DeKalb PUBLIC HEALTH

POOL HYDRAULIC ANALYSIS

DeKalb Public Health

POOL INFORMATION

Name:_____

Address: _____ GA_____
Street Suite/Bldg.# City Zip Code

Pool Type: □Swimming Pool □Whirlpool □Wading □Multi-Purpose □Wave □Lazy River
□Waterslide □Special Purpose □Spray Pool □Zero-depth

Location: □Indoor Pool □Outdoor Pool **Operation**: □Seasonal □Year-round **Government-owned** □Yes □No

---

CERTIFIED CONTRACTOR INFORMATION

Name: _____ Cert.#:_____

Company Name :_____

Address: _____
Street Suite/Bldg.# City State Zip Code

Contact: _____ _____ _____
Phone# Fax# E-mail

Shape:_____ Perimeter(ft.):_____ Width(ft.):_____

Length(ft.):_____ Min. Depth(ft.):_____ Break Depth(ft.):_____ Max. Depth(ft.):_____

Slope (< 5') = 1 ft. in _____ ft. Area: _____Sq. Ft. Volume: _____gallons

Pool Base Material: ☐Gunite ☐ Poured ☐Other: _____ Type of Piping:_____

Design Flow Rate = $\frac{\text{pool volume}}{\text{turnover time *}}$ = $\frac{\text{\_\_\_\_\_ gallons}}{\text{minutes}}$ = _____gpm**

*For pool use minimum 6 hr. turnover (360 min.)
wading pool use minimum 2 hr. turnover (120 min.)
whirlpool use minimum ½ hour turnover (30 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:

A. Swimming pools (see Appendix A, Fig. 4): minimum two skimmers, then one skimmer per 500 sq. ft pool surface area. Wading pools: minimum one skimmer per 200 sq. ft pool surface area. Whirlpool: minimum one skimmer per 100 sq. ft pool surface area.

Pool Surface Area: _____sq. ft.; # of skimmers required: _____; # of skimmers provided:_____

II. Skimmer / Gutter Flow Rate:

A. If wall returns are utilized: total skimmer/gutter flow rate = design flow rate x 0.8 = _____gpm

B. If floor returns are utilized: total skimmer/gutter flow rate = design flow rate = _____ gpm

C. Flow through each skimmer/gutter = skimmer/gutter flow rate = $\frac{\text{\_\_\_\_\_ gpm}}{\text{\# of skimmers provided}}$ = _____ gpm *

* Must be > 25 gpm and < 55 gpm

III. Number of Inlets Required:

A. Minimum # of inlets required = $\frac{\text{perimeter (ft)}}{\text{x*}}$ = _____ ft = _____ (use next whole number)

*For pools, x = 20 feet For wading pools or whirlpools, x = 10 feet

IV. Pipe Size Selection

A. Skimmer / Gutter Line Size: select pipe size which gives max. 5 fps velocity at skimmer / gutter flow rate*:

	Branch 1	Branch 2	Branch 3	Branch 4	Branch 5	Branch 6	Branch 7	Branch 8
# of Skimmers Served by Pipe								
Pipe Size (inches)								
Flow in Pipe (gpm)								
Velocity (fps)								

*Indicate which chart used for velocity numbers: _____

For additional branches, use the reverse side of this sheet

B. Return Line Size: select pipe sizes and branches which give max. 10 fps velocity at design flow rate*:

	Branch 1	Branch 2	Branch 3	Branch 4	Branch 5	Branch 6	Branch 7	Branch 8
# of Inlets Served by Pipe								
Pipe Size (inches)								
Flow in pipe (gpm)								
Velocity (fps)								

*Indicate which chart used for velocity numbers: _____

For additional branches, use the reverse side of this sheet

V. Main Drain: select pipe sizes which give maximum 5 fps velocity at the design flow rate:

A. Pipe size (inches): _____ Design flow rate (gpm): _____ Velocity (fps)_____

B. Main Drain Grate Selection: Main drain outlet 4 to 1 open area ratio each drain; minimum 2 main drains required; 1½ fps max. velocity through each grate; each main drain must accommodate 100% of the design flow rate; 5 fps max. flow rate*:

