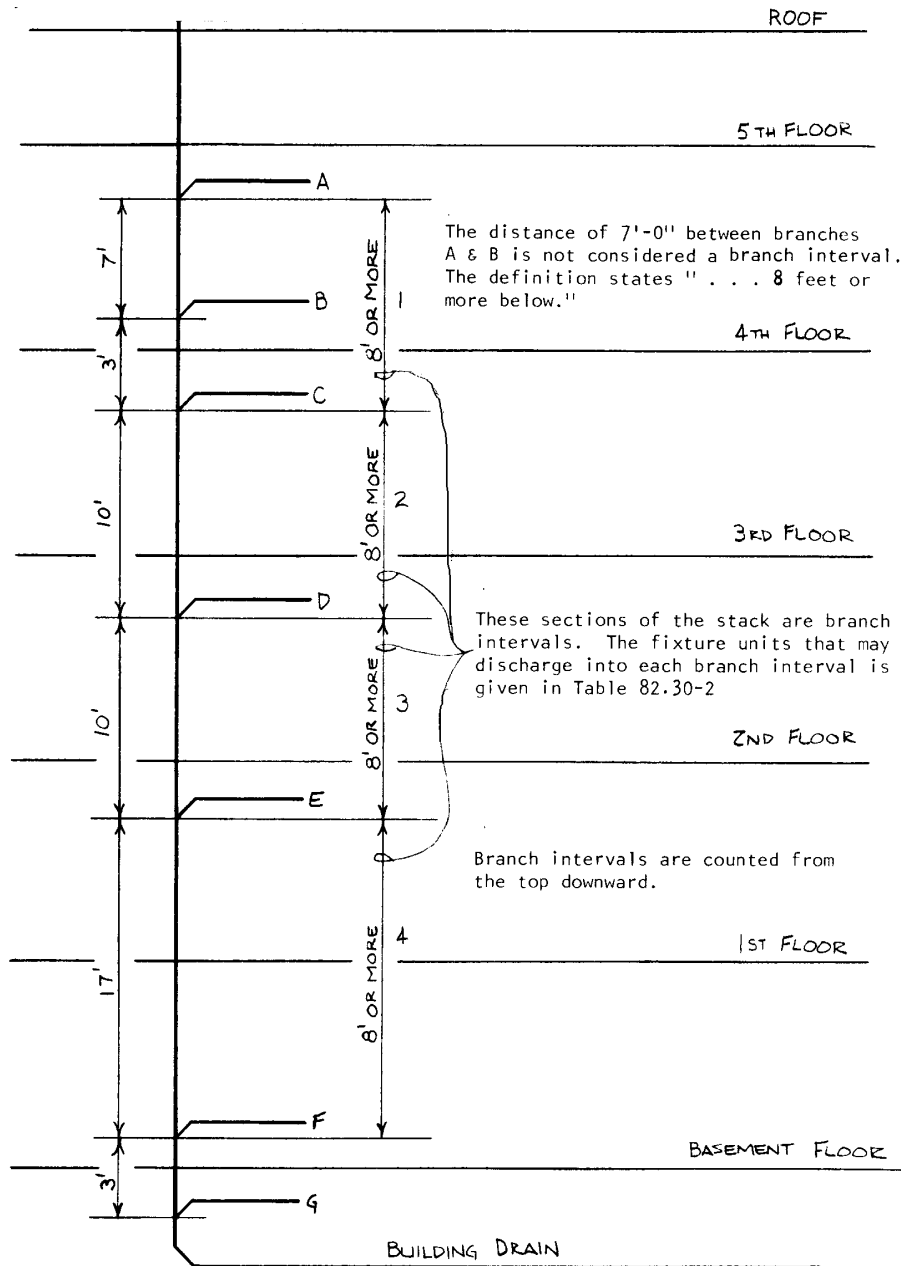


## Chapter Comm 82

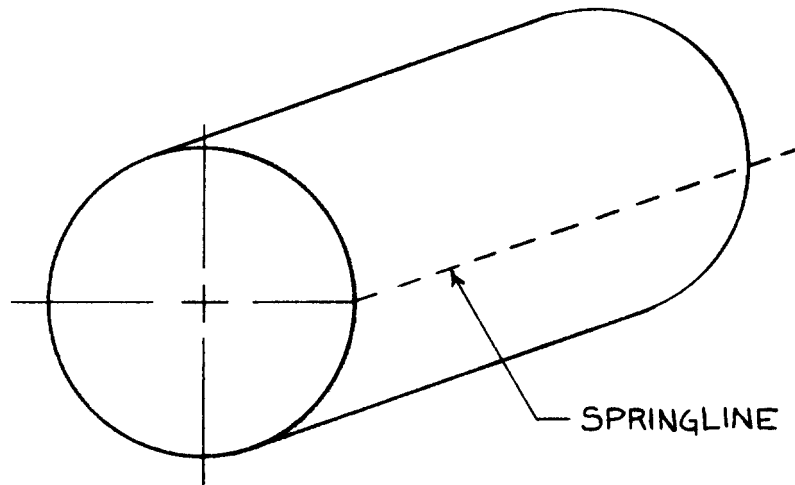
### APPENDIX

The material contained in this appendix is for clarification purposes only. The notes, illustrations, etc., are numbered to correspond to the number of the rule as it appears in the text of the code.

#### A-82.11 (29) BRANCH INTERVALS.



**A-82.11 (140) SPRINGLINE OF PIPE**



On a round pipe the springline is along the horizontal centerline.

**A-82.20 (2) AGENT MUNICIPALITIES.** The department has designated to the following municipalities, the authority to review and approve plumbing plans and specifications for those plumbing installations to be located within the municipality's boundary limits and which require approval under s. Comm 82.20 (1) (b).

Appleton  
100 N. Appleton Street  
Appleton, WI 54911-4799  
(414) 832-6411

Eau Claire  
203 South Farwell Street,  
Eau Claire, WI 54701  
(715) 839-4947

Green Bay  
100 N. Jefferson St., Rm. 403  
Green Bay, WI 54301  
(414) 448-3295

Greenfield  
7325 W. Forest Home Ave.  
Greenfield, WI 53220  
(414) 543-5500

Janesville  
P. O. Box 5005  
Janesville, WI 53547-5005  
(608) 755-3064

Kenosha  
Dept. of Housing  
625 52nd St., Rm. 100  
Kenosha, WI 53140  
(414) 658-4263

Madison  
P. O. Box 2984  
Madison, WI 53701-2984  
(608) 266-4568

Milwaukee  
Municipal Bldg., Rm. 1017  
841 N. Broadway Street  
Milwaukee, WI 53202  
(414) 286-3364

Oshkosh  
215 Church Ave.  
Oshkosh, WI 54901  
(414) 236-5052

Racine  
730 Washington Ave.  
Racine, WI 53403  
(414) 636-9164

Sheboygan  
City Hall - 3rd Floor  
828 Center Ave.  
Sheboygan, WI 53081  
(414) 459-3479

Two Rivers  
P. O. Box 87  
Two Rivers, WI 54241  
(414) 793-5580

**A-82.20 (4) PLANS AND SPECIFICATIONS.** The following is a list of water quality management agencies and the areas they serve.

**Note:** This listing is compiled by the department of natural resources and is subject to periodic update.

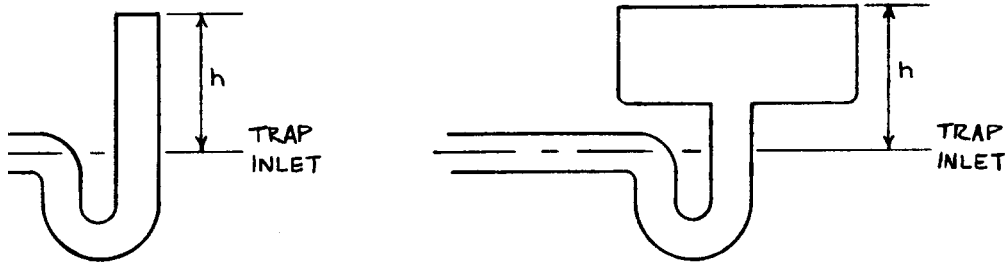
<u>AGENCY</u>	<u>AREAS SERVED</u>
East Central Wisconsin Regional Planning Agency 132 Main Street Menasha, WI 54952 (920) 751-4770	Counties of Calumet, Fond du Lac, Green Lake, Marquette, Menominee, Outagamie, Shawano, Waupaca, Waushara, Winnebago
Dane County Regional Planning Commission 217 South Hamilton, Room 403 Madison, WI 53703 (608) 266-4137	County of Dane
Brown County Planning Commission 100 N. Jefferson Street, Room 608 Green Bay, WI 54301 (920) 448-3400	County of Brown
Southeastern Wisconsin Regional Planning Commission 916 North East Avenue P. O. Box 1607 Waukesha, WI 53187-1607 (262) 547-6721	Counties of Kenosha, Milwaukee, Ozaukee, Racine, Walworth, Waukesha, Washington
West Central Wisconsin Regional Planning Commission 800 Wisconsin Street Eau Claire, WI 54703-3606 (715) 836-2918	"Chippewa-Eau Claire Metropolitan Planning Area;": Cities of Altoona, Chippewa Falls, Eau Claire, <i>River Falls (est. completion July 2000)</i> , Towns of Brunswick, Hallie, Lafayette, Seymour, Tilden, Union, Washington
St. Croix County Planning Department 1101 Carmichael Road Hudson, WI 54016 (715) 386-4673	"Hudson Urban Area;": City of Hudson Towns of Hudson, St. Joseph, Troy, Village of North Hudson, Western 1/2 of Town of Warren
Bay-Lake Regional Planning Commission 211 N. Broadway, Suite 211 Green Bay, WI 54303-2757 (920) 448-2820	Cities of Marinette, Kohler, Sheboygan, Sheboygan Falls, Sturgeon Bay, Manitowoc & <i>Two Rivers (est. completion Jan. 2000)</i> Towns of Peshtigo, Porterfield, Mosel, Wilson, Lima, Herman, Sheboygan, Sheboygan Falls, Herman Villages of Howards Grove, Kohler

Rock County Planning Agency 51 South Main Street Janesville, WI (608) 757-5310	Cities of Janesville and Beloit Towns of Beloit, Harmony, Rock, Janesville, LaPrairie, Turtle Village of Clinton
LaCrosse/Onalaska Office of City Engineer 400 LaCrosse Street LaCrosse, WI 54601 (608) 789-7505	Cities of LaCrosse, Onalaska Towns of Shelby, Campbell
Portage County Planning Department 1516 Church Street Stevens Point, WI 54481 (715) 346-1334	“Stevens Point Urban Area;” City of Stevens Point Villages of Plover, Park Ridge, Whiting Towns of Hull, Linwood, Plover
Marathon County Planning Department 210 River Drive Wausau, WI 54403-5449 (715) 261-6040	“Wausau Urban Area;” Cities of Wausau, Schofield Towns of Maine, Stettin, Texas, Wausau, Weston “Rib Mountain Met- ropolitan Sewerage District;” Towns of Kronenwetter, Rib Mountain, Rothschild Village of Weston
Wood County Planning 400 Market Street Wisconsin Rapids, WI 54495 (715) 421-8466	“Southern Wood County;” Cities of Nekoosa, Wisconsin Rapids Towns of Grand Rapids, Port Edwards, Rudolph, Saratoga, Seneca, Sigel Villages of Biron, Port Edwards, Rudolph
Dunn County Land Conservation 390 Red Cedar Street Menomonie, WI 54751 (715) 232-1496	City of Menomonie (Sanitary Sewer Extensions only)
Oconto County/West Shore Oconto County Office of Land Use and Zoning 310 Washington Street Oconto, WI 54153-1621 (920) 834-6827	City of Oconto Towns of Abrams, Little River, Little Suamico, Pensaukee, Stiles, Oconto
North Central Wisconsin Regional Planning Commission 407 Grant Street Wausau, WI 54403 (715) 261-6565	<i>City of Marshfield (est. completion July 2000)</i> City of Merrill
Sauk County Planning & Zoning 505 Broadway Baraboo, WI 53913 (608) 355-3285	<i>City of Baraboo (est. completion July 2000)</i>
City of Superior Administrative Engineer 1407 Hammond Avenue Superior, WI 54880 (715) 394-0691	City of Superior
Utilities General Manager Sturgeon Bay Utilities P.O. Box 259 230 East Vine Street Sturgeon Bay, WI 54235 (920) 746-2820	City of Sturgeon Bay

**A-82.30 (4) SIZE OF DRAIN PIPING.** The following tables list the maximum GPM which can be expected to readily flow through a given size trap where the receptor has a height as indicated.

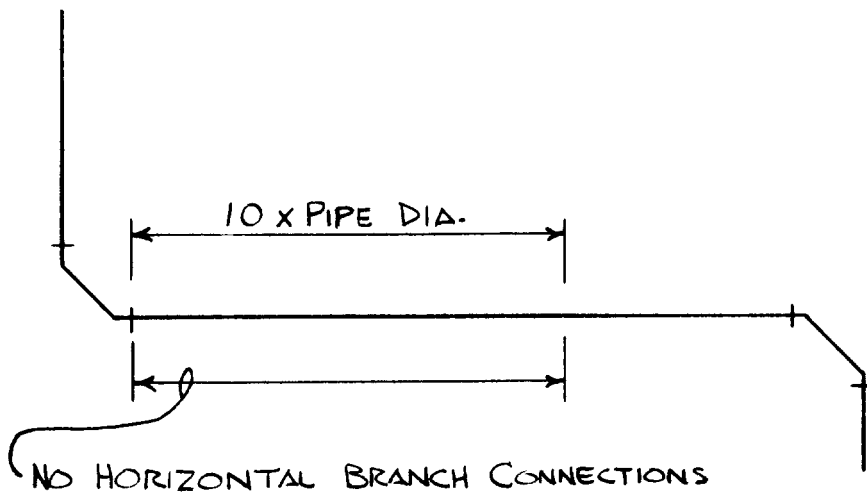
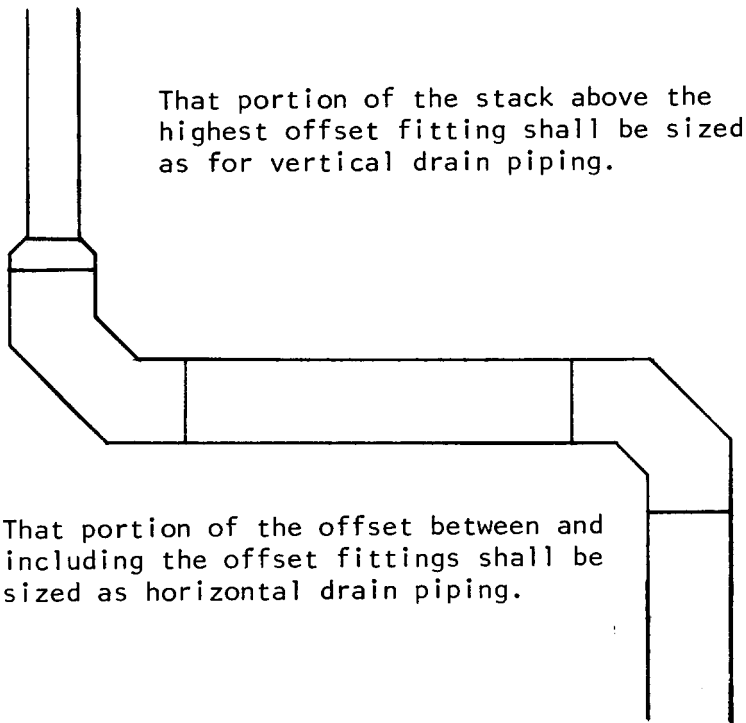
Also listed is a maximum drainage fixture unit load which a given size receptor trap may be expected to adequately receive.

**Note:** The department recommends an individual 4-inch diameter minimum trap and drain pipe for a commercial type dishwasher.

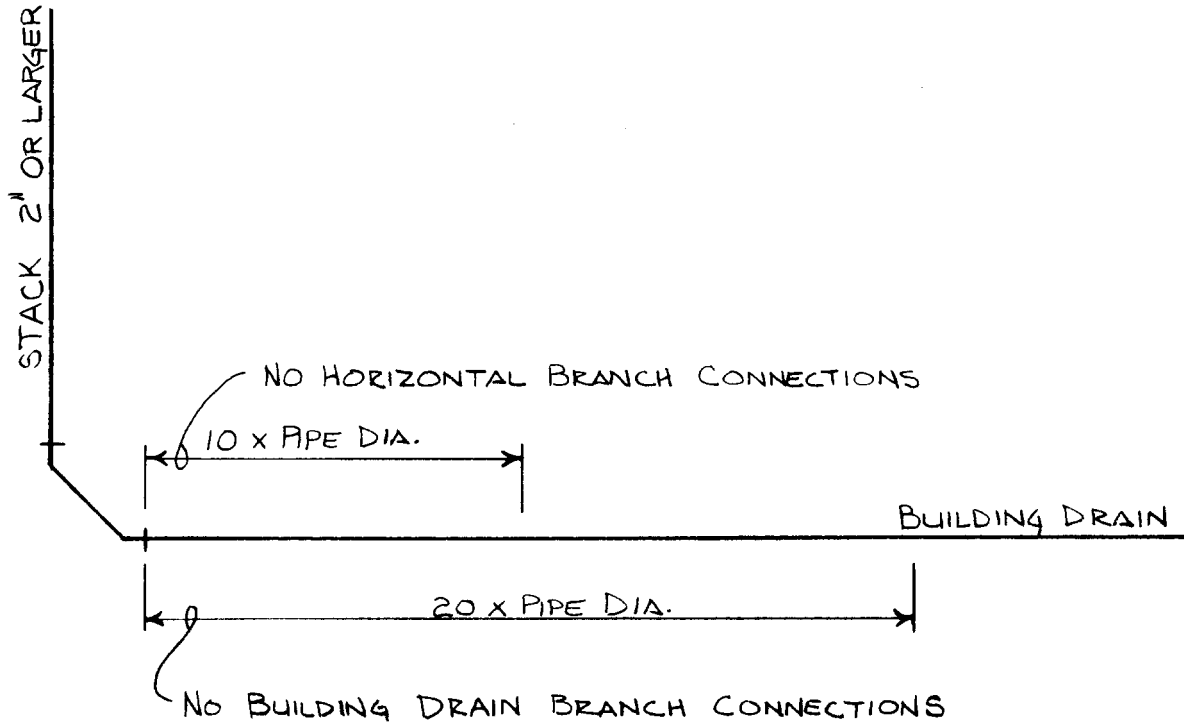


Receptor Trap Size	H – Height	GPM	d.f.u.
1-1/2"	12"	4	2
2"	14"	8	4
3"	15"	12	6
4"	17"	40	20
5"	20"	70	35
6"	22"	120	60
8"	25"	250	125

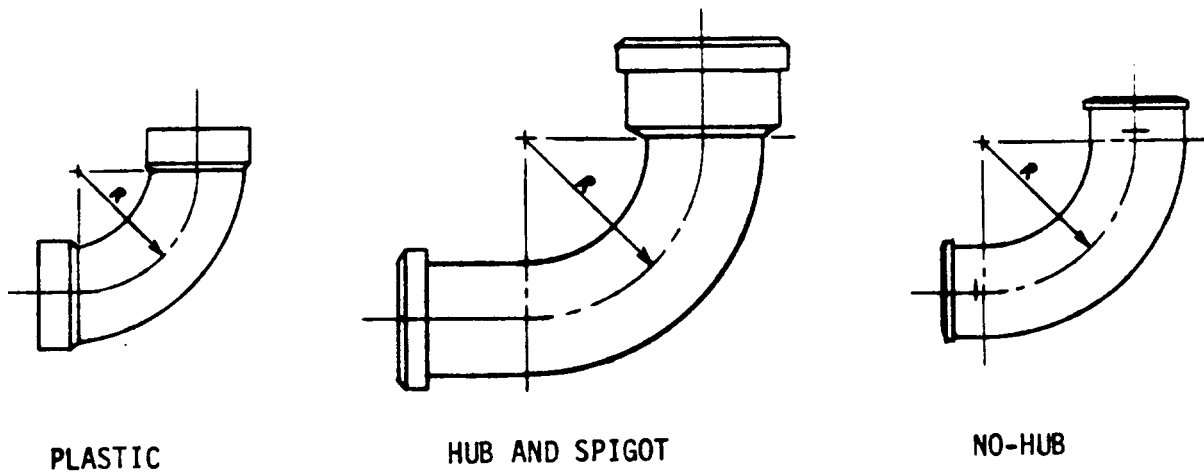
A-82.30 (6) (b) OFFSETS IN VERTICAL DRAINS.



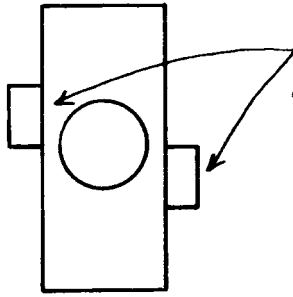
**A-82.30 (7) HORIZONTAL BRANCH DRAIN CONNECTION AT BASE OF A STACK.**



**A-82.30 (8) MEASURING RADIUS OF A FITTING.**

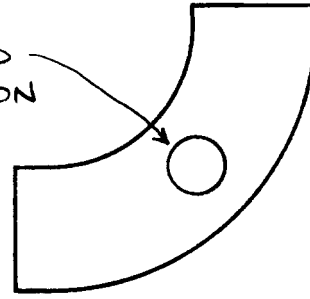


A-82.30 (9) DRAIN FITTINGS AND CONNECTIONS.



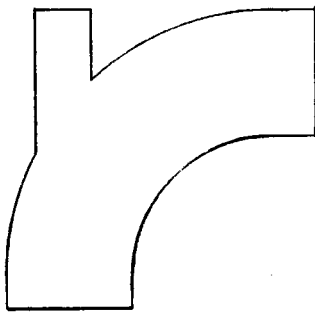
SIDE VIEW

SHALL NOT BE USED  
AS A VENT CONNECTION

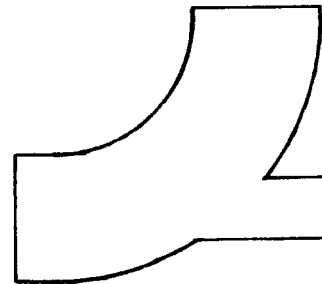


SIDE VIEW

SIDE INLETS



ALLOWED  
(SIDE VIEW)

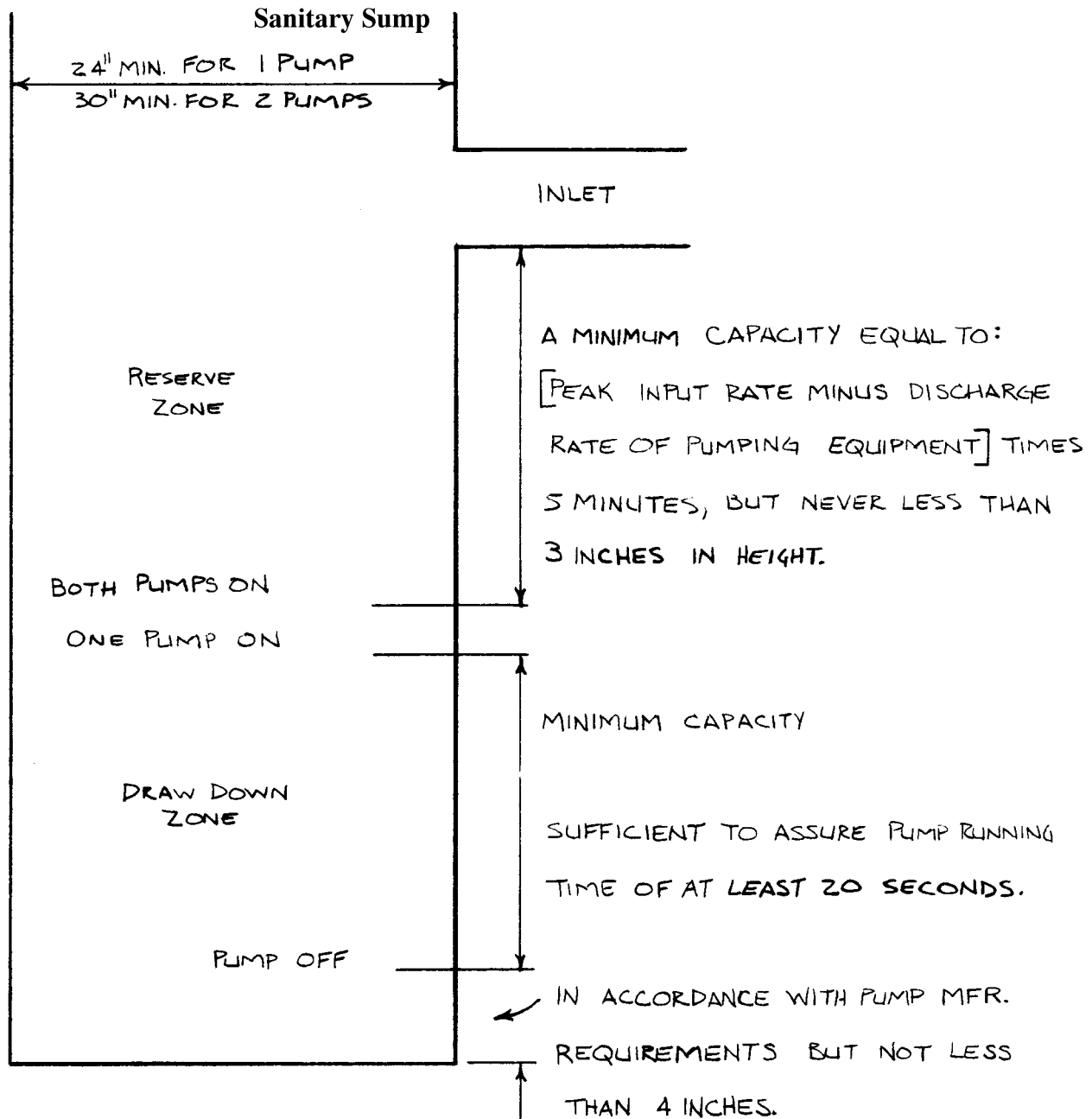


NOT ALLOWED  
(TOP VIEW OR SIDE VIEW)

HEEL INLETS



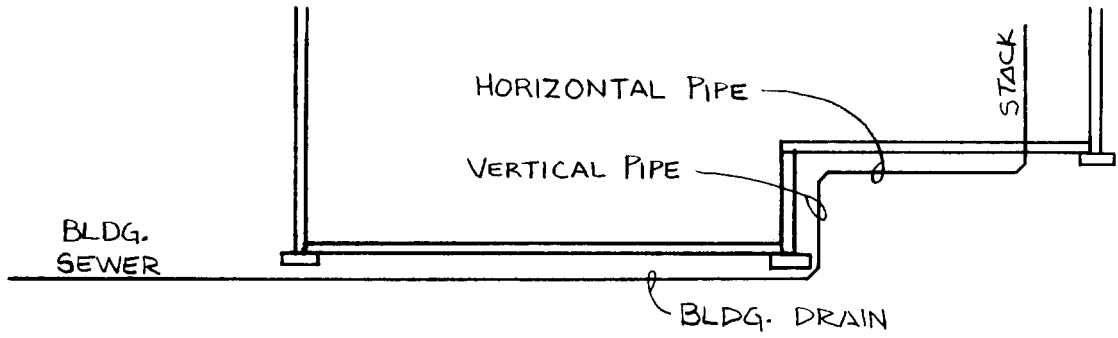
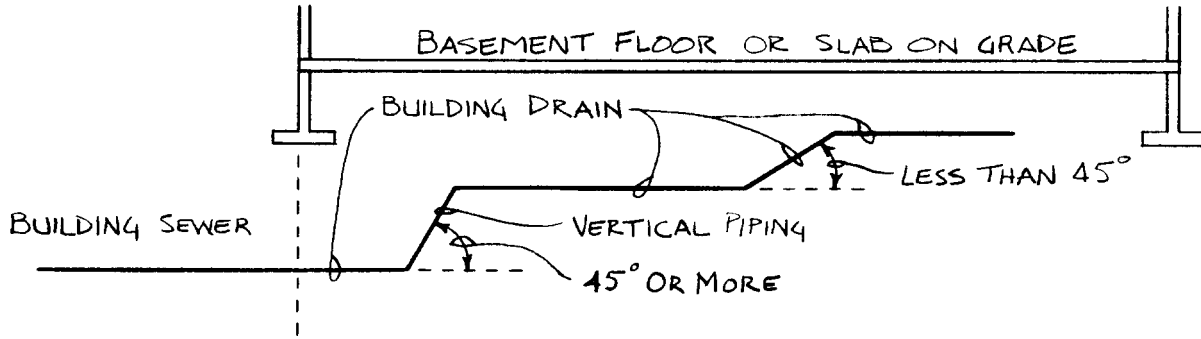
A-82.30 (10) (a) DETERMINING REQUIRED CAPACITY OF SANITARY PUMP.



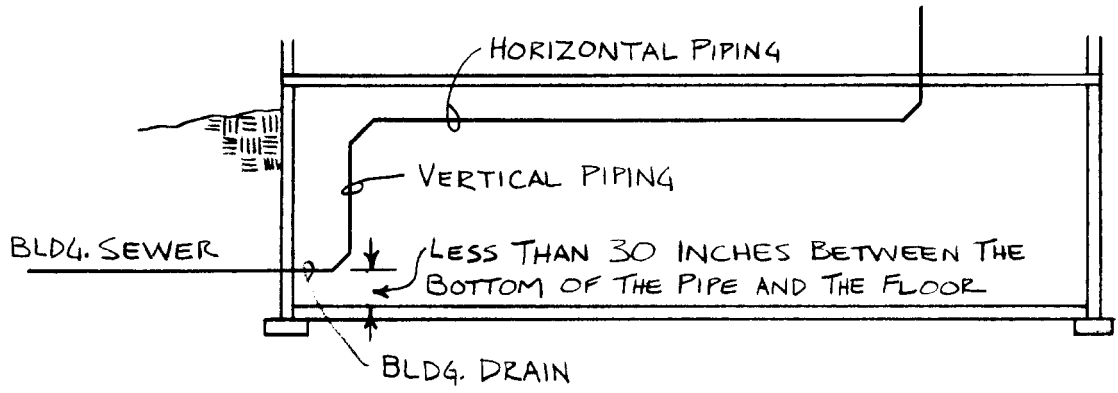
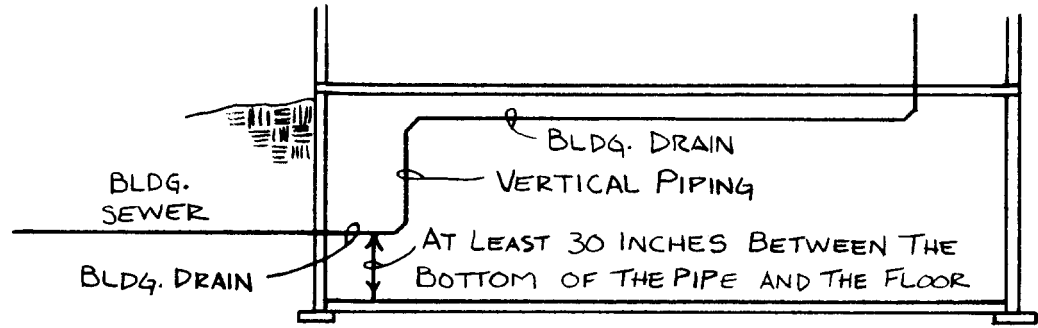
**A-82.30 (10) (a) SUMPS.****Capacity of sumps  
(in gallons)**

Diameter of sump in inches	Volume in gal/ft	Diameter of sump in inches	Volume in gal/ft
24	23.5	41	68.6
25	25.5	42	72.1
26	27.6	43	75.5
27	29.7	44	79.1
28	32.0	45	82.7
29	34.3	46	86.5
30	36.8	47	90.2
31	39.2	48	94.0
32	41.8	54	119.0
33	44.5	60	147.0
34	47.2	66	178.0
35	50.0	72	211.5
36	52.8	78	248.4
37	55.9	84	288.1
38	59.0	90	330.8
39	62.1	96	376.3
40	65.3	108	477.3

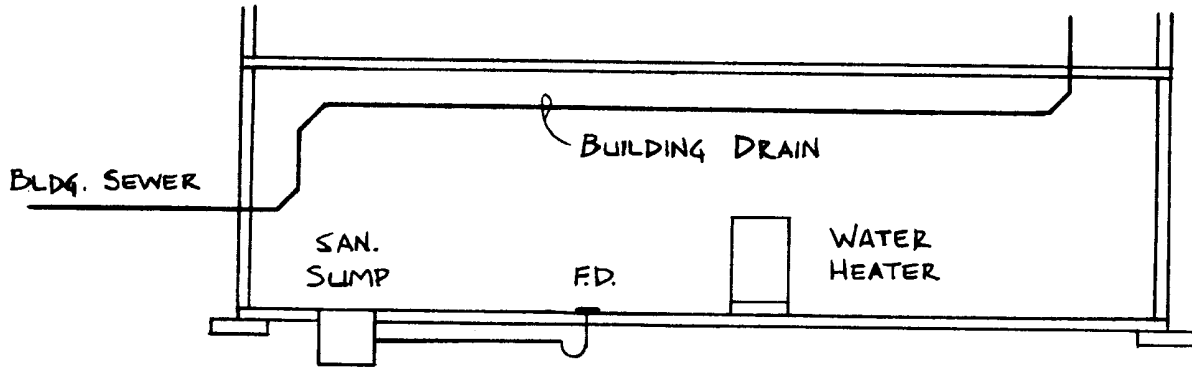
A-82.30 (11) (b) BUILDING DRAINS SERVING ANY BUILDING.



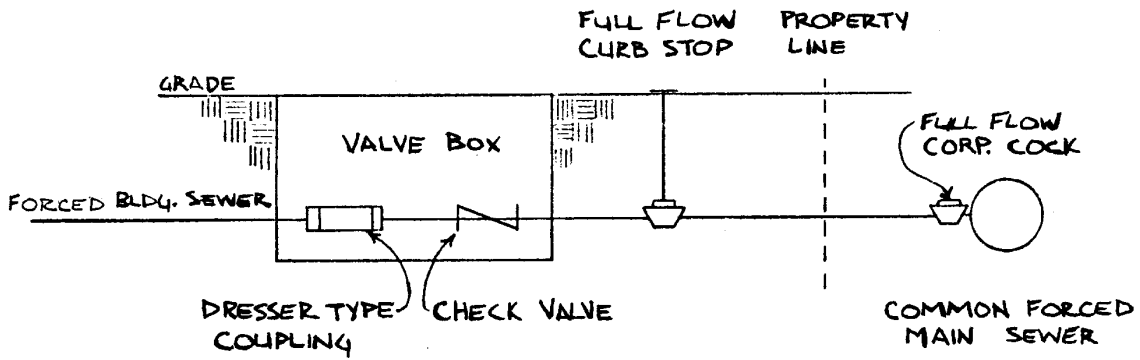
A-82.30 (11) (b) BUILDING DRAINS.



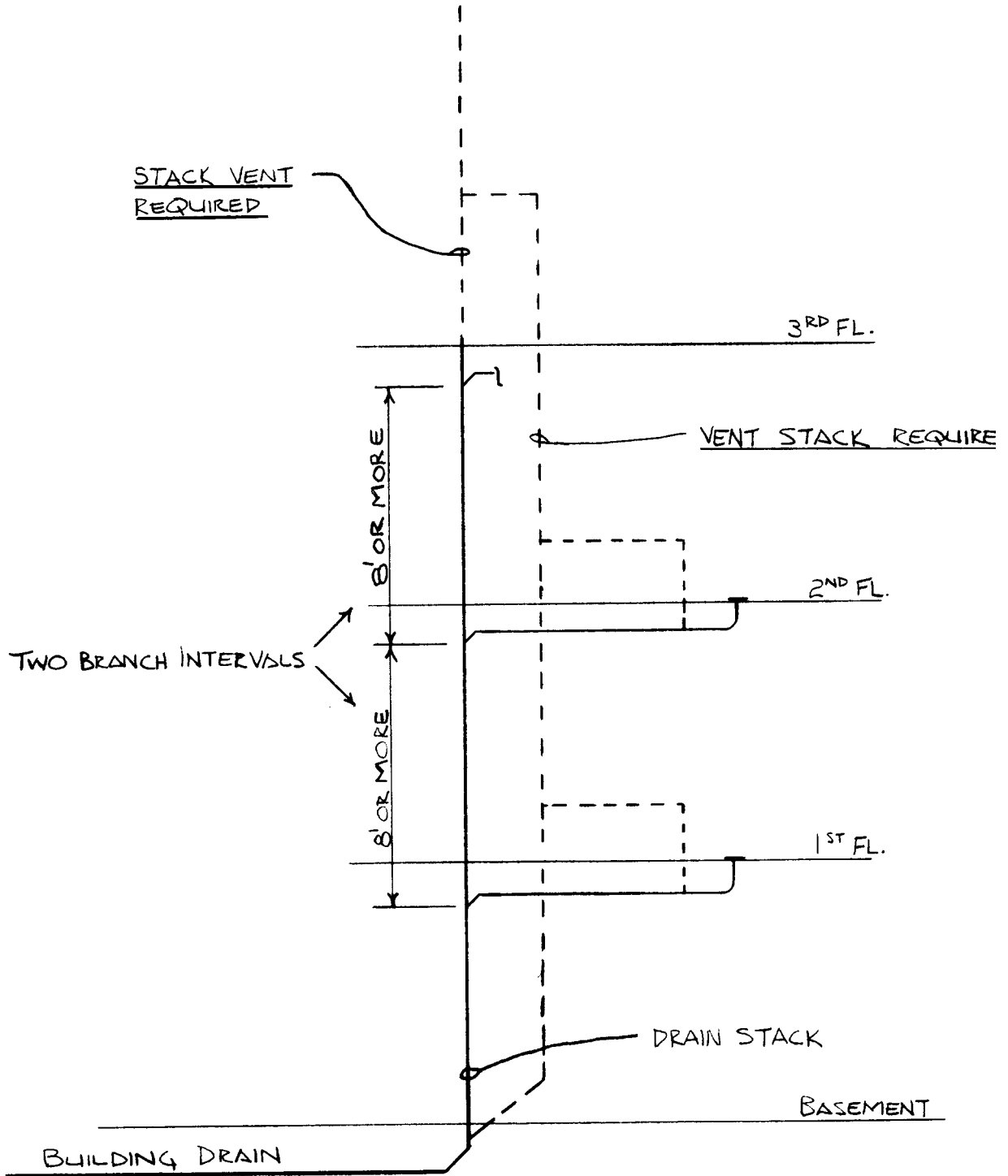
A-82.30 (11) (b) FLOOR DRAIN REQUIRED.



