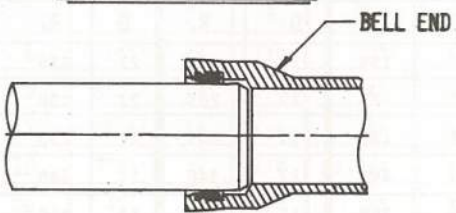
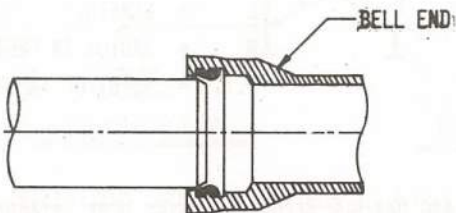
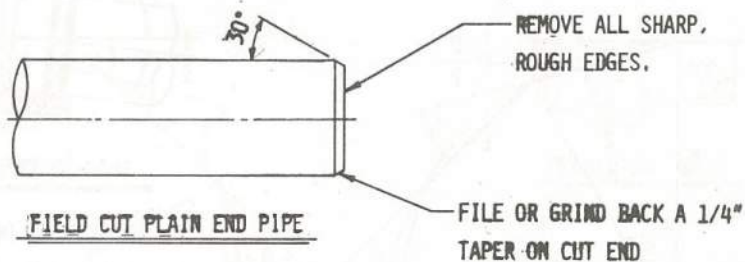




<u>DRAWING NO.</u>	<u>TITLE</u>	<u>PAGE NO.</u>
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WELD ON PIPE PUSH-ON TYP  
JOINT ASSEMBLY DETAIL

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MATERIAL

PIPE: DUCTILE IRON  
CAST IRON

GASKET: PLAIN RUBBER BASE

*Donald Luciani*  
CHIEF DESIGN BRANCH

*James J. Sullivan*  
DEPUTY COMMISSIONER

*James J. Sullivan*  
COMMISSIONER & CHIEF ENGR

FIELD CUT PIPE PUSH-ON TYPE  
JOINT ASSEMBLY DETAIL

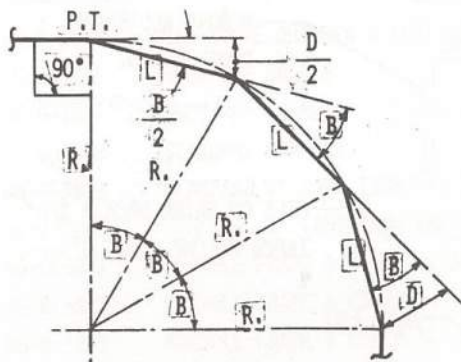
CITY OF PHILADELPHIA

WATER DEPARTMENT

46G-3790  
DRAWING NO.

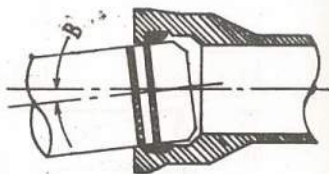
DATE 3-15-74

PAGE NO. 1



PLAN

PIPE DEFLECTION



PUSH-ON TYPE JOINT

- B = DEFLECTION IN DEGREES
- D = DEFLECTION IN INCHES
- L = LENGTH
- R = RADIUS IN FEET
- P.T. = POINT OF TANGENT

NOTE: DEFLECTIONS SHOWN ARE MAXIMUM ALLOWABLE WATER DEPT. STANDARD - 50% MAXIMUM ALLOWABLE UNLESS OTHERWISE AUTHORIZED.

PIPE SIZE	B	L = 16 FEET		L = 18 FEET		L = 20 FEET	
		D	R.	D	R.	D	R.
6	5°	17	185	19	205	21	230
8	5°	17	185	19	205	21	230
12	5°	17	185	19	205	21	230
16	4°	10	300	11	340	12	380
20	3°	10	300	11	340	12	380
24	3°	10	300	11	340	12	380
30	2°23"	6	450	7-1/2	510	8	570
36	2°5"	6	450	7-1/2	510	8	570
48	2°0"	6	450	7-1/2	510	8	570

*Richard L. ...*  
 CHIEF DESIGN BRANCH  
*James J. ...*  
 DEPUTY COMMISSIONER  
*Carroll J. ...*  
 COMMISSIONER & CHIEF ENGR

**MAXIMUM DEFLECTION & RADIUS  
 FOR PUSH-ON TYPE JOINT**

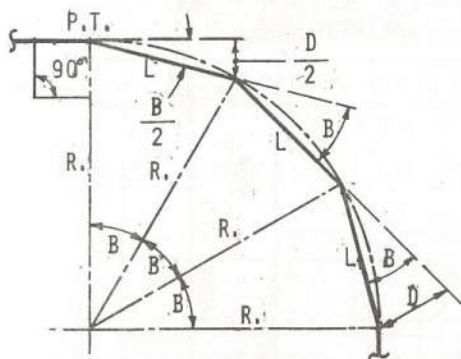
CITY OF PHILADELPHIA

WATER DEPARTMENT

46G-3791  
 DRAWING NO.

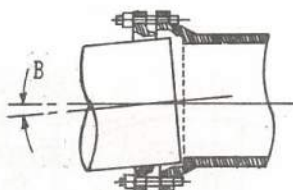
DATE 3-15-74

PAGE NO. 2



PLAN

PIPE DEFLECTION



MECHANICAL JOINT

- B = DEFLECTION IN DEGREES  
 D = DEFLECTION IN INCHES  
 L = LENGTH  
 R = RADIUS IN FEET  
 P.T. = POINT OF TANGENT

NOTE: DEFLECTIONS SHOWN ARE MAXIMUM ALLOWABLE WATER DEPT. STANDARD -  
 50% MAXIMUM ALLOWABLE UNLESS OTHERWISE AUTHORIZED.

PIPE SIZE	B	L = 16 FEET		L = 18 FEET		L = 20 FEET	
		D	R.	D	R.	D	R.
6	7°7'	24	130	27	145	30	160
8	5°21'	18	170	20	195	22	213
12	5°21'	18	170	20	195	22	220
16	3°35'	12	250	13-1/2	285	15	320
20	3°	10	300	11	340	12	380
24	2°23'	8	400	9	450	10	500
30	2°23'	8	400	9	450	10	500
36	2°5'	7	440	8	500		
48	2°	6	450	7-1/2	510		

*Pinello Luciani*  
 CHIEF DESIGN BRANCH  
*Benjamin J. Zeman*  
 DEPUTY COMMISSIONER  
*Carroll F. Susano*  
 COMMISSIONER & CHIEF ENGR.

**MAXIMUM DEFLECTION & RADIUS  
 FOR MECHANICAL JOINT PIPE**

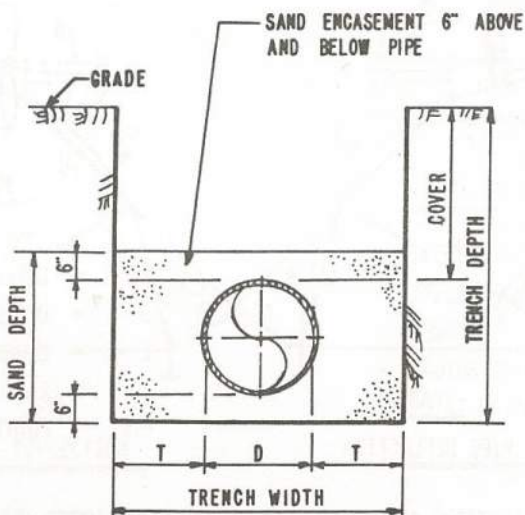
CITY OF PHILADELPHIA

WATER DEPARTMENT

**466-3792**  
 DRAWING NO.

DATE **3-15-74**

PAGE NO. **3**



TYPICAL WATER MAIN TRENCH		
D - NOMINAL DIA.	T	TRENCH DEPTH
24" DIA. AND OVER	12"	COVER + DIA. + 8"
8" DIA. TO 20" DIA.	8"	COVER + DIA. + 8"
6" DIA. AND LESS	6"	COVER + DIA. + 8"

TRENCH DEPTH = COVER PLUS NOMINAL PIPE DIA. PLUS  
2" PIPE THICKNESS PLUS SAND 6" BELOW  
PIPE.

TRENCH WIDTH = NOMINAL PIPE DIA. PLUS 2 X T WITH  
NO PIPE THICKNESS ALLOWNACE.

*Rinaldo Luciani*  
CHIEF DESIGN BRANCH  
*Samuel O. Stone*  
DEPUTY COMMISSIONER  
*Carroll F. Luciani*  
COMMISSIONER & CHIEF ENGR

**PAY LIMITS FOR EXCAVATION  
WATER MAIN TRENCHES**

CITY OF PHILADELPHIA

WATER DEPARTMENT

**46G-3793**

DRAWING NO.

DATE **7-18-74**

PAGE NO. **4**

EXCAVATION PAY LIMIT DIMENSIONS

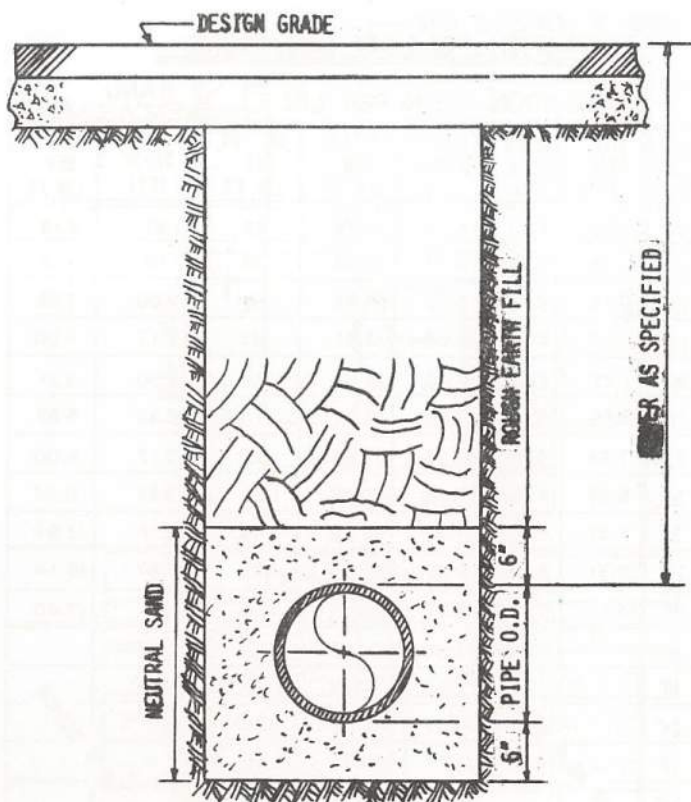
		EXCAVATION QUAN. PER LIN. FT.					SAND ENCASEMENT	
COVER	PIPE SIZE	PIPE AREA (FT <sup>2</sup> )	TRENCH WIDTH (FT)	TRENCH DEPTH (FT)	CU. FT. PER LIN. FT.	CU. YDS. PER LIN. FT.	DEPTH (FT.)	CU. FT. PER LIN. FT.
4'0" ±	6"	0.35	1.50	5.16	7.75	.29	1.67	2.16
	8"	0.54	2.00	5.33	10.66	.39	1.83	3.12
	10"	0.79	2.17	5.50	11.94	.44	2.00	3.55
	12"	1.06	2.33	5.67	13.21	.49	2.17	4.00
	16"	1.77	2.67	6.00	16.02	.59	2.50	4.91
	20"	2.64	3.00	6.33	18.99	.70	2.83	5.85
	24"	3.68	4.00	6.67	26.68	.99	3.17	9.00
	30"	5.57	4.50	7.17	32.27	1.19	3.67	10.94
	36"	7.87	5.00	7.67	38.36	1.42	4.17	12.98
	42"	10.55	5.50	8.17	44.94	1.66	4.67	15.14
48"	13.62	6.00	8.67	52.02	1.93	5.17	17.40	
5'0" ±	16"			7.00	18.69	.69		
	20"			7.33	21.99	.81		
	24"			7.67	30.68	1.14		
	30"			8.17	36.77	1.36		
	36"			8.67	43.35	1.60		
	42"			9.17	50.44	1.87		
	48"			9.67	58.02	2.15		

PIPE AREA (FT.<sup>2</sup>) = NOMINAL PIPE DIA. PLUS 2" PIPE THICKNESS.

SAND DEPTH = NOMINAL PIPE DIA. PLUS 2" PIPE THICKNESS PLUS 6" ABOVE AND BELOW PIPE.

