SUPPLEMENTAL MECHANICAL CORRECTION SHEET FOR SEWAGE EJECTORS AND SUMP PUMPS 2011 LAPC

This is intended to provide uniform application of the codes by the plan check staff and to help the public apply the codes correctly.

NOTES ON PLANS

☐ 1. Plans shall bear, in every page, the registration or license number and signature of an architect, contractor, or engineer, registered in the appropriate classification by the State of California (94.101.3.2, 94.101.3.6, 94.103.2.2; Chap. 7, Div. 3, Business and Professional Code, Art.2, sec. 6735.4).

☐ 2. Indicate the job address on each page of the plans (94.103.2.3).

☐ 3. Indicate on the plans the piping materials (94.0701.0).

☐ 4. Provide air tight cover for the sump (94.710.10).

☐ 5. Show load discharging into the sump (94.101.3.1, 94.103.2.3).

☐ 6. Show the make, model, and horse power of the pump on the plans (94.101.3.1, 94.103.2.3).

☐ 7. State the length of the pipe from the pump to the gravity line, and the elevation difference between the bottom of the sump and the gravity line (94.101.3.1, 94.103.2.3).

☐ 8. Sump(s) shall be made of concrete, metal or other approved materials. Fiberglass sumps shall be approved by the Los Angeles City Mechanical Testing Laboratory, or other City of Los Angeles recognized agency (94.710.8 & 94.103.4).

☐ 9. Please specify the type of material of the sump on the plans, or specify make, model and research report number of the prefabricated sump (94.101.15.4, 94.101.15.5).

☐ 10. The sump pit shall be at least 15 inches in diameter and 18 inches in depth (Rain water only, 94.1101.5.3).

☐ 11. Provide an approved modification from Grading allowing the site drainage to drain into a sump system (91.7013.10).

PLAN DETAILS

☐ 1. Provide a plot plan or lay out showing the sump location, the inlet lines, the outlet line, and gravity line (94.101.3.1, 94.103.2.3).

☐ 2. Show the gravity line all the way to the property line (94.101.3.1, 94.103.2.3).

☐ 3. When discharging to the public street the pressure line shall connect to a gravity pipe

within the property (Department of Public Works requirement).

☐ 4. When discharging under the curb, the drain line shall not be smaller than three inch diameter nor greater than four inch diameter (Department of Public Works requirement).

☐ 5. When the gravity line from rain water exceeds four inch in diameter either use rectangular fitting having height between three and four inches and a cross section equal or greater the cross section of the pipe, or manifold multiple pipes having aggregate cross sectional area equal or greater the cross sectional area of the gravity pipe (Department of Public Works requirement).

☐ 6. Provide a riser diagram showing the sump, sump inlet & outlet check valves and gravity line (94.101.3.1, 94.103.2.3).

☐ 7. The discharge line shall connect to the horizontal gravity line from the top through a wye branch fitting (94.710.4).

☐ 8. Show size, length and type of material of the pump discharge line (94.101.3.1).

☐ 9. The discharge line from the ejector or sump pump shall be provided with an accessible check valve and gate valve (94.710.4).

☐ 10. The gate valve shall be located on the discharge side of the check valve (94.710.4). Gate valve and check valve shall be located outside the pit (94.710.4).

☐ 11. Gate valves and check valves shall be located outside the pit (94.710.6).

☐ 12. Provide dual pumps each capable of handling the load independently (94.710.9).

☐ 13. Sump(s) shall be provided with a vent pipe which shall extend through the roof (94.710.7).

☐ 14. Show high water level. It shall be at least 2 inches below the lowest inlet (94.710.9).

☐ 15. Sewage ejectors located in single family dwellings and receiving waste from water closets or urinals, shall be able to pass a 1-1/2 inch diameter ball (94.710.3.2)

☐ 16. Sewage ejectors located in single family dwellings and receiving waste from water closets or urinals, shall have a minimum pump size of 2" and shall be connected to a discharge pipe of at least 2 inch (94.710.3.3.1).

☐ 17. In other than single dwellings, sewage ejectors receiving waste from water closets or urinals, shall be able to pass a 2 inch diameter ball (94.710.3.3).

