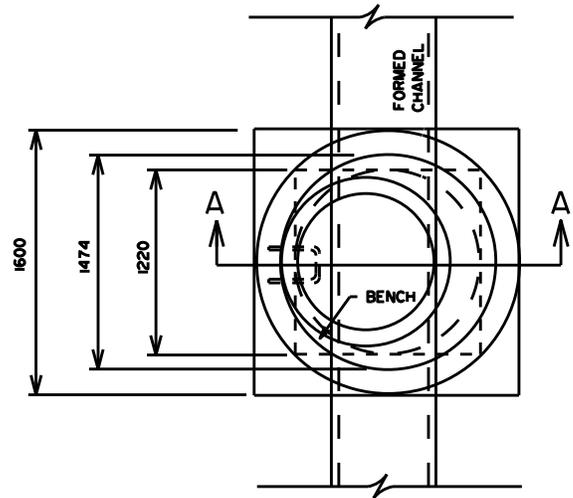


Appendix “A”

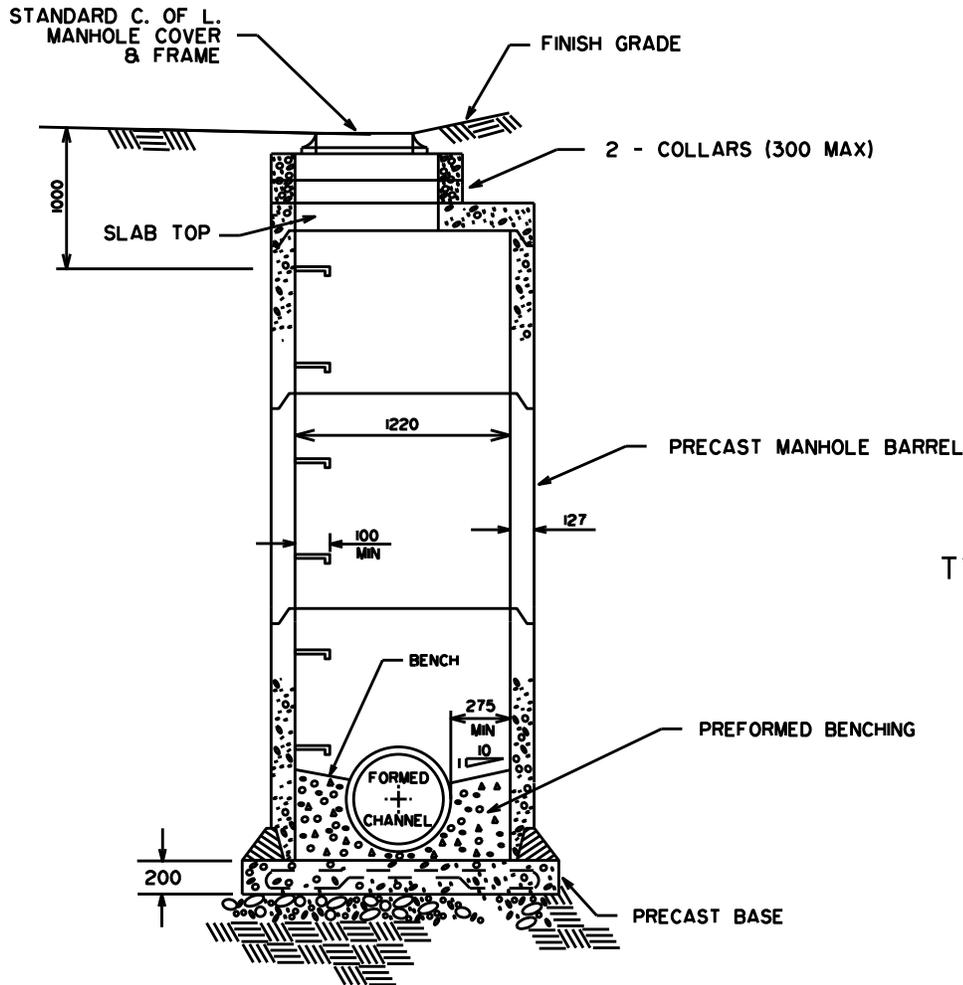
DETAILED ENGINEERING STANDARDS – WASTEWATER COLLECTION AND STORM DRAINAGE SYSTEMS

S-01	Standard Precast Manhole – Type 1
S-02	T-Riser Manhole
S-03	Standard Manhole With Vault – Type 3 (Cast in Place)
S-03A	Standard Precast Vaults
S-04	Standard Manhole with Exterior Drop – Type 4
S-05	Test Manhole for Commercial Sanitary Sewer Services
S-06	Service Connection Detail, Sanitary Manhole in Cul-De-Sac
S-07	Typical Benching in Sanitary Manholes
S-08	PVC Sewer Service Connection for Mains less than 3.7 m Deep
S-09	PVC Sewer Service Riser Connection for Mains 3.7m to 5.5m Deep
S-10	Standard Manhole Frame and Cover
S-10A	Standard Logo Cover
S-10B	Double lock manhole frame and cover
S-10C	Adjustable Frame Installation
S-10D	Adjustable Frame
S-10E	Adjustable Frame Foundation Ring
S-10F	Adjustable Manhole Frame & Cover – Standard Detail Drawings
S-10G	T67 Platen Manhole Lid
S-11	Single Catch Basin Frame Rolled Curb Type
S-11A	Double Catch Basin Frame Rolled Curb Type
S-11B	Catch Basin Grate – Rolled Curb Type
S-12	Standard Curb Type Catch Basin Frame and Grate
S-12A	Standard Curb Type Catch Basin Frame, Grate and Locking Side Inlet
S-13	Standard Catch Basin Frame and Grate, Round Type
S-14	Type 1 Catch Basin, Rolled Curb
S-15	Type 2 Catch Basin, Standard Curb
S-16	Type 3 Catch Basin, Round Top
S-19	Standard for Frost Shield for Mains and Services
S-21	Class “C” Bedding (Rigid Pipe)
S-22	Class “B” Bedding (Rigid Pipe)
S-23	Class “A” Bedding (Rigid Pipe)
S-24	Bedding and Backfilling PVC Pipe
S-29	Standard for Pumped Foundation Drainage Service
S-30	Infill Serviced Lots Only
S-30A	Single Family Lot Servicing

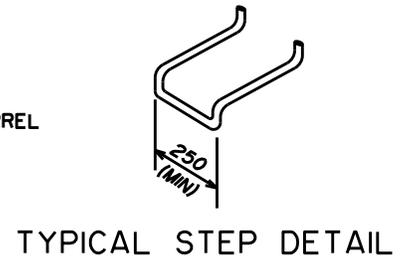
- NOTE: - PRECAST MANHOLE SECTIONS TO CONFORM TO A.S.T.M. DESIGNATION C478 (LATEST EDITION)
- ALL JOINTS TO BE SEALED WITH FLEXIBLE BUTYL RESIN SEALANT OR TYLOX SUPERSEAL GASKET
 - ALL DIMENSIONS IN mm
 - LADDER RUNGS SHALL BE CLEAR OF ALL LATERALS
 - MANHOLE STEPS AT 400 o/c
 - FOR BENCHING DETAIL SEE DRAWINGS S-07
 - CEMENT TO BE TYPE 50 (SULPHATE RESISTANT)



PLAN VIEW



SECTION A-A



NOTE: TO BE USED ONLY WHEN CONNECTING TO EXISTING MAINS 600 mm DIAMETER & SMALLER.

REVISED	 <p>CITY OF <i>Lethbridge</i> INFRASTRUCTURE SERVICES</p>	DRAWN	P.R.A.
NOV 15, 2004		CHECKED	
DEC 14, 2005		APPROVED	
FEB 3, 2010		SCALE	N.T.S.
	STANDARD MANHOLE TYPE I	DATE	97/03/08
		DWG NO	S-01

NOTICE:

T-RISER MANHOLES SHALL BE APPROVED BY THE CITY ENGINEER PRIOR TO USE. ENGINEERED DRAWING MUST BE SUBMITTED.

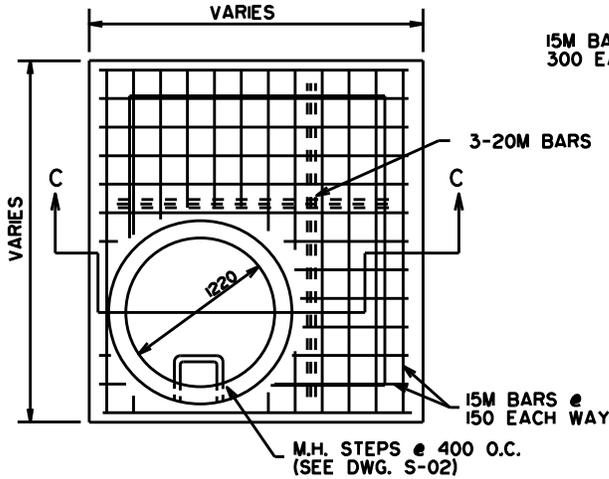
THIS TYPE OF MANHOLE TO BE BUILT ONLY ON MAINS OF 1200 DIAMETER OR LARGER.

TO BE USED ONLY WHERE THERE IS NO CHANGE IN DIRECTION OF FLOW
ie. A STRAIGHT-THROUGH FLOW.

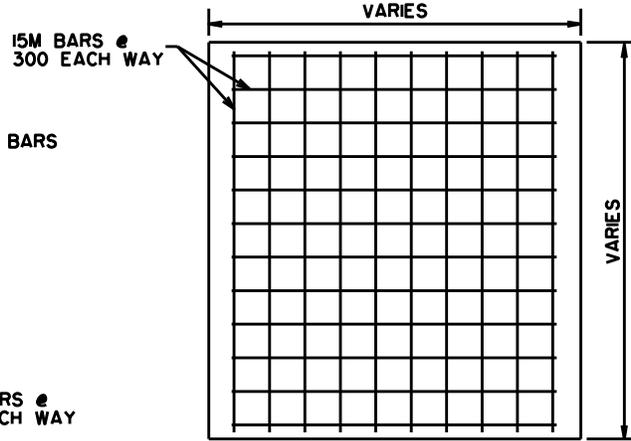
MANHOLE STEPS TO EXTEND FROM RISER SECTION TO SPRING LINE IN PIPE.

BEDDING TO BE APPROVED BY THE CITY ENGINEER.

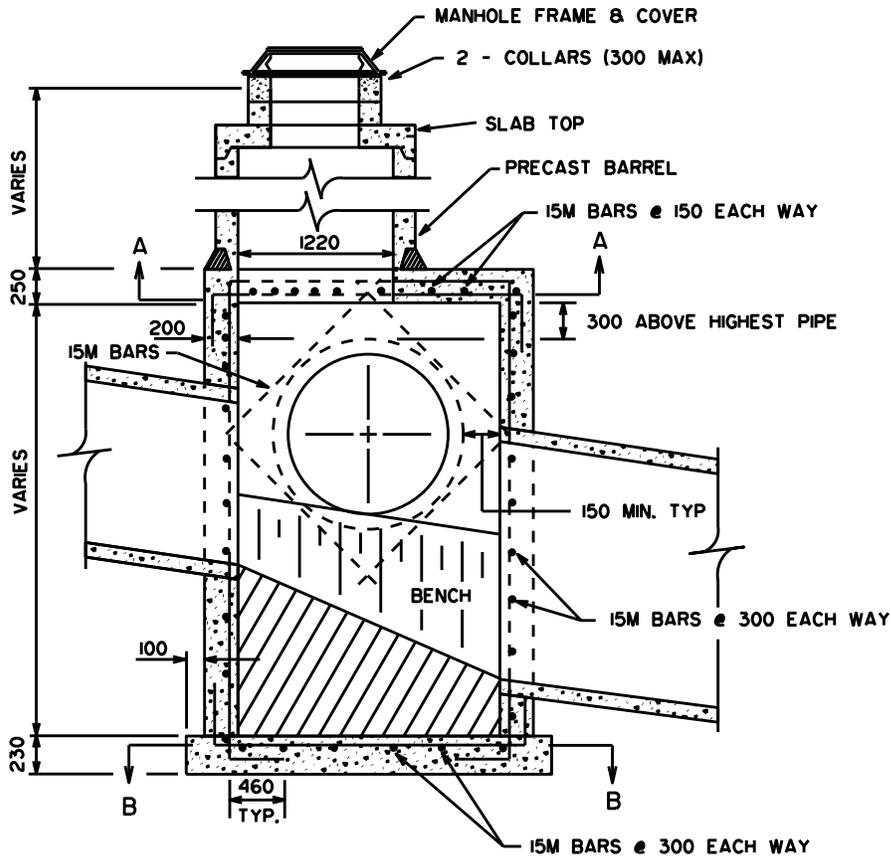
REVISED	 <p>CITY OF <i>Lethbridge</i> INFRASTRUCTURE SERVICES</p>	DRAWN
		CHECKED
		APPROVED
		SCALE N.T.S.
		DATE 04/11/24
		DWG NO S-02
	T-RISER MANHOLE & BASE	



SECTION A-A
DECK REINFORCING DETAIL



SECTION B-B
BASE REINFORCING DETAIL



SECTION C-C

NOTE:

- ALL DIMENSIONS IN MILLIMETERS
- USE THIS TYPE OF MANHOLE FOR PIPE LARGER THAN 600 Ø
- CONCRETE TO BE NO LESS THAN 30 MPa STRENGTH IN 28 DAYS
- ALL REINFORCING BAR OVERLAPS TO BE MIN 30 BAR DIAMETERS
- MIN. COVER ALL REINFORCING - 50mm
- ALL JOINTS TO BE SEALED WITH FLEXIBLE BUTYL RESIN SEALANT OR TYLOX SUPERSEAL GASKETS
- PRECAST MANHOLE & VAULT TO CONFORM TO A.S.T.M. C-478 (LATEST EDITION)
- CEMENT TO BE TYPE 50 (SULPHATE RESISTANT)

REVISED
NOV 15, 2004
DEC 15, 2005



CITY OF
Lethbridge
INFRASTRUCTURE SERVICES

STANDARD MANHOLE WITH VAULT
TYPE 3

DRAWN	P.R.A.
CHECKED	
APPROVED	
SCALE	N.T.S.
DATE	97/02/02
DWG NO	S-03

NOTICE:

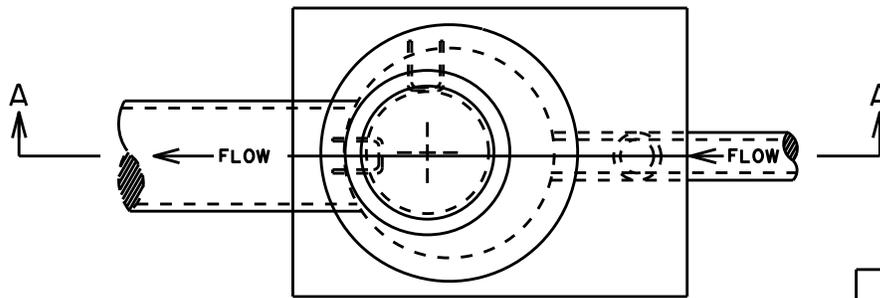
PRECAST I-S MANHOLES SHALL BE APPROVED BY THE CITY ENGINEER PRIOR TO USE..

PRECAST I-S MANHOLE APPROVED TO DATE ARE AS FOLLOWS:

PRECON PRECAST PRODUCTS

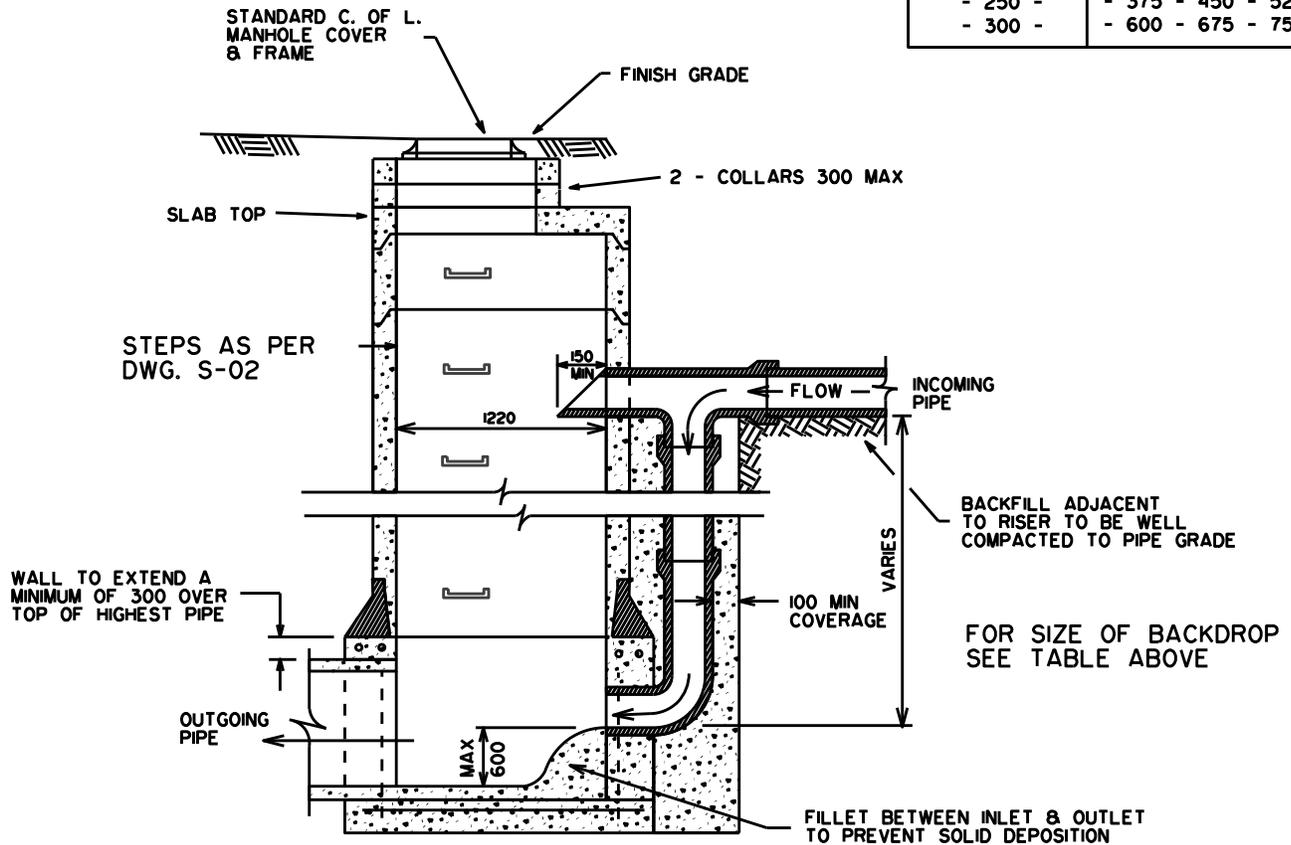
- MODEL VS 1212-15
- MODEL VS 1515-20
- MODEL VS 1818-20
- MODEL VS 1824-25
- MODEL VS 2530
- MODEL VS 3040

REVISED	 CITY OF <i>Lethbridge</i> INFRASTRUCTURE SERVICES	DRAWN
		CHECKED
		APPROVED
		SCALE N.T.S.
		DATE 04/11/24
	STANDARD PRECAST VAULTS	DWG NO S-03A



PLAN VIEW

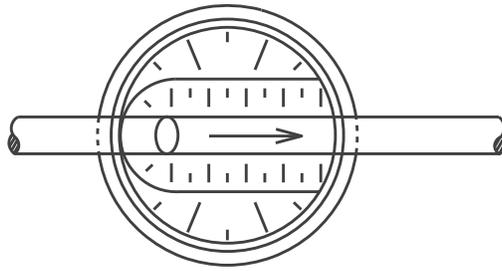
SIZE OF BACK DROP	SIZE OF INCOMING PIPE
- 200 -	- 200 - 250 - 300
- 250 -	- 375 - 450 - 525
- 300 -	- 600 - 675 - 750



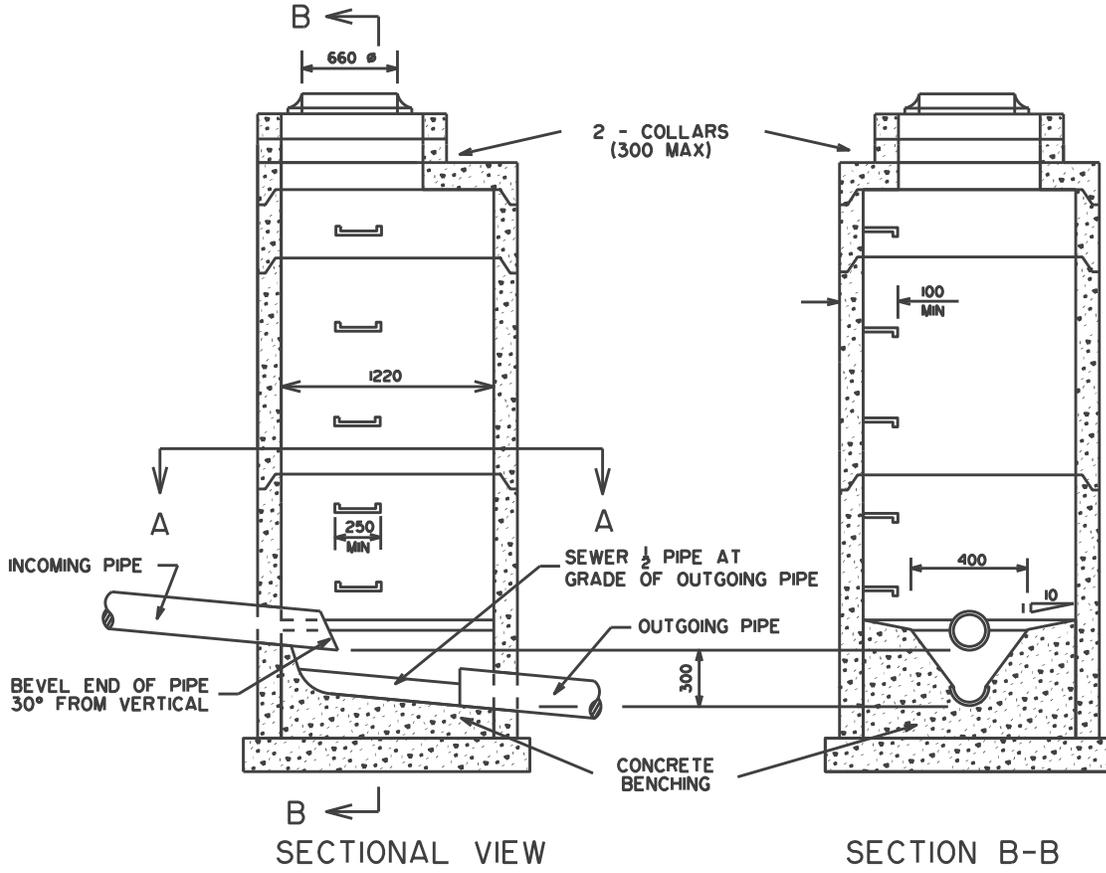
SECTION A-A

- NOTE: - ALL DIMENSIONS IN MILLIMETERS
- CEMENT TO BE TYPE 50 (SULPHATE RESISTANT)
 - BACKDROPS ARE REQUIRED WHEN THE DIFFERENCE BETWEEN OUTGOING INVERT AND INCOMING SAN. S EXCEEDS 600
 - FOR MANHOLE DETAILS SEE DRAWING S-01.
 - ALL CONCRETE TO BE MIN OF 30 MP_a STRENGTH AT 28 DAYS
 - ON EXISTING MANHOLES. BACK DROP COMES TO TOP OF BENCHING
 - ALL JOINTS TO BE SEALED WITH FLEXIBLE BUTYL RUBBER SEALANT OR TYLOX SUPERSEAL PRELUBRICATED GASKETS

REVISED	 <p>CITY OF <i>Lethbridge</i> INFRASTRUCTURE SERVICES</p>	DRAWN	P.R.A.
NOV 15, 2004		CHECKED	
DEC 14, 2005		APPROVED	
		SCALE	N.T.S.
		DATE	97/02/05
	STANDARD MANHOLE WITH EXTERIOR DROP TYPE 4	DWG NO	S-04



SECTION A-A

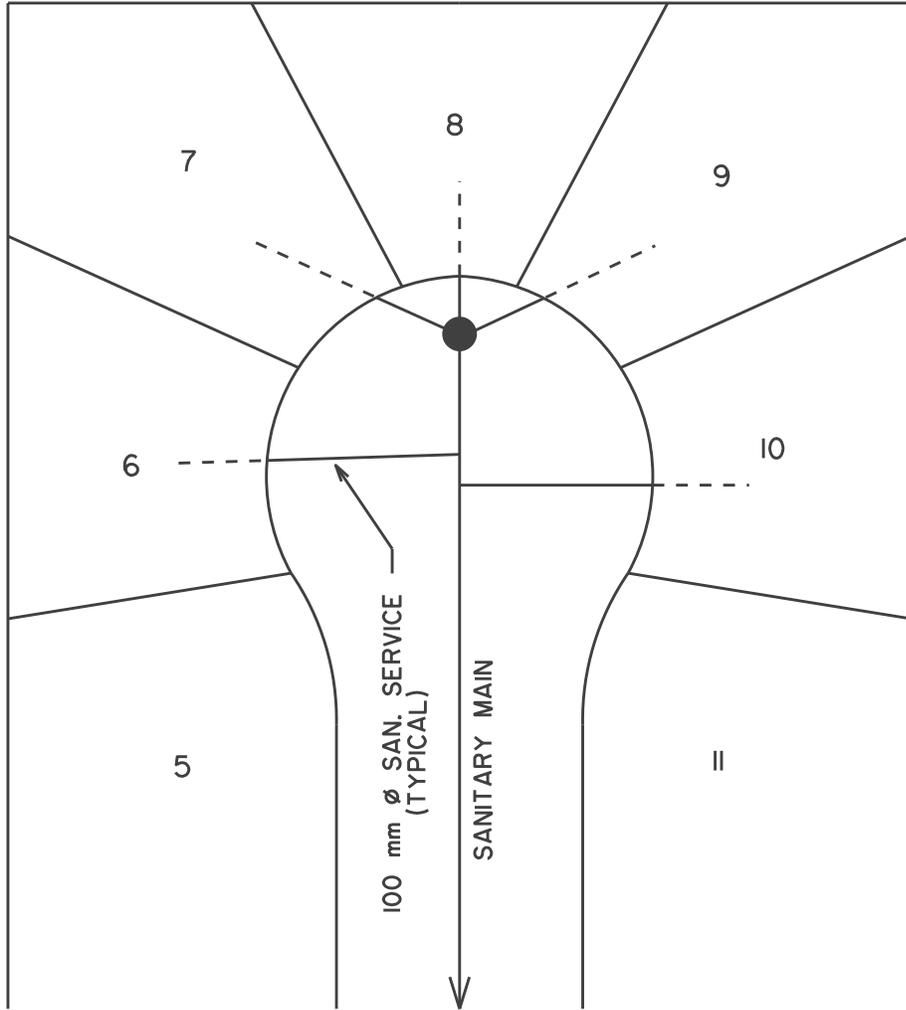


SECTIONAL VIEW

SECTION B-B

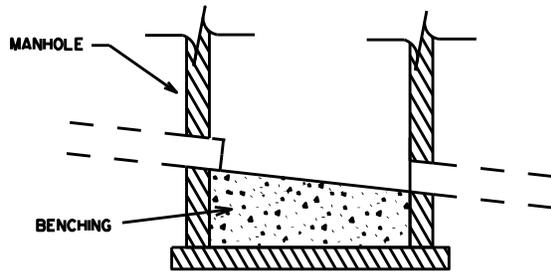
- NOTE: - ALL DIMENSIONS IN MILLIMETERS
- PRECAST MANHOLE SECTIONS TO CONFORM TO A.S.T.M. DESIGNATION C478 (LATEST EDITION)
 - CEMENT TO BE TYPE 50 (SULPHATE RESISTANT)
 - CONCRETE STRENGTH TO BE 30 MP_a AT 28 DAYS
 - MANHOLE STEPS @ 400 o/c
 - ALL JOINTS TO BE SEALED WITH FLEXIBLE BUTYL RESIN SEALANT OR APPROVED EQUAL OR TYLOX SUPERSEAL PRELUNRICATED GASKETS
 - TEST MANHOLE TO BE LOCATED ON PRIVATE PROPERTY WITHIN 3 m OF PROPERTY LINE OR ON PROPERTY BUT NOT IN ANY EASEMENT.

REVISED	 <p>CITY OF <i>Lethbridge</i> INFRASTRUCTURE SERVICES</p>	DRAWN	P.R.A.
NOV 15. 2004		CHECKED	
FEB 3. 2010		APPROVED	
		SCALE	N.T.S.
		DATE	97/02/06
	TEST MANHOLE FOR COMMERCIAL SANITARY SEWER SERVICES	DWG NO	S-05

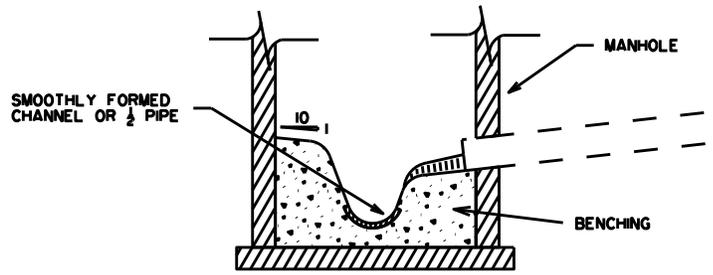


- NOTE:
- DIMENSIONS ARE IN MILLIMETERS.
 - SAN. $\frac{1}{2}$ PIPE TO GO STRAIGHT THROUGH MANHOLE.
 - IN THE CASE OF MORE THAN 3 CONNECTIONS INTO MANHOLE, A DETAILED DRAWING SHALL BE SUBMITTED FOR APPROVAL.

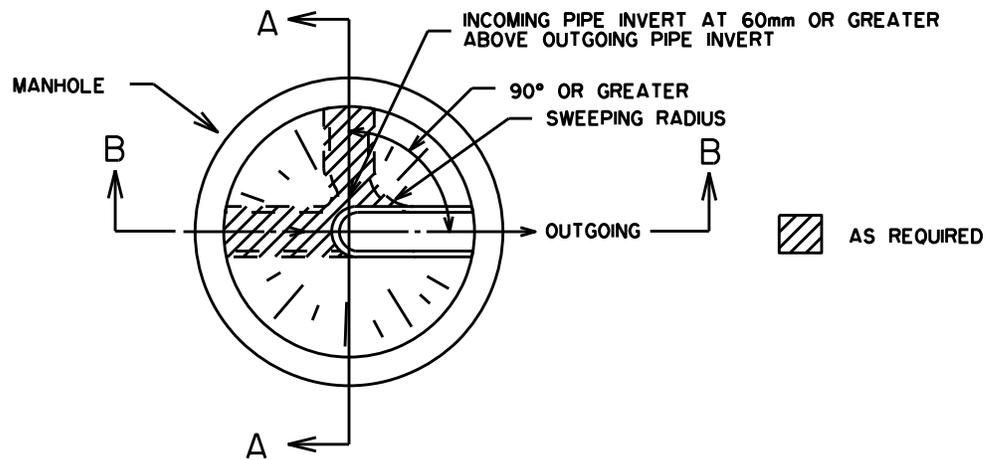
REVISED	 <p style="text-align: center;">CITY OF <i>Lethbridge</i> INFRASTRUCTURE SERVICES</p>	DRAWN	P.R.A.
NOV 15. 2004		CHECKED	
		APPROVED	
		SCALE	N.T.S.
		DATE	97/02/19
		DWG NO	S-06
SERVICE CONNECTION DETAIL SAN. MANHOLE IN CUL-DE-SAC			



SECTION B-B
TYPICAL BENCHING



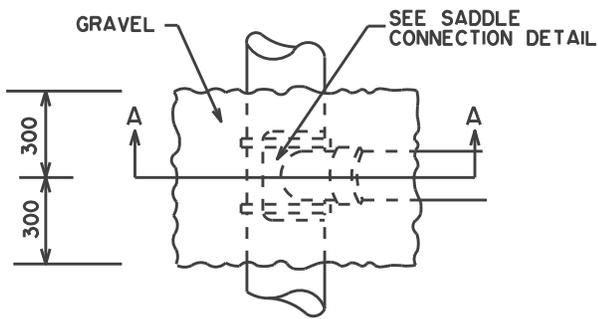
SECTION A-A
TYPICAL BENCHING



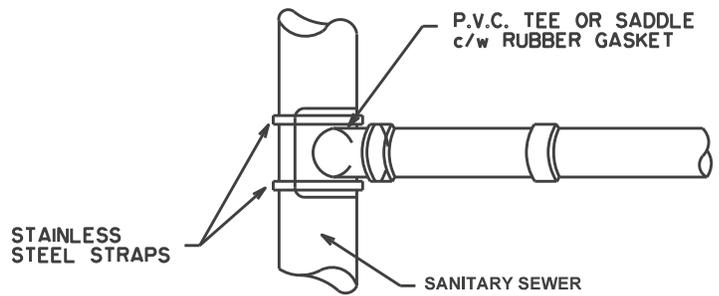
NOTE: - ALL DIMENSIONS IN MILLIMETERS.

