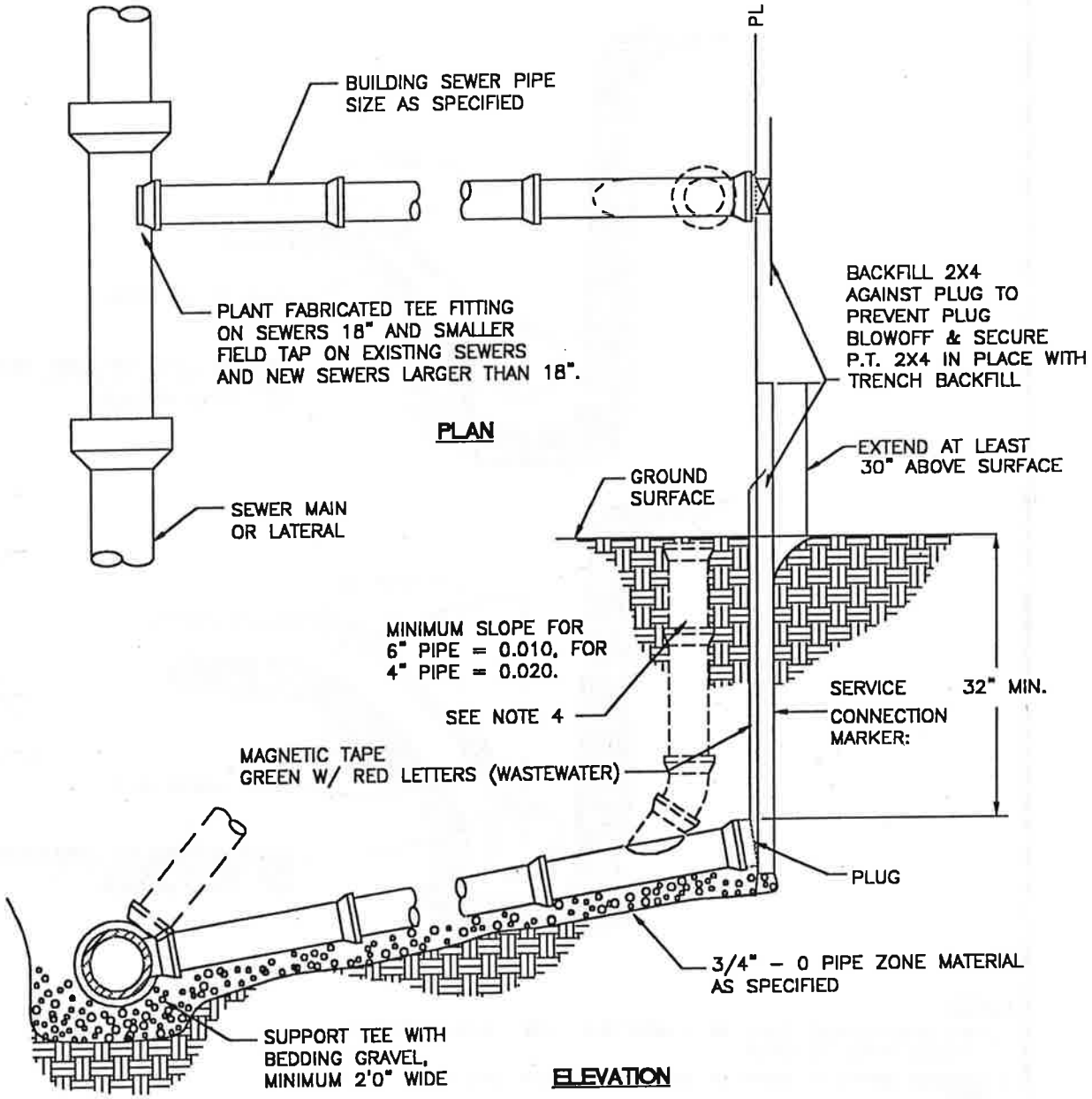


CITY OF LOWELL

SUBSURFACE DRAIN DETAIL

DATE:	DRAWING NO.
APRIL 2002	310

FILENAME: APWA0061.DWG



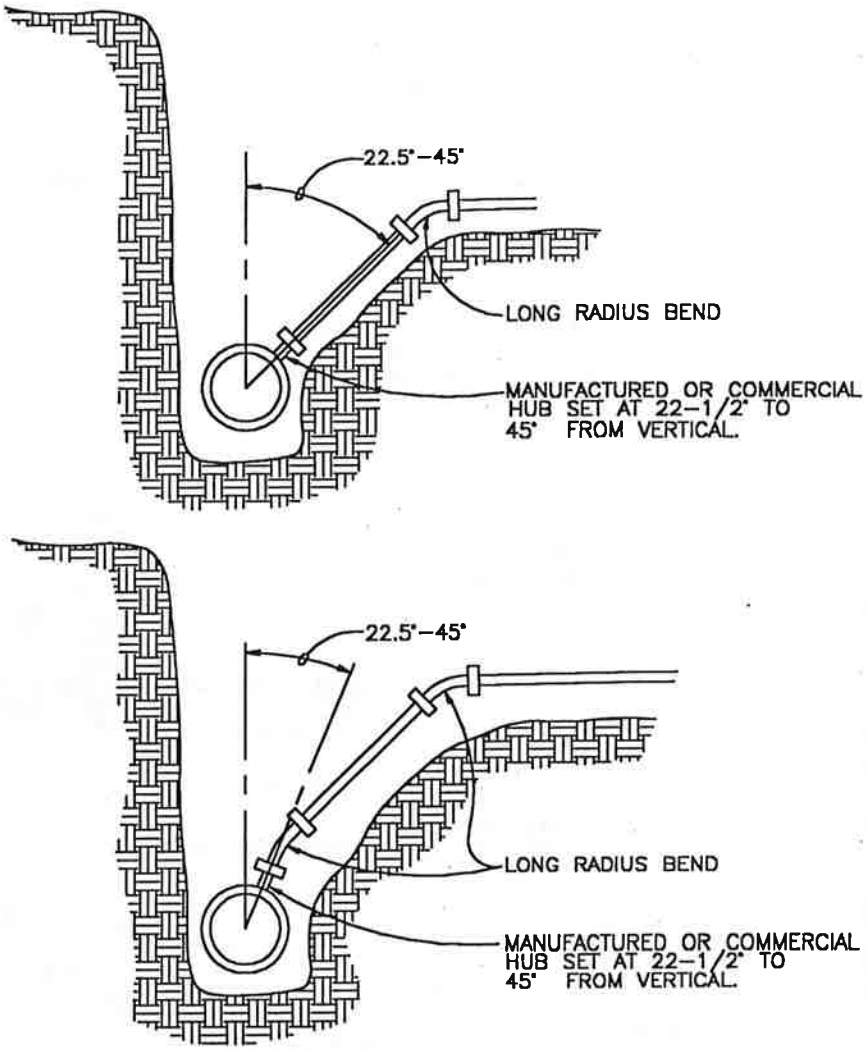
NOTES:

1. PIPE AND FITTINGS SHALL BE COMPATIBLE. ONLY MANUFACTURED FITTINGS SHALL BE USED.
2. MINIMUM DEPTH AT RIGHT OF WAY OR EASEMENT LINE SHALL BE 3 FEET.
3. MARKER POSTS AND BLOCKING SHALL BE TREATED WOOD. POST SHALL BE 2" x 4" FIR. POST TO EXTEND 30" MINIMUM ABOVE FINISH GRADE AND EXPOSED AREA SHALL BE PAINTED WHITE.
4. WHEN REQUIRED, A CLEANOUT SHALL BE INSTALLED.
5. LAY BUILDING SEWER AT MAX. 45° FROM HORIZONTAL TO ACHIEVE REQUIRED DEPTH AT PROPERTLY LINE WHEN MINIMUM SLOPE RESULTS IN EXCESSIVE DEPTH.

CITY OF LOWELL

SHALLOW TRENCH SERVICE CONNECTION, BLOCKING AND MARKERS

DATE:	DRAWING NO.
APRIL 2002	311



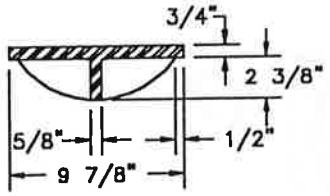
NOTES:

1. PIPE AND FITTINGS SHALL BE COMPATIBLE. ONLY MANUFACTURED FITTINGS SHALL BE USED.
2. MINIMUM DEPTH AT RIGHT OF WAY OR EASEMENT LINE SHALL BE 4 FEET.
3. PLUGGING, BLOCKING, AND MARKING OF UNCONNECTED SERVICES SHALL CONFORM TO SHALLOW TRENCH SERVICE CONNECTION DRAWING.
4. VERTICAL TRENCH WALLS ARE REQUIRED. IF IT IS NOT POSSIBLE TO MAINTAIN VERTICAL TRENCH WALLS, USE ALTERNATE CONNECTION METHOD TO MAINTAIN 6" MAXIMUM DISTANCE BETWEEN RISER PIPE AND TRENCH WALLS. REPLACE ALL EXCAVATED OR DISTURBED MATERIAL WITH FULL DEPTH GRANULAR BACKFILL COMPACTED TO 95% RELATIVE DENSITY.
5. WHERE DEEP CONNECTION IS AT AN ANGLE LESS THAN 45° FROM VERTICAL, DUCTILE IRON PIPE AND FITTINGS SHOULD BE USED.

