Georgia Department of Public Health
Environmental Health Section
Public Swimming Pools, Spas and Recreational Waterparks Program

<u>Public Swimming Pool Hydraulic Analysis Worksheet</u>

Pool Name_____ Date _____

Pool Address_____

Shape_____ Perimeter ft._____ Width_____

Length_____ Min. Depth _____ Break_____   Max. _____
                                                      Depth   Depth
Slope = 1 ft. in_____ft. Area = _____ Sq. ft. Volume = _____ gallons

Gunite _____ Poured _____ Other_____ Pipe Mat'l_____
Outdoor, Indoor or Both
_____
Design Flow Rate = <u>Pool Volume</u>   (_____) <u>Gal.</u> = _____gpm
                        Turnover time *1   (   ) Min.
Check minimum skimmer flow rate. If turnover rate is inadequate for minimum skimmer operation (as per manufacturer or rule (25 gpm) then design flow rate must be increased to provide minimum skimmer flow rate.

   I. <u>Number of Skimmers Required:</u>

_____Quantity = no. of skimmers required from Swimming Pool Rules.

            Surface Area of Pool _____ sq. ft.   No. of skimmers required_____
            No. of skimmers provided _____.

   II. <u>Skimmer Flow Rate:</u>

_____A.) Skimmer flow rate = 100% of Design flow rate = _____gpm.

_____B.) <u>Flow through each Skimmer =</u> skimmer flow rate (above) = <u>(_____ gpm)</u> = _____ gpm
                 for each skimmer   no. of skimmers provided*2

_____C.) Select equalizer line cover(s) with a flow in gpm equal to the maximum pump flow divided by
                 the # of skimmers.

   III. <u>Number of Inlets Required:</u>

            No. of inlets = <u>perimeter</u>   = (_____) = _____ (Use next
                                 20'   (20'   )   whole number)

   *1 For pool use minimum 6 hr. turnover (360 min.) or product of 1.5 x average water depth, whichever is
        less. For special purpose pools and others listed use turnover rate in Rule .07.
   *2 Must be 25 – 55 gpm or based on manufacturer specifications.

IV.   Pipe Size Selection

A. Skimmer Line Size:
Select pipe size which gives max. 6' fps velocity at skimmer flow rate.

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

(Indicate which chart used for velocity numbers) _____

B. Return Line Size:
Select pipe size and branches, which gives max. 8 fps velocity at design flow rate.

No. inlets	Branch 1	Branch 2	Branch 3	Branch 4
served by pipe	_____	_____	_____	_____
Pipe Size	_____	_____	_____	_____
Flow in pipe	_____	_____	_____	_____
Velocity (fps)	_____	_____	_____	_____

(Indicate which chart used for velocity numbers) _____

V. Main Drain Pipe and (Suction) Outlet Covers Selection

A.   Main Drain Size:
Select pipe size which gives max. 6 fps velocity at highest flow rate on the pump curve.

Pipe size _____ [1]Max. Pump Flowrate _____Velocity (fps) _____

B. Pipe Cover   [1,2] Max.Pump   # of Covers   Flowrate/Cover*   (Capacity)
    Size Size (each)   flow (gpm)   (Q=Max. flow/N-1)   (All Covers)

Frame & Grate Cat. No. _____ Quant._____
1. Use the pump's maximum flow rate from the pump curve to obtain flowrate/cover.
2. If therapy flow is through these covers, this flow must also be figured into all calculations.
*Covers meet APSP-16

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CALCULATE RETURN LINE LOSS:*

STATE WHICH CHART, GRAPH, NOMIGRAPH, ETC. USED_____ADD _____ AT
                                                                                     BOTTOM OF COLUMN

1.   Straight pipe size_____ = _____@_____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 size)

2.   Straight pipe size_____ = _____ @ _____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 size)

3.   Straight pipe size_____= _____@_____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 size)

4.   Straight pipe size_____= _____@_____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 size)

5.   Straight pipe size_____= _____@_____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 size)

6.   Straight pipe size_____= _____@_____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 size)

   Friction loss due to inlet resistance at _____ gpm = _____ ft.
   (from manufacturer)   Total Return Line friction loss = _____ft.
                              (add all _____ totals)   *(Enter on page 6)

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CALCULATE SKIMMER LINE LOSS: *
STATE WHICH CHART, GRAPH, NOMIGRAPH, ETC. USED _____ADD _____ AT
BOTTOM OF COLUMN

1.   Straight pipe size _____ = _____ @_____gpm
#_____ Elbows x Equiv. Length _____= _____
#_____Tees   x Equiv. Length_____ = _____
#_____ Valves x Equiv. Length _____ = _____
Friction loss per 100' _____ x total equiv. length _____ ÷ 100 = _____ft.

2.   Straight pipe size _____ = _____@ _____ 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 size)

3.   Straight pipe size _____ = _____ @ _____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 size)

4.   Straight pipe size _____ = _____ @ _____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 size)

5.   Straight pipe size _____ = _____ @_____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 size)

6.   Straight pipe size _____ = _____ @ _____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 size)

Friction loss over the weir at _____ gpm = _____ ft.
(from manufacturer)
              <u>Total Skimmer Line friction loss</u> = _____ ft.
              (add all _____ totals)   *(Enter on page 6)

Total Dynamic Head Required:

Return Line Loss   = _____ ft.
(from page 4)

Filter Loss When Dirty   = _____ ft.
*(see below)

Skimmer Line Loss   = _____ft.
(from page 5)

Heater Loss   = _____ ft.
(from manufacturer)

Other (Multiport valves, etc.)   = _____ ft.
(from manufacturer)

Total Loss   _____ ft.

Pump Selection: (Submit Curve)

Make _____   Model _____, _____gpm @ _____ TDH

Backwash rate _____gpm @ _____ TDH**

Filter Selection:

Filter area required = $\dfrac{(\text{ Design flow rate })}{(\text{ Flow Rate per sq. ft.})}$ = $\dfrac{(\underline{\hspace{3cm}})}{(\underline{\hspace{3cm}})}$ = _____

Flow rate per sq. ft. = (Hi rate = 15 gpm per sq. ft.- minimum 15 inch bed depth)
                            (Hi rate = 12 gpm per sq. ft. - less than 15 inch bed depth) (Sand = 5 gpm per sq. ft.)
                            (Cartridge = .3 gpm per sq. ft.) (Vacuum pre-coat = 2 gpm per sq. ft.)
                            (Continuous vacuum pre-coat = 2.5 gpm per sq. ft.) (Pressure pre-coat = 2 gpm per sq. ft.)

Cat. No. _____   Model _____

Filter Area _____sq. ft. No. Tanks _____   Size _____

Pump Specifications _____ HP _____ Cycle _____ Phase_____ Volt_____RPM

Pool Design Professional _____GA. License # _____

Pool Contractor_____

Approved & Checked By _____   Date _____
     (Health Dept.)

* Cartridge Filter = 23.1 ft.   Sand Filter = 34.7 ft.   Pressure pre-coat = 57.8 ft.   Vacuum pre-coat = 4.3 ft.
** Backwash TDH = TDH - Return Piping and Fixtures + Backwash Line Loss