

PORTION OF THE S.E. 1/4, S.E. 1/4, SECTION 4, TOWNSHIP 23 NORTH, RANGE 5 EAST, W.M.

REEDSHAW PLAT WATER DETAILS

CITY OF RENTON

REEDSHAW PLAT RENTON, WA

FOR: CALLIDUS DEVELOPMENT INC. 16838 SE 43RD STREET ISSAQUAH, WA 98027 PHONE: (425) 818-8829 FAX: (425) 818-8843

PROJECT NO.: 12007

DRAWN BY: VK

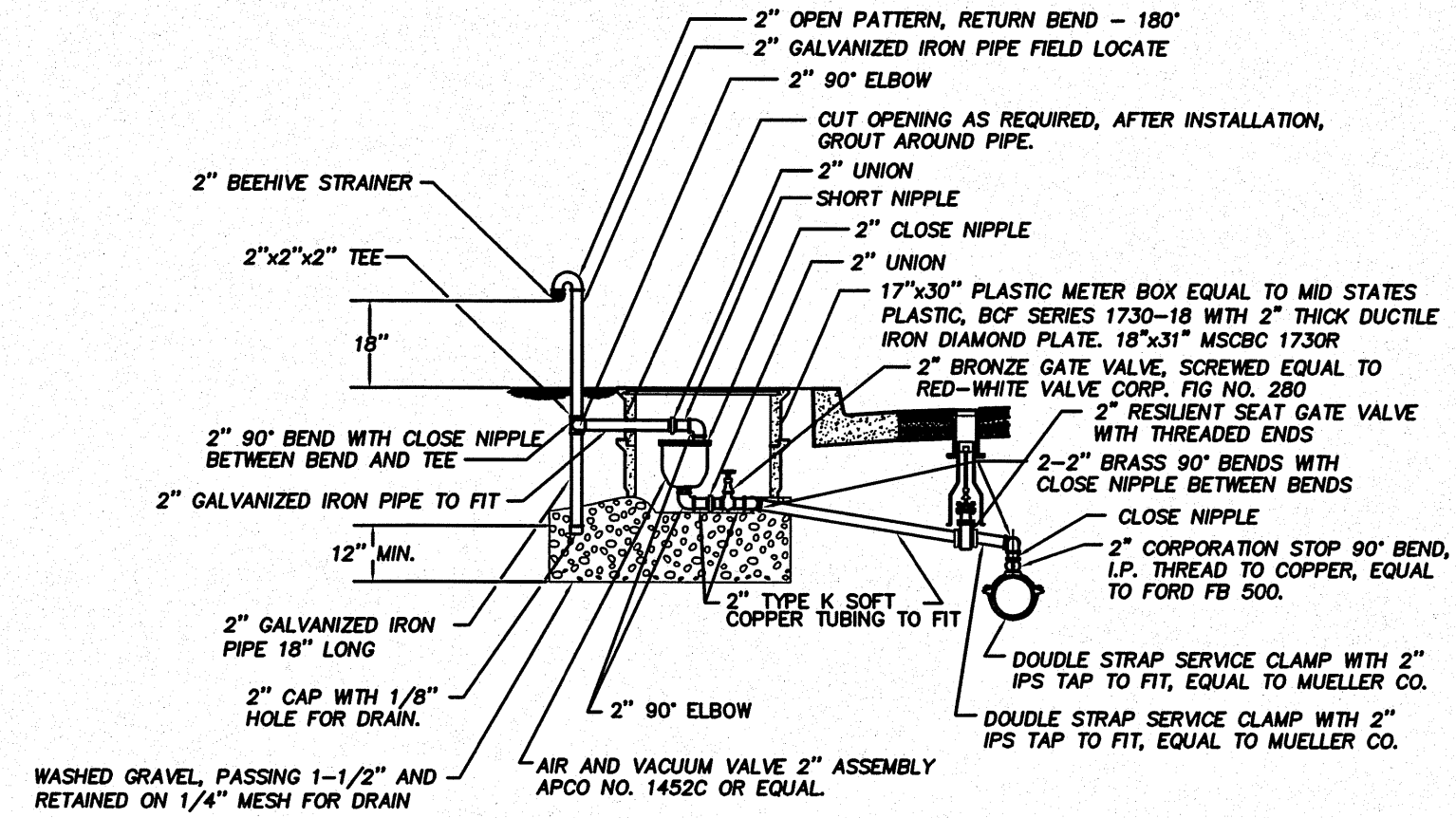
ISSUE DATE: 12/05/06

SHEET REV.: 07/19/2012

WATER DETAILS