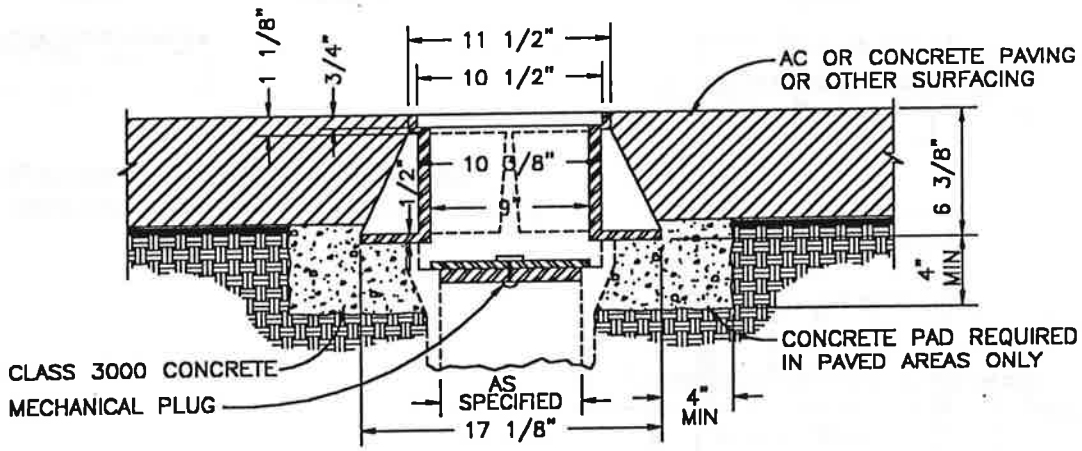
CITY OF LOWELL

TYPICAL DEEP TRENCH SERVICE CONNECTIONS

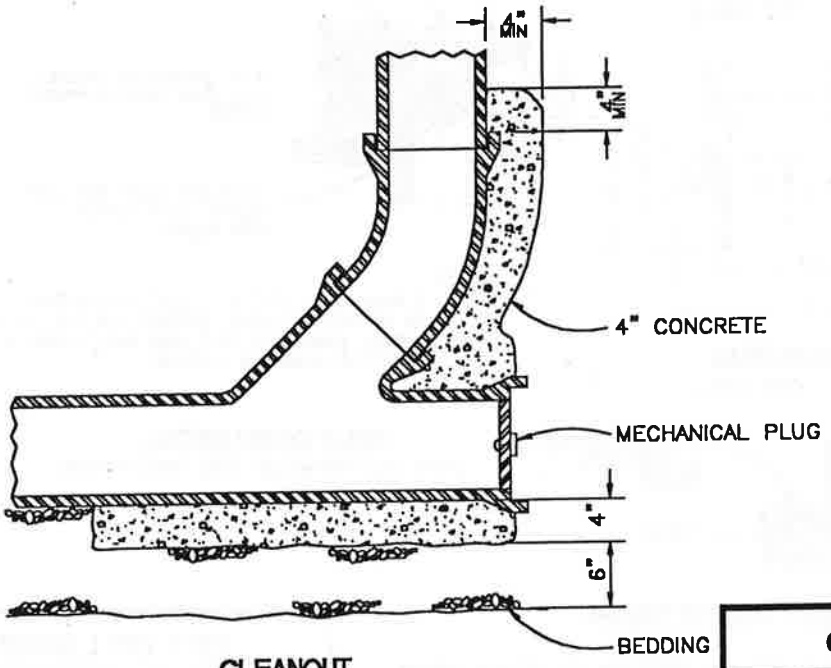
DATE:	DRAWING NO.
APRIL 2002	312



CAST IRON COVER



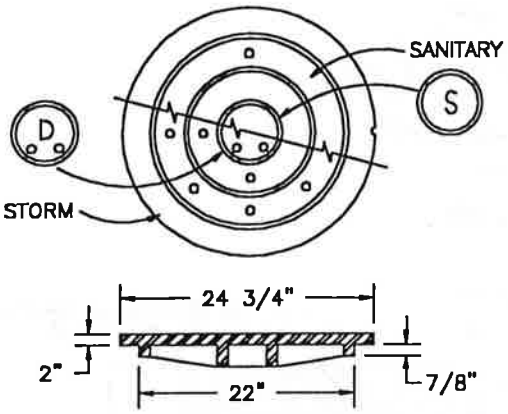
CAST IRON FRAME

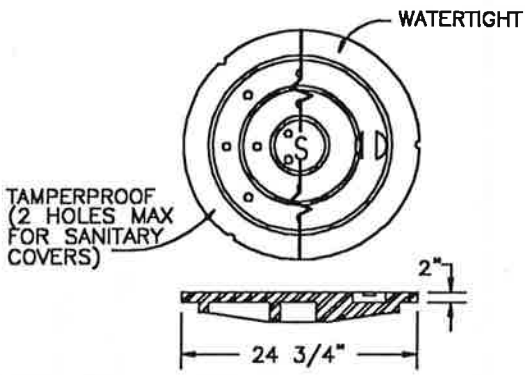


CLEANOUT

NOTE:
ALL CLEANOUT MATERIAL TO BE SAME AS CARRIER PIPE.

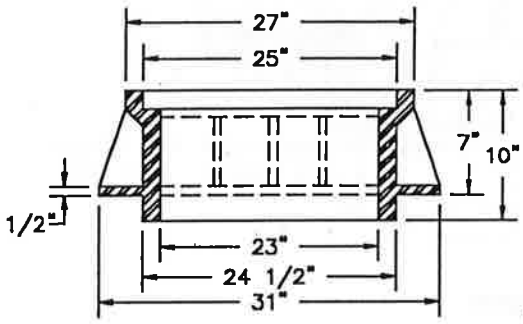
CITY OF LOWELL	
CLEANOUT	
DATE: APRIL 2002	DRAWING NO. 313





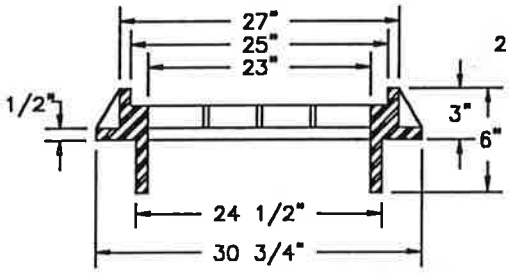
CAST IRON TAMPERPROOF & WATERTIGHT

(FRAMES AVAILABLE IN STANDARD OR SUBURBAN PATTERN)



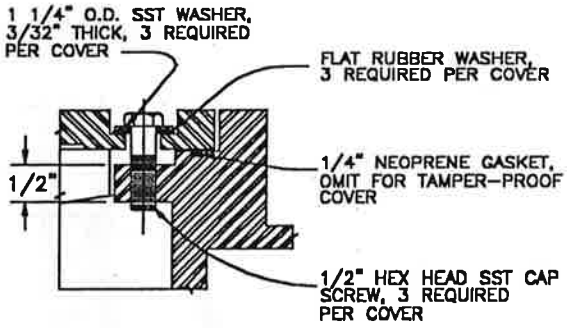
CAST IRON STANDARD

(APPROX. WT. – 387 LBS.)



CAST IRON SUBURBAN

(APPROX. WT. – 305 LBS.)

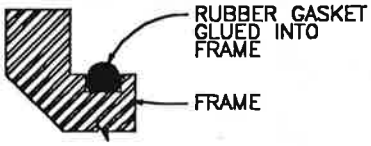


NOTE:

3 REQUIRED, 1/2" x 1 1/4" PENTAGONAL OR HEXAGONAL HEAD, BRONZE OR CAD. PLATED. INSTALL FRAME SO THAT ONE BOLT BOSS IS LOCATED OVER THE MANHOLE LADDER.

BOLT-DOWN DETAIL

(FOR TAMPERPROOF AND WATERTIGHT)



WATERTIGHT GASKET DETAIL

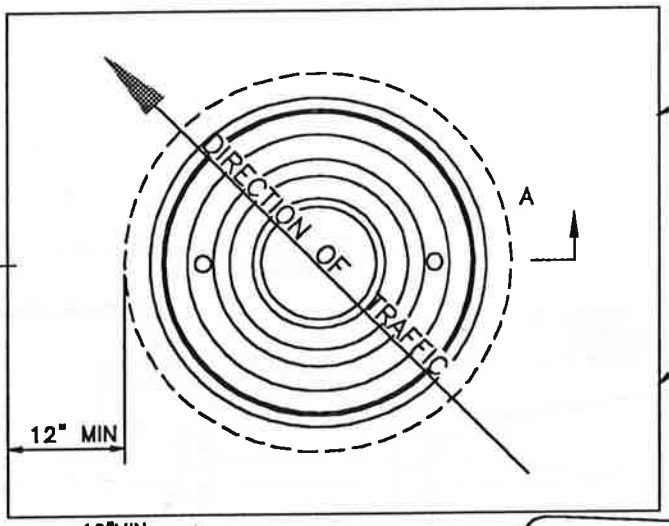
NOTES:

1. TAMPERPROOF COVERS REQ'D ON SANITARY OR STORM DRAIN MANHOLE WHERE LOCATED IN PEDESTRIAN WAYS OR EASMENT AREAS. TAMPERPROOF COVERS FOR SANITARY MANHOLES SHALL HAVE 2 HOLES MAXIMUM.
2. WATERTIGHT COVERS REQUIRED IF LOCATED WHERE COVER MAY BE SUBMERGED.
3. FRAMES AND COVERS SHALL BE STAMPED WITH MANUFACTURER'S INITIALS, HEAT NUMBER AND POINT OF ORIGIN.