- BENCHING SLOPE TO BE 10 : 1 FROM SPRING LINE OF PIPE (1/2 WAY UP)
- ON SANITARY SEWER USE EXTERIOR DROP MANHOLE WHEN INCOMING PIPE INVERT IS 600 OR GREATER ABOVE OUTGOING PIPE INVERT.
- NO SHARP CORNERS.
- BENCHING CONCRETE TO BE TYPE 50 SULPHATE RESISTANT CEMENT. MINIMUM COMPRESSIVE STRENGTH TO BE 30 MPa @ 28 DAYS.
- 30 mm DROP ACROSS M.H. BETWEEN INCOMING & OUTGOING INVERTS FOR PIPE GRADE UP TO 2%.
- 60 mm DROP ACROSS M.H. BETWEEN INCOMING & OUTGOING INVERTS FOR PIPE GRADES > 2%. AND < = 5%. ALSO FOR 90° TURNS.
- DROP ACROSS M.H. BETWEEN INCOMING & OUTGOING INVERTS TO BE @ GRADE OF PIPE FOR PIPE GRADES > 5%
- ALL INCOMING PIPE MUST BE GROUTED TO BE FLUSH WITH BENCHING IN MANHOLES.

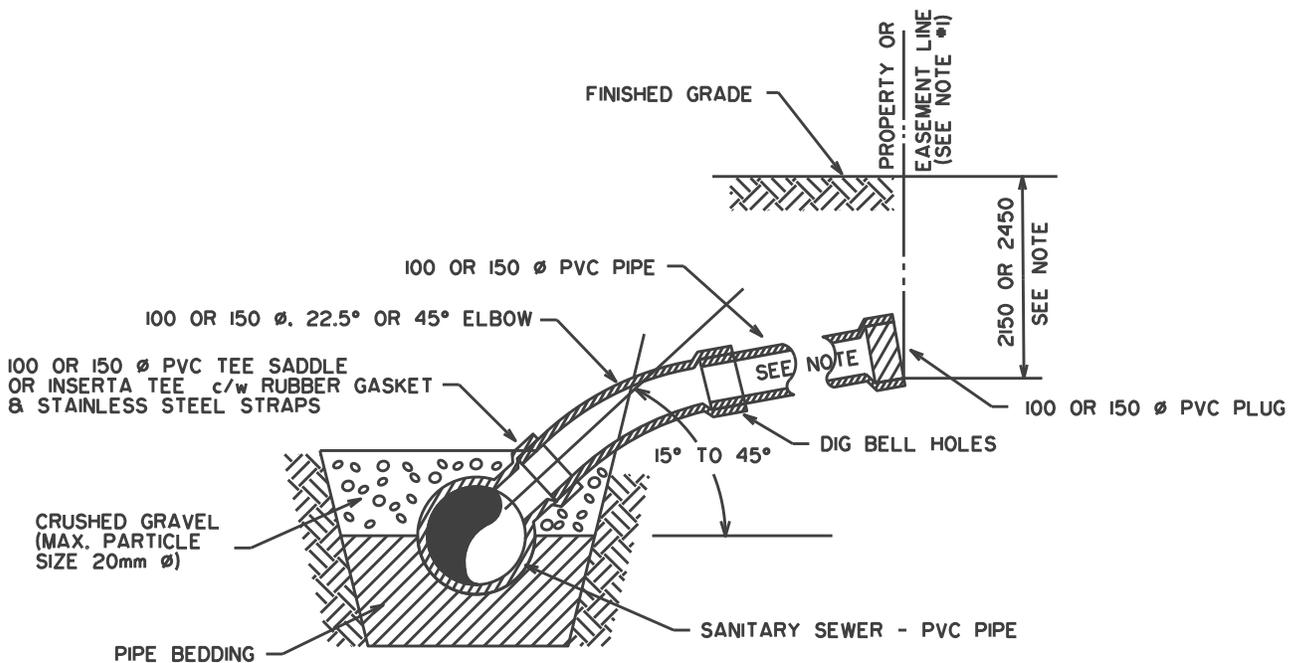
REVISED	 <p>CITY OF <i>Lethbridge</i> INFRASTRUCTURE SERVICES</p>	DRAWN	P.R.A.
DEC 3/07		CHECKED	
FEB 5/10		APPROVED	
		SCALE	N.T.S.
		DATE	97/02/18
		DWG NO	S-07
TYPICAL BENCHING IN MANHOLES			



PLAN



SADDLE CONNECTION DETAIL

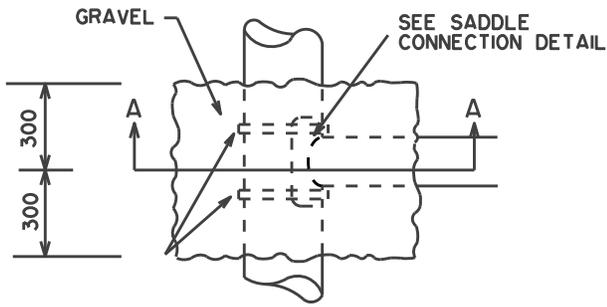


SECTION A-A

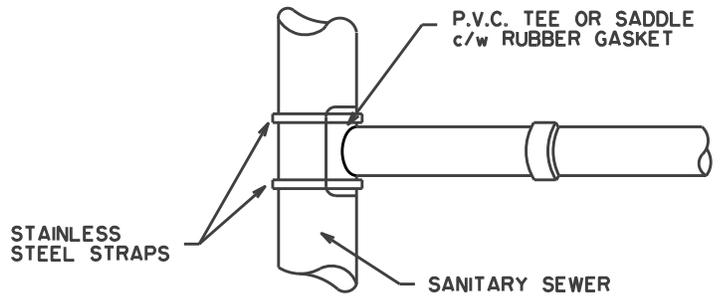
FOR SEWERS LESS THAN 3700 DEEP

- NOTE:
- 150 Ø SERVICES AT MIN 1%
 - 100 Ø SERVICES AT MINIMUM 2%
 - ALL P.V.C. PIPE TO BE MUNICIPAL STUB SEWER PIPE. A.S.T.M. D3034, DR 28
 - SEWER SERVICES MUST TERMINATE WITH A BELL END
 - SADDLES TO BE 400mm APART MIN.
 - ALL DIMENSIONS ARE IN MILLIMETERS
 - WHEN LOT SLOPES FROM BACK TO FRONT. THE DEPTH AT P/L TO BE 2150
 - WHEN LOT SLOPES FRONT TO BACK. THE DEPTH AT P/L TO BE 2450
 - ON LOTS WHERE MAIN DEPTH VARIES THE CITY SURVEYOR MUST DETERMINE DEPTH AT P/L
 - *1 - ON LOTS WHERE THERE IS A UTILITY ROW EXTEND PIPE TO BACK OF EASEMENT

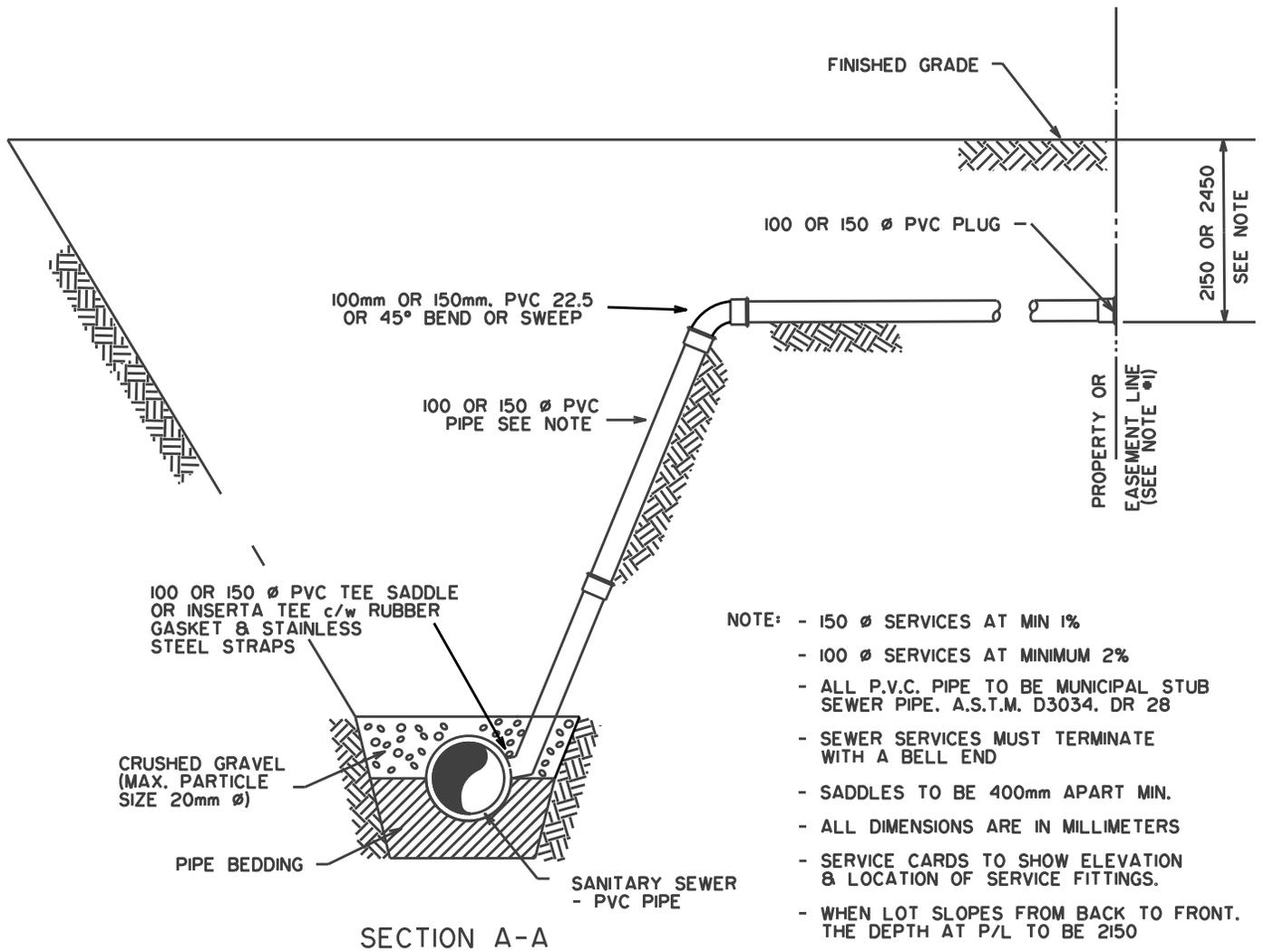
REVISED	 <p>CITY OF <i>Lethbridge</i> INFRASTRUCTURE SERVICES</p>	DRAWN	P.R.A.
AUG 2019 - NOTE #1		CHECKED	
		APPROVED	
		SCALE	N.T.S.
		DATE	97/03/10
	P.V.C. SEWER SERVICE CONNECTION FOR MAINS LESS THAN 3.7 DEEP	DWG NO	S-08



PLAN

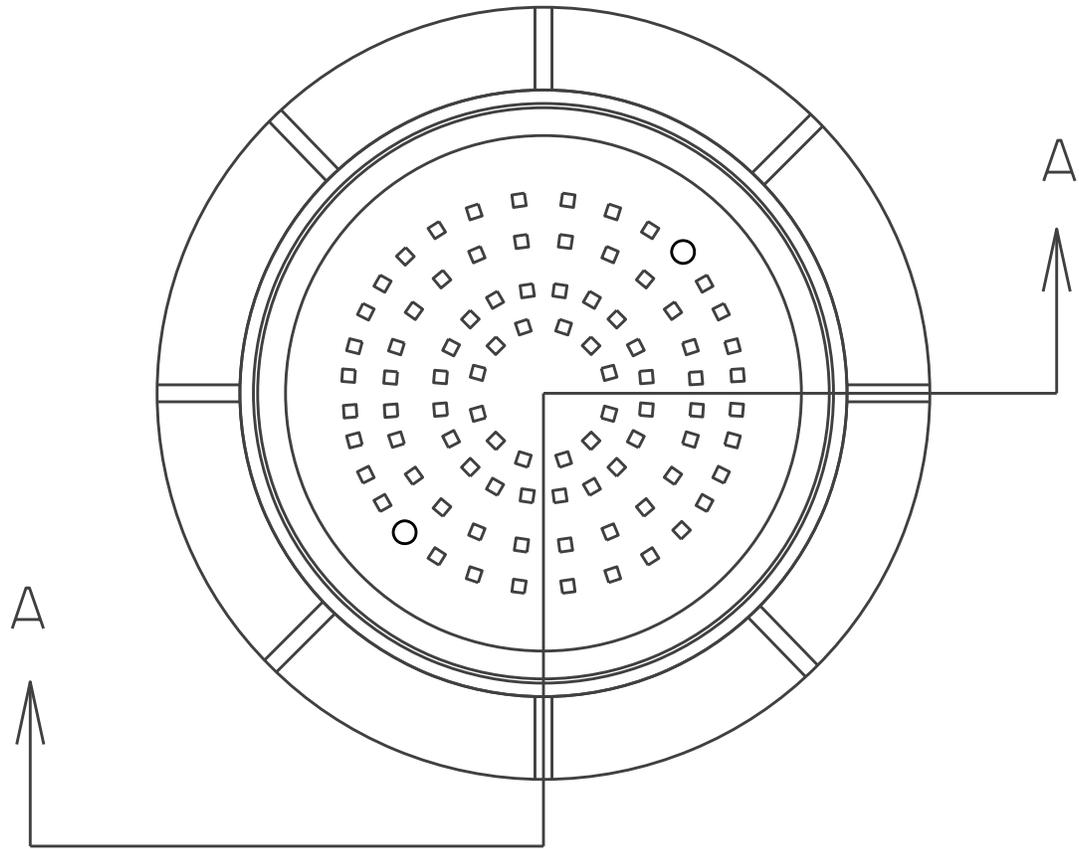


SADDLE CONNECTION DETAIL



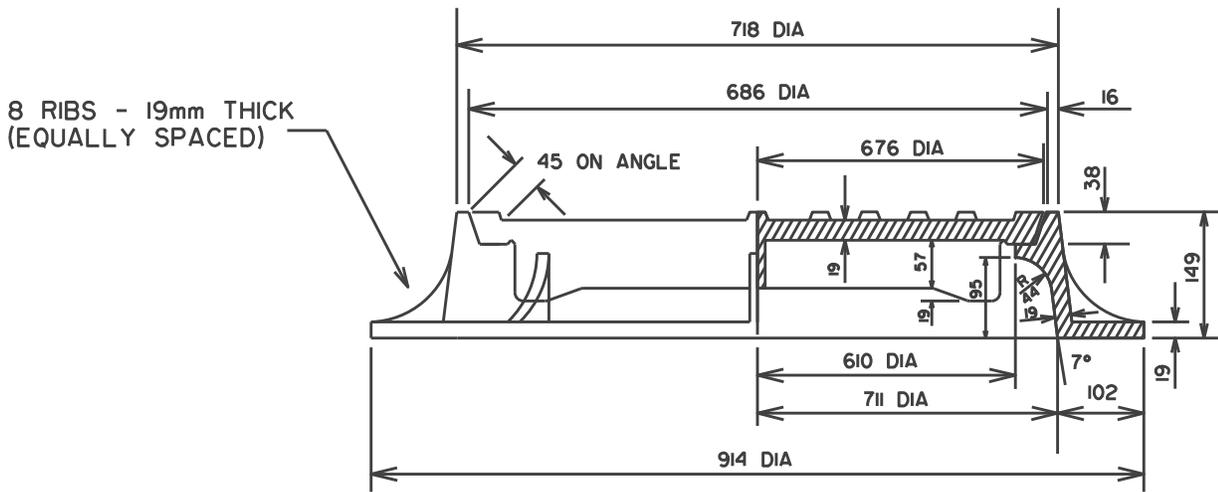
- NOTE:
- 150 Ø SERVICES AT MIN 1%
 - 100 Ø SERVICES AT MINIMUM 2%
 - ALL P.V.C. PIPE TO BE MUNICIPAL STUB SEWER PIPE, A.S.T.M. D3034, DR 28
 - SEWER SERVICES MUST TERMINATE WITH A BELL END
 - SADDLES TO BE 400mm APART MIN.
 - ALL DIMENSIONS ARE IN MILLIMETERS
 - SERVICE CARDS TO SHOW ELEVATION & LOCATION OF SERVICE FITTINGS.
 - WHEN LOT SLOPES FROM BACK TO FRONT. THE DEPTH AT P/L TO BE 2150
 - WHEN LOT SLOPES FRONT TO BACK. THE DEPTH AT P/L TO BE 2450
 - ON LOTS WHERE MAIN DEPTH VARIES THE CITY SURVEYOR MUST DETERMINE DEPTH AT P/L
 - *1 - ON LOTS WHERE THERE IS A UTILITY ROW EXTEND PIPE TO BACK OF EASEMENT

REVISED	 <p style="text-align: center;">CITY OF <i>Lethbridge</i> INFRASTRUCTURE SERVICES</p>	DRAWN	P.R.A.
AUG 2019 - NOTE #1		CHECKED	
		APPROVED	
		SCALE	N.T.S.
		DATE	97/03/11
	P.V.C. SEWER SERVICE RISER CONNECTION FOR MAINS 3.7 TO 5.5m DEEP	DWG NO	S-09



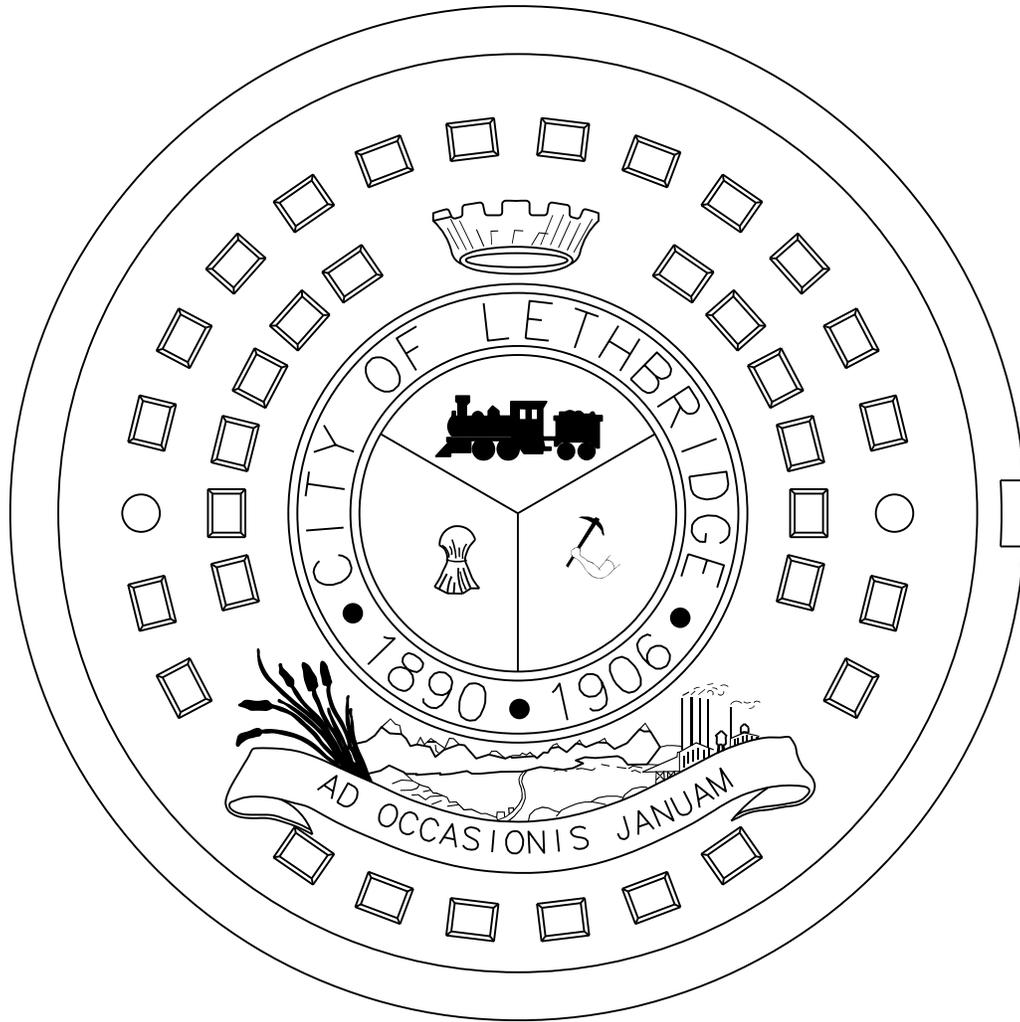
TOP VIEW

MATERIAL
CLASS 30 CAST IRON



SECTION A-A

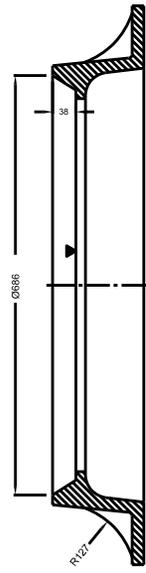
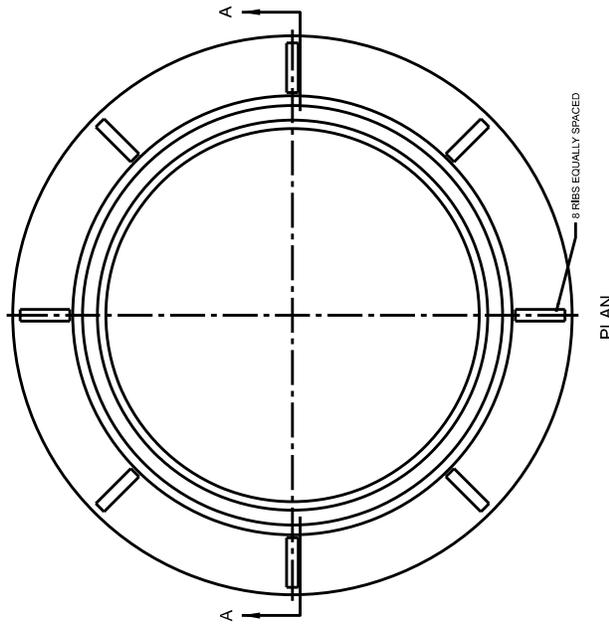
REVISED	 <p>CITY OF <i>Lethbridge</i> INFRASTRUCTURE SERVICES</p>	DRAWN	P.R.A.
		CHECKED	
		APPROVED	
		SCALE	N.T.S.
		DATE	97/03/11
		DWG NO	S-10
STANDARD MANHOLE FRAME AND COVER			



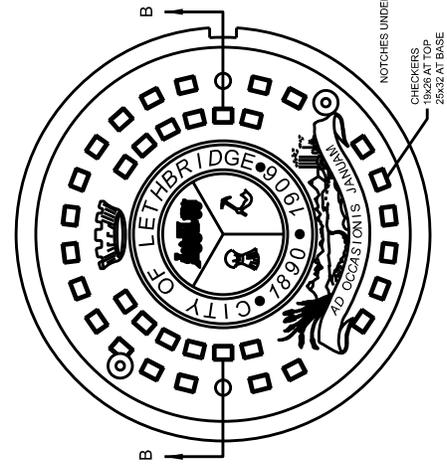
STANDARD LOGO COVER

REVISED	 <p>CITY OF <i>Lethbridge</i> INFRASTRUCTURE SERVICES</p>	DRAWN	
		CHECKED	
		APPROVED	
		SCALE	
		DATE	2004-10-26
	STANDARD LOGO COVER	DWG NO	S 10-A

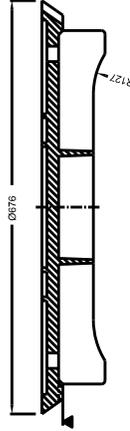
STANDARD FRAME



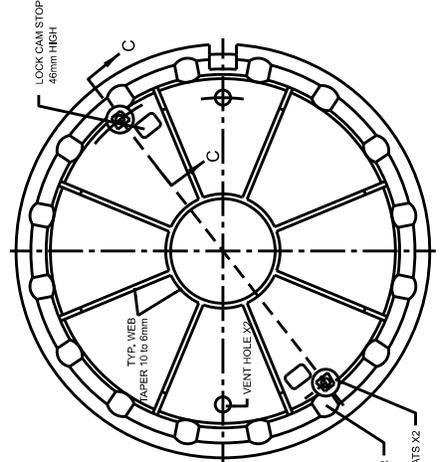
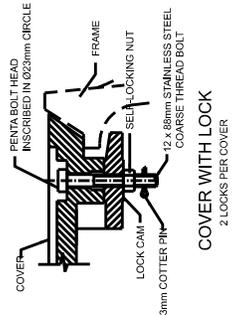
LOCKING COVER
MASS: 63,90KG (142,00LBS)



PLAN

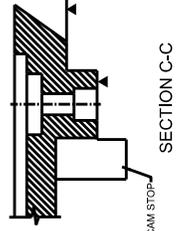


SECTION B-B

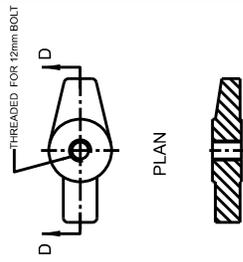


BOTTOM VIEW

LOCK SEAT DETAILS

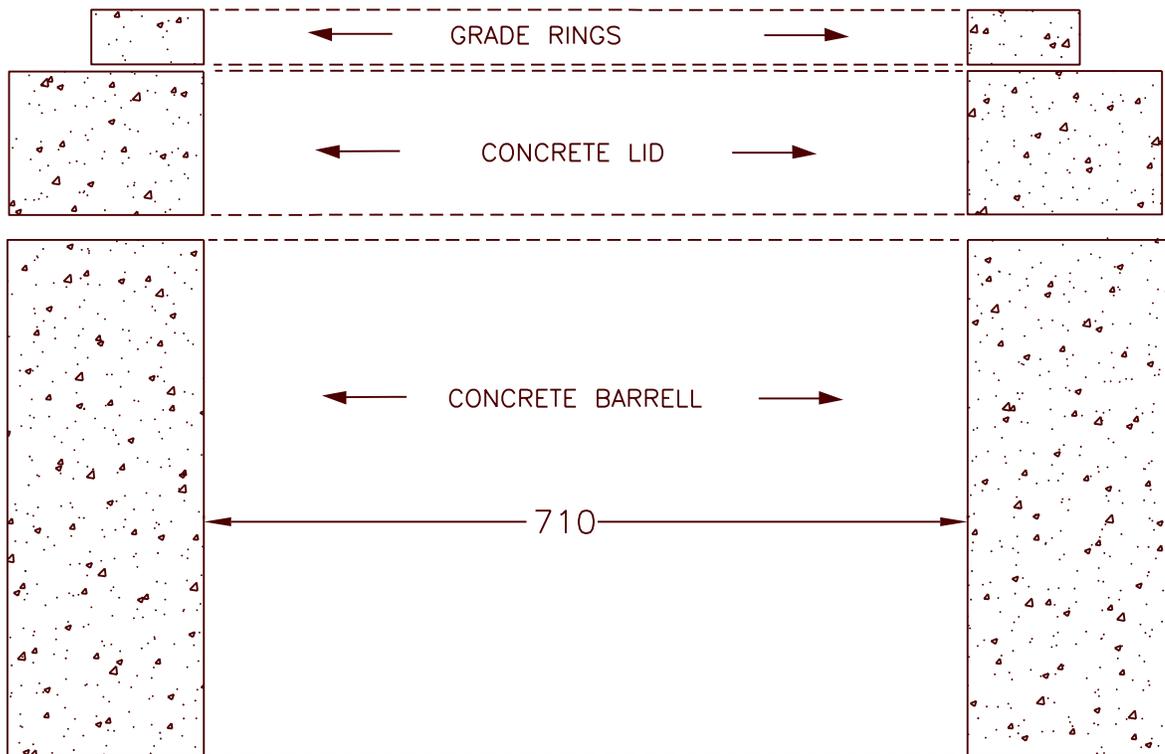
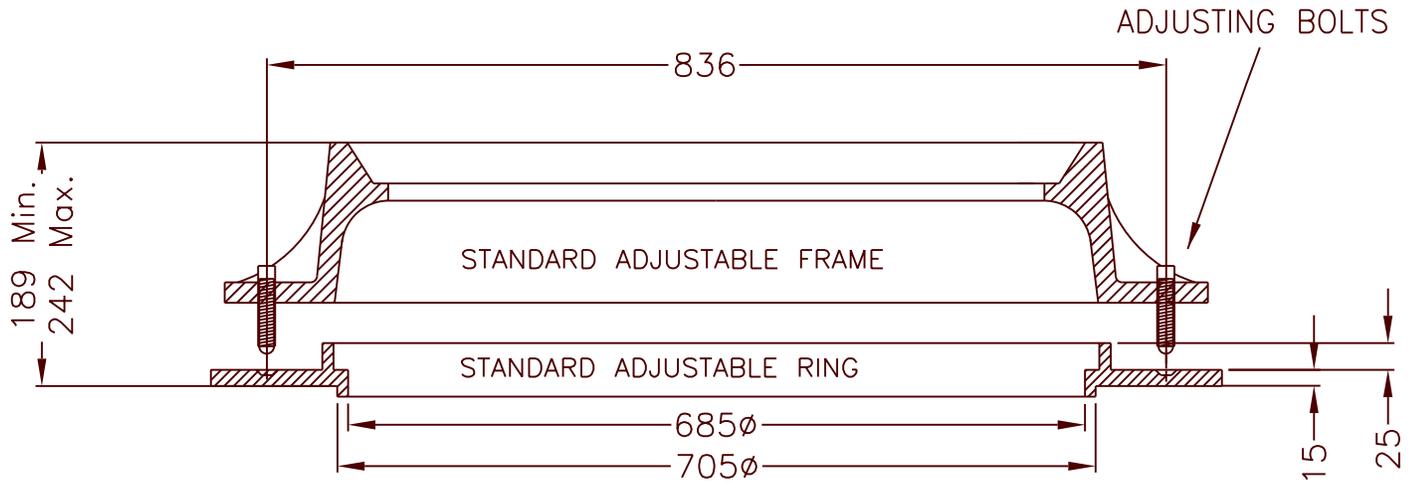


LOCK CAM DETAILS



NOTE - LOCKING DEVICE OPTIONAL

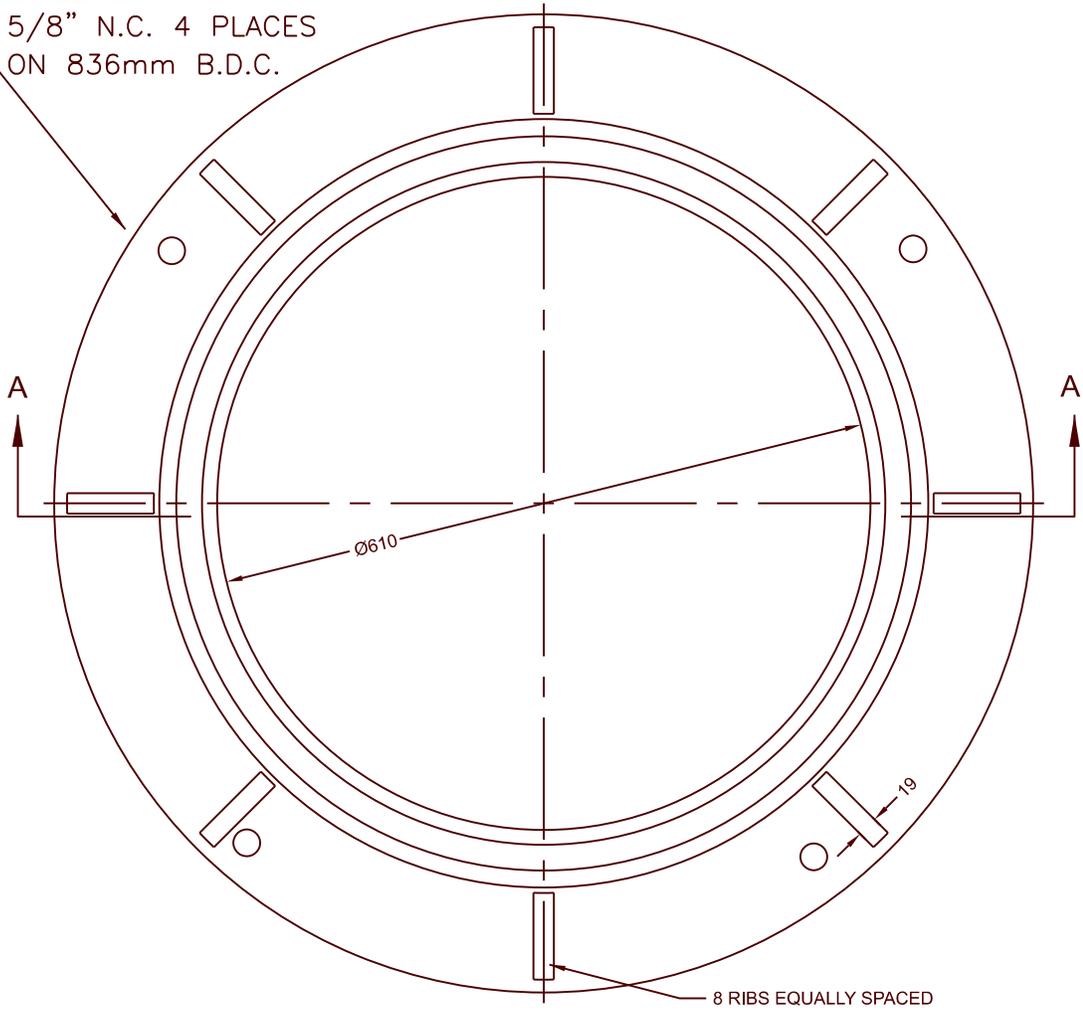
REVISED	 <p>CITY OF <i>Lethbridge</i> INFRASTRUCTURE SERVICES</p>	DRAWN	D.F.
		CHECKED	
		APPROVED	
		SCALE	N.T.S.
		DATE	06/12/15
	DOUBLE LOCK MANHOLE FRAME AND COVER	DWG NO	S-10-B



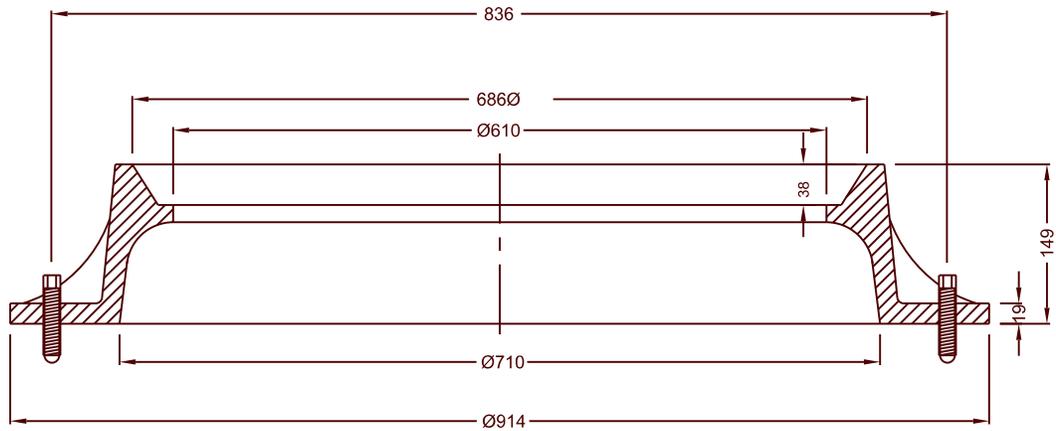
RING - DUCTILE IRON 65-45-12.
 BOLTS - 5/8" NC LOW ALLOY HIGH STENGTH.
 BOLTS - AVAILABLE IN 6" IF NEEDED.