<i>Rinaldo Luciani</i> CHIEF DESIGN BRANCH <i>Kenneth D. Stone</i> DEPUTY COMMISSIONER <i>Carroll J. Brennan</i> COMMISSIONER & CHIEF ENGR	PAY LIMITS FOR EXCAVATION WATER MAIN TRENCHES	466-3794
		DRAWING NO.
		DATE 7-22-74
CITY OF PHILADELPHIA	WATER DEPARTMENT	PAGE NO. 5





*Rinaldo Luciani*  
 CHIEF DESIGN BRANCH  
*Kenneth D. Brown*  
 DEPUTY COMMISSIONER  
*Carson J. Quasius*  
 COMMISSIONER & CHIEF ENGR

**TYPICAL  
 WATER TRENCH RESTORATION**

CITY OF PHILADELPHIA

WATER DEPARTMENT

**46G-3795**  
 DRAWING NO.

DATE **3-15-74**

PAGE NO. **6**

PAVING RESTORATION NOTES

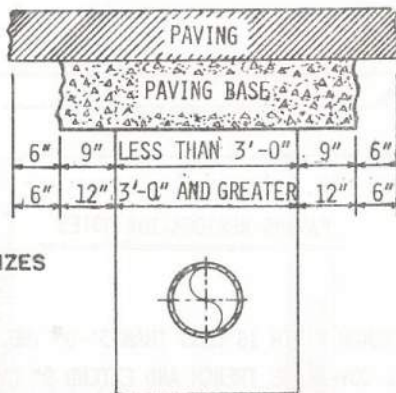
WHERE THE TRENCH WIDTH IS LESS THAN 3'-0" THE CONCRETE BASE RESTORATION SHALL COVER THE TRENCH AND EXTEND 9" OVER UNDISTURBED OR COMPACTED SOIL ON EACH SIDE OF THE TRENCH.

WHERE THE TRENCH WIDTH IS 3'-0" OR GREATER THE CONCRETE BASE RESTORATION SHALL COVER THE TRENCH AND EXTEND 12" OVER UNDISTURBED OR COMPACTED SOIL ON EACH SIDE OF THE TRENCH.

SURFACE COURSE PAVING RESTORATION SHALL COVER THE WIDTH OF THE CONCRETE BASE AND EXTEND 6" BEYOND EXCEPT THAT BITUMINOUS CONCRETE SURFACE COURSE RESTORATION SHALL ONLY COVER THE RESTORED CONCRETE BASE.

REMOVAL OF BASE AND PAVING OUTSIDE OF TRENCH LIMITS SHALL BE INCLUDED IN THE COST OF PAVING RESTORATION.

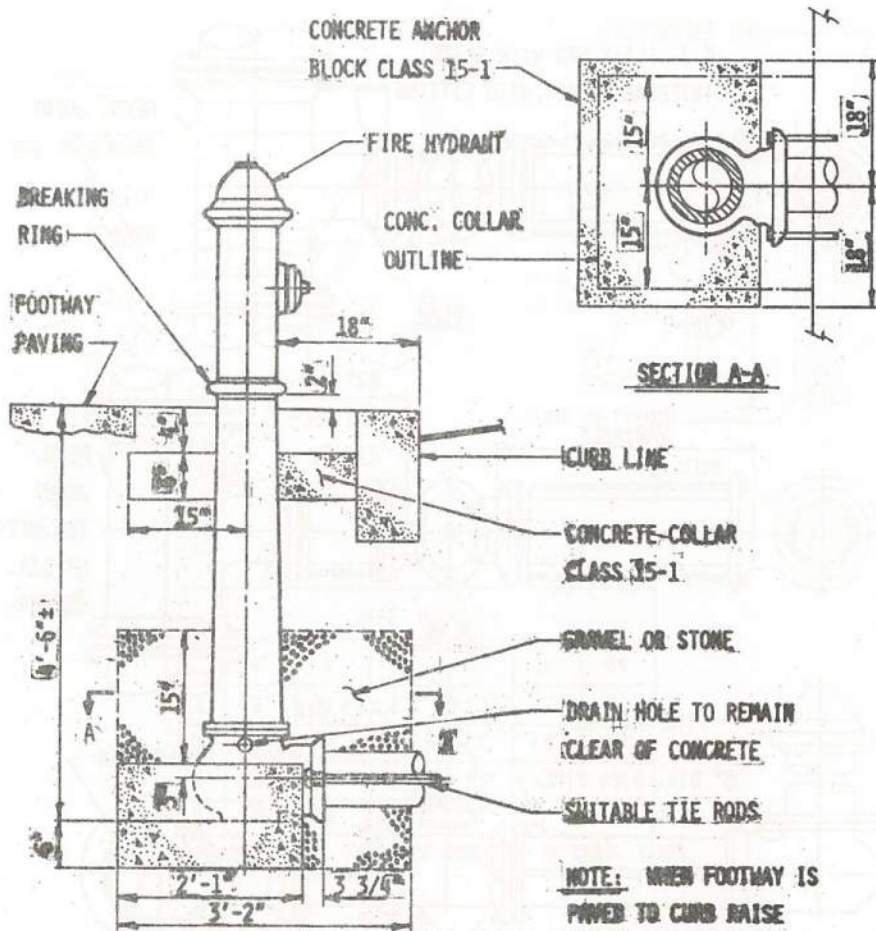
<i>Arnoldo Rosario</i> CHIEF DESIGN BRANCH	<b>PAY LIMITS FOR REPAVING WATER MAIN TRENCHES</b>	<b>46G-3796</b> DRAWING NO.
<i>Thomas A. Bone</i> DEPUTY COMMISSIONER		DATE <b>3-15-74</b>
<i>Carver F. Evans</i> COMMISSIONER & CHIEF ENGR		PAGE NO. <b>7</b>
CITY OF PHILADELPHIA		WATER DEPARTMENT



\* INCLUDES ALL SIZES  
LESS THAN 6".

PAVING BASE DIMENSIONS AND REPAVING QUANTITIES							
PIPE SIZE	TRENCH WIDTH (FT)	BASE WIDTH (FT.)	CU. YDS/ LIN. FT. 10" BASE	CU. YDS/ LIN. FT. 8" BASE	CU. YDS/ LIN. FT. 6" BASE	PAVING WIDTH (FT.)	PAVING SQ. YDS/ LIN. FT.
6"*	1.50	3.00	.093	.074	.056	4.00	.44
8"	2.00	3.50	.108	.086	.065	4.50	.50
10"	2.17	3.67	.113	.091	.068	4.67	.52
12"	2.33	3.83	.118	.094	.071	4.83	.54
16"	2.67	4.17	.129	.103	.077	5.17	.57
20"	3.00	4.50	.139	.111	.083	5.50	.61
24"	4.00	6.00	.185	.148	.111	7.00	.78
30"	4.50	6.50	.201	.160	.120	7.50	.83
36"	5.00	7.00	.216	.173	.130	8.00	.89
42"	5.50	7.50	.231	.185	.139	8.50	.94
48"	6.00	8.00	.247	.197	.148	9.00	1.00

<i>Frank Luciani</i> CHIEF DESIGN BRANCH <i>Samuel J. Ryan</i> DEPUTY COMMISSIONER <i>Carroll F. Buscino</i> COMMISSIONER & CHIEF ENGR	<b>PAY LIMITS FOR REPAVING WATER MAIN TRENCHES</b>	466-3797
		FORM 3-15-74
	CITY OF PHILADELPHIA	WATER DEPARTMENT
		FORM NO. 8



ELEVATION

*Arnold L. ...*  
CHIEF DESIGN BRANCH

*Samuel J. ...*  
DEPUTY COMMISSIONER

*Carroll J. ...*  
COMMISSIONER & CHIEF ENGINEER

**FIRE HYDRANT INSTALLATION**

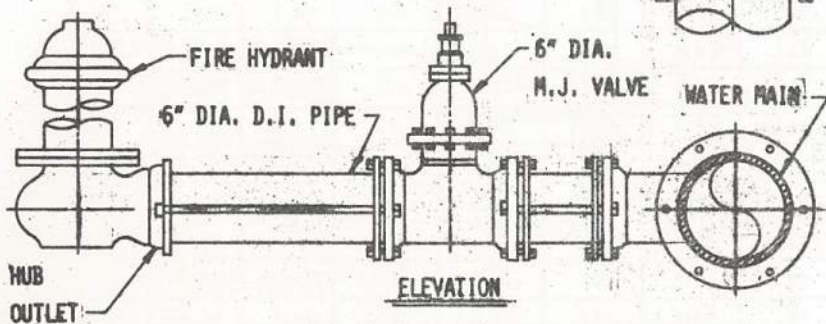
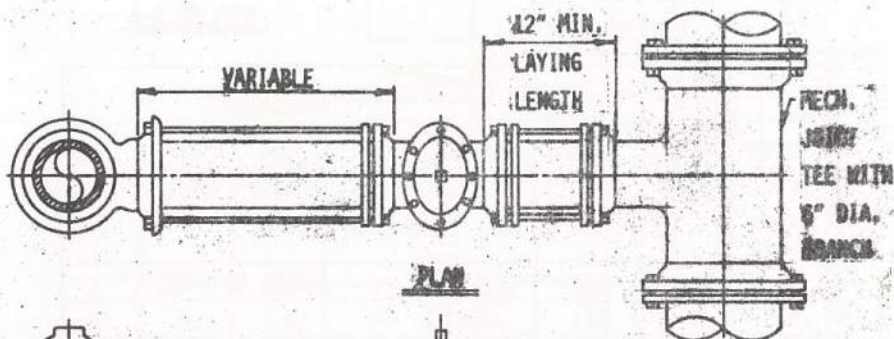
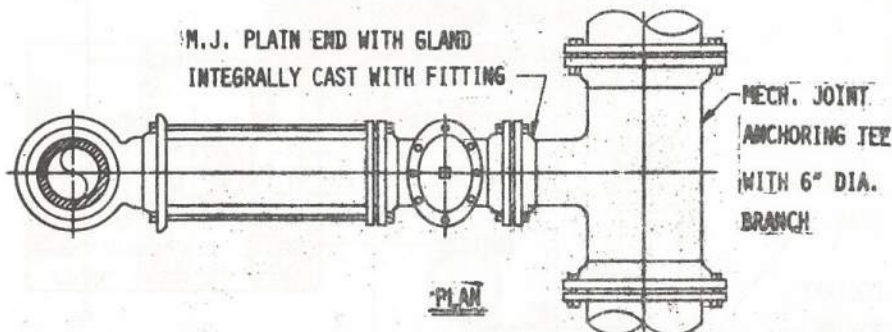
CITY OF PHILADELPHIA

WATER DEPARTMENT

**466-3798**  
DRAWING NO.

DATE 3-15-74

PAGE NO. 9



**NOTE:** TIE RODS REQUIRED WHEN DISTANCE BETWEEN CENTER  
LINES OF MAIN AND HYDRANT IS 10' OR LESS

*Rivale Luciani*  
CHIEF DESIGN BRANCH

*Bennett D. Sinton*  
DEPUTY COMMISSIONER

*Carroll F. Sweeney*  
COMMISSIONER & CHIEF ENGR

**FIRE HYDRANT CONNECTIONS  
MECHANICAL JOINT  
VALVE & FITTINGS**

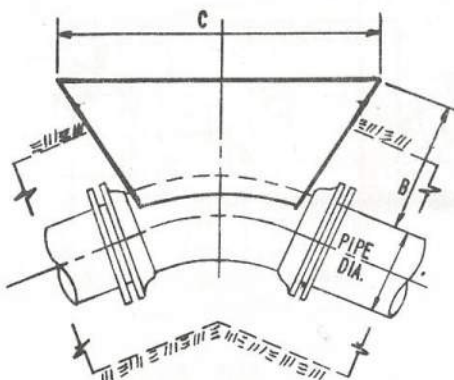
CITY OF PHILADELPHIA

WATER DEPARTMENT

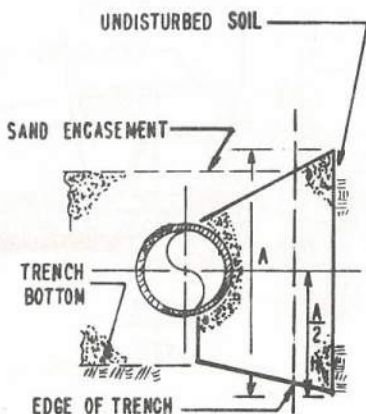
466-3799  
DRAWING NO.

DATE 3-15-74

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PLAN



SECTION

	PIPE DIAMETER					
	6"	8"	12"	16"	20"	24"
A	18"	21"	2' 6"	3' 6"	4' 0"	5' 0"
B	12"	12"	15"	18"	2' 0"	2' 3"
C	15"	20"	2' 6"	3' 0"	4' 0"	4' 6"
D	.06	.07	.15	.28	.66	1.0

D - APPROXIMATE VOLUME OF CONCRETE IN CUBIC YARDS

NOTES

1. WRAP FITTING WITH BURLAP BEFORE PLACING CONCRETE.
2. CONCRETE SHALL BE CLASS 15-1.
3. CONCRETE MUST BEAR UPON UNDISTURBED SOIL.
4. SOIL BEARING VALUE - 2000 PSF.