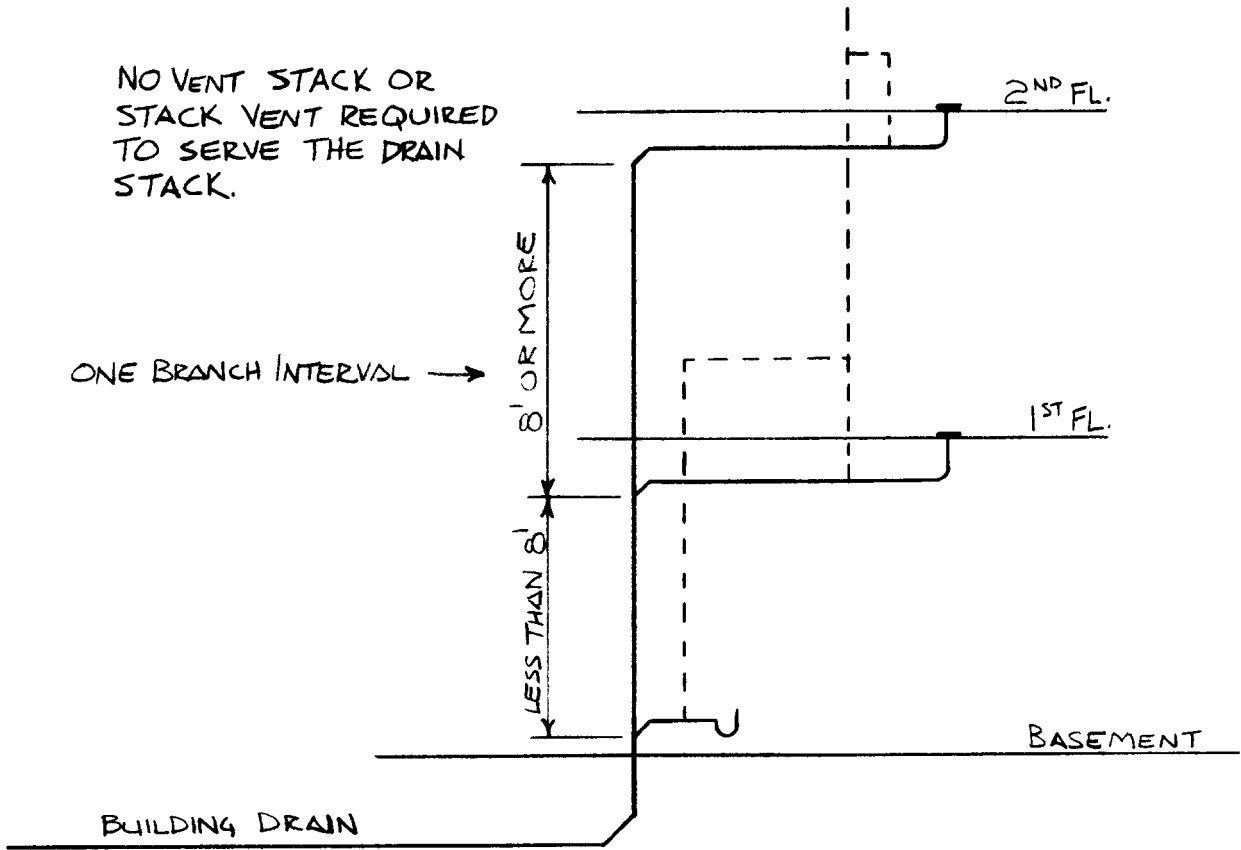
A-82.30 (11) (f) CONNECTION TO PRESSURIZED PUBLIC SEWER.



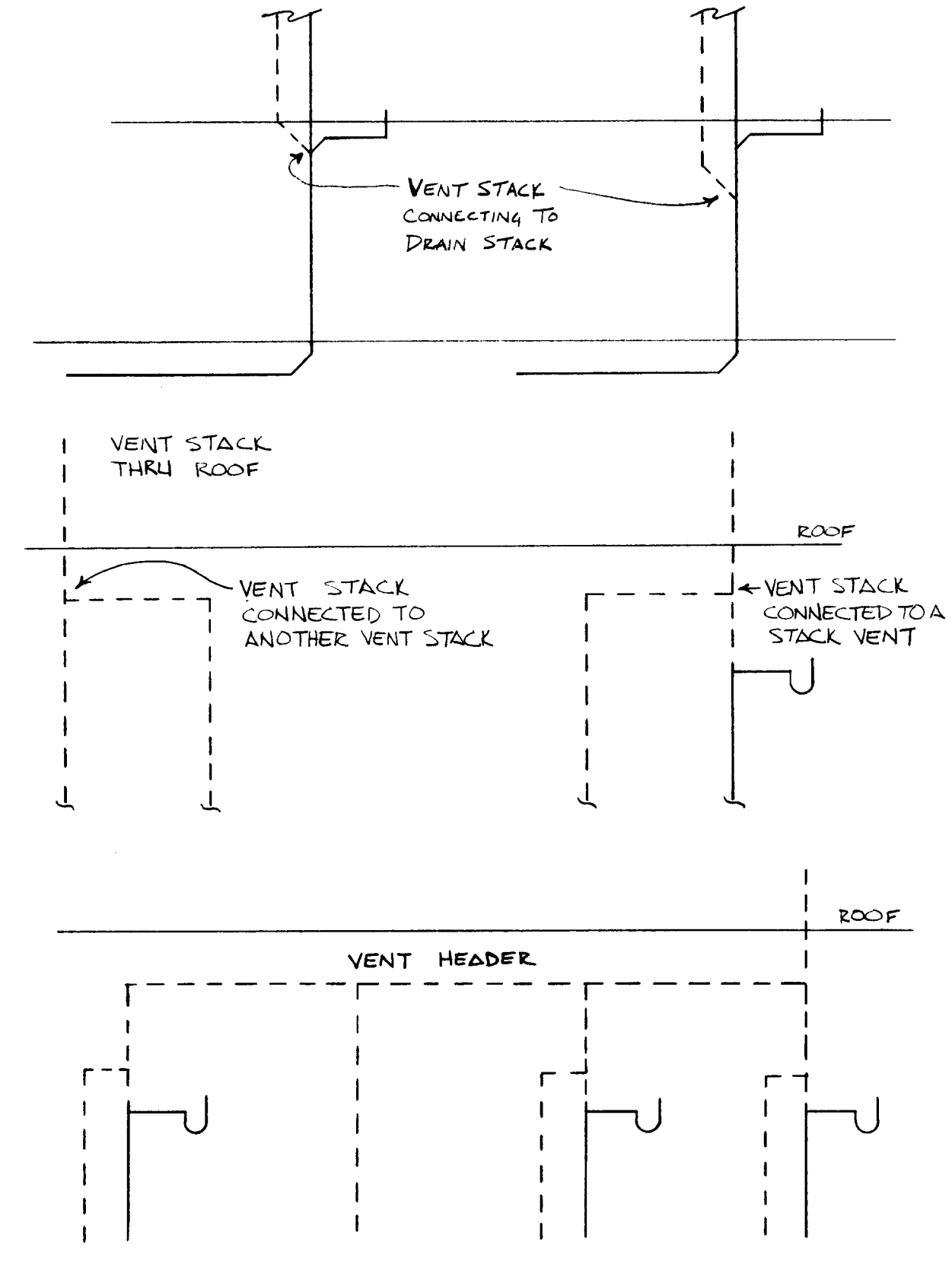
A-82.31 (4) (a) WHERE A VENT STACK AND STACK VENT ARE REQUIRED.



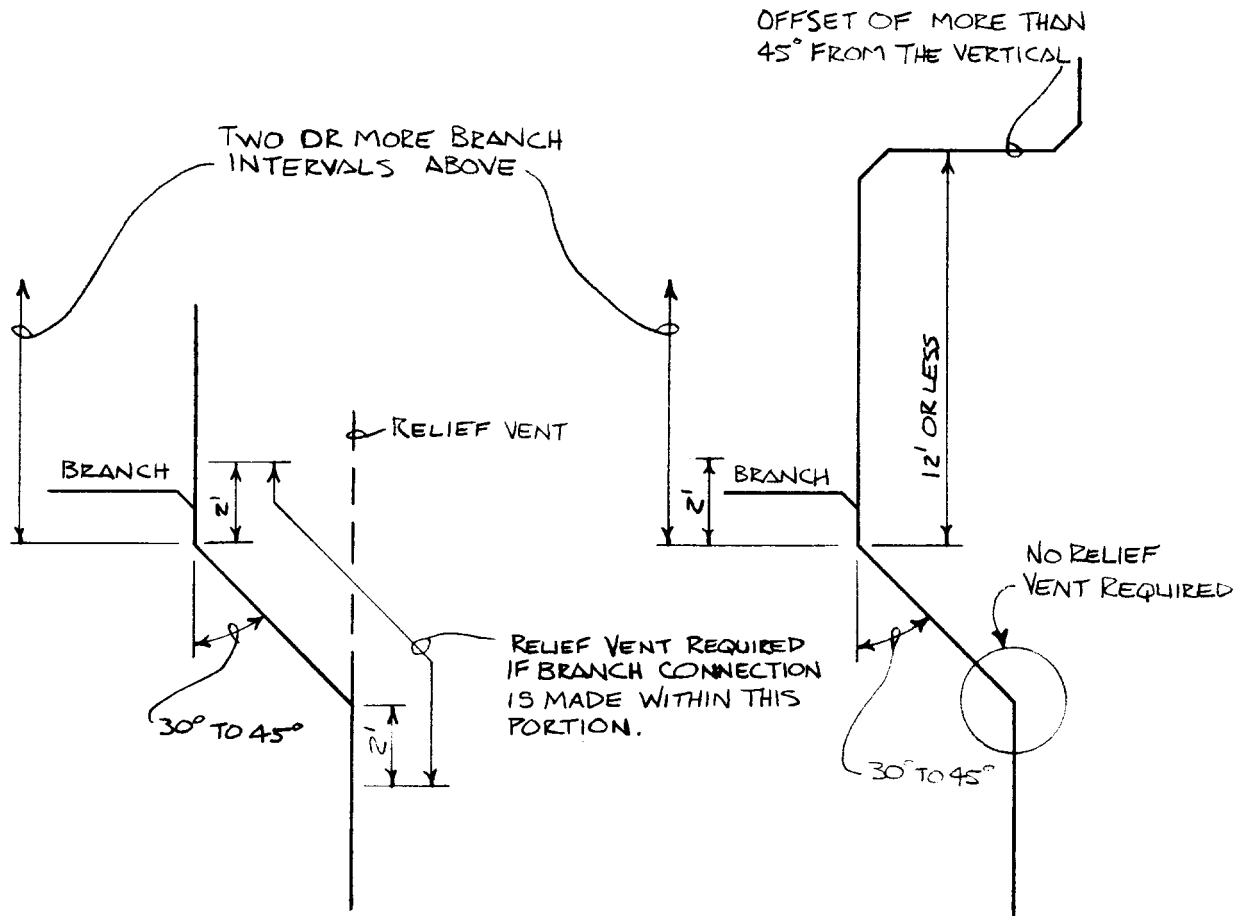
A-82.31 (4) (a) WHERE A VENT STACK AND STACK VENT ARE NOT REQUIRED.



A-82.31 (4) (b) INSTALLATION OF VENT STACK AND STACK VENT.

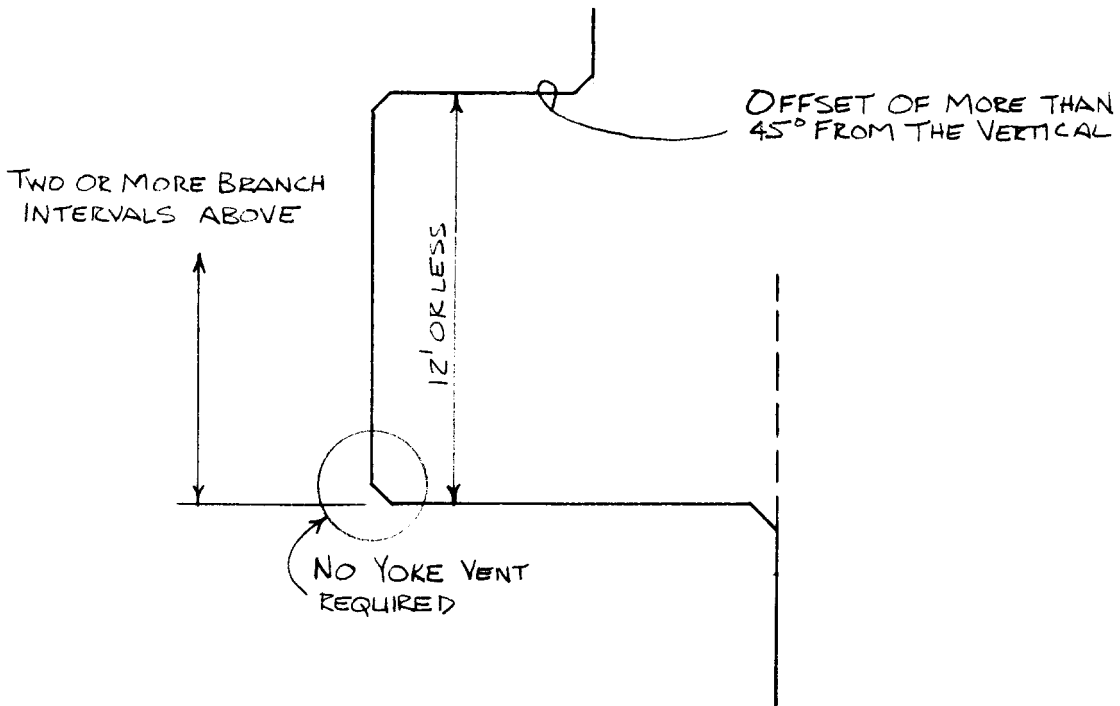
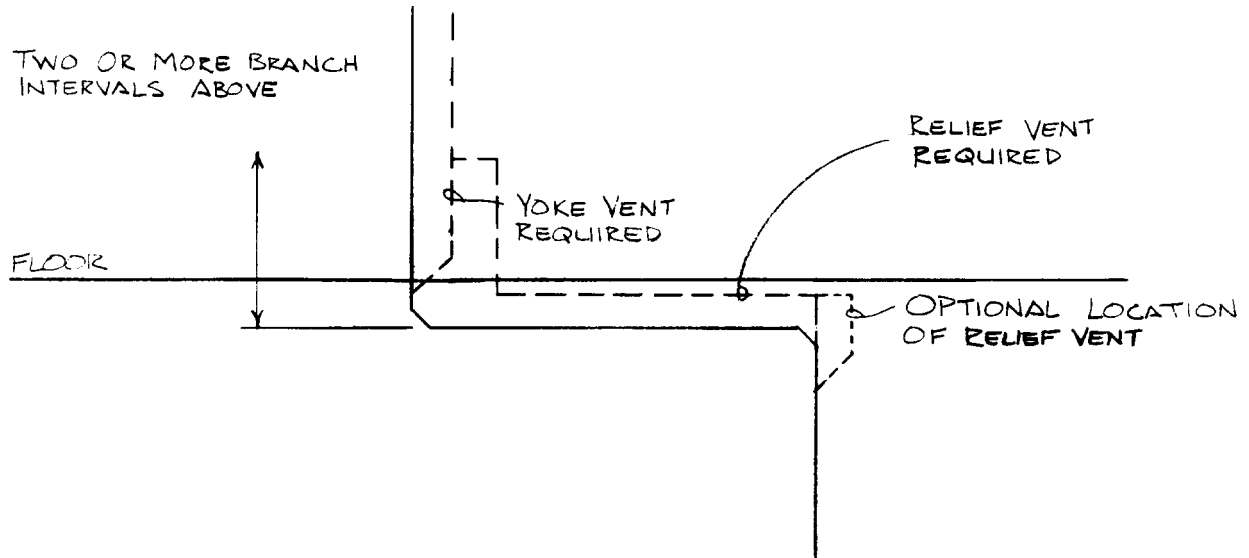


A-82.31 (5) (a) Relief vent for offsets of 30 to 45 degrees.

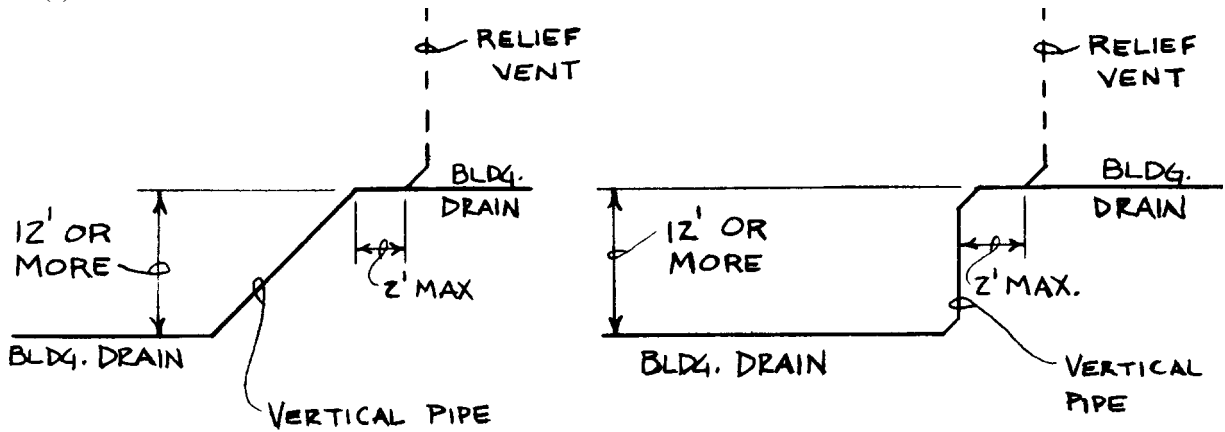




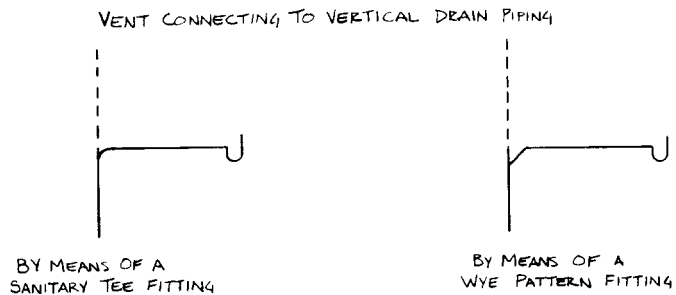
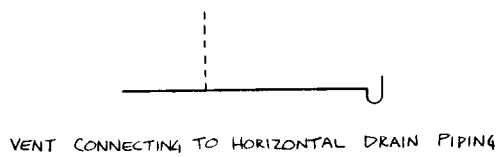
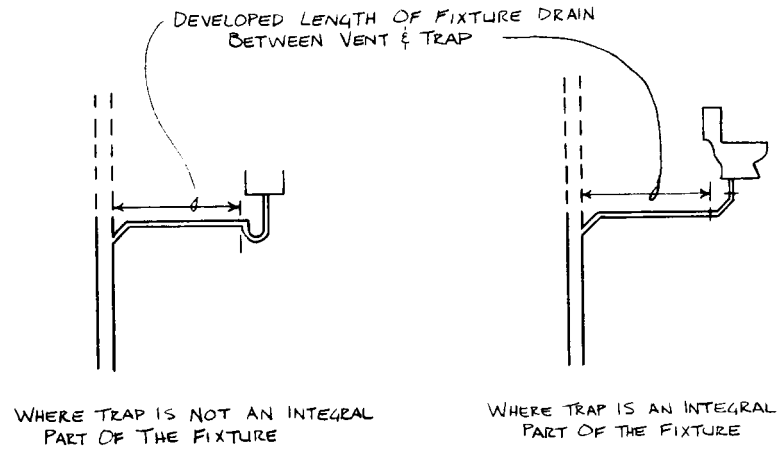
A-82.31 (5) (b) RELIEF AND YOKE VENTS FOR OFFSETS OF MORE THAN 45 DEGREES.



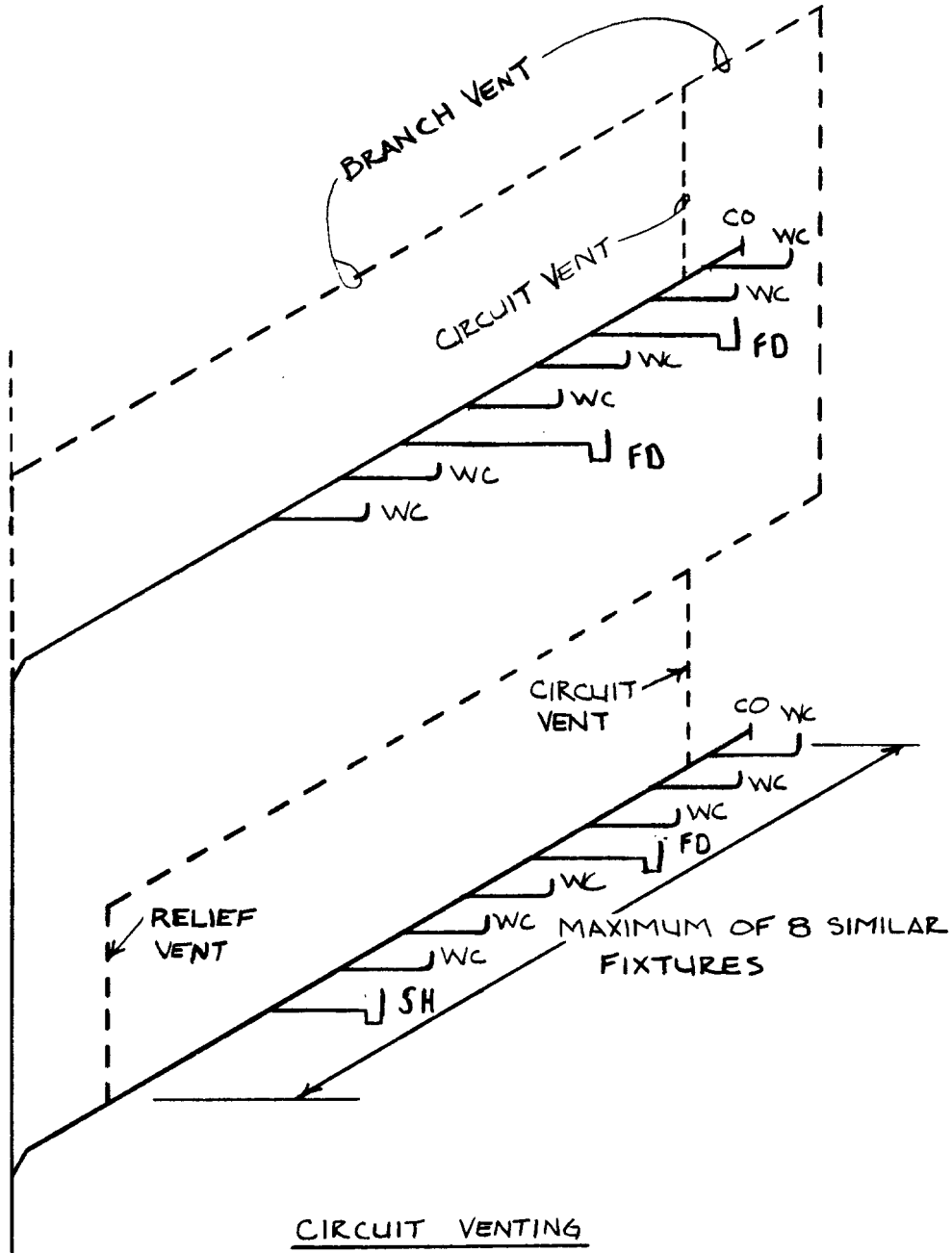
A-82.31 (7) RELIEF VENTS FOR BUILDING DRAINS.



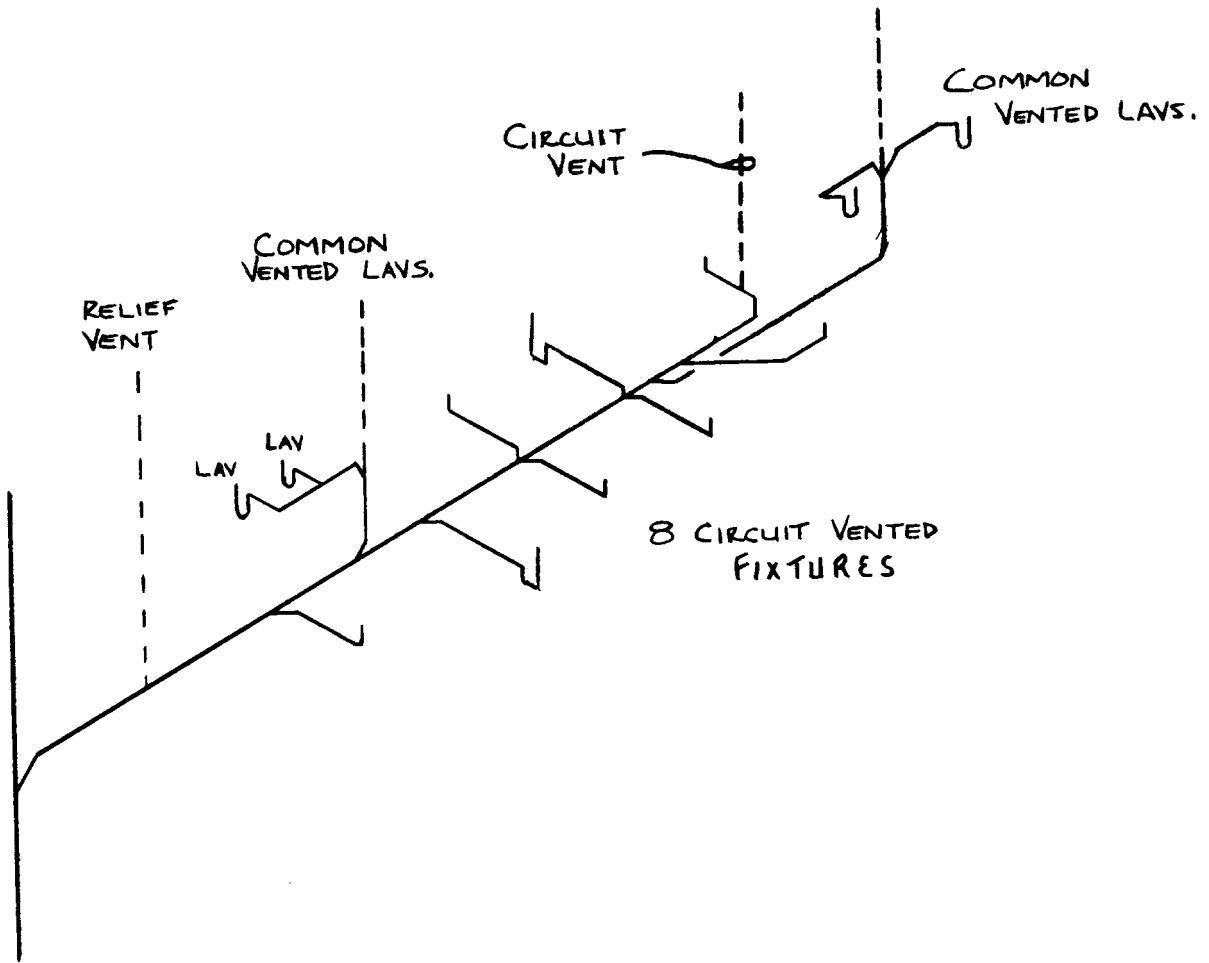
A-82.31 (9) FIXTURE VENTS.



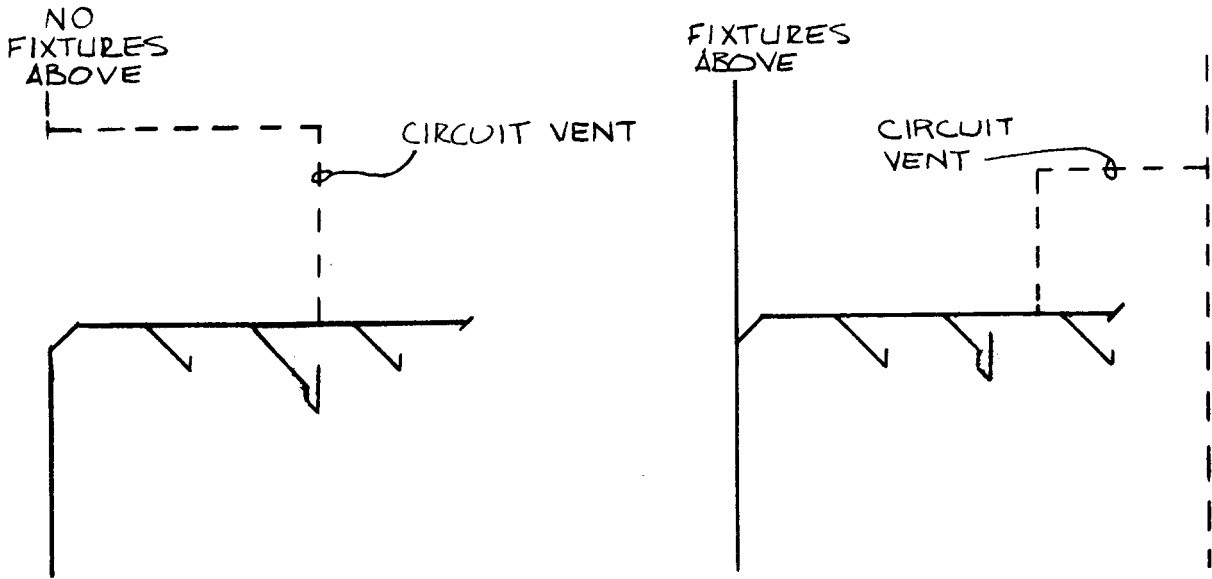
A-82.31 (10) CIRCUIT VENTING.



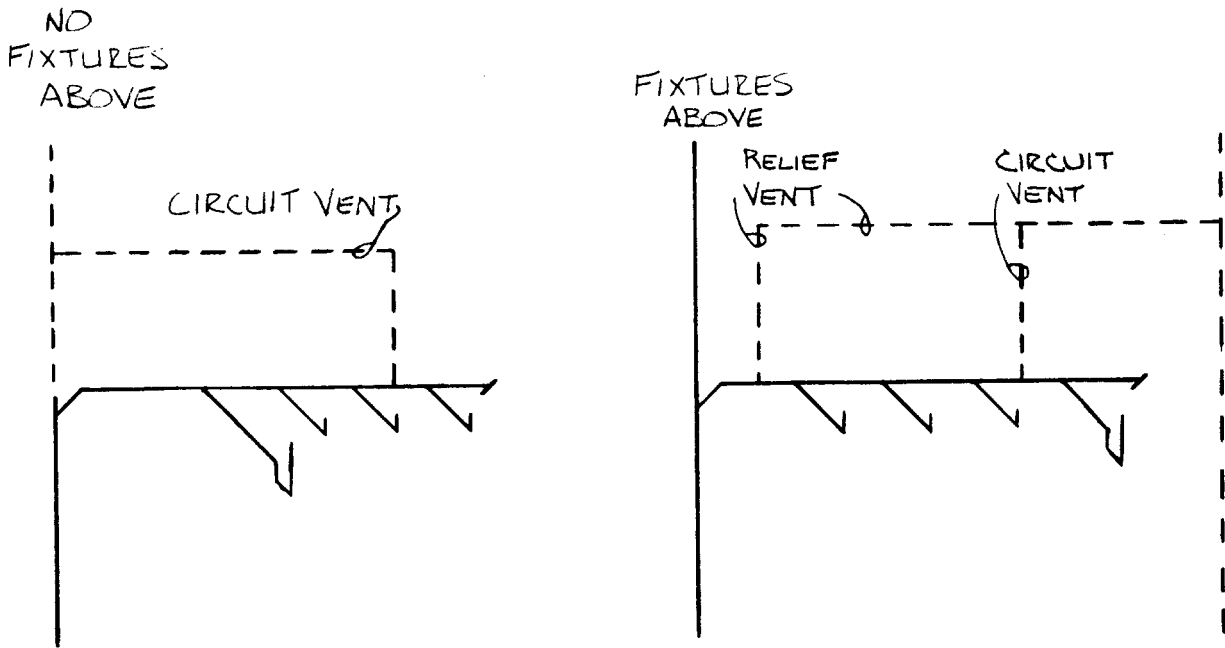
A-82.31 (10) CIRCUIT VENTING.



**A-82.31 (10) CIRCUIT VENTING.**

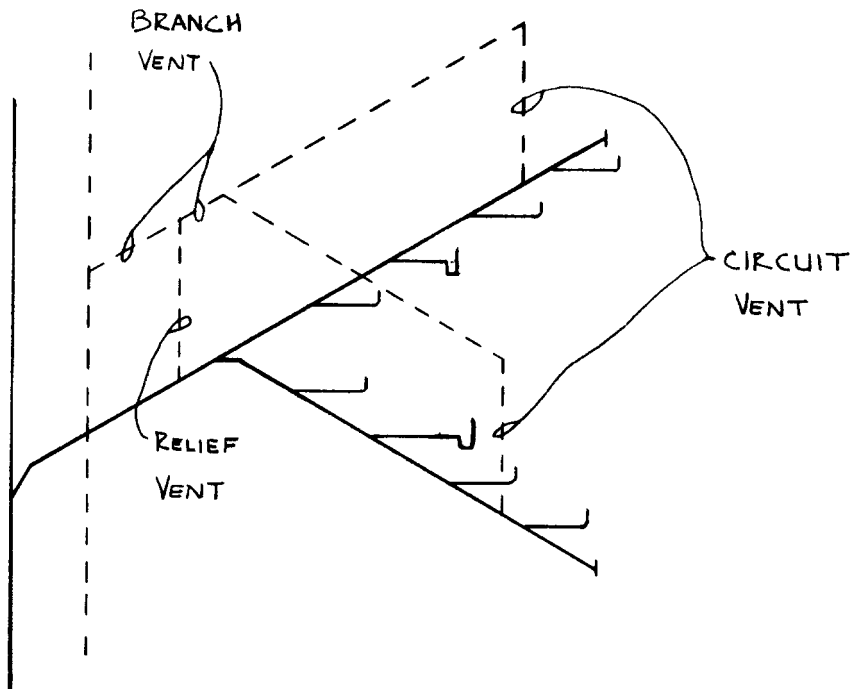
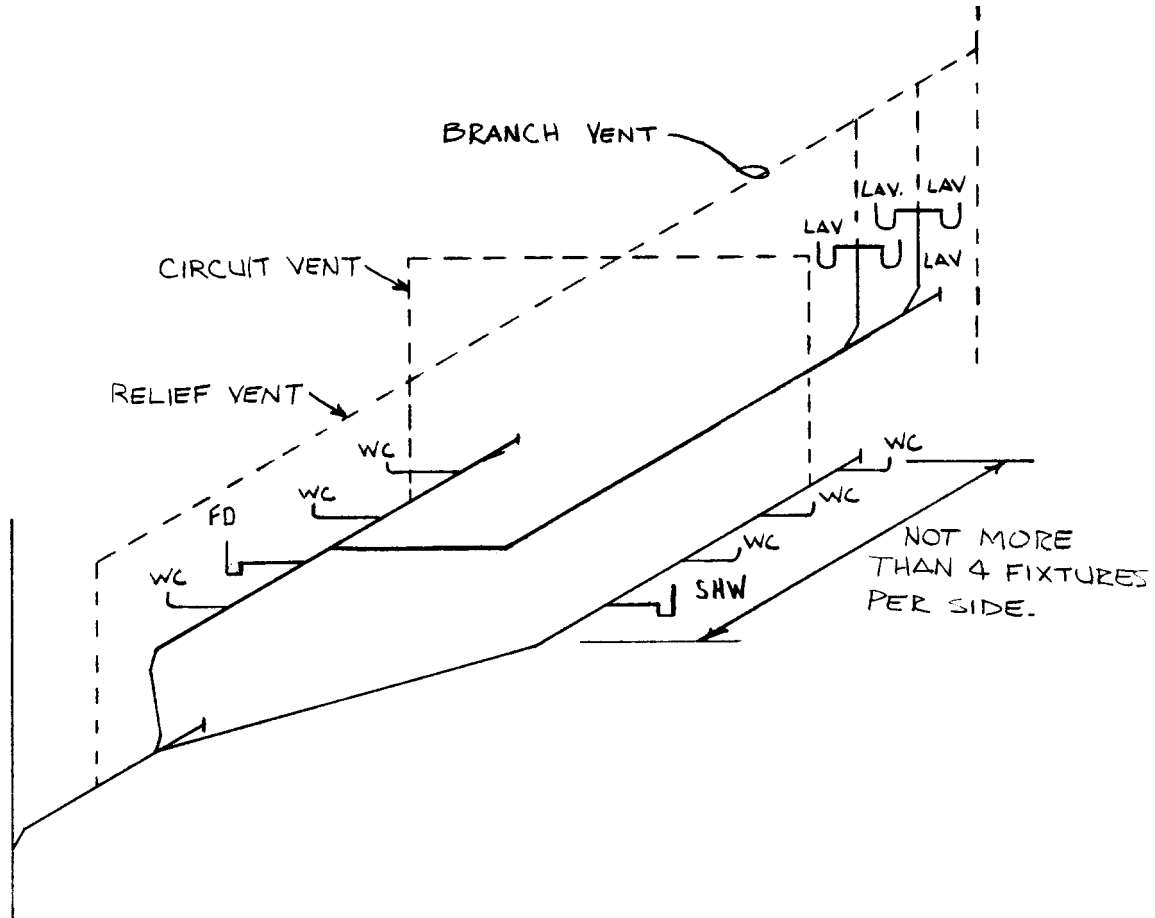


CIRCUIT VENTING  
3 FIXTURES

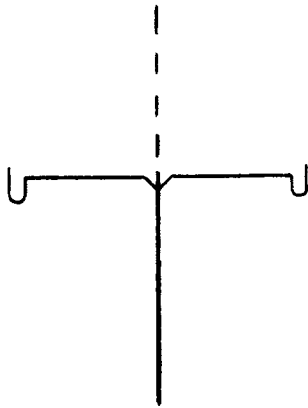


CIRCUIT VENTING 4 OR  
MORE FIXTURES

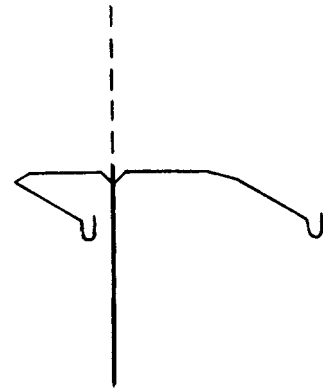
A-82.31 (10) CIRCUIT VENTING.



A-82.31 (11) (a) COMMON VENTS, VERTICAL DRAINS.