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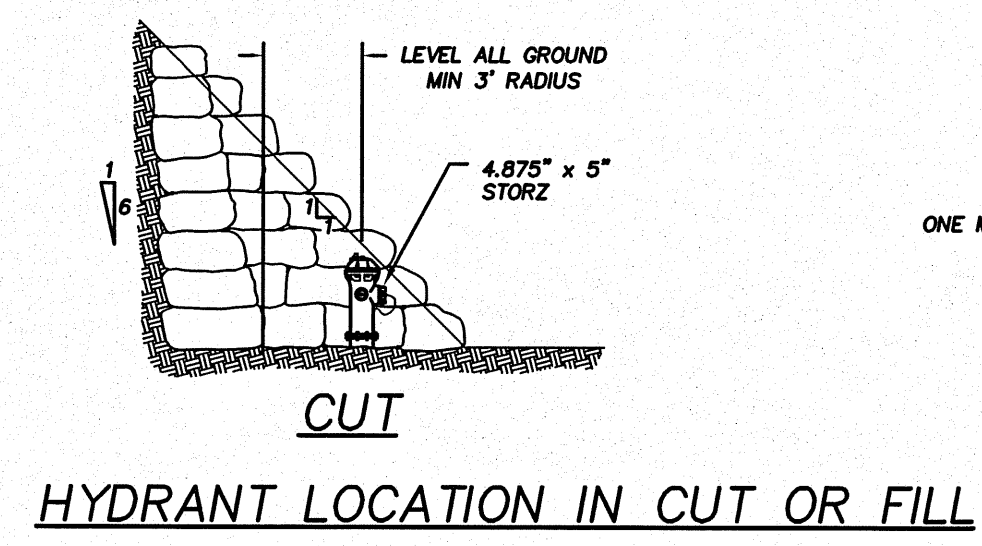
C25 SHEET 26 OF 29



NOTES :
AIR AND VACUUM RELEASE VALVE ASSEMBLY SHALL BE INSTALLED AT HIGHEST POINT OF LINE. IF HIGH POINT FALLS IN A LOCATION WHERE ASSEMBLY CANNOT BE INSTALLED, PROVIDE ADDITIONAL DEPTH OF LINE TO CREATE A HIGH POINT AT A LOCATION WHERE ASSEMBLY CAN BE INSTALLED.
LOCATE AIR VACUUM METER BOX OUTSIDE OF TRAFFIC AREAS, IN PLANTING STRIPS, BEHIND CURB AND SIDEWALK.