*Rinaldo Luciani*  
CHIEF DESIGN BRANCH  
*Kenneth J. Seane*  
DEPUTY COMMISSIONER  
*Carroll J. Deane*  
COMMISSIONER & CHIEF ENGR

**MINIMUM ANCHOR FOR  
HORIZONTAL 1/8 BENDS**

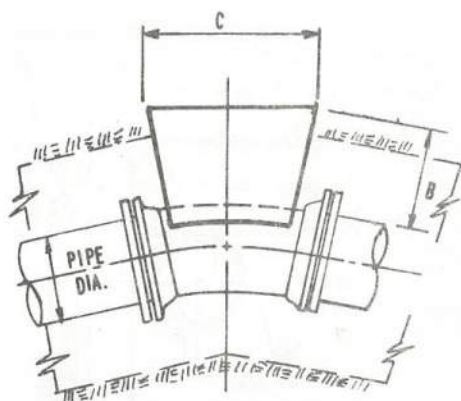
CITY OF PHILADELPHIA

WATER DEPARTMENT

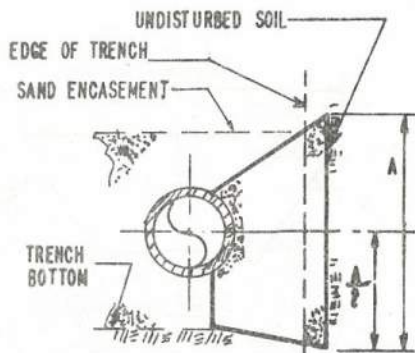
**46 G-3800**  
DRAWING NO.

DATE 7-22-74

PAGE NO. 11



PLAN



SECTION

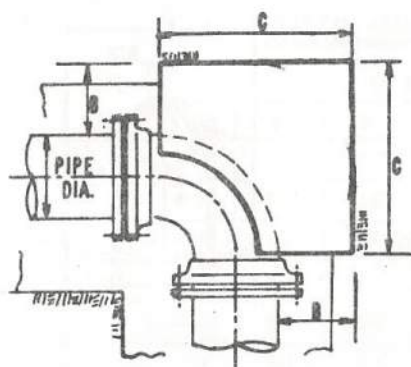
	PIPE DIAMETER					
	6"	8"	12"	16"	20"	24"
A	20"	22"	2'2"	2'6"	3'0"	3'6"
B	12"	12"	15"	18"	21"	2'0"
C	12"	16"	21"	2'3"	3'0"	3'8"
D	.03	.05	.1	.17	.3	.5

D - APPROXIMATE VOLUME OF CONCRETE IN CUBIC YARDS.

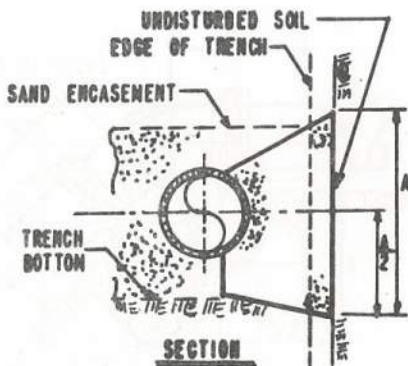
NOTES

1. WRAP FITTING WITH BURLAP BEFORE PLACING CONCRETE.
2. CONCRETE SHALL BE CLASS 15-1.
3. CONCRETE MUST BEAR UPON UNDISTURBED SOIL.
4. SOIL BEARING VALUE - 2000 PSF.

<i>Pinello Luciani</i> CHIEF DESIGN BRANCH <i>James J. Brown</i> DEPUTY COMMISSIONER <i>James F. Brown</i> COMMISSIONER & CHIEF ENGR.	<b>MINIMUM ANCHOR FOR          HORIZONTAL 1/16 &amp; 1/32 BENDS</b> CITY OF PHILADELPHIA	<b>466-3801</b> DRAWING NO. DATE <b>7-25-74</b> PAGE NO. <b>12</b>
--	---	---



PLAN



SECTION

	PIPE DIAMETER					
	6"	8"	12"	16"	20"	24"
A	18"	24"	3'0"	3'0"	4'6"	5'0"
B	9"	12"	12"	12"	16"	18"
C	2'0"	2'6"	2'6"	3'0"	3'9"	4'6"
D	.1	.2	.3	.4	1.1	1.58

D - APPROXIMATE VOLUME OF CONCRETE IN CUBIC YARDS.

NOTES

1. WRAP FITTING WITH BURLAP BEFORE PLACING CONCRETE.
2. CONCRETE SHALL BE CLASS 15-1.
3. CONCRETE MUST BEAR UPON UNDISTURBED SOIL.
4. SOIL BEARING VALVE - 2000 PSF.

*Ronald Lorian*  
CHIEF DESIGN BRANCH

*Kenneth D. Stone*  
PLUMBY COMMISSIONER

*Carver F. Bueris*  
COMMISSIONER & CHIEF ENG'R.

MINIMUM ANCHOR FOR  
HORIZONTAL 1/4 BENDS

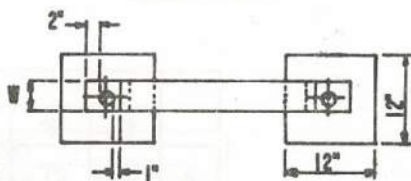
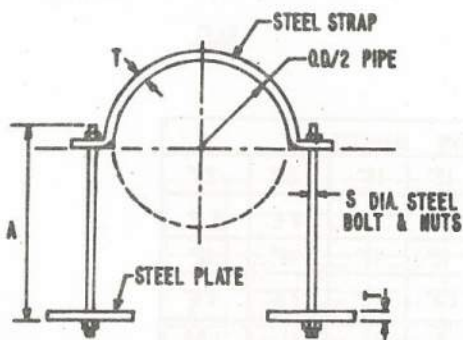
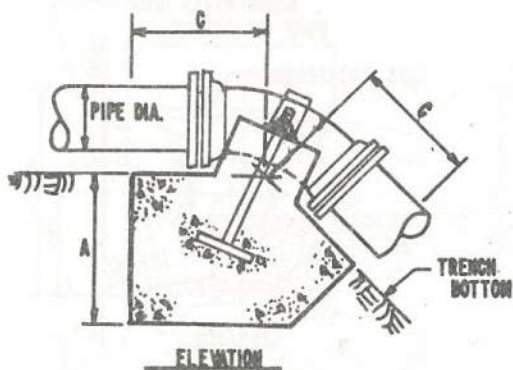
CITY OF PHILADELPHIA WATER DEPARTMENT

466-3802  
DRAWING NO.

DATE 7-26-74

PAGE NO. 13





**NOTES:**

1. WRAP FITTING WITH BURLAP BEFORE PLACING CONCRETE.
2. CONCRETE SHALL BE CLASS 15-1.
3. CONCRETE SHALL HAVE 2" MINIMUM CLEARANCE UNDER BELLS & GLANDS.
4. APPLY COLD BITUMEN COATING AS SPECIFIED.

*Frank Luciani*  
 CHIEF DESIGN BRANCH  
*James J. ...*  
 DEPUTY COMMISSIONER  
*Carroll J. ...*  
 COMMISSIONER & CHIEF ENG'R

**MINIMUM ANCHOR FOR VERTICAL  
 1/8, 1/16 & 1/32 BENDS**

CITY OF PHILADELPHIA

WATER DEPARTMENT

46G-3803  
 DRAWING NO.

DATE 8-27-74

PAGE NO. 14

VERTICAL ANCHOR DIMENSIONS

PIPE DIA.	1/8 BEND 45°						
	A	B	C	D	S	T	W
6"	2'-10"	2'-6"	2'-0"	.65	3/4"	1/2"	4"
8"	4'-0"	2'-6"	3'-0"	1.47	3/4"	1/2"	4"
12"	4'-9"	3'-6"	3'-6"	2.8	1"	1/2"	5"
16"	5'-8"	4'-6"	4'-0"	4.7	1"	3/4"	5"
20"	7'-0"	5'-0"	5'-0"	8.15	1-1/4"	3/4"	6"
24"	7'-9"	5'-6"	5'-6"	10.89	1-1/2"	3/4"	6"
1/16 BEND 22-1/2°							
6"	2'-0"	2'-6"	2'-0"	.4	3/4"	1/2"	3"
8"	2'-0"	2'-6"	2'-6"	.55	3/4"	1/2"	4"
12"	4'-0"	2'-6"	3'-0"	1.38	3/4"	1/2"	4"
16"	4'-6"	3'-0"	4'-0"	2.5	3/4"	1/2"	5"
20"	5'-0"	4'-0"	4'-6"	4.15	1"	3/4"	5"
24"	5'-0"	4'-0"	5'-0"	6.0	1-1/4"	3/4"	5"
1/32 BEND 11-1/4°							
6"	18"	18"	18"	.2	3/4"	1/2"	3"
8"	2'-0"	2'-0"	2'-0"	.4	3/4"	1/2"	3"
12"	2'-6"	2'-6"	2'-6"	.75	3/4"	1/2"	4"
16"	3'-0"	3'-0"	2'-6"	1.4	3/4"	1/2"	4"
20"	3'-3"	3'-0"	3'-6"	2.1	1"	3/4"	4"
24"	3'-6"	4'-0"	3'-6"	3.0	1"	3/4"	5"

D - APPROXIMATE VOLUME OF CONCRETE IN CUBIC YARDS

*Arnold Lucian*  
CHIEF, DESIGN BRANCH  
*Samuel A. Jones*  
DEPUTY COMMISSIONER  
*Carroll J. Pessini*  
COMMISSIONER & CHIEF ENGR

**MINIMUM ANCHOR FOR VERTICAL  
BENDS - DIMENSIONS**

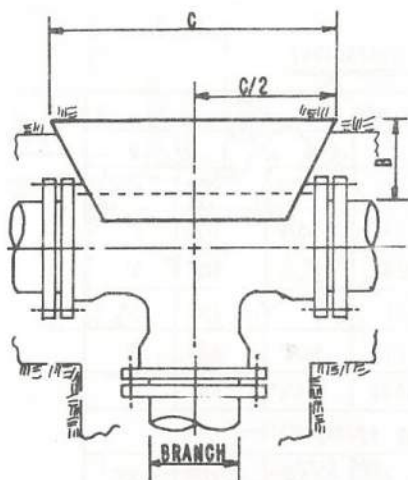
CITY OF PHILADELPHIA

WATER DEPARTMENT

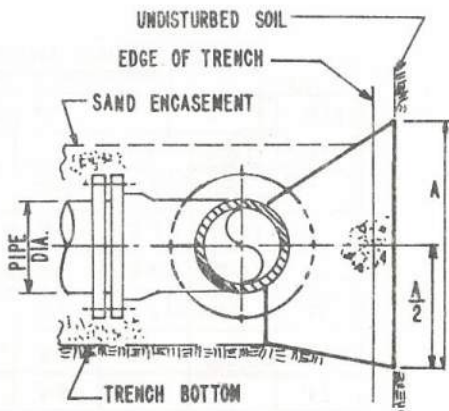
**46G-3804**  
DRAWING NO.

DATE **8-15-74**

PAGE NO. **15**



PLAN



SECTION

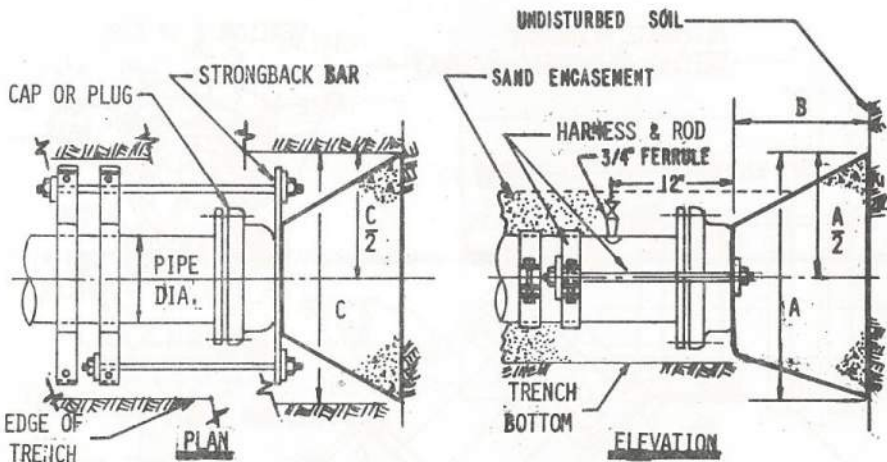
	BRANCH PIPE DIAMETER					
	6	8	12	16	20	24
A	18"	2'0"	3'0"	3'9"	4'6"	5'0"
B	12"	15"	15"	18"	18"	2'0"
C	18"	2'0"	3'0"	4'0"	5'6"	6'0"
D	.1	.2	.4	.8	1.4	2.2

D- APPROXIMATE VOLUME OF CONCRETE IN CUBIC YARDS.

NOTES:

1. WRAP FITTING WITH BURLAP BEFORE PLACING CONCRETE.
2. CONCRETE SHALL BE CLASS 15-1.
3. CONCRETE MUST BEAR AGAINST UNDISTURBED SOIL.
4. SOIL BEARING, VALVE - 2000 PSF.