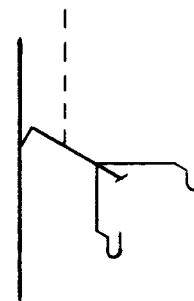
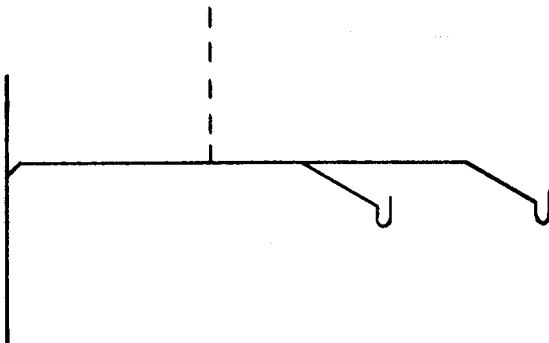
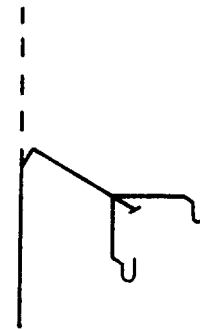
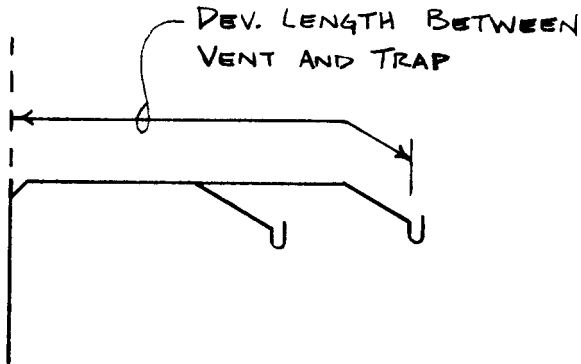
BACK-TO-BACK



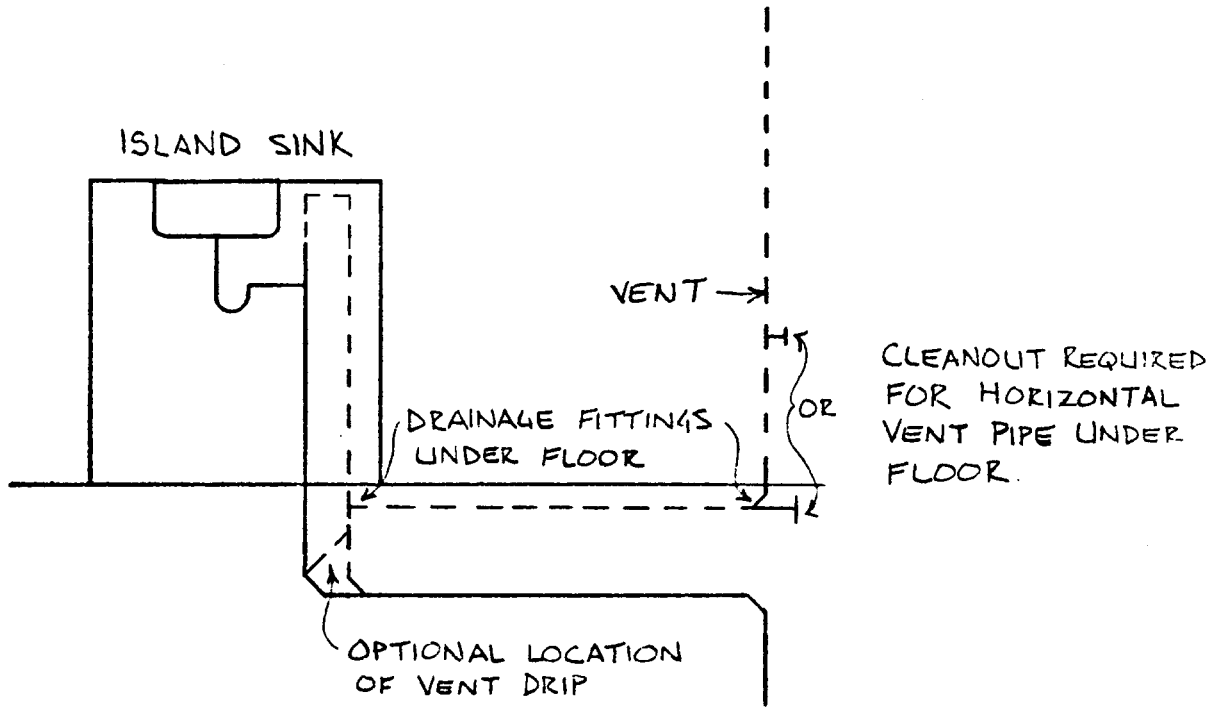
SIDE-BY-SIDE

COMMON VENT SERVING ANY TWO FIXTURES

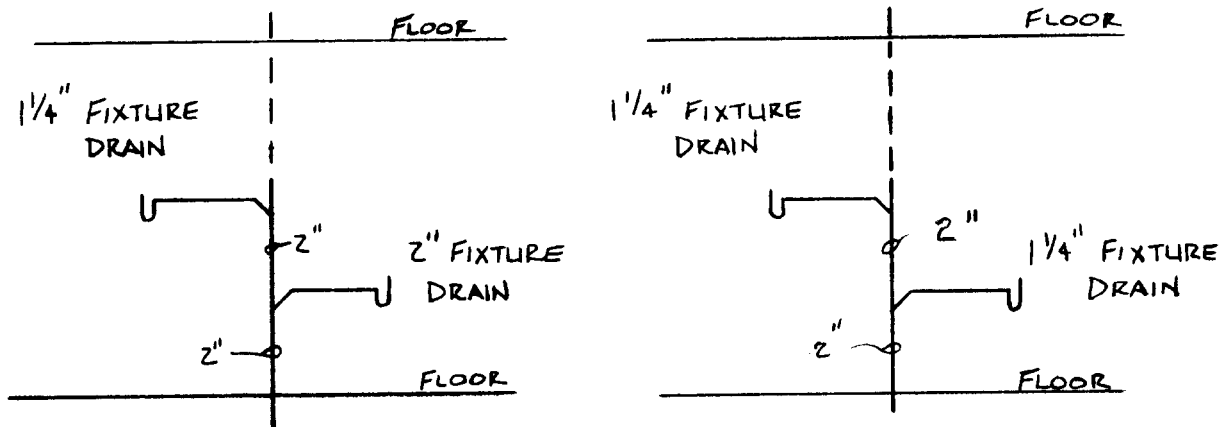
A-82.31 (11) (b) COMMON VENTS, HORIZONTAL DRAINS.



A-82.31 (12) ISLAND FIXTURE VENTING.

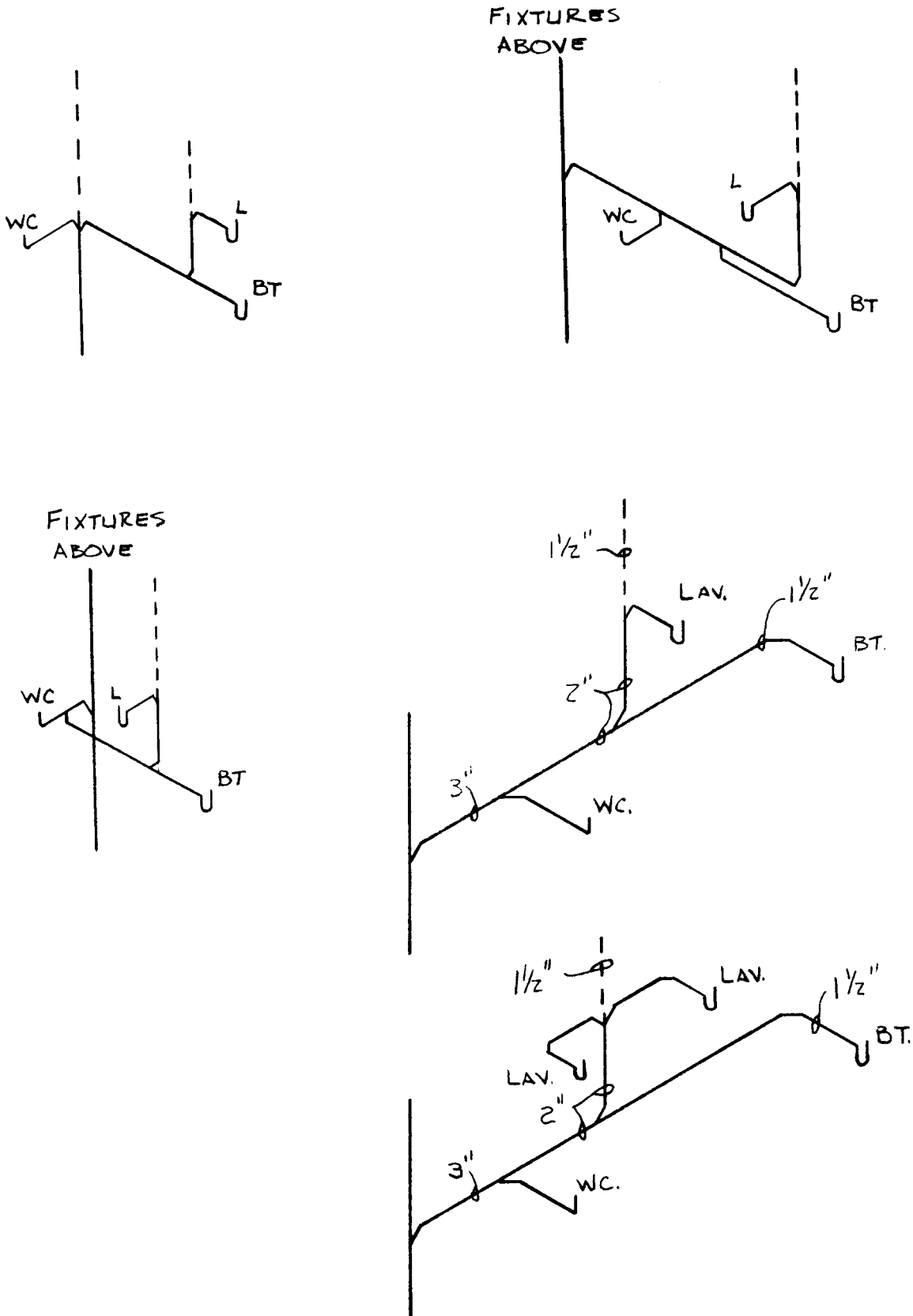


A-82.31 (13) (a) VERTICAL WET VENTS.

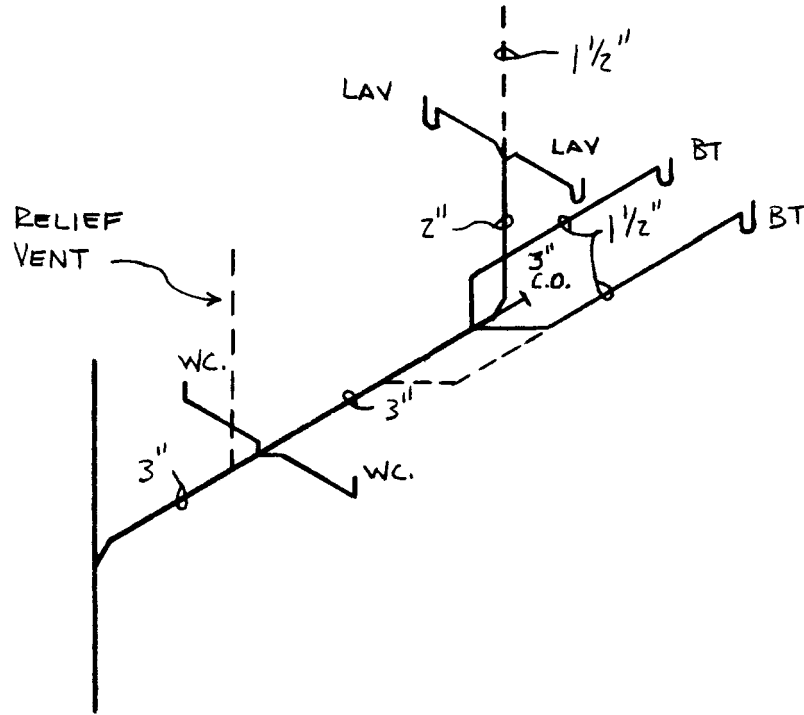




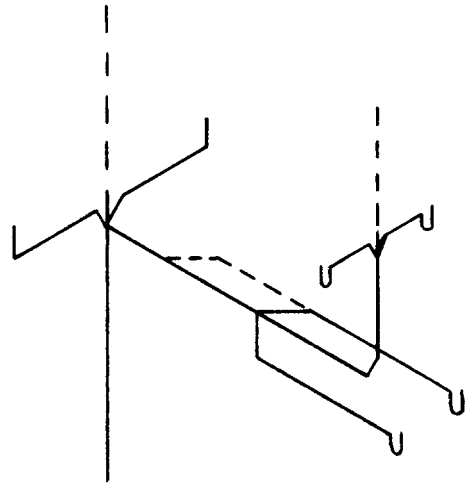
A-82.31 (13) (b) HORIZONTAL WET VENTS.



A-82.31 (13) (b) HORIZONTAL WET VENTS.



HORIZONTAL WET VENTS



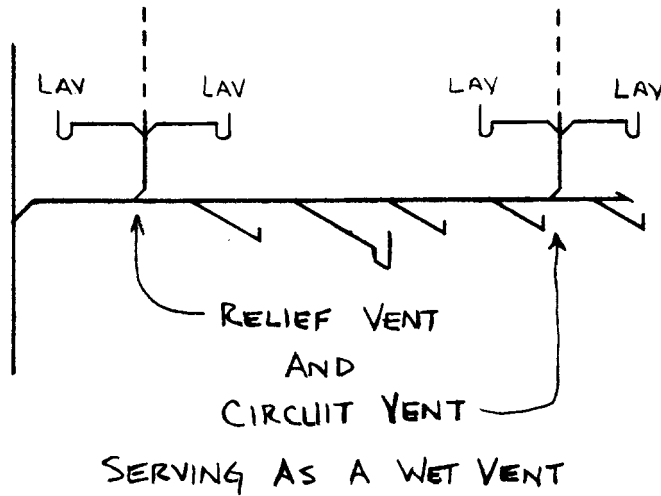
**A-82.31 (13) (c) WET VENTING - FLOOR OUTLET FIXTURES.**



INDIVIDUAL VENT FOR FLOOR OUTLET FIXTURE  
SERVING AS A WET VENT

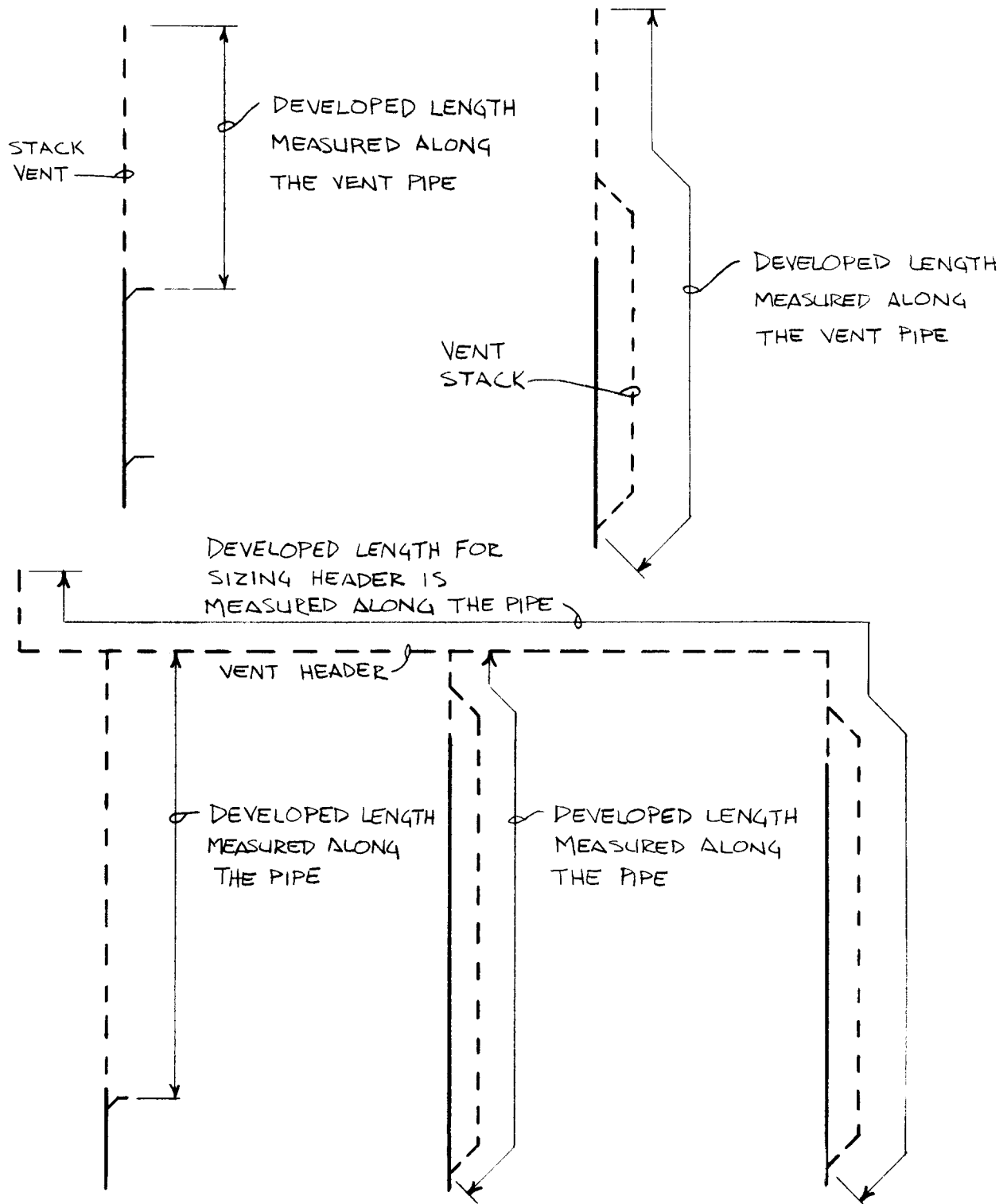


COMMON VENT FOR FLOOR OUTLET FIXTURES  
SERVING AS A WET VENT

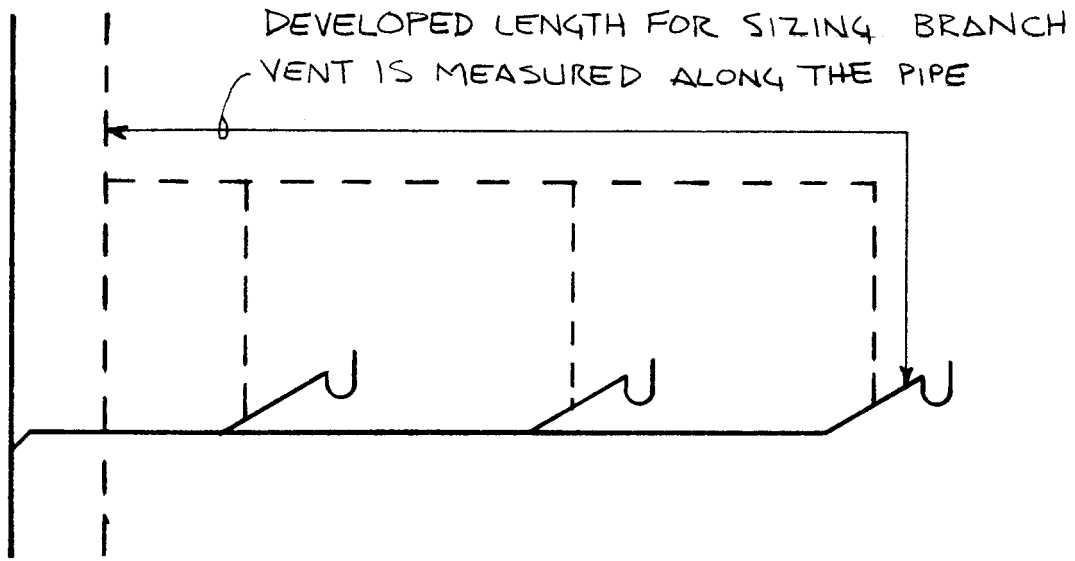


SERVING AS A WET VENT

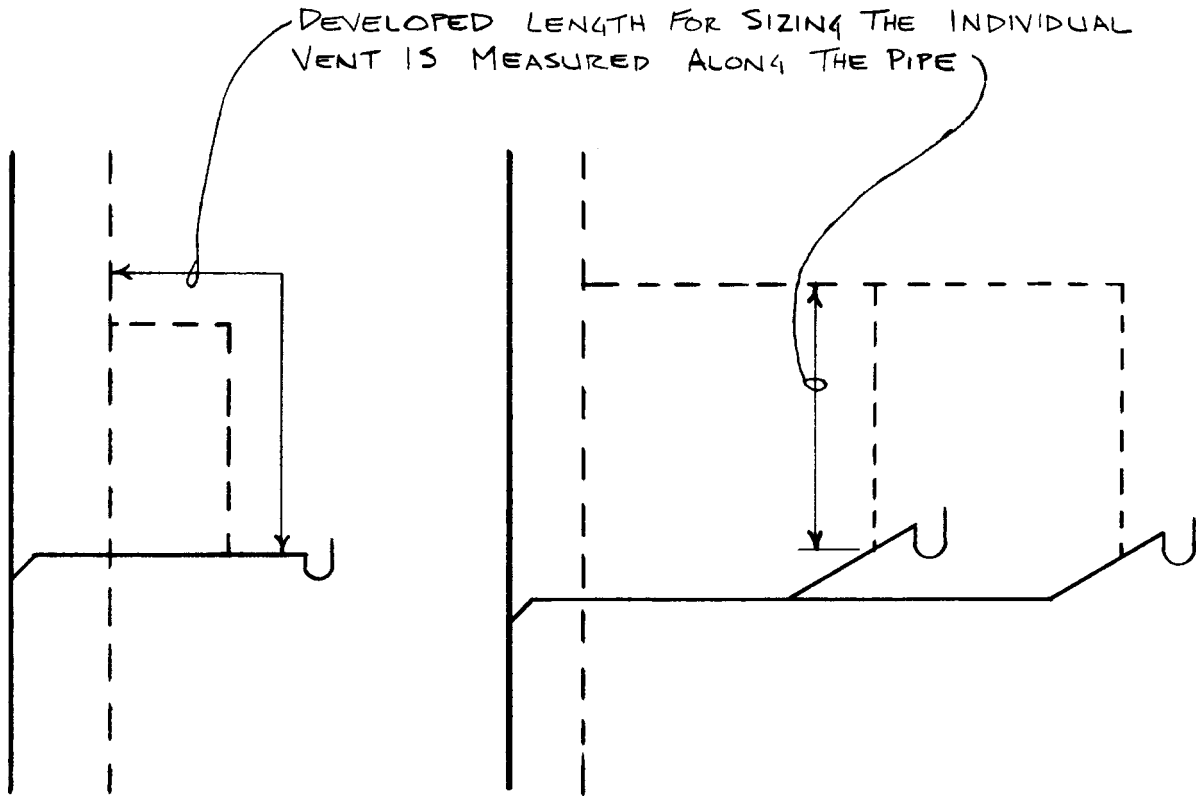
A-82.31 (14) (a) and (b) SIZING VENT STACKS AND STACK VENTS.



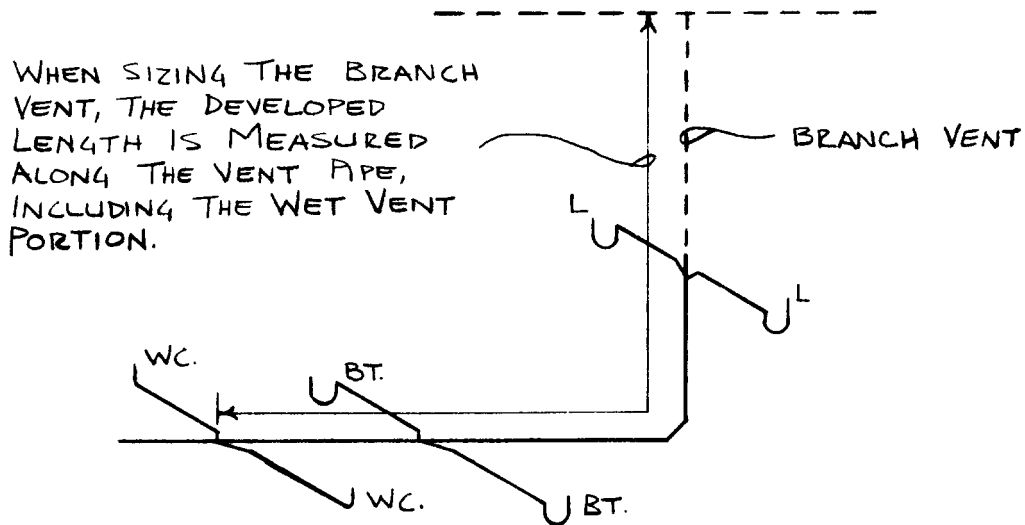
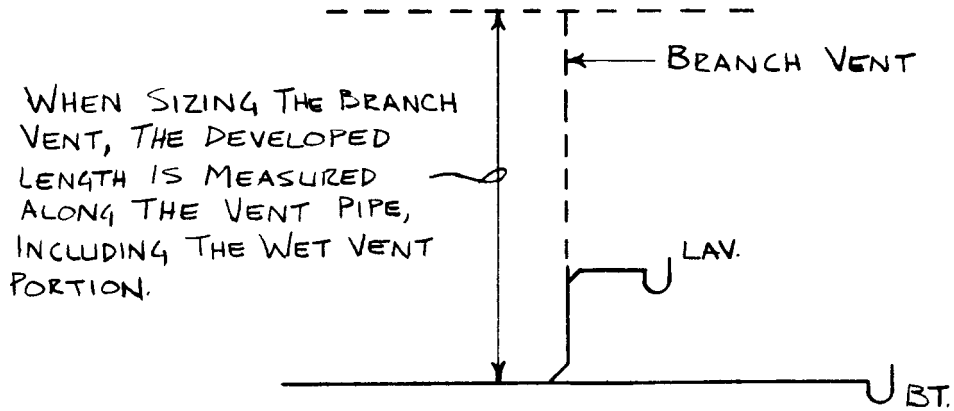
**A-82.31 (14) (c) SIZING BRANCH VENTS.**



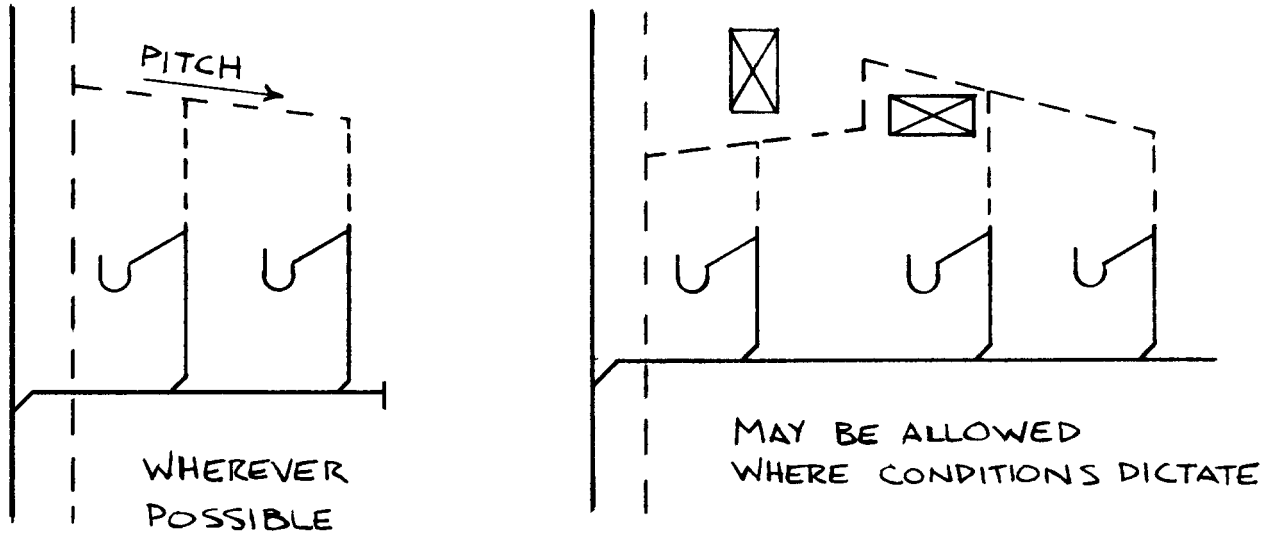
**A-82.31 (14) (d) SIZING INDIVIDUAL VENTS.**



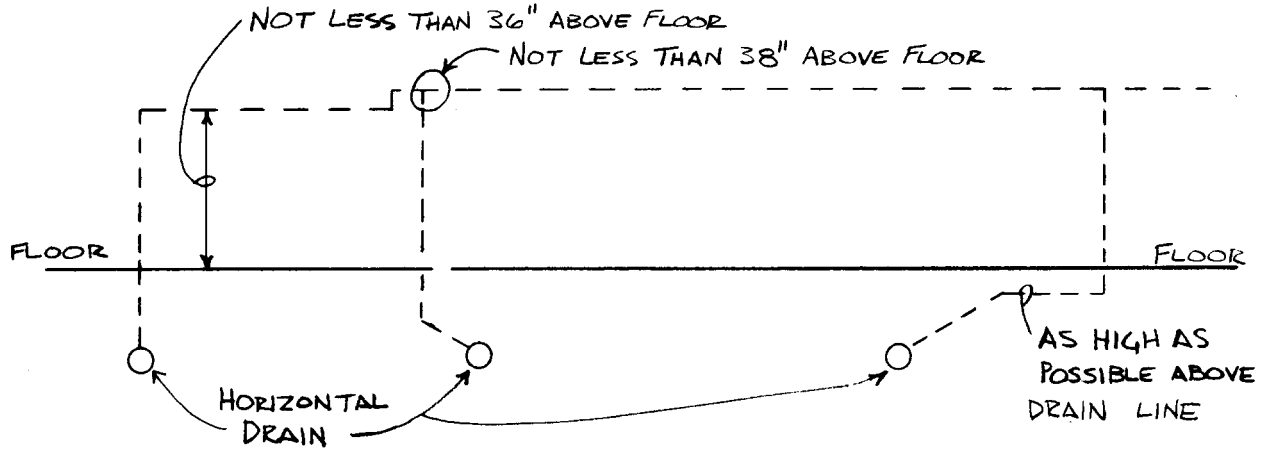
A-82.31 (14) (c) SIZING BRANCH VENTS SERVING A WET VENT.



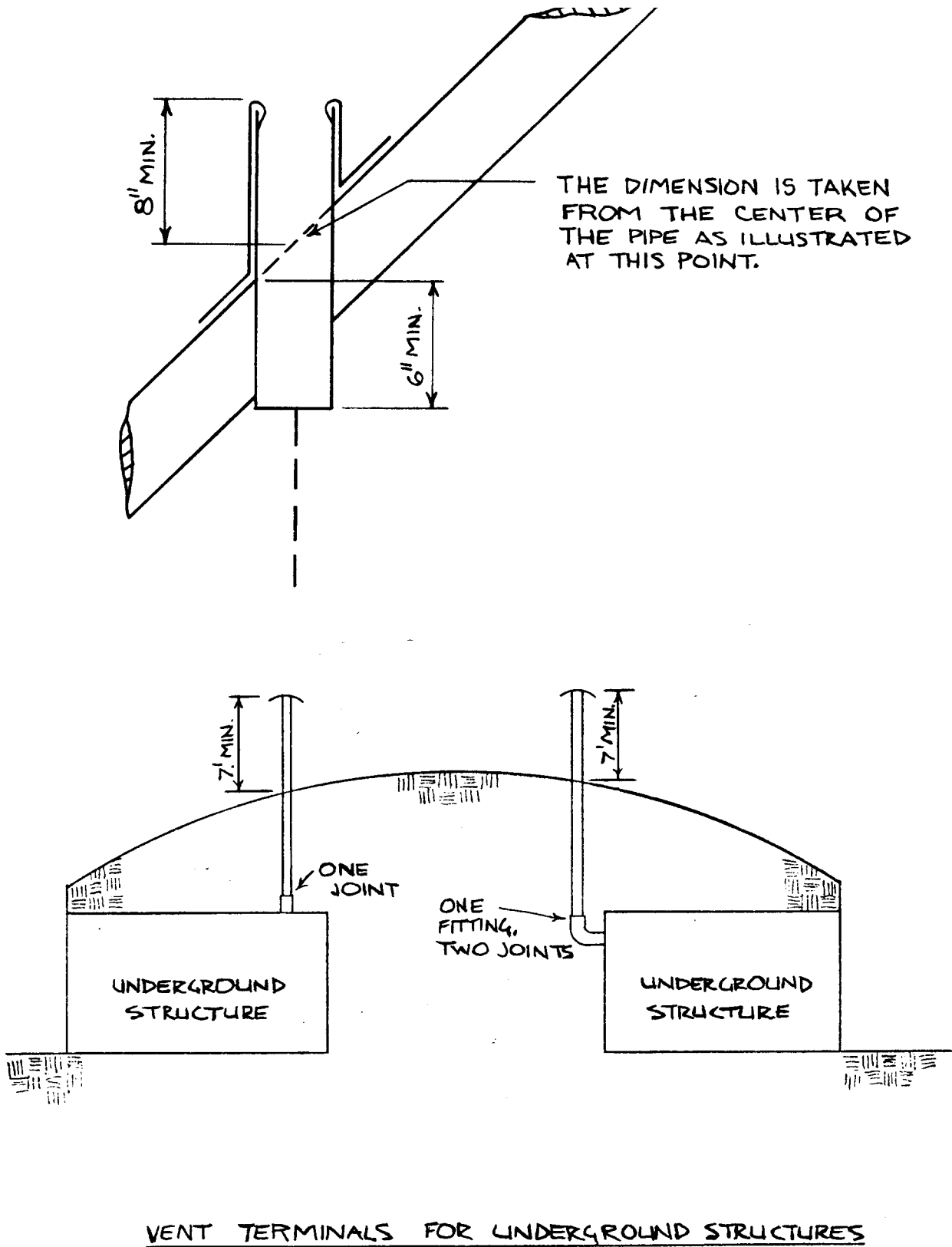
A-82.31 (15) (a) VENT GRADES AND CONNECTIONS.



A-82.31 (15) (b) VENT GRADES AND CONNECTIONS.

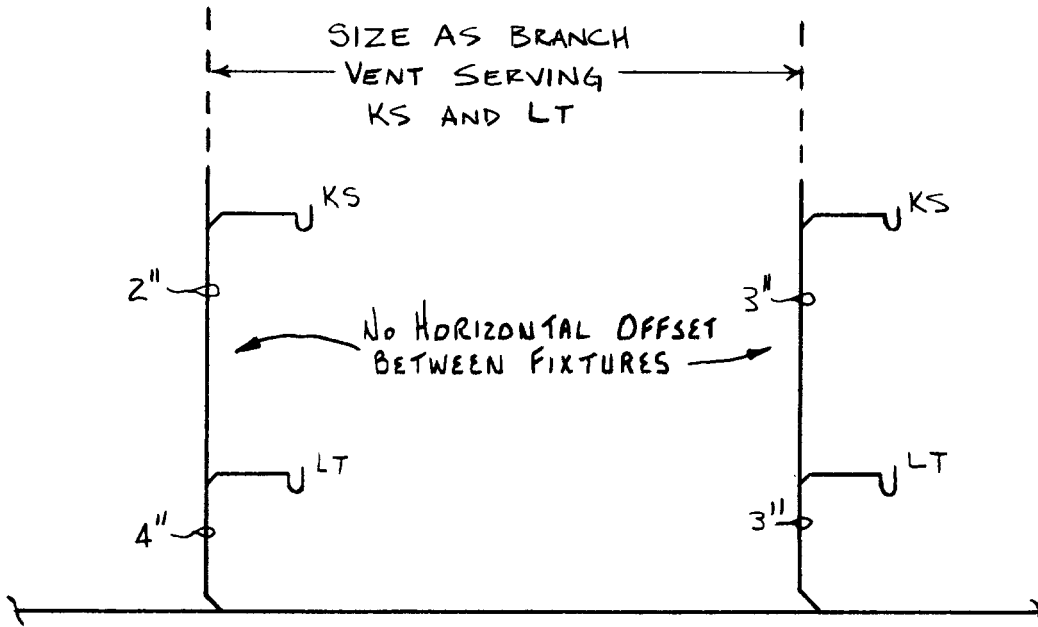
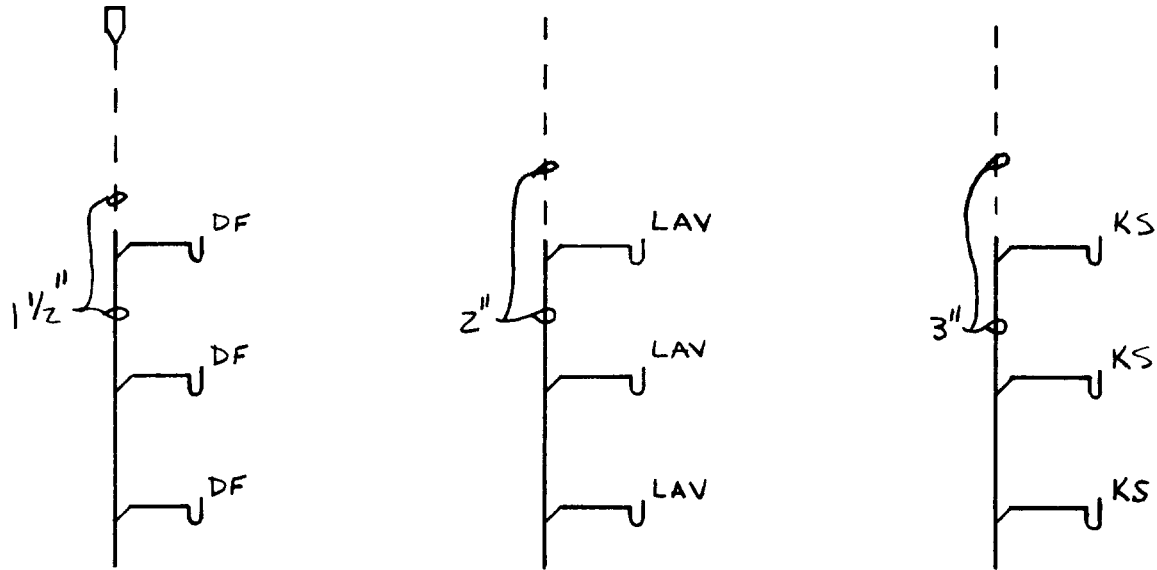


A-82.31 (16) VENT TERMINALS.