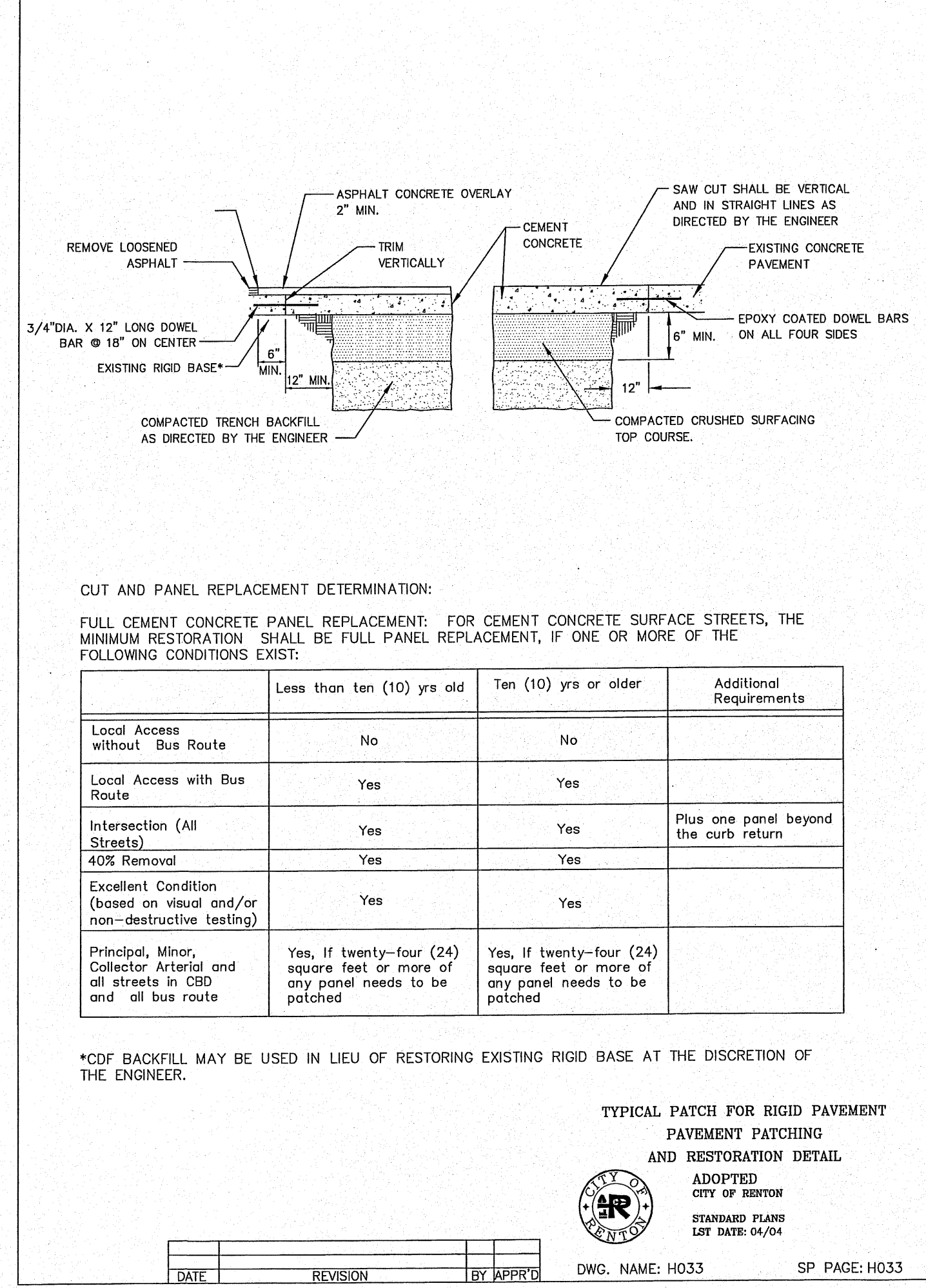
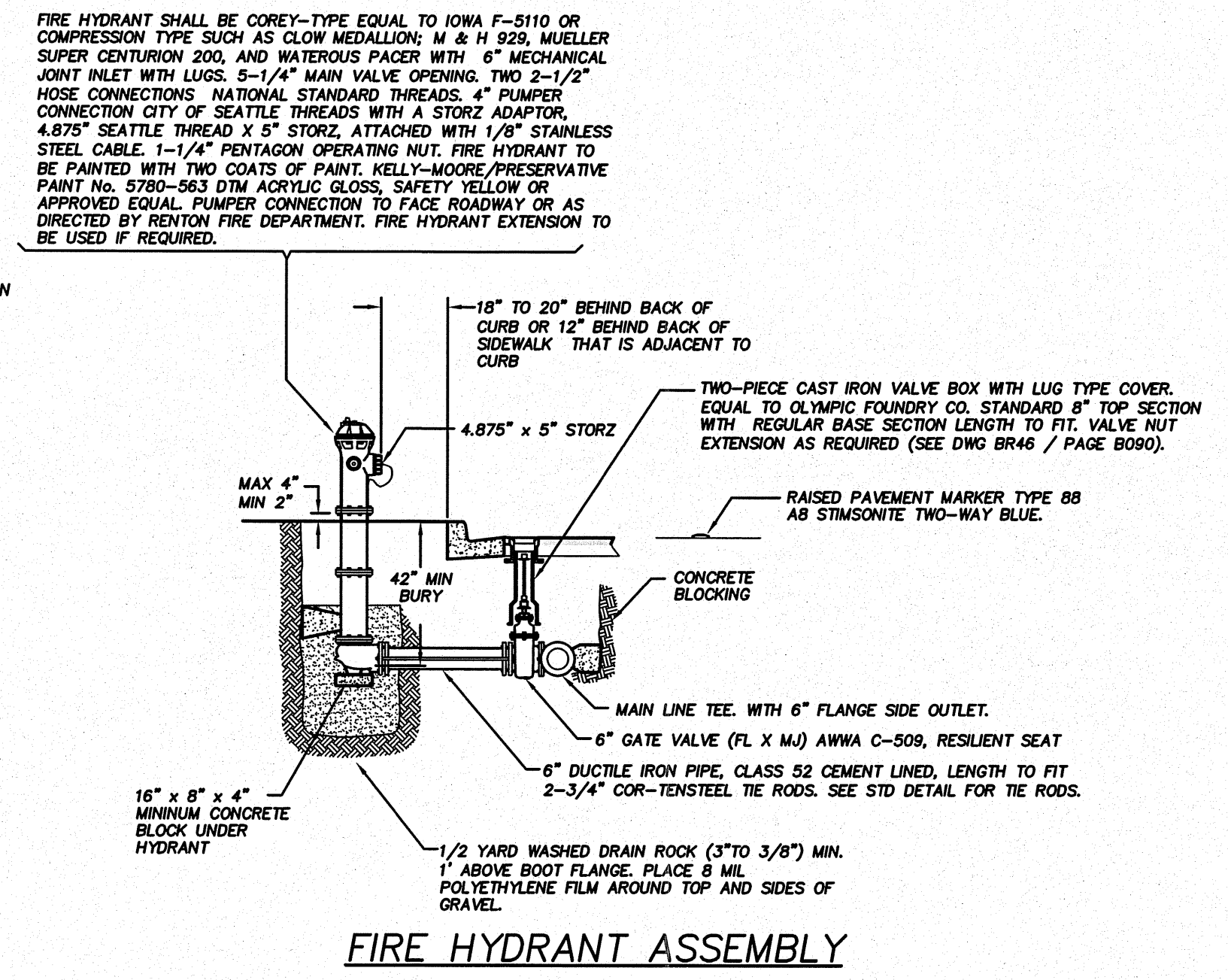
ADOPTED CITY OF RENTON
Standard plans
LST DATE: 04/04