☐ 18. Sewage ejectors, in other than single dwellings, and receiving waste from water closets or urinals shall have discharge piping, check valves, and gate valves not less than 3 inch in diameter (94.710.3.3

☐ 19. The discharge line from the sump shall be at least 1 ½ inch diameter (Subsoil only) (94.1101.5.3)

☐ 20. Backwater valves shall be installed to prevent flooding of the garage from outside water (Subsoil and Rain water only 94.1105.5.5).

☐ 21. Show all pipe sizes on the plan (94.101.3.1, 94.103.2.3).

CALCULATIONS

☐ 1. Determine the gallons per minute going into the sump (94.101.3.1, 94.103.2.3).

☐ 2. Calculate the amount of water collected at the rate of 0.021 gpm per square foot (LAPC Table D-1).

☐ 3. Provide a hydrologic report based on the proper 50-year isohyetal. Calculations shall be according to the Peak Rate Method for a concentration time of 5 minutes (91.7013.6).

☐ 4. Provide pump performance curve (94.101.3.1, 94.103.2.3).

☐ 5. Provide calculations for the system curve. Take into consideration all the fittings, gate valve and backwater valve.

☐ 6. Draw the system curve on the pump curve to determine the point of intersection, which will determine the volume flow coming out of the pump.

☐ 7. Determine the fixture unit loading of the gravity drain by allowing two (2) fixture units for every gallon per minute pumped by the sewage ejector (94.702.3 and 94.710.5).

☐ 8. Determine the square footage loading of the gravity drain by allowing 47.62 square feet of area for every gallon per minute pumped by the sump pump (LAPC Table D-1).

☐ 9. The pump shall have a discharge capacity of not less than15 gpm. (Subsoil drainage only) (94.1101.5.3)

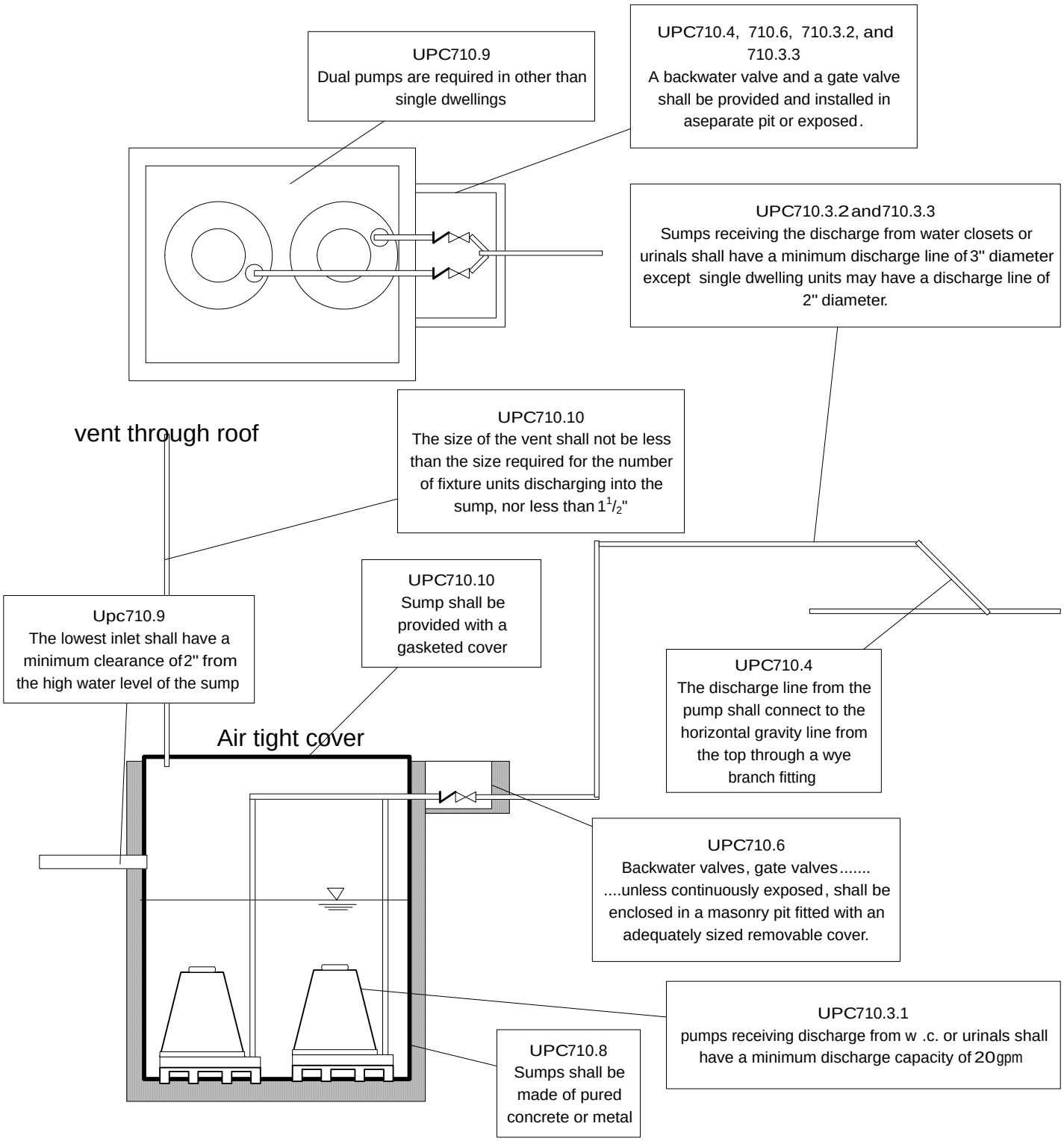
☐ 10. The pump shall have a discharge capacity of not less than 20 gpm (Sewage ejectors 94.710.3.1)