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

C. Open pipe area = _____ (sq. in.) X 4 = _____ (sq. in.) [must be < _____ open grate area(sq. in.)]

Frame & Grate Catalog Number: _____ Quantity: _____

*If booster or additional pump flow is through the main drain grates, this flow must also be figured into all calculations

Maximum velocity through each grate 1 ½ fps.
(.321 x Design Flow Rate _____ gpm)/Grate Open Area _____ sq. in= Velocity _____ fps
Velocity _____ fps. < 1.5 fps.
Is velocity through each drain grate approved? Yes/No

D. **Main Drain Line Head Loss**

If wall returns are utilized, head loss calculation must be based on:

Main drain flow rate = 0.20 x design flow rate = 0.20 x _____ gpm = _____ gpm

Straight pipe size = _____(in.) Straight pipe length = _____(ft.)

_____ # elbows x equiv. length _____ = _____(ft.)

_____ # tees x equiv. length _____ = _____(ft.)

_____ # valves x equiv. length _____ = _____(ft.)

Total equiv. length = _____(ft.)

Friction loss per 100' based on above flow rate = _____ x total equiv. length _____ ÷ 100 = _____(ft.)
(enter on page 6)

Indicate which chart used for equivalent lengths: _____

If floor returns are utilized, head loss calculations are based on 100% flow through skimmers:

Skimmer flow rate = design flow rate

Main drain flow rate = 0

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

E. **Interactive Play Features Utilizing Separate Drains as a Water Source**

Drain Grate Selection: Drain outlet 4 to 1 open area ratio each drain; minimum 2 drains required; 1½ fps max. velocity through each grate; each drain must accommodate 100% of the design flow rate; 5 fps max. flow rate*:

Pipe Size (in.)	Grate Size (each, sq. in.)	Flow Area (each, sq. in.)	Velocity (fps)	(Total Flow, Both Drains gpm)
_____	_____	_____	_____	_____

Open pipe area = _____ (sq. in.) X 4 = _____ (sq. in.) [must be < _____ open grate area(sq. in.)]

Frame & Grate Catalog Number: _____ Quantity: _____

Drain Line Head Loss (not to be included into pool total head loss)

Main drain flow rate = _____ gpm

Straight pipe size = _____(in.) Straight pipe length = _____(ft.)

_____ # elbows x equiv. length _____ = _____(ft.)

_____ # tees x equiv. length _____ = _____(ft.)

_____ # valves x equiv. length _____ = _____(ft.)

Total equiv. length = _____(ft.)

Friction loss per 100' based on above flow rate = _____ x total equiv. length _____ ÷ 100 = _____(ft.)

Indicate which chart used for equivalent lengths: _____

VI. Return Line Loss

Indicate which chart used for return line loss calculations:_____

Calculate return line loss for each branch or run of entire return line

Branch #1: Straight pipe size = _____ in. Straight pipe length @ _____ gpm = _____ft.
# of elbows _____ x equiv. length _____ = _____ft.
# of tees _____ x equiv. length _____ = _____ft.
# of valves _____ x equiv. length _____ = _____ft.
Friction loss (for above pipe size) per 100' = _____ x total equiv. length _____ft.÷ 100 = _____ft.

Branch #2: Straight pipe size = _____ in. Straight pipe length @ _____ gpm = _____ft.
# of elbows _____ x equiv. length _____ = _____ft.
# of tees _____ x equiv. length _____ = _____ft.
# of valves _____ x equiv. length _____ = _____ft.
Friction loss (for above pipe size) per 100' = _____ x total equiv. length _____ft.÷ 100 = _____ft.

Branch #3: Straight pipe size = _____ in. Straight pipe length @ _____ gpm = _____ft.
# of elbows _____ x equiv. length _____ = _____ft.
# of tees _____ x equiv. length _____ = _____ft.
# of valves _____ x equiv. length _____ = _____ft.
Friction loss (for above pipe size) per 100' = _____ x total equiv. length _____ft.÷ 100 = _____ft.

Branch #4: Straight pipe size = _____ in. Straight pipe length @ _____ gpm = _____ft.
# of elbows _____ x equiv. length _____ = _____ft.
# of tees _____ x equiv. length _____ = _____ft.
# of valves _____ x equiv. length _____ = _____ft.
Friction loss (for above pipe size) per 100' = _____ x total equiv. length _____ft.÷ 100 = _____ft.