2" AIR & VACUUM RELEASE VALVE ASSEMBLY
DWG. NAME : BR51 SP PAGE : B085



ADOPTED CITY OF RENTON
Standard plans
LST DATE: 04/04

FIRE HYDRANT ASSEMBLY DETAIL
DWG. NAME : BR24 SP PAGE : B102



CONCRETE BLOCKING SIZING PROCEDURE

A. **GENERAL**
The amount of concrete required to anchor horizontal bends, tees, and dead ends depends on the strength of the soil. The methods of placing concrete to keep the joint accessible is shown in Figure 1. The area in square feet of concrete which must bear against the side of the trench is found by dividing the thrust in pounds shown in Table 1 by the safe bearing load of the soil as shown in Table 2.

B. **CRITERIA**
1. The sizing procedure is for horizontal or downward thrust only.
2. Height of the thrust block must be equal to or less than 1/2 the depth from the ground surface to the block base.
3. The thrust block bearing face is approximately rectangular.
4. The concrete blocking shall be as per APWA Specification 74-2.14.

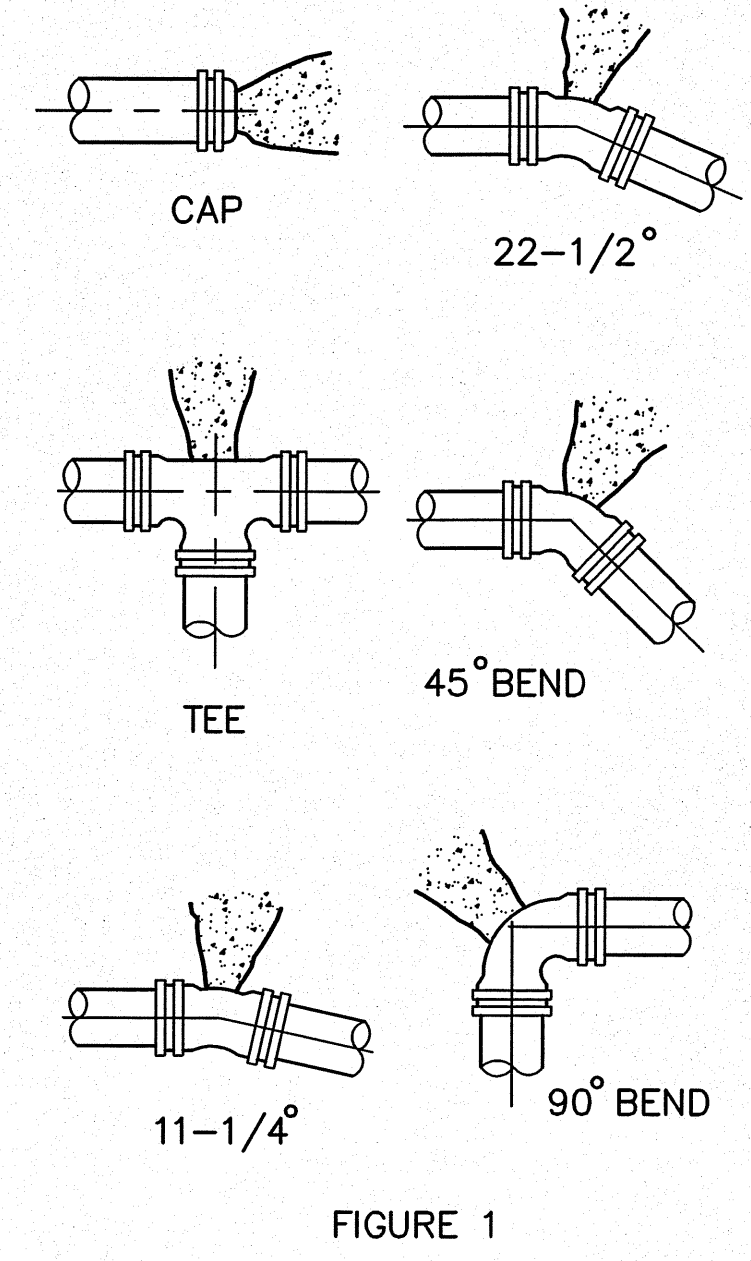
C. **SYMBOLS**
d = Outside Diameter of Pipe in Feet
T = Thrust in Pounds at the Fitting (Table 1)
SBL = Safe Bearing Load in Pounds/Sq. Ft. (Table 2)
h = Depth of Trench in Feet
W = Width of Trench in Feet
A = Area of Concrete which must bear against the Side of the Trench in Sq. Ft.
Hm = Maximum Height of the Thrust Block in feet
Dc = Depth of the Concrete Thrust Block to Bearing Surface in Feet
Lm = Maximum Length of the Thrust Block in Feet

- Go to Table 2: Table 2 gives the safe bearing load for sand and gravel: 3,000 lbs./sq. ft.
- Go to Figure 1: figure 1 indicates the position of the concrete for blocking the 90° bend.
- Go to the specifications of the project and find depth of trench (h) = 4 feet
- Width of trench (W) = 3 feet

With the above assembled information, we proceed to the final calculations:
- Area of Concrete (A) = $\frac{\text{Thrust}}{\text{Safe Bearing Load}} = \frac{21,360}{3,000} = 7.12 \text{ sq. ft.}$
- Maximum Height of Thrust Block (Hm) = $\frac{\text{Depth of Trench in Feet}}{2} = \frac{4}{2} = 2.0 \text{ ft.}$
- Depth of Concrete Thrust Block (Dc) = $\frac{\text{Width of Trench in Feet (W)} - \text{Outside Diameter of Pipe (d)}}{2} = \frac{3 - 0.75}{2} = 1.13 \text{ ft.}$
- Maximum Length of Thrust Block (Lm) = $\frac{\text{Area of Concrete}}{\text{Height of Concrete}} = \frac{7.12}{2.0} = 3.56 \text{ ft.}$
- Required Amount of Concrete = $(\text{Height} \times \text{Depth} \times \text{Length}) \times 0.03704 = (2.0 \times 1.13 \times 3.56) \times 0.03704 = 0.30 \text{ cu. yd.}$

