Georgia Department of Public Health
Environmental Health Branch
Swimming Pool Program

SWIMMING POOL HYDRAULIC ANALYSIS WORKSHEET

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 or Indoor
_____

Design Flow Rate = Pool Volume   (   ) Gal. = _____gpm
                    Turnover time *1   (   ) Min.

Check minimum skimmer flow rate. If turnover rate is inadequate for minimum skimmer operation (as per manufacturer or 25 gpm) then design flow rate must be increased to provide minimum skimmer flow rate.

    I. Number of Skimmers Required:

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

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

    II. Skimmer Flow Rate:

_____A.) If wall returns are utilized:
           Skimmer flow rate = Design flow rate x 0.8
                        = _____gpm. x 0.8 = _____gpm
        B.) If floor returns are utilized:
           Skimmer flow rate = Design flow rate = _____gpm

        Flow through each Skimmer:

_____Skimmer flow   skimmer flow rate (above) = (_____ gpm) = _____ gpm
           for each skimmer   no. of skimmers provided   (   )   *2

    III.   Number of Inlets Required: (15' max. spacing)

        No. of inlets = perimeter   = (_____) = _____ (Use next
                15'   (15'   )   whole number)

   *1 For pool use minimum 6 hr. turnover (360 min.)
      For other pools, use table in Rule .07
    *2 Must be at least 25 gpm.

IV.   Pipe Size Selection

A. Skimmer Line Size:
Select pipe size which give max. 4' – 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 give max. 5 - 10 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) _____

C. Main Drain Size:
Select pipe size which gives max. 6 fps velocity at design flow rate.
Pipe size _____Design flow rate_____Velocity (fps) _____

V. Main Drain Grate Selection

Main drain outlet: (4 to 1 open area ratio each drain)
(2 required)   (1 ½ fps max. velocity through grate-each
drain) *1

Pipe Size	Grate Size (each)	Flow Area (each)	Velocity (fps.)	(Total Flow,) (Both Drains)

Frame & Grate Cat. No. _____ Quan._____

*1 If therapy flow is through these grates, this flow must also be figured into all calculations.

MAIN DRAIN LINE LOSS: *

<u>If wall returns are utilized:</u> Head loss calculation must be based on:

Main drain flow rate = 0.2 x design flow rate

= 0.2 x _____gpm

= _____gpm

Straight Pipe Length (Size_____)   = _____

_____ elbows x equiv. length _____= _____
_____ tees   x equiv. length _____= _____
_____ valves x equiv. length _____= _____
Total equiv. length =   = _____
Friction loss per 100' _____ x total equiv. length _____ ÷ 100   = _____
*1   * (enter on page 6)

<u>If floor returns are utilized:</u> Head loss calculations are based on 100% flow thru skimmers.

Skimmer flow rate   = design flow rate

Main drain flow rate   = 0

Main drain head loss   = 0 (enter 0 on page 6)

*1   = based on above main drain flow rate

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:

Main Drain Line Loss   = _____ ft.
(from page 3)

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.

<u>Pump Selection: (Submit Curve)</u>

Make _____   Model _____, _____gpm @ _____ TDH

Backwash rate _____gpm @ _____ TDH**

<u>Filter Selection:</u>

Filter area required = (__Design flow rate__)   = (_____) = _____
                       (Flow Rate per sq. ft.)   (   )

Flow rate per sq. ft. = (Diatomite = 1 gpm per sq. ft.)   (Hi rate = 15 gpm per sq. ft.)
                         (Sand   = 5 gpm per sq. ft.)   (Cartridge = .3 gpm per sq. ft.)

Cat. No. _____   Model _____

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

Pump Specifications _____ HP _____ Cycle _____ Phase_____ Volt_____RPM

Certified Contractor _____Certification Number _____

Representing _____

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

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