CITY OF LOWELL

MANHOLE COVER AND FRAME DETAILS

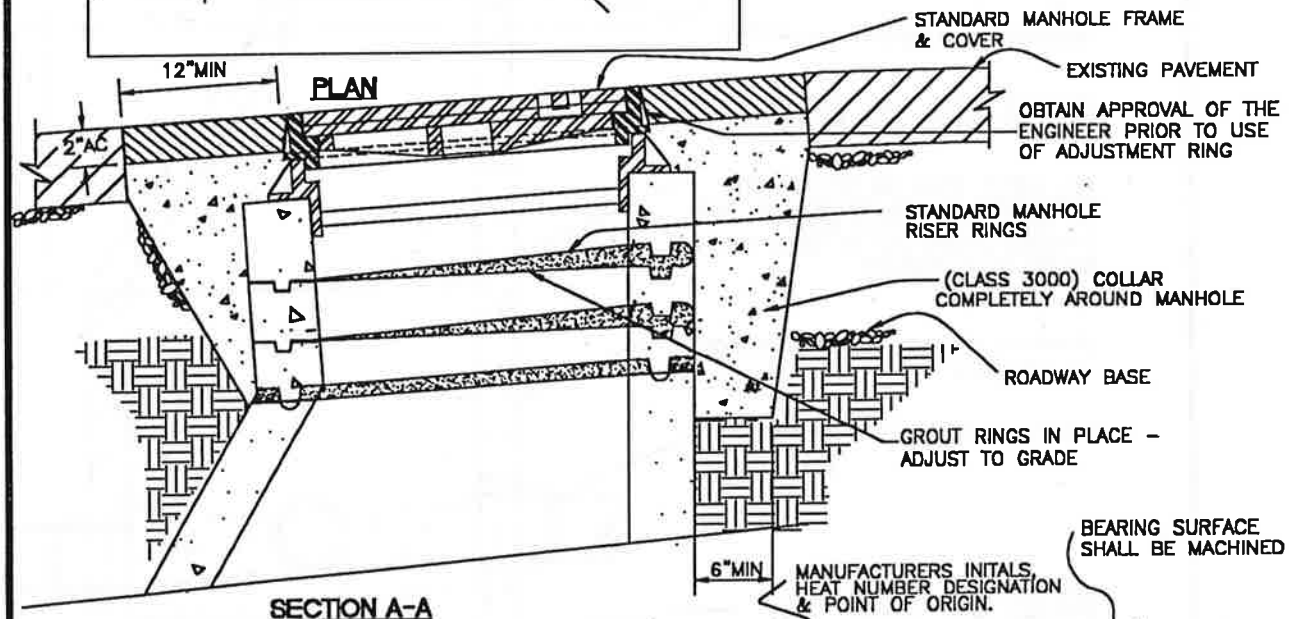
DATE:	DRAWING NO.
APRIL 2002	315A



MANHOLE ADJUSTMENT AFTER PAVING
SAW CUT SQUARE AND REMOVE PAVEMENT 2-FOOT MINIMUM LARGER THAN MANHOLE FRAME DIMENSION.
CONFIGURE THE SAWCUT SO THAT THE PATCH IS DIAMOND SHAPED IN THE DIRECTION OF TRAFFIC.

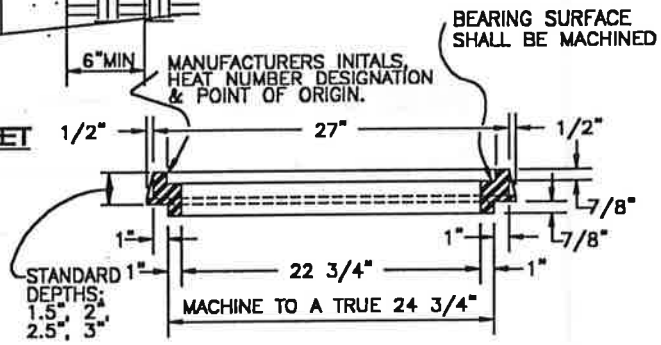
APPLY TACK COAT TO EDGES OF EXISTING PAVEMENT BEFORE INSTALLING PATCH. FINISH JOINT WITH ASPHALTIC SEAL AND SAND.

PLAN

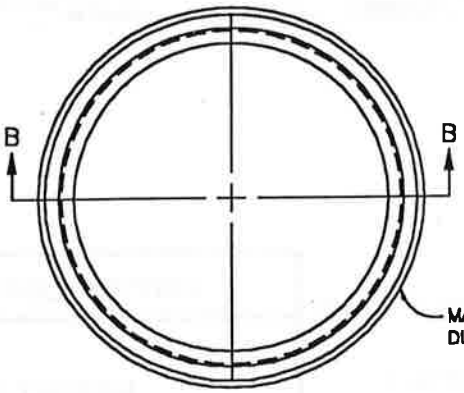


SECTION A-A

TYPICAL MANHOLE GRADE ADJUSTMENT IN STREET



SECTION B-B



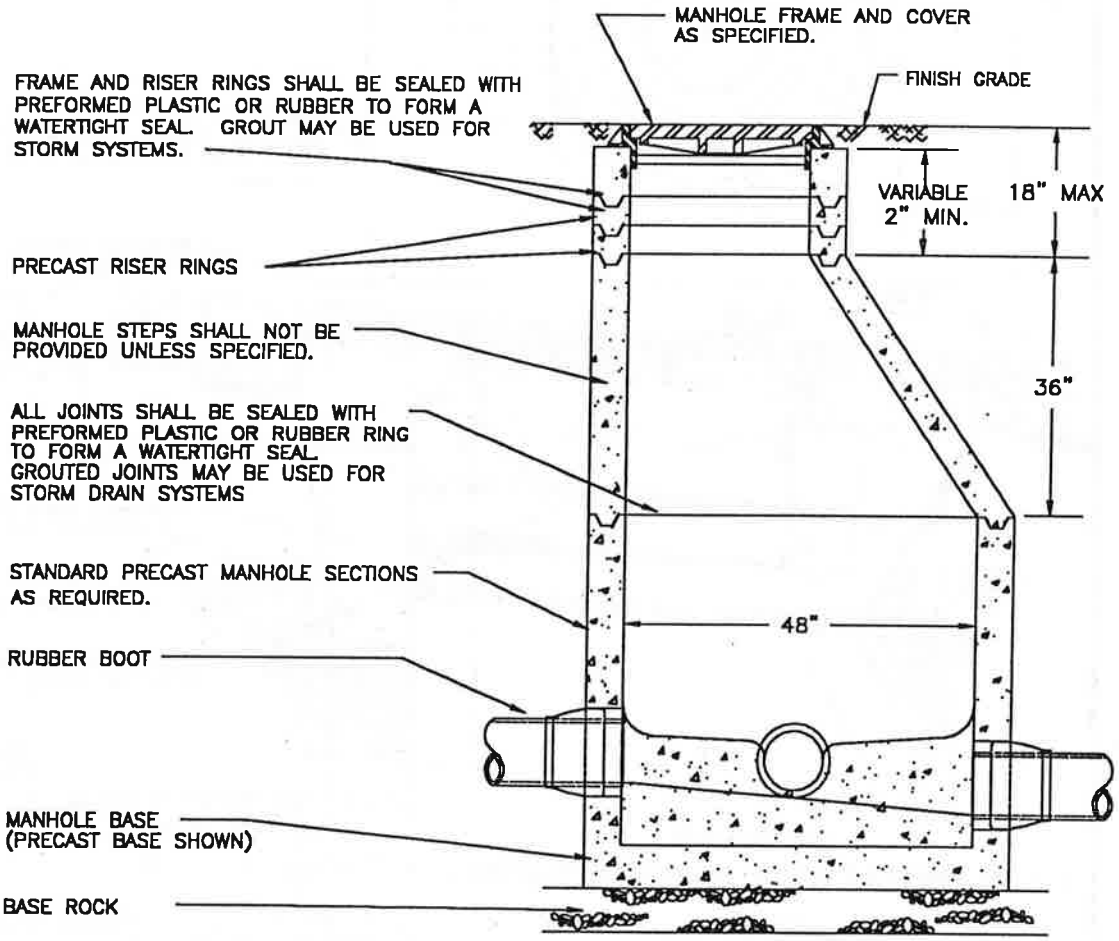
MANHOLE ADJUSTMENT RINGS FOR RESURFACING

NOTE:
THE DISTANCE FROM THE TOP OF THE FRAME TO THE TOP OF THE CONE SHALL NOT EXCEED 18".