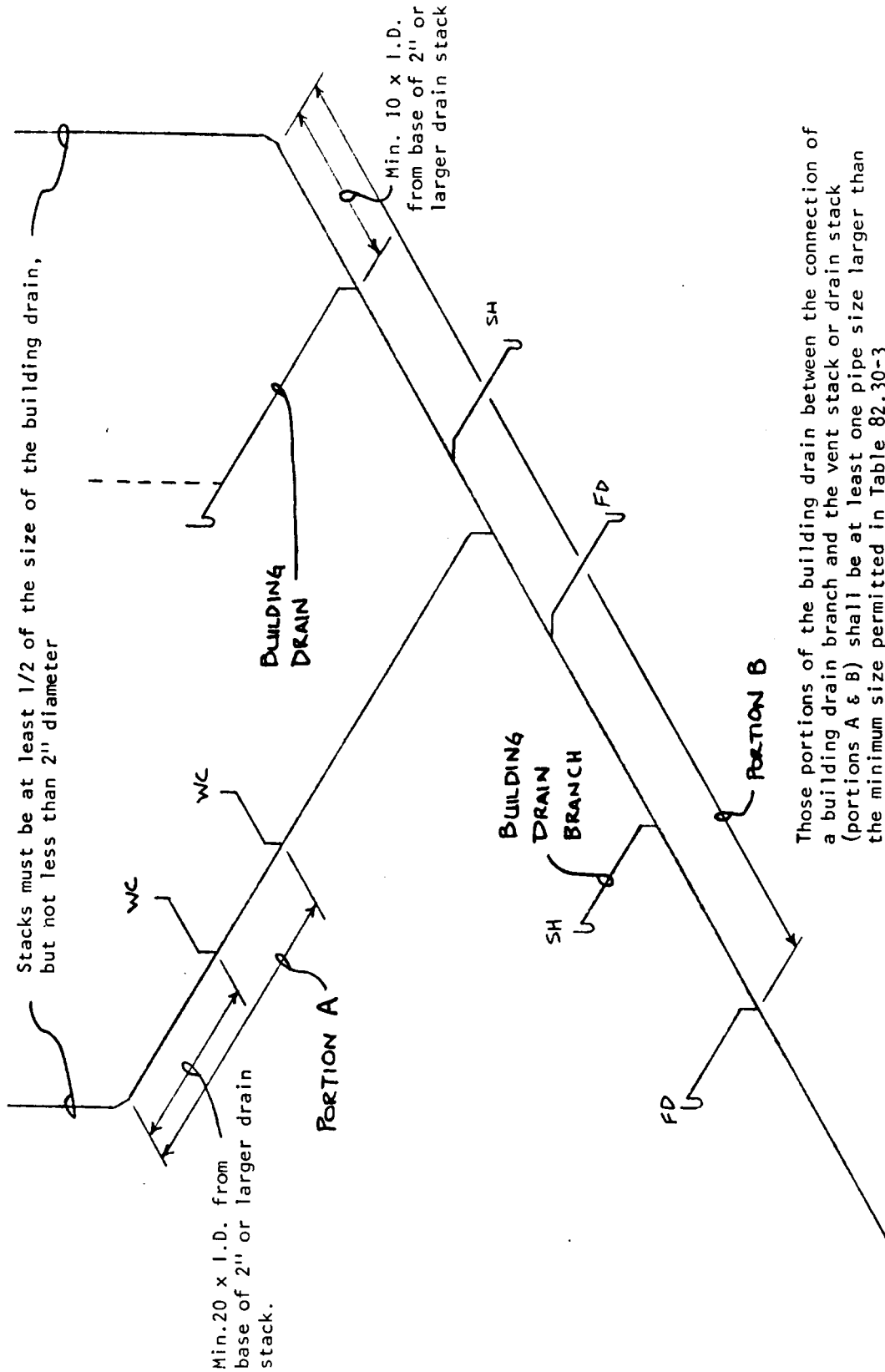




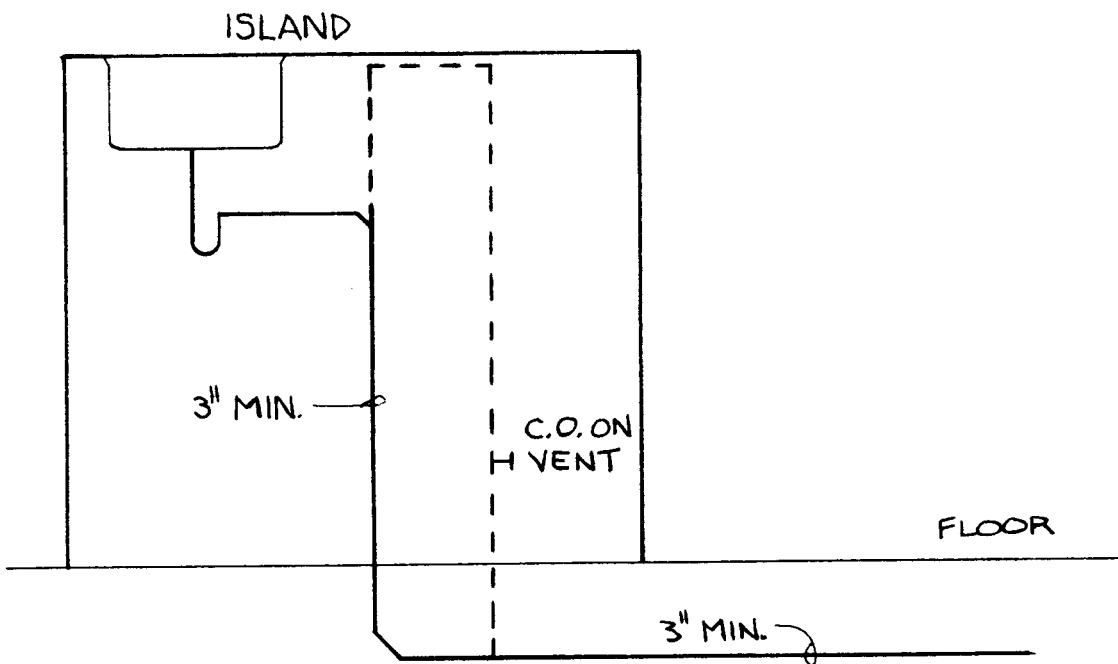
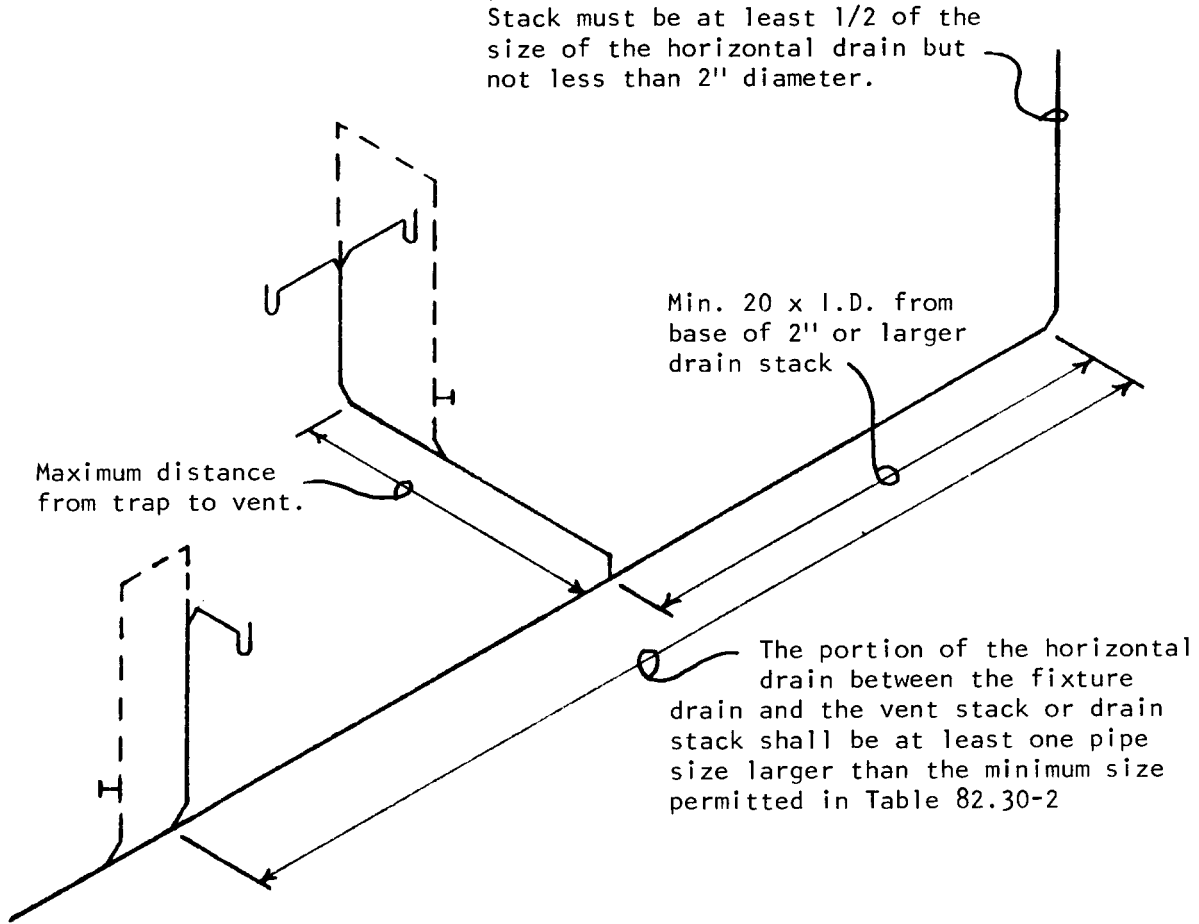
A-82.31 (17) (a) COMBINATION DRAIN AND VENT STACKS.



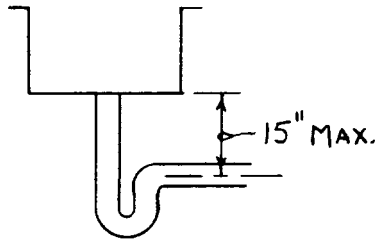
A-82.31 (17) (b) COMBINATION DRAIN AND VENT BUILDING DRAIN.



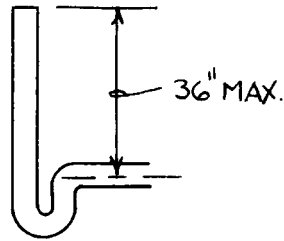
A-82.31 (17) (c) COMBINATION DRAIN AND VENT LABORATORY SINK VENTING.



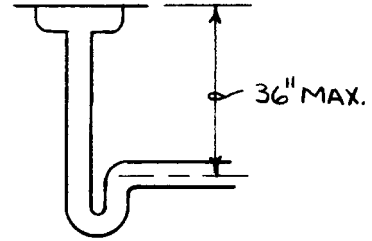
A-82.32 (4) (b) INSTALLATION OF TRAPS.



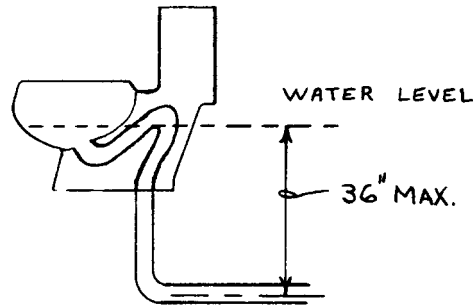
MOST FIXTURES



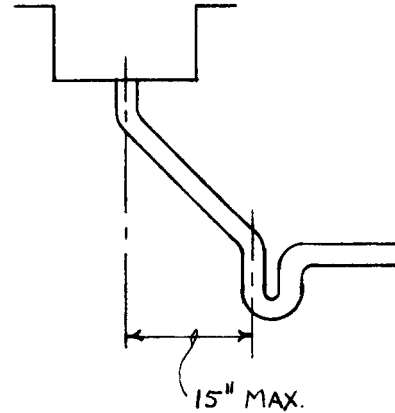
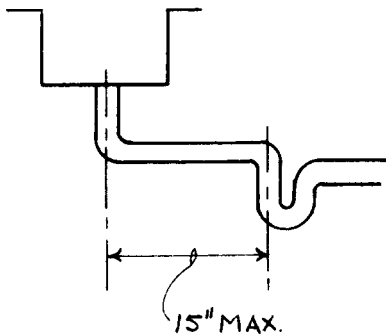
STANDPIPE



FLOOR DRAIN

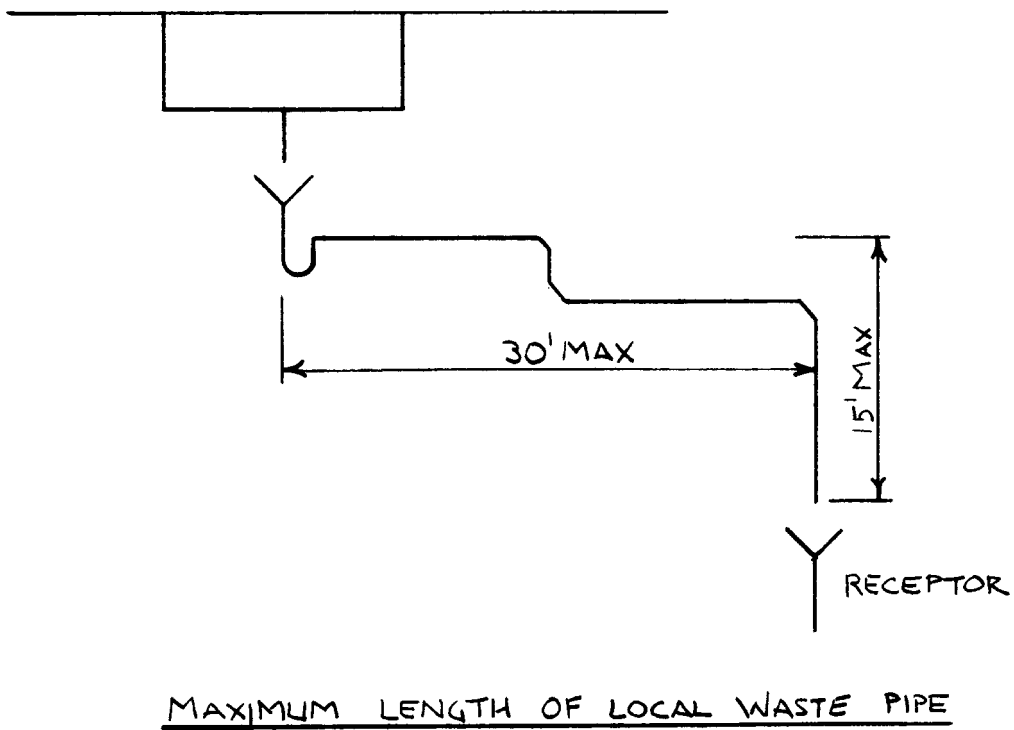
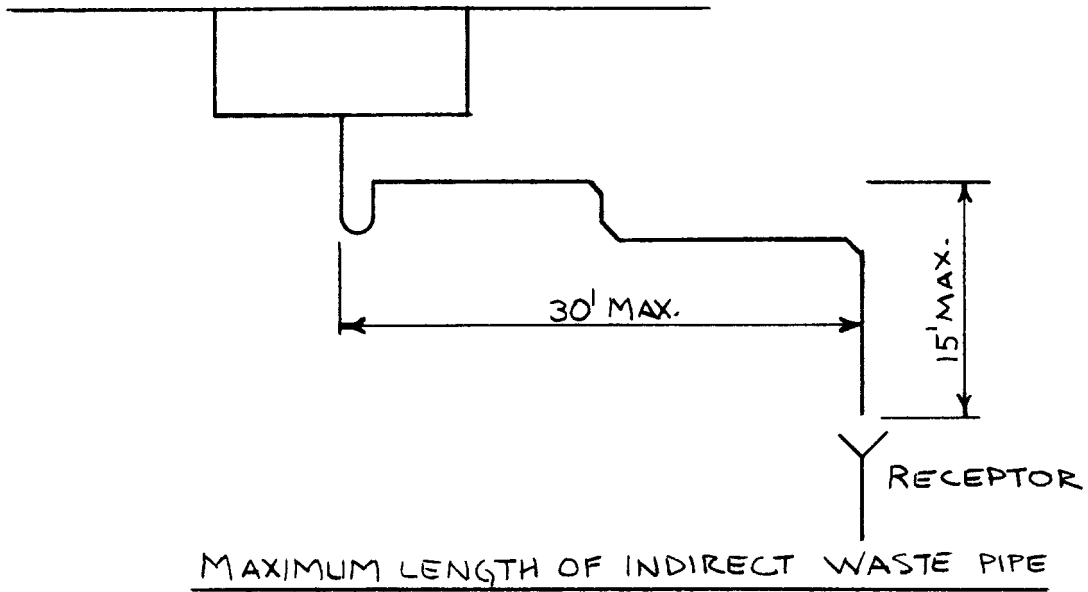


VERTICAL DISTANCE BETWEEN FIXTURE DRAIN OUTLET AND TRAP

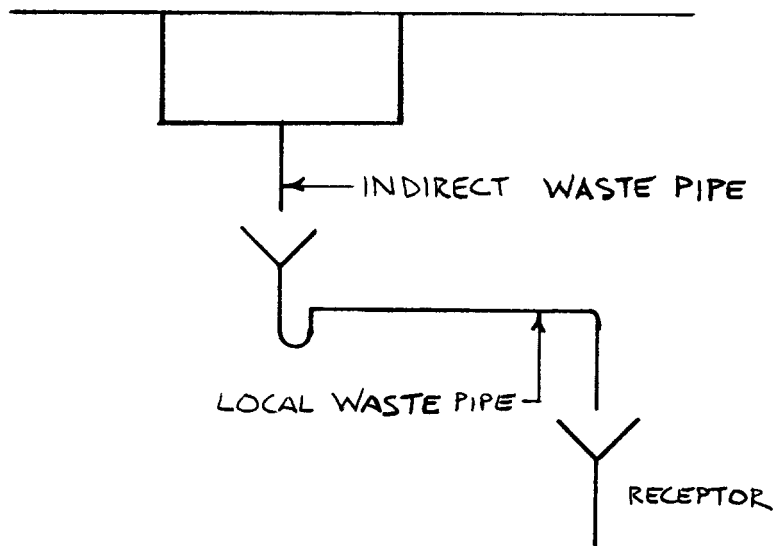
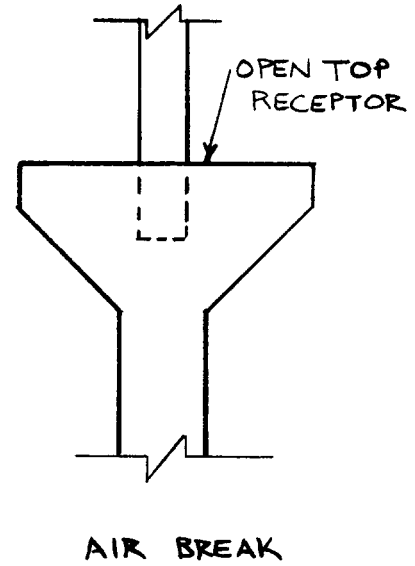
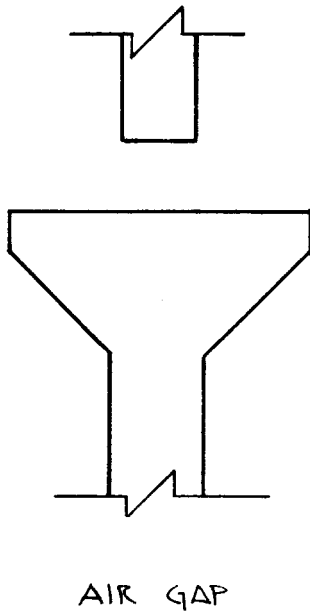


HORIZONTAL DISTANCE BETWEEN FIXTURE DRAIN OUTLET AND TRAP

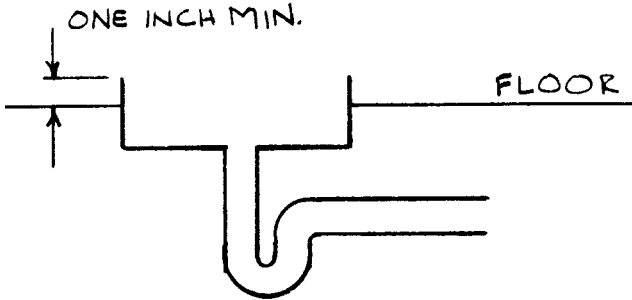
**A-82.33 (6) INDIRECT AND LOCAL WASTE PIPING.**



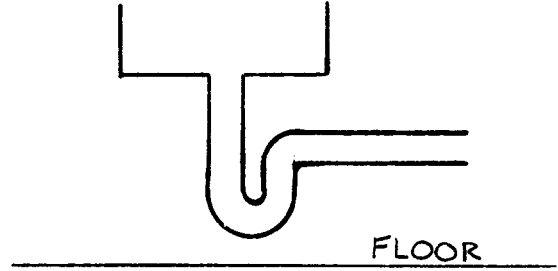
A-82.33 (7) AIR-GAPS AND AIR-BREAKS.



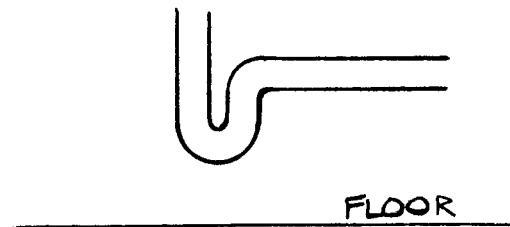
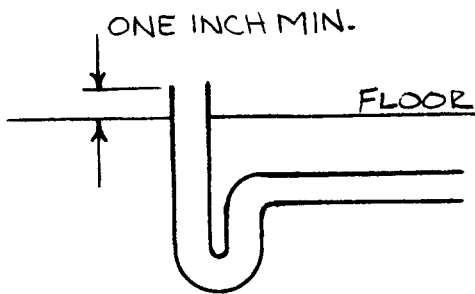
**A-82.33 (8) (a) WASTE SINKS AND STANDPIPES.**



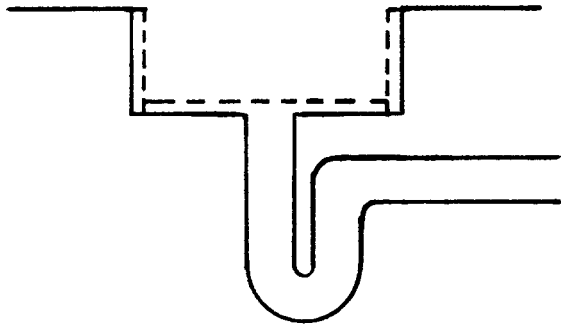
WASTE SINK IN FLOOR



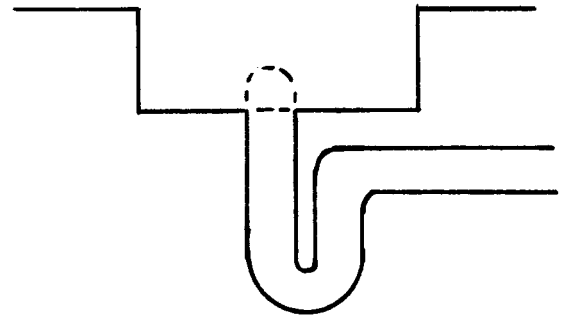
WASTE SINK ABOVE FLOOR



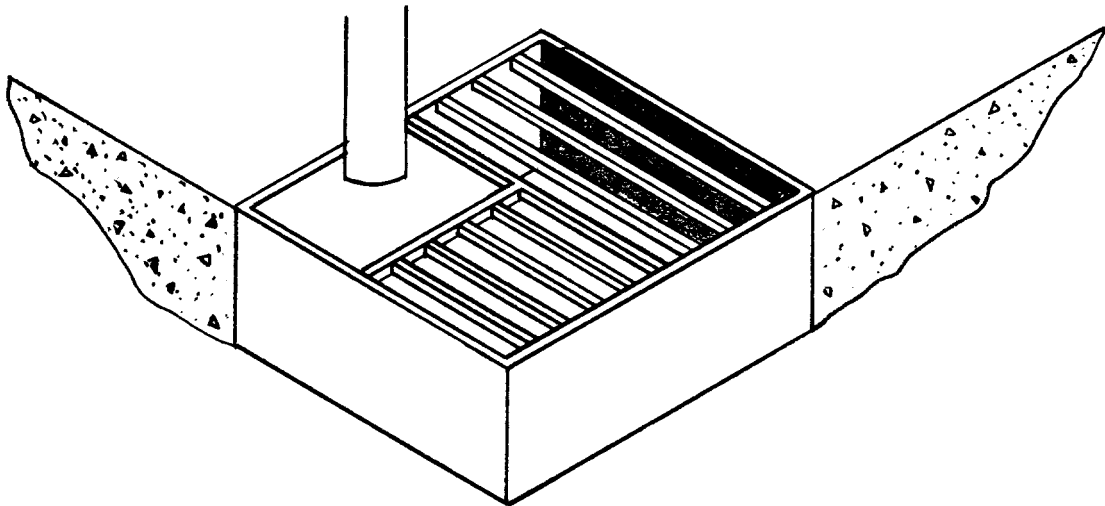
A-82.33 (8) (b) FLOOR SINKS.



FLOOR SINK WITH BASKET



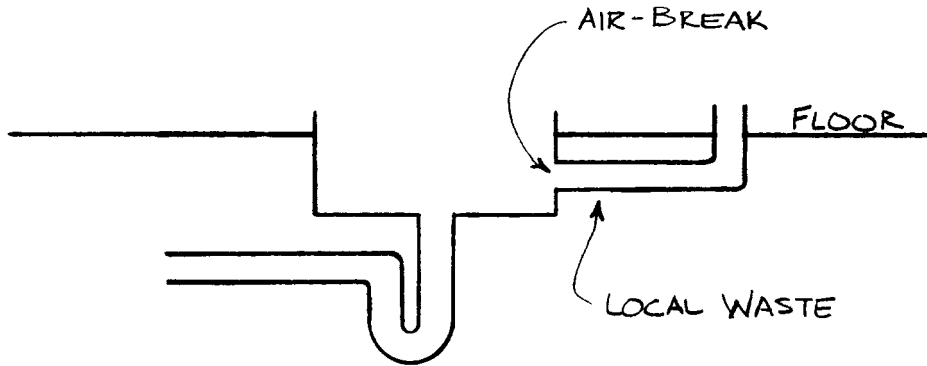
FLOOR SINK WITH DOME STRAINER



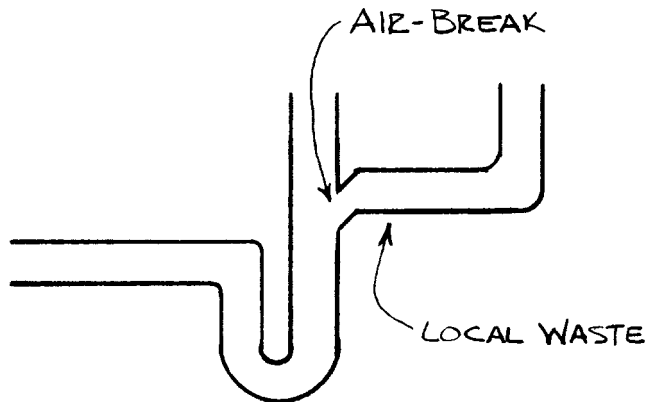
FLOOR SINK WITH GRATE OPENING  
FOR AIR GAP



**A-82.33 (8) (c) LOCAL WASTE PIPING.**

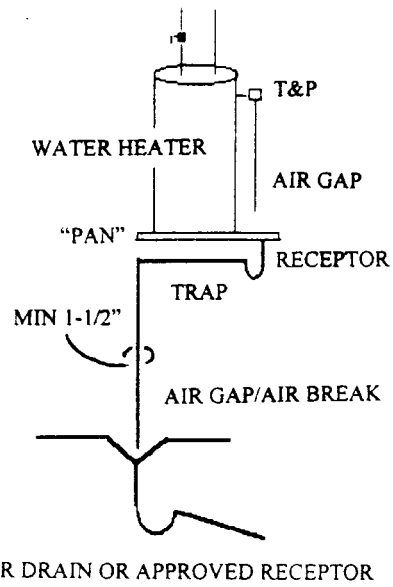
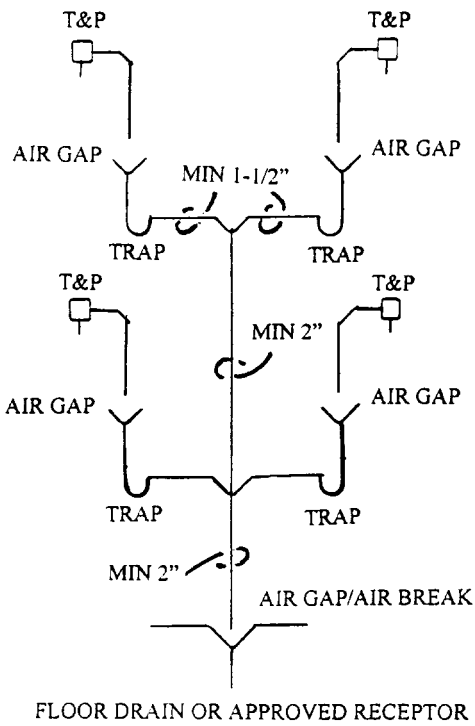
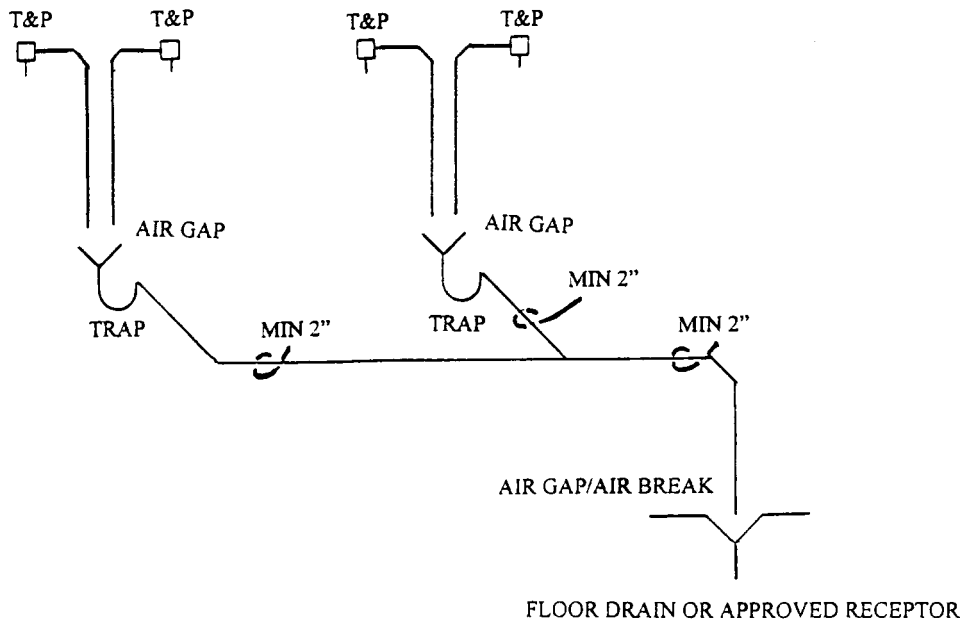


LOCAL WASTE LEADING TO A WASTE SINK,  
FLOOR SINK OR FLOOR DRAIN



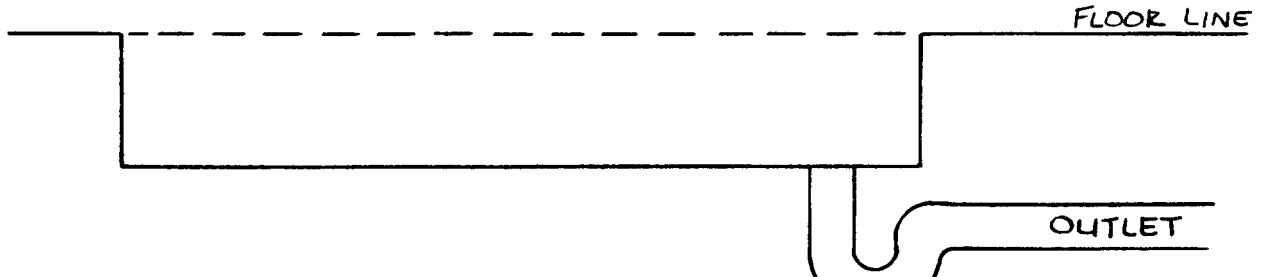
LOCAL WASTE LEADING TO A STANDPIPE

A-82.33 (8) (c) LOCAL WASTE PIPING SERVING WATER HEATER RELIEF VALVES.

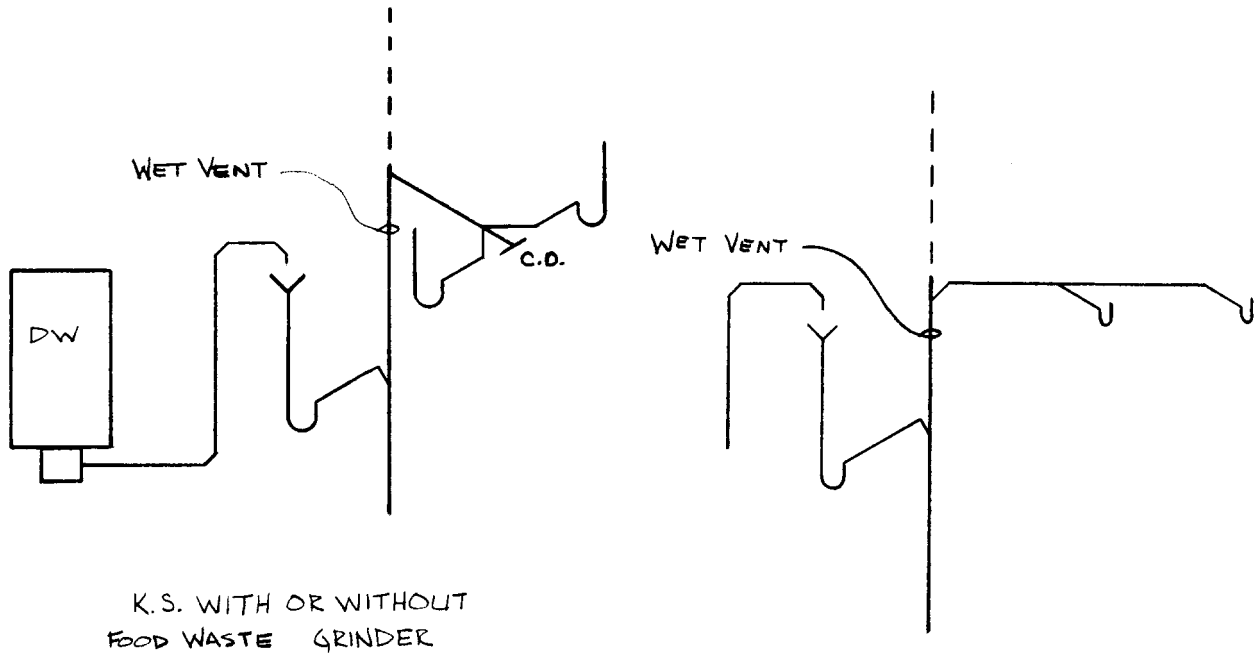


A-82.33 (9) (c) COMMERCIAL GRAVITY DISCHARGE-TYPE CLOTHES WASHERS.

TRENCH TYPE LAUNDRY RECEPTOR



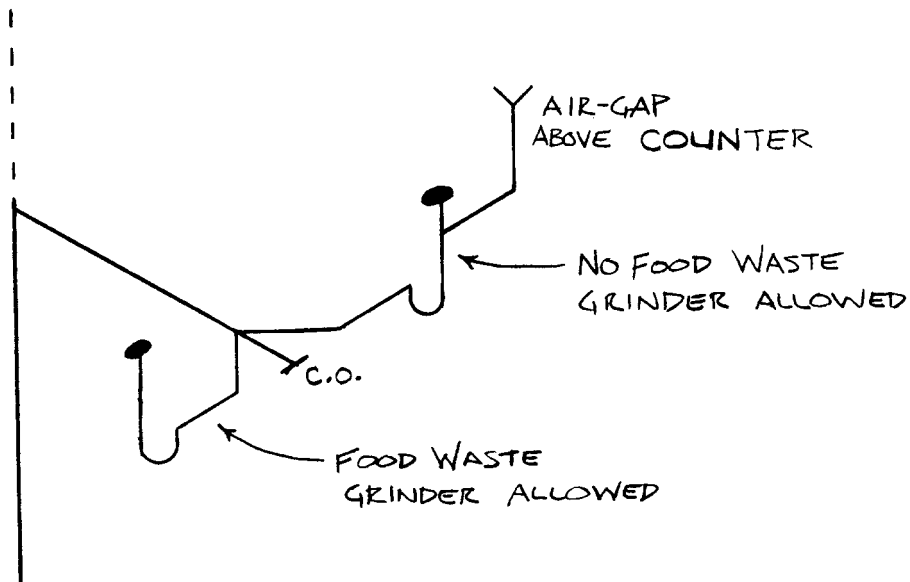
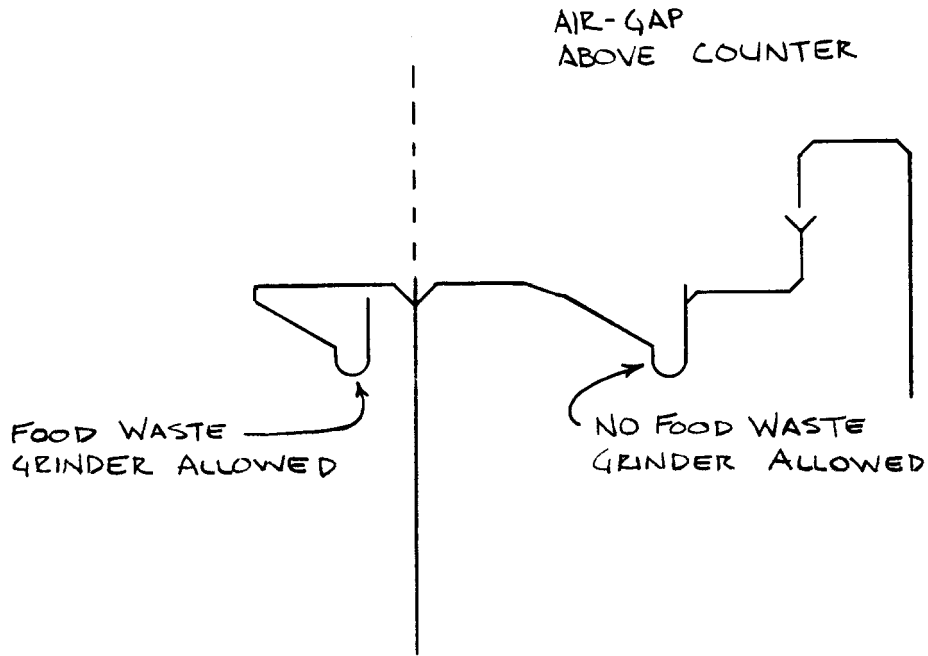
A-82.33 (9) (d) RESIDENTIAL-TYPE DISHWASHERS.



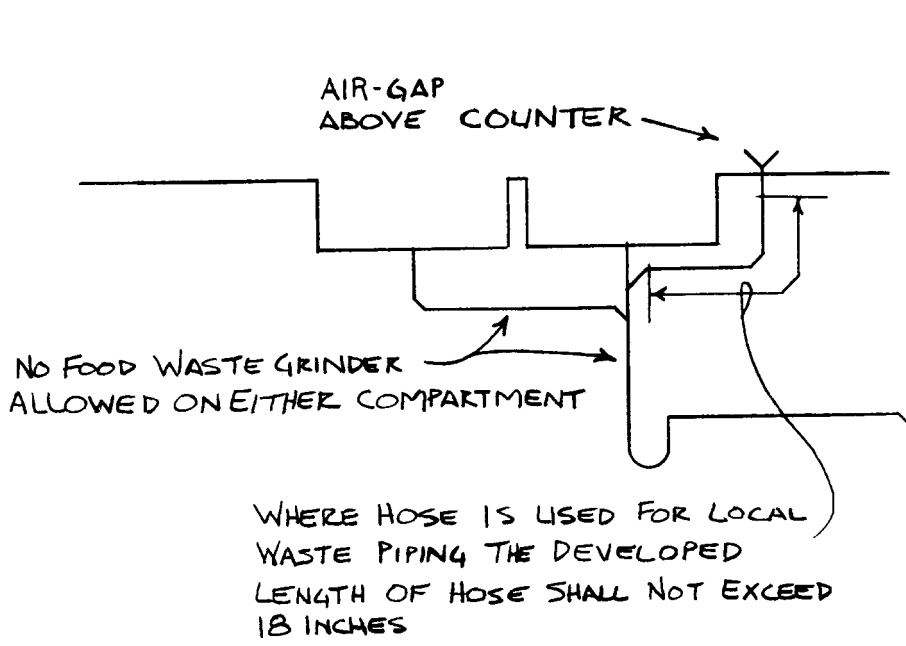
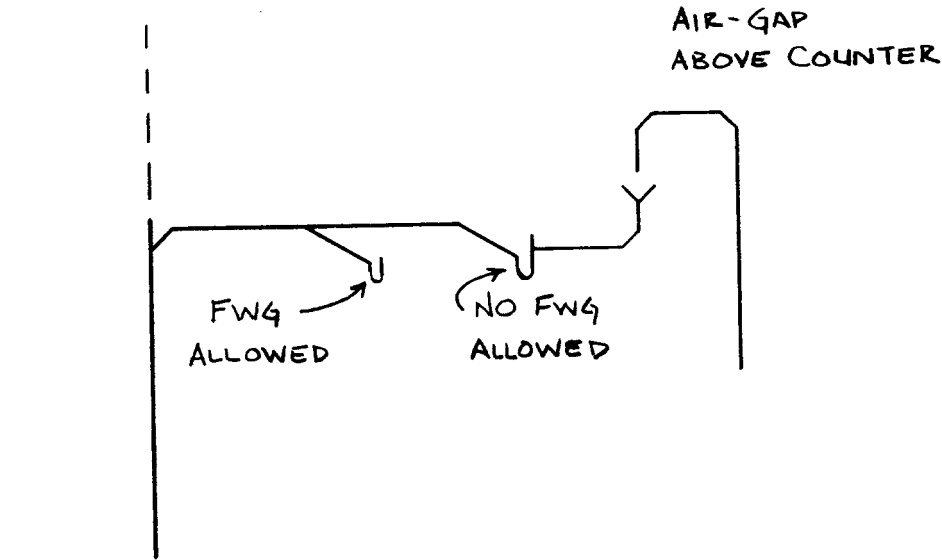
K.S. WITH OR WITHOUT  
FOOD WASTE GRINDER

DISWASHER DISCHARGING TO A STANDPIPE  
BELOW THE COUNTER TOP.

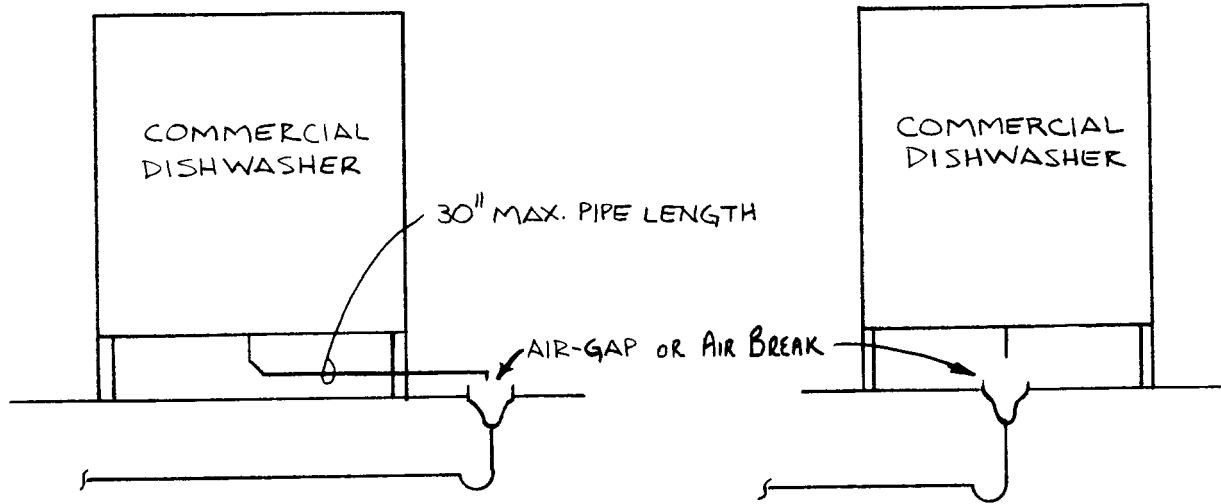
A-82.33 (9) (d) RESIDENTIAL-TYPE DISHWASHERS.