REVISED	 <p>CITY OF <i>Lethbridge</i> INFRASTRUCTURE SERVICES</p>	DRAWN
		CHECKED
		APPROVED
		SCALE NTS
		DATE SEPT 10/2010
		DWG NO S-10-C
	ADJUSTABLE FRAME INSTALLATION	

DRILL & TAP
 5/8" N.C. 4 PLACES
 ON 836mm B.D.C.

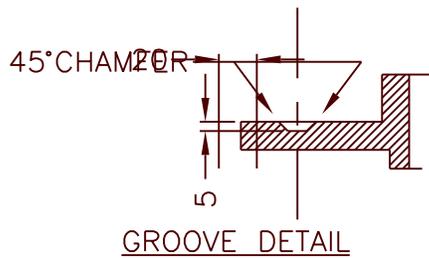
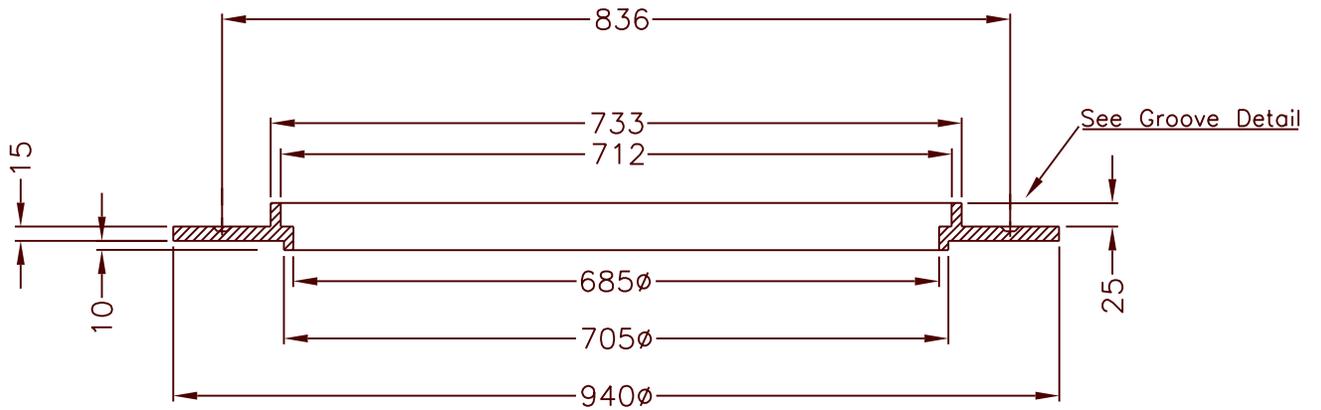
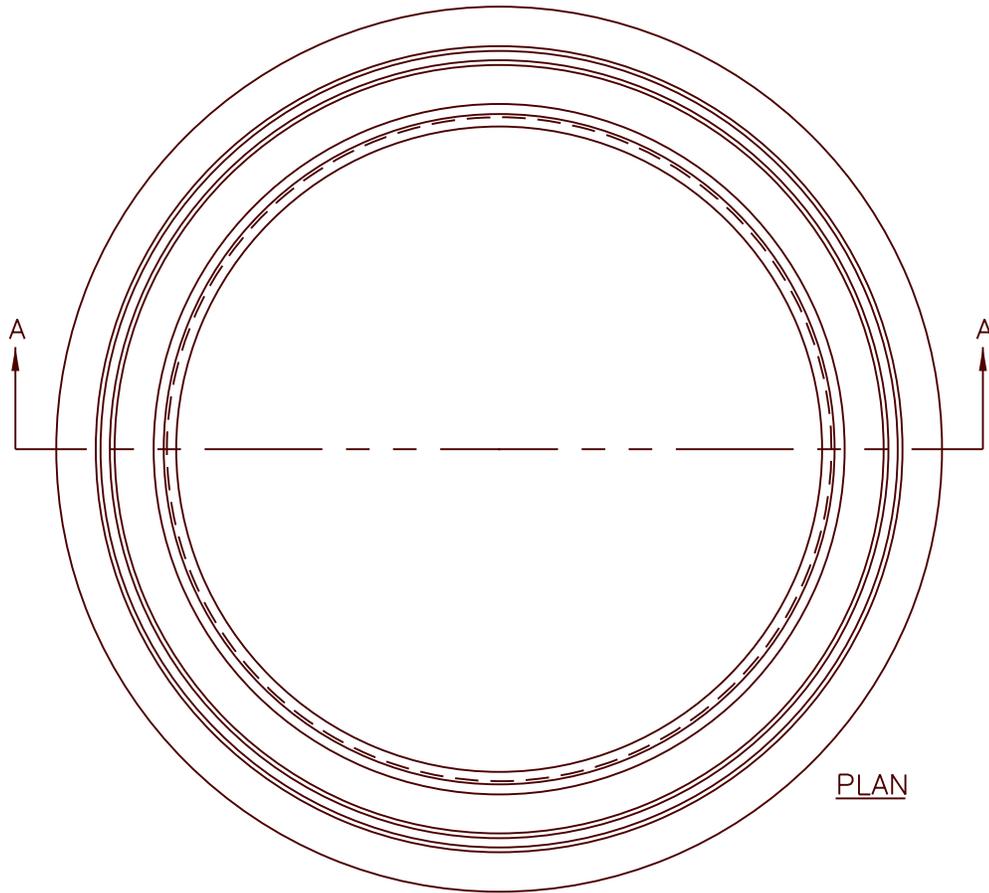


PLAN



SECTION A-A

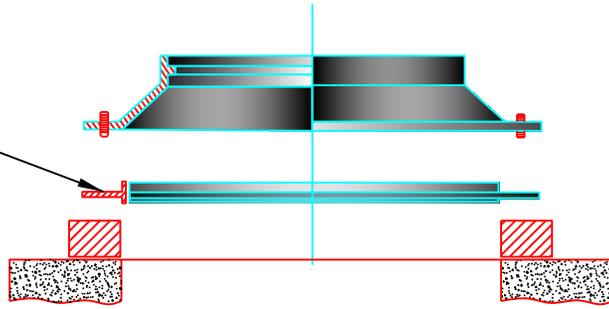
REVISED	 <p>CITY OF <i>Lethbridge</i> INFRASTRUCTURE SERVICES</p>	DRAWN	
		CHECKED	
		APPROVED	
		SCALE	NTS
		DATE	SEPT 10/2010
		DWG NO	S-10-D
ADJUSTABLE FRAME			



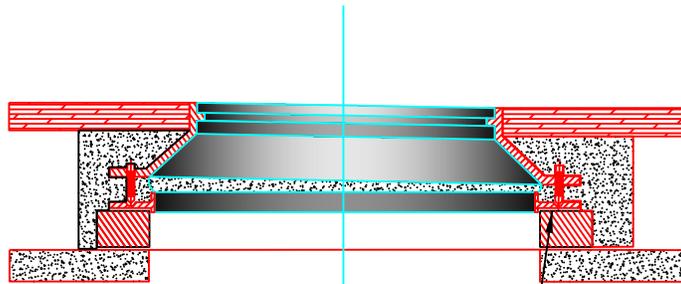
RING - DUCTILE 65-45-12

REVISED	 <p>CITY OF <i>Lethbridge</i> INFRASTRUCTURE SERVICES</p>	DRAWN
		CHECKED
		APPROVED
		SCALE NTS
		DATE SEPT 10/2010
		DWG NO S-10-E
ADJUSTABLE FRAME FOUNDATION RING		

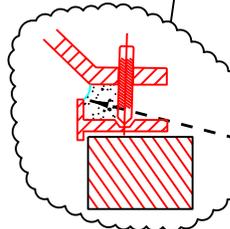
GROOVES FOR SCREWS



NOTES:
FOR GRADES >4% USE
LONGER SET SCREWS OR
USE SLOPE GRADE RINGS
AS RECOMMENDED BELOW.



ROAD GRADE	GRADE RING	ADJUSTABLE FRAME
8 - 12%	8%	AFSR
4 - 8%	4%	AFSR
0 - 4%		AFSR ONLY



15mm MINIMUM GAP BETWEEN
TOP OF SUPPORT RING FORM
TO BOTTOM OF CASTING

RAKE FINISH SURFACE OF CONCRETE
MAINTAIN MINIMUM 50mm ASPHALT
THICKNESS OVER CONCRETE

MIN. ASPHALT THICKNESS TO BE
50mm AROUND FRAME

FILL VOID
WITH CONCRETE

MATCH CONTOUR OF ROAD
SURFACE.

SET SCREW TO HAVE BONDED
THREAD PROTECTION AND
GRAPHITE. THREADED HOLES
IN FRAME

DO NOT EXCAVATE
BEYOND GRADE RINGS
100mm, RECOMMEND
HYDRO EXCAVATION

PLACE CONCRETE BETWEEN FRAME
AND SUPPORTING RING, IN A SINGLE
HOMOGENEOUS MANNER.
EXPOSED CONCRETE INSIDE CHIMNEY
TO BE HAND FINISHED SMOOTH

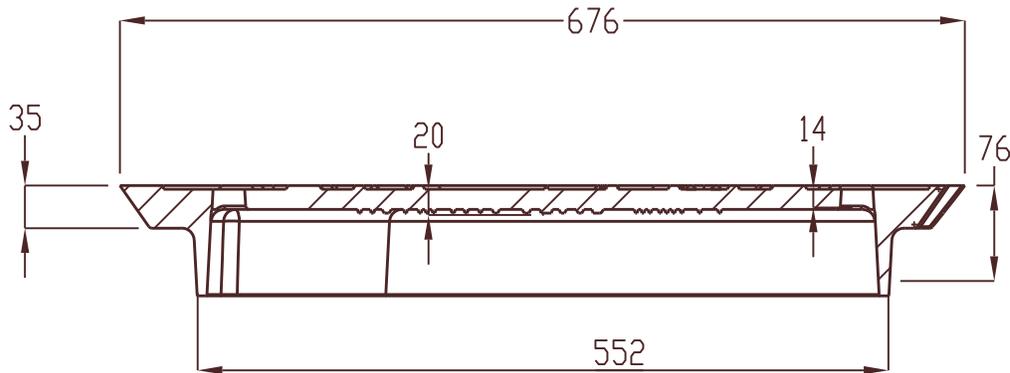
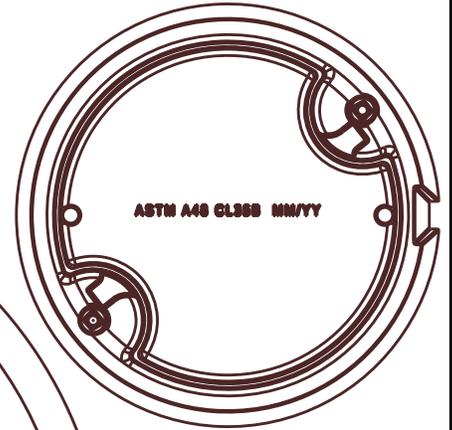
NOTE: PROTECT SET SCREW
THREADS FROM CONCRETE
USING PLASTIC THREAD CAPS
OR OTHER APPROVED EQUAL.
(SEE MANUFACTURERS
RECOMMENDATIONS.

THICKNESS OF CONCRETE TO
BE 100mm
-CONCRETE 30 MPA
-10mm AGREGATE REDUCE
SHRINKAGE BY USE OF
PLASTISIZER

FEB. 02/2011

ADJUSTABLE MANHOLE FRAME AND COVER STANDARD DETAIL DRAWINGS

S 10F

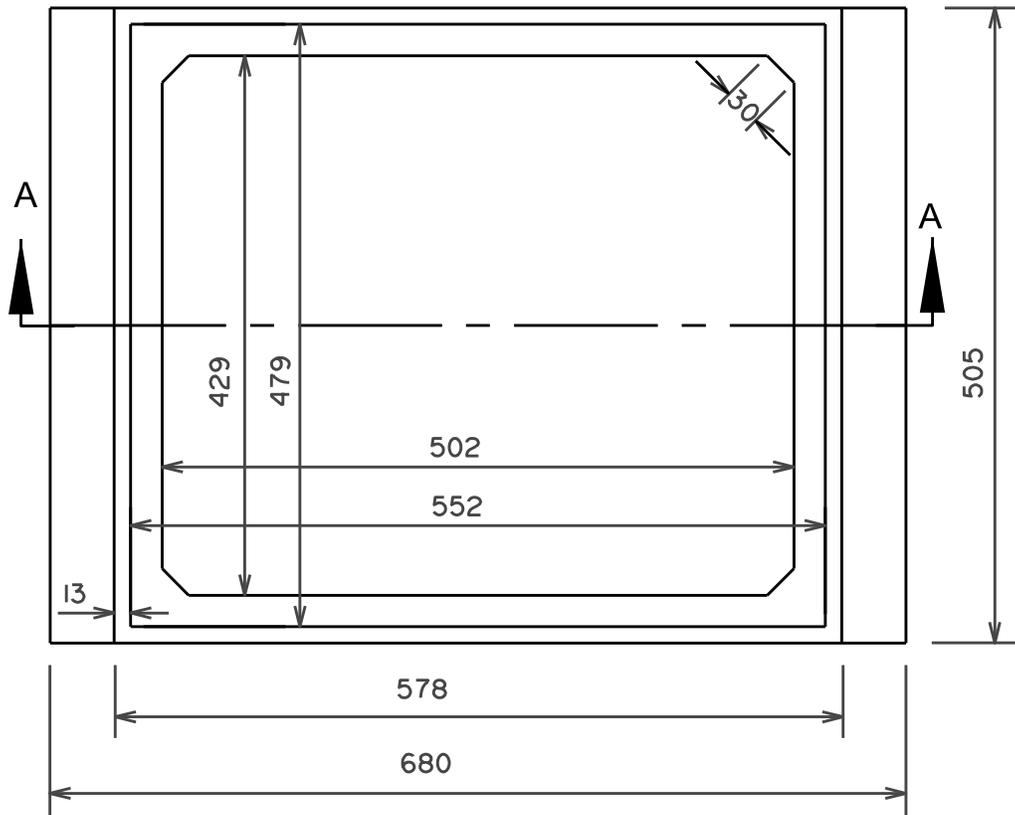


REVISED


CITY OF
Lethbridge
INFRASTRUCTURE SERVICES

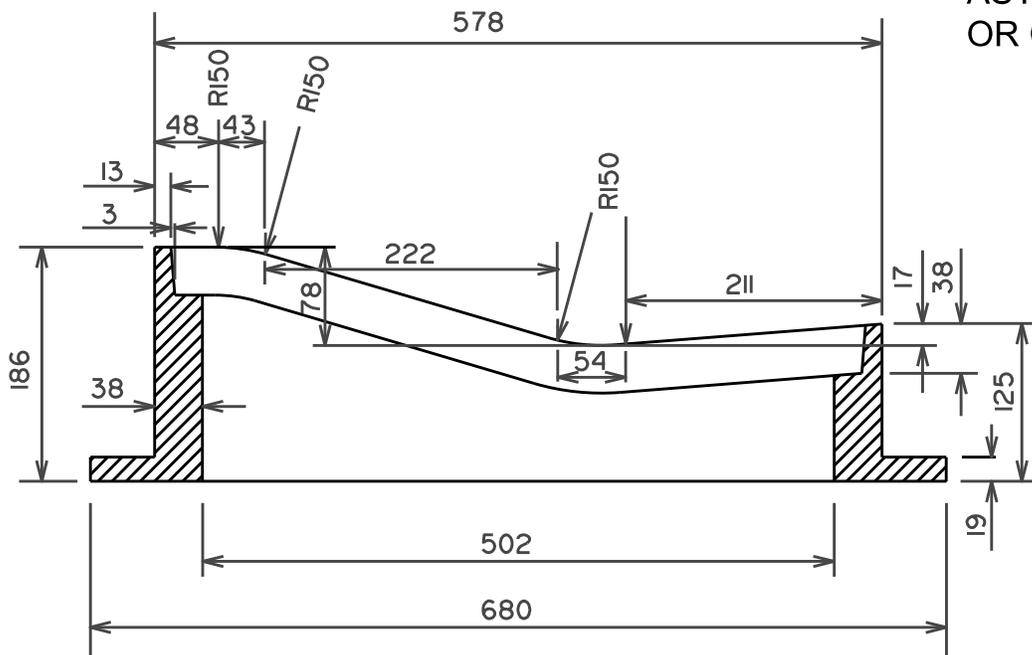
T67 PLATEN LID

DRAWN	
CHECKED	
APPROVED	
SCALE	
DATE	08/13/13
DWG NO	S-10-G



PLAN

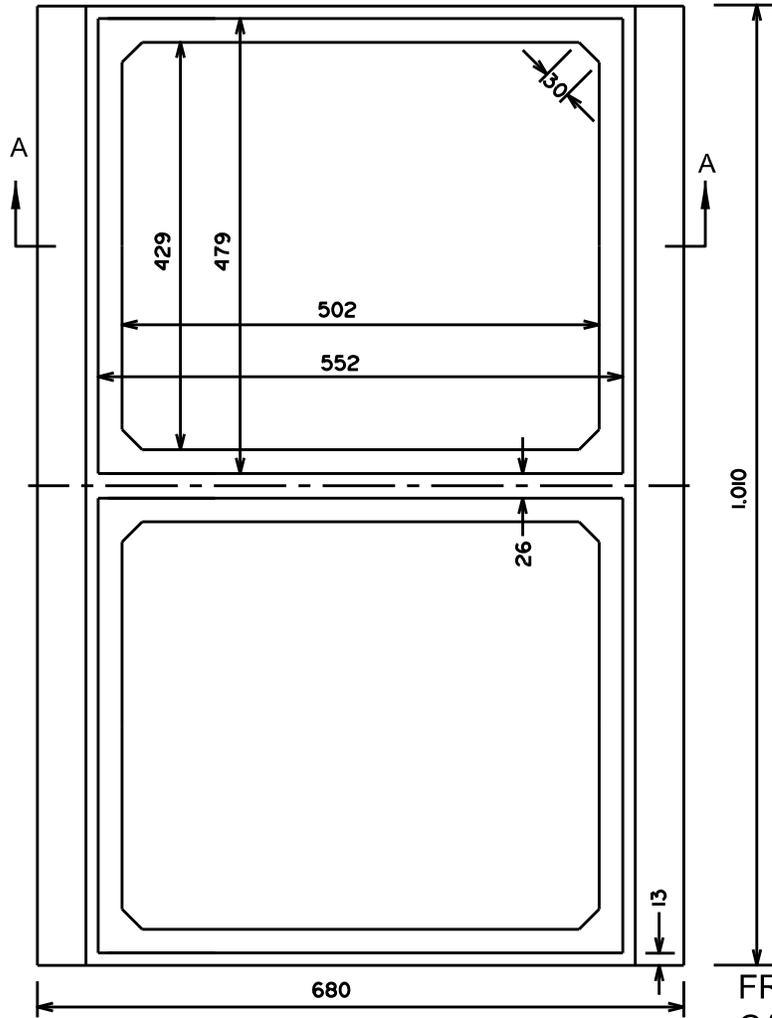
FRAME MATERIAL :
CAST IRON
ASTM A48 CL 25B
OR CL 30



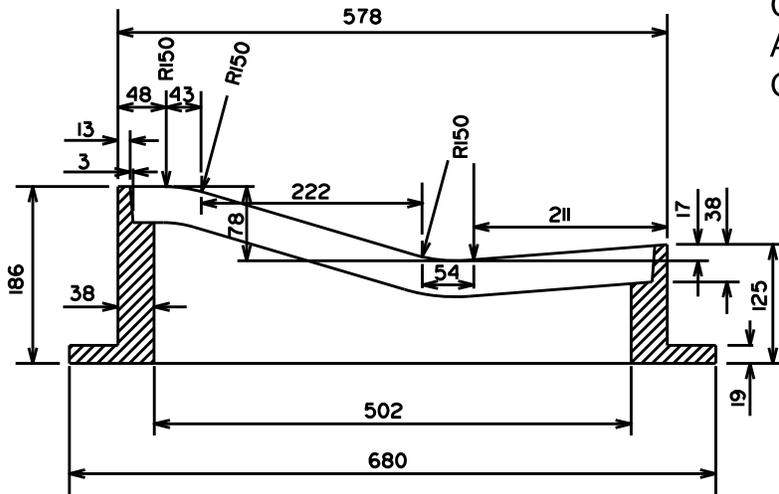
SECTION A-A

REVISED	 <p>CITY OF <i>Lethbridge</i> INFRASTRUCTURE SERVICES</p> <p>SINGLE CATCH BASIN FRAME ROLLED CURB TYPE</p>	DRAWN	D.F.
		CHECKED	
		APPROVED	
		SCALE	NTS
		DATE	NOV 25/2004
		DWG NO	S-II

PLAN

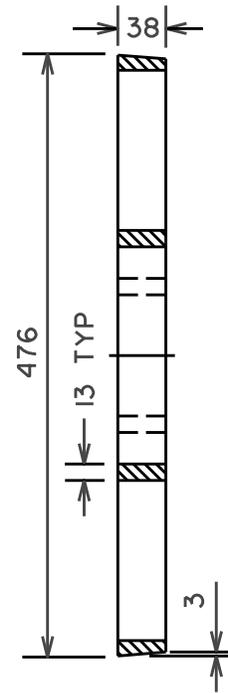
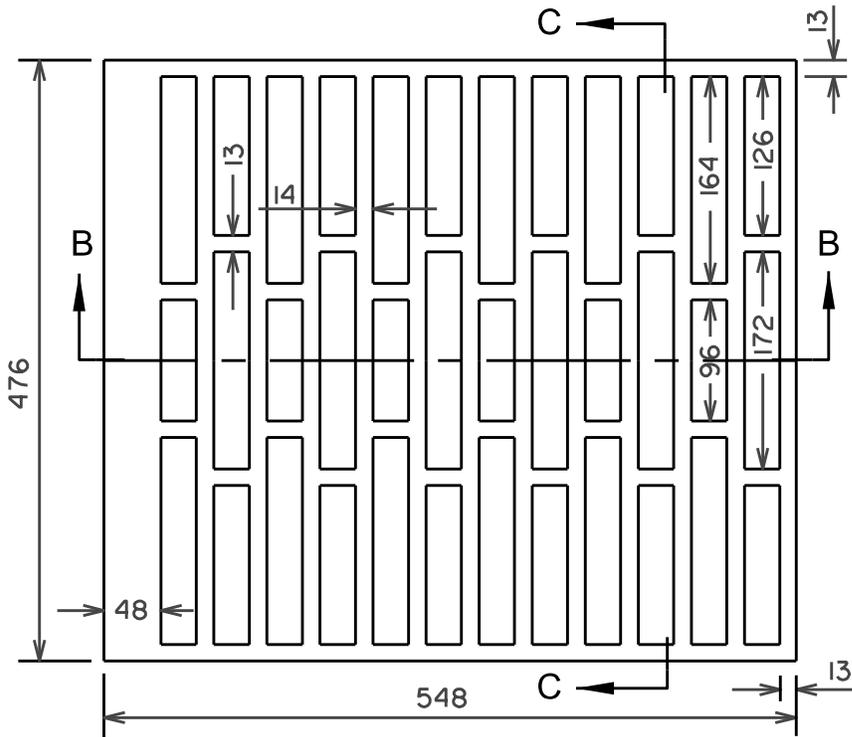


FRAME MATERIAL :
CAST IRON
ASTM A48 CL25B
OR CL 30

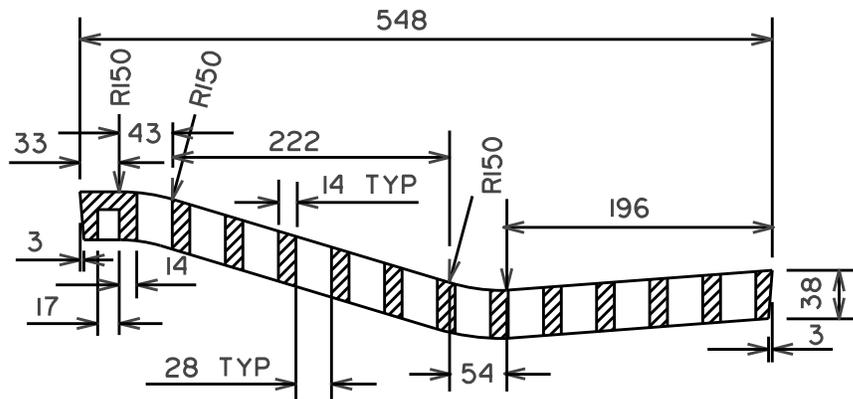


SECTION A-A

REVISED	 <p>CITY OF <i>Lethbridge</i> INFRASTRUCTURE SERVICES</p>	DRAWN	D.F.
		CHECKED	
		APPROVED	
		SCALE	N.T.S.
		DATE	NOV 29/2004
		DWG NO	S-IIA
		DOUBLE CATCH BASIN FRAME ROLLED CURB TYPE	



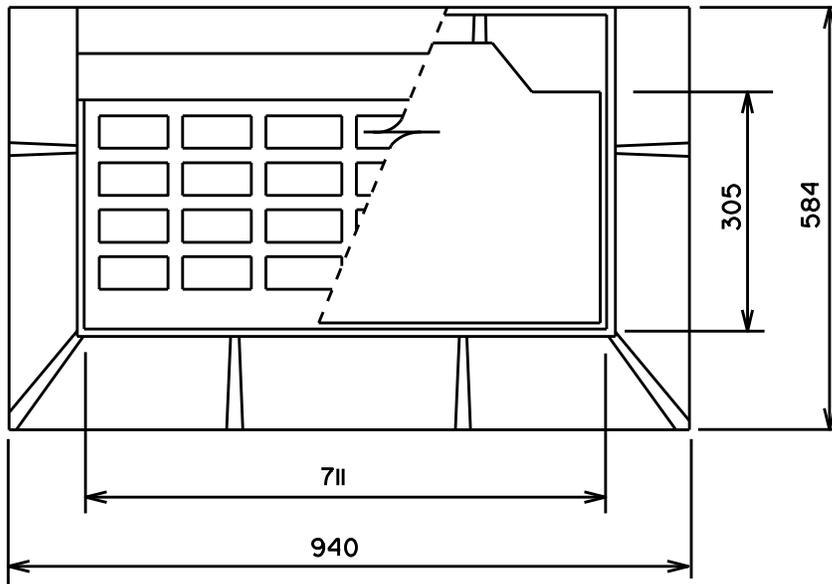
SECTION C-C



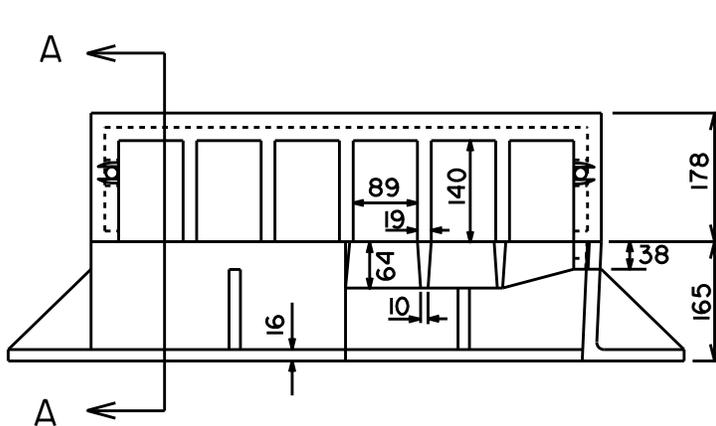
SECTION B-B

GRATE MATERIAL :
 DUCTILE IRON
 ASTM A536
 GRADE 60-40-18

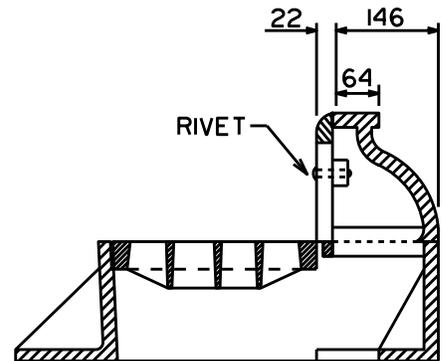
REVISED	 CITY OF <i>Lethbridge</i> INFRASTRUCTURE SERVICES	DRAWN	D.F.
		CHECKED	
		APPROVED	
		SCALE	NTS
		DATE	NOV 25/2004
		DWG NO	S-IIB
	CATCH BASIN GRATE ROLLED CURB TYPE		



TOP VIEW



FRONT VIEW



SECTION A-A

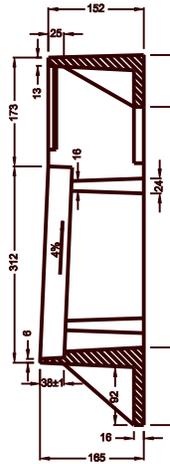
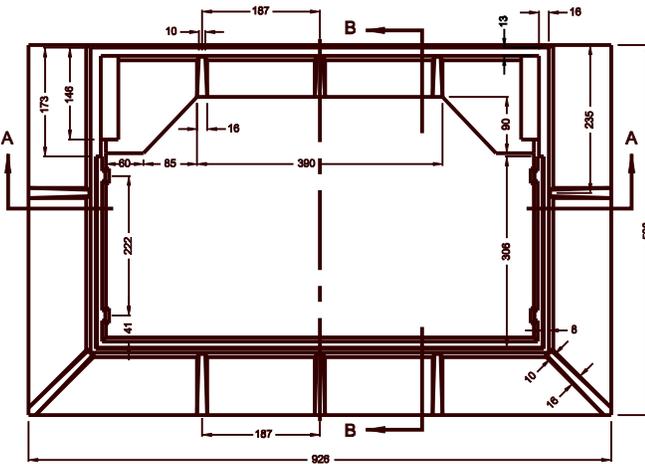
MATERIAL

CLASS 30 CAST IRON
FRAME. GRID & CURB. BACK

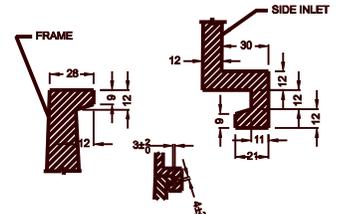
DUCTILE 65-45-12
CURB BACK GRID

REVISED	 <p>CITY OF <i>Lethbridge</i> INFRASTRUCTURE SERVICES</p>	DRAWN	P.R.A.
		CHECKED	
		APPROVED	
		SCALE	N.T.S.
		DATE	97/03/11
	STANDARD C.B. FRAME & GRATE STANDARD CURB TYPE	DWG NO	S-12