CITY OF LOWELL

MANHOLE ADJUSTMENT DETAILS

DATE:	DRAWING NO.
APRIL 2002	315B

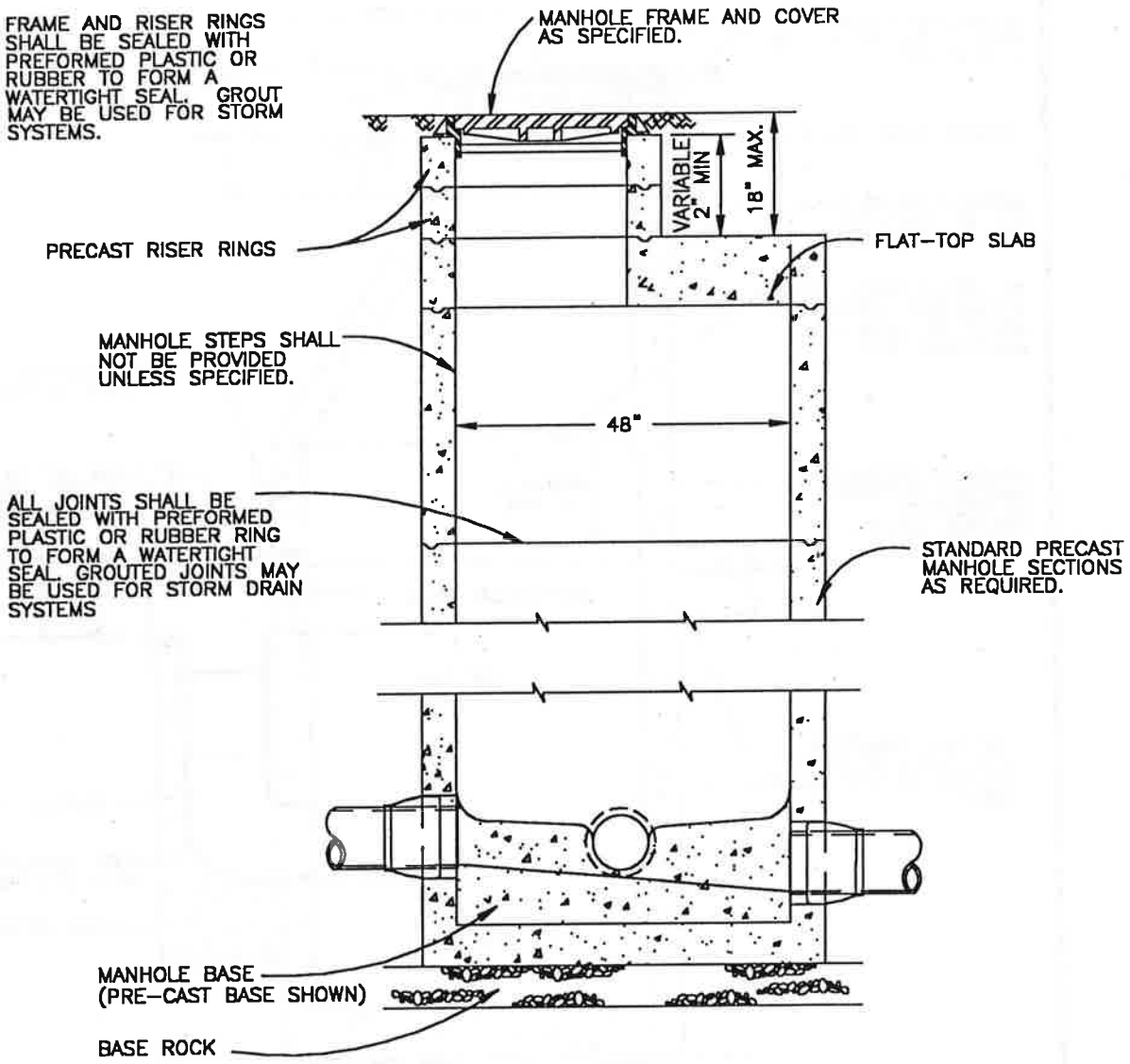


NOTES:

1. STANDARD PRECAST MANHOLE SECTION DIAMETER SHALL BE 48". USE 42" IF SPECIFIED BY THE ENGINEER.
2. SEE MANHOLE BASE SECTION DRAWING FOR BASE DETAILS.

CITY OF LOWELL	
MANHOLE	
DATE: APRIL 2002	DRAWING NO. 316

FILENAME: APWA0028.DWG



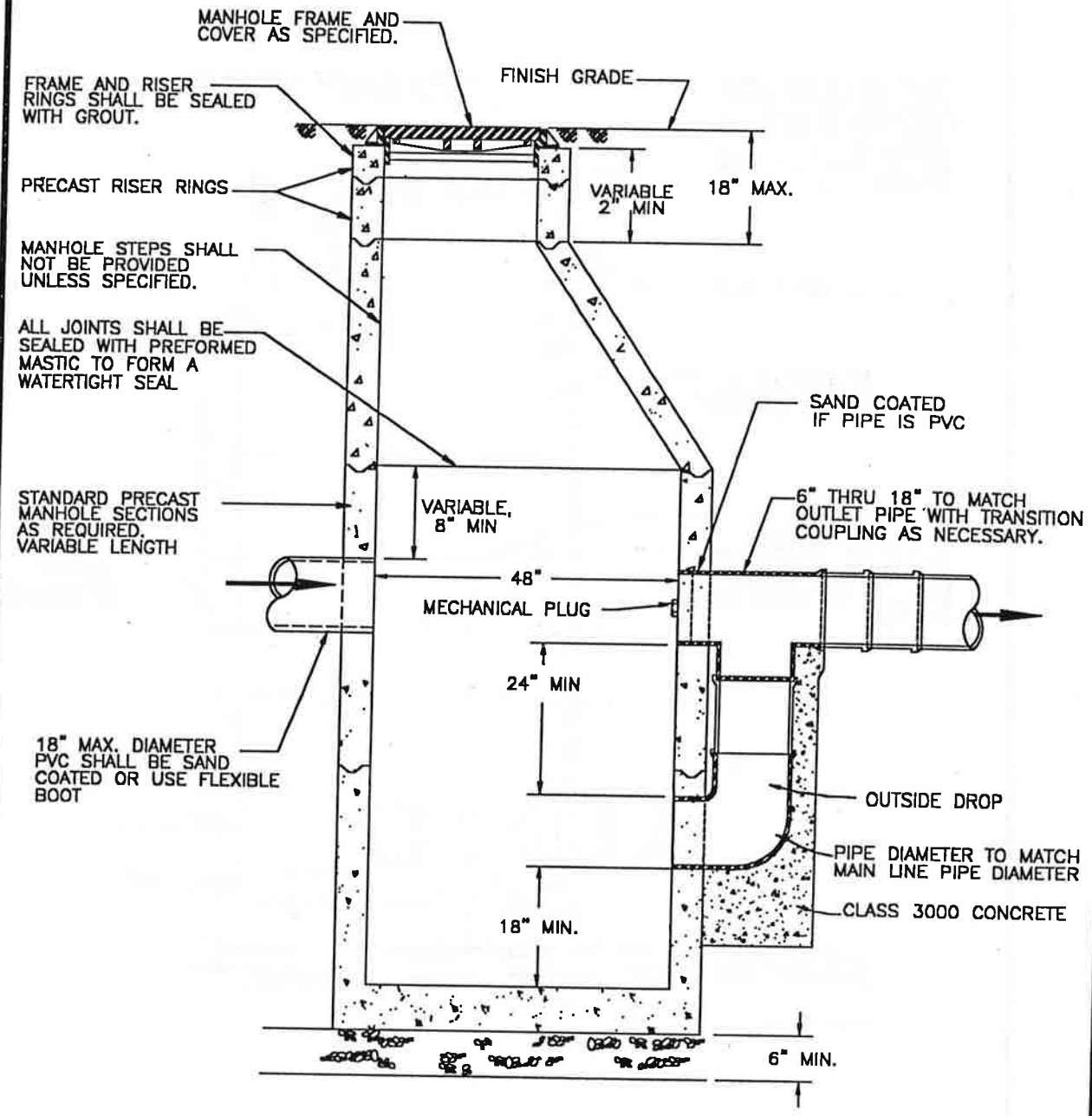
NOTE:

1. SEE MANHOLE BASE SECTION DRAWING FOR BASE DETAILS
2. MANHOLE MAY BE 42" DIAMETER IF DIRECTED BY ENGINEER.

CITY OF LOWELL

FLAT-TOP MANHOLE

DATE:	DRAWING NO.
APRIL 2002	317



NOTE:

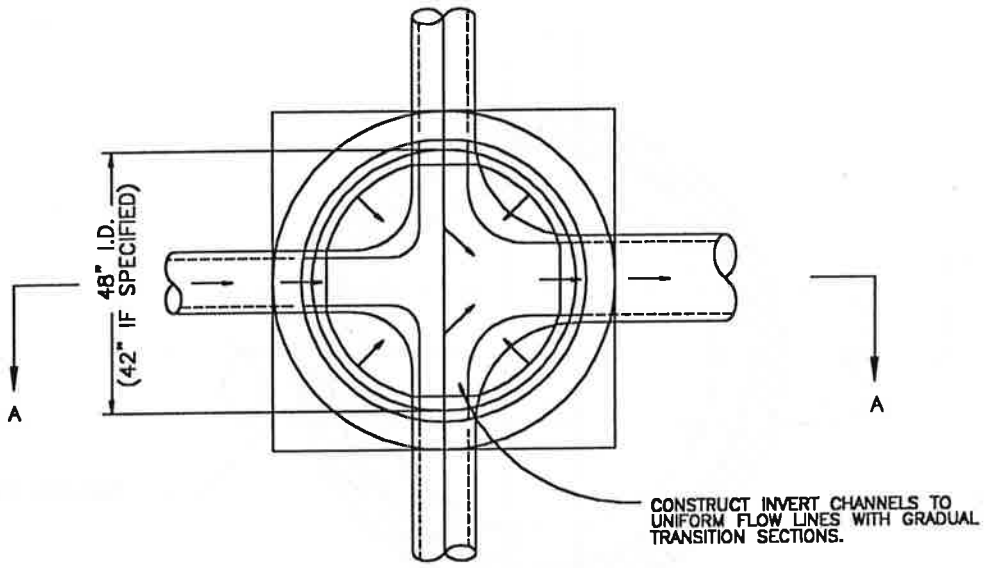
1. STANDARD PRECAST MANHOLE SECTION DIAMETER MAY BE 42" IF DIRECTED BY ENGINEER.
2. ALL PRECAST SECTIONS SHALL CONFORM TO REQUIREMENTS OF ASTM C 478.
3. ALL CONNECTING PIPE SHALL HAVE A FLEXIBLE JOINT WITHIN 18" OF MANHOLE WALL. IF THE PIPE IS PVC, IT SHALL BE EPOXY–SAND COATED WHERE IT IS GROUTED INTO THE MANHOLE.
4. CONSTRUCT OUTSIDE DROP PER THE DETAIL FOR 'OUTSIDE DROP CONNECTION FOR MANHOLES.'

CITY OF LOWELL

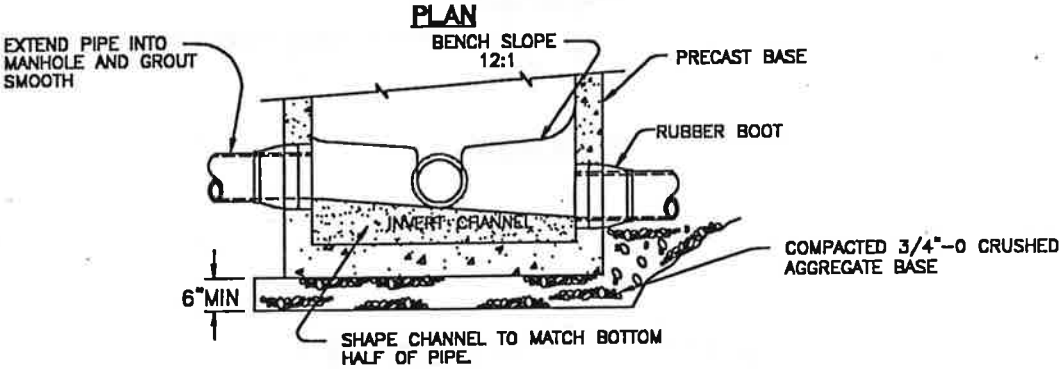
POLLUTION CONTROL MANHOLE WITH ELBOW

DATE:	DRAWING NO.
APRIL 2002	318

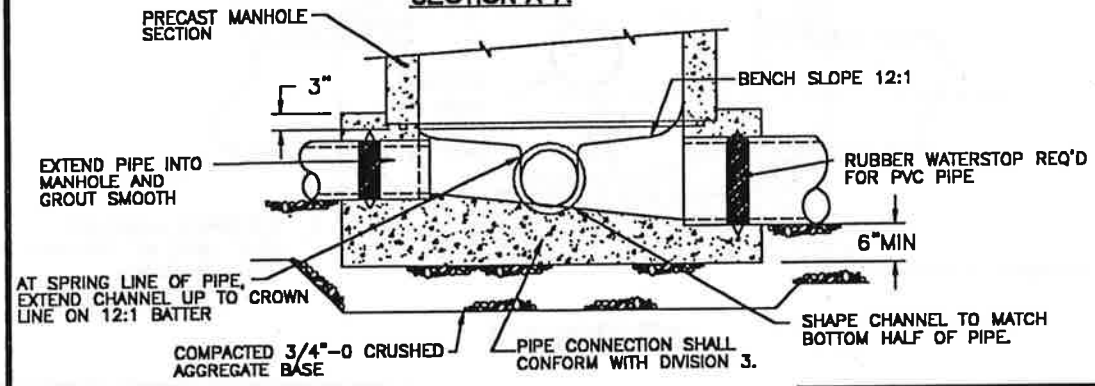
FILENAME: APWA0063.DWG



PLAN



PRECAST MANHOLE BASE
SECTION A-A



CAST -IN-PLACE MANHOLE BASE
SECTION A-A

NOTES:

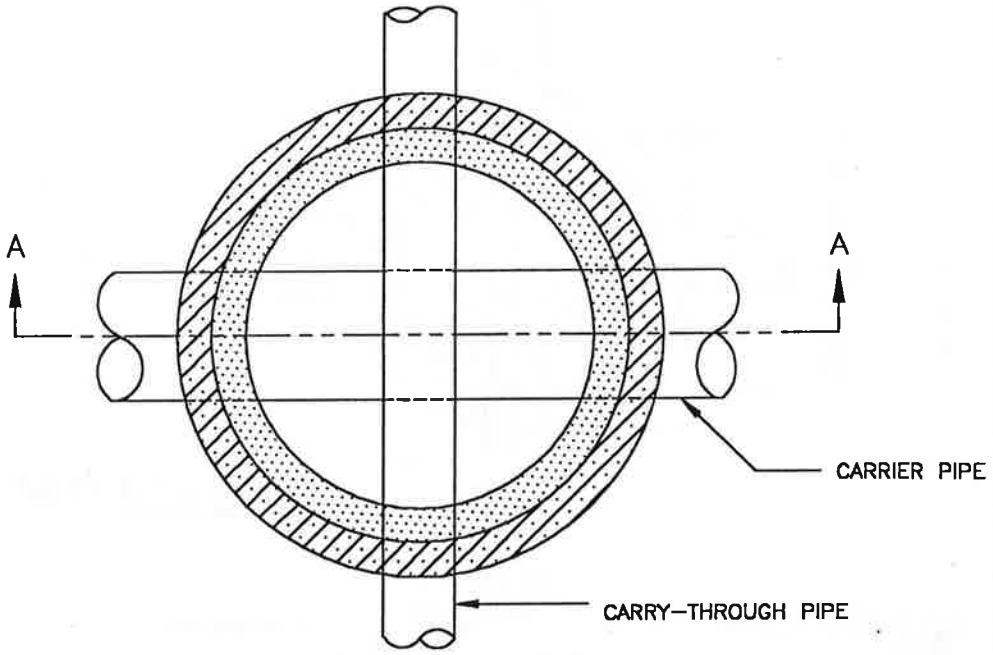
1. CONCRETE SHALL BE CLASS 3000.
2. CHANNELS SHALL BE CONSTRUCTED TO PROVIDE SMOOTH SLOPES AND RADII TO OUTLET PIPE.
3. BASES MAY BE PRECAST OR POURED IN PLACE.
4. THIS MANHOLE BASE SECTION SHALL BE USED FOR PIPE SIZES UP TO 24".
5. USE RUBBER BOOTS IF PIPE IS FLEXIBLE. BOOTS MAY BE KOR-N-SEAL OR EQUIVALENT.