<i>Michael Lucini</i> CHIEF DESIGN BRANCH <i>James A. ...</i> DEPUTY COMMISSIONER <i>Carroll F. Swanson</i> COMMISSIONER & CHIEF ENGR	<b>MINIMUM ANCHOR FOR TEES</b>	<b>46G-3805</b> DRAWING NO.
	CITY OF PHILADELPHIA	WATER DEPARTMENT
	DATE 8-28-74	PAGE NO. 18



	PIPE DIAMETER					
	6	8	12	16	20	24
A	18"	2'0"	2'6"	3'9"	4'6"	5'0"
B	12"	12"	18"	2'0"	2'0"	2'0"
C	18"	2'0"	3'6"	4'0"	5'0"	6'0"
D	.06	.15	.4	.8	1.3	1.7

D - APPROXIMATE VOLUME OF CONCRETE IN CUBIC YARDS.

NOTES

1. WRAP STRONGBACK BAR AND CAP OR PLUG WITH BURLAP BEFORE PLACING CONCRETE.
2. STRONGBACK BAR SHALL BE SAME WIDTH & THICKNESS AS CORRESPONDING HARNESS MATERIAL ON DWG. NO. 466-3807.
3. CONCRETE MUST BEAR AGAINST UNDISTURBED SOIL.
4. SOIL BEARING VALUE - 2000 PSF.
5. CONCRETE SHALL BE CLASS 15-1.

*Ronald Luciani*  
CHIEF DESIGN BRANCH  
*Samuel J. ...*  
DEPUTY COMMISSIONER  
*James P. ...*  
COMMISSIONER & CHIEF ENGR

MINIMUM ANCHOR FOR  
DEAD ENDS

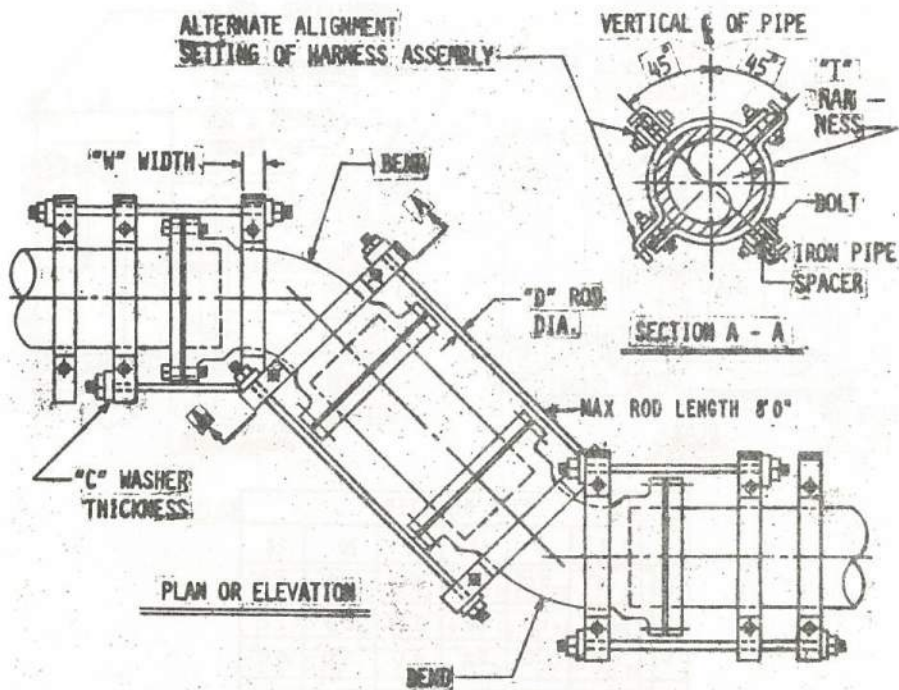
CITY OF PHILADELPHIA

WATER DEPARTMENT

46 G - 3806  
DRAWING NO.

DATE 8-15-74

PAGE NO. 17



PIPE SIZE	D	T	W	C	BOLT SIZE	SPACER LENGTH	APPROX. WT./JT.
6"	3/4"	1/2"	2"	1/2"	5/8"	1-1/4"	40
8"	3/4"	1/2"	2"	1/2"	5/8"	1-1/4"	50
12"	1"	3/4"	3"	3/4"	7/8"	1-1/2"	60
16"	1"	3/4"	3"	1"	7/8"	1-1/2"	80
20"	1-1/4"	3/4"	3"	1"	7/8"	1-3/4"	100
24"	1-1/2"	3/4"	4"	1"	7/8"	2"	120
30"	1-3/4"	3/4"	4"	1"	7/8"	2-3/8"	140

*Walter L. Lorian*  
 CHIEF DESIGN BRANCH  
*Kenneth J. ...*  
 DEPUTY COMMISSIONER  
*Warren J. ...*  
 COMMISSIONER & CHIEF ENGR

## HARNESS INSTALLATION FOR IRON PIPE

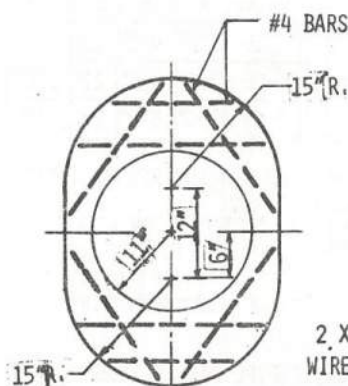
CITY OF PHILADELPHIA

WATER DEPARTMENT

466-3807

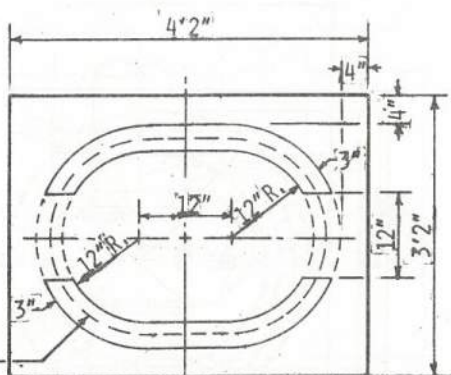
DATE 8-15-74

PAGE NO. 18

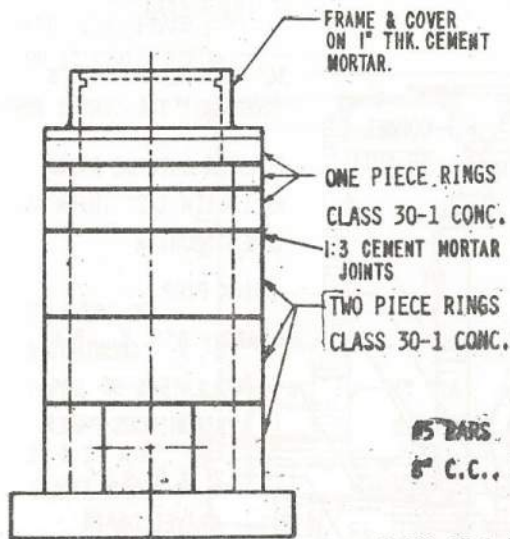


TOP RING

2 X 2 X 14  
WIRE FABRIC



PLAN



ELEVATION

SYMM. ABT.



SECTION

*Ronald Luciano*  
CHIEF DESIGN BRANCH  
*Thomas J. ...*  
DEPUTY COMMISSIONER  
*Carroll J. ...*  
COMMISSIONER & CHIEF ENG'R

CITY OF PHILADELPHIA

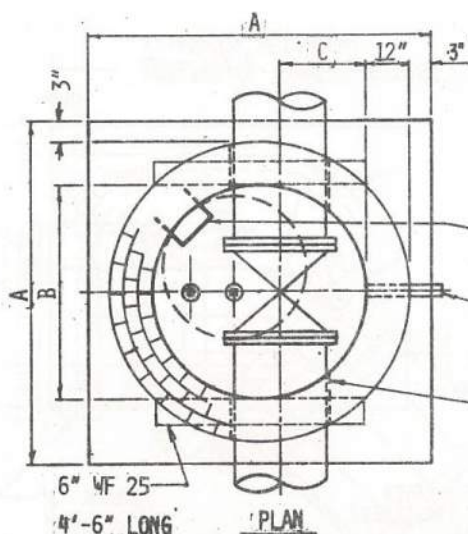
CONCRETE VALVE BOX

WATER DEPARTMENT

468-3808  
DRAWING NO.

DATE 8-15-74

PAGE NO 19



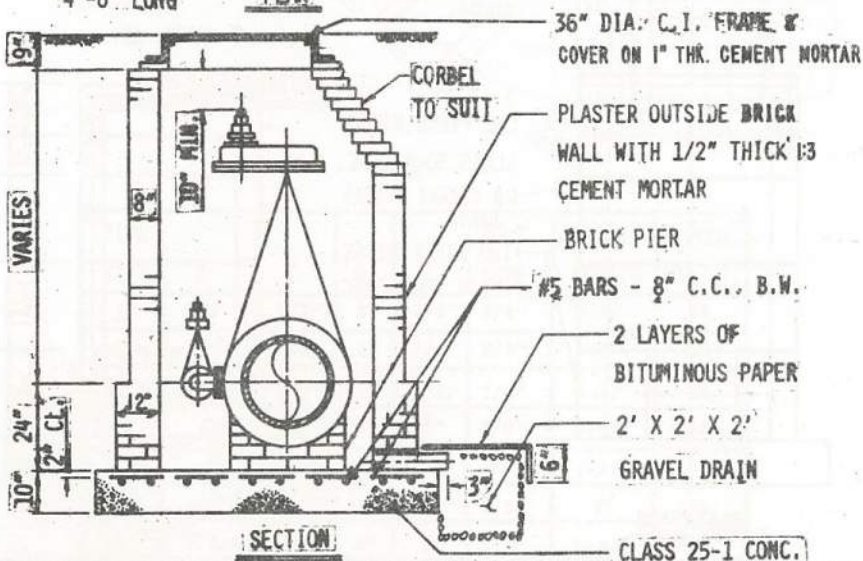
VALVE	A	B	C	D*
16	6'8"	4'2"	19"	5'2"
20	7'0"	4'6"	21"	5'6"
24	7'6"	5'0"	24"	6'0"

\*D - COVER REQUIRED OVER PIPE

DUCTILE IRON STEPS  
12" C.C.

3" DIA. D.I. PIPE

WHERE PIPE PASSES THRU  
WALL, WRAP WITH 3 LAYERS  
OF 1" THICK FELT



36" DIA. C.I. FRAME &  
COVER ON 1" THK. CEMENT MORTAR

CORBEL  
TO SUIT

PLASTER OUTSIDE BRICK  
WALL WITH 1/2" THICK 1:3  
CEMENT MORTAR

BRICK PIER

#5 BARS - 8" C.C., B.W.

2 LAYERS OF  
BITUMINOUS PAPER

2' X 2' X 2'

GRAVEL DRAIN

CLASS 25-1 CONC.

*Pinella Lisciani*  
CHIEF DESIGN BRANCH  
*Bennett J. Brown*  
DEPUTY COMMISSIONER  
*Carroll J. Brown*  
COMMISSIONER & CHIEF ENGR

**VERTICAL VALVE CHAMBERS  
FOR 16", 20" & 24" DIA. VALVES**

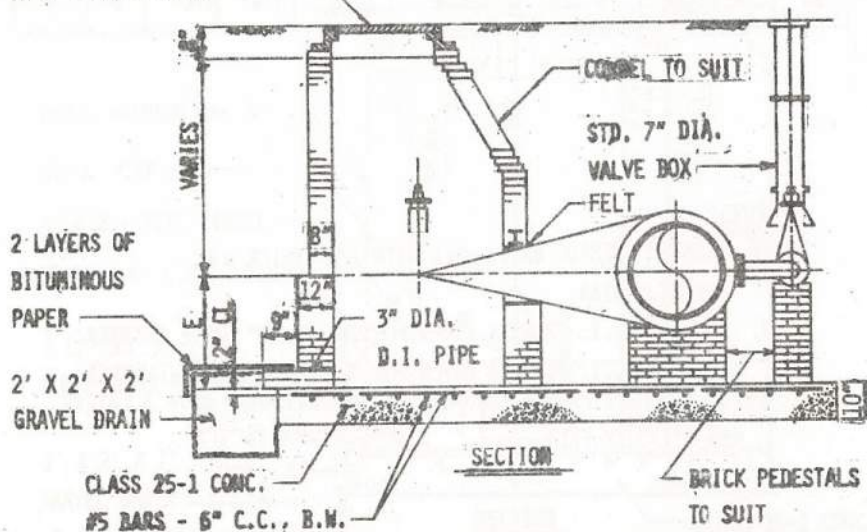
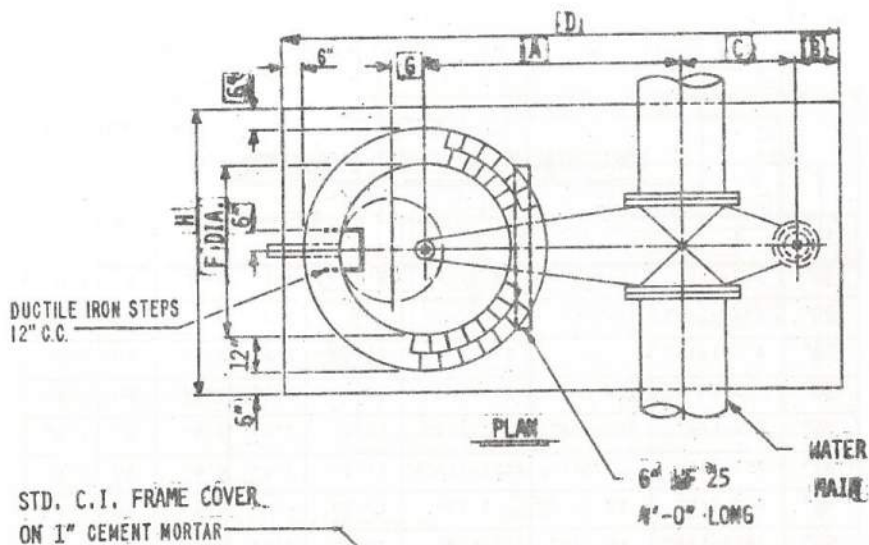
CITY OF PHILADELPHIA

WATER DEPARTMENT

468-3809  
DRAWING NO.