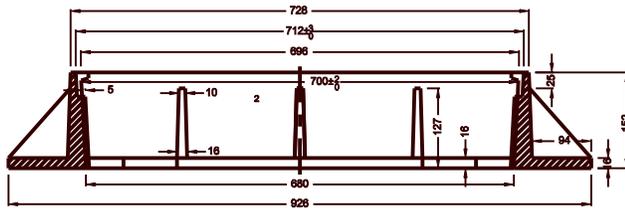
FRAME - PLAN



SECTION B-B

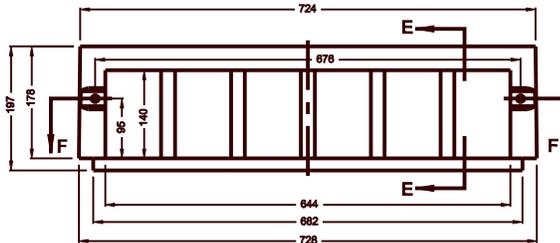


FRAME/SIDE INLET DETAIL



SECTION A-A

SIDE INLET - GRATE



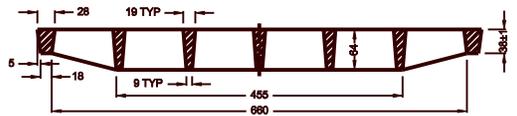
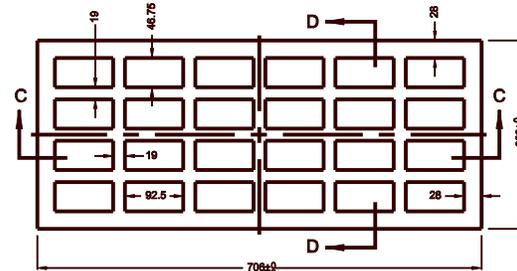
FRONT VIEW



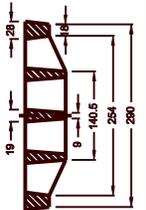
SECTION F-F

SECTION E-E

GRATE - PLAN

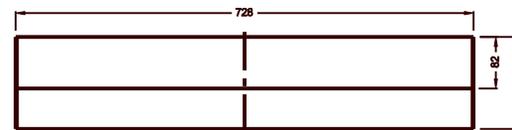


SECTION C-C

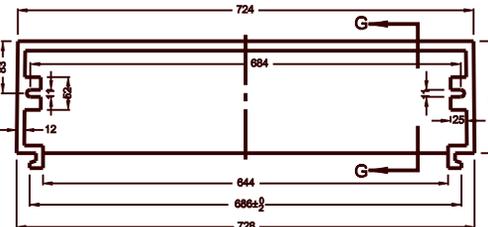


SECTION D-D

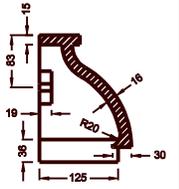
SIDE INLET - FRAME



PLAN



FRONT VIEW



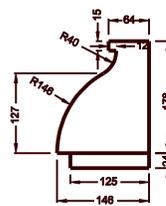
SECTION G-G

MATERIAL:

FRAME, GRATE, SIDE INLET FRAME - CLASS 30 CAST IRON
SIDE INLET GRATE - DUCTILE IRON 65-45-12

WEIGHT:

FRAME - 90.8kg (200lb) ±3%
GRATE - 30.8kg (68lb) ±3%
SIDE INLET SET - 40.8kg (90lb) ±3%



END VIEW

3/8" x 2 1/4" HEX HD BOLT & NUT
NCT - 2 REQUIRED



REVISED



CITY OF
Lethbridge
INFRASTRUCTURE SERVICES

STANDARD CURB TYPE
CATCH BASIN FRAME, GRATE & LOCKING SIDE INLET

DRAWN

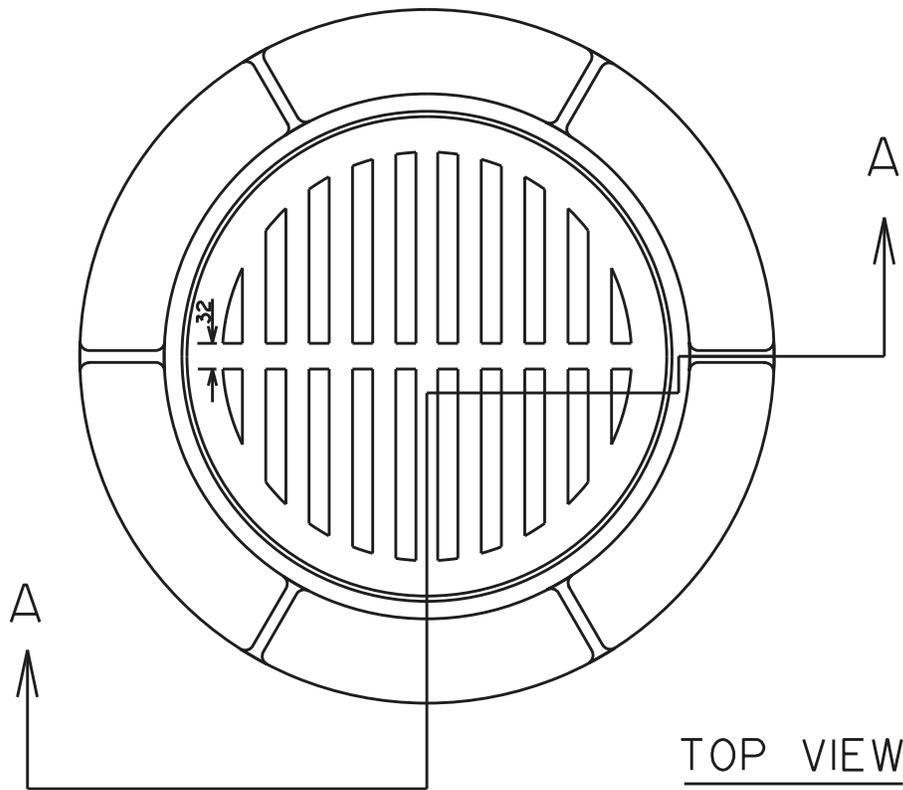
CHECKED

APPROVED

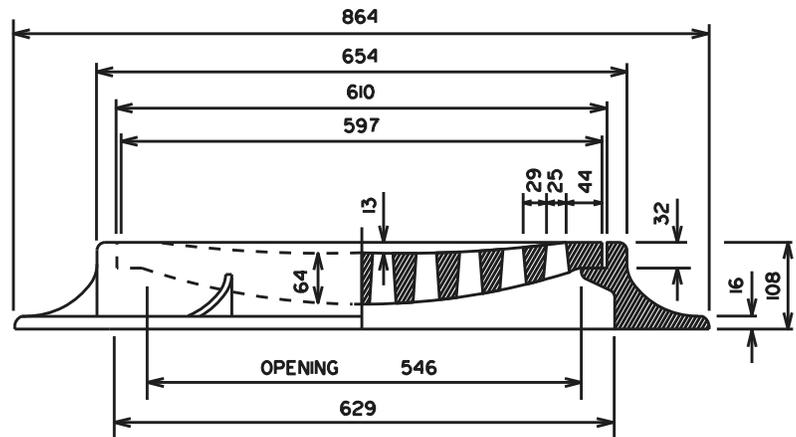
SCALE NTS

DATE 05/01/21

DWG NO S-12A



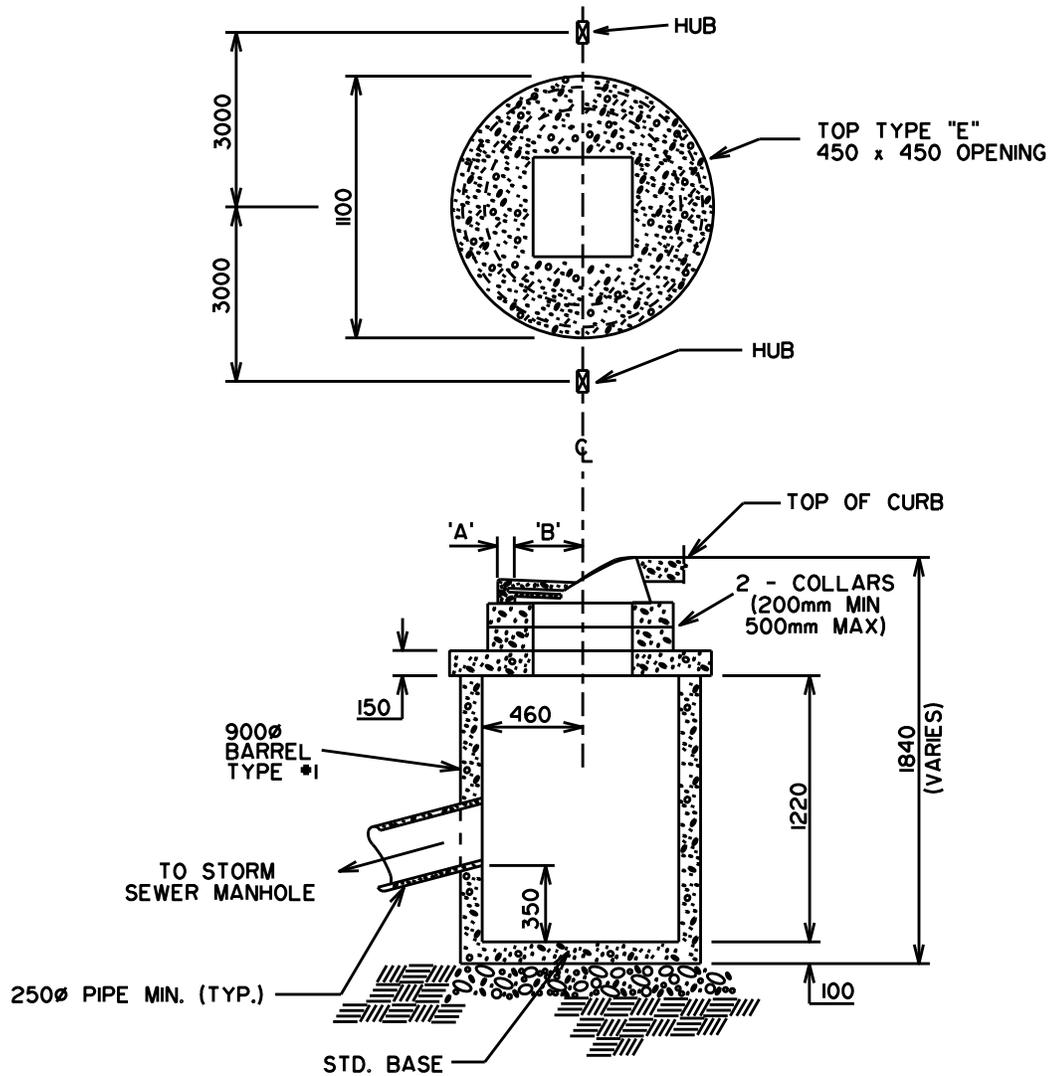
TOP VIEW



SECTION A-A

MATERIAL: CL. 30 CAST IRON

REVISED	 <p>CITY OF <i>Lethbridge</i> INFRASTRUCTURE SERVICES</p>	DRAWN	P.R.A.
		CHECKED	
		APPROVED	
		SCALE	N.T.S.
		DATE	97/03/11
		DWG NO	S-13
<p>STANDARD C.B. FRAME & GRATE ROUND TYPE</p>			

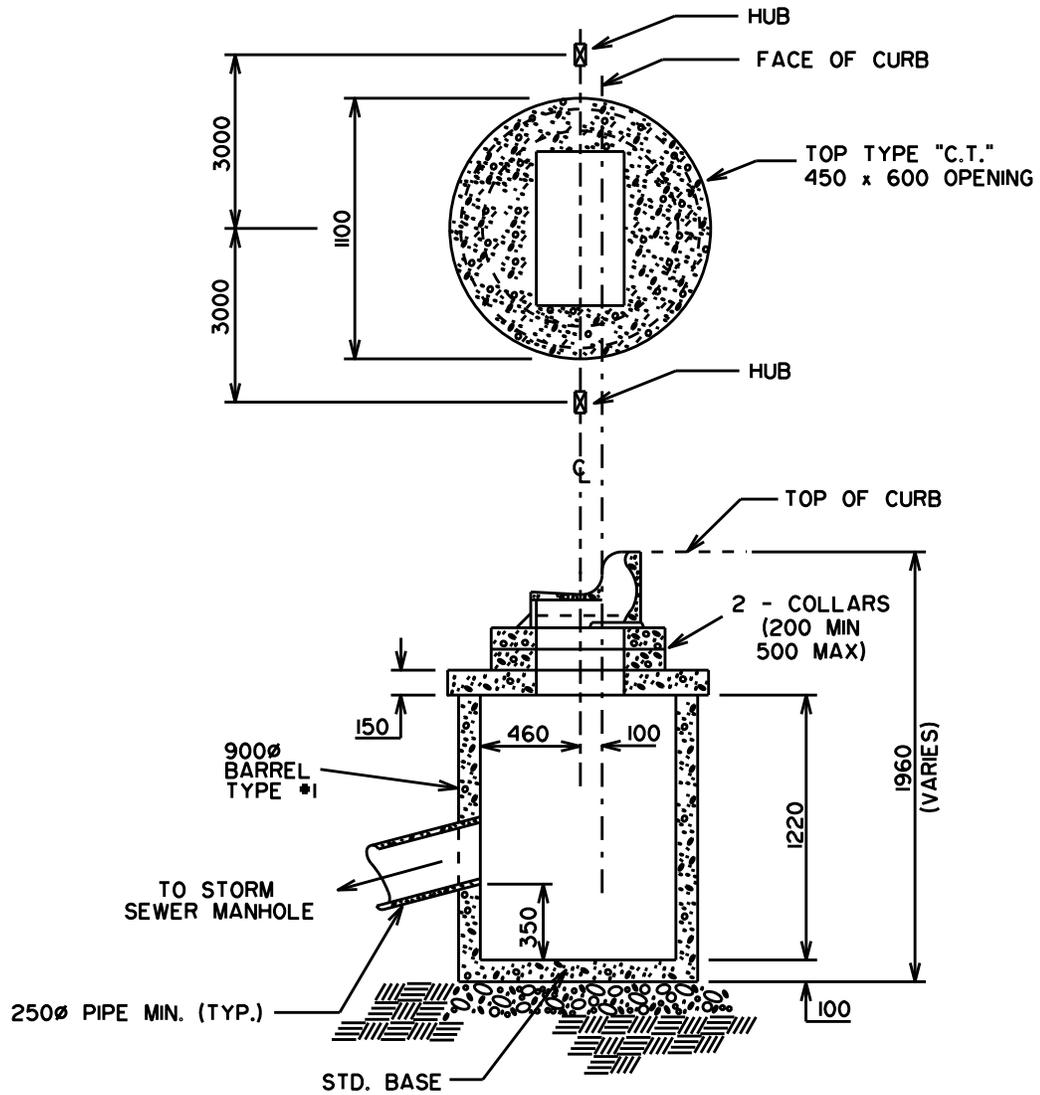


CURB & GUTTER WIDTH	DIMENSION	
	'A'	'B'
600mm	75mm	300mm
690mm	100mm	300mm

INSTALLING CATCH BASINS

- ALL JOINTS IN PRECAST SECTIONS TO BE SEALED WITH FLEXIBLE BUTYL RUBBER SEALANT (OR APPROVED EQUAL).
- PRECAST SECTION TO CONFORM TO A.S.T.M. C-478 (LATEST EDITION).
- ALL COVERS TO MEET CITY OF LETHBRIDGE STANDARDS.
- NO GRAVEL REQUIRED IF BASE IS SET ON UNDISTURBED SOIL. OTHERWISE 150 MINIMUM THICKNESS.
- ALL DIMENSIONS ARE IN MILLIMETRES.
- CEMENT TO BE TYPE 50 (SULFATE RESISTANT).

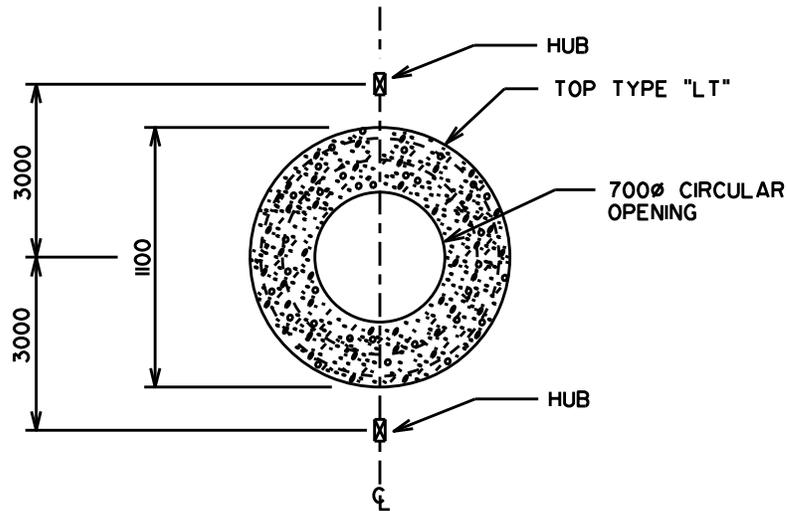
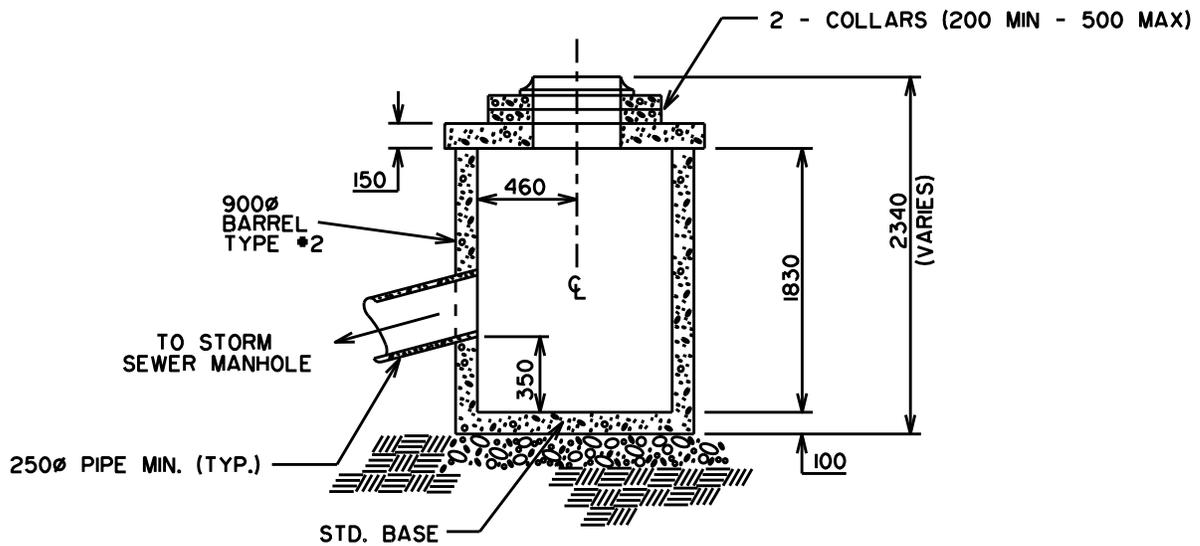
REVISED	 <p style="text-align: center;">CITY OF <i>Lethbridge</i> INFRASTRUCTURE SERVICES</p>	DRAWN	C.R.S.
		CHECKED	
		APPROVED	
		SCALE	N.T.S.
		DATE	97/03/06
		DWG NO	S-14
	CATCH BASIN ROLLED CURB		



INSTALLING CATCH BASINS

- ALL JOINTS IN PRECAST SECTIONS TO BE SEALED WITH FLEXIBLE BUTYL RUBBER SEALANT (OR APPROVED EQUAL).
- PRECAST SECTION TO CONFORM TO A.S.T.M. C-478 (LATEST EDITION).
- ALL COVERS TO MEET CITY OF LETHBRIDGE STANDARDS.
- NO GRAVEL REQUIRED IF BASE IS SET ON UNDISTURBED SOIL. OTHERWISE 150 MINIMUM THICKNESS.
- ALL DIMENSIONS ARE IN MILLIMETRES.
- CEMENT TO BE TYPE 50 (SULFATE RESISTANT).

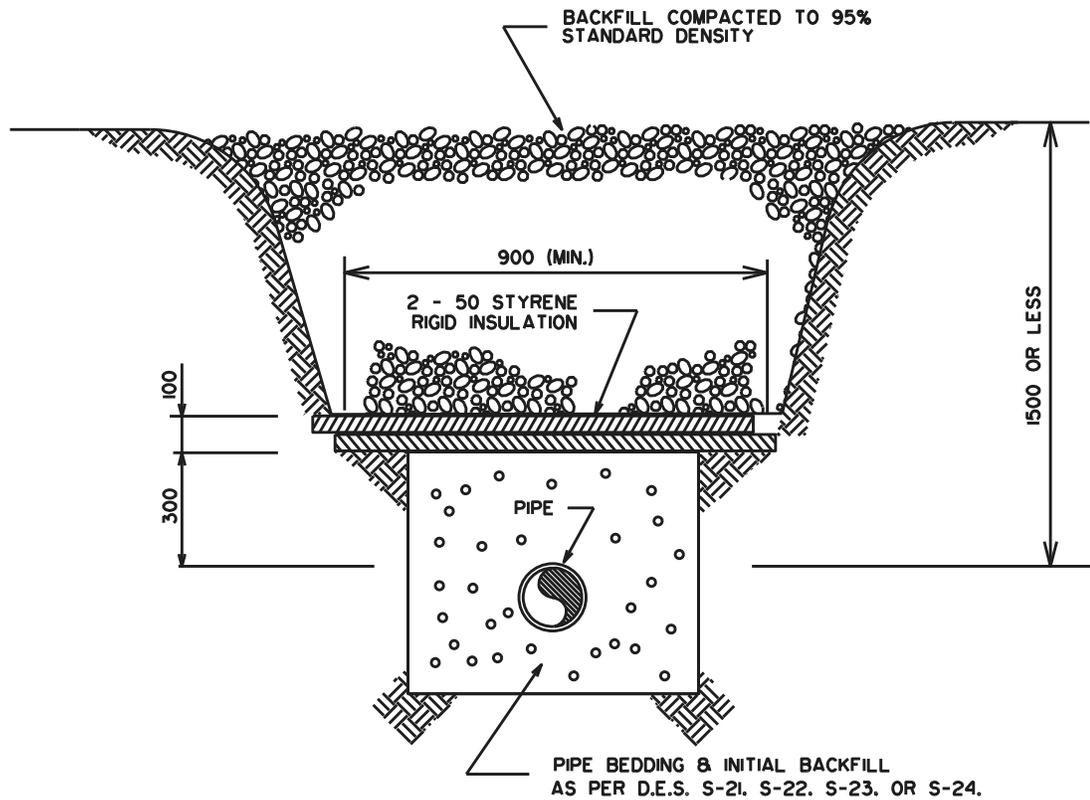
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NOV 17, 2004		CHECKED	
		APPROVED	
		SCALE	N.T.S.
		DATE	97/03/06
		DWG NO	S-15
TYPE 2 CATCH BASIN STANDARD CURB			



INSTALLING CATCH BASINS

- ALL JOINTS IN PRECAST SECTIONS TO BE SEALED WITH FLEXIBLE BUTYL RUBBER SEALANT (OR APPROVED EQUAL).
- PRECAST SECTION TO CONFORM TO A.S.T.M. C-478 (LATEST EDITION).
- ALL COVERS TO MEET CITY OF LETHBRIDGE STANDARDS.
- NO GRAVEL REQUIRED IF BASE IS SET ON UNDISTURBED SOIL. OTHERWISE 150 MINIMUM THICKNESS.
- ALL DIMENSIONS ARE IN MILLIMETRES.
- CEMENT TO BE TYPE 50 (SULFATE RESISTANT).
- SEE DRAWING S-14 FOR CATCH BASIN STAKING DETAILS.

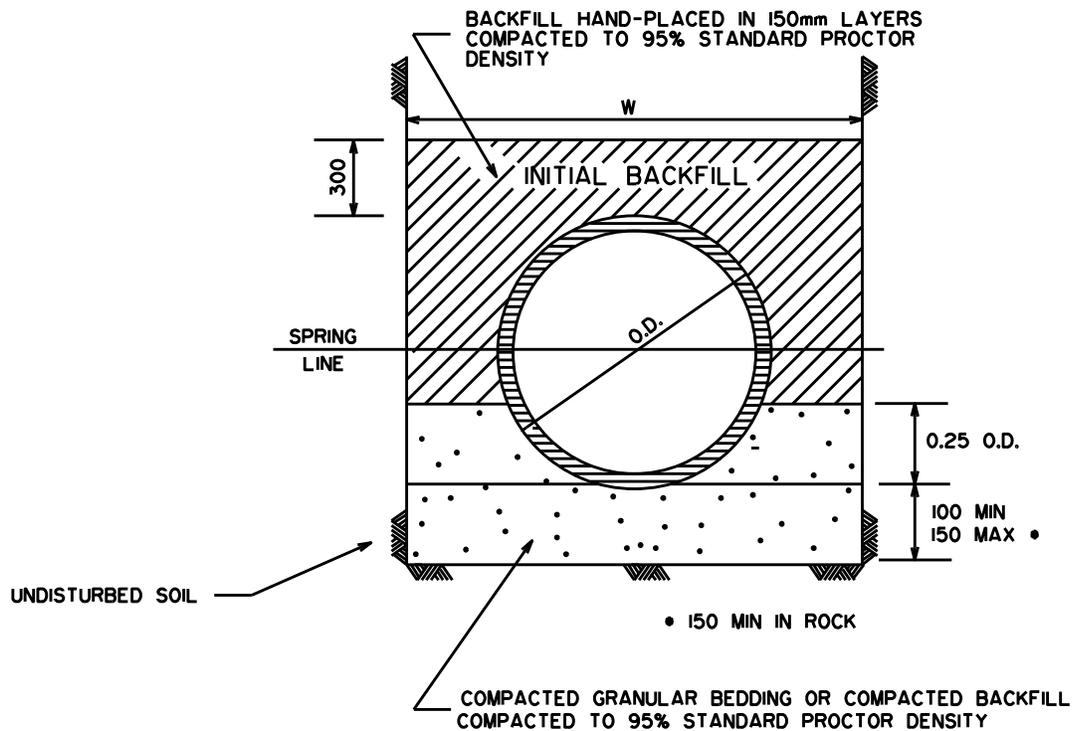
REVISED	 <p style="text-align: center;">CITY OF <i>Lethbridge</i> INFRASTRUCTURE SERVICES</p>	DRAWN	C.R.S.
NOV 17, 2004		CHECKED	
		APPROVED	
		SCALE	N.T.S.
		DATE	97/03/06
		DWG NO	S-16
TYPE 3 CATCH BASIN - ROUND TOP (FOR LANE INSTALLATION)			



NOTES:

- ALL DIMENSIONS IN MILLIMETERS
- FROST SHIELD TO BE USED IN TRENCHES THAT ARE 1500mm OR LESS IN DEPTH.
- STAGGER JOINTS ON INSULATION 50mm ACROSS WIDTH OF DITCH.
- STAGGER JOINTS OF INSULATION $\frac{1}{2}$ SHEET ALONG LENGTH OF DITCH.
- INSULATION TO BE 'STYROFOAM - HIGHLOAD' BRAND EXTRUDED EXPANDED POLYSTYRENE FOAM MANUFACTURED BY DOW CHEMICAL CANADA INC. OR APPROVED EQUAL.

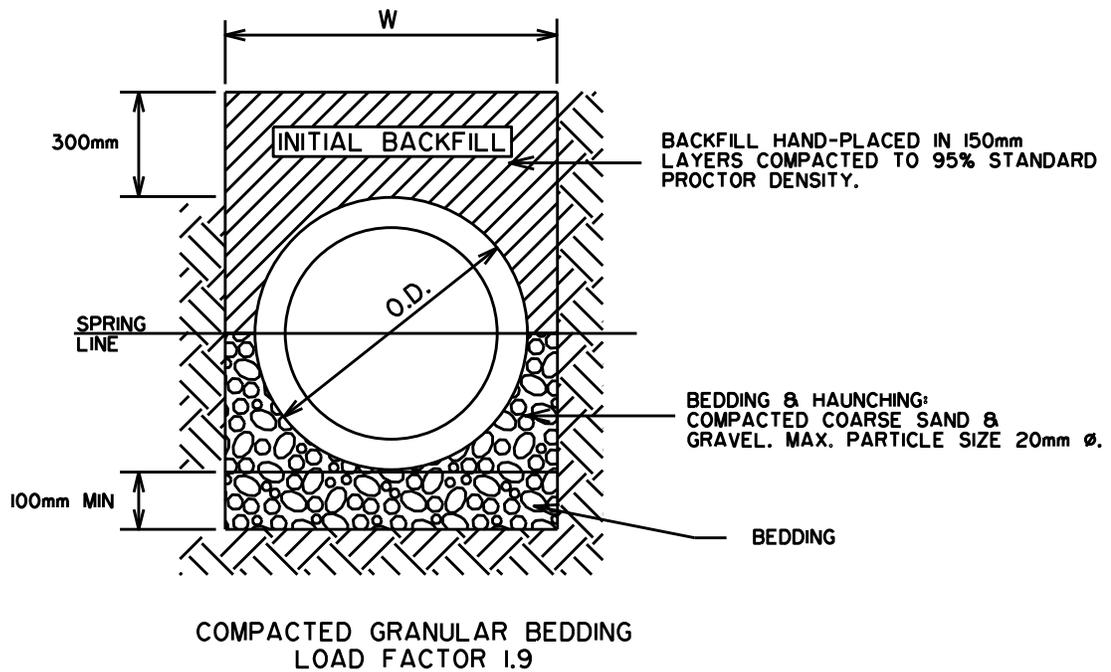
REVISED	 <p>CITY OF <i>Lethbridge</i> INFRASTRUCTURE SERVICES</p> <p>STANDARD FOR FROST SHIELD FOR MAINS & SERVICES</p>	DRAWN	P.R.A.
		CHECKED	
		APPROVED	
		SCALE	N.T.S.
		DATE	97/03/11
		DWG NO	S-19



GRANULAR FOUNDATION

- GRANULAR FOUNDATION - THE PIPE SHALL BE BEDDED IN COMPACTED GRANULAR MATERIAL HAVING A MINIMUM THICKNESS OF 100mm AND A MAX THICKNESS OF 150mm
- PROVIDE PIPE SIDE SUPPORT IN THE HAUNCHING AREA. MATERIAL SHALL EXTEND ABOVE THE BEDDING TO A POINT EQUAL TO 0.25 x O.D. OF THE PIPE
- LOAD FACTOR = 1.5
- W = O.D. + 400 FOR PIPE 840 Ø & SMALLER
- W = O.D. + 600 FOR PIPE LARGER THAN 840 Ø
- GRANULAR BEDDING SHALL BE COARSE SAND OR GRAVEL. MAXIMUM PARTICLE SIZE TO BE 20mm Ø.