☐ 11. Provide calculations showing that the discharge to the street does not exceed 7 ft/s (Department of Public Works requirement).

☐ 12. Provide clearance from the Department of Public Works allowing the water velocity to exceed 7 ft/s at the point of discharge to the public street (Department of Public Works requirement).

EXAMPLES

The following are design examples.

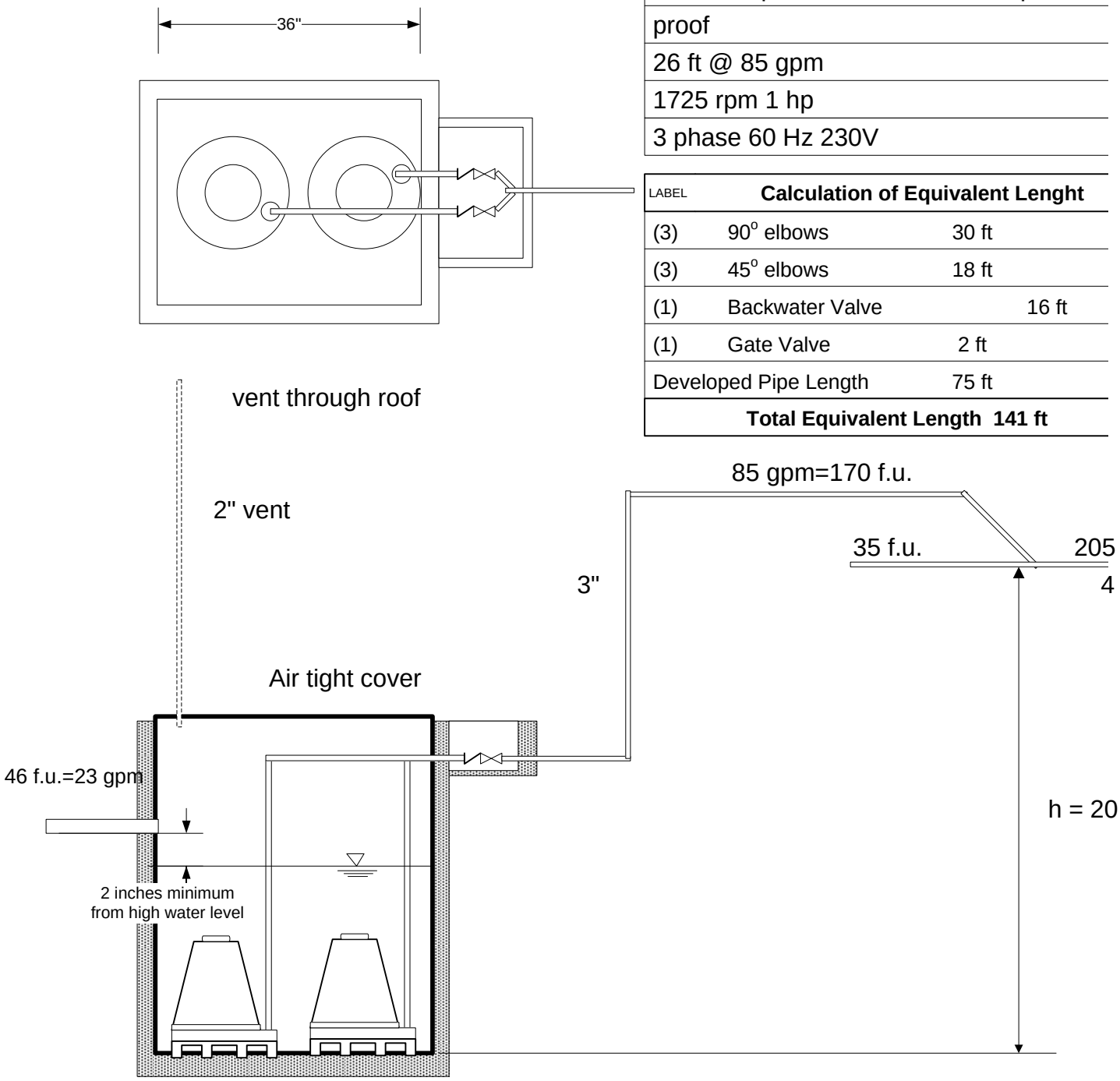


DO NOT SUBMIT PLANS ON 8 1/2" X 11" Sheets.
USE REGULAR SIZE BLUEPRINTS

Pipe Material: No Hub Cast Iron

Pump:
Best Pump Co. Model SE 600 Explosion
proof
26 ft @ 85 gpm
1725 rpm 1 hp
3 phase 60 Hz 230V

LABEL	Calculation of Equivalent Lenght		
(3)	90° elbows	30 ft	
(3)	45° elbows	18 ft	
(1)	Backwater Valve		16 ft
(1)	Gate Valve	2 ft	
Developed Pipe Length		75 ft	
Total Equivalent Length 141 ft			



