COBB & DOUGLAS PUBLIC HEALTH

SWIMMING POOL HYDRAULIC ANALYSIS WORKSHEET

Pool Name: _____ Type: _____ Date: _____

Pool Address: _____

Shape: _____ Perimeter: _____ ft. Length: _____ ft. Width: _____ ft.

Minimum Depth: _____ ft. Break Depth: _____ ft. Maximum Depth: _____ ft.

Slope = 1 ft. in _____ ft. Area: _____ sq. ft. Volume: _____ gal.

☐ Gunite ☐ Poured Other: _____

Pool Surface Material: _____ Piping Material: _____ Indoor / Outdoor / Both (circle one)

Design Flow Rate = $\frac{\text{Pool Volume}}{\text{Turnover Time}_1}$ = $\frac{(\quad) \text{ gal}}{(\quad) \text{ min}}$ = _____ gpm *

*Check minimum skimmer flow rate. If turnover rate is inadequate for minimum skimmer operation (per manufacturer or 25 gpm/skimmer) then the design flow rate must be increased to provide the combined minimum flow rate for all skimmers.

I. **Number of Skimmers Required (Two skimmers minimum, except for spas)**

Quantity = $\frac{\text{Pool Area}}{X_2}$ = _____ = _____ **

II. **Skimmer Flow Rate:**

Skimmer Flow Rate = Design Flow Rate = _____ gpm

III. **Flow Through Each Skimmer:**

$\frac{\text{Skimmer Flow Rate}}{\text{No of Skimmers Provided}}$ = _____ = _____ gpm

(Min. 25 gpm / Max. 55 gpm)

IV. **Number of Inlets Required:**

Number of Inlets = $\frac{\text{Pool Perimeter}}{20 \text{ ft.}_3}$ = _____ = _____ **

(Minimum 2 inlets)

1 Standard Pools: 6 hours (360 minutes) or product of 1.5 x avg. depth (in hours), whichever is less; Wading Pools: 60 minutes; Spas: 30 minutes. See Part 9 of rule for additional pool types.

2 Standard Pools: 1 per 400 sq, ft, of surface area or fraction thereof (minimum 2 skimmers); Spas: 1 per 100 sq. ft. of surface area or fraction thereof.

3 Divide perimeter by 20 or pool surface area by 300, whichever is greater, to determine the number of required inlets.

** Round fractions up to the next whole number

V. **Pipe Size Selection:**

A. **Skimmer Line Sizes** (Velocity in selected pipe size shall not exceed 6 fps at the design flow rate.)

	Branch 1	Branch 2	Branch 3	Branch 4
No. of Skimmers Served by Pipe				
Pipe Size				
Flow in Pipe				
Velocity (fps)				

Indicate which chart used for velocity numbers: _____

B. **Return Line Size** (Velocity in selected pipe size shall not exceed 8 fps at the design flow rate.)

	Branch 1	Branch 2	Branch 3	Branch 4	Branch 5
No. of Inlets Served by Pipe					
Pipe Size					
Flow in Pipe					
Velocity (fps)					

Indicate which chart used for velocity numbers: _____

C. **Main Drain Size** (Velocity in selected pipe size shall not exceed 6 fps at the design flow rate.)

Pipe size (in.): _____ Design Flow Rate (gpm): _____ Velocity (fps): _____

VI. **Main Drain/Suction Outlet Cover Selection**

Cover Size (each)	Max. Pump Flow* (gpm)	# of Covers	Flowrate/Cover**	Capacity (all covers)

Suction Outlet Cover Manufacturer: _____ Model#: _____

Suction Outlet Cover Quantity: _____

*Use the pump's maximum flow rate from its performance curve to determine the flowrate per cover.

**For three or more branched suction outlets, flow rate/cover = DFR/(N-1) (See Part 12, (4)(a) for more info.)
NOTE: Spas must have two suction outlets provided for each pump in the system with covers sized for each pump's maximum flow rate.

VII. **Calculate Return Line Loss (**use additional sheets if necessary)

State which chart, graph, nomograph, etc. used: _____

1. Straight pipe size: _____ Straight pipe length = _____ @ _____ gpm
   _____ # Elbows x Equiv. length _____ = _____
   _____ # Tees x Equiv. length _____ = _____
   _____ # Valves x Equiv. length _____ = _____
   Friction loss per 100' _____ x Total equiv. length _____ ÷ 100
   = _____ ft. (for above pipe)
2. Straight pipe size: _____ Straight pipe length = _____ @ _____ gpm
   _____ # Elbows x Equiv. length _____ = _____
   _____ # Tees x Equiv. length _____ = _____
   _____ # Valves x Equiv. length _____ = _____
   Friction loss per 100' _____ x Total equiv. length _____ ÷ 100
   = _____ ft. (for above pipe)
3. Straight pipe size: _____ Straight pipe length = _____ @ _____ gpm
   _____ # Elbows x Equiv. length _____ = _____
   _____ # Tees x Equiv. length _____ = _____
   _____ # Valves x Equiv. length _____ = _____
   Friction loss per 100' _____ x Total equiv. length _____ ÷ 100
   = _____ ft. (for above pipe)
4. Straight pipe size: _____ Straight pipe length = _____ @ _____ gpm
   _____ # Elbows x Equiv. length _____ = _____
   _____ # Tees x Equiv. length _____ = _____
   _____ # Valves x Equiv. length _____ = _____
   Friction loss per 100' _____ x Total equiv. length _____ ÷ 100
   = _____ ft. (for above pipe)
5. Straight pipe size: _____ Straight pipe length = _____ @ _____ gpm
   _____ # Elbows x Equiv. length _____ = _____
   _____ # Tees x Equiv. length _____ = _____
   _____ # Valves x Equiv. length _____ = _____
   Friction loss per 100' _____ x Total equiv. length _____ ÷ 100
   = _____ ft. (for above pipe)
6. Straight pipe size: _____ Straight pipe length = _____ @ _____ gpm
   _____ # Elbows x Equiv. length _____ = _____
   _____ # Tees x Equiv. length _____ = _____
   _____ # Valves x Equiv. length _____ = _____
   Friction loss per 100' _____ x Total equiv. length _____ ÷ 100
   = _____ ft. (for above pipe)