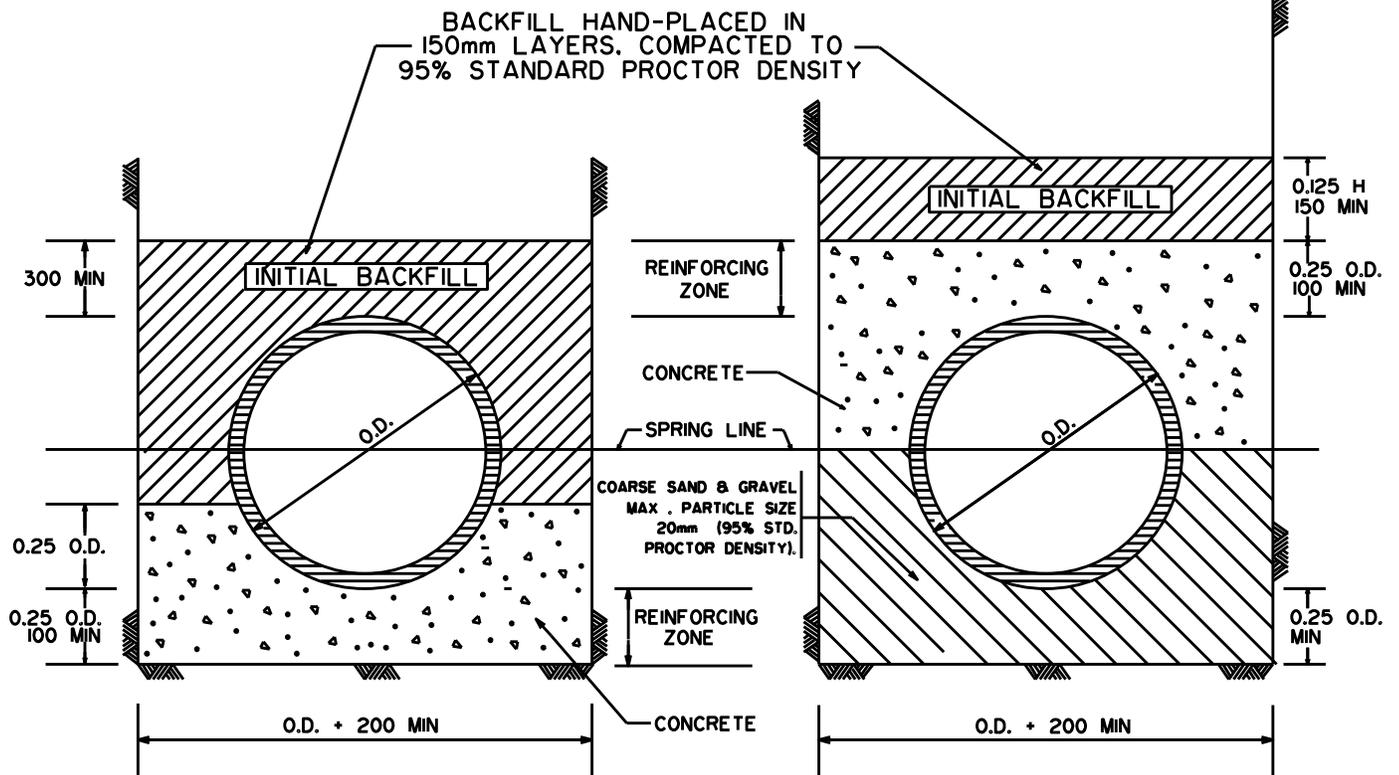
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		CHECKED	
		APPROVED	
		SCALE	N.T.S.
		DATE	97/03/11
		DWG NO	S-21
	CLASS 'C' BEDDING RIGID PIPE		



- COMPACTED GRANULAR BACKFILL - THE PIPE SHALL BE BEDDED IN COMPACTED GRANULAR MATERIAL HAVING A 100mm MINIMUM THICKNESS BENEATH THE PIPE, AND EXTEND TO A HEIGHT LEVEL WITH THE SPRING LINE OF THE PIPE AT THE SIDES.
- THE BACKFILL IS TO BE HAND-PLACED IN 150mm LAYERS AND DENSELY COMPACTED TO A POINT 300mm MINIMUM ABOVE THE PIPE.

NOTE: $W = O.D. + 400$ FOR PIPE 840 ϕ AND SMALLER.
 $W = O.D. + 600$ FOR PIPE LARGER THAN 840 ϕ .
 O.D. = OUTSIDE DIAMETER.

REVISED	 <p>CITY OF <i>Lethbridge</i> INFRASTRUCTURE SERVICES</p>	DRAWN	P.R.A.
		CHECKED	
		APPROVED	
		SCALE	N.T.S.
		DATE	97/03/11
	CLASS 'B' BEDDING (RIGID PIPE)	DWG NO	S-22



DETAIL "A" - CONCRETE CRADLE

DETAIL "B" - CONCRETE ARCH

DETAIL "A" - CONCRETE CRADLE

- THE PIPE SHALL BE EMBEDDED IN A MONOLITHIC CRADLE OF PLAIN OR REINFORCED CONCRETE HAVING A MINIMUM THICKNESS OF ONE-FOURTH THE I.D. OR A MINIMUM OF 100 UNDER THE BARREL AND EXTENDING UP THE SIDES FOR A HEIGHT EQUAL TO ONE-FOURTH THE O.D.
- THE CRADLE SHALL HAVE A WIDTH AT LEAST EQUAL TO THE O.D. OF THE PIPE BARREL PLUS 200.
- BACKFILL ABOVE THE CRADLE TO EXTEND 300 ABOVE THE CROWN OF THE PIPE AND IT SHALL BE COMPACTED TO 95% STANDARD PROCTOR DENSITY (MIN.). MOISTURE TO BE +3% TO -1% OF OPTIMUM.

DETAIL "B" - CONCRETE ARCH

- THE PIPE SHALL BE EMBEDDED IN COMPACTED GRANULAR MATERIAL (95% STANDARD PROCTOR DENSITY) HAVING A MINIMUM THICKNESS OF ONE-FOURTH THE O.D. BETWEEN BARREL AND BOTTOM OF TRENCH EXCAVATION AND EXTENDING HALFWAY UP THE SIDES OF THE PIPE.
- THE TOP HALF OF THE PIPE SHALL BE COVERED WITH A MONOLITHIC PLAIN OR REINFORCED CONCRETE ARCH HAVING A MINIMUM THICKNESS OF ONE-FOURTH THE INSIDE DIAMETER AT THE CROWN AND HAVING A MINIMUM WIDTH EQUAL TO THE O.D. PLUS 200.

NOTE: O.D. = OUTSIDE DIAMETER

I.D. = INSIDE OF PIPE

H = COVER ABOVE TOP OF PIPE

AS = % AREA OF TRANSVERSE STEEL LOCATED IN THE REINFORCING ZONE

REINFORCED $A_s = 1\%$. LOAD FACTOR = 4.8

REINFORCED $A_s = 0.4\%$. LOAD FACTOR = 3.4

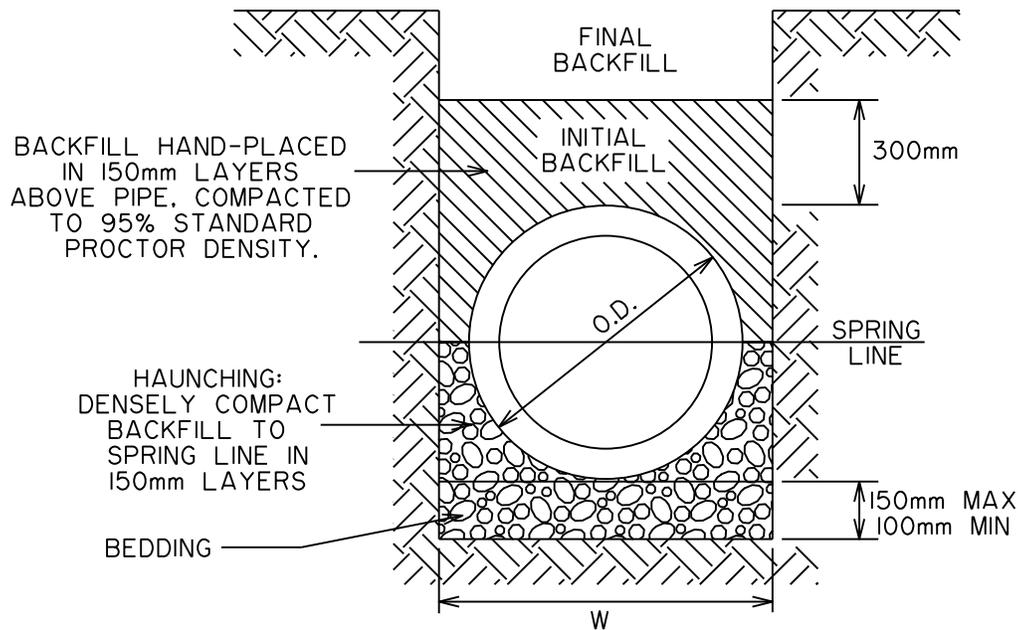
NON-REINFORCING. LOAD FACTOR = 2.3

ALL CONCRETE TO BE 20 MPa MIN.

CEMENT TO BE TYPE 50 (SULPHATE RESISTANT)

DO NOT USE WITH FLEXIBLE PIPES (IE. PVC)

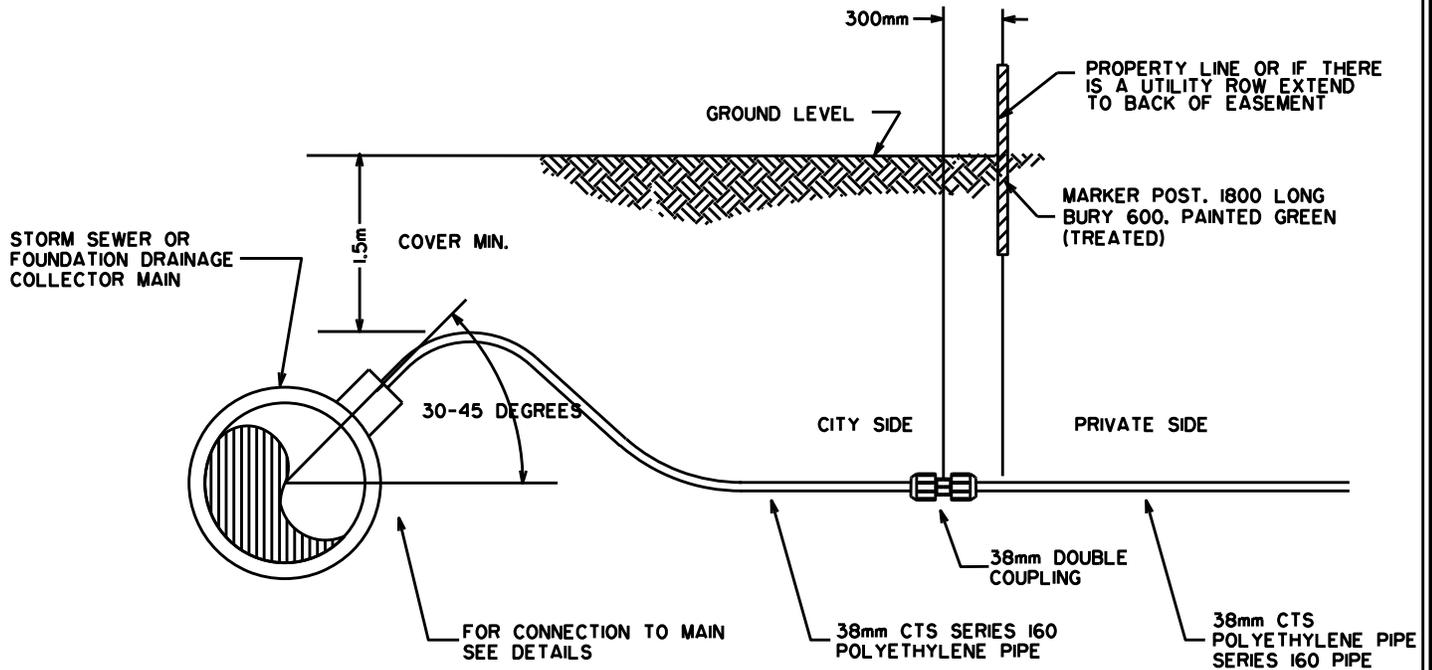
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		CHECKED	
		APPROVED	
		SCALE	N.T.S.
		DATE	97/03/11
		DWG NO	S-23
CLASS "A" BEDDING (RIGID PIPE)			



NOTE:

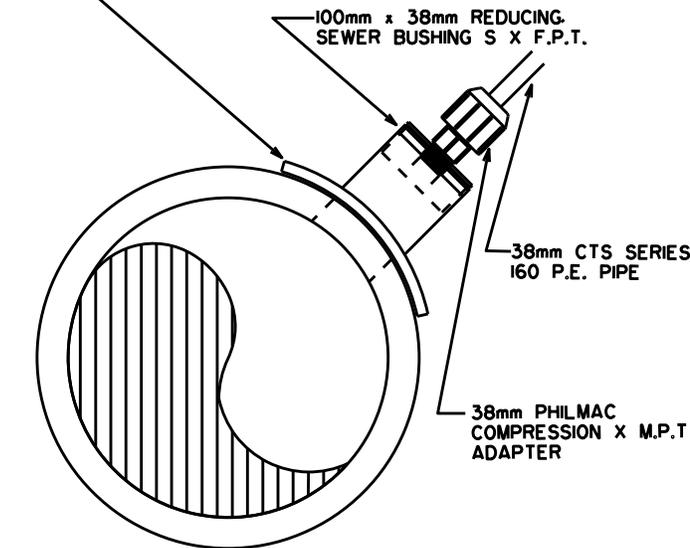
1. GRANULAR MATERIALS ARE TO BE USED IN THE BEDDING AND HAUNCHING ZONES. ALL BEDDING AND HAUNCHING MATERIALS ARE TO BE COMPACTED TO MINIMUM 95% STANDARD PROCTOR DENSITY.
2. GRANULAR OR SELECT NATIVE MATERIALS MAY BE USED IN THE INITIAL BACKFILL ZONE. ALL INITIAL BACKFILL MATERIALS ARE TO BE COMPACTED TO MINIMUM 95% STANDARD PROCTOR DENSITY.
3. ALL GRANULAR MATERIALS ARE TO CONFORM TO THE APPROVED GRADATIONS IN THE SPECIFICATION.
4. WHEN COMPACTING IN PIPE ZONE, CARE SHOULD BE TAKEN TO AVOID CONTACT BETWEEN THE PIPE AND COMPACTION EQUIPMENT (JUMPING JACKS, TAMPING BARS, ETC.)
5. COMPACTION IN THE HAUNCHING AREA IS TO BE OBTAINED BY USE OF JUMPING JACKS AND TAMPING BARS. CARE SHOULD BE TAKEN TO ENSURE THAT THE PIPE DOES NOT "FLOAT" DUE TO COMPACTIVE METHODS.
6. WHEN COMPACTING INITIAL BACKFILL, JUMPING JACKS ARE TO BE USED ADJACENT TO THE PIPE. JUMPING JACKS SHALL NOT BE USED DIRECTLY ABOVE THE PIPE UNTIL A MINIMUM OF 0.3m OF MATERIAL IS IN PLACE ABOVE THE PIPE.
7. WHEN COMPACTING FINAL BACKFILL, ROLLING EQUIPMENT IS NOT TO BE USED IN DITCH UNTIL A MINIMUM OF 0.5m OF BACKFILL MATERIAL IS IN PLACE ABOVE THE TOP OF PIPE.
8. IF A HYDRO-HAMMER IS USED TO COMPACT FINAL BACKFILL, A MINIMUM OF 1.0m COVER IS REQUIRED OVER THE PIPE. DO NOT USE A HYDRO-HAMMER ON INITIAL BACKFILL.
9. TRENCH WIDTH IS CRITICAL FOR PROPER PIPE SUPPORT. DO NOT EXCEED THE FOLLOWING TRENCH WIDTH DIMENSIONS:
 - W= O.D. + 300mm (MIN)
 - W= I.D. + 600mm (MAX)
 FOR FLEXABLE PIPES ie. P.V.C, PE

REVISED	 <p>CITY OF <i>Lethbridge</i> INFRASTRUCTURE SERVICES</p>	DRAWN	C.R.S.
		CHECKED	
		APPROVED	
		SCALE	N.T.S.
		DATE	97/03/11
		DWG NO	S-24
BEDDING AND BACKFILLING FLEXIBLE PIPE			



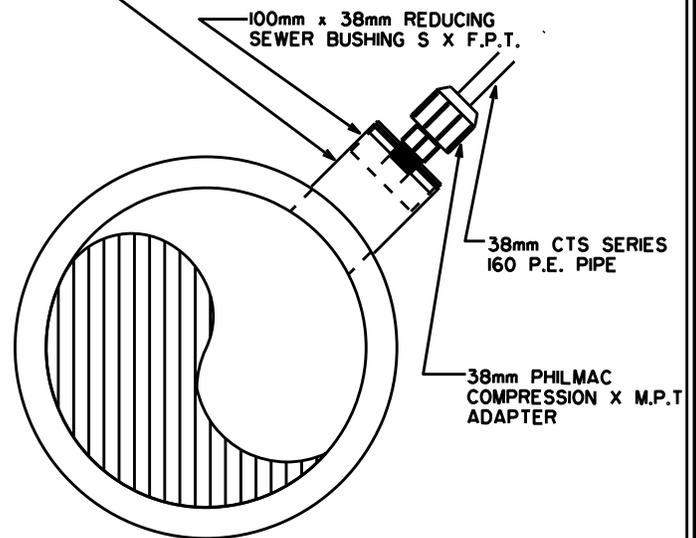
NOTE: CAUTION PROPER INSERT REQUIRED FOR PHILMAC FITTINGS

100Ø PVC STRAP-ON SADDLE C/W RUBBER GASKET & STAINLESS STEEL STRAPS OR LE-RON PLASTICS INSERTA TEE OR EZ TEE 100mm X 37mm THREADED BUSHING & SS STRAPS



FOR CONNECTION TO P.V.C. MAINS

100Ø FERRO E-Z STRAP OR LE-RON PLASTICS INSERTA TEE



FOR CONNECTION TO CONCRETE MAINS

REVISED



CITY OF
Lethbridge
INFRASTRUCTURE SERVICES

STANDARD FOR PUMPED FOUNDATION DRAINAGE SERVICE LINE

DRAWN

K.L.A.

CHECKED

APPROVED

SCALE

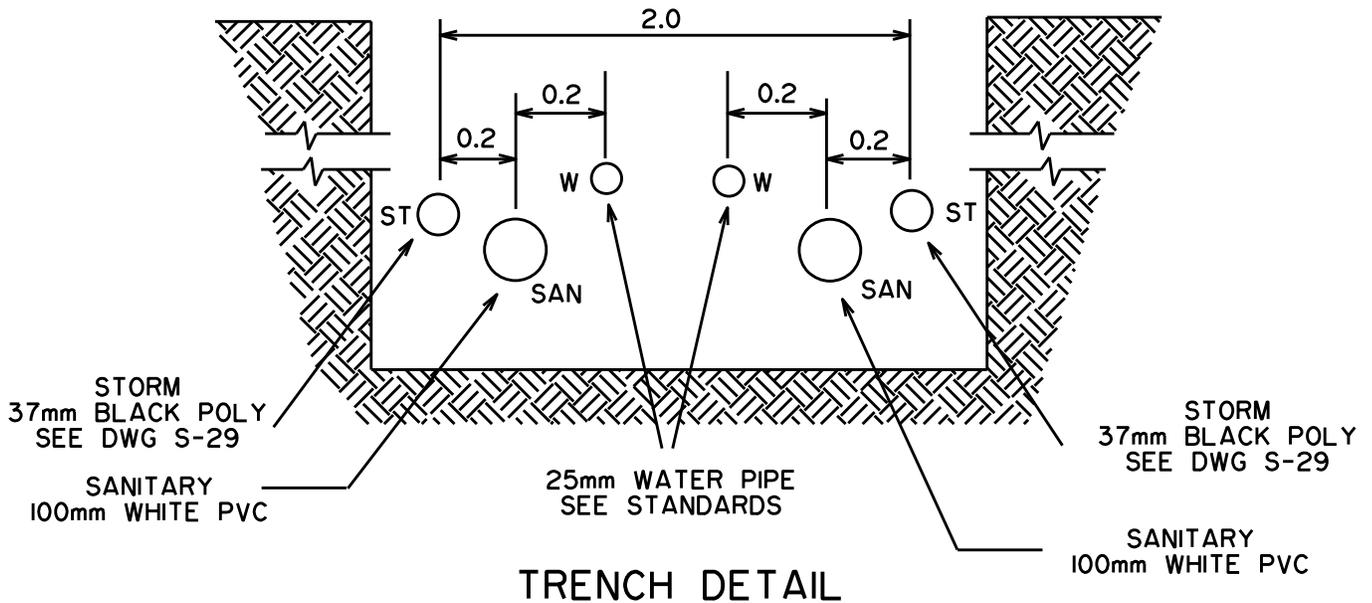
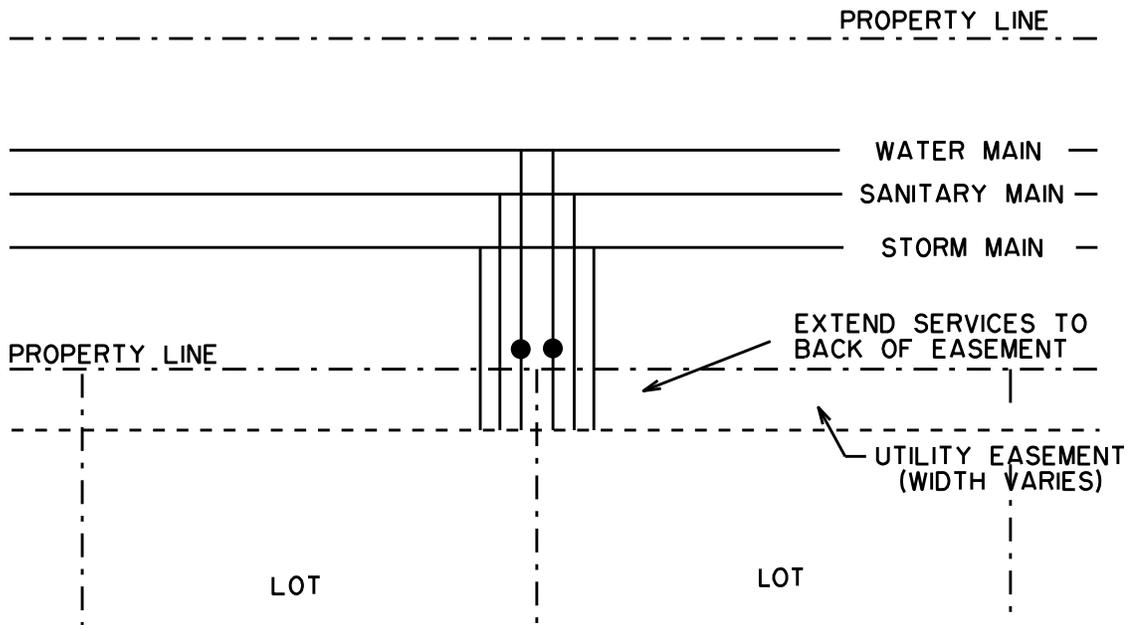
N.T.S.

DATE

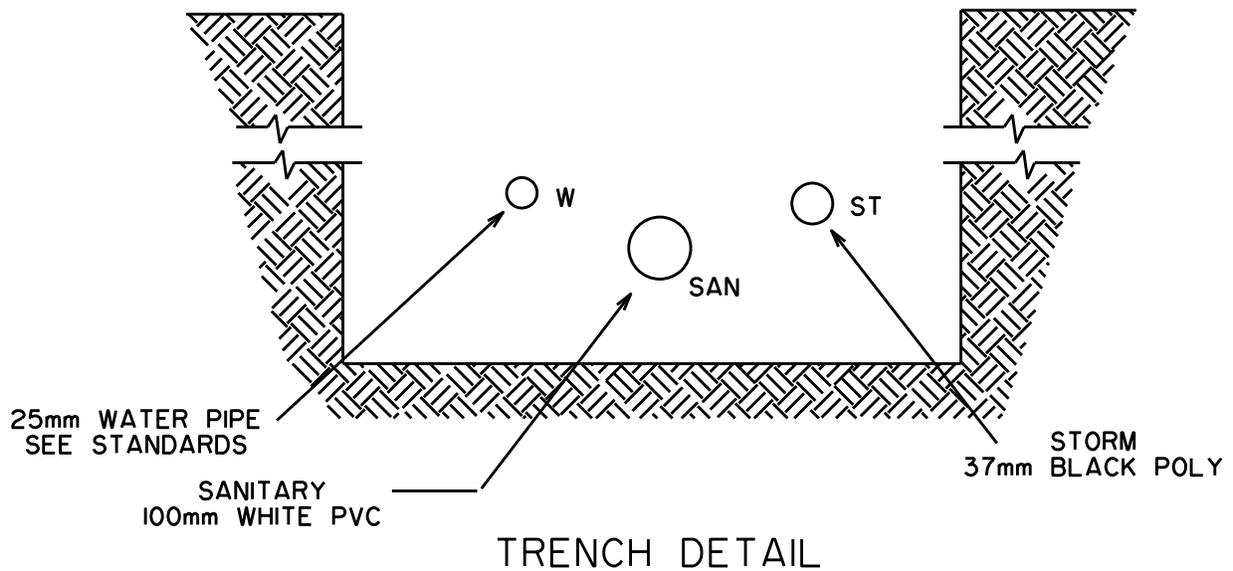
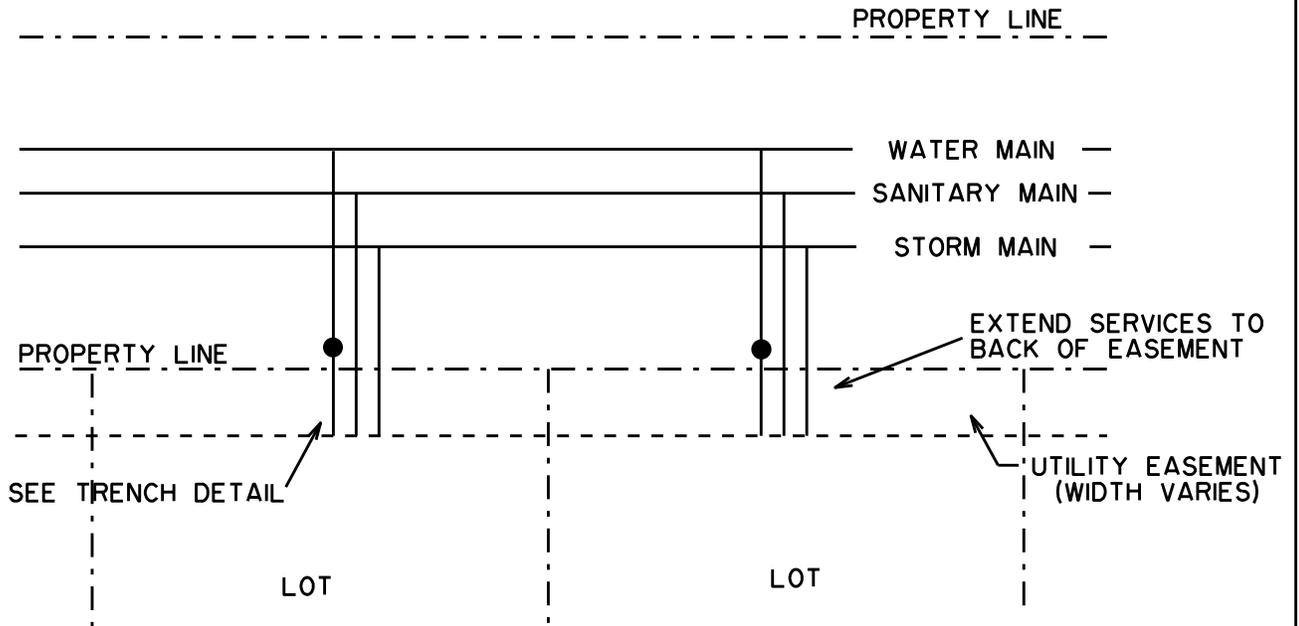
97/03/12

DWG NO

S-29



REVISED	 CITY OF <i>Lethbridge</i> INFRASTRUCTURE SERVICES	DRAWN	D.F.
FEB 27. 2006		CHECKED	
NOV 15. 2006		APPROVED	
FEB 4. 2008		SCALE	NTS
AUG 24. 2009		DATE	97/03/11
AUG 2019		DWG NO	S-30
DOUBLE SERVICED LOTS			

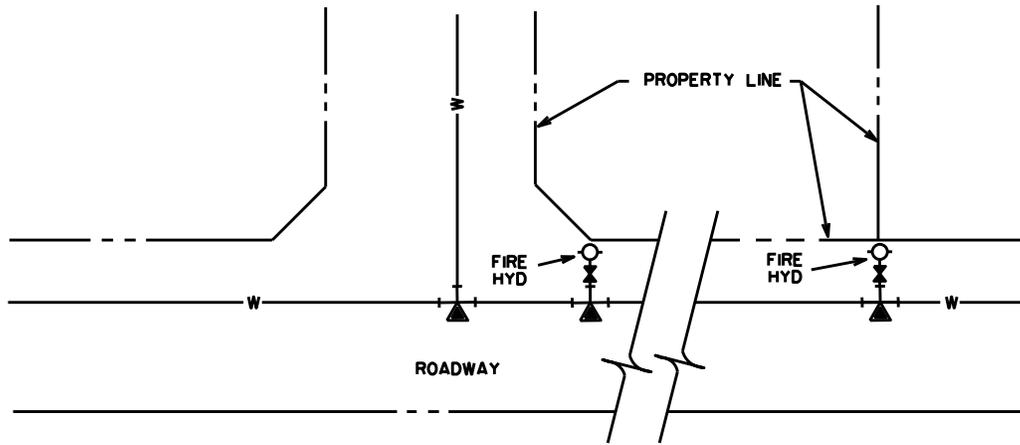


REVISED	 <p>CITY OF <i>Lethbridge</i> INFRASTRUCTURE SERVICES</p>	DRAWN	D.F.
FEB 27. 2006		CHECKED	
NOV 15. 2006		APPROVED	
JAN 10. 2008		SCALE	NTS
AUG 24. 2009		DATE	97/03/11
AUG 2019		DWG NO	S-30A
SINGLE FAMILY LOTS			

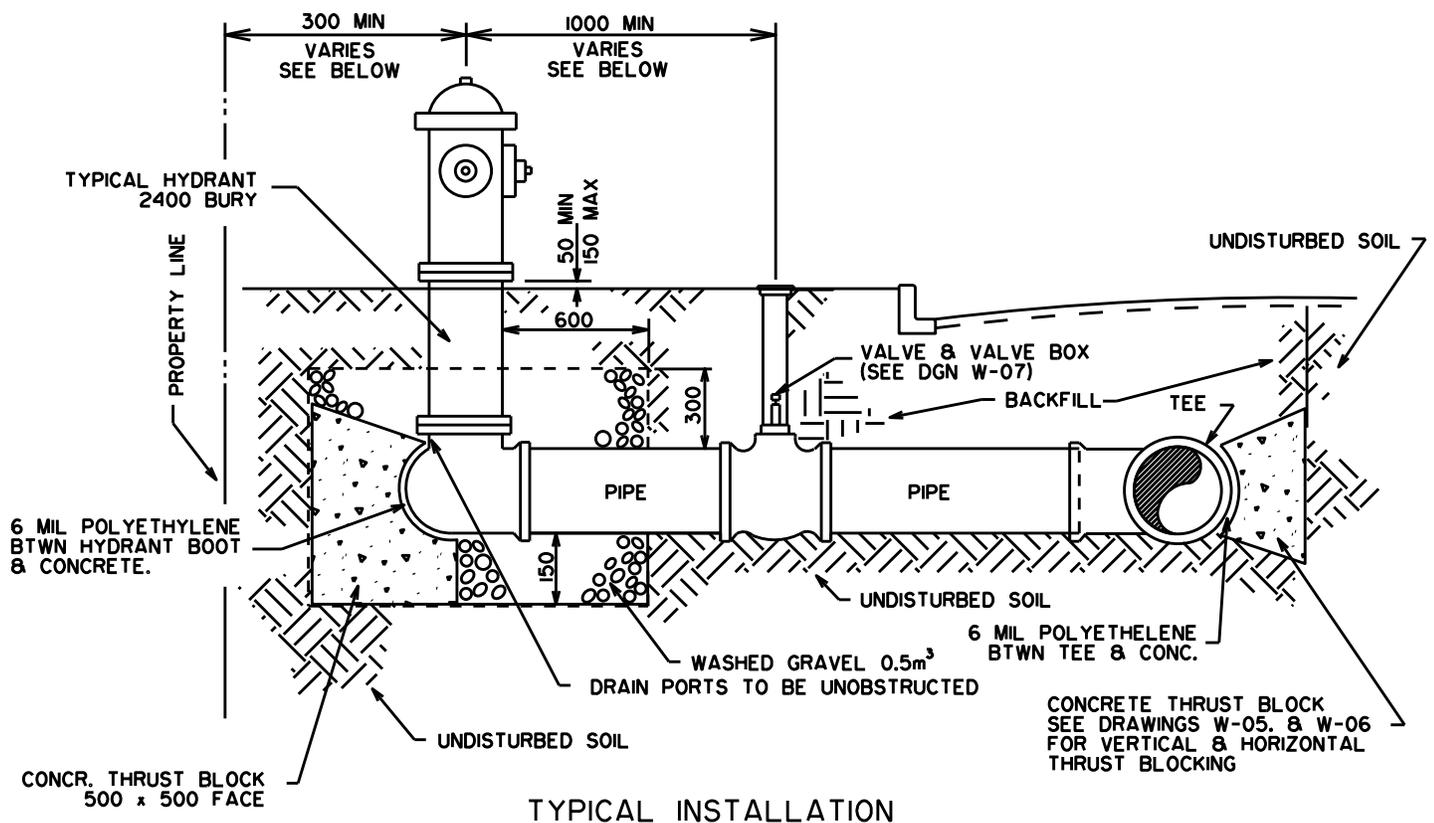
Appendix "B"

DETAILED ENGINEERING STANDARDS – WATER DISTRIBUTION SYSTEM

W-01	Standard for Fire Hydrant Installation
W-02	Standard for 25 mm Diameter Water Service
W-02A	Standard for 20 mm and 25 mm Diameter Water Service (RENEWAL)
W-03	Standard for 37 mm and 50 mm Diameter Water Service
W-03A	Curb Stand Detail (Service Box)
W-03B	Curb Stand Operating Rod Detail
W-04	Standard Water Service Connections for 150 mm & 200 mm Diameter Services
W-05	Horizontal Thrust Blocking
W-06	Vertical Thrust Blocking
W-07	Standard Gate Valve Installation
W-08	Standard Butterfly Valve Installation
W-09	Standard for 75 mm Diameter Irrigation Service Riser
W-10	Standard for 25 mm, 38 mm, and 50 mm Diameter Irrigation Service Riser
W-11	Standard Vacuum & Air Relief Valve Installation for PVC Pipe
W-12	Valve Box Riser
W-12A	Valve box cap
W-13	Chlorination Point Detail for Chlorinating and Flushing Water mains
W-14	300 mm Valve Box Riser
W-15	Typical Installation of 50 mm Water Meter