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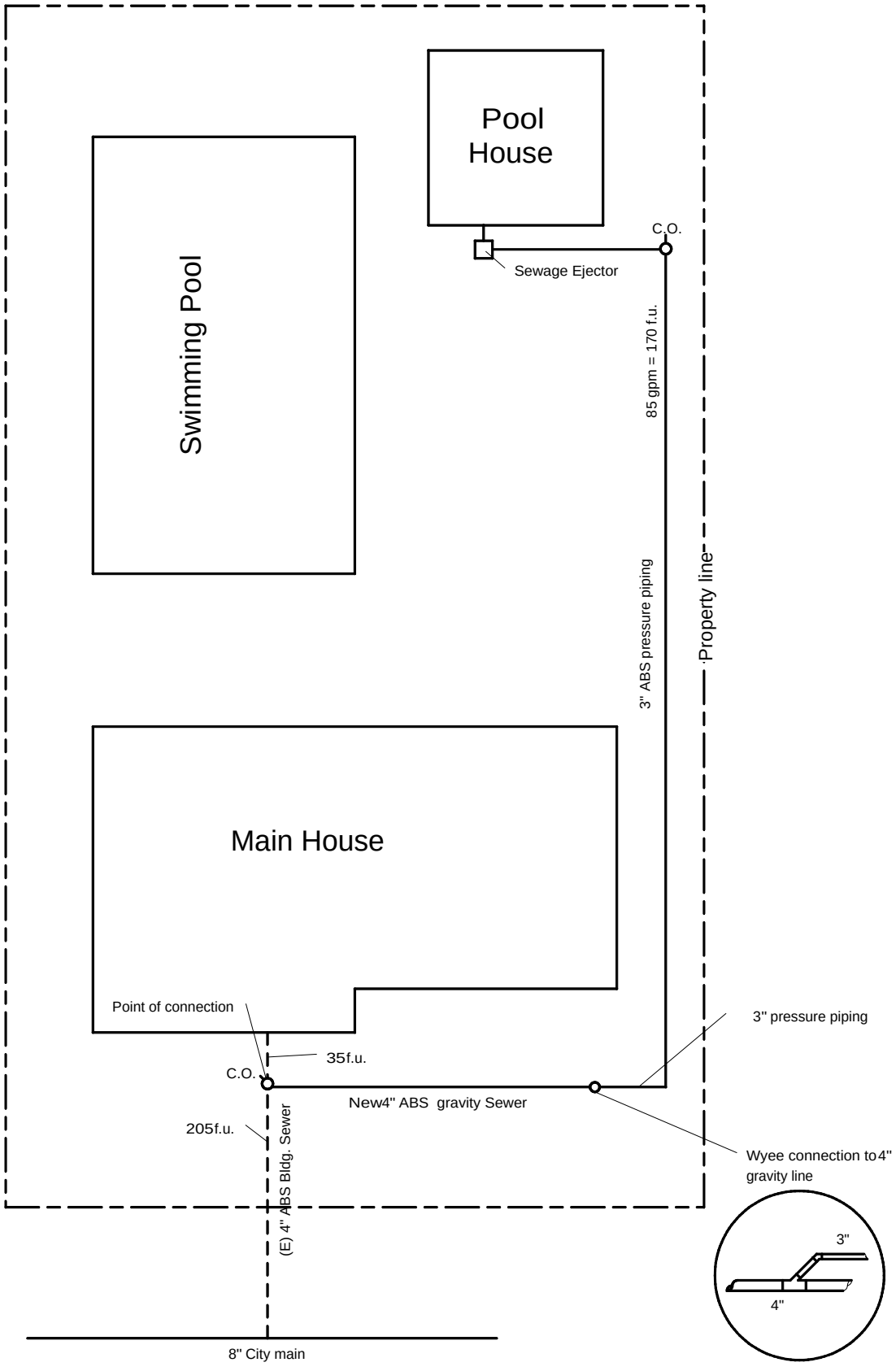


DO NOT SUBMIT PANS ON8½ BY11" SHEETS.
USE REGULAR SIZE BLUE PRINTS.

Sample of calculations:

Step 1. Calculate the equivalent pipe length:

Use the following equivalent length for the fittings:

Diameter of fitting in inches	45^o bend feet	90^o bend feet	Gate Valve feet	Backwater valve feet
2"	4'	7'	1.3'	11'
3"	6'	10'	2'	16'
4"	8'	14'	2.7'	22'
6"	12'	20'	4'	31'

(3) 45^o bend	18 ft
(3) 90^o bend	30 ft
(1) Gate Valve	2 ft
(1) Backwater valve	16 ft
Developed pipe length	75 ft
TOTAL EQUIVALENT LENGTH $\ell =$	141 ft

Step 2 Calculate the System Curve:

$h_n = \frac{10.51 Q^{1.85}}{C^{1.85} d^{4.87}} l$ (feet of water)	*Q:Flow in g.p.m.* *d: pipe diameter in inches*

Use:	C=100 for cast iron pipes C=120 for black iron pipes	C=140 for cement lined pipes C=150 for plastic and copper pipes

h= difference in elevation between the bottom of the sump basin and the gravity sewer line