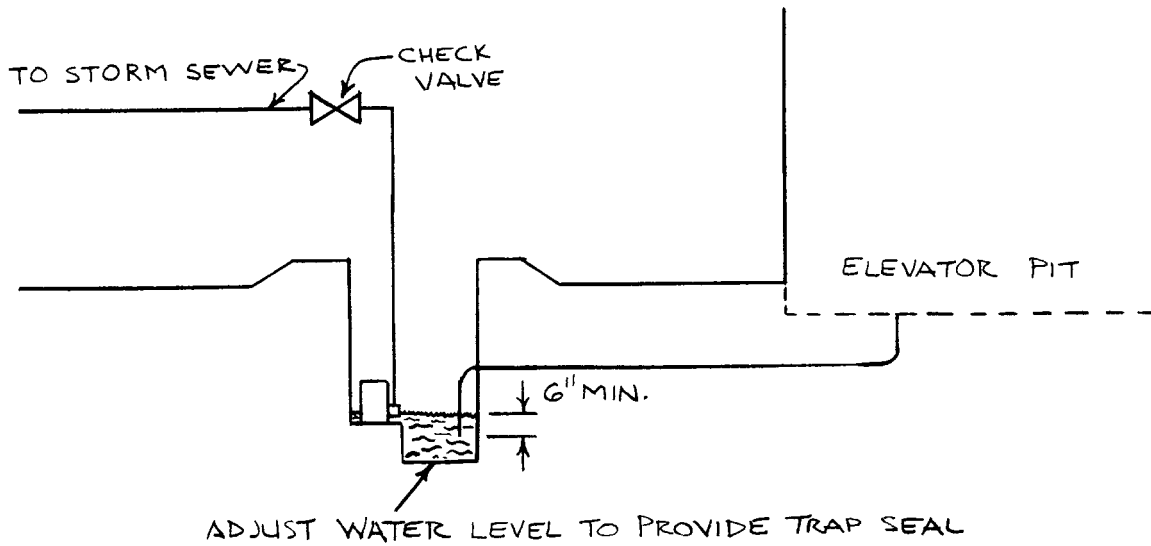
A-82.33 (9) (d) RESIDENTIAL-TYPE DISHWASHERS.



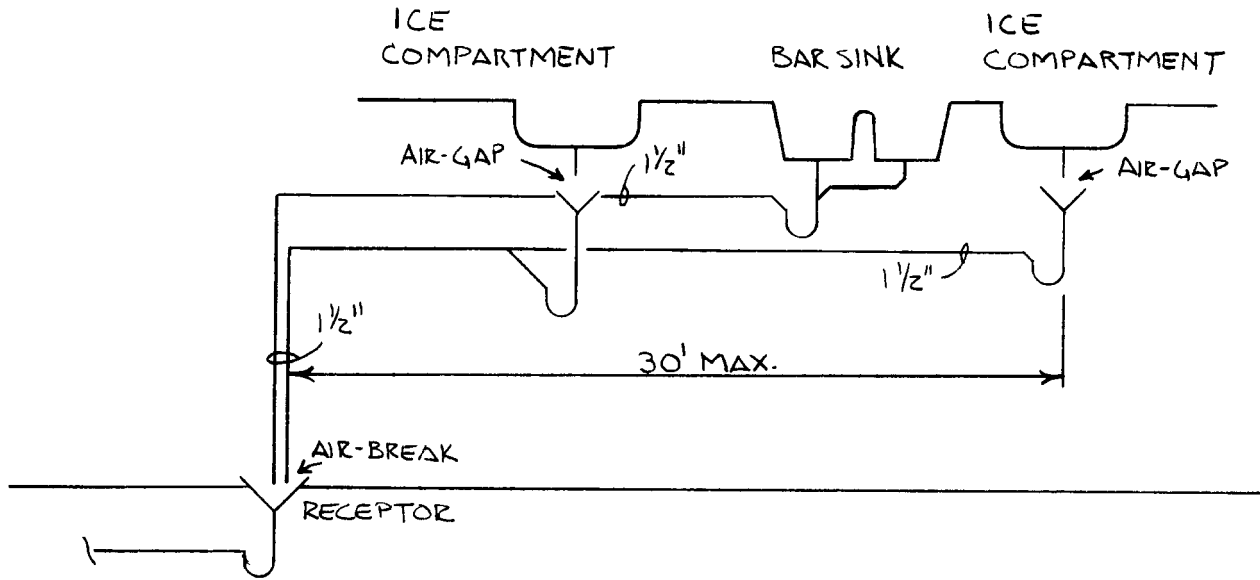
A-82.33 (9) (d) COMMERCIAL DISHWASHERS.



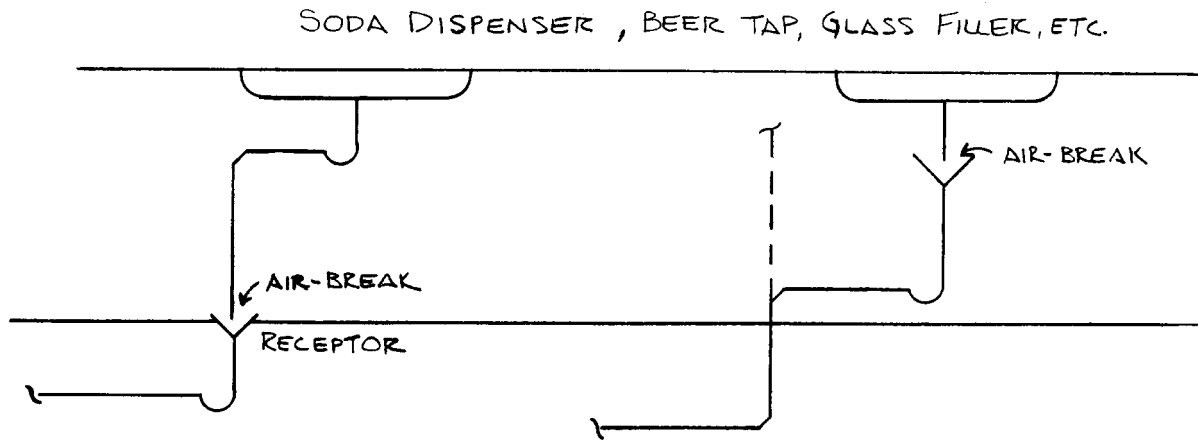
A-82.33 (9) (f) ELEVATOR PIT SUBSOIL AND FLOOR DRAINS.



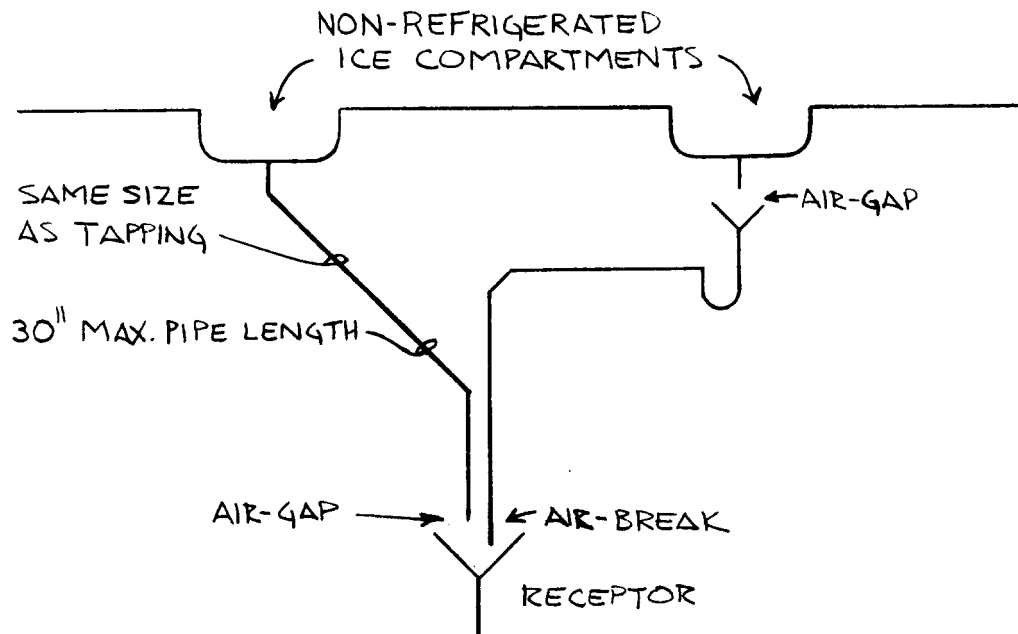
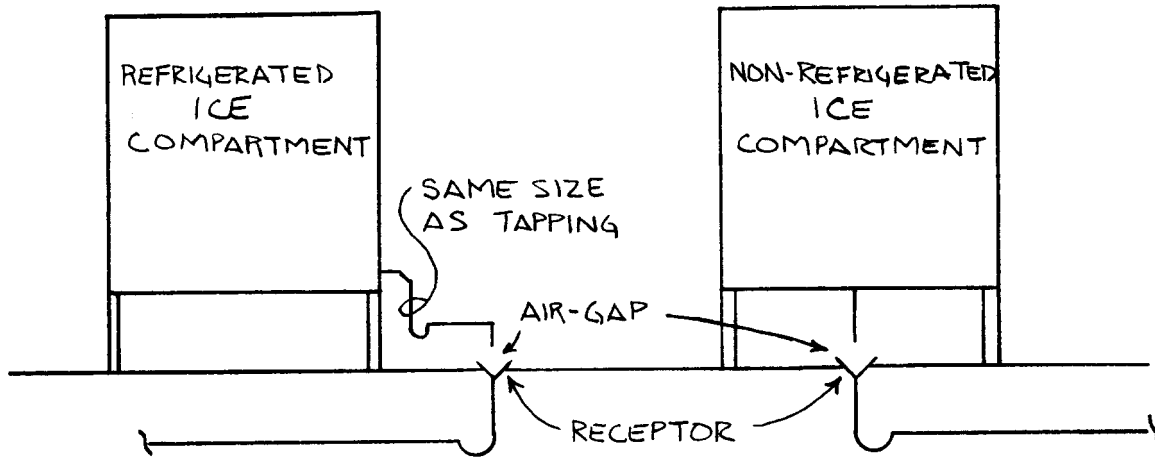
A-82.33 (9) (g) 1. BAR AND SODA FOUNTAIN SINKS.



A-82.33 (9) (g) 2. BEER TAPS, COFFEE MAKERS, GLASS FILLERS AND SODA DISPENSERS.

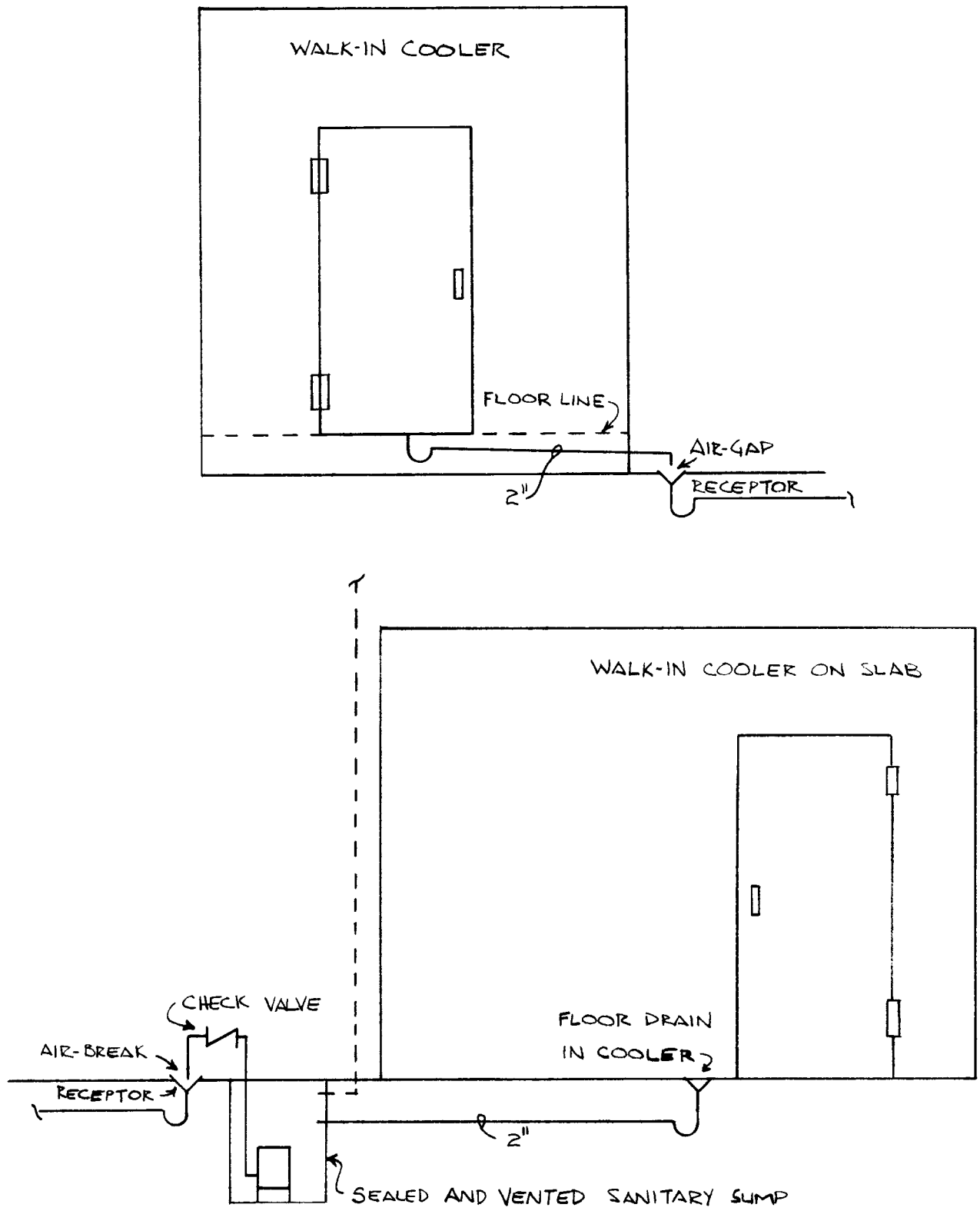


A-82.33 (9) (g) 3. NOVELTY BOXES, AND ICE COMPARTMENTS AND ICE CREAM DIPPER WELLS.

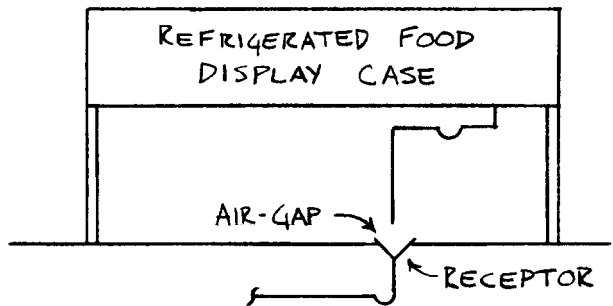
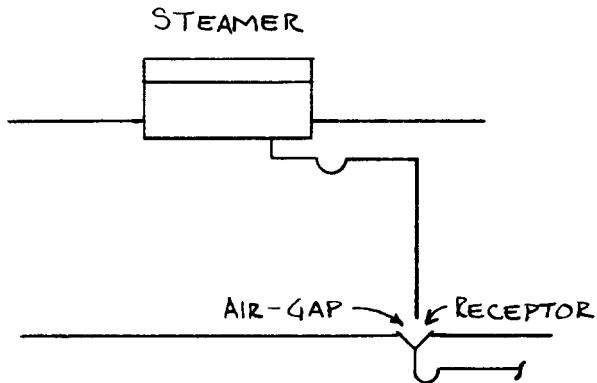
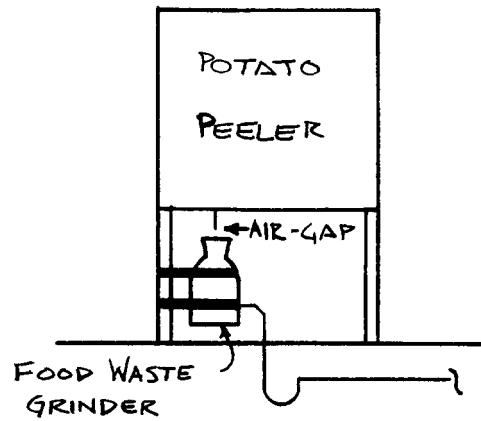
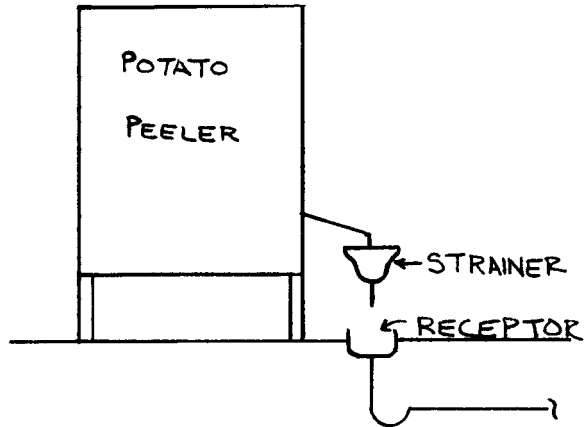




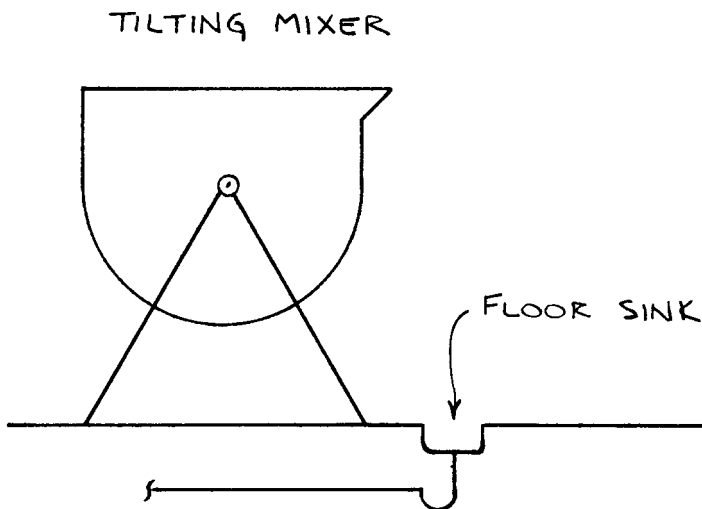
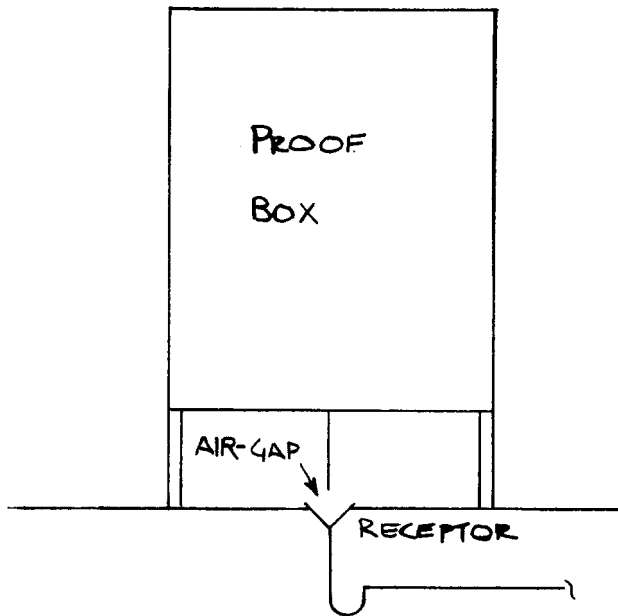
A-82.33 (9) (g) 4. REFRIGERATED FOOD STORAGE ROOMS, COMPARTMENTS, AND DISPLAY CASES.



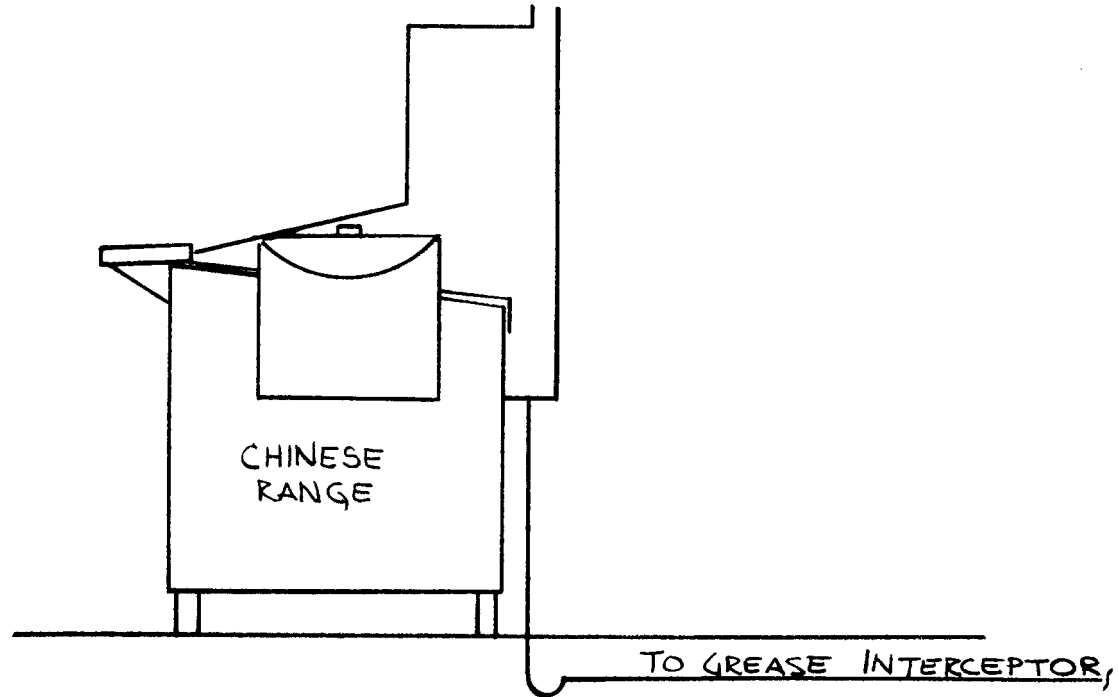
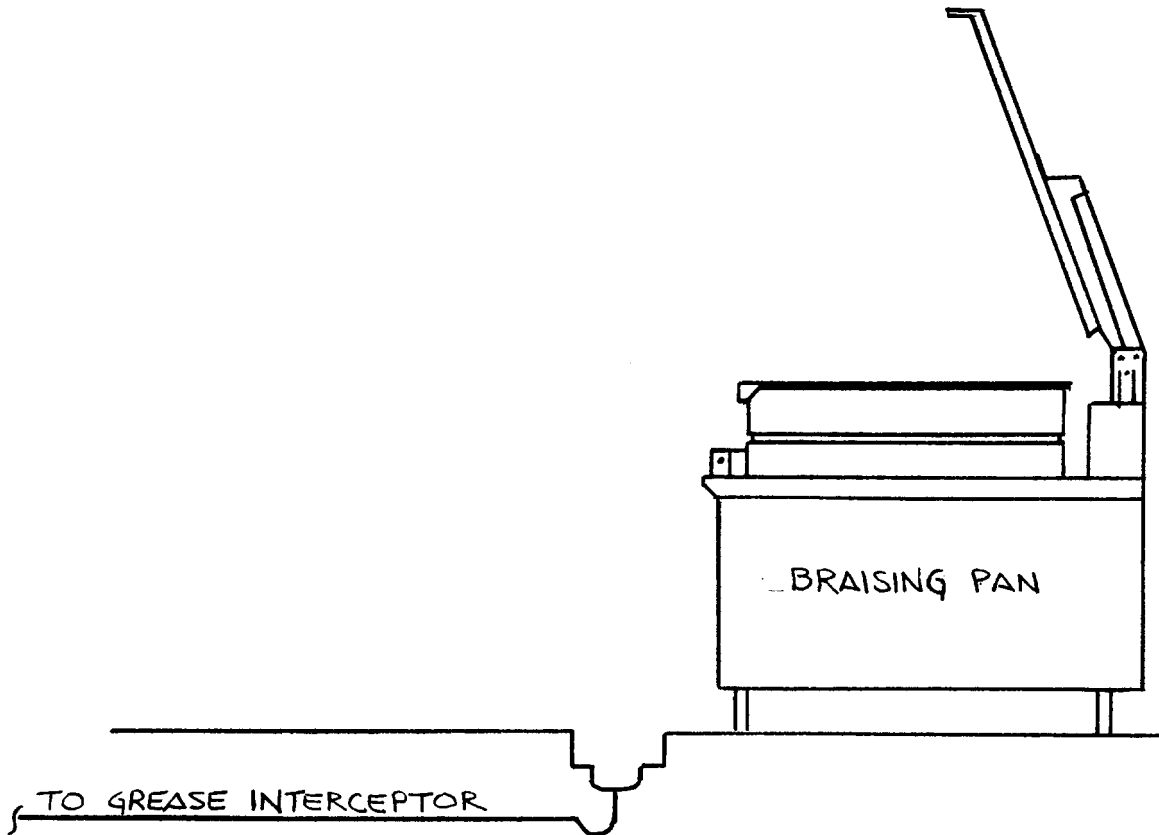
A-82.33 (9) (g) 5. MISCELLANEOUS FOOD HANDLING EQUIPMENT.



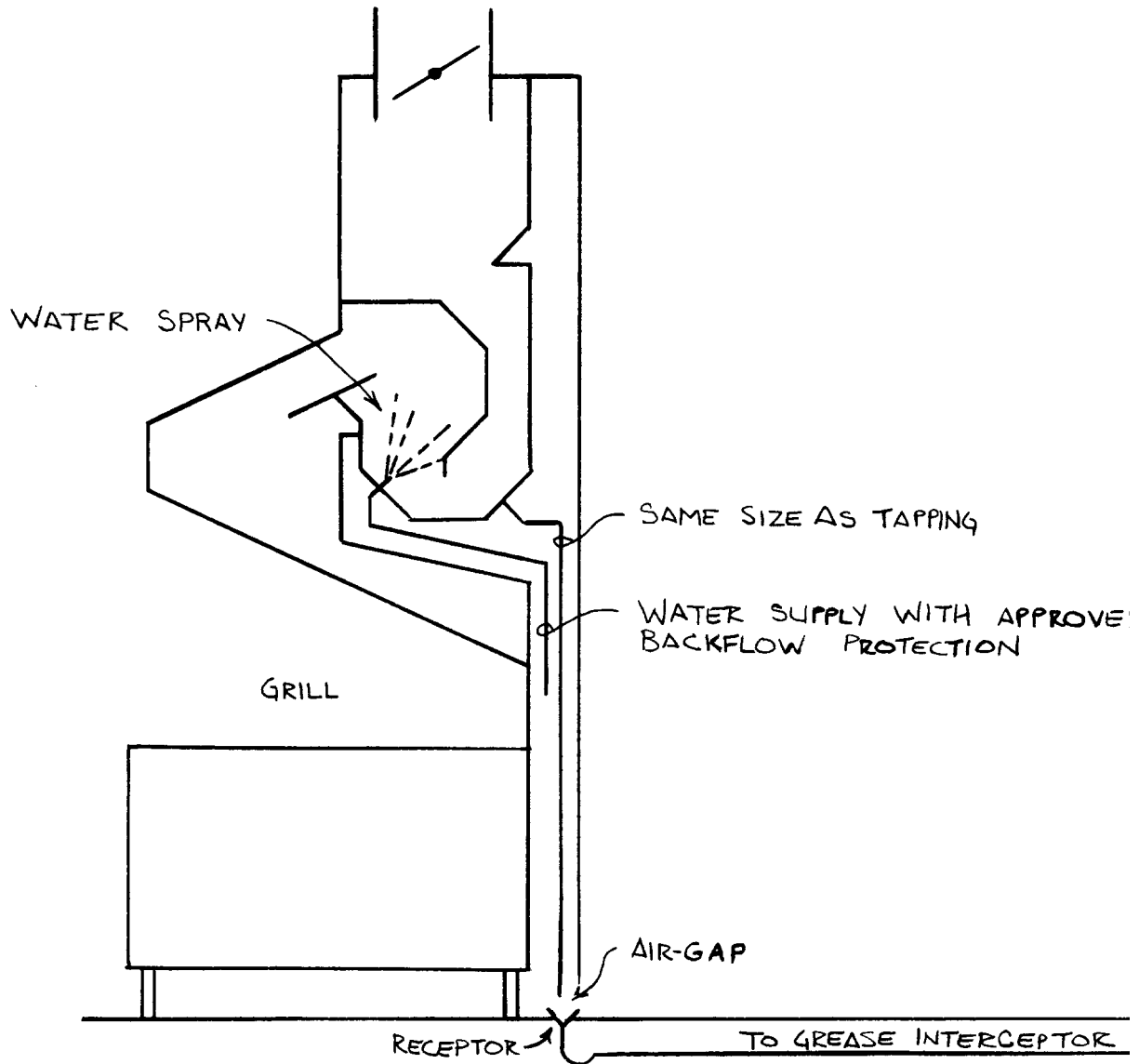
**A-82.33 (9) (g) 5. MISCELLANEOUS FOOD HANDLING EQUIPMENT.**



A-82.33 (9) (g) 5. MISCELLANEOUS FOOD HANDLING EQUIPMENT.



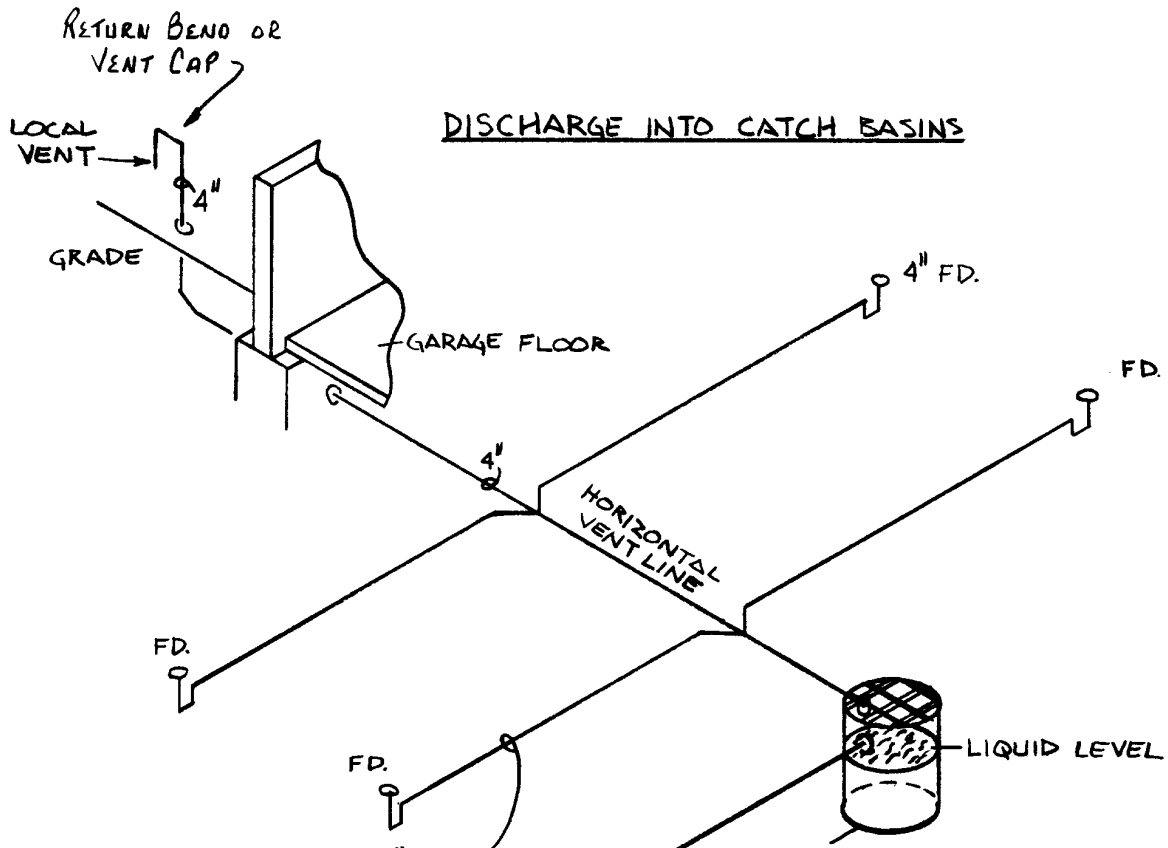
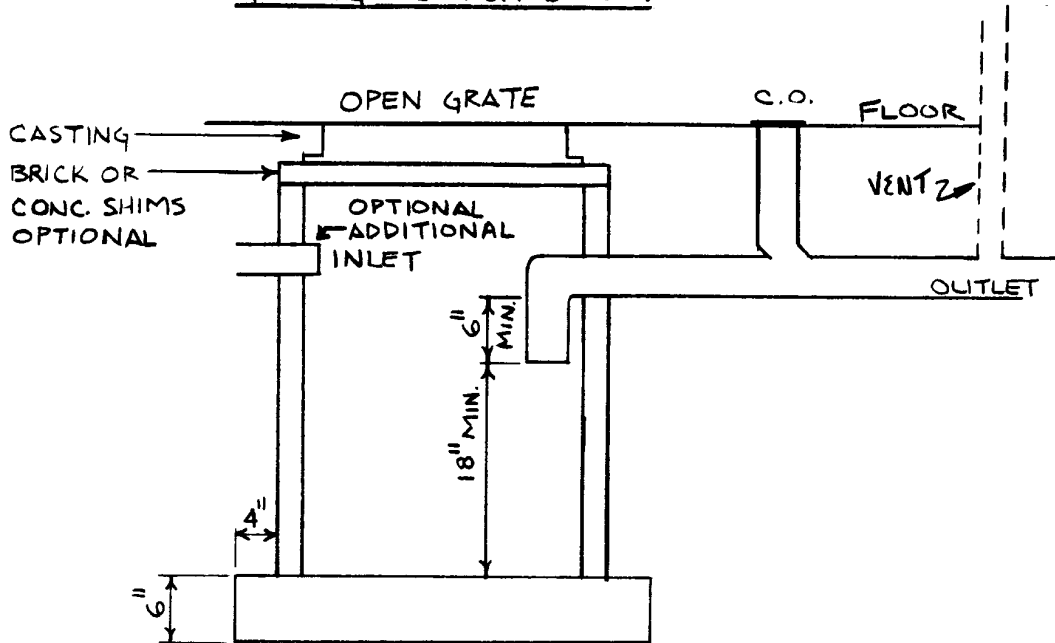
A-82.33 (9) (g) 5. MISCELLANEOUS FOOD HANDLING EQUIPMENT.



EXHAUST HOOD WASHER

A-82.34 (4) (a) PUBLIC BUILDINGS.

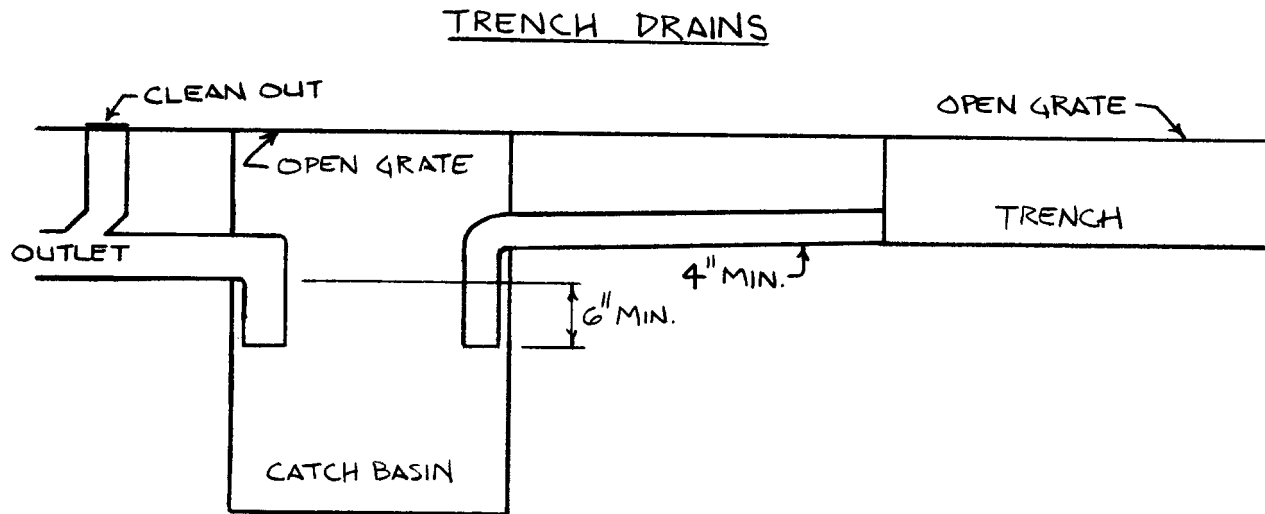
### GARAGE CATCH BASIN



**A-82.34 (4) (a) PUBLIC BUILDINGS.**

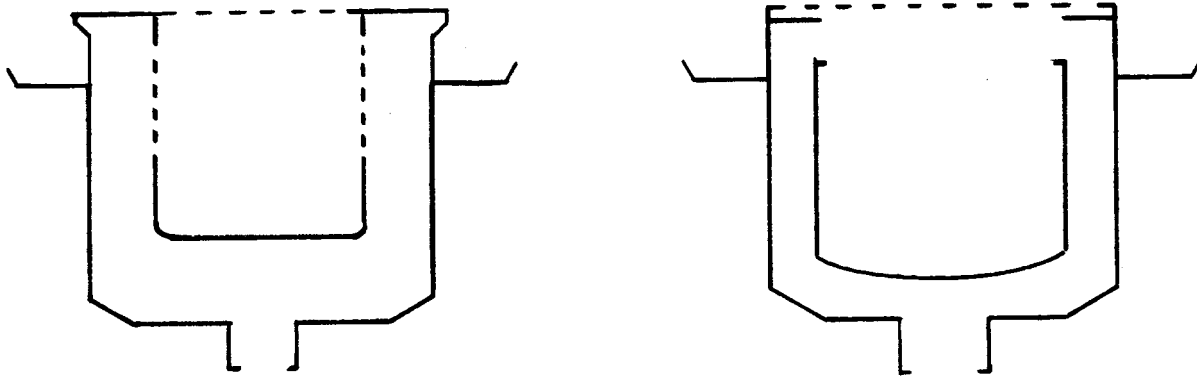
Diameter of Catch Basin	Volume in cubic feet per foot of depth	Diameter of Catch Basin	Volume in cubic feet per foot of depth
36	7.1	45	11.1
37	7.5	46	11.6
38	7.9	47	12.1
39	8.3	48	12.6
40	8.7	54	15.9
41	9.2	60	19.7
42	9.7	66	23.8
43	10.1	72	28.3
44	10.6	84	38.6

**A-82.34 (4) (a) PUBLIC BUILDINGS.**



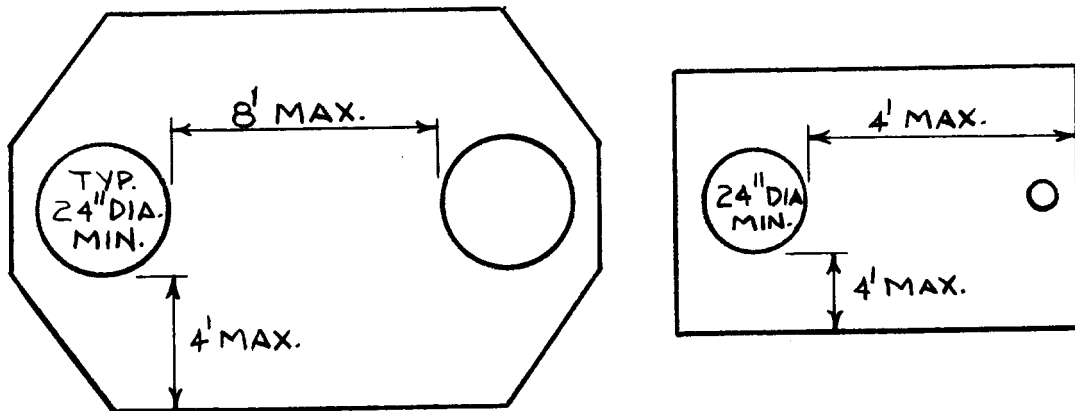
A-82.34 (4) (b) GARAGES FOR ONE- AND 2-FAMILY DWELLINGS.