CITY OF LOWELL

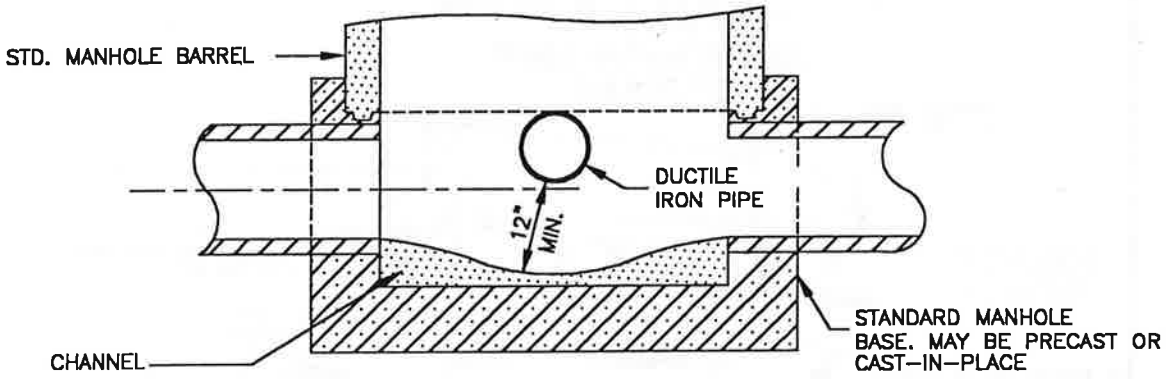
MAHHOLE BASE SECTION

DATE:	DRAWING NO.
APRIL 2002	319

FILENAME: APWA0029.DWG



PLAN VIEW



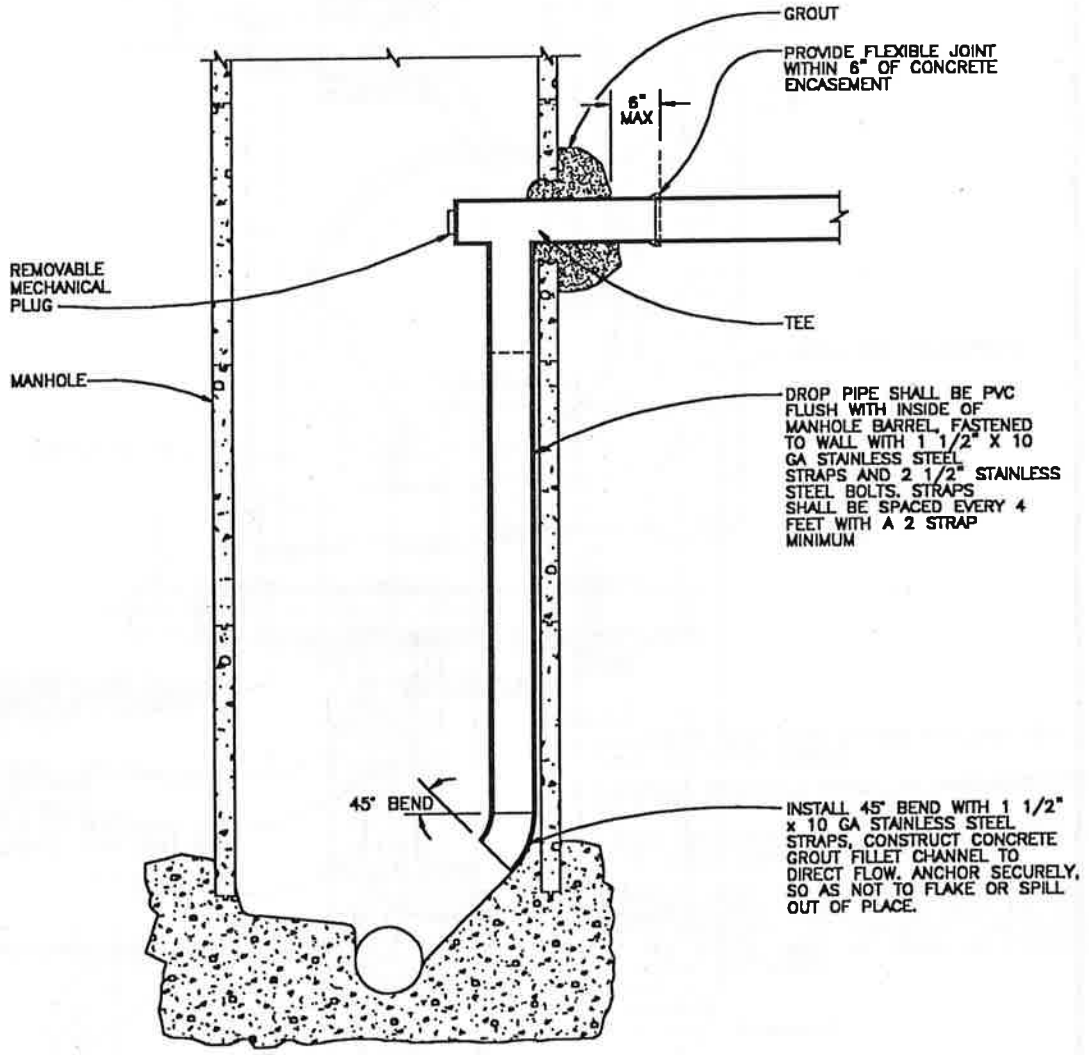
SECTION A-A

NOTE:

1. CARRY–THROUGH PIPE SHALL BE DUCTILE IRON.
2. THIS MANHOLE DESIGN SHALL BE USED ONLY AS DIRECTED BY THE ENGINEER TO MITIGATE UNAVOIDABLE GRADE CONFLICTS.

CITY OF LOWELL	
CARRY THROUGH MANHOLE–STORM	
DATE: APRIL 2002	DRAWING NO.: 320

FILENAME: APWA0062.DWG



NOTE:
ONLY ONE INSIDE DROP CONNECTION ALLOWED PER MANHOLE.

MINIMUM MANHOLE DIAMETER WITH DROP CONNECTION SHALL BE 48-INCHES.

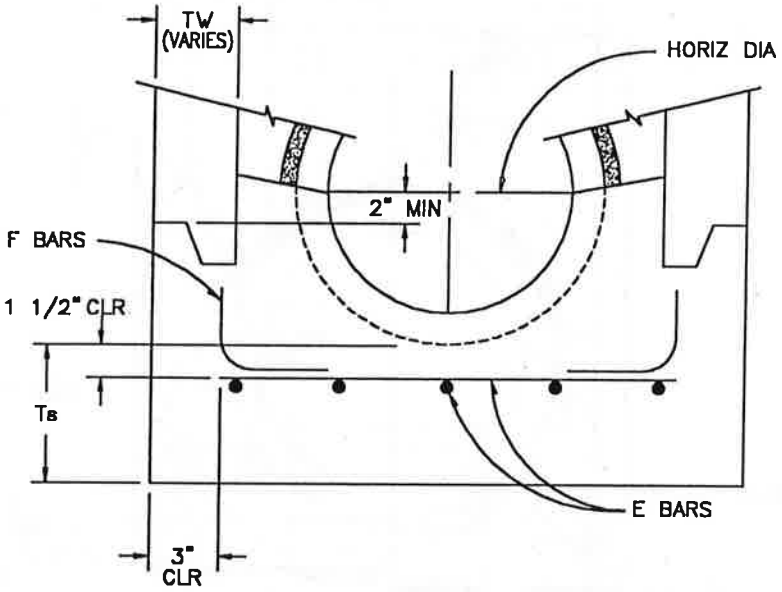
MAXIMUM DROP PIPE DIAMETER SHALL BE 8-INCHES.

CITY OF LOWELL

DETAILS FOR INSIDE DROP CONNECTION FOR MANHOLES

DATE:	DRAWING NO.
APRIL 2002	321

FILENAME: APWA0030.DWG



CAST-IN-PLACE BASE

BASE I.D.		60"		72"		84"		96"	
TYPE	DEPTH*	0'–15'	15'–30'	0'–15'	15'–30'	0'–15'	15'–30'	0'–15'	15'–30'
CAST IN PLACE	Ts	7.0"	9.0"	7.0"	9.0"	8.0"	10.0"	9.0"	11.0"
	E BARS	#4 @ 12"	#4 @ 9"	#4 @ 9"	#4 @ 6"	#4 @ 8"	#5 @ 9"	#4 @ 7"	#5 @ 8"
	F BARS	#4 @ 12"	#4 @ 9"	#4 @ 9"	#4 @ 6"	#4 @ 8"	#5 @ 9"	#4 @ 7"	#5 @ 8"

*INVERT TO STREET GRADE

NOTE:
CONCRETE SHALL BE CLASS 3000. STEEL fg = GRADE 60.

CITY OF LOWELL

LARGE CAST–IN–PLACE
CONCRETE MANHOLE BASE

DATE:	DRAWING NO.
APRIL 2002	324

FILENAME: FILENAME

(HORIZONTAL) BEARING AREA OF THRUST BLOCKS IN SQUARE FEET									(VERTICAL) VOLUME OF THRUST BLOCK IN CUBIC YARDS			
FITTING SIZE	TEE, WYE, DEAD END AND HYDRANT	STRADDLE BLOCK	90° BEND PLUGGED CROSS	TEE PLUGGED ON RUN		45° BEND	22-1/2° BEND	11-1/4° BEND	90° BEND	45° BEND	22-1/2° BEND	11-1/4° BEND
				A-1	A-2							
4	2.0	3.2	2.8	3.8	2.8	2.0	---	---	---	---	---	---
6	4.2	7.4	6.0	8.6	6.0	3.2	2.0	---	2.6	---	---	---
8	7.6	13	10.6	15.2	10.8	5.8	3.0	2.0	4.6	2.2	---	---
10	11.8	20.4	16.8	23.6	16.8	9.2	4.8	2.4	7.4	3.6	---	---
12	17.0	29.4	24.0	34.0	24.0	13.2	6.8	3.4	11.0	5.6	2.4	---
14	23.0	---	32.6	46.0	32.6	17.8	9.2	4.6	15.2	7.8	3.4	---
16	30.0	52.2	42.6	60.0	42.6	23.2	12.0	6.0	19.8	10.2	4.6	1.8
18	38.0	---	54.0	76.0	54.0	29.2	15.2	7.6	---	---	---	---
20	47.0	81.6	66.6	94.0	66.6	36.2	18.8	9.4	---	---	---	---
24	68.0	117.6	96.0	136.0	96.0	52.4	27.2	13.6	---	---	---	---