TABLE 1
Thrust at Fittings in Pounds

Size	Pressure PSI	Tees Dead Ends	90° Bend	45° Bend	22-1/2° Bend	11-1/4° Bend
3"	300	2,120	3,990	1,830	830	430
4"	300	2,120	5,970	2,910	1,470	750
6"	300	8,500	12,000	6,510	3,320	1,700
8"	300	15,100	21,360	11,560	5,880	3,020
10"	275	21,620	30,570	16,540	8,430	4,330
12"	250	31,930	48,000	25,950	13,260	6,780
14"	250	48,200	65,370	35,340	18,030	9,240
16"	225	45,250	64,000	34,820	17,650	9,050
18"	200	50,900	72,000	38,940	19,860	10,180
20"	200	62,840	86,900	48,080	24,520	12,560
24"	200	90,480	127,980	69,200	35,320	18,100
30"	200	141,370	195,960	108,150	55,140	28,280
36"	200	203,580	287,950	155,740	79,400	40,720



NOTE: FOR CONVEX VERTICAL BENDS BLOCKING SEE APWA STANDARD PLAN NO. 73.

D. **CALCULATION EQUATIONS**
1. Area of Concrete (A) = $\frac{\text{Thrust (In Pounds)}}{\text{Safe Bearing Load (In Pounds/Sq. Ft.)}} = \frac{T}{\text{SBL}}$
2. Maximum Height of Thrust Block (Hm) = $\frac{\text{Depth of Trench in Feet}}{2} = \frac{h}{2}$
3. Depth of Concrete Thrust Block = $\frac{(\text{Width of Trench in Feet}) - (\text{Outside Diameter of Pipe in Feet})}{2} = \frac{W-d}{2}$
4. Maximum Length of Thrust Block (Lm) = $\frac{\text{Area of Concrete}}{\text{Maximum Height}} = \frac{A}{\text{Hm}}$
5. Required Amount of Concrete (Cu. Yd.) = $(\text{Height} \times \text{Depth} \times \text{Length}) \times 0.03704 = (\text{Hm} \times \text{Lm} \times \text{Dc}) \times 0.03704$

E. **EXAMPLE**
1. **Problem:**
Calculation of the amount of concrete required to block a 90° bend in an 8" C.I. water main; the normal operating pressure in the pipe will be 65 psi and the soil condition in the area indicates sand and gravel.
2. **Solution:**
- Maximum testing pressure (See Table 1) = 300 psi. = 0.75 ft.
- Outside diameter of 8" pipe = 9.05 in. = 9.05/12
- Go to Table 1: The testing pressure of 300 psi, we see that the thrust on a 90° bend is 21,360 pounds.

TABLE 2
Safe Bearing Loads in Lb./Sq. Ft.

The safe bearing loads given in the following table are for horizontal thrusts when the depth of cover over the pipe exceeds 2 feet.

SOIL
Safe Bearing Load Lb. per Sq. Ft.
*Muck, peat, etc. 0
Soft Clay 1,000
Sand 3,000
Sand and Gravel 3,000
Sand and Gravel Cemented with Clay 4,000
Hard Shale 10,000

*In muck or peat, all thrusts shall be restrained by piles or tie rods to solid foundations or by removal of muck or peat and replacement with ballast of sufficient stability to resist thrusts.

ADOPTED CITY OF RENTON
Standard plans
LST DATE: 12/96

CONCRETE BLOCKING SIZING PROCEDURE
DWG. NAME : BR26 SP PAGE : B085

CHECKED FOR COMPLIANCE TO CITY STANDARDS
Date _____
Date _____
Date _____

RECOMMENDED FOR APPROVAL
BY: _____
BY: _____

W-337205