DATE 8-15-74

PAGE NO. 20



*Ronald L. Luccini*  
CHIEF DESIGN BRANCH

*Herbert J. Stone*  
DEPUTY COMMISSIONER

*Comin F. Sherman*  
COMMISSIONER & CHIEF ENGR

**HORIZONTAL VALVE CHAMBERS  
FOR 16" TO 60" DIA. VALVES**

CITY OF PHILADELPHIA

WATER DEPARTMENT

46G-3810  
DRAWING NO.

DATE 3-15-74

PAGE NO. 21



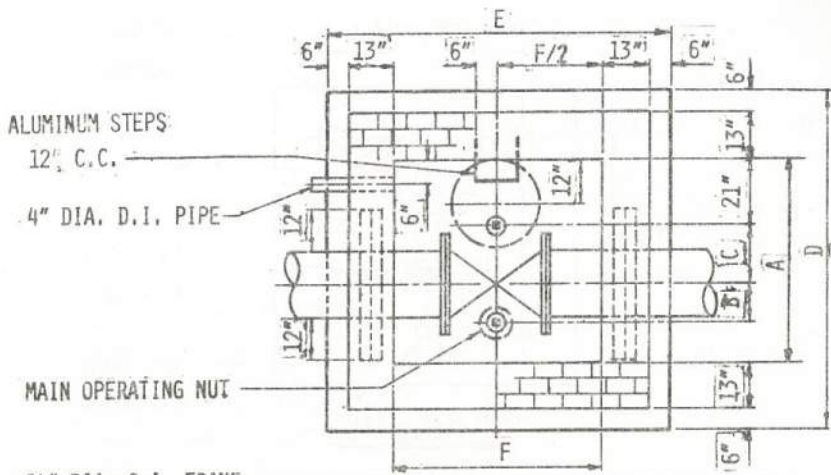
HORIZONTAL VALVE CHAMBER DIMENSIONS

SIZE	A	B	C	D	E	F	G	H
16"	3'3-5/8"	9-1/2"	18-3/4"	8'9"	2'0"	3'0"	6"	6'0"
20"	3'10-3/8"	9-3/4"	20-3/4"	9'9"	2'3"	3'6"	9"	6'6"
24"	4'6-1/16"	13"	2'0-7/8"	11'0"	2'6"	3'6"	9"	6'6"
30"	5'5"	13-1/2"	2'4-3/8"	12'3"	3'0"	3'6"	9"	6'6"
36"	6'4-1/4"	12-3/8"	2'7-1/8"	13'4"	3'0"	3'6"	9"	6'6"
42"	7'7-1/2"	12-3/4"	2'11-11/16"	15'3"	3'6"	4'0"	6"	7'0"
48"	8'5-7/8"	13-5/16"	3'10"	17'3"	4'0"	4'0"	6"	7'0"
60"	10'6-1/4"	16-1/8"	4'6-5/8"	20'6"	5'0"	4'6"	9"	7'6"

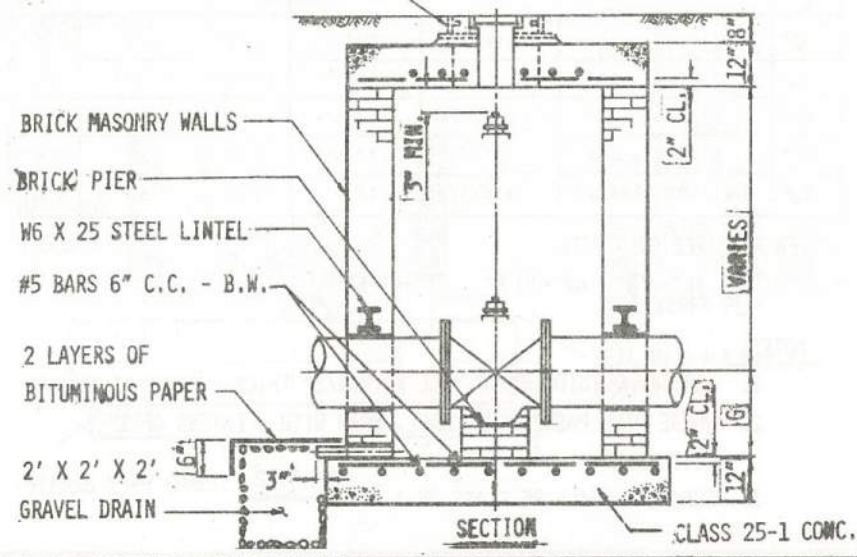
NOTE:

1. PLASTER OUTSIDE BRICK WALL WITH 1/2" THICK 1:3 CEMENT MORTAR.
2. 24" DIA. C.I. FRAME & COVER FOR 16" TO 36" VALVE CHAMBER.  
36" DIA. C.I. FRAME & COVER FOR 42" TO 60" VALVE CHAMBER.
3. WHERE VALVE PASSES THRU WALL OF MANHOLE WRAP WITH 3 LAYERS OF 1" THICK FELT.

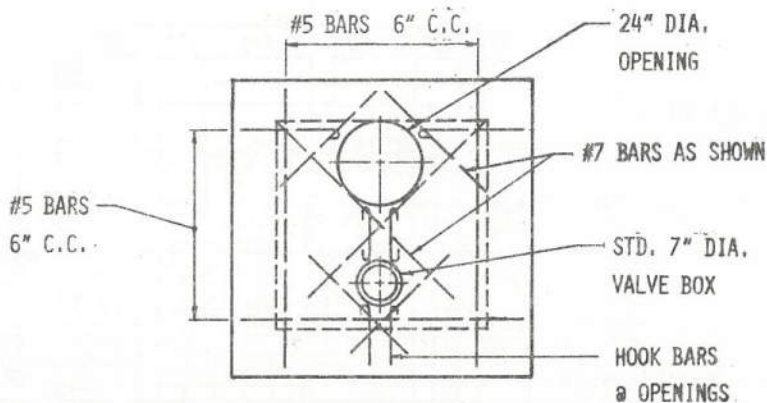
<i>Philip L. Zeman</i> CHIEF DESIGN BRANCH <i>Thomas J. ...</i> DEPUTY COMMISSIONER COMMISSIONER & CHIEF ENG'N	HORIZONTAL VALVE CHAMBERS FOR 16" TO 60" DIA. VALVES		466-3811 DRAWING NO.
	CITY OF PHILADELPHIA	WATER DEPARTMENT	DATE 3-15-74
			PAGE NO. 22



24" DIA. C.I. FRAME  
& COVER ON 1" CEMENT MORTAR



<i>Ronald L. Lisciani</i> CHIEF DESIGN BRANCH <i>Fernand J. Sime</i> DEPUTY COMMISSIONER <i>Carroll F. Suenens</i> COMMISSIONER & CHIEF ENGR.	<b>VERTICAL VALVE CHAMBERS</b> <b>FOR 30" TO 60" DIA. VALVES</b>	<b>466-3812</b> DRAWING NO.
	CITY OF PHILADELPHIA	DATE <b>3-15-74</b>
	WATER DEPARTMENT	PAGE NO. <b>23</b>



TOP SLAB DETAIL

SIZE	A	B	C	D	E	F	G
30"	6'10"	10"	2'4-3/8"	10'0"	9'6"	6'4"	2'6"
36"	7'7"	10"	2'7-1/8"	10'9"	10'0"	6'10"	3'0"
42"	8'4"	13"	2'11-11/16"	11'6"	10'6"	7'4"	3'3"
48"	9'7"	13"	3'10"	12'9"	10'9"	7'7"	3'6"
60"	11'10"	16-3/8"	4'6-5/8"	15'0"	11'0"	7'10"	4'0"

COVER REQUIRED OVER PIPE

\* 30"=7'0" 36"=7'8" 42"=10'6" 48"=11'6"

NOTES:

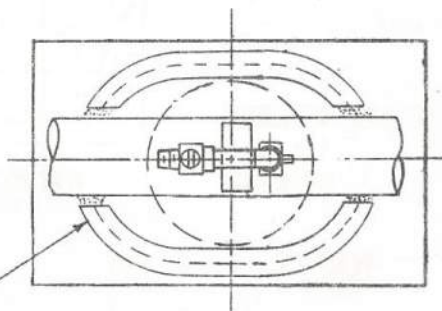
1. PLASTER OUTSIDE BRICK WALL WITH 1/2" THICK 1:3 CEMENT MORTAR
2. WHERE PIPE PASSES THRU WALL, WRAP WITH 3 LAYERS OF 1" THICK FELT.
3. CONCRETE SHALL BE CLASS 25-1.

<i>Thomas L. Mason</i> CHIEF DESIGN BRANCH <i>Benjamin J. Brown</i> DEPUTY COMMISSIONER <i>Charles F. Sullivan</i> COMMISSIONER & CHIEF ENGR.	<b>VERTICAL VALVE CHAMBERS</b> <b>FOR 30" TO 60" DIA. VALVES</b>	<b>466-3813</b> DRAWING NO.	
	CITY OF PHILADELPHIA	WATER DEPARTMENT	DATE <b>3-15-74</b>
			PAGE NO. <b>24</b>

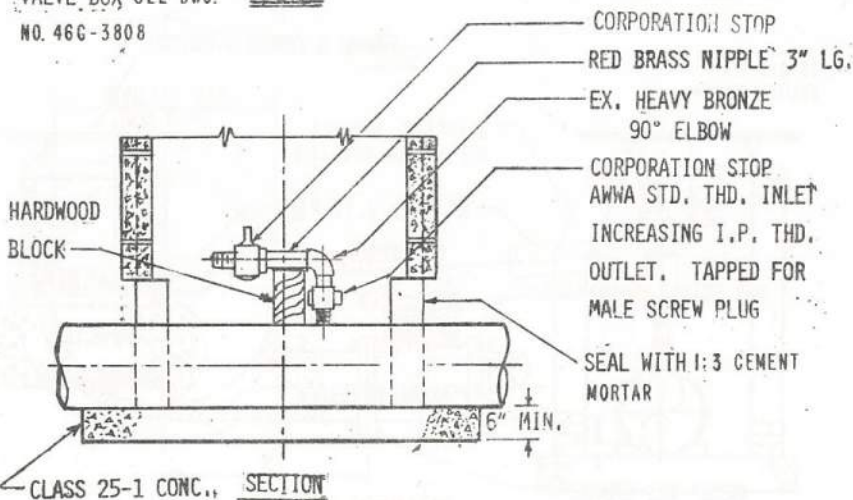
TYPICAL MANUAL AIR VALVE MANHOLE FOR 6" TO 12" MAINS

FOR 10" DIA. & LARGER MAINS

- (A) ROTATE VALVE BOX 90°.
- (B) ELIMINATE BOTTOM RING, BRING CONCRETE FLUSH WITH TOP OF MAIN.
- (C) BASE WIDTH SHALL BE THE GREATER, 4'-2" OR FULL TRENCH WIDTH.