TYPICAL FLOOR DRAIN WITH SOLID BOTTOM SEDIMENT BASKET



A-82.34 (5) (b) EXTERIOR GREASE INTERCEPTORS.

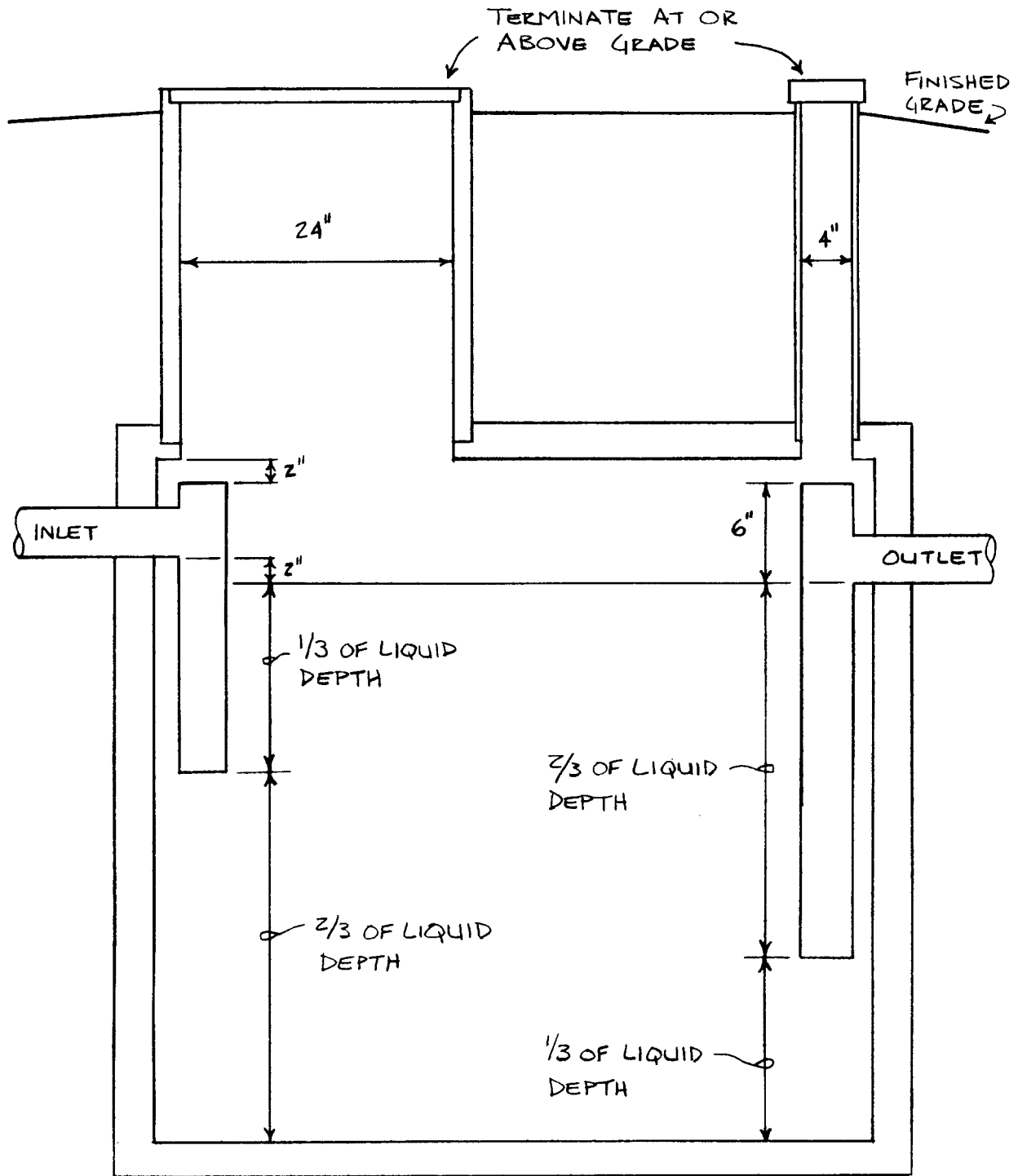
GREASE INTERCEPTOR MANHOLE LOCATION



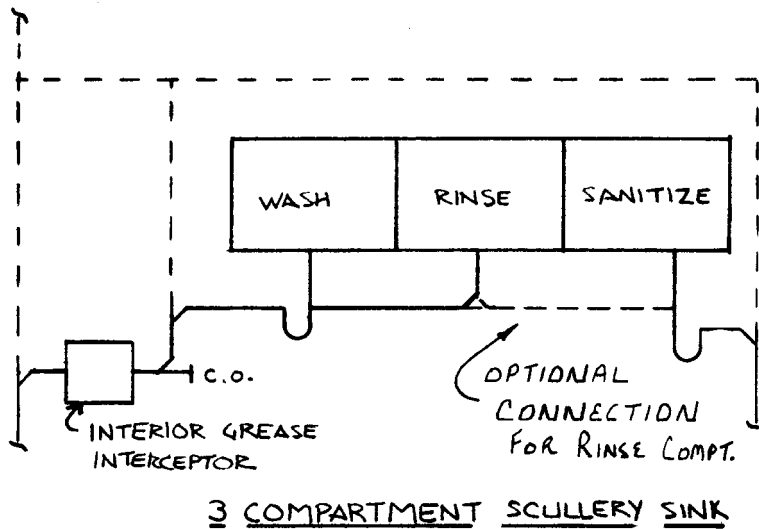
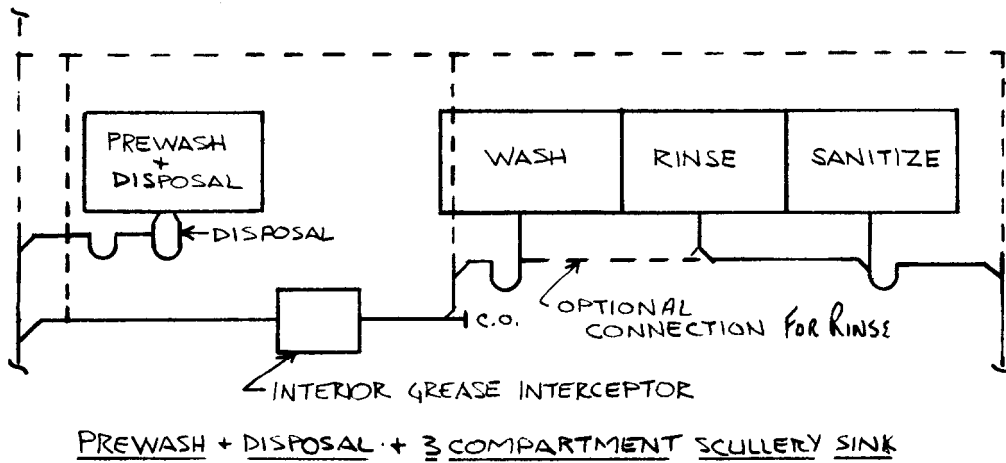
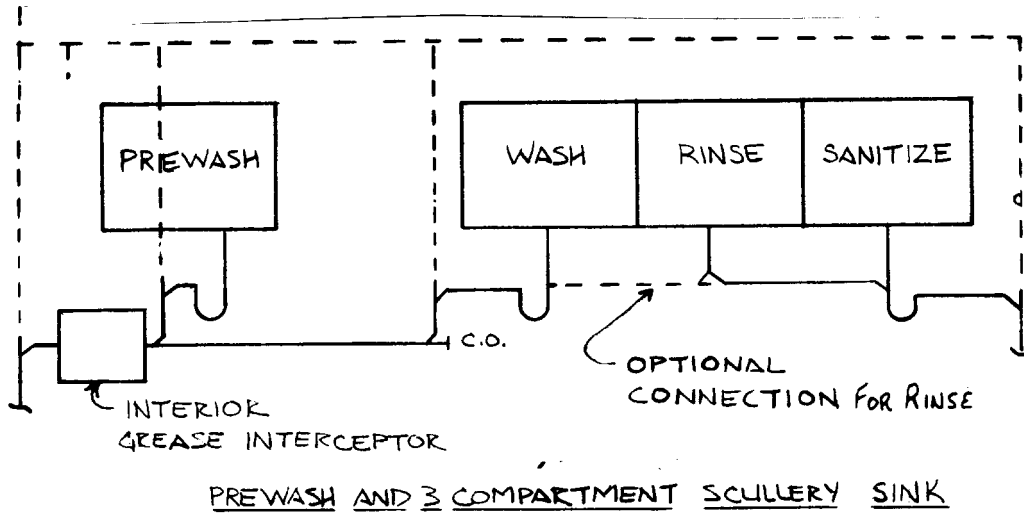


A-82.34 (5) (b) EXTERIOR GREASE INTERCEPTORS.

EXTERIOR GREASE INTERCEPTOR

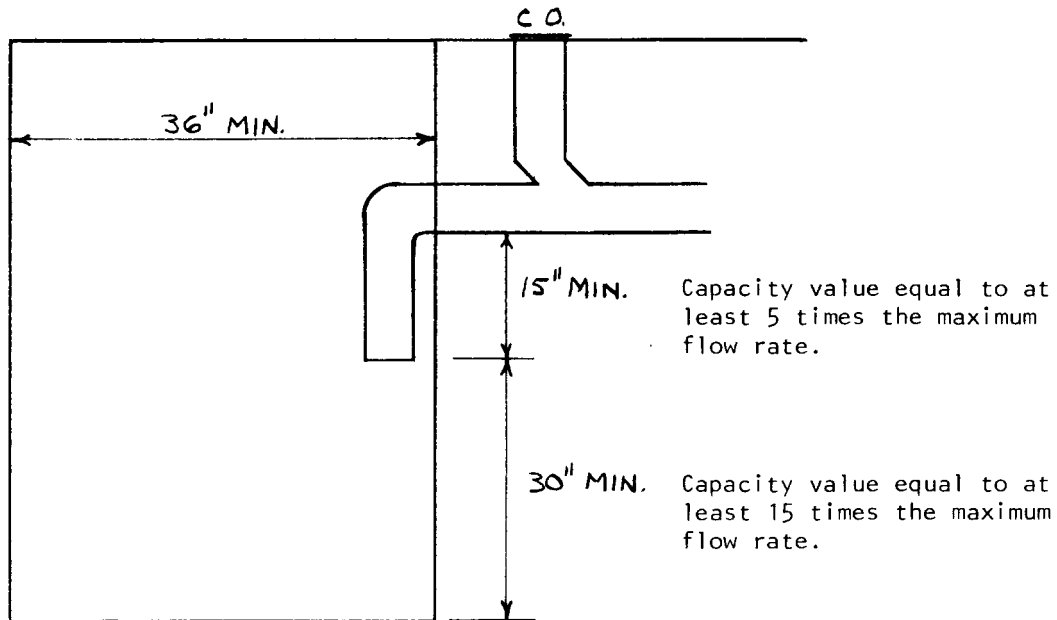


A-82.34 (5) (c) INTERIOR GREASE INTERCEPTORS.

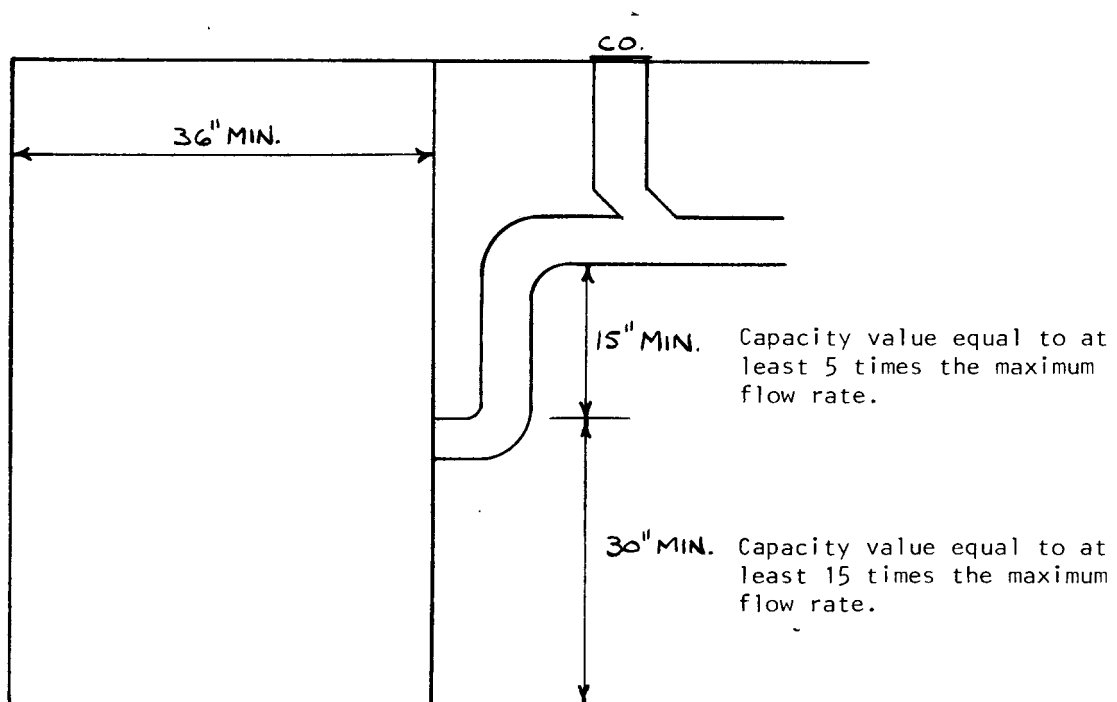


Note: Rinse and sanitize compartments and garbage disposals may discharge through interior grease interceptors.

A-82.34 (6) AUTOMATIC CAR WASHES.



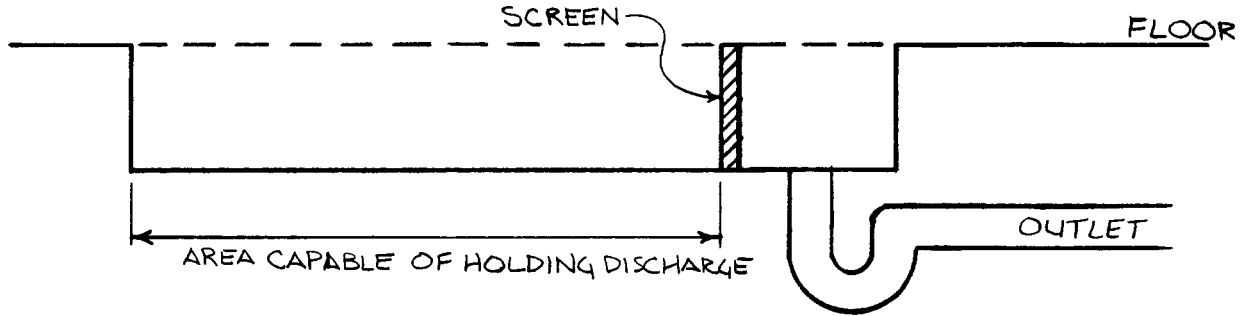
CAR WASH INTERCEPTOR WITH INVERT INSIDE OF BASIN



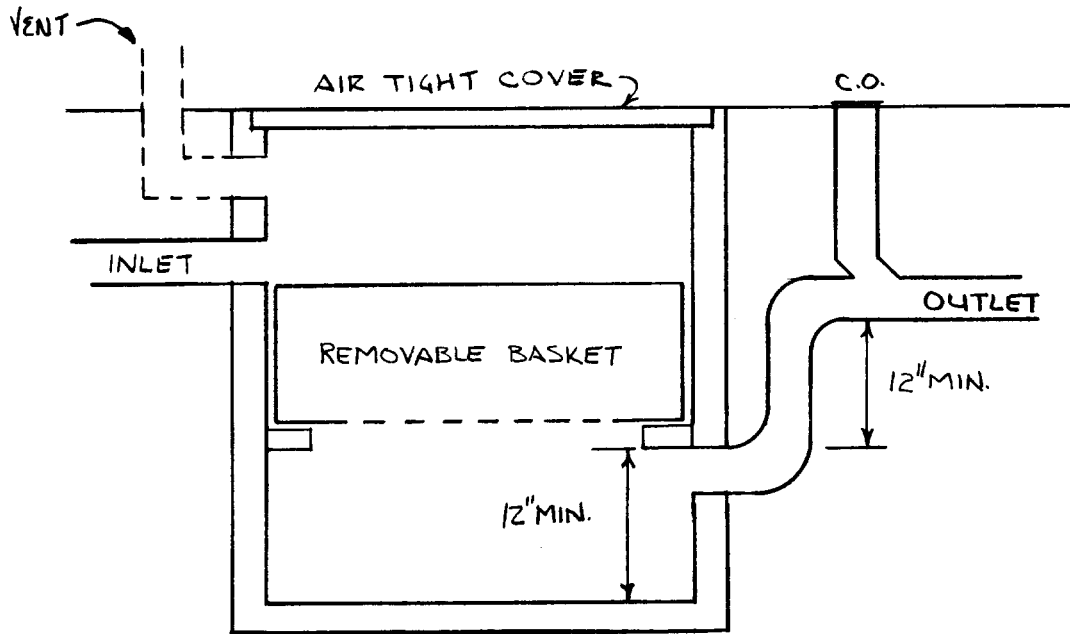
CAR WASH INTERCEPTOR WITH INVERT OUTSIDE OF BASIN

A-82.34 (7) COMMERCIAL LAUNDRIES.

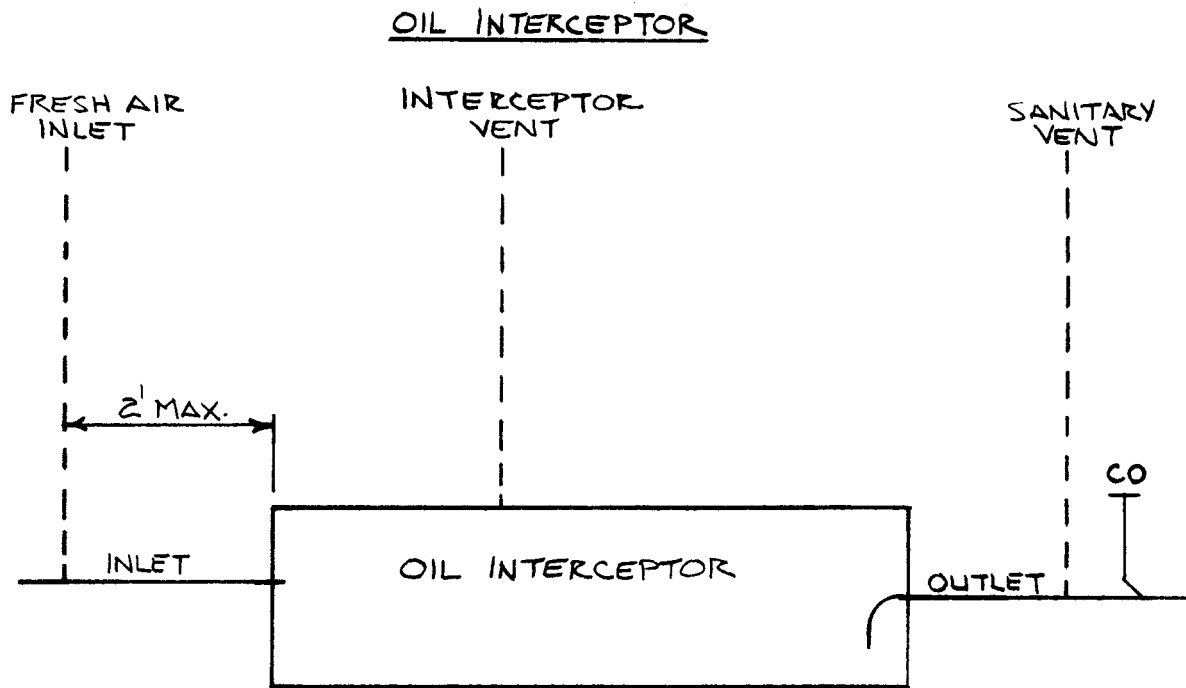
TRENCH TYPE LAUNDRY INTERCEPTOR



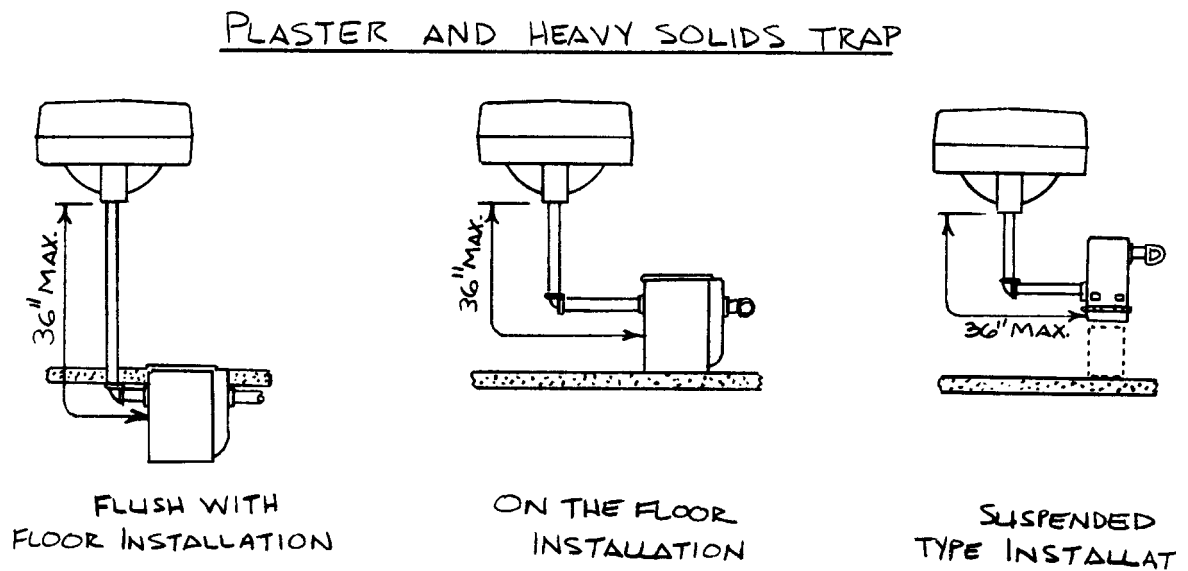
IN-LINE LAUNDRY INTERCEPTOR



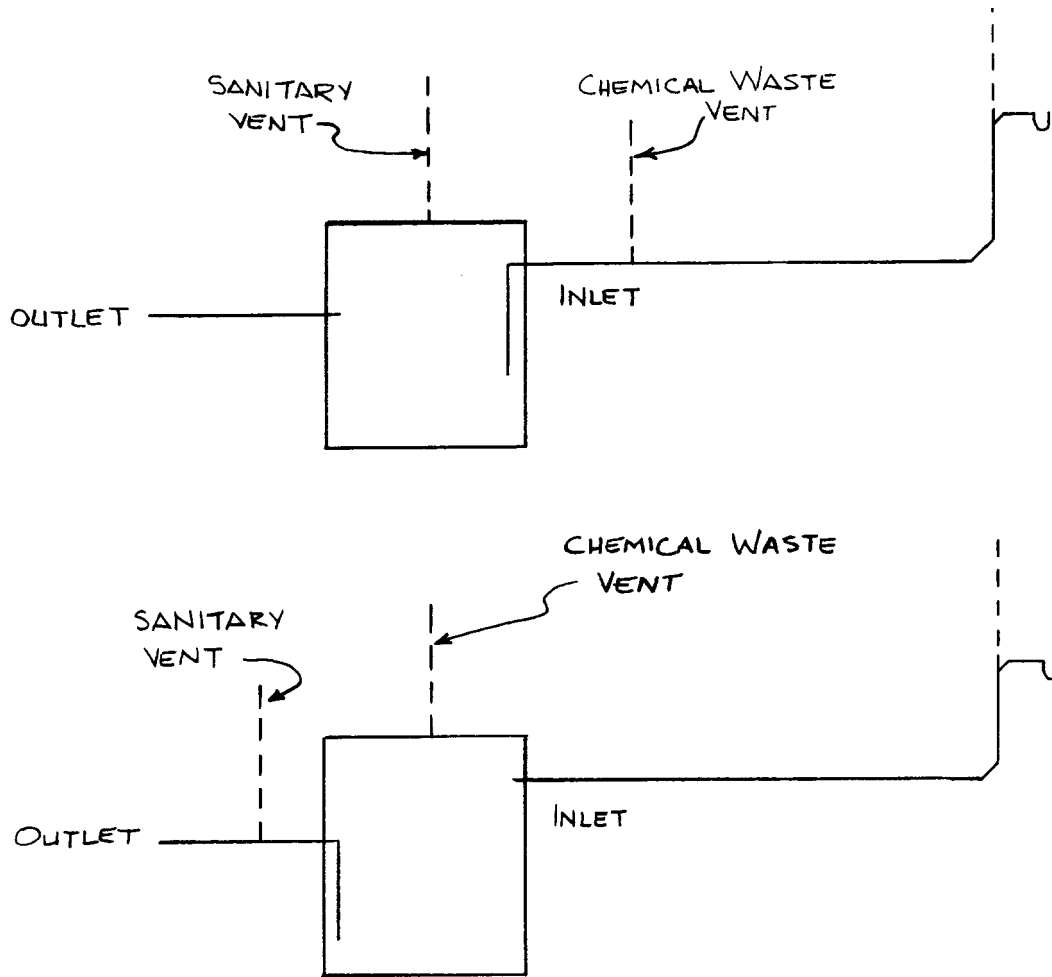
A-82.34 (8) OIL AND FLAMMABLE LIQUIDS.



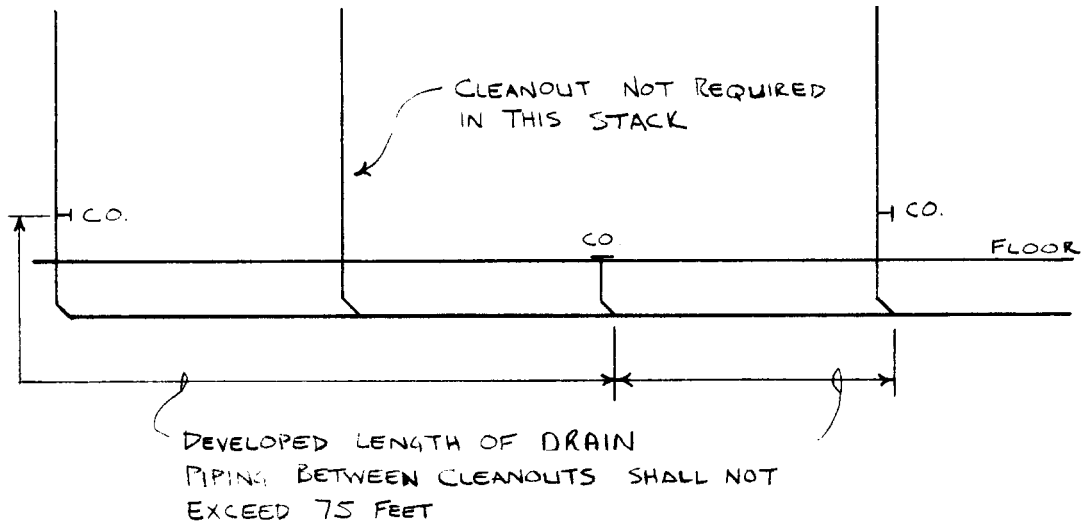
A-82.34 (13) PLASTER AND HEAVY SOLIDS TRAP TYPE INTERCEPTORS.



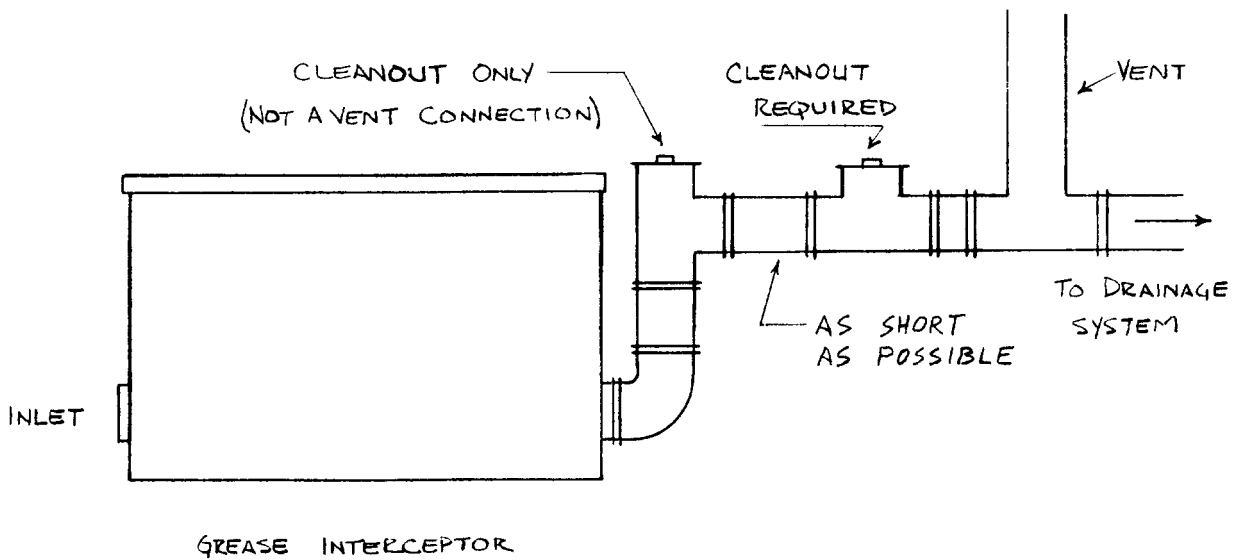
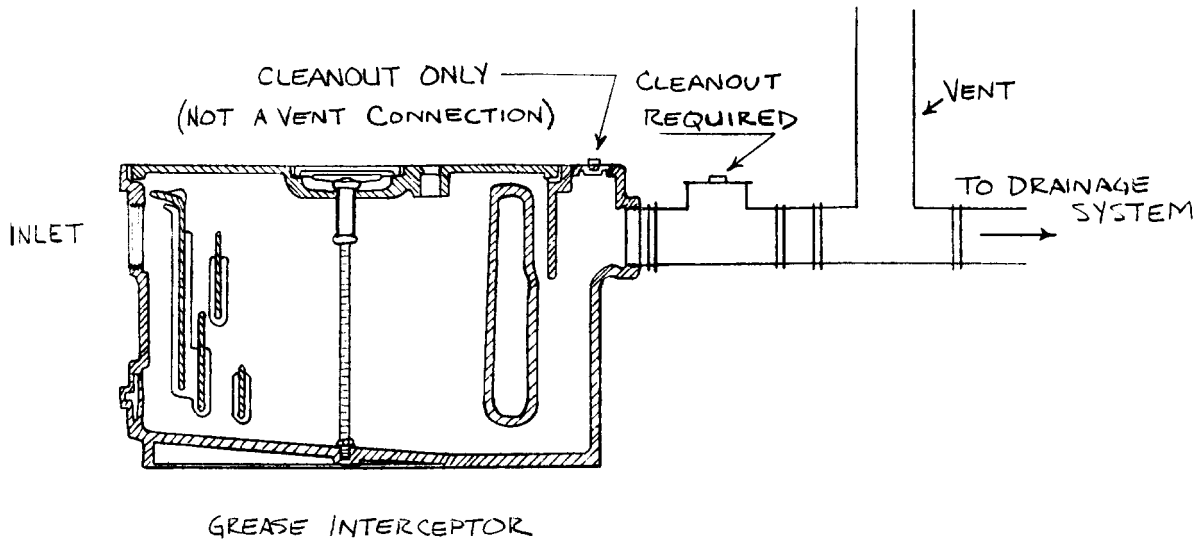
A-82.34 (14) CHEMICAL DILUTION AND NEUTRALIZING BASINS.



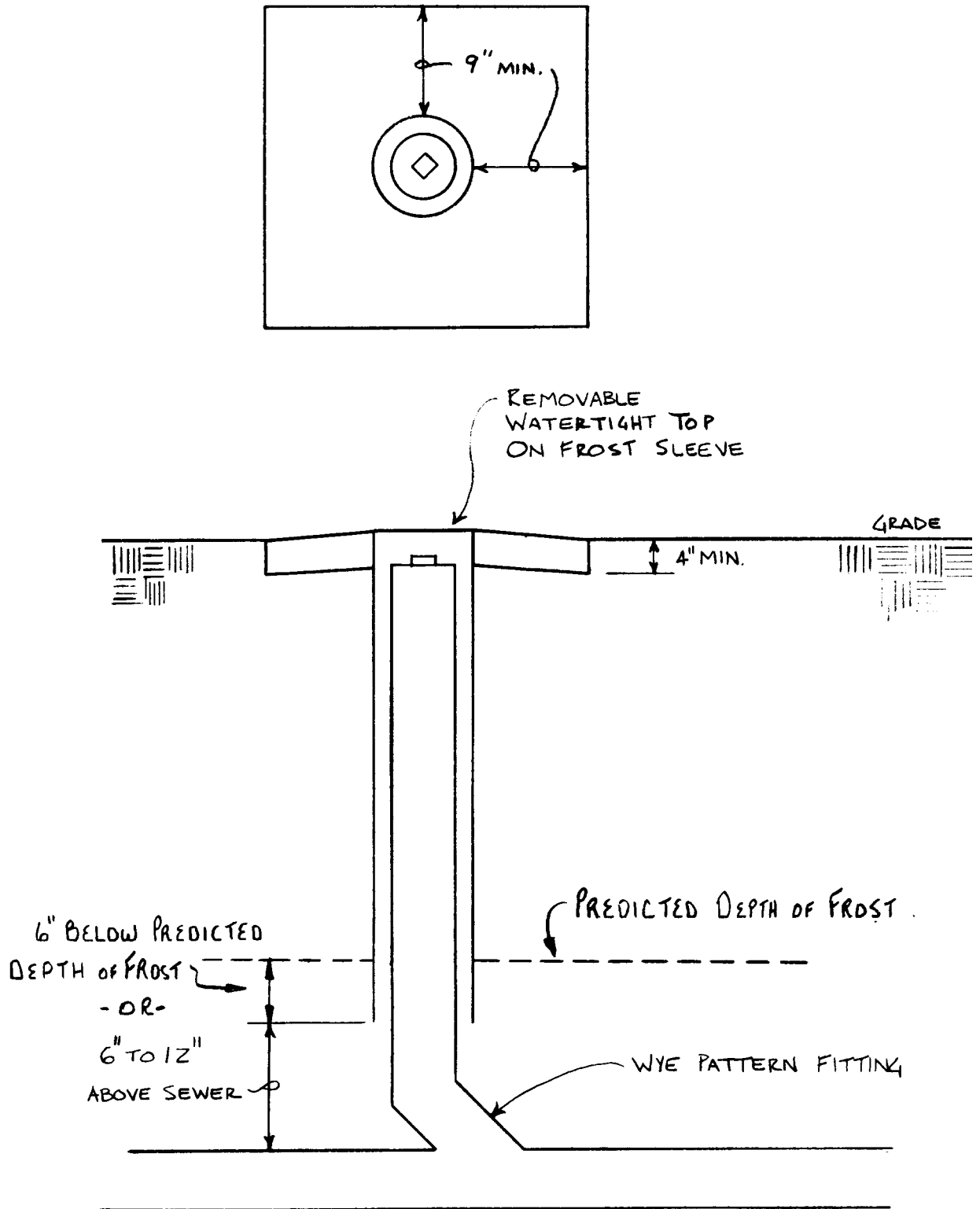
A-82.35 (3) CLEANOUTS SERVING HORIZONTAL DRAINS WITHIN OR UNDER A BUILDING.



A-82.35 (3) CLEANOUTS SERVING HORIZONTAL DRAINS.

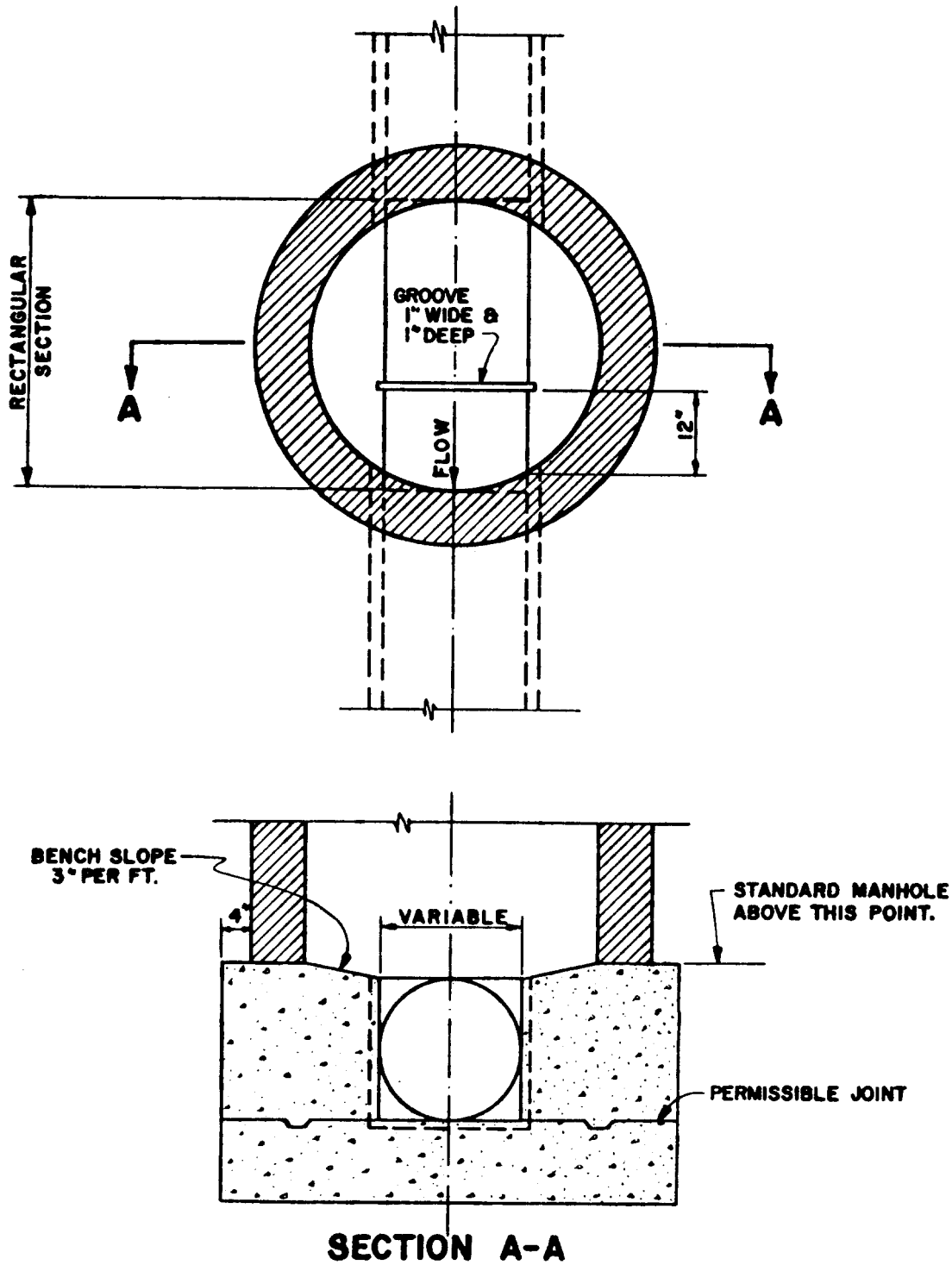


A-82.35 (5) (a) CLEANOUT EXTENSION TO GRADE.