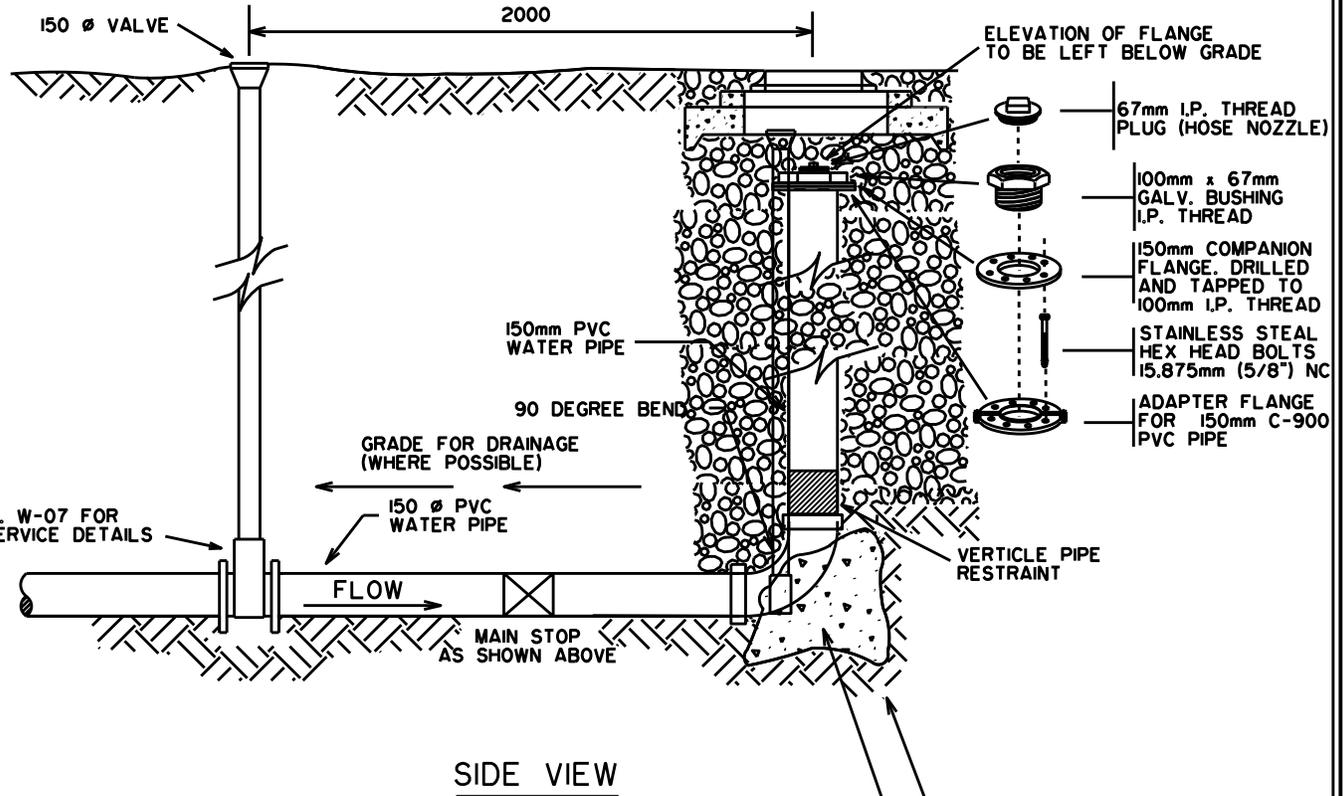
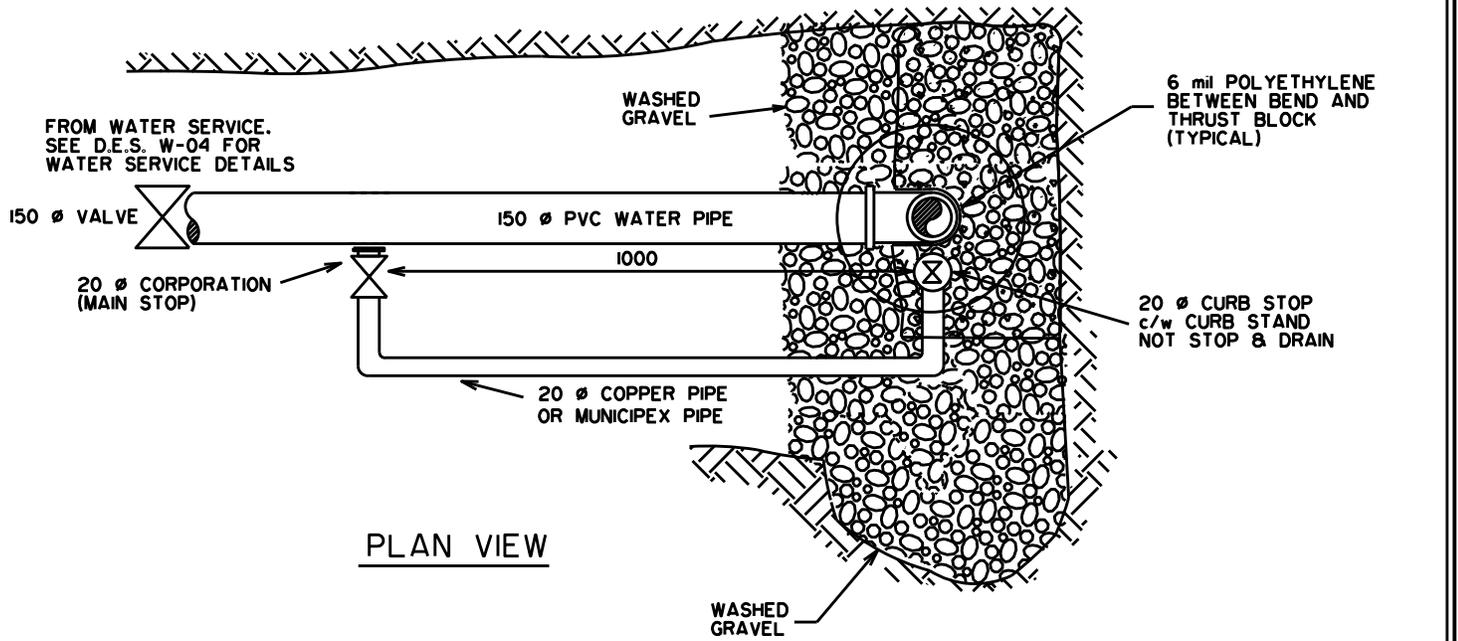
TYPICAL LOCATION



TYPICAL INSTALLATION

- THRUST BLOCKS SHALL BE OF CONCRETE OBTAINING A COMPRESSIVE STRENGTH OF AT LEAST 30 MP_a @ 28 DAYS. CEMENT TO BE TYPE 50 (SULPHATE RESISTANT).
- TO OBTAIN DISTANCE FROM PROPERTY LINE TO HYDRANT AND VALVE. SEE CITY OF LETHBRIDGE ROAD R.O.W. - LINE ASSIGNMENT CORRESPONDING TO R.O.W. WIDTH.
- ALL DIMENSIONS ARE IN MILLIMETERS.

REVISED	 <p>CITY OF <i>Lethbridge</i> INFRASTRUCTURE SERVICES</p> <p>STANDARD FOR FIRE HYDRANT INSTALLATION</p>	DRAWN	P.R.A.
07/01/10		CHECKED	
		APPROVED	
		SCALE	N.T.S.
		DATE	97/03/11
		DWG NO	W-01

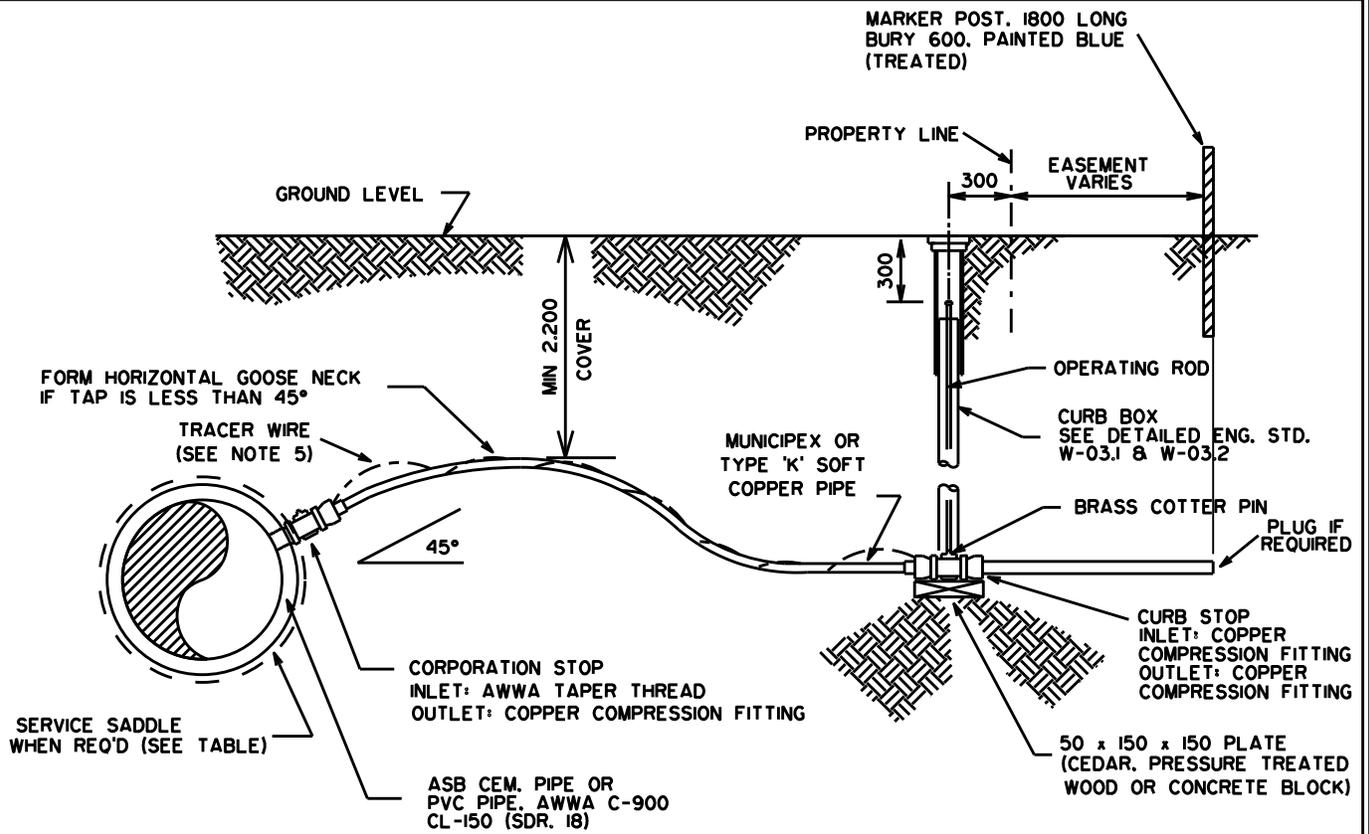


NOTES:

- ALL DIMENSIONS IN MILLIMETERS.
- PVC WATER PIPE TO BE CSA B137.3-M86, AWWA C-900, CL 150, DR 18.

CONCRETE THRUST BLOCK AS PER D.E.S. W-06 TABLE 'A' (TYPICAL)

REVISED	 <p style="text-align: center;">CITY OF <i>Lethbridge</i> INFRASTRUCTURE SERVICES</p>	DRAWN	DF
FEB 22/2016		CHECKED	
		APPROVED	
		SCALE	N.T.S.
		DATE	09/05/27
		DWG NO	W-01A
FLUSHING RISER			

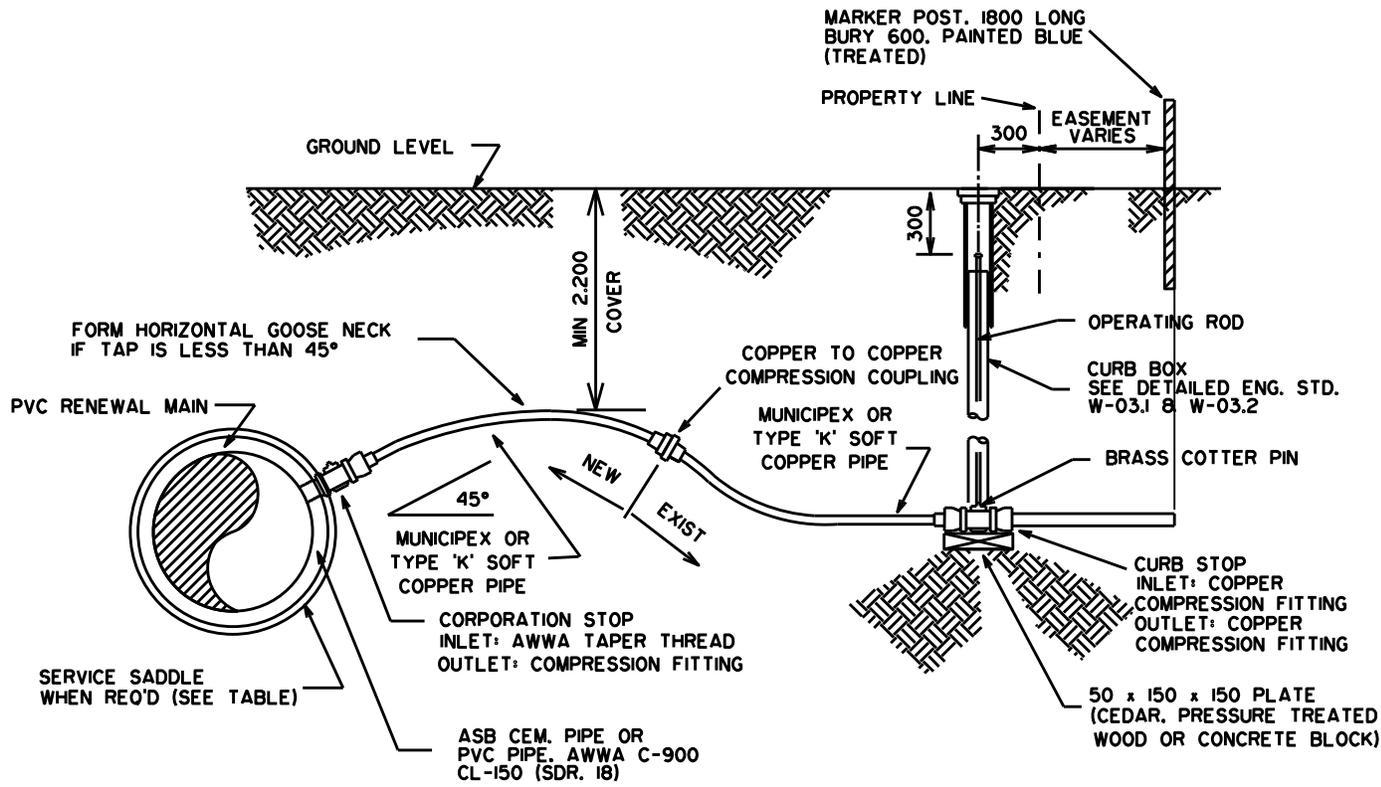


PIPE SIZE	MAX SIZE OF OUTLET ALLOWED WITH CL 150 AC PIPE		MAX SIZE OF OUTLET WITH PVC PIPE CL 150 (SDR.18)	
	CORPORATION STOP ONLY	CORP STOP WITH SERVICE SADDLE	CORPORATION STOP ONLY	CORP STOP WITH SERVICE SADDLE
100	-	25	20	50
150	-	37	25	50
200	-	50	25	50
250	-	50	25	50
300	-	50	25	50
350	-	50	25	50
400	-	50	25	50

NOTES:

1. CORPORATION STOPS TO BE STAGGERED AND AT LEAST 400 mm APART.
2. CORPORATION STOPS TO BE 300 mm MIN. FROM END OF PIPE SECTION.
3. USE AWWA THREAD FOR ALL DIRECT TAPS & SERVICE SADDLE CONNECTIONS
4. FOR CONNECTIONS IN EXISTING AREAS, HORIZONTAL GOOSENECK TO BE FORMED IF DEPTH IS LESS THAN 1500 mm
5. TRACER WIRE SHALL BE INSTALLED ON ALL SERVICES.

REVISED	 <p>CITY OF <i>Lethbridge</i> INFRASTRUCTURE SERVICES</p>	DRAWN	P.R.A.
DEC 15, 2005		CHECKED	
AUG 2019		APPROVED	
FEB 2020		SCALE	N.T.S.
		DATE	97/03/11
STANDARD FOR 25mm WATER SERVICE		DWG NO	W-02

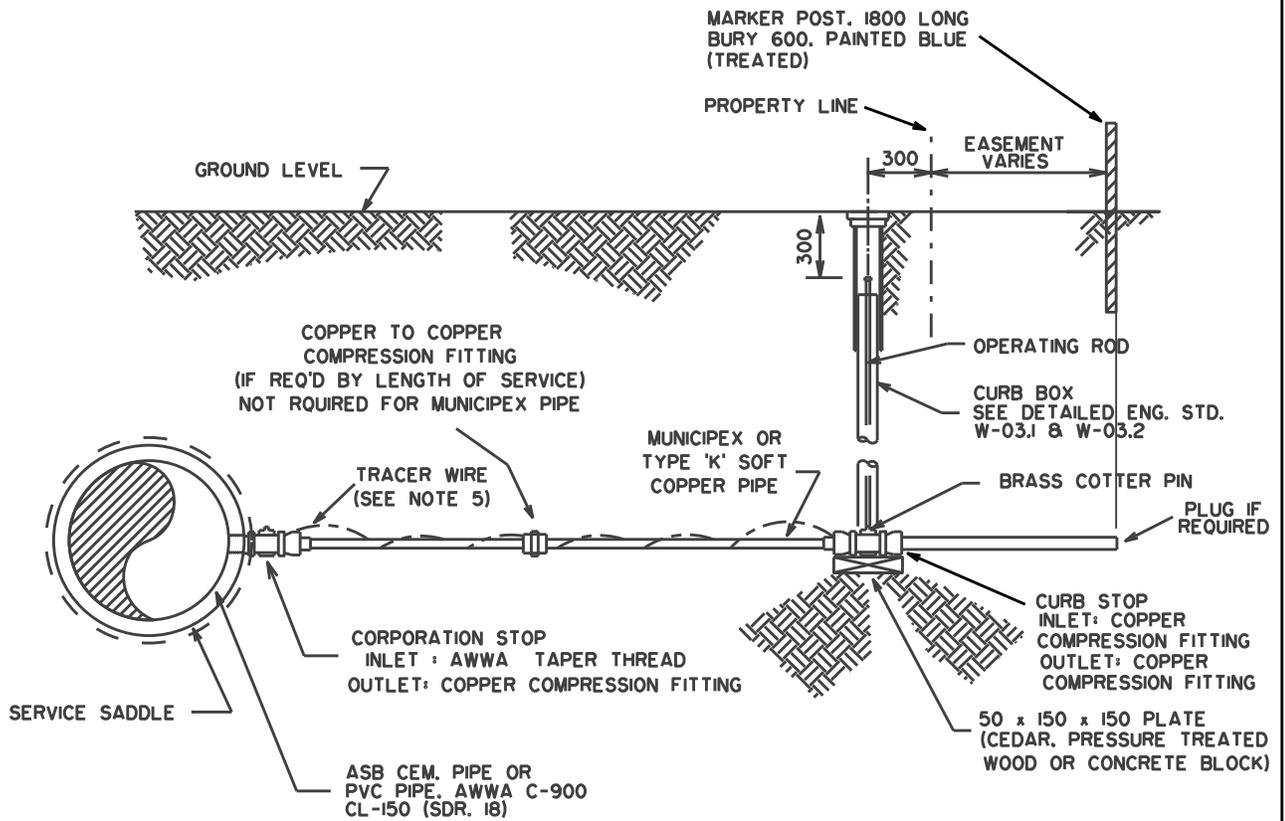


PIPE SIZE	MAX SIZE OF OUTLET ALLOWED WITH CL 150 AC PIPE		MAX SIZE OF OUTLET WITH PVC PIPE CL 150 (SDR.18)	
	CORPORATION STOP ONLY	CORP STOP WITH SERVICE SADDLE	CORPORATION STOP ONLY	CORP STOP WITH SERVICE SADDLE
100	-	25	20	50
150	-	37	25	50
200	-	50	25	50
250	-	50	25	50
300	-	50	25	50
350	-	50	25	50
400	-	50	25	50

NOTES:

1. CORPORATION STOPS TO BE STAGGERED AND AT LEAST 400 mm APART.
2. CORPORATION STOPS TO BE 300 mm MIN. FROM END OF PIPE SECTION.
3. USE AWWA THREAD FOR ALL DIRECT TAPS & SERVICE SADDLE CONNECTIONS
4. FOR CONNECTIONS IN EXISTING AREAS, HORIZONTAL GOSENECK TO BE FORMED IF DEPTH IS LESS THAN 1500 mm

REVISED	 <p style="text-align: center;">CITY OF <i>Lethbridge</i> INFRASTRUCTURE SERVICES</p> <p style="text-align: center;">STANDARD FOR 20mm & 25mm WATER SERVICE RENEWALS ONLY</p>	DRAWN	P.R.A.
DEC 15, 2005		CHECKED	D. P.
SEPT 2019		APPROVED	
		SCALE	N.T.S.
		DATE	97/03/11
		DWG NO	W-2A



PIPE SIZE	MAX SIZE OF OUTLET ALLOWED WITH CL 150 AC PIPE		MAX SIZE OF OUTLET WITH PVC PIPE CL 150 (SDR.18)	
	CORPORATION STOP ONLY	CORP STOP WITH SERVICE SADDLE	CORPORATION STOP ONLY	CORP STOP WITH SERVICE SADDLE
100	—	25	—	50
150	—	37	—	50
200	—	50	—	50
250	—	50	—	50
300	—	50	—	50
350	—	50		
400	—	50		

NOTES:

- SERVICE SADDLE TO BE BRONZE BODY, AWWA THREAD, C/W DOUBLE STAINLESS STEEL STRAP FOR PIPE > 100mm Ø & SINGLE 50mm WIDE FOR STAINLESS STEEL STRAP FOR PIPE 100 mm Ø
- CORPORATION STOPS TO BE STAGGERED AND AT LEAST 400 mm APART.
- CORPORATION STOPS TO BE 300 mm MIN. FROM END OF PIPE SECTION.
- USE AWWA THREAD FOR ALL DIRECT TAPS
- TRACER WIRE SHALL BE INSTALLED ON ALL SERVICES.

REVISED	 <p>CITY OF <i>Lethbridge</i> INFRASTRUCTURE SERVICES</p>	DRAWN	P.R.A.
SEPT 2019		CHECKED	
FEB 2020		APPROVED	
		SCALE	N.T.S.
		DATE	97/03/08
		STANDARD FOR 37mm & 50mm WATER SERVICE	DWG NO

FOR 20mm & 25mm VALVES

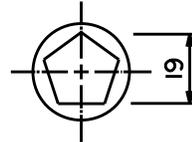
FOR 37mm & 50mm VALVES

CAST-IRON, RIBBED LID c/w 32mm
PENTAGON HEAD BRASS PLUG

STANDARD I.P. THREAD

35
MIN

610 MIN
1000 MAX



TOP VIEW
BRASS PLUG

35
MIN

610 MIN
1000 MAX

TOP BOX SLIDER, 38mm SCHEDULE 40
GALVANIZED IRON PIPE

CASING, 25mm SCHEDULE 40
GALVANIZED IRON PIPE

15.875mm Ø STAINLESS STEEL ROD
SEE ENGINEERING STANDARD W-03B

10mm Ø GALVANIZED SET SCREW
OR THREADED JOINT

NECK I.D.
38mm

38

230

15 92Ø

NECK I.D. 38mm

38

280

15 127Ø

EPOXY COATED BOOT

REVISED



CITY OF
Lethbridge

INFRASTRUCTURE SERVICES

CURB STAND DETAIL
(SERVICE BOX)

DRAWN

CHECKED

APPROVED

SCALE

N.T.S.

DATE

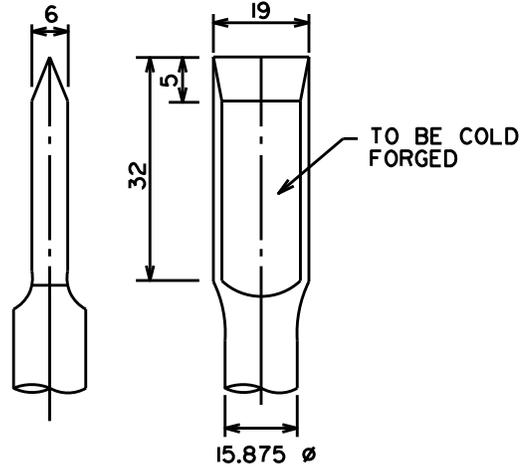
97/02/28

DWG NO

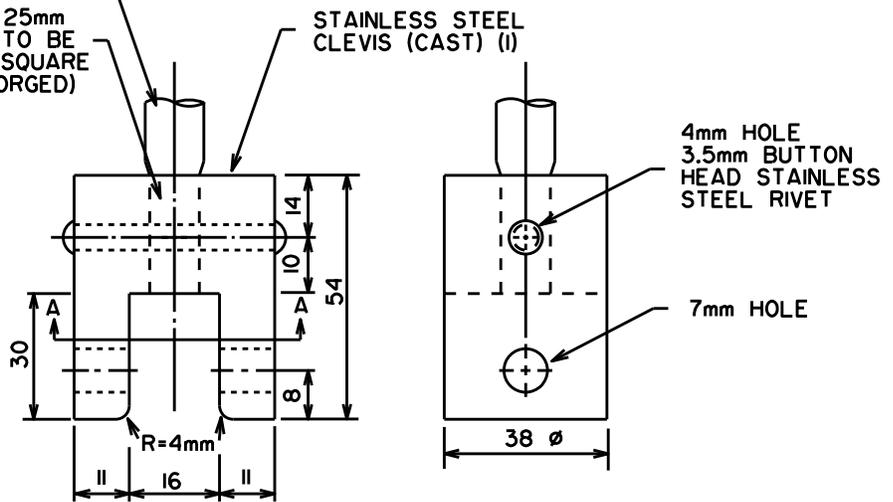
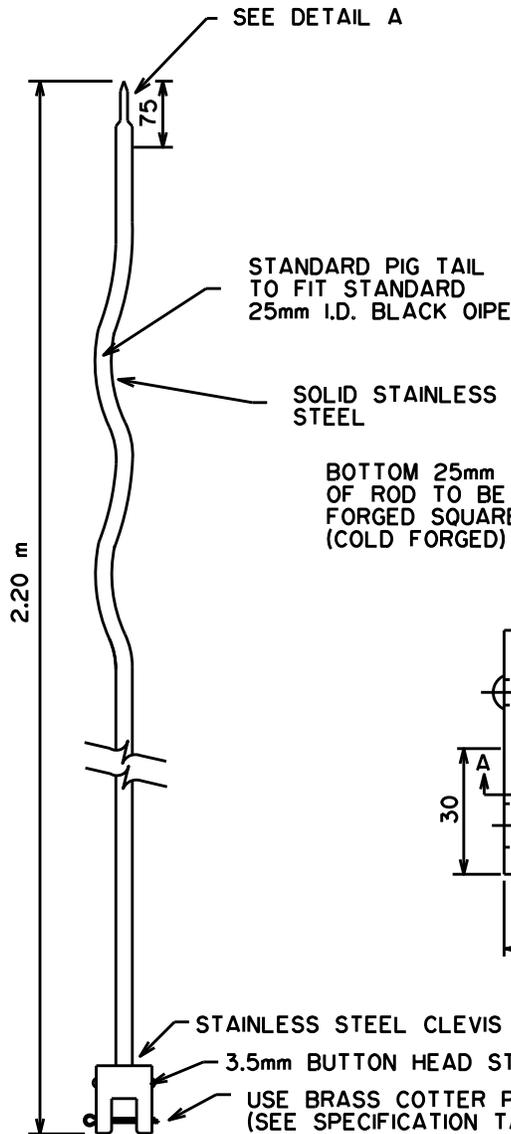
W-03A

COTTER PIN SPECIFICATIONS

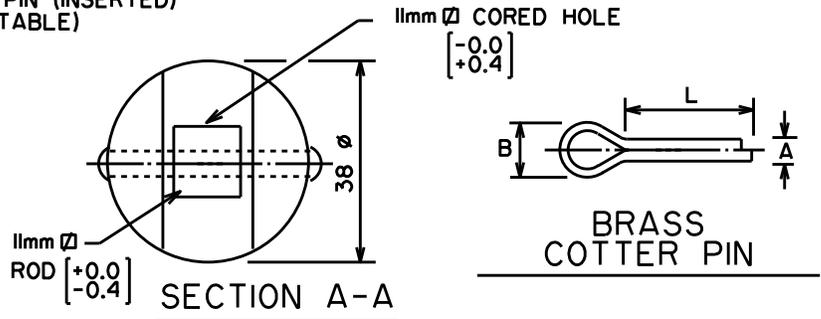
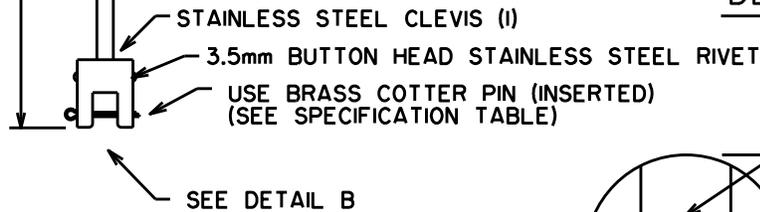
NOMINAL DIAMETER	DIAMETER A		OUTSIDE EYE DIAMETER B (MIN)	HOLE SIZE RECM'D	LENGTH L
	MAX	MIN			
6.35mm	5.7mm	5.6mm	12.7mm	6.7mm	55mm



DETAIL A



DETAIL B



REVISED
JAN 27, 2005 - (I)

