

PLAN

SECTION A-A

BUTTRESS FOR HORIZONTAL BENDS								
	PIPE SIZE							
	D**	4"	6"	8"	10"	12"	16"	20"
1/32 BEND	A	9"	9"	1'-0"	1'-0"	1'-6"	2'-0"	3'-0"
	B	9"	9"	9"	1'-0"	1'-0"	1'-0"	1'-0"
	C	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-6"	2'-0"
1/16 BEND	A	1'-0"	1'-0"	1'-6"	1'-6"	2'-0"	3'-0"	3'-0"
	B	9"	9"	1'-0"	1'-0"	1'-6"	1'-6"	2'-0"
	C	1'-0"	1'-0"	1'-0"	1'-0"	1'-6"	2'-0"	3'-0"
1/8 BEND	A	1'-6"	1'-6"	2'-0"	2'-6"	3'-0"	4'-0"	4'-6"
	B	1'-0"	1'-0"	1'-0"	1'-6"	2'-0"	2'-0"	2'-6"
	C	1'-0"	1'-0"	1'-0"	2'-0"	2'-6"	3'-0"	4'-0"
1/4 BEND	A	2'-6"	2'-6"	3'-0"	3'-6"	4'-0"	5'-6"	SITE SPECIFIC DESIGN REQUIRED
	B	1'-0"	1'-0"	1'-6"	2'-0"	2'-6"	2'-6"	
	C	1'-6"	2'-0"	2'-6"	2'-6"	3'-6"	4'-0"	

D\*\* INDICATES NOMINAL DIAMETER PIPE SIZES


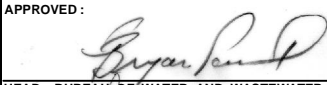
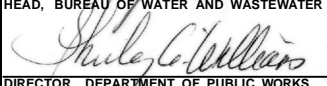
**NOTES:**

1. ALL CONCRETE TO BE MIX 3,  $f'c = 3,500$  PSI AT 28 DAYS.
2. THE MINIMUM DIMENSION AS SHOWN IS BASED ON THE FOLLOWING CONDITIONS AND LIMITATIONS:
  - a. ALLOWABLE SOIL BEARING CAPACITY = 2,000 PSF.
  - b. OPERATING WATER PRESSURE = 150 PSI.
  - c. DEPTH FROM FINISHED GRADE TO TOP OF PIPE ASSUMED TO EQUAL 4'-0" OR DEEPER.
  - d. ELEVATION OF GROUNDWATER TABLE ASSUMED TO BE BELOW BOTTOM OF THE CONCRETE BLOCK.
3. ALL DIMENSIONS ARE MINIMUM EXCEPT WHERE LARGER DIMENSION WILL INTERFERE WITH THE PIPE JOINTS OR NOT FACILITATE BOLT REMOVAL ON MECHANICAL JOINTS.
4. ALL DIMENSIONS ARE FOR DUCTILE IRON PIPE FITTINGS OR PVC PIPE WITH DUCTILE IRON PIPE FITTINGS. BUTTRESSES FOR HDPE PIPE AND FITTINGS SHALL BE CONSIDERED SITE SPECIFIC AND SHALL REQUIRE BALTIMORE CITY APPROVAL.

**SITE SPECIFIC DESIGN CRITERIA:**

IF THE ABOVE STATED CONDITIONS AND LIMITATIONS ARE NOT MET, OR THE PIPE DIAMETER IS GREATER THAN 20", A SITE SPECIFIC DESIGN WILL BE REQUIRED FOR APPROVAL.

- a. DESIGN THRUST FORCE SHALL BE CALCULATED BASED ON THE OUTSIDE DIAMETER OF THE PIPE.
- b. DESIGN THRUST FORCES = CALCULATED THRUST X 1.5 FACTOR OF SAFETY.

	APPROVED:  HEAD, BUREAU OF WATER AND WASTEWATER	CITY OF BALTIMORE DEPARTMENT OF PUBLIC WORKS BUREAU OF WATER AND WASTEWATER  BUTTRESS FOR HORIZONTAL BENDS (FOR 4" - 20")	ISSUED	REVISED	REVISED
	 DIRECTOR, DEPARTMENT OF PUBLIC WORKS		3 / 2008		
			<b>STANDARD NO. BC 862.01</b>		
			SCALE : NONE	SHEET 1 OF 1	