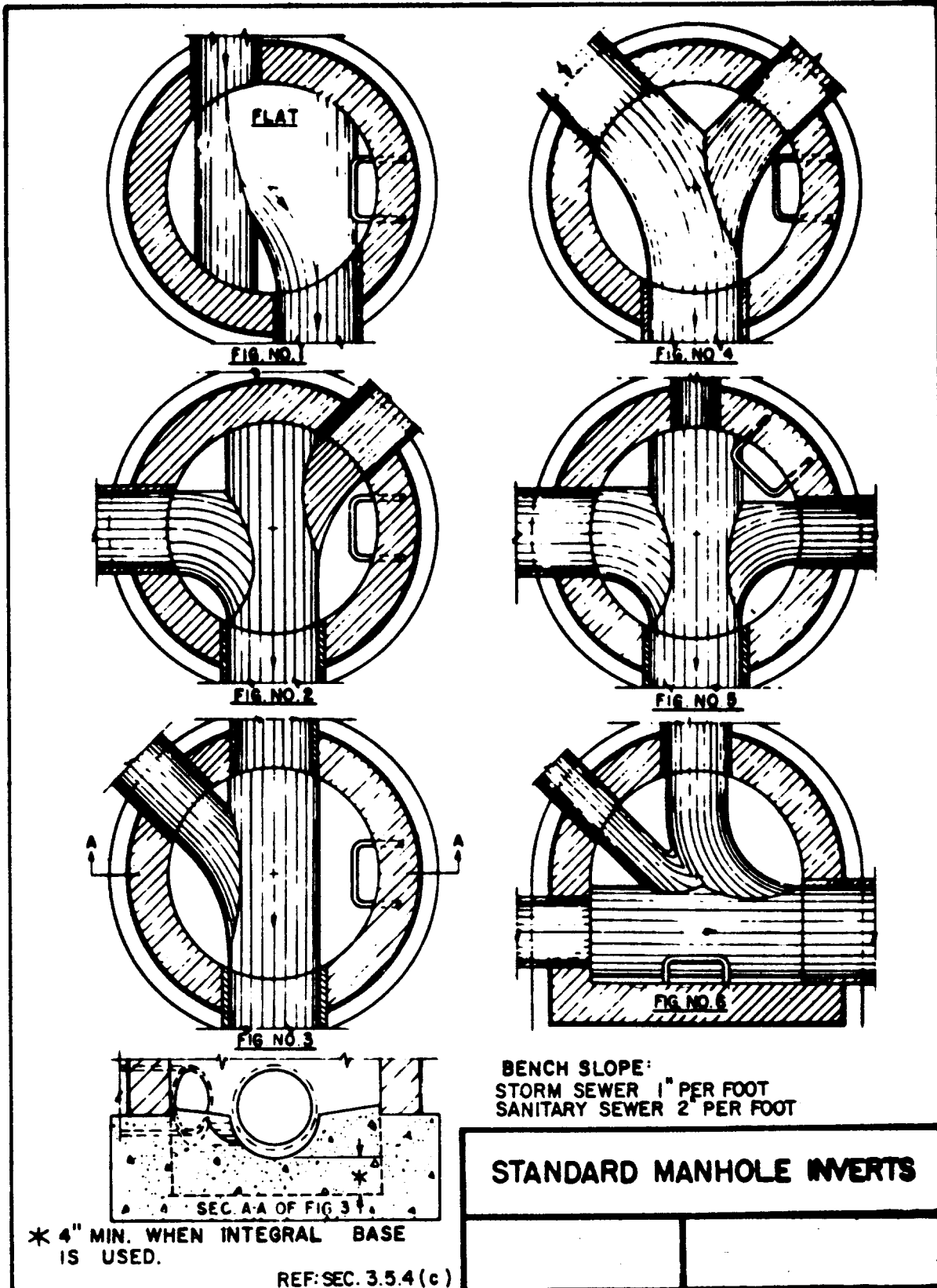


A-82.35 (8) MANHOLES.

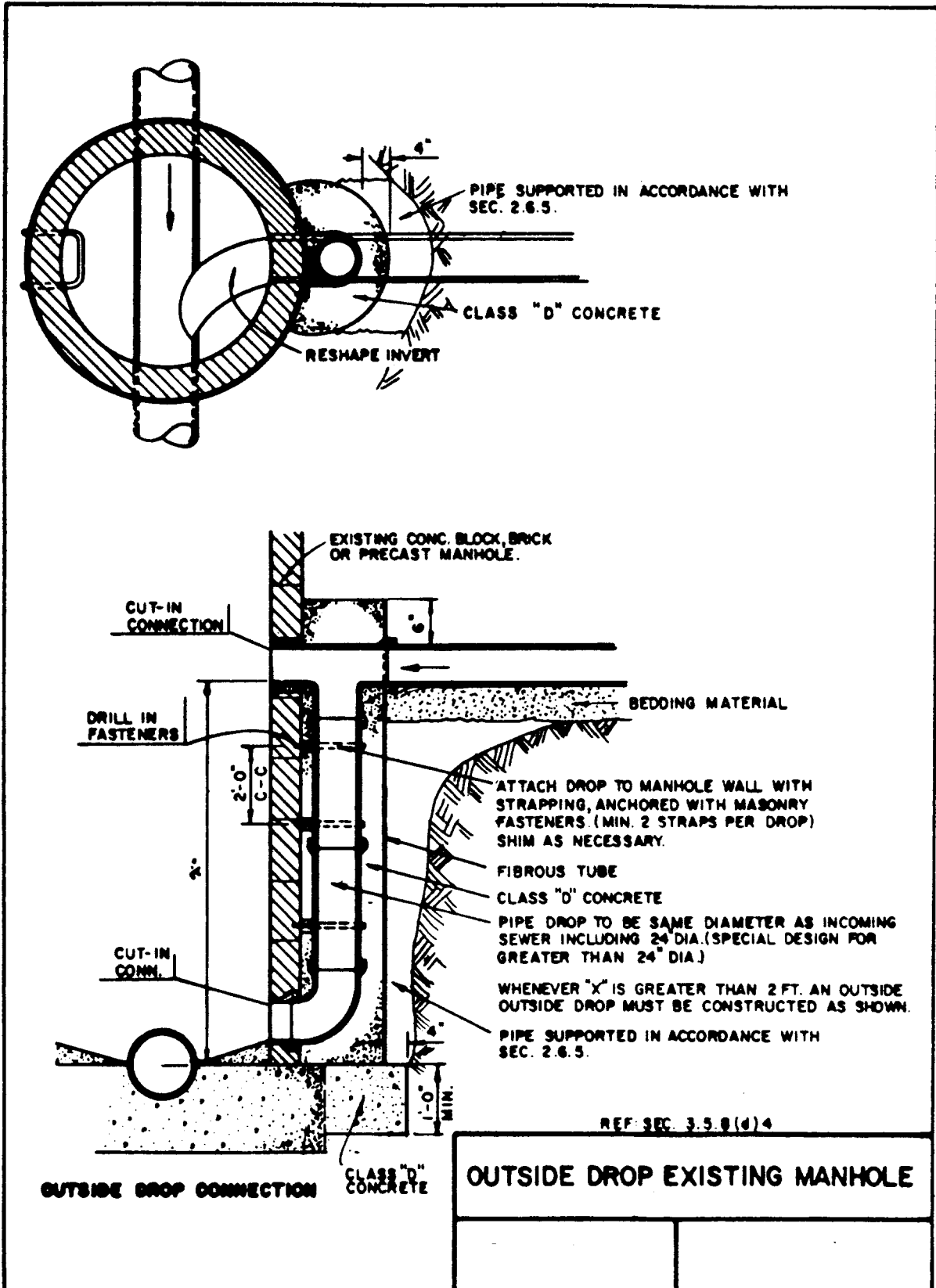


**DETAIL OF SAMPLING MANHOLE**

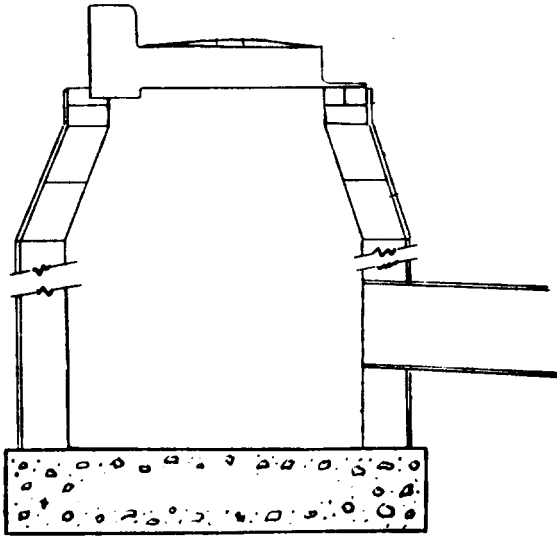
A-82.35 (8) MANHOLES.



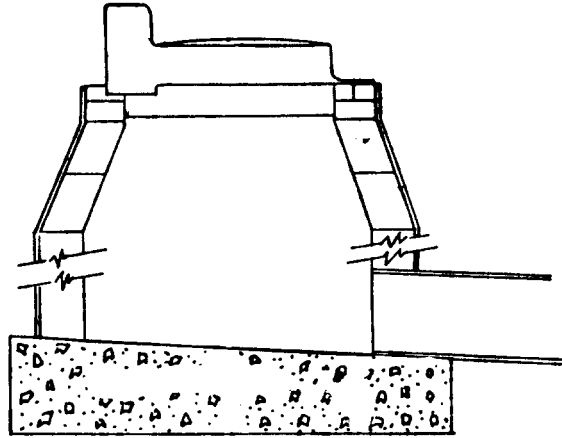
A-82.35 (8) MANHOLES.



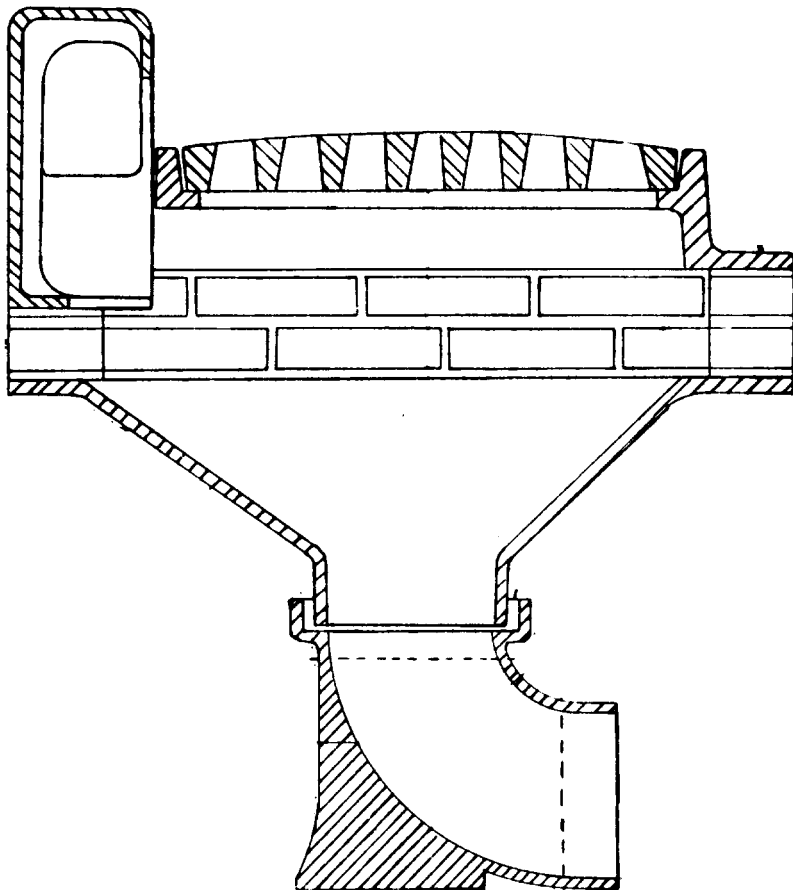
A-82.36 (17) AREA DRAIN INLETS.



**STANDARD STORM WATER  
CATCH BASIN (MASONRY)**

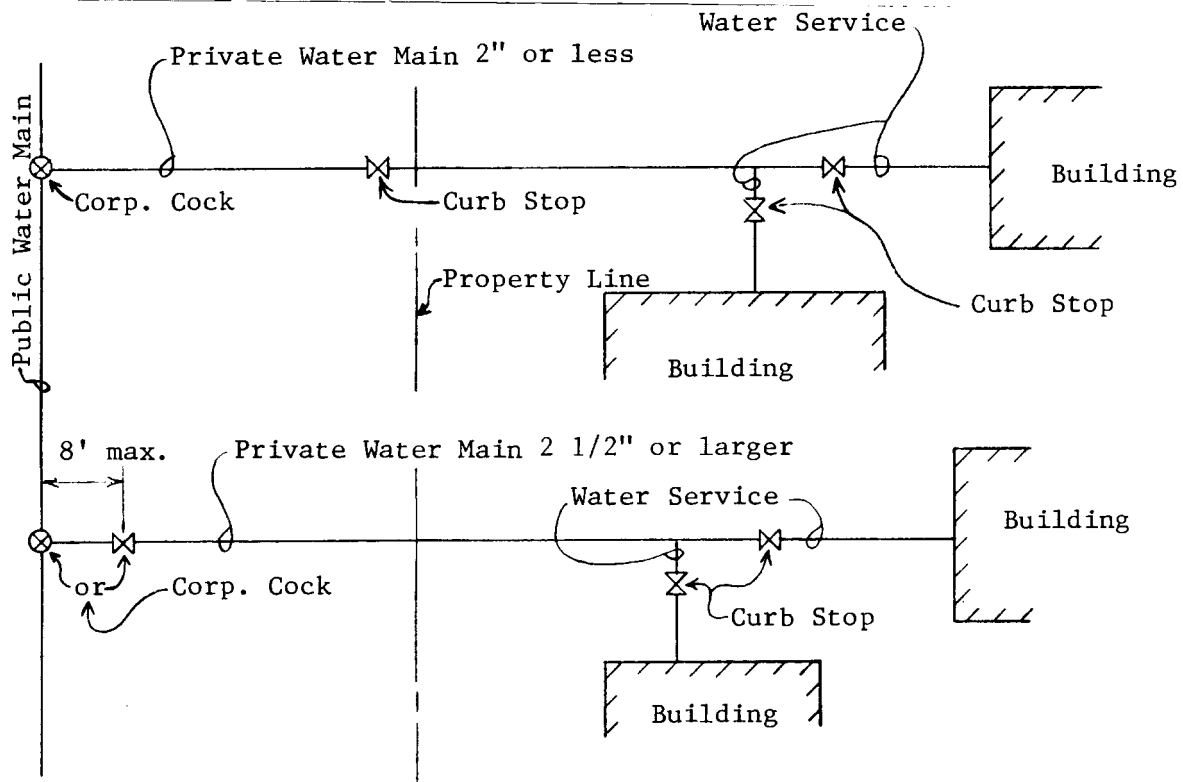


**STANDARD STORM WATER  
INLET (MASONRY)**

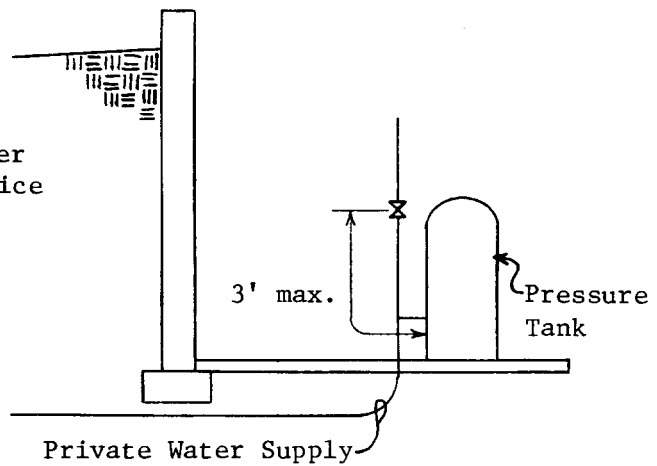
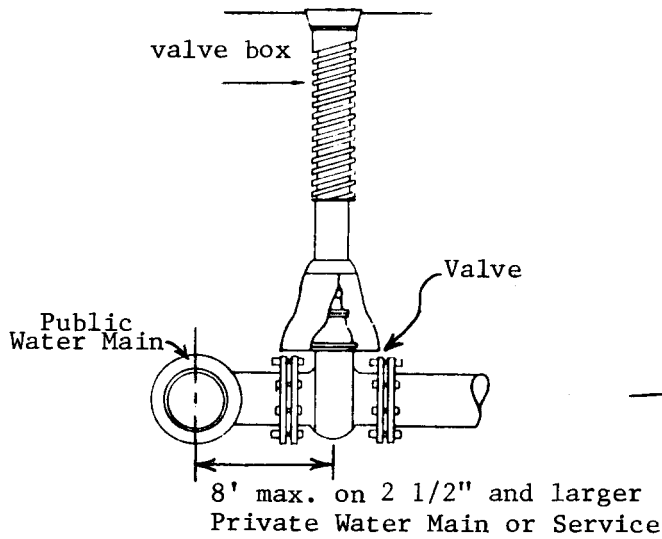
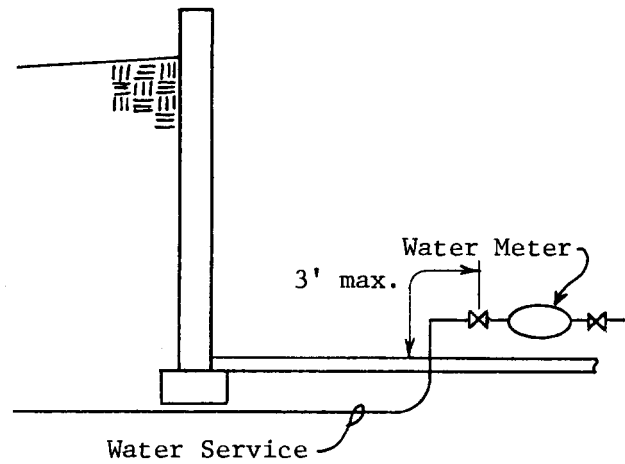
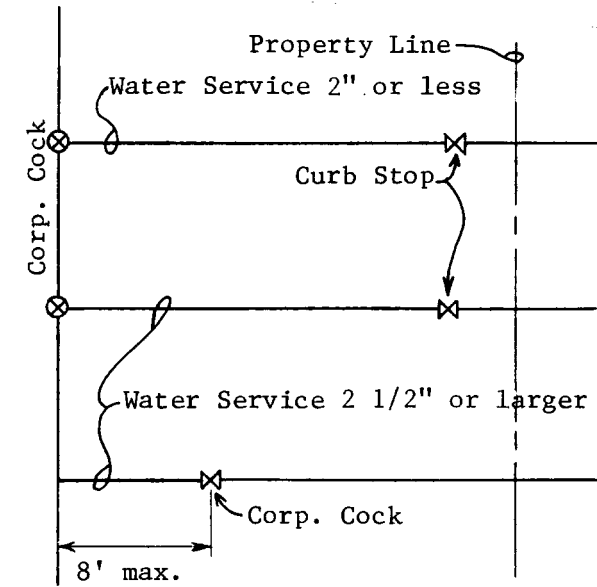


**CAST IRON STORM  
WATER INLET**

A-82.40 (4) CONTROL VALVES.



A-82.40 (4) (b) WATER SERVICES.



**A-82.40 (5) PIPING INSULATION.** The following is a reprint of s. Comm 63.1029 (1) and (2) and Table 63.1029.

**Comm 63.1029 Insulation, materials and construction.** (1) GENERAL. Insulation required by subs. (2) and (3) shall be suitably protected from damage. Insulation shall be installed in accordance with practices acceptable to the department. The department accepts MICA Commercial and Industrial Insulation Standards as an insulation installation practice.

(2) PIPING INSULATION. Except as provided in pars. (a) to (c), recirculating plumbing system piping, plumbing piping in the first 8 feet from storage tanks for noncirculating systems, any piping served by a self-regulating electric heating cable, HVAC system piping, and related HVAC fluid conveying conduit, such as heat exchanger bodies, shall be thermally insulated in accordance with Table 63.1029 or equivalent. The following piping or conduit is exempted from this subsection:

- (a) Factory-installed piping or conduit within HVAC equipment tested and rated in accordance with s. Comm 63.1020;
- (b) Piping or conduit for which no insulation is specified in Table 63.1029.
- (c) Where it can be shown that the heat gain or heat loss to or from piping or conduit without insulation will not increase building energy use.

**Table 63.1029  
Plumbing and HVAC Piping Minimum Insulation [in. <sup>a</sup> (R-value)]**

Fluid Design Operating Temp. Range, °F	Insulation Conductivity <sup>a</sup>		Nominal Pipe Diameter [in. (R-value)]					
	Conductivity Range Btu in./ (h ft <sup>2</sup> °F)	Mean Rating Temp. °F	Runouts <sup>b</sup> up to 2	1 and less	1-1/4 to 2	2-1/2 to 4	5 & 6	8 & up
<b>Heating systems (Steam, Steam Condensate, and Hot Water)</b>								
Above 350	0.32-0.34	250	1.5(R-4.4)	1.5(R-4.4)	2.5(R-7.4)	3.0(R-8.8)	3.5(R-10.3)	3.5(R-10.3)
251-350	0.29-0.31	200	1.5(R-4.8)	1.5(R-4.8)	2.5(R-8.1)	2.5(R-8.1)	3.5(R-11.3)	3.5(R-11.3)
201-250	0.27-0.30	150	1.0(R-3.3)	1.0(R-3.3)	1.5(R-5.0)	2.0(R-6.7)	2.0(R-6.7)	3.5(R-11.7)
141-200	0.25-0.29	125	0.5(R-1.8)	0.5(R-1.8)	1.5(R-5.2)	1.5(R-5.2)	1.5(R-5.2)	1.5(R-5.2)
105-140	0.24-0.28	100	0.5(R-1.8)	0.5(R-1.8)	1.0(R-3.6)	1.0(R-3.6)	1.0(R-3.6)	1.5(R-5.4)
<b>Domestic and Service Hot Water systems<sup>c</sup></b>								
105 and greater	0.24-0.28	100	0.5(R-1.8)	1.0(R-3.6)	1.0(R-3.6)	1.5(R-5.4)	1.5(R-5.4)	1.5(R-5.4)
<b>Cooling systems (Chilled water, brine, and refrigerant)<sup>d</sup></b>								
40-55	0.23-0.27	75	0.5(R-1.9)	0.5(R-1.9)	0.75(R-2.8)	1.0(R-3.7)	1.0(R-3.7)	1.0(R-3.7)
Below 40	0.23-0.27	75	1.0(R-3.7)	1.0(R-3.7)	1.5(R-5.6)	1.5(R-5.6)	1.5(R-5.6)	1.5(R-5.6)

<sup>a</sup> For insulation outside the state conductivity range, the minimum thickness (T) shall be determined as follows:  $T = PR [(1 + t/PR) K/k - 1]$ , where T = minimum insulation thickness for material with conductivity K, in.; PR = actual outside radius of pipe, in.; t = insulation thickness, in.; K = conductivity of alternate material at mean rating temperature indicated for the applicable fluid temperature; and k = the lower value of the conductivity range listed for the applicable fluid temperature.

<sup>b</sup> Runouts to individual terminal units not exceeding 12 ft. in length.

<sup>c</sup> Applies to recirculating sections of service or domestic hot water systems and first 8 ft. from storage tank for nonrecirculating systems.

<sup>d</sup> The required minimum thickness does not consider water vapor transmission and condensation.

**A-82.40 (7) (a) METHODOLOGY.**

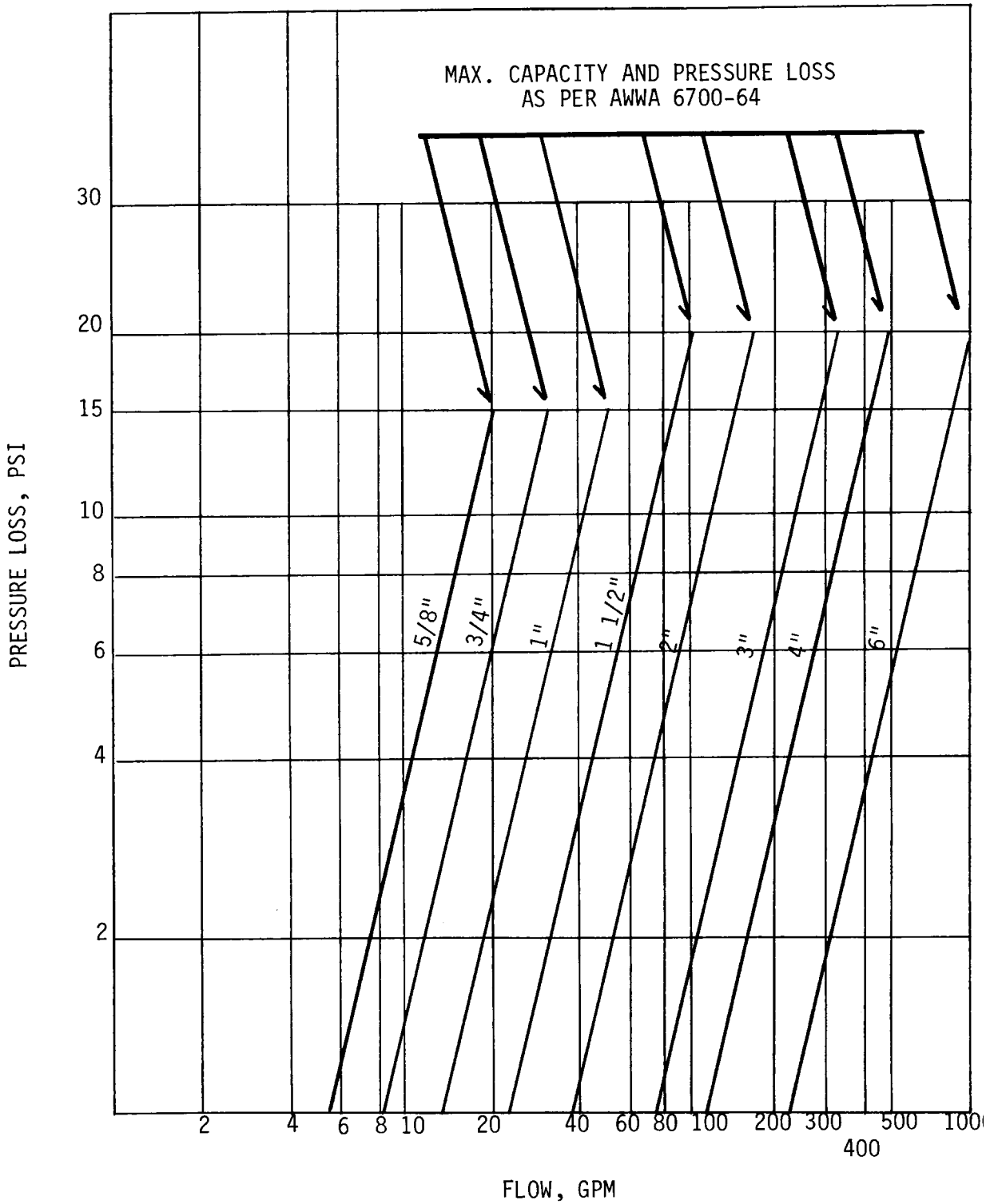
Where equipment such as an instantaneous or tankless water heater, water treatment device, water meter, and backflow preventer is provided in the design, the friction loss in such equipment, corresponding to the GPM demand, should be determined from the manufacturer or other reliable source.

Where a direct fired pressurized tank type water heater is provided in the design, the friction loss for such equipment can be assumed as part of the pressure losses due to flow through piping, fittings, valves and other plumbing appurtenances when the developed length of piping is multiplied by 1.5.

The pressure losses due to flow friction through displacement type cold-water meters may be calculated from Graph A-82.40 (7)-1.

Graph A-82.40 (7) - 1

PRESSURE LOSS IN COLD-WATER METERS, DISPLACEMENT TYPE





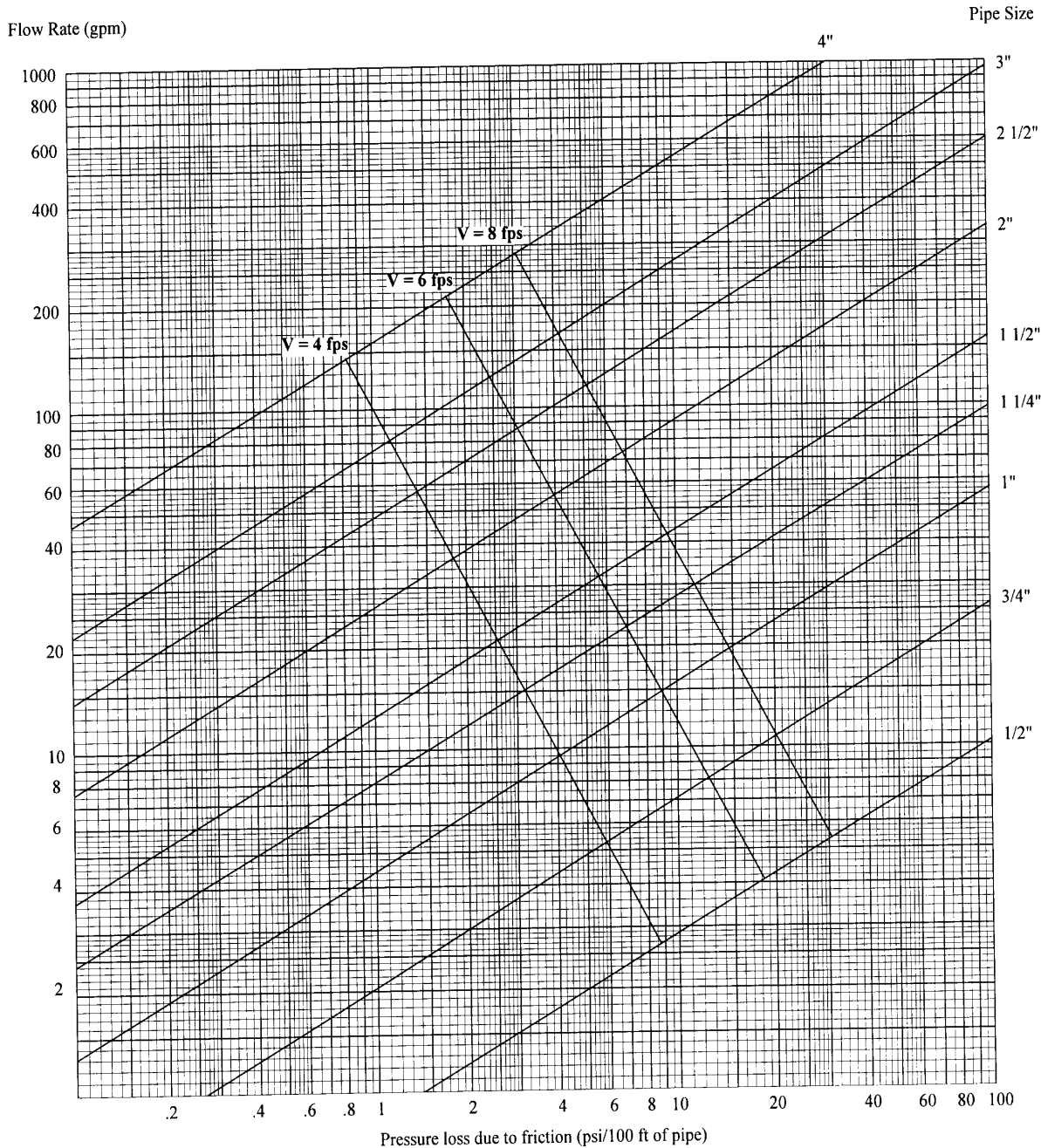
**A-82.40 (7) (b) PRIVATE WATER MAINS AND WATER SERVICES.**

Graphs A-82.40 (7)-2 to A-82.40 (7)-6 may be used to size private water mains and water services.

**Graph A-82.40 (7)-2**

Pressure losses due to flow friction

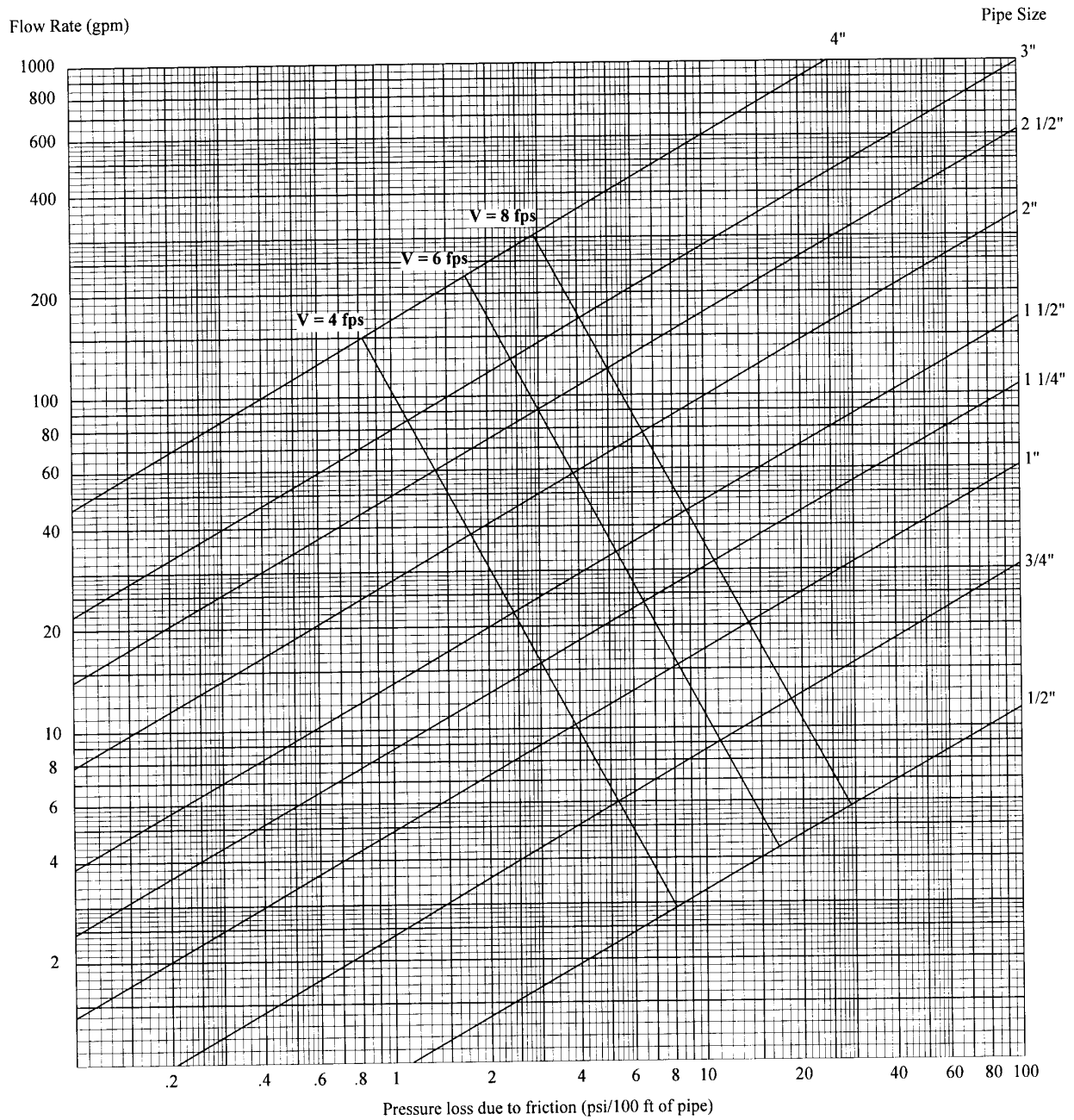
Material: Copper Tube-Type K, ASTM B88



**Graph A-82.40 (7)-3**

Pressure losses due to flow friction

Material: Copper Tube-Type L, ASTM B88



**Graph A-82.40 (7)-4**

Pressure losses due to flow friction

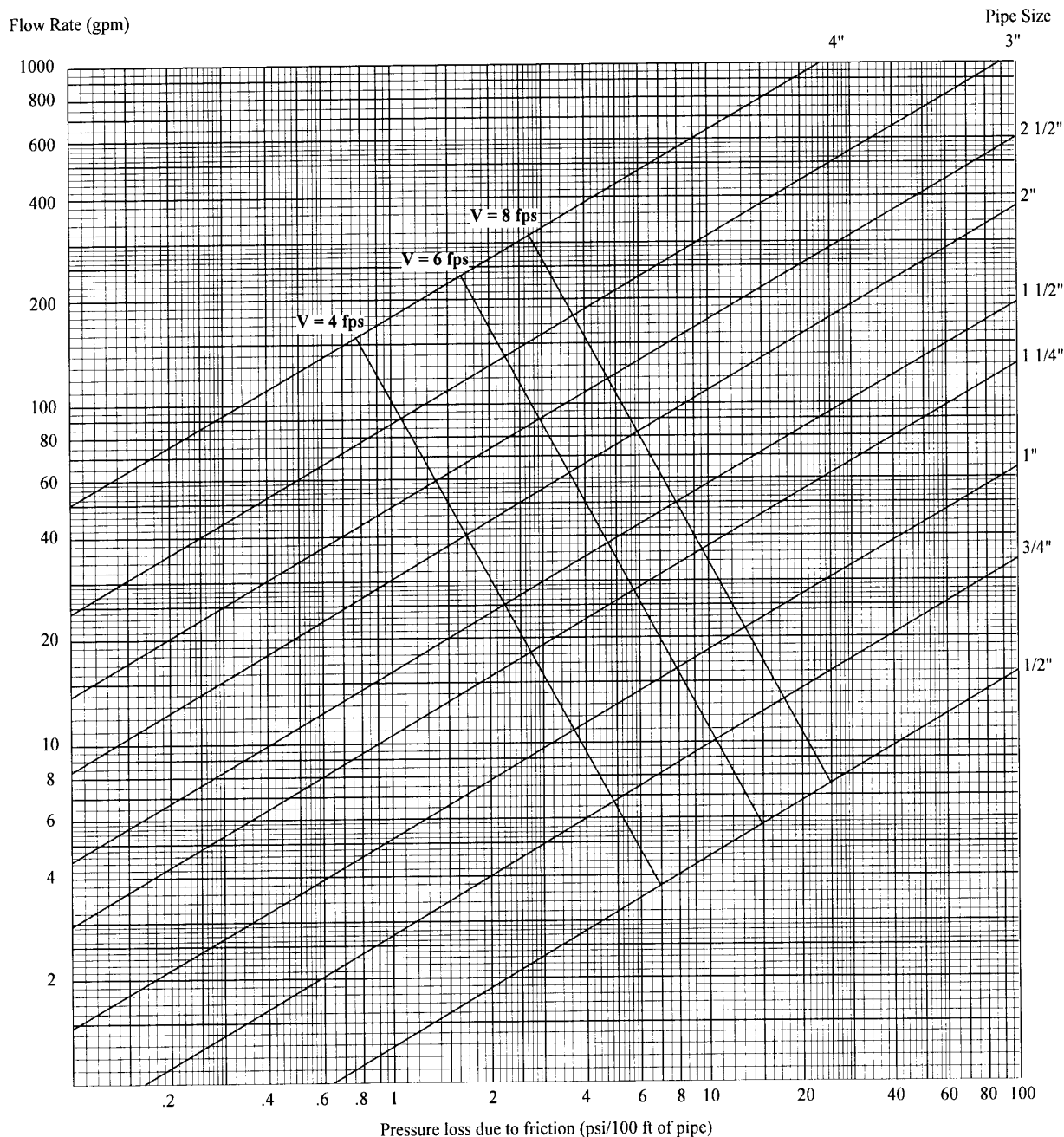
Material: Galvanized Steel Pipe-Schedule 40, ASTM A53, ASTM A120;