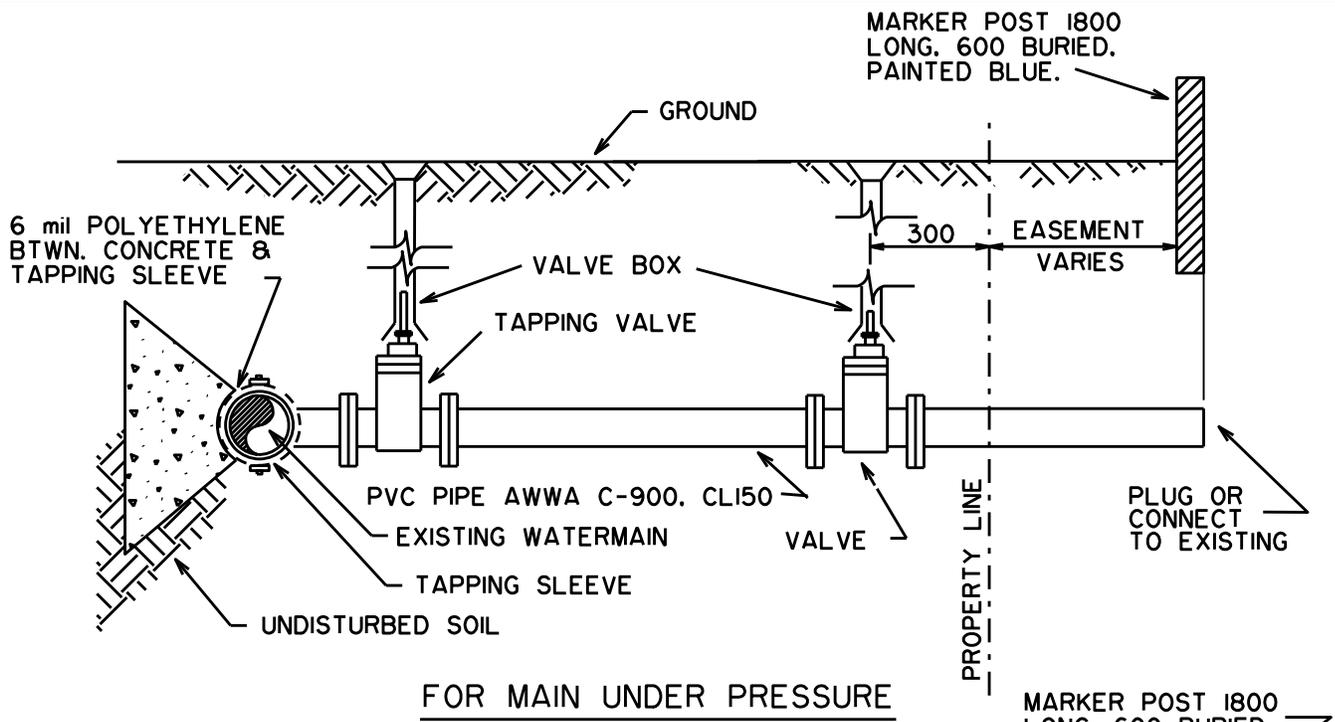


CITY OF
Lethbridge

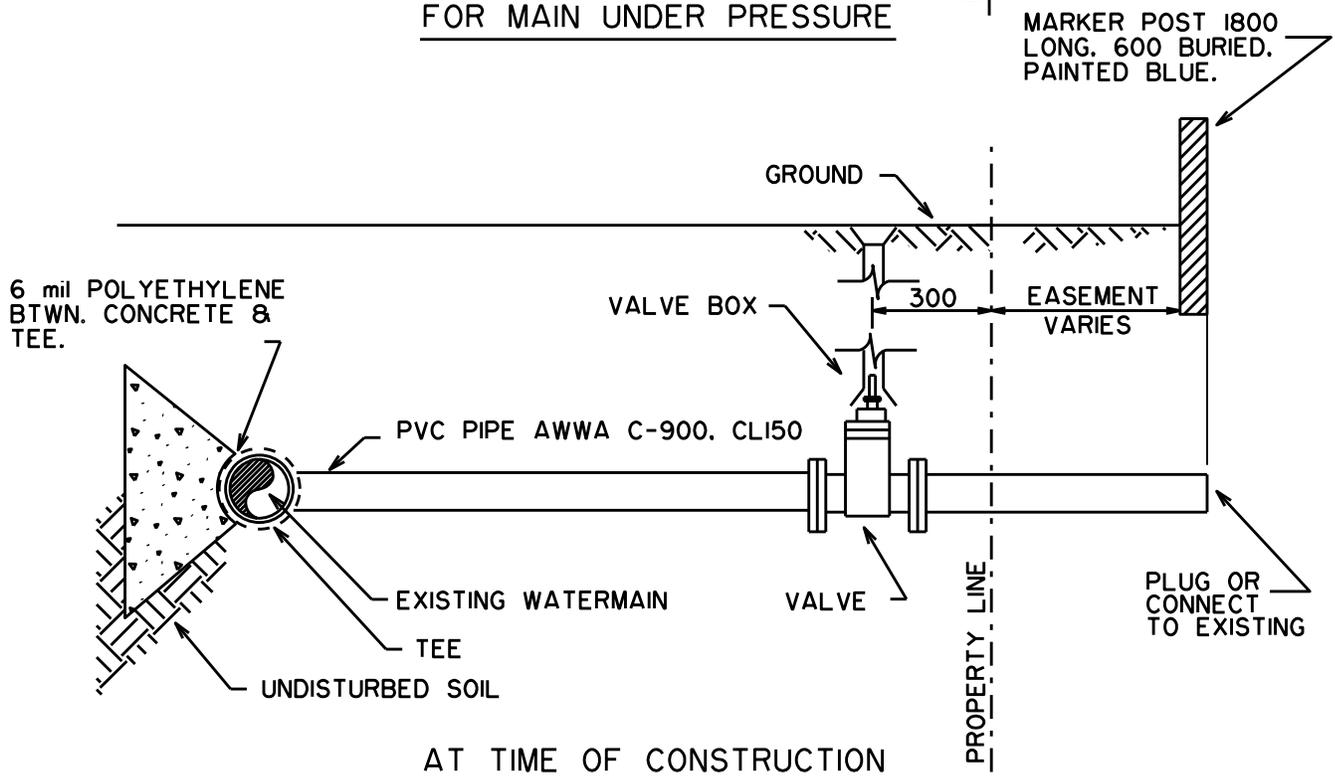
INFRASTRUCTURE SERVICES

CURB STAND OPERATING
ROD DETAIL

DRAWN	P.R.A.
CHECKED	
APPROVED	
SCALE	N.T.S.
DATE	97/02/07
DWG NO	W-03B



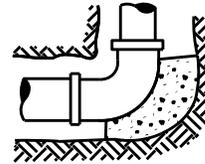
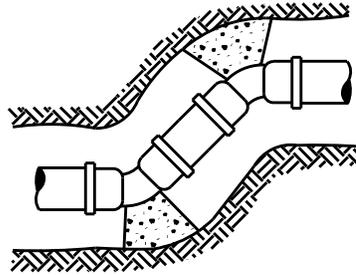
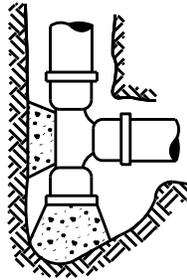
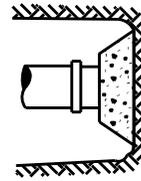
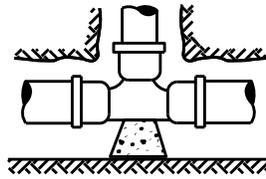
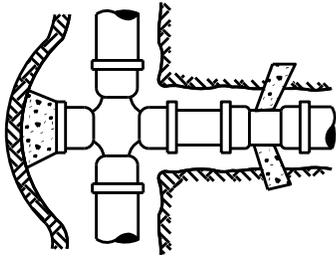
FOR MAIN UNDER PRESSURE



AT TIME OF CONSTRUCTION

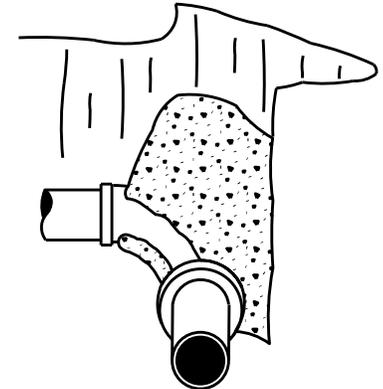
- NOTE:
- ALL DIMENSIONS IN MILLIMETERS.
 - THRUST BLOCKS TO BE AS PER "STANDARD FOR HORIZONTAL THRUST BLOCKING" DRAWING W-05.

REVISED	 <p>CITY OF <i>Lethbridge</i> INFRASTRUCTURE SERVICES</p>	DRAWN	P.R.A.
SEPT 2019		CHECKED	
		APPROVED	
		SCALE	N.T.S.
		DATE	97/02/19
		DWG NO	W-04
STANDARD WATER SERVICE CONNECTIONS FOR 150mm & 200mm			



FOR SMALL PIPE

LOCATION OF HORIZONTAL THRUST BLOCKS



FOR LARGE PIPE

TABLE "A"

THRUST BLOCK FACE AREA IN SQ. METRES AT FITTING FOR CL150 PIPE @ 1000kPa & SOIL BEARING CAPACITY OF 100 kPa

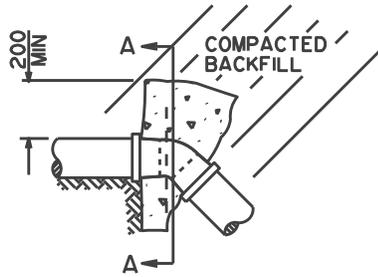
PIPE SIZE	DEAD ENDS & TEES	90° BEND	45° BEND	22 1/2° BEND	11 1/4° BEND
100	0.12	0.17	0.10	0.10	0.10
150	0.25	0.35	0.19	0.10	0.10
200	0.43	0.60	0.33	0.17	0.10
250	0.70	0.99	0.54	0.27	0.14
300	1.00	1.40	0.75	0.39	0.19
350	1.35	1.90	1.03	0.52	0.26
400	1.75	2.47	1.34	0.68	0.34
450	2.24	3.15	1.72	0.87	0.44
500	2.77	3.90	2.12	1.07	0.54
600	4.00	5.64	3.07	1.55	0.78
750	6.26	8.83	4.81	2.44	1.22
900	9.03	12.70	7.58	3.51	1.76

TABLE "B"

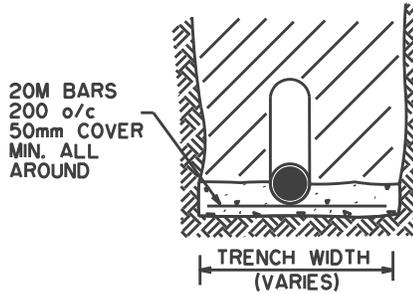
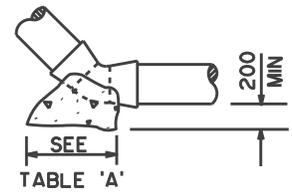
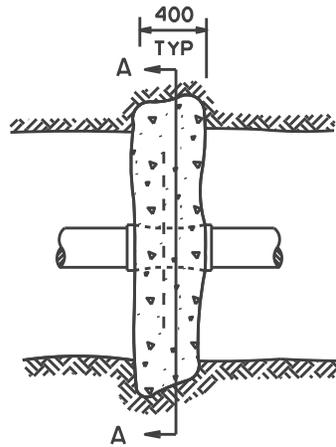
SOIL TYPE	SAFE BEARING LOAD - kPa
SOFT CLAY; LOOSE SAND	50
MED. SOFT CLAY; DENSE SAND	100
DENSE CLAY TILL & GRAVEL	150
HARD SHALE	500

- NOTE: - CONCRETE THRUST BLOCKS ARE TO BE PLACED AT ALL TEES, BENDS, PLUGS, CAPS, PIPE DEFLECTIONS AND REDUCERS.
- CONCRETE THRUST BLOCKS SHALL EXTEND INTO UNDISTURBED SOIL. THRUST BLOCKS IN SOFT UNSTABLE SOILS WILL REQUIRE REMOVAL OF SOIL & REPLACEMENT WITH COMPACTABLE FILL OF SUFFICIENT STABILITY TO RESIST THRUST TO THE SATISFACTION OF THE ENGINEER.
- THRUST BLOCKS SHALL BE OF CONCRETE OBTAINING A COMPRESSIVE STRENGTH OF AT LEAST 30 MPa @ 28 DAYS. CEMENT TO BE TYPE 50 (SULPHATE RESISTANT).
- CONCRETE SHALL BE KEPT CLEAR OF BELLS AND SHALL NOT CONTACT THE PIPE. USE A MINIMUM OF 6 mil POLYETHYLENE BETWEEN CONCRETE AND ALL FITTING SURFACES.
- ALL THRUST BLOCKS SHALL HAVE A MINIMUM FACE OF 0.10 m²
- REDUCERS SHALL HAVE A TOTAL BEARING AREA EQUAL TO THAT OF AN 11 1/4° BEND BASED UPON THE LARGEST DIAMETER OF THE REDUCER.

REVISED	 <p>CITY OF <i>Lethbridge</i> INFRASTRUCTURE SERVICES</p>	DRAWN	P.R.A.
		CHECKED	
		APPROVED	
		SCALE	N.T.S.
		DATE	97/02/12
	HORIZONTAL THRUST BLOCKING	DWG NO	W-05



USE TABLE 'C'



KEY CONCRETE INTO TRENCH WALL

20M REBAR
50mm COVER
MIN

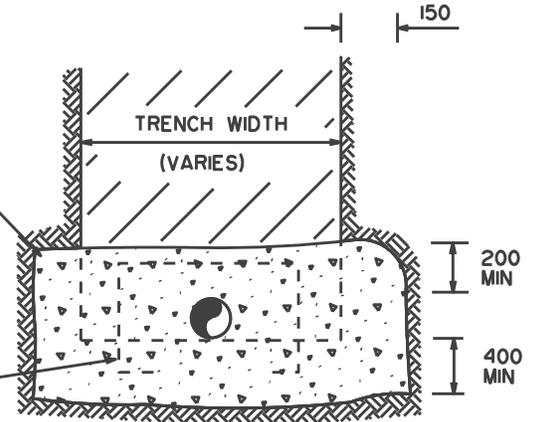


TABLE "A"

THRUST BLOCK FACE AREA IN SQ. METRES AT FITTING FOR CL150 PIPE @ 1000kPa & SOIL BEARING CAPACITY OF 100 kPa

PIPE SIZE	90° BEND	45° BEND	22 1/2° BEND	11 1/4° BEND
100	0.17	0.10	0.10	0.10
150	0.35	0.19	0.10	0.10
200	0.60	0.33	0.17	0.10
250	0.99	0.54	0.27	0.14
300	1.40	0.75	0.39	0.19
350	1.90	1.03	0.52	0.26
400	2.47	1.34	0.68	0.34
450	3.15	1.72	0.87	0.44
500	3.90	2.12	1.07	0.54
600	5.64	3.07	1.55	0.78
750	8.83	4.81	2.44	1.22
900	12.70	7.58	3.51	1.76

SECTION A-A

NOTES:

- VERTICAL BENDS ARE TO BE ANCHORED BY CONCRETE FOR THRUST RESISTANCE BY DEAD WEIGHT. SEE TABLE 'C'.
- ALL CONCRETE THRUST BLOCKS SHALL EXTEND INTO UNDISTURBED SOIL. THRUST BLOCKS IN SOFT UNSTABLE SOILS WILL REQUIRE REMOVAL OF NATIVE SOILS AND REPLACEMENT WITH COMPACTABLE FILL OF SUFFICIENT STABILITY TO RESIST THRUST TO THE SATISFACTION OF THE ENGINEER.
- THRUST BLOCKS SHALL BE OF CONCRETE OBTAINING A COMPRESSIVE STRENGTH OF AT LEAST 30 MPa @ 28 DAYS. CEMENT TO BE TYPE 50 (SULFATE RESISTANT).
- ALL THRUST BLOCKS SHALL HAVE A MINIMUM FACE OF 0.100 m².
- ALL CONCRETE SHALL BE KEPT CLEAR OF BELLS AND SHALL NOT CONTACT THE PIPE. USE A MINIMUM OF 6 mil POLYETHYLENE BETWEEN CONCRETE AND ALL FITTING SURFACES.

TABLE "C"

DEAD WEIGHT REQUIREMENTS FOR VERTICAL BENDS
CUBIC METRES OF CONCRETE (m³)

TYPE OF BEND	SIZE (mm)						
	100	150	200	250	300	350	400
90° BEND	0.75	1.5	2.75	4.25	6.0	8.50	11.0
45° BEND	0.5	1.0	1.5	2.25	3.5	4.75	6.0
22 1/2° BEND	0.25	0.5	0.75	1.25	1.5	2.25	3.0
11 1/4° BEND	0.25	0.25	0.5	0.75	1.0	1.25	1.5

TABLE "B"

SOIL TYPE	SAFE BEARING LOAD - kPa
SOFT CLAY; LOOSE SAND	50
MED. SOFT CLAY; DENSE SAND	100
DENSE CLAY TILL & GRAVEL	150
HARD SHALE	500

REVISED



CITY OF

Lethbridge

INFRASTRUCTURE SERVICES

VERTICAL
THRUST BLOCKING

DRAWN

P.R.A.

CHECKED

APPROVED

SCALE

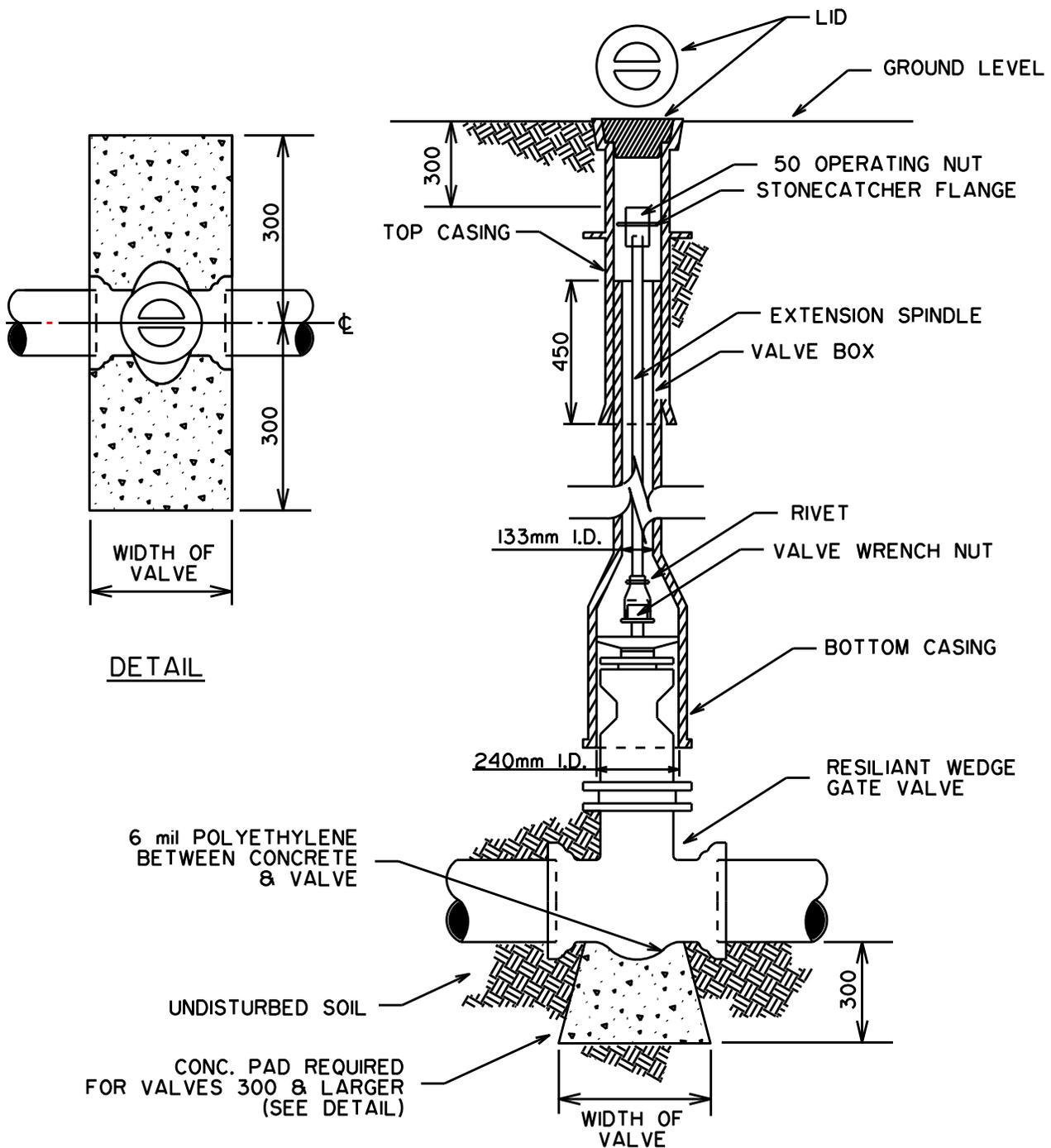
N.T.S.

DATE

97/02/13

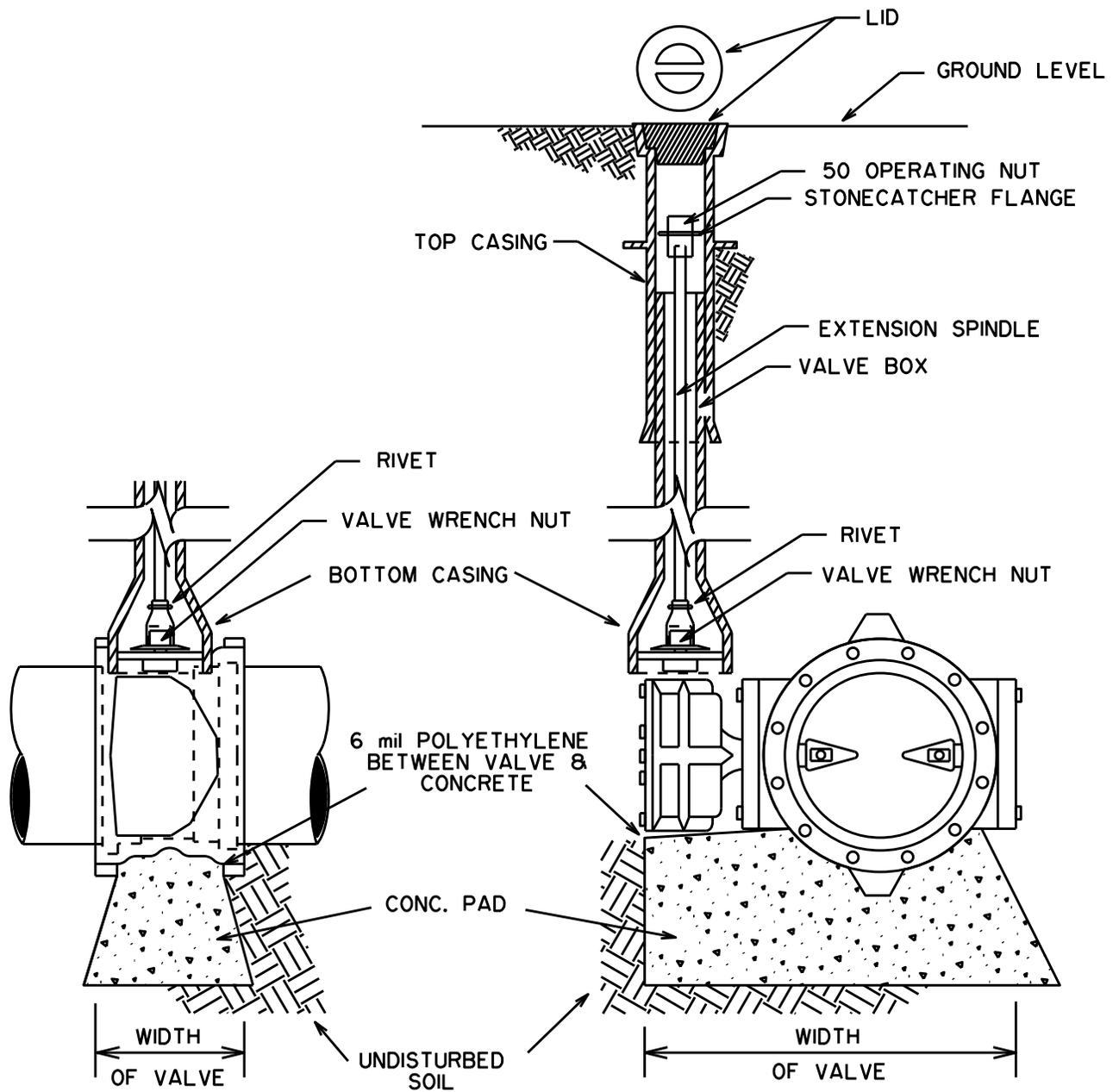
DWG NO

W-06



- NOTE:
- ALL DIMENSIONS ARE IN MILLIMETERS
 - ALL VALVES LEFT TURN TO OPEN (COUNTER-CLOCKWISE) FOR MAIN SIZES 150mm TO 300mm
 - CONCRETE SHALL OBTAIN A MINIMUM COMPRESSIVE STRENGTH OF 30 MPa @ 28 DAYS. ALL CEMENT TO BE TYPE 50 (SULPHATE RESISTANT).

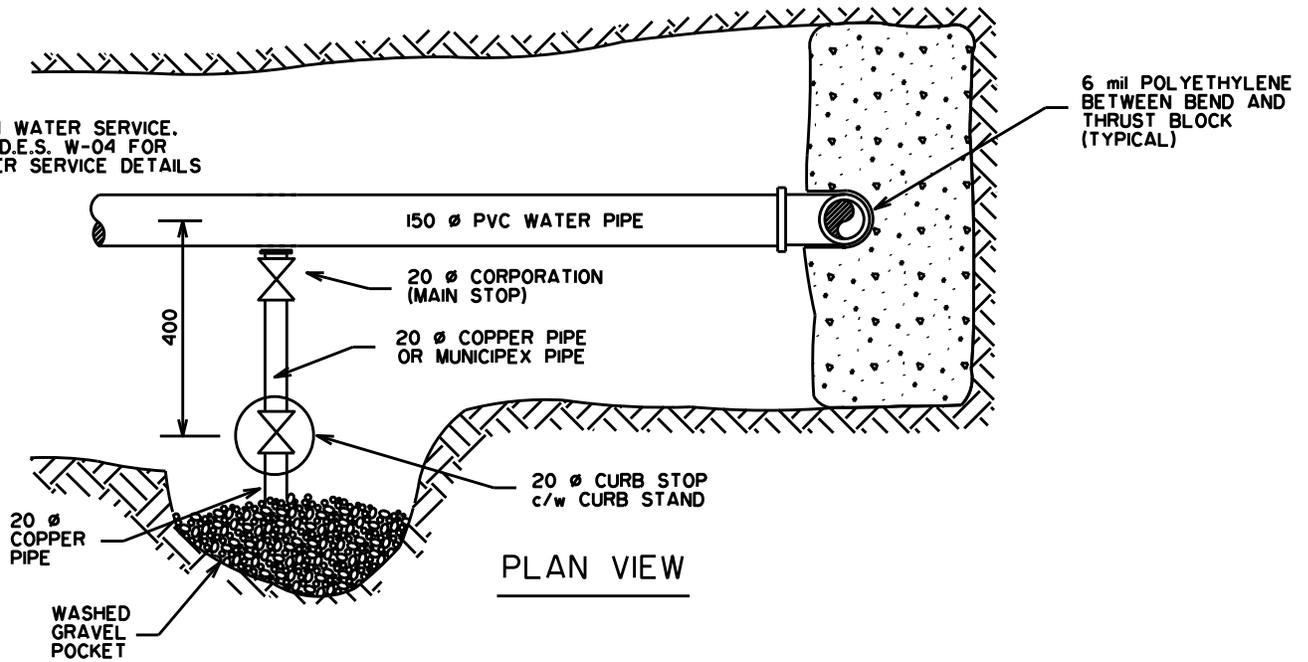
REVISED	 <p>CITY OF <i>Lethbridge</i> INFRASTRUCTURE SERVICES</p>	DRAWN	P.R.A.
		CHECKED	
		APPROVED	
		SCALE	N.T.S.
		DATE	95/05/11
		DWG NO	W-07
STANDARD GATE VALVE INSTALLATION			



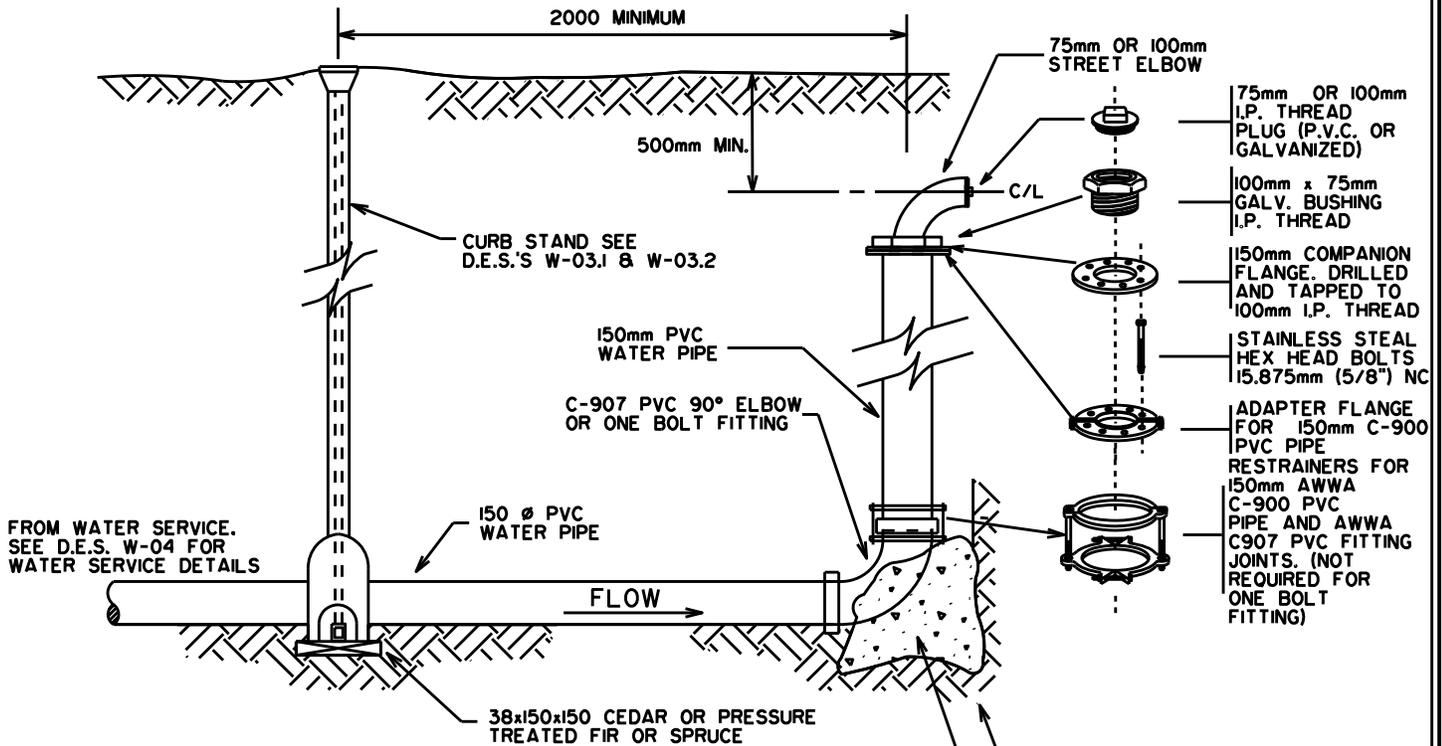
- NOTE:
- USE FOR MAIN SIZES 350 Ø AND LARGER
 - DURING INSTALLATION, CHECK TO MAKE SURE DISC ROTATES FREELY AND DOES NOT CATCH ON PIPE
 - ALL DIMENSIONS ARE IN MILLIMETERS
 - CAUTION SHOULD BE TAKEN WHEN OPERATING THIS TYPE OF VALVE DO NOT USE A CHEATER
 - ALL VALVES LEFT TURN TO OPEN (COUNTER-CLOCKWISE)
 - CONCRETE SHALL OBTAIN A MINIMUM COMPRESSIVE STRENGTH OF 30 MP_a @ 28 DAYS. ALL CEMENT TO BE TYPE 50 (SULPHATE RESISTANT).

REVISED	 <p style="text-align: center;">CITY OF <i>Lethbridge</i> INFRASTRUCTURE SERVICES</p>	DRAWN	P.R.A.
		CHECKED	
		APPROVED	
		SCALE	N.T.S.
		DATE	97/02/15
		DWG NO	W-08
	STANDARD BUTTERFLY VALVE INSTALLATION		

FROM WATER SERVICE.
SEE D.E.S. W-04 FOR
WATER SERVICE DETAILS



PLAN VIEW



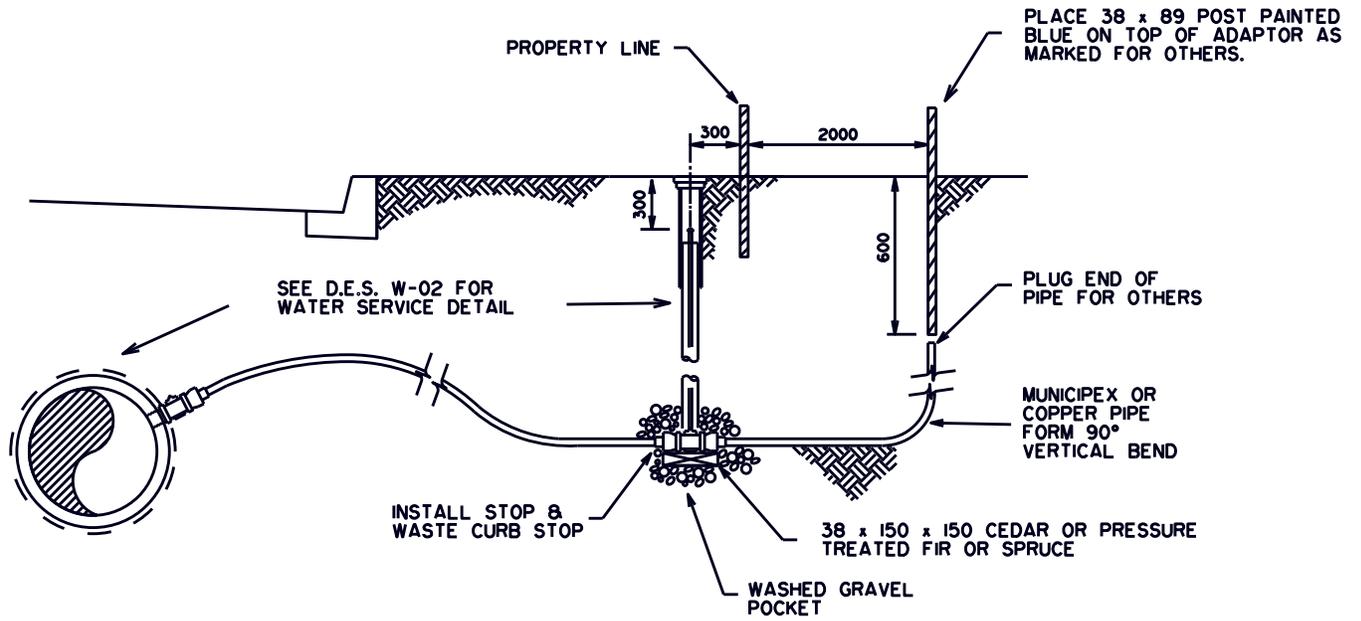
SIDE VIEW

NOTES:

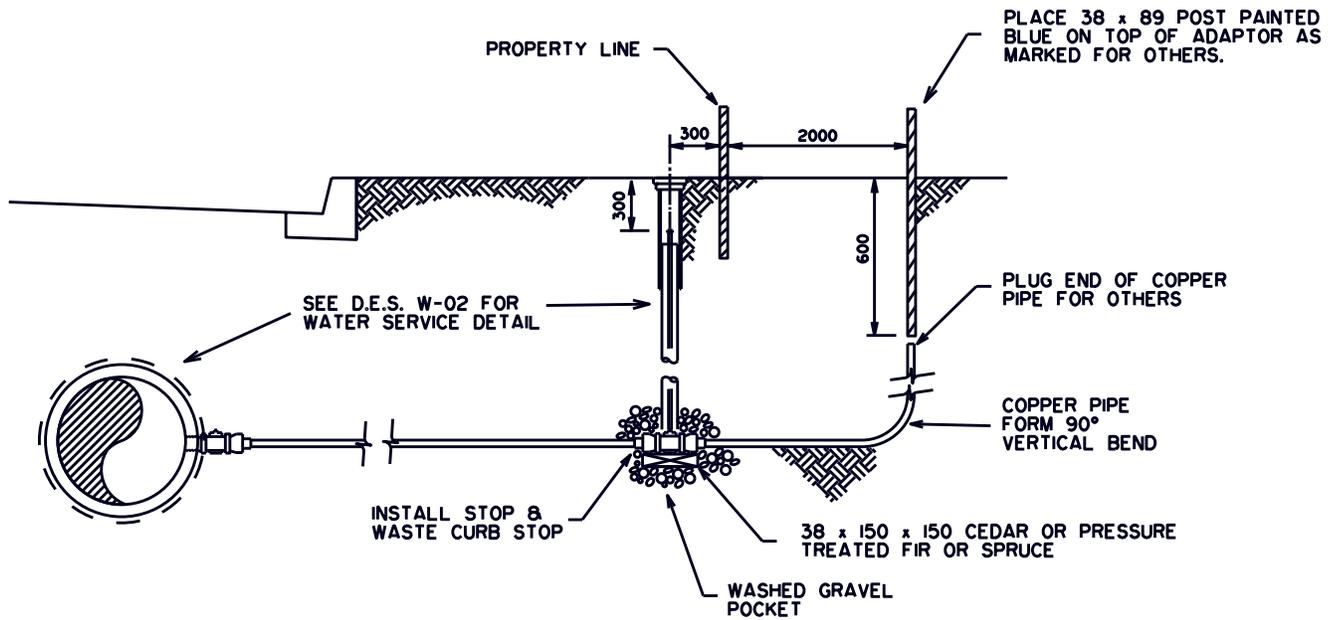
- 300 GRAM ZINC ALLOY CAPS TO BE USED ON PVC JOINT RESTRAINTS.
- ALL DIMENSIONS IN MILLIMETERS.
- PVC WATER PIPE TO BE CSA B137.3-M86, AWWA C-900, CL 150, DR 18.