Friction loss due to inlet resistance @ _____ gpm = _____ ft.

Total return line loss (add all totals) = _____ ft. **(Enter on page 5)**

VIII. **Calculate Skimmer Line Loss (**use additional sheets if necessary)

State which chart, graph, nomograph, etc. used: _____

1. Straight pipe size: _____ Straight pipe length = _____ @ _____ gpm
   _____ # Elbows x Equiv. length _____ = _____
   _____ # Tees x Equiv. length _____ = _____
   _____ # Valves x Equiv. length _____ = _____
   Friction loss per 100' _____ x Total equiv. length _____ ÷ 100
   = _____ ft. (for above pipe)
2. Straight pipe size: _____ Straight pipe length = _____ @ _____ gpm
   _____ # Elbows x Equiv. length _____ = _____
   _____ # Tees x Equiv. length _____ = _____
   _____ # Valves x Equiv. length _____ = _____
   Friction loss per 100' _____ x Total equiv. length _____ ÷ 100
   = _____ ft. (for above pipe)
3. Straight pipe size: _____ Straight pipe length = _____ @ _____ gpm
   _____ # Elbows x Equiv. length _____ = _____
   _____ # Tees x Equiv. length _____ = _____
   _____ # Valves x Equiv. length _____ = _____
   Friction loss per 100' _____ x Total equiv. length _____ ÷ 100
   = _____ ft. (for above pipe)
4. Straight pipe size: _____ Straight pipe length = _____ @ _____ gpm
   _____ # Elbows x Equiv. length _____ = _____
   _____ # Tees x Equiv. length _____ = _____
   _____ # Valves x Equiv. length _____ = _____
   Friction loss per 100' _____ x Total equiv. length _____ ÷ 100
   = _____ ft. (for above pipe)
5. Straight pipe size: _____ Straight pipe length = _____ @ _____ gpm
   _____ # Elbows x Equiv. length _____ = _____
   _____ # Tees x Equiv. length _____ = _____
   _____ # Valves x Equiv. length _____ = _____
   Friction loss per 100' _____ x Total equiv. length _____ ÷ 100
   = _____ ft. (for above pipe)
6. Straight pipe size: _____ Straight pipe length = _____ @ _____ gpm
   _____ # Elbows x Equiv. length _____ = _____
   _____ # Tees x Equiv. length _____ = _____
   _____ # Valves x Equiv. length _____ = _____
   Friction loss per 100' _____ x Total equiv. length _____ ÷ 100
   = _____ ft. (for above pipe)

Friction loss over the weir @ _____ gpm = _____ ft.

Total skimmer line loss (add all totals) = _____ ft. **(Enter on page 5)**

Total Dynamic Head Required:

Return Line Loss	(from page 3)	=	_____	ft.
Filter Loss When Dirty	(see below*)	=	_____	ft.
Skimmer Line Loss	(from page 4)	=	_____	ft.
Heater Loss	(from manufacturer)	=	_____	ft.
Other (multiport valves, etc.)	(from manufacturer)	=	_____	ft.
	Total Loss:	=	_____	ft.

*Sand Filter: 34.7 ft.
Cartridge Filter: 23.1 ft.
Pressure D.E.: 57.8 ft.
Vacuum D.E.: 4.3 ft.

Pump Selection: (Submit performance curve)

Manufacturer: _____ Model: _____ HP: _____

Number of pumps used: _____

Pump Rated: _____ gpm @ _____ TDH

Backwash Rate: _____ gpm @ _____ TDH**

**Backwash TDH = TDH – Return Piping and Fixtures Loss + Backwash Line Loss

Filter Selection:

Filter area required = $\frac{\text{(Design flow rate)}}{\text{(Flow rate per sq. ft.***)}}$ = $\frac{(\quad)}{(\quad)}$ = _____ sq. ft.

***Flow rate per sq. ft.: Hi-Rate Sand = 15 gpm/sq. ft., Cartridge = 0.3 gpm/sq. ft., Pre-coat D.E. = 2 gpm/sq. ft.

Manufacturer: _____ Model: _____

Filter area: _____ sq. ft. No. Tanks: _____ Size: _____

Designer/Contractor Information:

Pool Design Professional: _____ GA License #: _____

Pool Contractor: _____

EH Review Information:

Approved By: _____

Approval Date: _____