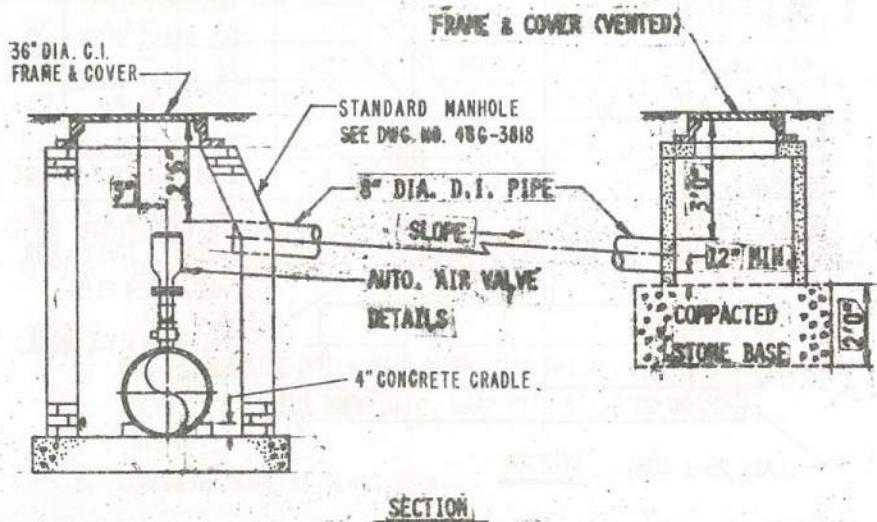
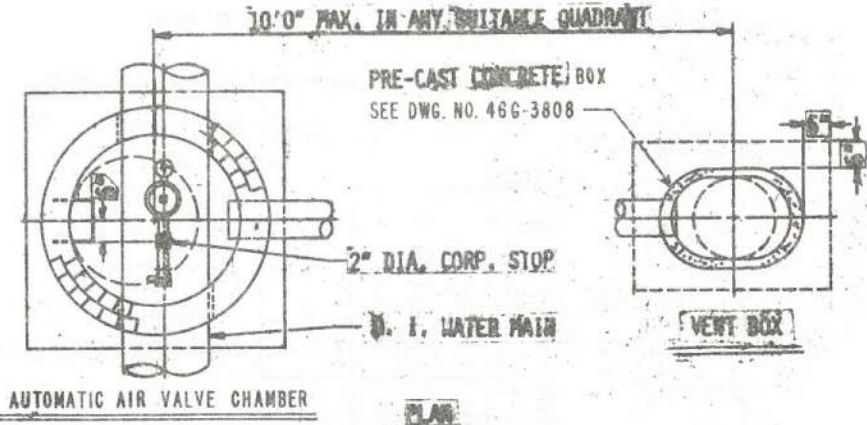
STANDARD CONCRETE VALVE BOX SEE DWG. NO. 46G-3808 PLAN



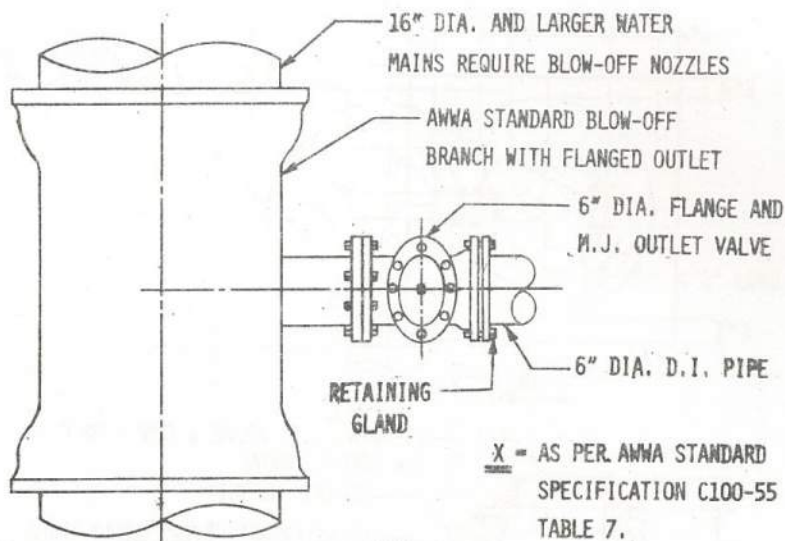
MANUAL AIR VALVE  
&  
MANUAL AIR VALVE MANHOLE  
CITY OF PHILADELPHIA WATER DEPARTMENT

*Arnold J. Fucini*  
CHIEF DESIGN BRANCH  
*James L. Burns*  
DEPUTY COMMISSIONER  
*James L. Burns*  
COMMISSIONER & CHIEF ENGR

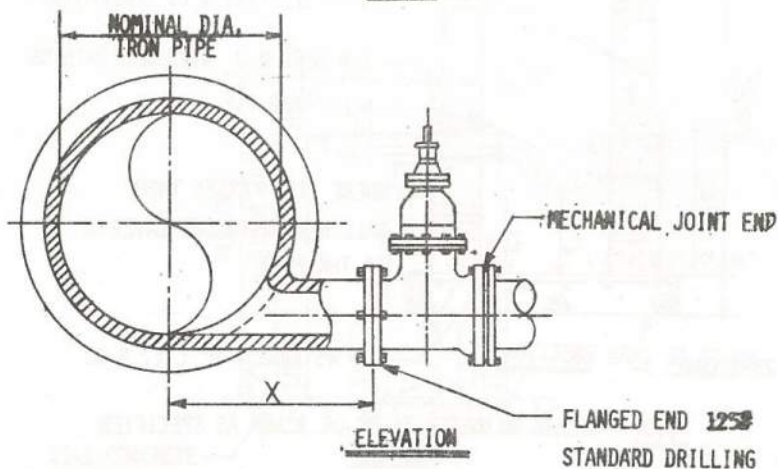
46 G-3814  
DRAWING NO.  
DATE 8-15-74  
PAGE NO. 25



<i>Ronald L. ...</i> CHIEF DESIGN BRANCH <i>Kenneth O. ...</i> DEPUTY COMMISSIONER <i>Charles J. ...</i> COMMISSIONER & CHIEF ENGR.	<b>AUTOMATIC AIR VALVE CHAMBER &amp; VENT BOX ARRANGEMENT FOR D. I. WATER MAINS</b>	<b>466-3815</b> <small>REVISION NO.</small> <b>DATE 5-15-74</b> <b>PAGE NO. 26</b>
CITY OF PHILADELPHIA		WATER DEPARTMENT



PLAN



*Paula Luciani*  
CHIEF DESIGN BRANCH

*Russell Brown*  
DEPUTY COMMISSIONER

*Thomas J. Swann*  
COMMISSIONER & CHIEF ENGR

CAST IRON BLOW-OFF BRANCH  
WITH 6" DIA. OUTLET VALVE

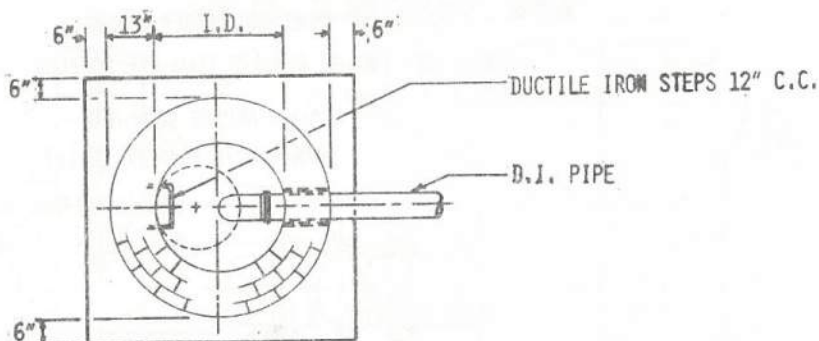
CITY OF PHILADELPHIA

WATER DEPARTMENT

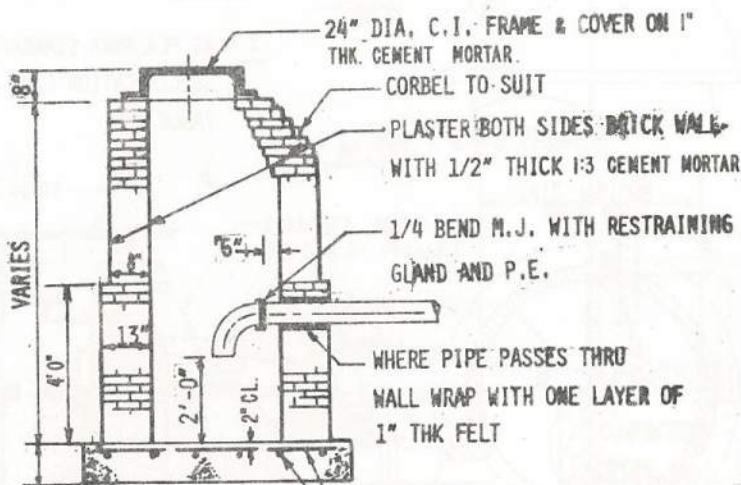
46G-3816  
DRAWING NO.

DATE 3-15-74

PAGE NO. 27



PLAN

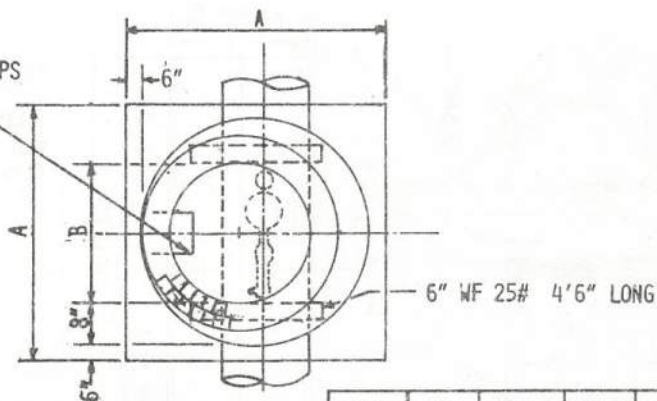


CLASS 25-1 CONC.      SECTION      #5 BARS @ 8" C.C. B.W.

I.D. = INSIDE DIAMETER 3'-0" OR N'-0" AS SPECIFIED.

<i>Ronald Luciano</i> CHIEF DESIGN BRANCH <i>Benjamin J. ...</i> DEPUTY COMMISSIONER <i>William J. ...</i> COMMISSIONER & CHIEF ENGR.	<b>BLOW-OFF CHAMBER</b>	<b>466-3817</b> DRAWING NO.
		DATE 8-15-74
		PAGE NO. 28
CITY OF PHILADELPHIA		WATER DEPARTMENT

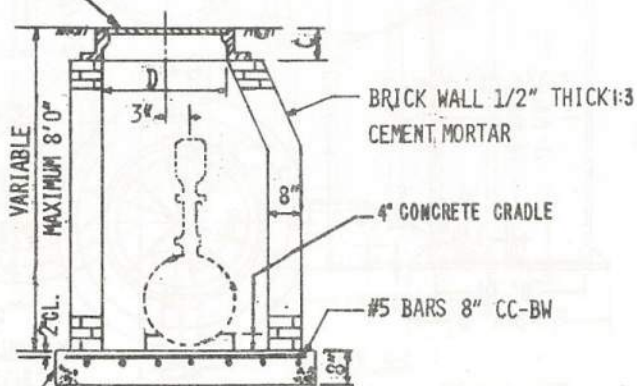
DUCTILE IRON STEPS  
12" C.C.



PLAN

PIPE DIA.	A	B	C	D
6-12	5'4"	3'0"	7"	24"
16-24	6'4"	4'0"	8"	36"

STD. C.I. FRAME & COVER ON 1"  
THK. CEMENT MORTAR



SECTION

25-1 CONCRETE

*Arnold Luciani*  
CHIEF DESIGN BRANCH  
*Fernando J. Gomez*  
DEPUTY COMMISSIONER  
*Thomas J. Brown*  
COMMISSIONER & CHIEF ENGR

## STANDARD MANHOLE

CITY OF PHILADELPHIA

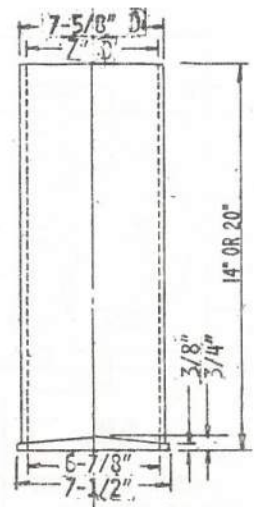
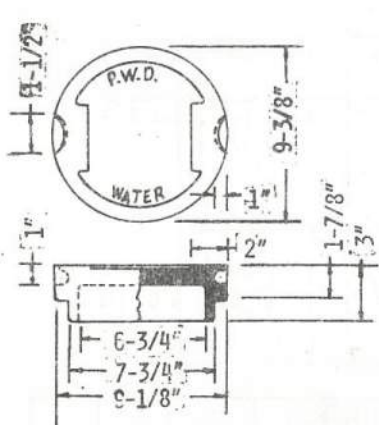
WATER DEPARTMENT

460-3819  
DRAWING NO.