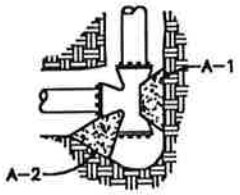
NOTES:

1. ABOVE BEARING AREAS BASED ON TEST PRESSURE OF 150 PSI AND AN ALLOWABLE SOIL BEARING STRESS OF 1000 POUNDS PER SQUARE FOOT. TO COMPUTE BEARING AREAS FOR DIFFERENT TEST PRESSURES AND SOIL BEARING STRESSES, USE THE FOLLOWING EQUATION:

   BEARING AREA = (TEST PRESSURE / 150) x (1000 / SOIL BEARING STRESS) x (TABLE VALUE)

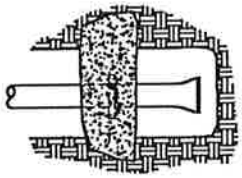
2. ABOVE VOLUMES BASED ON TEST PRESSURE OF 150 PSI AND THE WEIGHT OF CONCRETE = 4050 POUNDS PER CUBIC YARD. TO COMPUTE FOR DIFFERENT TEST PRESSURES, USE THE FOLLOWING EQUATION:

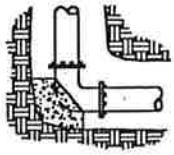
   VOLUME = (TEST PRESSURE / 150) x (TABLE VALUE)

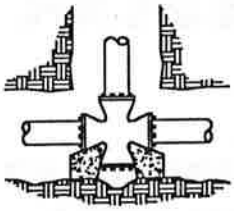


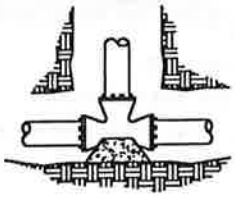
TEE

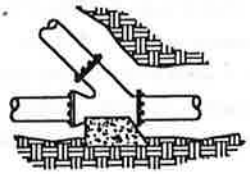

CROSS

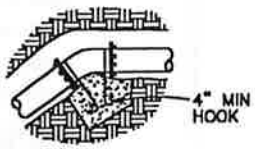

STRADDLE BLOCK


BEND


CROSS


TEE


WYE



VERTICAL BEND

RODS FOR VERTICAL BENDS		
FITTING SIZE	ROD SIZE	EMBEDMENT
12" AND LESS	#6	30"
14"-16"	#8	36"

NOTES:

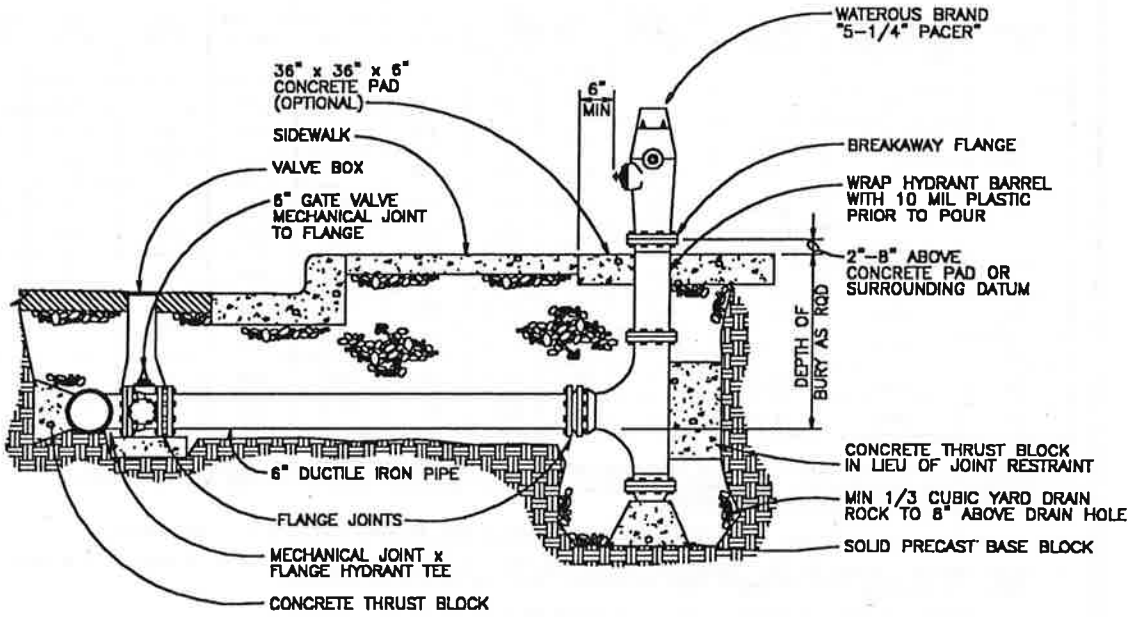
1. CONCRETE BLOCKING TO BE POURED AGAINST UNDISTURBED EARTH.
2. ALL CONCRETE TO BE CLASS 2400 MINIMUM.
3. INSTALL ISOLATION MATERIAL BETWEEN PIPE AND/OR FITTINGS BEFORE POURING CONCRETE BLOCKING.
4. CONCRETE SHALL BE KEPT CLEAR OF ALL JOINTS AND ACCESSORIES.
5. TIE RODS SHALL BE DEFORMED GALVANIZED COLD ROLLED STEEL, 40000 PSI TENSILE STRENGTH.

CITY OF LOWELL

THRUST BLOCKING

DATE: APRIL 2002

DRAWING NO. 401



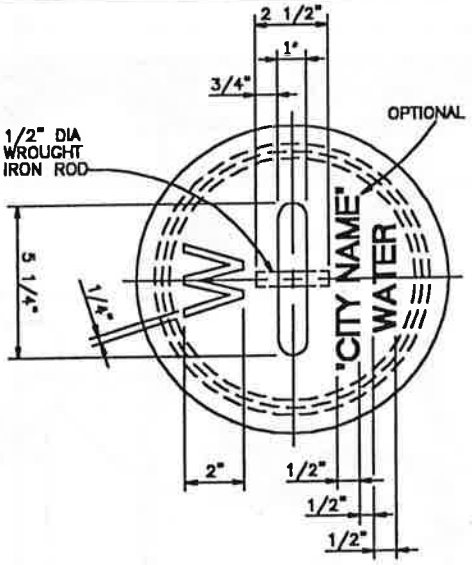
NOTES

1. WHEN PIPE IS SHORTER THAN 18', NO JOINTS ALLOWED. USE MECHANICAL JOINT RETAINER GLANDS. TWO 3/4" GALVANIZED TIE RODS MAY BE USED IN LIEU OF THRUST BLOCKS FOR INSTALLATIONS LESS THAN 18' LONG. TIE RODS SHALL BE COATED WITH TWO COATS OF BITUMASTIC.
2. WHEN PIPE IS LONGER THAN 18', RETAINER GLANDS NOT REQUIRED.
3. THERE SHALL BE A MINIMUM OF 18" HORIZONTAL CLEARANCE AROUND HYDRANT.
4. WHEN PLACED ADJACENT TO CURB, HYDRANT PORT SHALL BE 24" FROM FACE OF CURB.
5. CONCRETE THRUST BLOCKS SHALL BE CONSTRUCTED AS PER THRUST BLOCK STANDARD DRAWING. DO NOT BLOCK DRAIN HOLES.
6. EXTENSIONS REQUIRED FOR HYDRANT SYSTEMS SHALL BE INSTALLED TO THE MANUFACTURER'S SPECIFICATIONS.
7. FIRE HYDRANTS SHALL BE PLACED TO PROVIDE A MINIMUM OF 5' CLEARANCE FROM DRIVEWAYS, POLES, AND OTHER OBSTRUCTIONS.
8. HYDRANT PUMPER PORT SHALL FACE DIRECTION OF ACCESS.