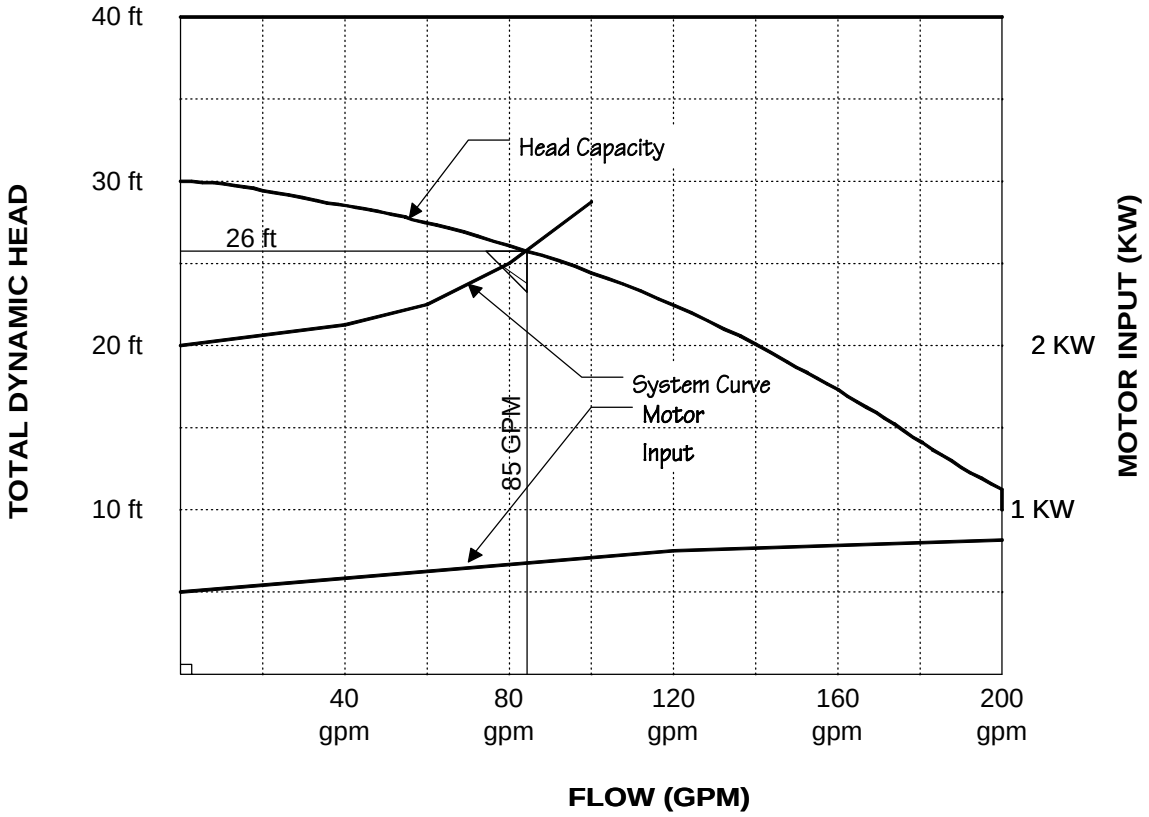
$h_{tot} = h_n + h$ (feet of water) ***System Curve***

Q (g.p.m.)	40	60	80	100
$\boldsymbol{h_n}$	1.283	2.716	4.624	6.987
$\boldsymbol{h_{tot}}$	21	23	25	27

Step 3 Find the system operating point

Jot down the system curve on top of the pump performance curve. The point of operation of the pump system is where the two curves intersect; that is:

Q= 85gpm, h_{tot}=26ft



tep 4 Acceptance of the pump:

The flow coming out of the pump must be equal or greater than the flow coming into the sump: (fixture units coming in)x(2 fixture units/gpm)<gpm pumped out

Step 5 Determine the number of fixture units discharging from the pump:

85 gpm x 2 fixture units/gpm=170 fixture units.

Step 6 Conclusions

Add the fixture units discharging from the pump to the fixture units in the horizontal drain and continue checking sizing the syste.

SIZING OF SUMP BASIN

The code does no regulate the size of the sump basin in a sewer system.

☐ However, the basin needs to be large enough to accommodate the pump or pumps installed inside it.

☐ Some designers select a usable volume of the sump basin to be at least twice the volume that is ejected in one minute by the pump. (In our example 85 galx2=170 gal.), or

☐ Other designers chose a pump and a basin to have a minimum cycling time of 6 minutes(10 start ups per hour):
The cycling time is the time between two consecutive pump start ups:

Cycling time= time to empty the basin + time to fill the basin

Rate of discharge= 85gpm Pump discharge 23gpm water incoming into the sump=67gpm

if the sump usable volume is 170 gal: $\frac{170 gal}{67 gal/\ \min} = 2.5\ \min$

time to empty the sump basin:

$$\frac{170 gal}{23 gal/\ \min} = 7.4\ \min \quad +$$

time to fill the basin:

Cycling time: = 9.9min

Since the cycling time is more than 6 min, a usable sump volume of 170 gallons is adequate.