ABS Pipe-Schedule 40; ASTM D1527; or

CPVC Pipe-Schedule 40; ASTM F441; or

PE Pipe-Schedule 40; ASTM D2104; ASTM D2447; or

PVC Pipe-Schedule 40; ASTM D1785; ASTM D2672



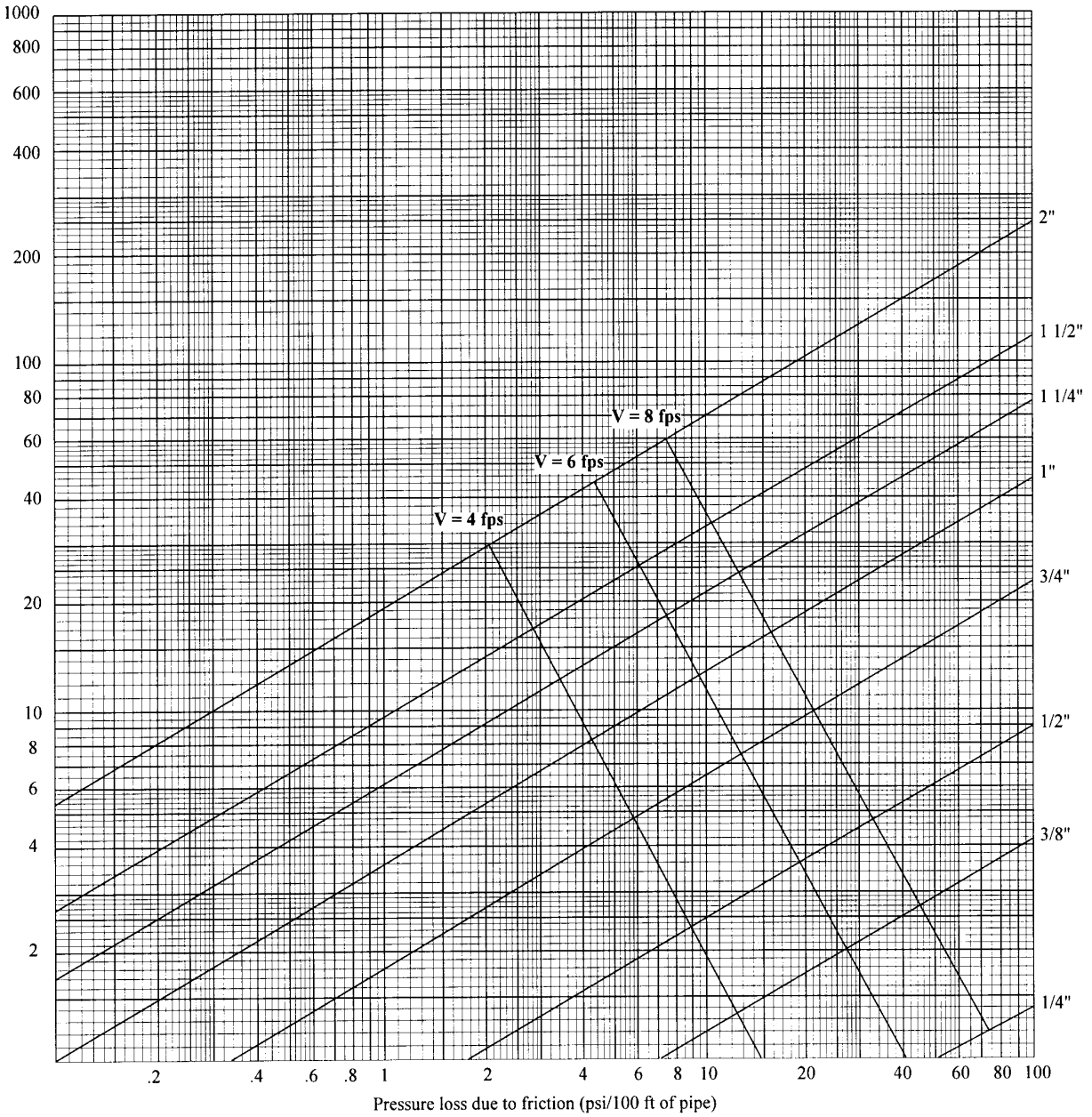
**Graph A-82.40 (7)-5**

Pressure losses due to flow friction

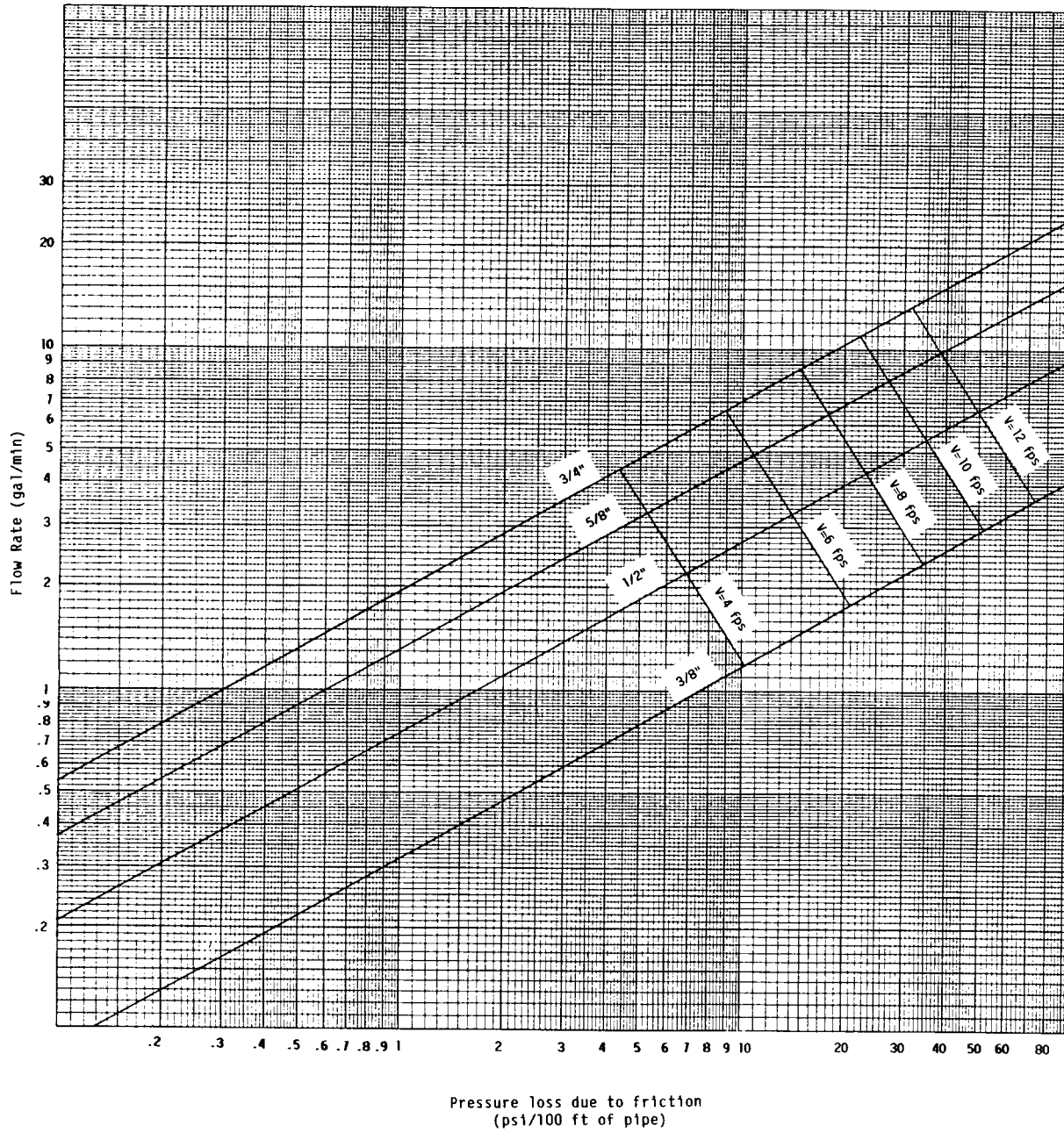
Material: Polybutylene Tubing, ASTM D3309; or  
CPVC Tubing; ASTM D2846

Flow Rate (gpm)

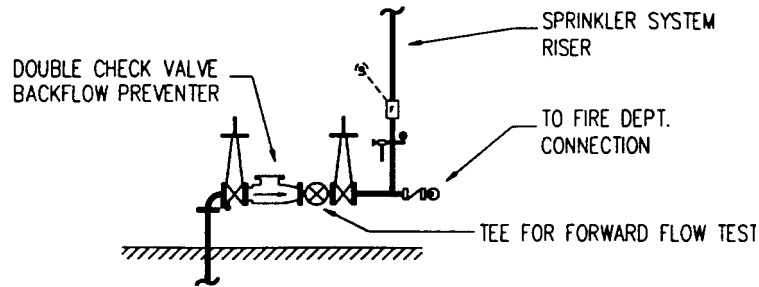
Pipe Size



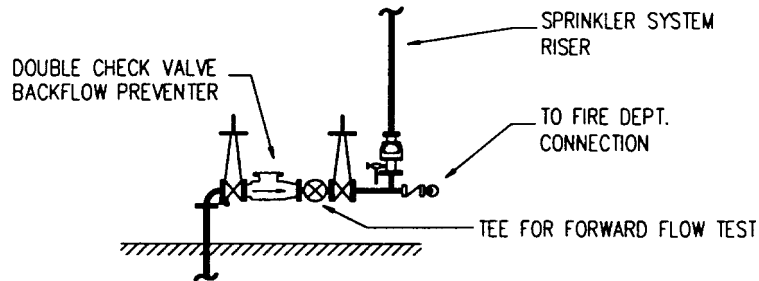
**Graph A-82.40 (7)-6**  
Pressure losses due to flow friction  
Material: Crosslinked Polyethylene (PEX) Tubing, ASTM F876



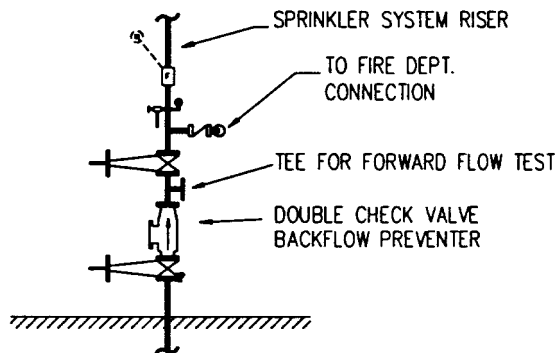
A82.41 (4) (g) 2. TEST OUTLET



SINGLE WET SYSTEM ARRANGEMENT

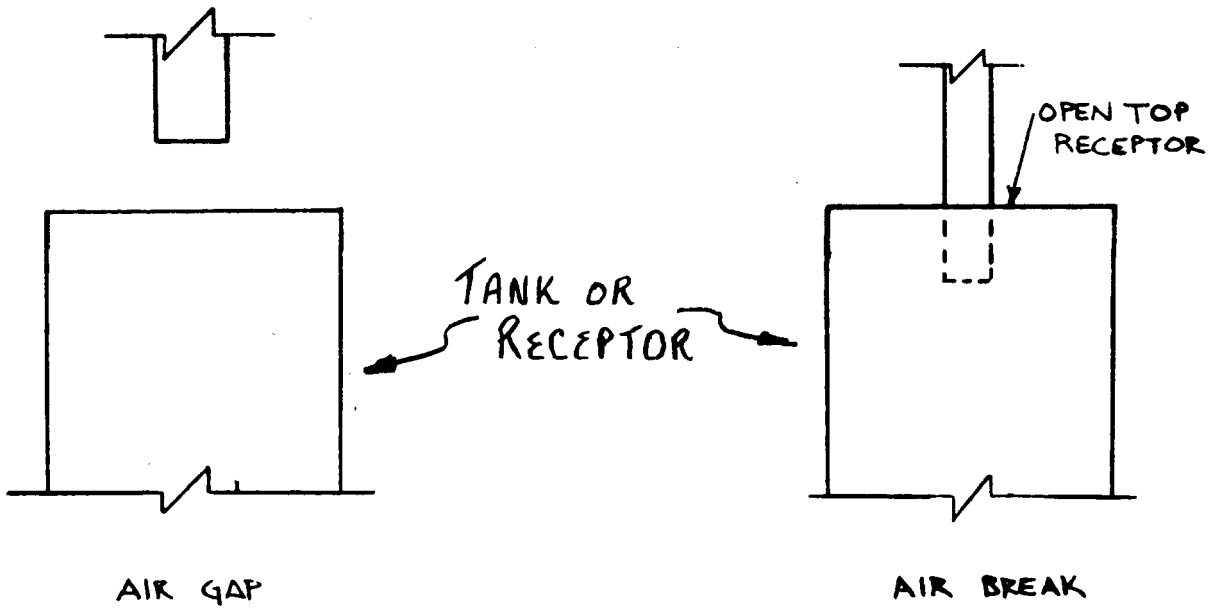


SINGLE DRY SYSTEM ARRANGEMENT



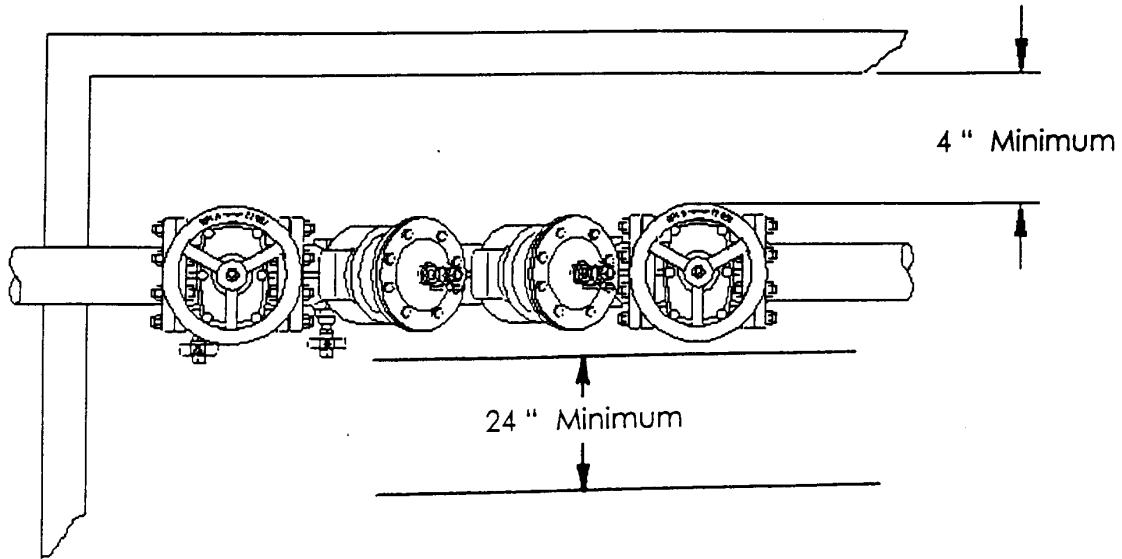
SINGLE WET SYSTEM ARRANGEMENT

A-82.41 (5) (a) AIR GAP.

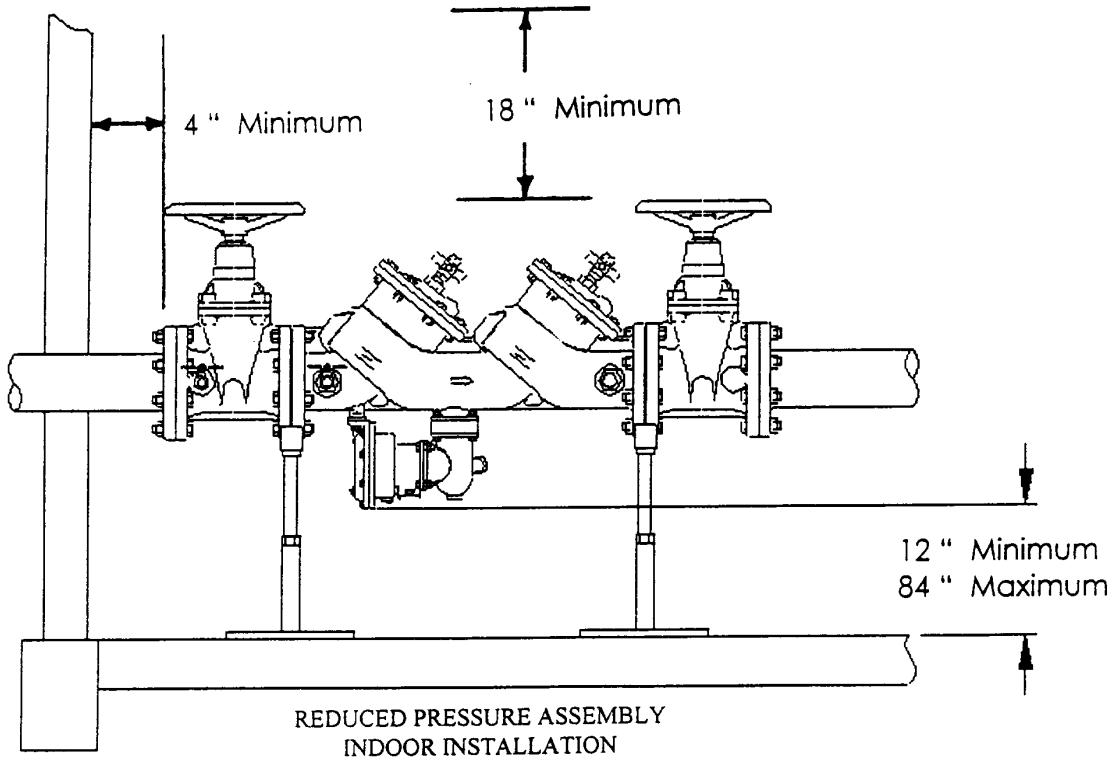


ANSI STANDARD A112.1.2 DESCRIBES OTHER ACCEPTABLE TYPES OF AIR GAPS.

A-82.41 (5) (f) CROSS CONNECTION CONTROL DEVICE INSTALLATION.

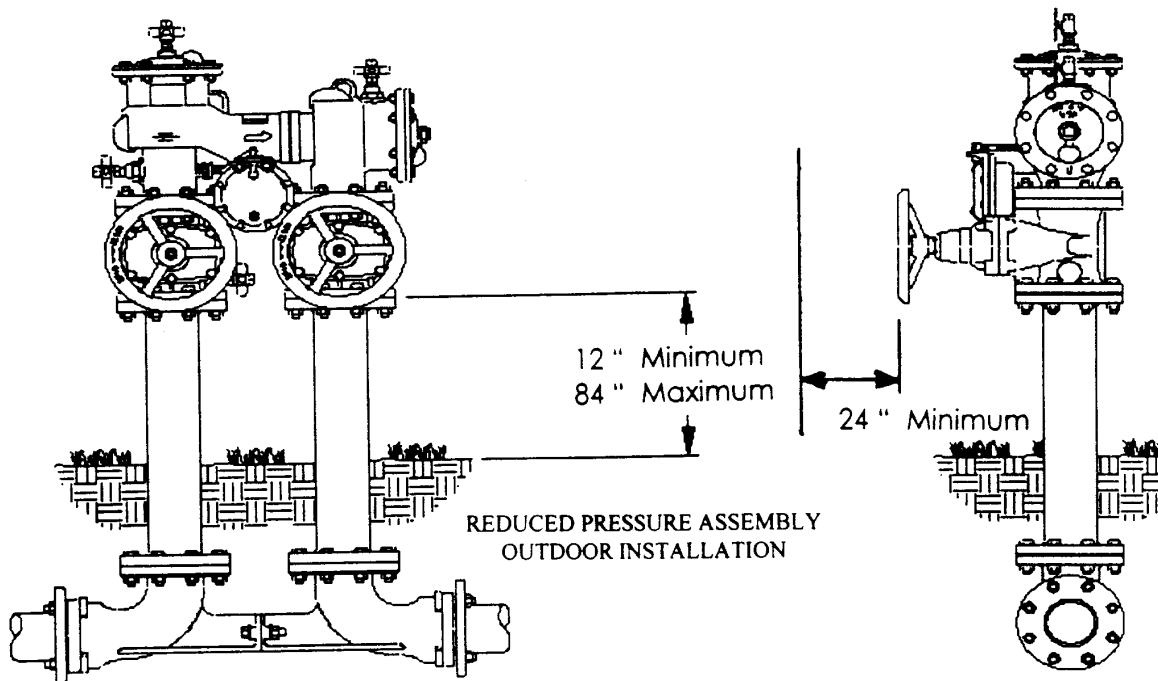
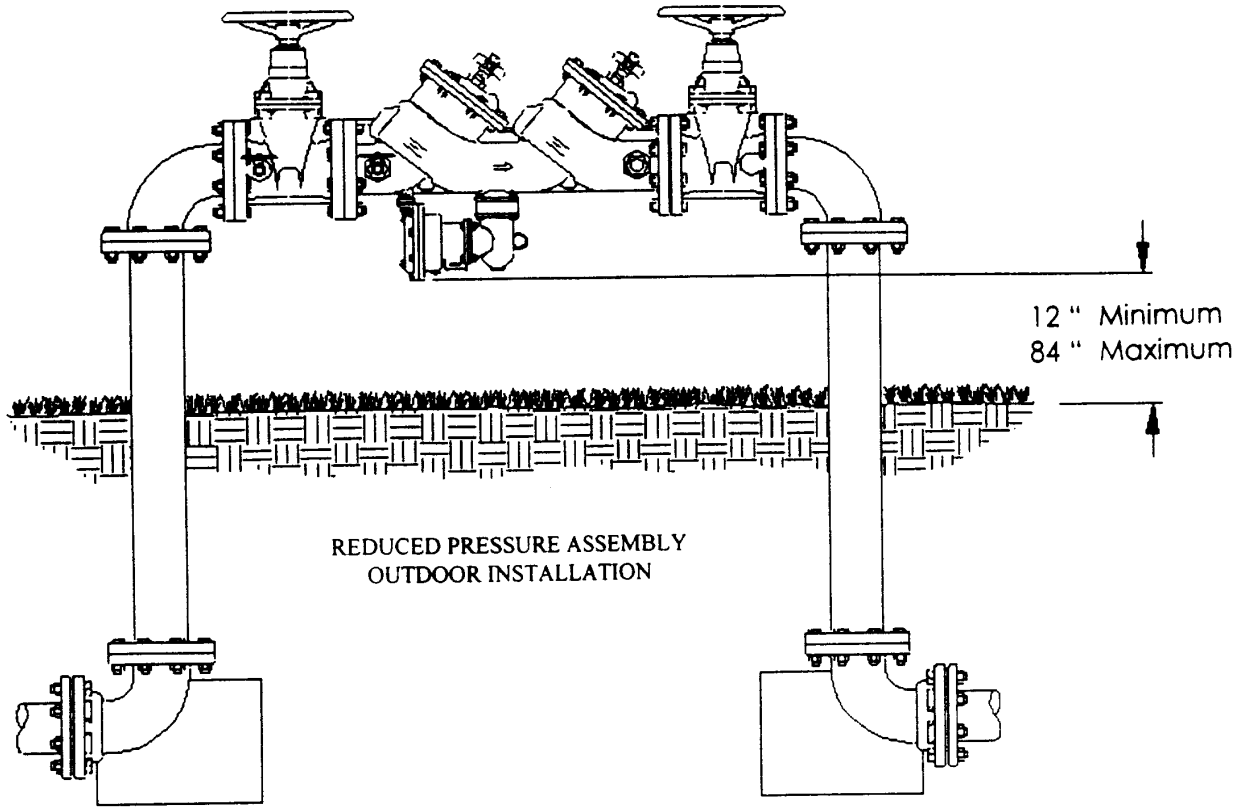


NOTE: ASSEMBLIES SHALL BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S WRITTEN INSTALLATION SPECIFICATIONS OR WITHIN THE DIMENSIONS SHOWN.

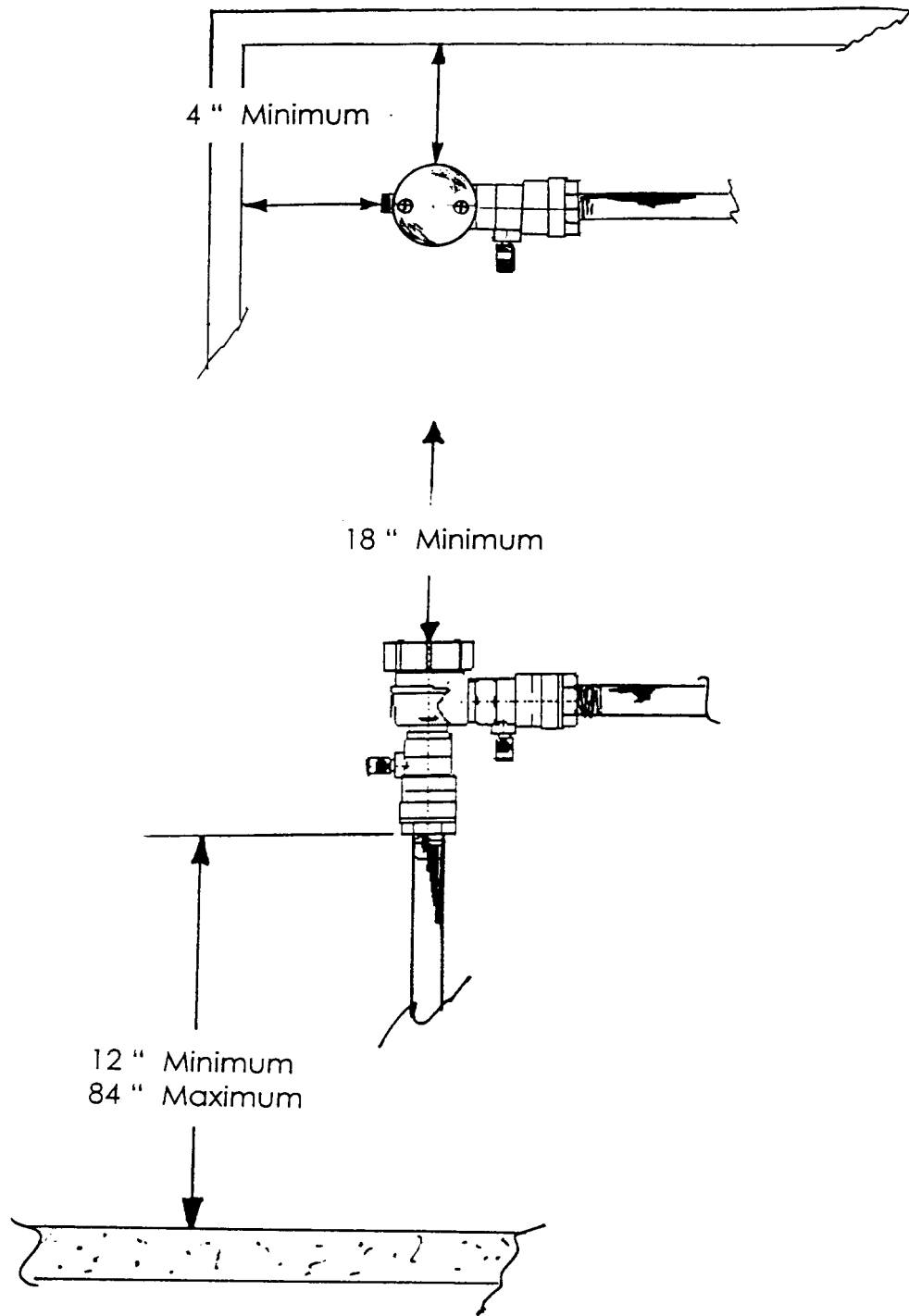




**A-82.41 (5) (f) CROSS CONNECTION CONTROL DEVICE INSTALLATION.**

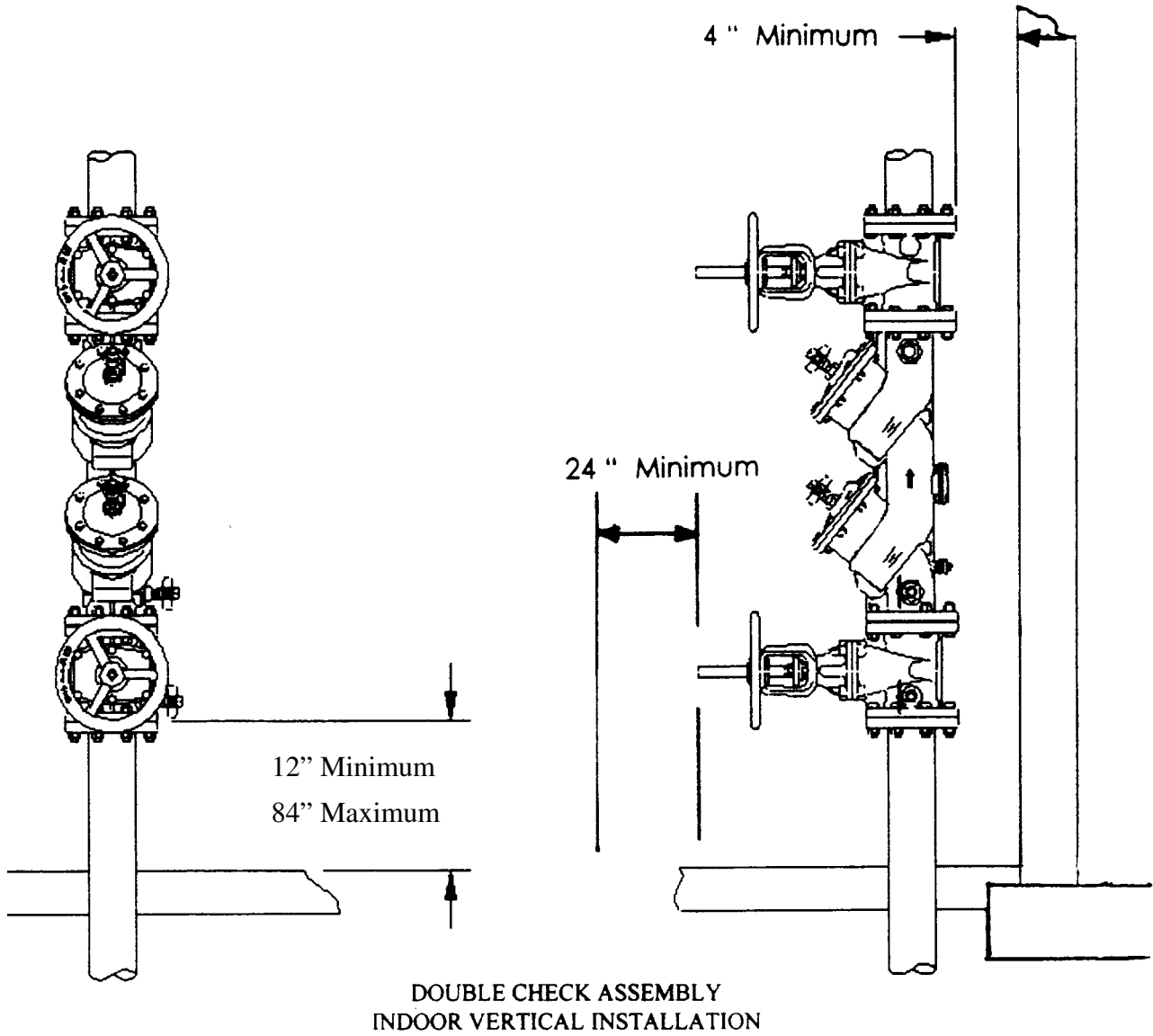


**A-82.41 (5) (f) CROSS CONNECTION CONTROL DEVICE INSTALLATION**

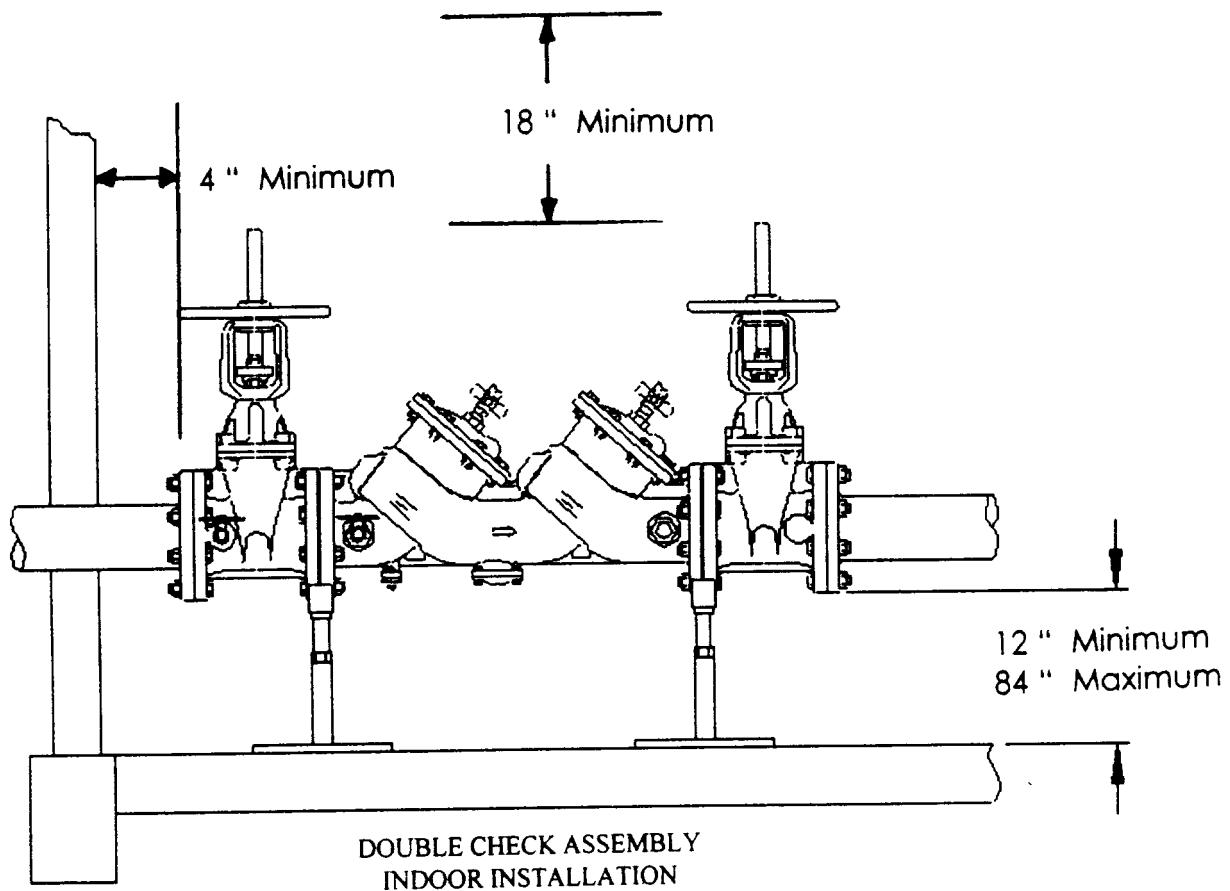
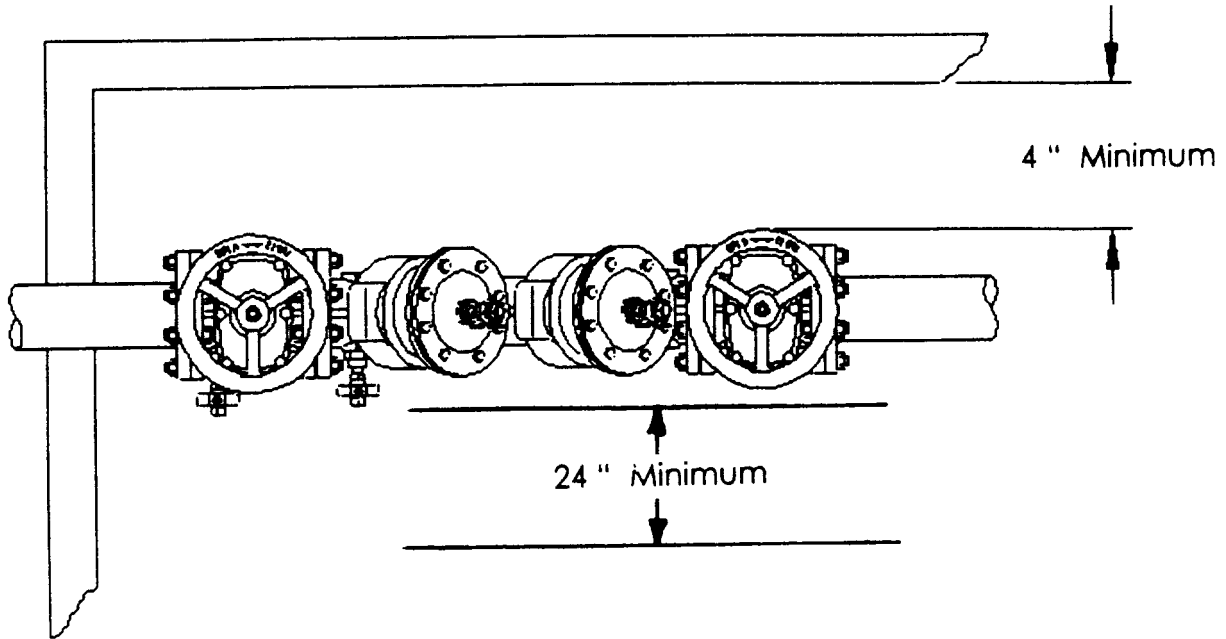


**PRESSURE VACUUM BREAKER ASSEMBLY  
BACK SIPHONAGE BACKFLOW VACUUM BREAKER**

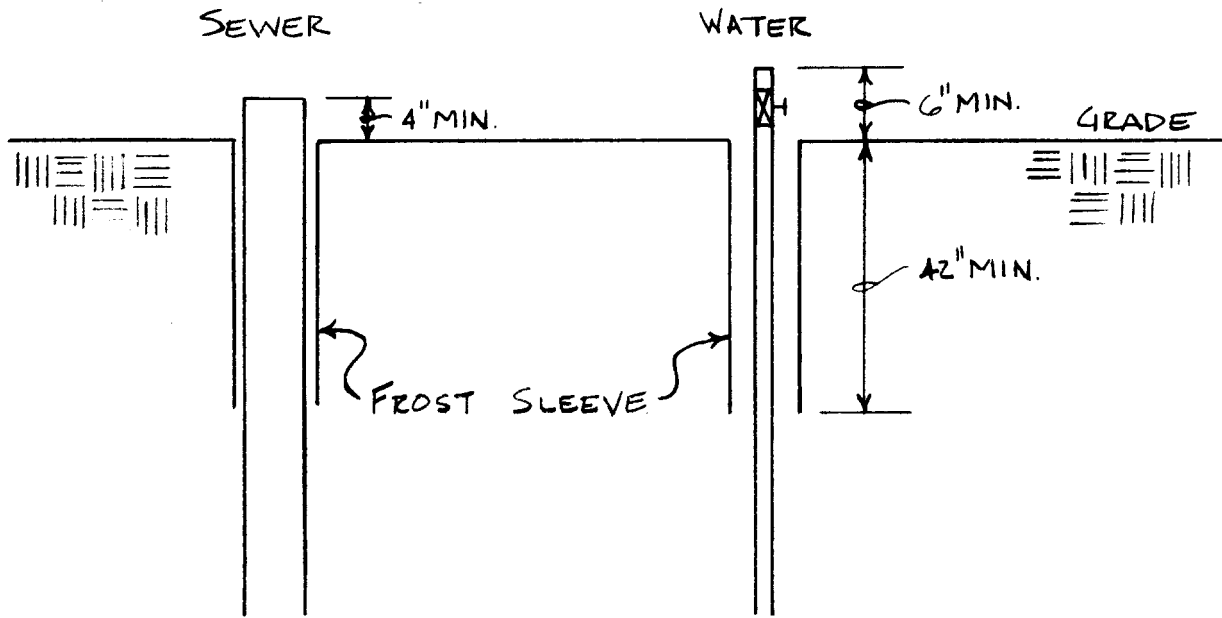
**A-82.41 (5) (f) CROSS CONNECTION CONTROL DEVICE INSTALLATION.**



**A-82.41 (5) (f) CROSS CONNECTION CONTROL DEVICE INSTALLATION.**



**A-82.51 (3) MOBILE HOME SITES AND PARKS.**



MOBILE HOME BUILDING SEWER AND  
WATER SERVICE TERMINATIONS