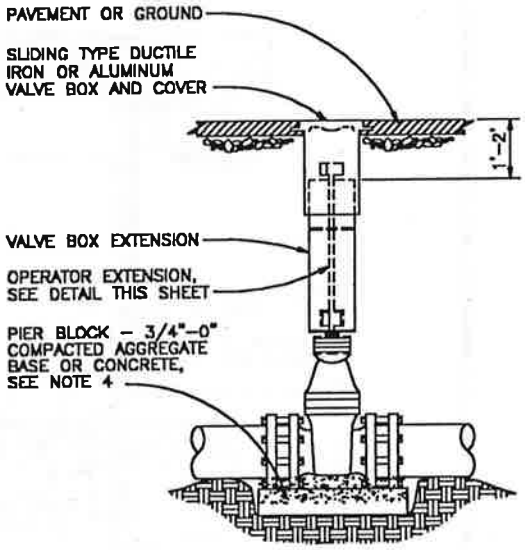
CITY OF LOWELL

HYDRANT INSTALLATION

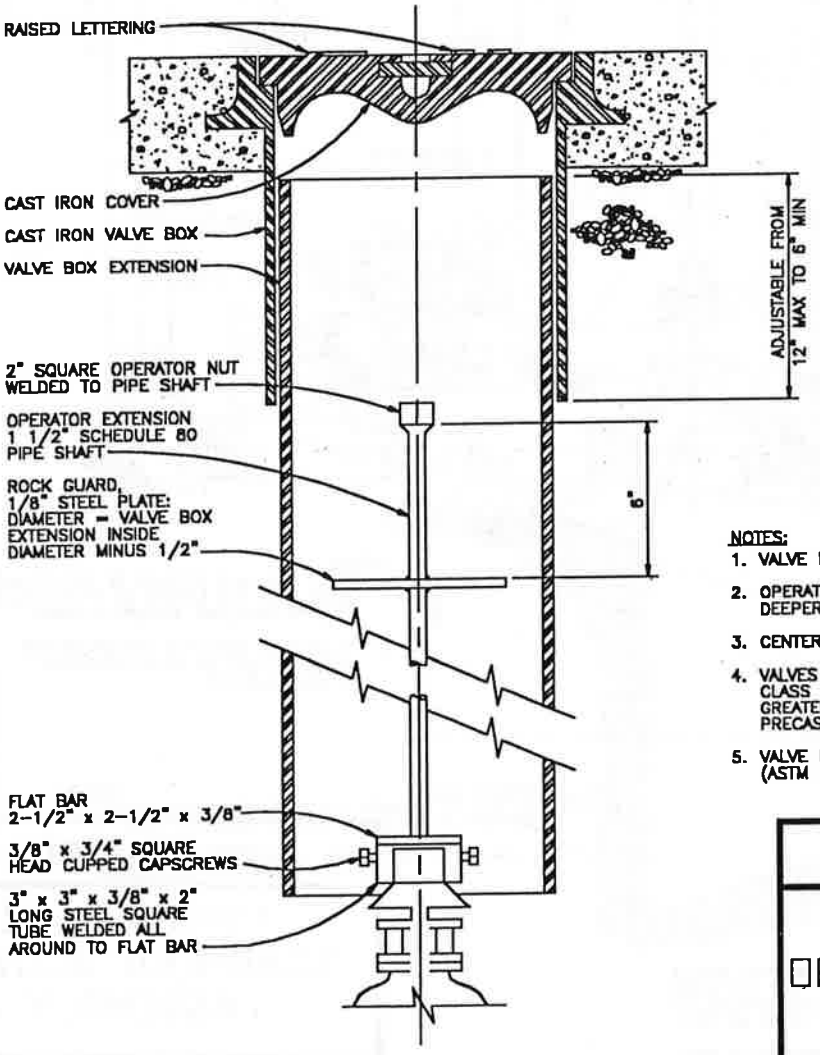
DATE:	DRAWING NO.
APRIL 2002	402



COVER PLAN



VALVE BOX
ASSEMBLY DETAIL



VALVE BOX EXTENSION SECTION

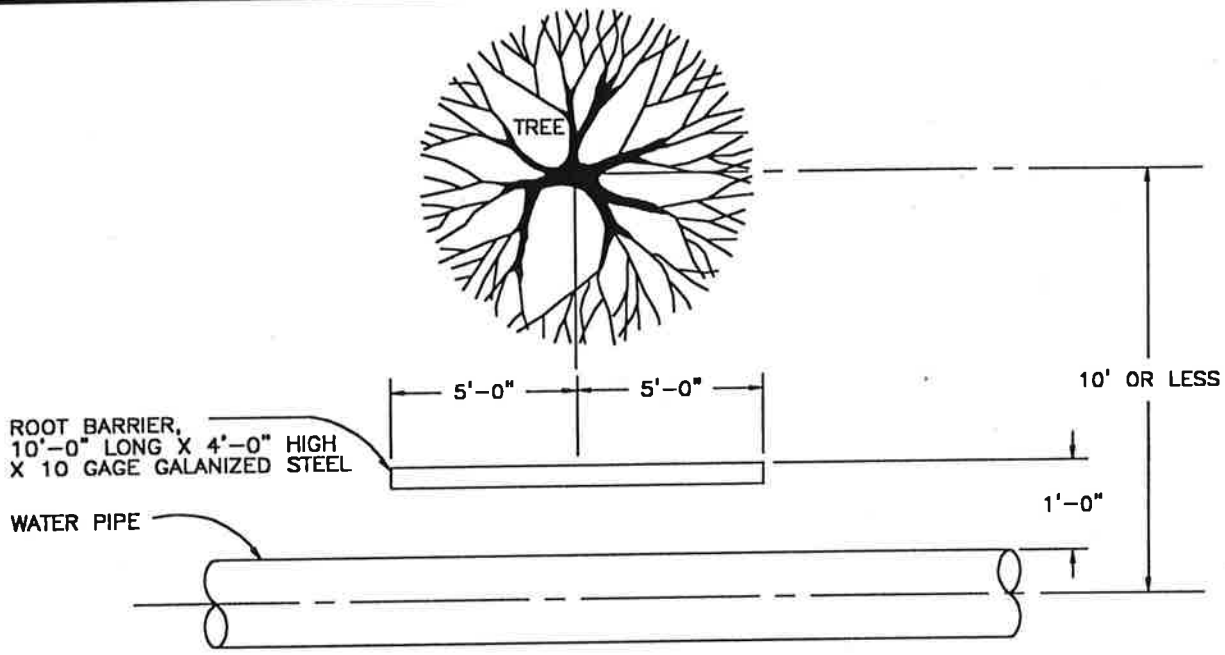
NOTES:

1. VALVE BOX NOT TO REST ON OPERATING ASSEMBLY.
2. OPERATOR EXTENSION REQUIRED WHEN VALVE NUT IS DEEPER THAN 4 FEET FROM FINISH GRADE.
3. CENTER VALVE BOX ON AXIS OF OPERATOR NUT.
4. VALVES 12" AND SMALLER SHALL BE PROVIDED WITH CLASS B BASE ON UNDISTURBED GROUND. VALVES GREATER THAN 12" SHALL BE INSTALLED ON PRECAST CONCRETE PIER BLOCK.
5. VALVE BOX EXTENSION SHALL BE CAST IRON OR PVC (ASTM D 3034).

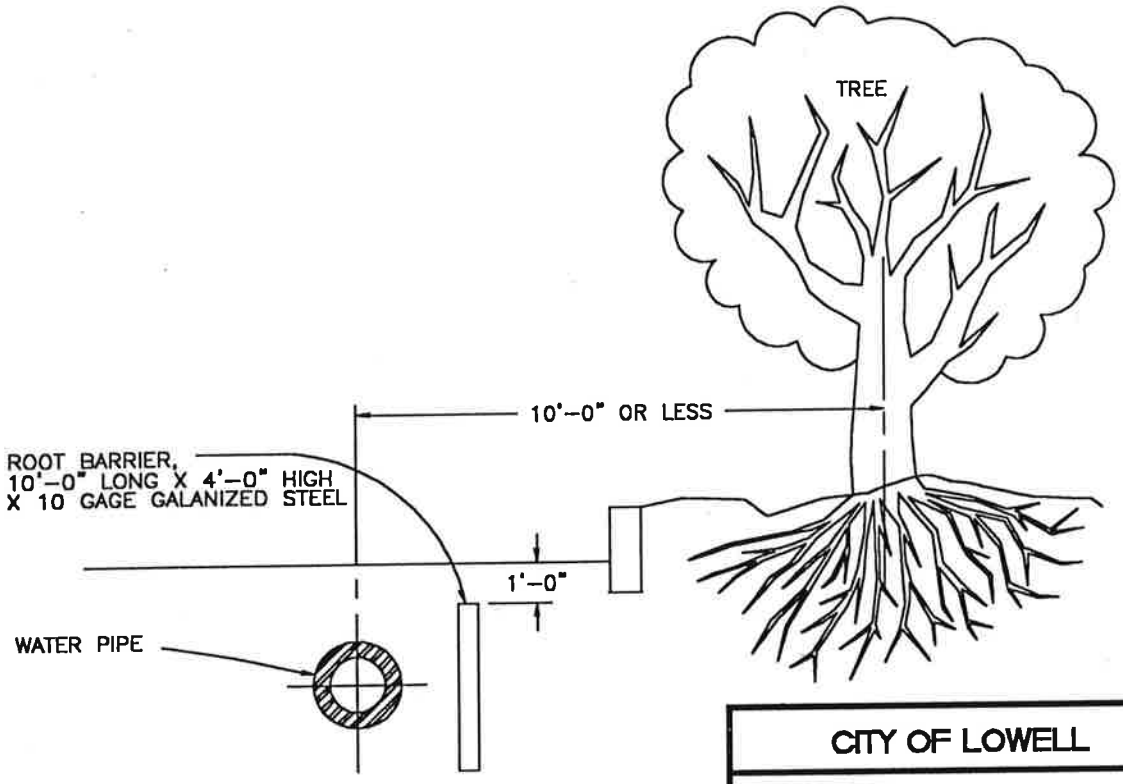
CITY OF LOWELL

VALVE BOX AND OPERATOR EXTENSION ASSEMBLY

DATE:	DRAWING NO.
APRIL 2002	403



PLAN



SECTION

CITY OF LOWELL	
ROOT BARRIER	
DATE: APRIL 2002	DRAWING NO. 408