CONCRETE THRUST
BLOCK AS PER
D.E.S. W-06 TABLE 'A'
(TYPICAL)

REVISED	 <p>CITY OF <i>Lethbridge</i> INFRASTRUCTURE SERVICES</p> <p>STANDARD FOR 75mm & 100mm IRRIGATION SERVICE RISER</p>	DRAWN	P.R.A.
		CHECKED	
		APPROVED	
		SCALE	N.T.S.
		DATE	97/02/14
		DWG NO	W-09



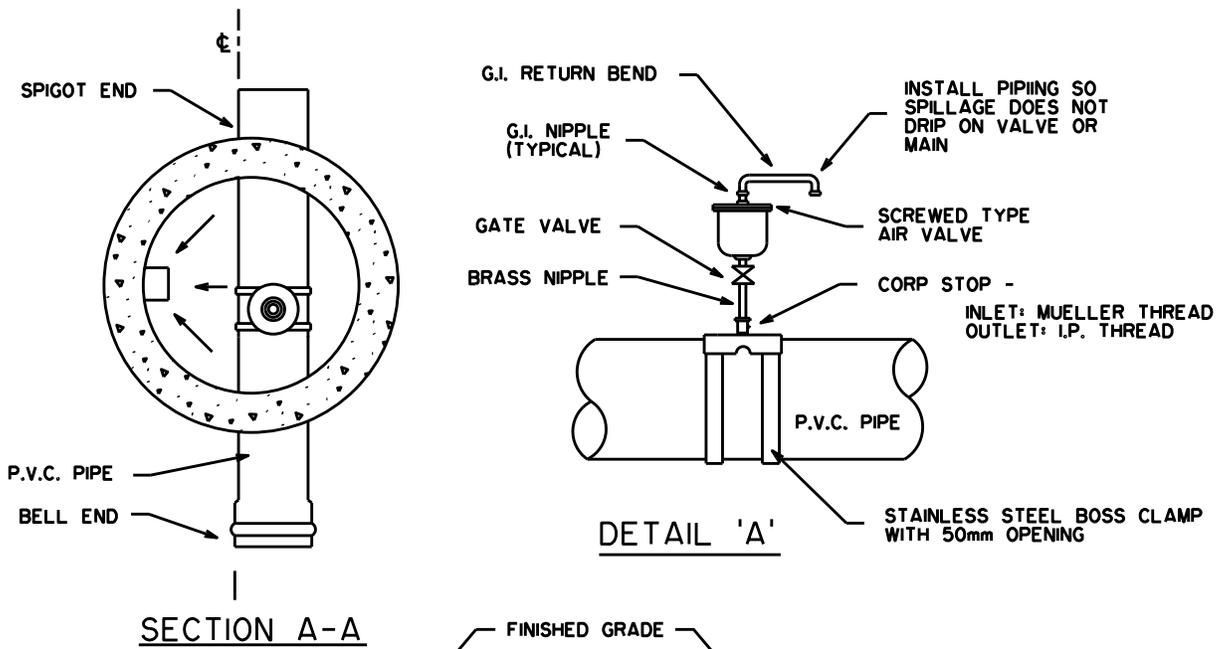
TYPICAL 25 mm \varnothing SERVICE & RISER



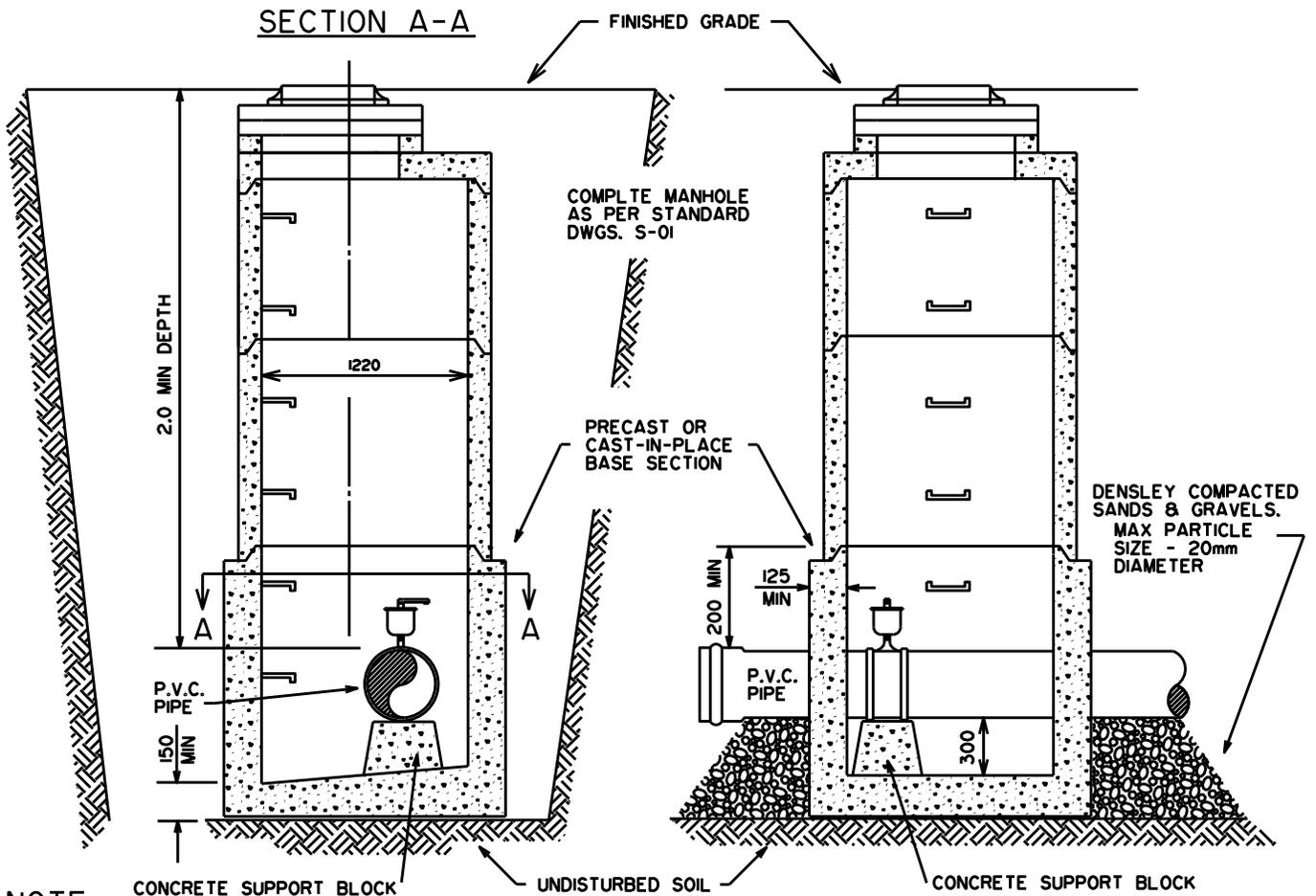
TYPICAL 37 mm & 50 mm \varnothing SERVICE & RISER

- NOTES:
- ALL DIMENSIONS IN MILLIMETERS
 - SIZE OF PIPE & FITTINGS TO BE EQUAL TO SIZE REQUIRED BY COMMUNITY SERVICES

REVISED	 <p>CITY OF <i>Lethbridge</i> INFRASTRUCTURE SERVICES</p>	DRAWN	P.R.A.
		CHECKED	
		APPROVED	
		SCALE	N.T.S.
		DATE	97/02/09
		DWG NO	W_10
<p>STANDARD FOR 25mm, 38mm & 50 mm IRRIGATION SERVICE RISER</p>			



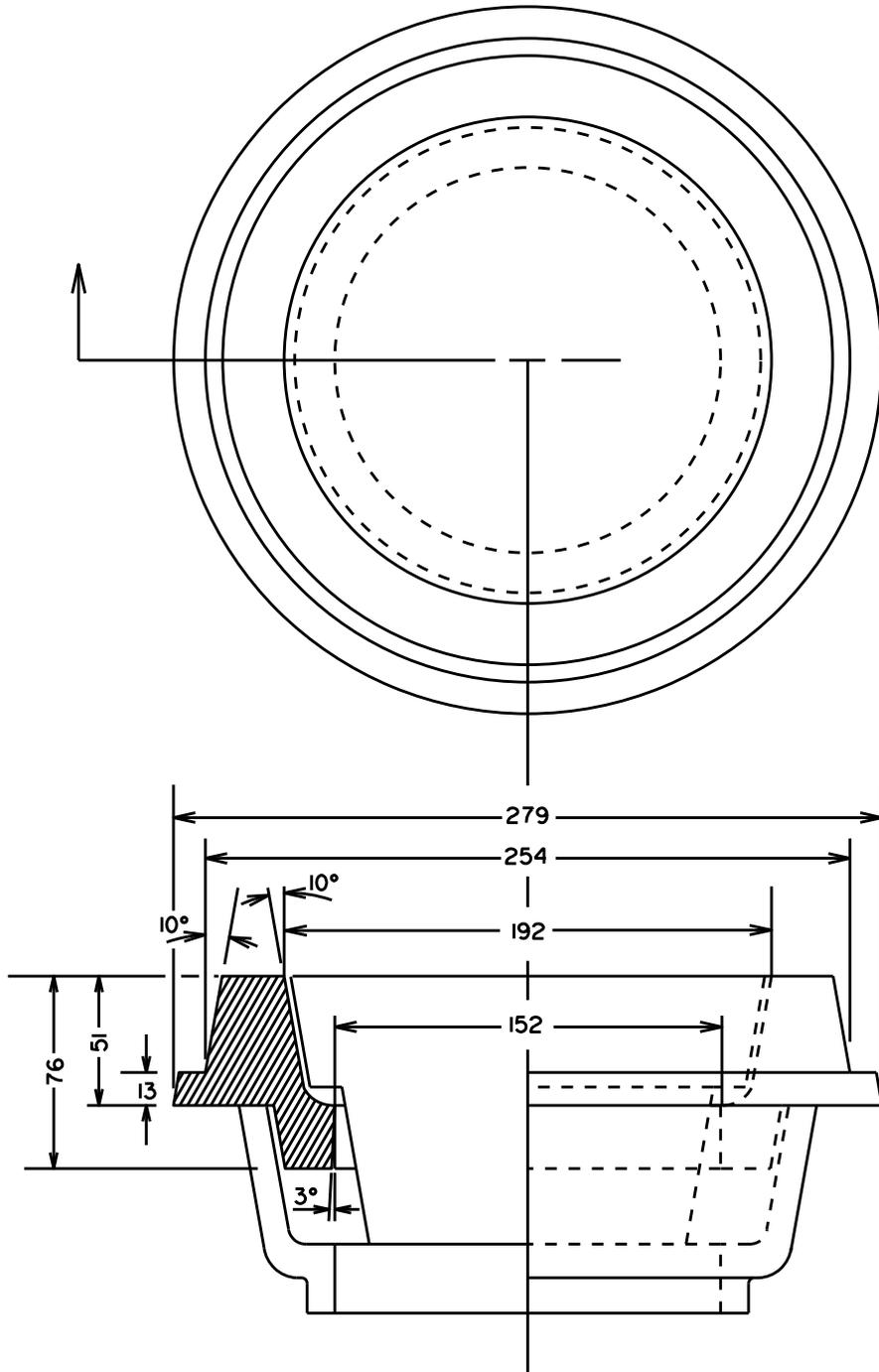
SECTION A-A



NOTE:

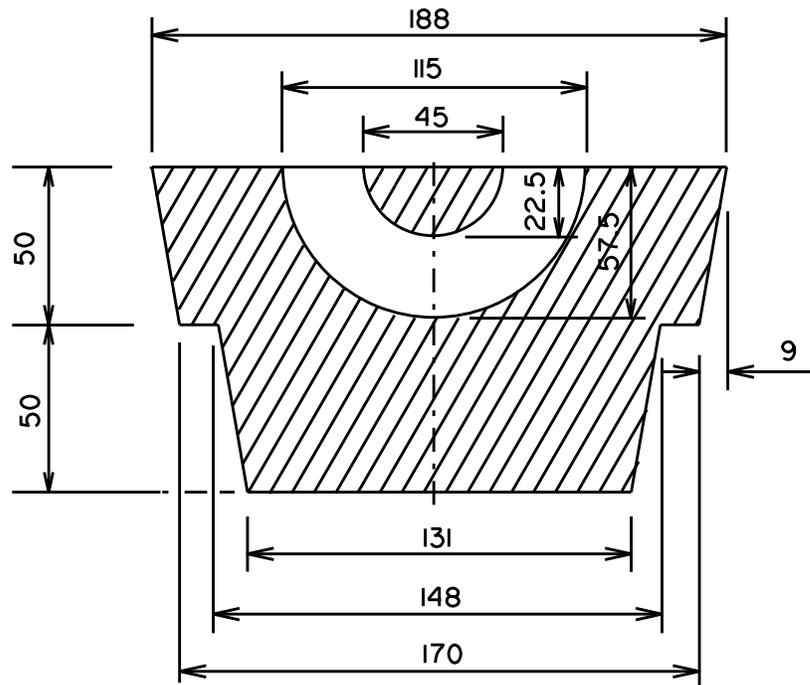
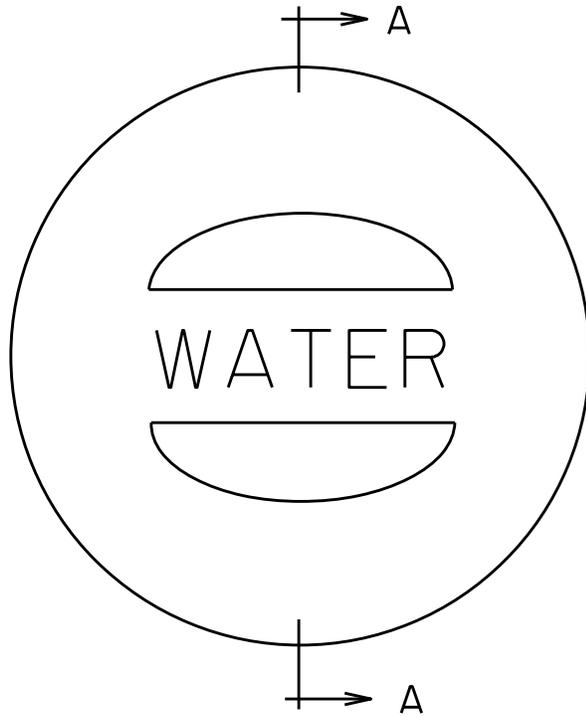
- SEAL ALL MANHOLE JOINTS WITH FLEXIBLE BUTYL RESIN SEALANT
- PRECAST MANHOLE SECTIONS TO CONFORM TO A.S.T.M. DESIGNATION C478 (LATEST EDITION)
- SEE CONTRACT DRAWING FOR SIZE OF MATERIALS
- WHERE P.V.C. IS TO BE BONDED TO M.H. BARREL, A LEAK RING IS REQUIRED & P.V.C. PIPE IS TO BE "SAND COATED"
- ALL CAST-IN-PLACE CONCRETE SHALL HAVE MIN. COMPRESSIVE STRENGTH OF 30 MPa @ 28 DAYS.
- ALL CEMENT TO BE TYPE 50 (SULPHATE RESISTANT).

REVISED	 <p style="text-align: center;">CITY OF <i>Lethbridge</i> INFRASTRUCTURE SERVICES</p> <p style="text-align: center;">STANDARD VACUUM & AIR RELIEF VALVE INSTALLATION FOR P.V.C. PIPE</p>	DRAWN	P.R.A.
		CHECKED	
		APPROVED	
		SCALE	N.T.S.
		DATE	97/02/15
		DWG NO	W-II



NOTE: ALL DIMENSIONS IN MILLIMETERS

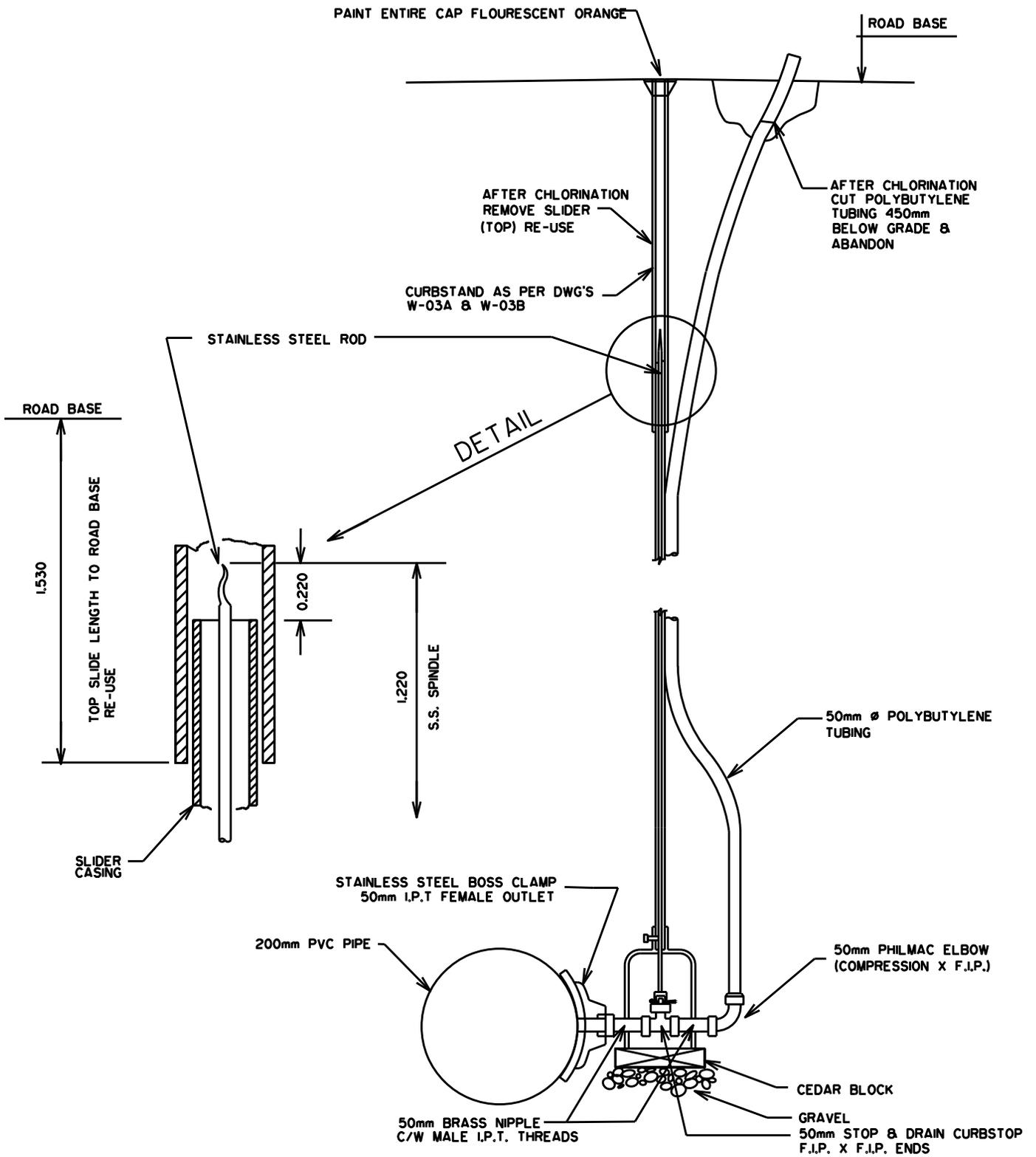
REVISED	 <p>CITY OF <i>Lethbridge</i> INFRASTRUCTURE SERVICES</p>	DRAWN	P.R.A.
		CHECKED	
		APPROVED	
		SCALE	N.T.S.
		DATE	97/02/10
		DWG NO	W-12
VALVE RISER BOX			



SECTION A-A

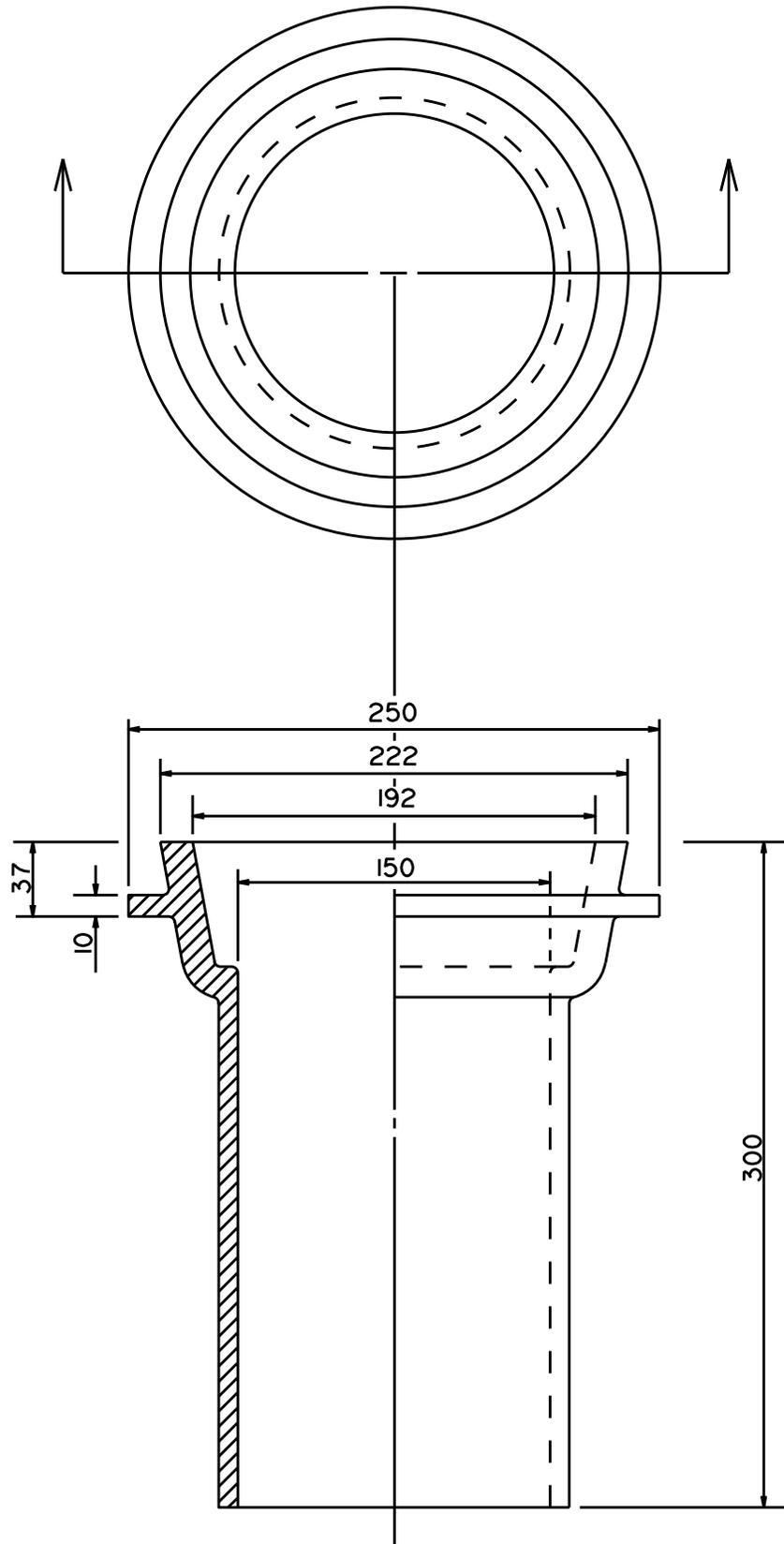
NOTE: ALL DIMENSIONS IN MILLIMETERS

REVISED	 <p>CITY OF <i>Lethbridge</i> INFRASTRUCTURE SERVICES</p>	DRAWN	D.F.
		CHECKED	
		APPROVED	
		SCALE	N.T.S.
		DATE	06/12/08
		DWG NO	W-12A
		VALVE BOX CAP	



CHLORINATION SYSTEM

REVISED	 <p style="font-size: 1.2em; font-weight: bold;">CITY OF <i>Lethbridge</i></p> <p style="font-weight: bold;">INFRASTRUCTURE SERVICES</p> <p>FOR CHLORINATING & FLUSHING WATERMANS</p>	DRAWN	L.M.C
		CHECKED	
		APPROVED	
		SCALE	N.T.S.
		DATE	97/02/01
	DWG NO	W-13	



REVISED

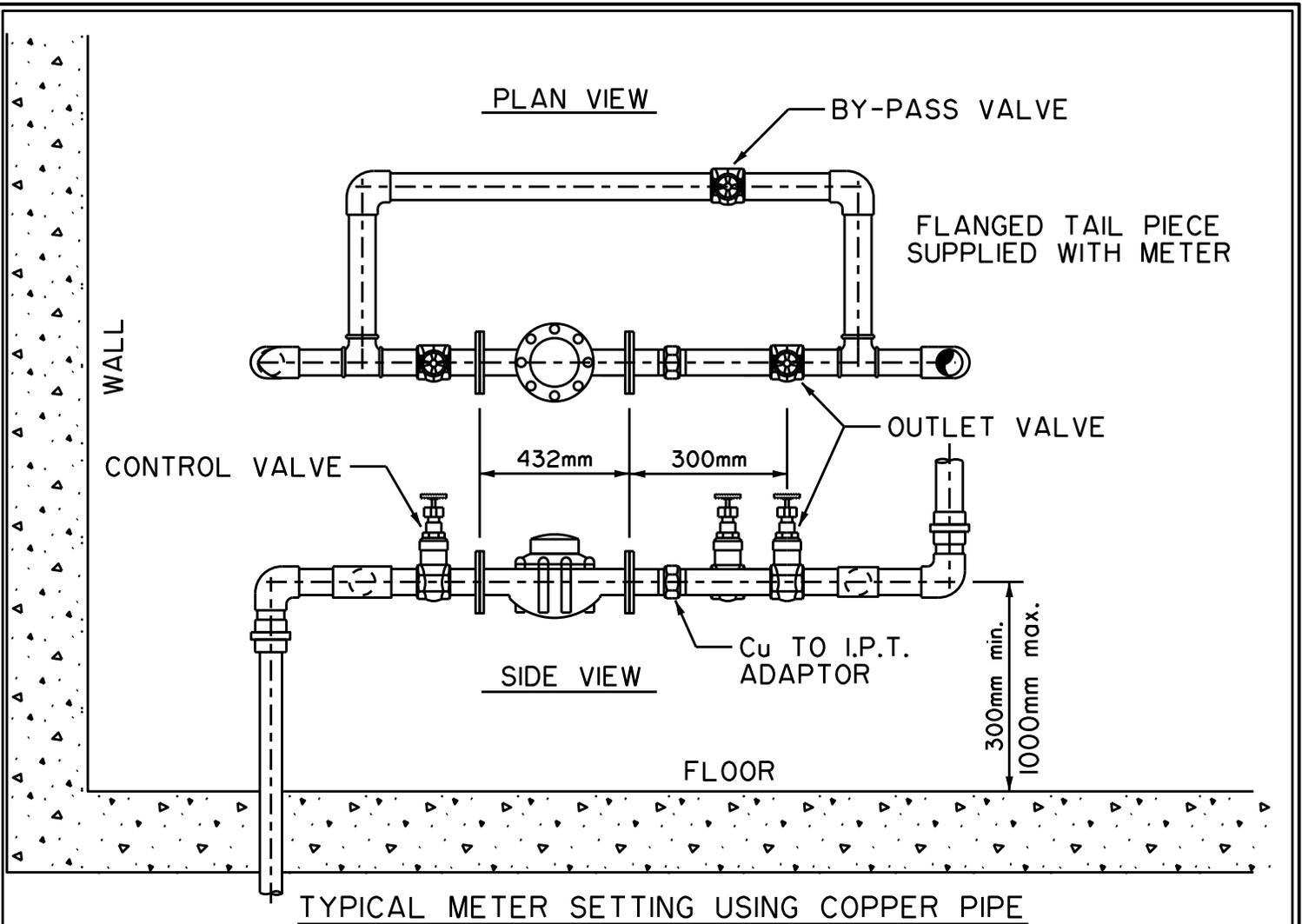


CITY OF
Lethbridge

INFRASTRUCTURE SERVICES

300 mm VALVE BOX RISER

DRAWN	P.R.A.
CHECKED	D.L.F.
APPROVED	
SCALE	N.T.S.
DATE	97/02/14
DWG NO	W-14



1. PIPING ON EACH SIDE OF THE METER MUST BE ADEQUATELY SUPPORTED TO THE SATISFACTION OF THE WATERWORKS METER SECTION
2. PIPING FOR METER MUST BE ON A HORIZONTAL PLANE.
3. MINIMUM DISTANCE OF 300 mm BETWEEN ANY WALL AND A METER OR BANK.
4. VALVES ARE REQUIRED ADJACENT TO METERS (INLET & OUTLET SIDE).
5. THE AREA FOR 600 mm IN FRONT OF THE METER SHALL BE FREE OF OBSTRUCTION TO ALLOW FOR CONVENIENT READING AND SERVICING OF THE METER. 2.0 M HEADROOM MUST BE PROVIDED IN THIS AREA.
6. METERS MUST BE INSTALLED IN THE MECHANICAL ROOM AND WITHIN REASONABLE DISTANCE OF A FLOOR DRAIN, IN NO CASE SHOULD A METER BE INSTALLED IN A BEDROOM, BATHROOM OR UNDER A STAIRWELL.
7. EXCEPT WHERE NOTED, ALL FITTING & PIPE ARE SOLDERED COPPER OR THREADED GALVANIZED PIPE.
8. WHERE SOLDERED VALVES ARE BEING USED. COPPER TO FEMALE I.P.T. ADAPTERS MUST BE SUPPLIED TO ACCOMODATE METER FLANGE.
9. BY - PASS REQUIRED.

REVISED	 CITY OF <i>Lethbridge</i> INFRASTRUCTURE SERVICES	DRAWN	DMC
		CHECKED	
		APPROVED	
		SCALE	N.T.S.
		DATE	98/02/26
		DWG NO	W-15
TYPICAL INSTALLATION OF 50 MM Ø WATER METER			