DATE 8-15-74

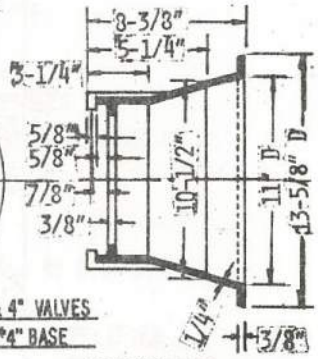
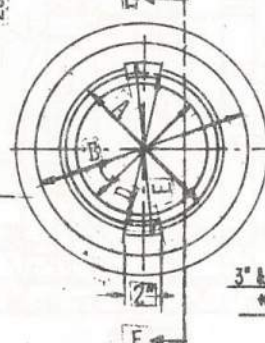
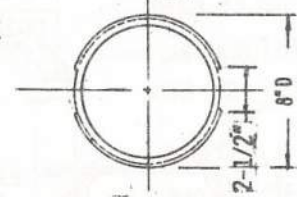
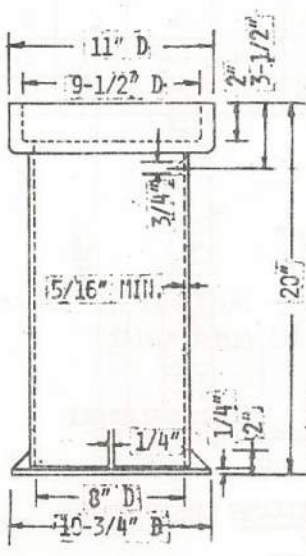
PAGE NO. 29





MATERIAL  
CAST IRON ASTM A-48  
CLASS 25-B

A	8-1/4" D
B	11-1/2" D
C	7-1/8" D
D	7-3/4" D
E	9-1/2" D



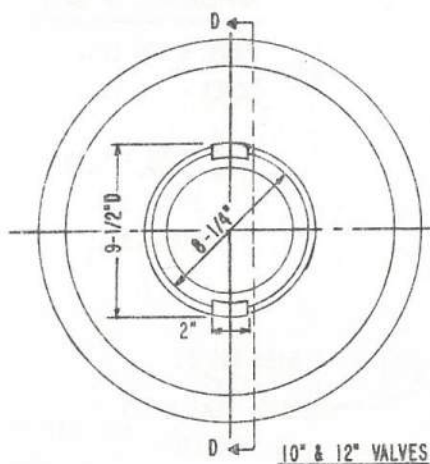
TOP SECTION

SECTION E-E

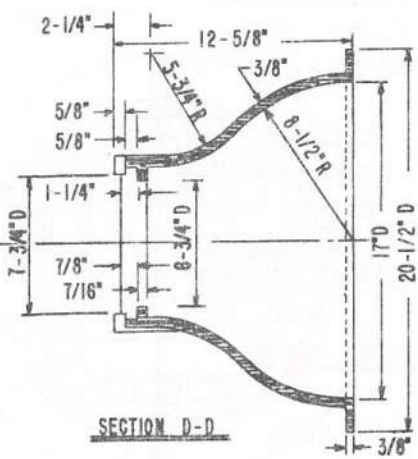
*Samuel L. Linton*  
CHIEF DESIGN BRANCH  
*Samuel D. Brown*  
DEPUTY COMMISSIONER  
*Thomas F. Brennan*  
COMMISSIONER & CHIEF CIVIL

STANDARD 7" CAST IRON  
VALVE BOX  
BASE SECTIONS  
CITY OF PHILADELPHIA WATER DEPARTMENT

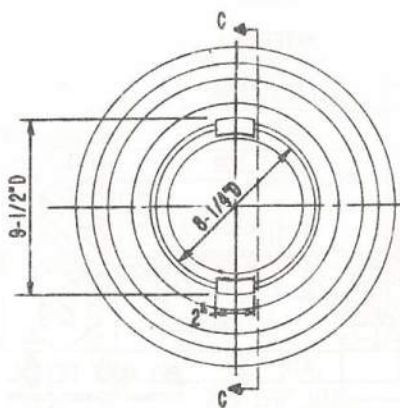
46 G-3819  
DRAWING NO.  
DATE 8-15-74.  
MOD. NO. 30



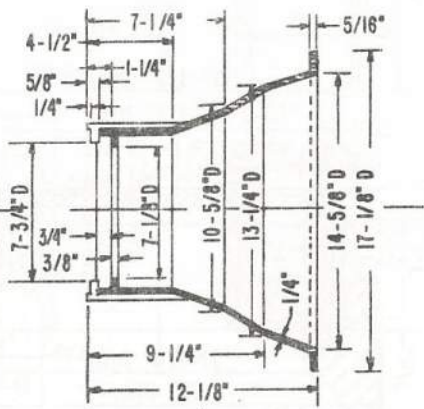
10" & 12" VALVES  
# 8" BASE



SECTION D-D



6" & 8" VALVES  
6" BASE

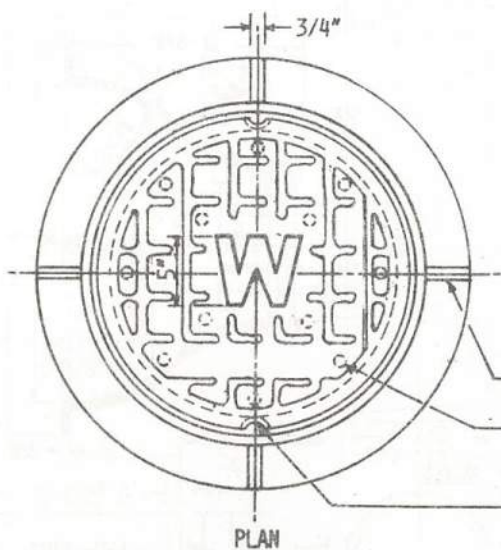


SECTION C-C

*Ronald Lucien*  
CHIEF DESIGN BRANCH  
*James J. ...*  
DEPUTY COMMISSIONER  
*James J. ...*  
COMMISSIONER & CHIEF ENGR

STANDARD 7" CAST IRON  
VALVE BOX  
BASE SECTIONS  
CITY OF PHILADELPHIA WATER DEPARTMENT

466-3820  
DRAWING NO.  
DATE 8-30-74  
PAGE NO. 31



APPROXIMATE WEIGHTS:

FRAME - 220 LBS.

COVER - 105 LBS.

MACHINE FINISH

FRAME SEAT

COVER SEAT

4 RIBS REQ'D.

1" DIA. VENT HOLES  
AS SPECIFIED

2 PRY HOLES REQ'D.

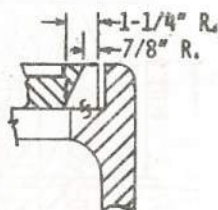
PLAN

MATERIAL:

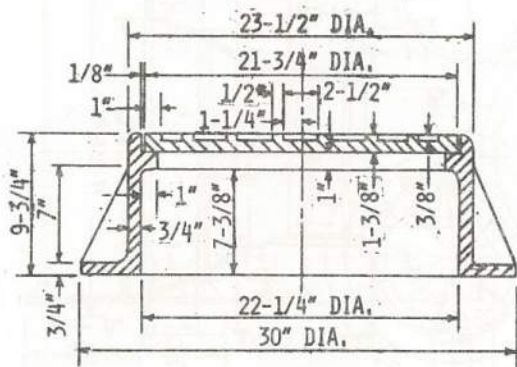
CAST IRON

ASTM A-48

CLASS 30B



PRY HOLE DETAIL



SECTION

<i>Richard Luciani</i> CHIEF DESIGN BRANCH	<b>FRAME AND COVER</b> <b>21 3/4" DIAMETER</b>	<b>463-3821</b> DRAWING NO.
<i>Benjamin S. Brown</i> DEPUTY COMMISSIONER		DATE 8-15-74
<i>Carroll P. Swanson</i> COMMISSIONER & CHIEF ENGR		WATER DEPARTMENT PAGE NO. 32

APPROXIMATE WEIGHTS

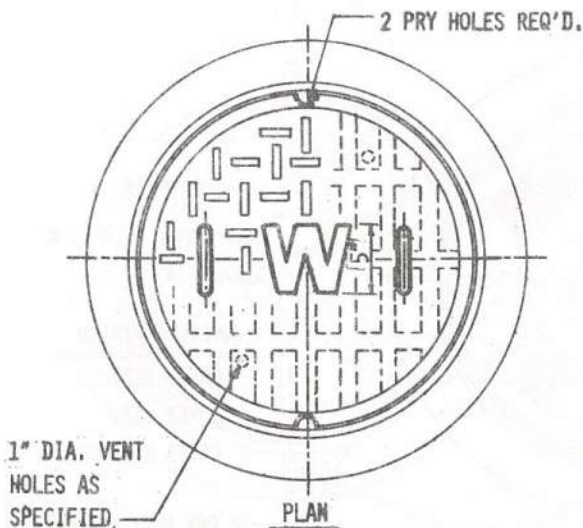
FRAME - 200 LBS.  
COVER - 175 LBS.

MATERIALS:

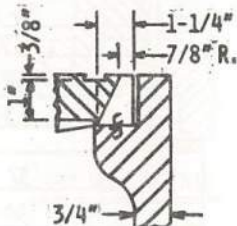
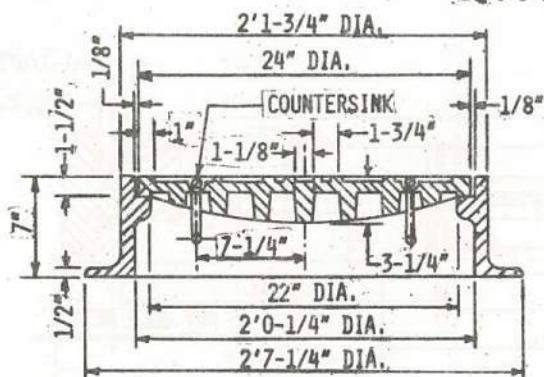
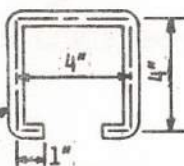
CAST IRON - ASTM A - 48  
CLASS 300  
STAINLESS STEEL -  
ASTM A-276, AISI 304

MACHINE FINISH

FRAME SEAT  
COVER SEAT



1/2" DIA. BAR  
18-8-S ST. ST.



SECTION.

FRAME AND COVER  
24" DIAMETER

466-3822  
DRAWING NO.

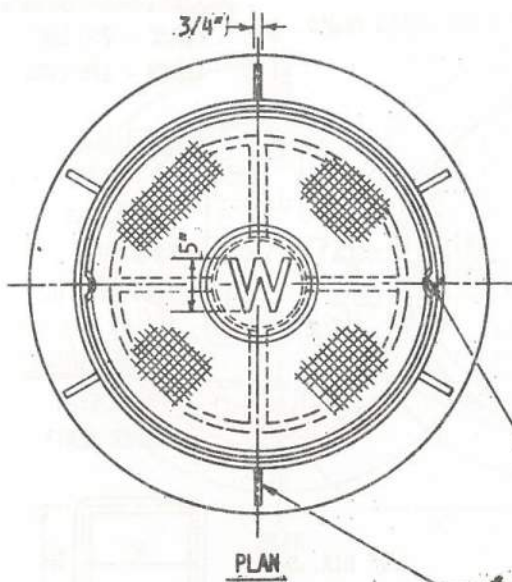
DATE 8-15-74

PAGE NO. 33

*Rinaldo Luciani*  
CHIEF DESIGN BRANCH  
*Thomas J. Sweeney*  
DEPUTY COMMISSIONER  
*Carroll F. Luciani*  
COMMISSIONER & CHIEF ENGR

CITY OF PHILADELPHIA

WATER DEPARTMENT

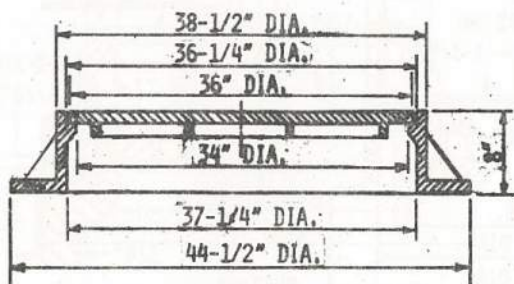


MATERIAL  
 CAST IRON, ASTM A-48  
 CLASS 30B

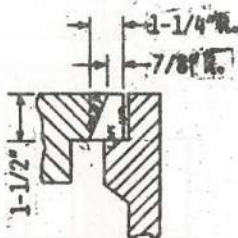
MACHINE FINISH  
 FRAME SEAT  
 COVER SEAT  
 COVER SIDEWALL

2 PRY HOLES REQ'D.

6 RIBS EQUALLY SPACED



SECTION



PRY HOLE DETAIL

*Ronald Luciano*  
 CHIEF DESIGN BRANCH  
*James O. Brown*  
 DEPUTY COMMISSIONER  
*Carroll H. Swain*  
 COMMISSIONER & CHIEF ENGINEER

**FRAME AND COVER**  
**36" DIAMETER**

CITY OF PHILADELPHIA

WATER DEPARTMENT

466-3823  
 DRAWING NO.

DATE 8-15-74

PAGE NO. 34

MATERIAL

CAST IRON, ASTM A-48  
CLASS 30 B

MACHINE FINISH:

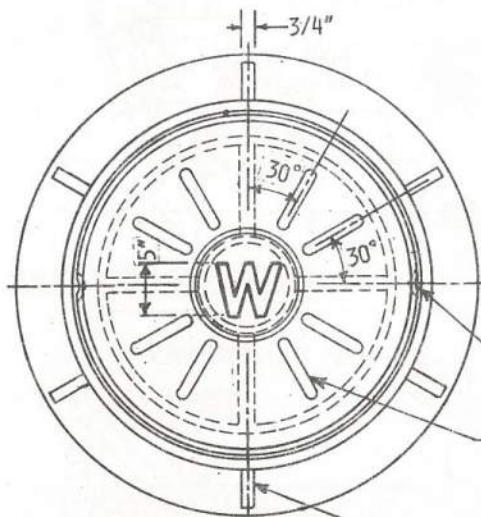
FRAME SEAT  
COVER SEAT  
COVER SIDEWALL

2 PRY HOLES REQ'D.

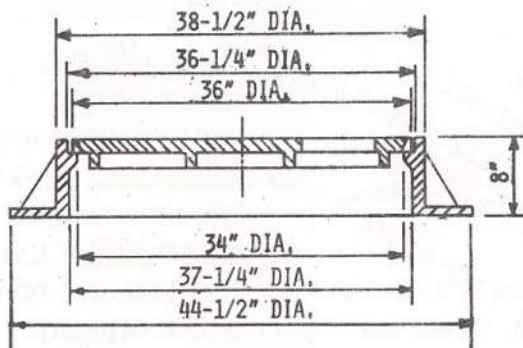
8 VENT SLOTS

1" WIDE X 8" LONG

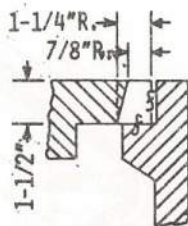
6 RIBS EQUALLY SPACED



PLAN



SECTION



PRY HOLE DETAIL

*Richard Luciani*  
CHIEF DESIGN BRANCH  
*James J. Zima*  
DEPUTY COMMISSIONER  
*James J. Zima*  
COMMISSIONER & CHIEF ENGR

FRAME AND VENTED COVER  
36" DIAMETER

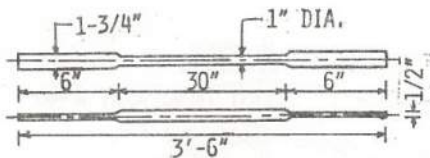
CITY OF PHILADELPHIA

WATER DEPARTMENT

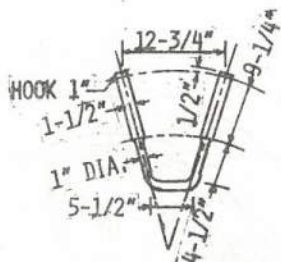
46G-3824  
DRAWING NO.

DATE 8-15-74

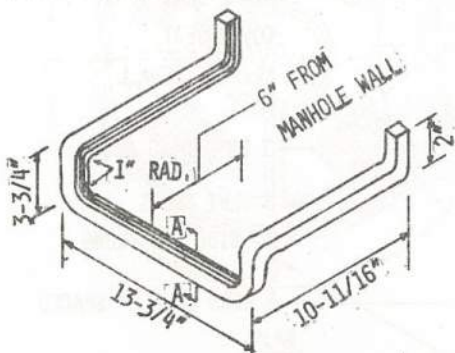
PAGE NO. 35



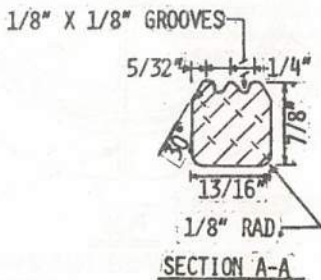
**DUCTILE IRON LADDER BAR**



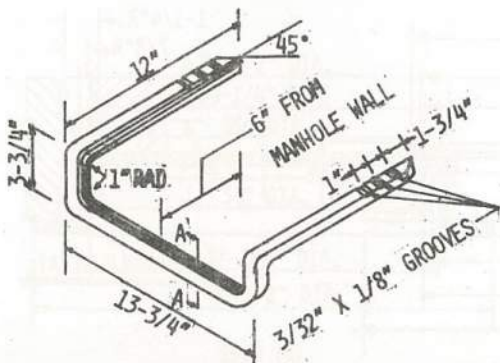
**DUCTILE IRON STEP**



**ALUMINUM STEP FOR BRICK MANHOLE**



**SECTION A-A**



**ALUMINUM STEP FOR CONCRETE OR PRECAST R.C. MANHOLE**

NOTE:

- (1) DUCTILE IRON SHALL CONFORM TO ASTM A536-67, GRADE 60-40-18
- (2) ALUMINUM SHALL CONFORM TO ASTM B-221: ALLOY 6061 T-6
- (3) EMBEDDED ENDS OF ALUMINUM STEPS SHALL HAVE TWO (2) COATS OF BITUMASTIC

*Ennio Luciani*  
CHIEF DESIGN BRANCH  
*Thomas J. French*  
DEPUTY COMMISSIONER  
*Carroll F. Byrnes*  
COMMISSIONER & CHIEF ENGR

**MANHOLE STEPS  
AND  
LADDER BAR**

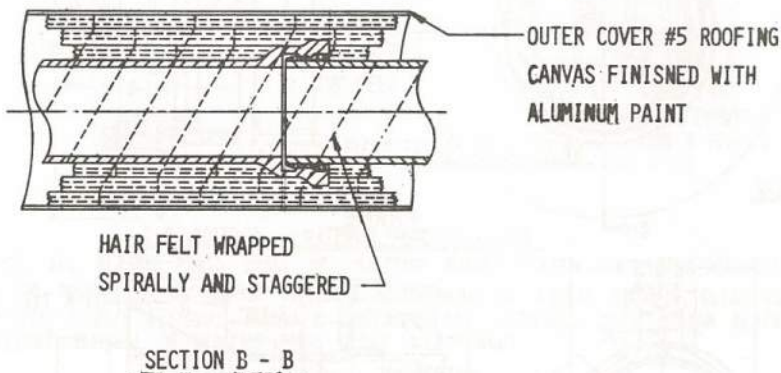
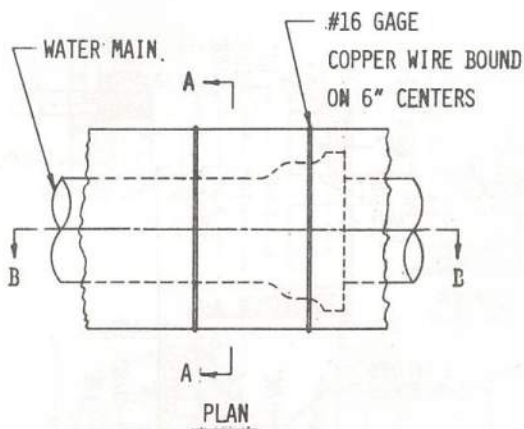
CITY OF PHILADELPHIA

WATER DEPARTMENT

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NOTES:

1. EACH LAYER OF FELT SHALL BE WRAPPED WITH TWINE.
2. ALUMINUM PAINT SHALL CONFORM TO PHILA. PROCUREMENT SPEC. NO. TT-P-38d.

*Richard J. ...*  
CHIEF DESIGN BRANCH

*Richard J. ...*  
DEPUTY COMMISSIONER

*Charles T. ...*  
COMMISSIONER & CHIEF ENGR

**EXPOSED WATER MAIN**  
**FROST PROTECTIVE COVERING**

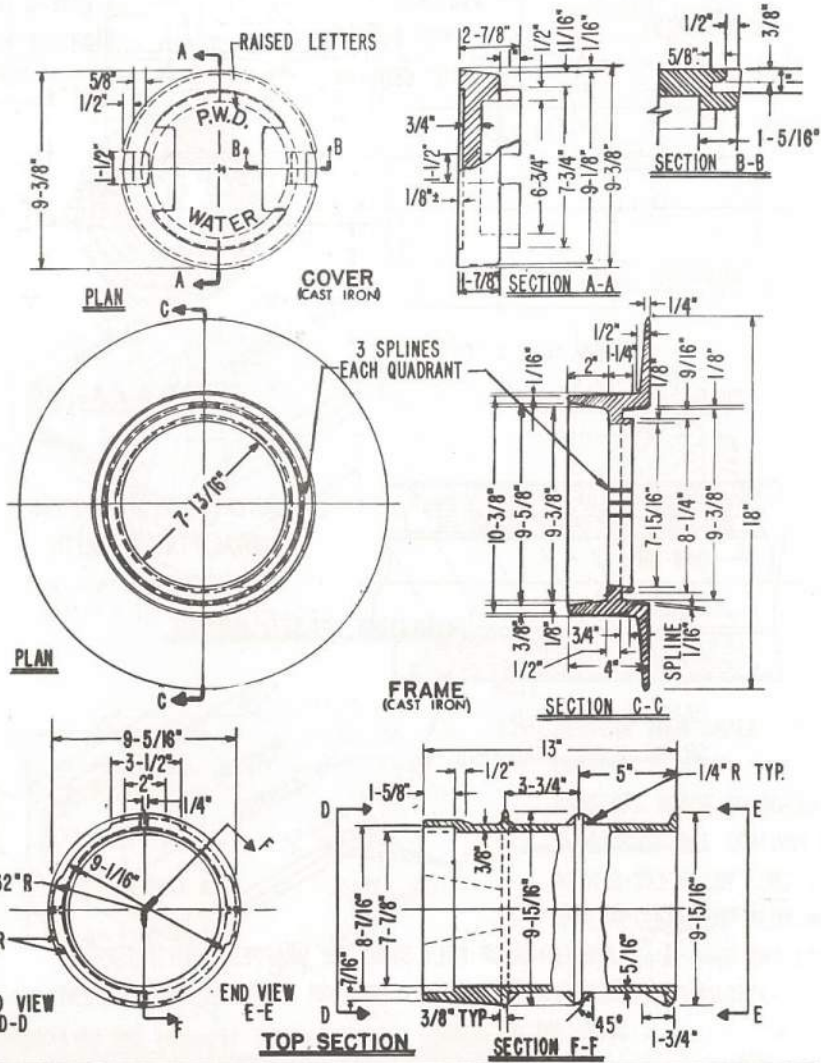
CITY OF PHILADELPHIA      WATER DEPARTMENT

**46G-3826**  
DRAWING NO.

DATE **8-15-74**

PAGE NO. **37**

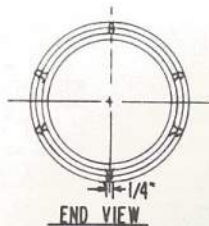




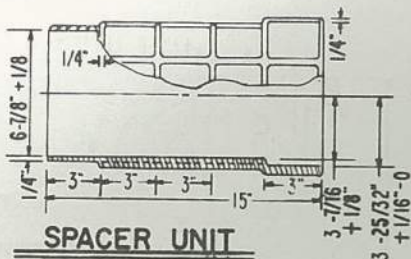
*Arnold Luciani*  
 CHIEF DESIGN BRANCH  
*Samuel D. Zonne*  
 DEPUTY COMMISSIONER  
*Carroll F. Swears*  
 COMMISSIONER & CHIEF ENGR

**STANDARD 7" PLASTIC VALVE BOX**  
**CAST IRON COVER & FRAME-TOP SECTION**  
 CITY OF PHILADELPHIA      WATER DEPARTMENT

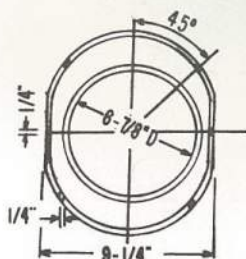
**46G-3827**  
 DRAWING NO.  
 DATE **8-15-74**  
 PAGE NO. **38**



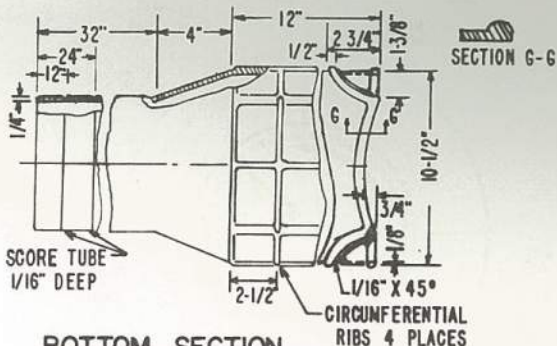
END VIEW



SPACER UNIT



END VIEW



BOTTOM SECTION

MATERIAL SPECIFICATIONS

PLASTIC: ALL PLASTIC PARTS SHALL BE INJECTION MOLDED. PLASTIC SHALL BE A REINFORCED OLEFIN POLYMER IN ACCORDANCE WITH THE REQUIREMENTS OF A.S.T.M. D2853-70, CLASS 1212, REINFORCED WITH A FIBROUS INORGANIC COMPONENT AND STABILIZED WITH CARBON BLACK TO PREVENT MATERIAL DEGRADATION FROM ULTRA-VIOLET LIGHT.

PHYSICAL PROPERTIES

	TEST METHOD-ASTM	MIN TEST VALUES
TENSILE STRENGTH (2.0" MIN.)	D-638	3400 PSI
IMPACT STRENGTH 120D	D-256	0.6 FT. LB./IN.
DUROMETER HARDNESS, TYPE D	D-2250	60
DEFLECTION TEMPERATURE-66 PSI STRESS	D-648	230°F
SPECIFIC GRAVITY	D-792	1.15

NOTE - SPECIAL ALLOWANCES SHALL BE MADE IF TEST SECTION IS CUT FROM FINISHED PRODUCT  
 CAST IRON - CAST IRON SHALL CONFORM TO A.S.T.M. A-48, CLASS 30B.

*Rinaldo Luciani*  
 CHIEF DESIGN BRANCH  
*Renech J. Simon*  
 DEPUTY COMMISSIONER  
*James F. Sweeney*  
 COMMISSIONER & CHIEF ENGR.

STANDARD 7" PLASTIC VALVE BOX  
 SPACER UNIT & BOTTOM SECTION

CITY OF PHILADELPHIA WATER DEPARTMENT

46G-3828  
 DRAWING NO  
 DATE 8-9-74  
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