Branch #5: Straight pipe size = _____in. Straight pipe length @ _____ gpm = _____ft.
# of elbows _____ x equiv. length _____= _____ft.
# of tees _____ x equiv. length _____ = _____ft.
# of valves _____ x equiv. length _____= _____ft.
Friction loss (for above pipe size) per 100' = _____ x total equiv. length _____ft.÷ 100 = _____ft.

Branch #6: Straight pipe size = _____ in. Straight pipe length @ _____ gpm = _____ft.
# of elbows _____ x equiv. length _____= _____ft.
# of tees _____ x equiv. length _____ = _____ft.
# of valves _____ x equiv. length _____= _____ft.
Friction loss (for above pipe size) per 100' = _____ x total equiv. length _____ft.÷ 100 = _____ft.

Branch #7: Straight pipe size = _____ in. Straight pipe length @ _____ gpm = _____ft.
# of elbows _____ x equiv. length _____= _____ft.
# of tees _____ x equiv. length _____= _____ft.
# of valves _____ x equiv. length _____= _____ft.
Friction loss (for above pipe size) per 100' = _____ x total equiv. length _____ft.÷ 100 = _____ft.

Branch #8: Straight pipe size = _____ in. Straight pipe length @ _____ gpm = _____ft.
# of elbows _____ x equiv. length _____= _____ft.
# of tees _____ x equiv. length _____ = _____ft.
# of valves _____ x equiv. length _____= _____ft.
Friction loss (for above pipe size) per 100' = _____ x total equiv. length _____ft.÷ 100 = _____ft.

Friction loss due to inlet resistance @ _____gpm = _____ft.

Total return line friction loss = _____ ft.
(enter on page 6)

VII. Skimmer / Gutter Line Loss

Indicate which chart used for skimmer / gutter line loss calculations:_____

Calculate skimmer/gutter line loss for each branch or run of entire return line

Branch #1: Straight pipe size = _____ in. Straight pipe length @ _____ gpm = _____ft.
# of elbows _____ x equiv. length _____ = _____ft.
# of tees _____ x equiv. length _____ = _____ft.
# of valves _____ x equiv. length _____ = _____ft.
Friction loss (for above pipe size) per 100' = _____ x total equiv. length _____ft.÷ 100 = _____ft.

Branch #2: Straight pipe size = _____ in. Straight pipe length @ _____ gpm = _____ft.
# of elbows _____ x equiv. length _____ = _____ft.
# of tees _____ x equiv. length _____ = _____ft.
# of valves _____ x equiv. length _____ = _____ft.
Friction loss (for above pipe size) per 100' = _____ x total equiv. length _____ft.÷ 100 = _____ft.

Branch #3: Straight pipe size = _____ in. Straight pipe length @ _____ gpm = _____ft.
# of elbows _____ x equiv. length _____ = _____ft.
# of tees _____ x equiv. length _____ = _____ft.
# of valves _____ x equiv. length _____ = _____ft.
Friction loss (for above pipe size) per 100' = _____ x total equiv. length _____ft.÷ 100 = _____ft.

Branch #4: Straight pipe size = _____ in. Straight pipe length @ _____ gpm = _____ft.
# of elbows _____ x equiv. length _____ = _____ft.
# of tees _____ x equiv. length _____ = _____ft.
# of valves _____ x equiv. length _____ = _____ft.
Friction loss (for above pipe size) per 100' = _____ x total equiv. length _____ft.÷100 = _____ft.

Branch #5: Straight pipe size = _____in. Straight pipe length @ _____ gpm = _____ft.
# of elbows _____ x equiv. length _____ = _____ft.
# of tees _____ x equiv. length _____ = _____ft.
# of valves _____ x equiv. length _____ = _____ft.
Friction loss (for above pipe size) per 100' = _____ x total equiv. length _____ft.÷ 100 = _____ft.

Branch #6: Straight pipe size = _____ in. Straight pipe length @ _____ gpm = _____ft.
# of elbows _____ x equiv. length _____ = _____ft.
# of tees _____ x equiv. length _____ = _____ft.
# of valves _____ x equiv. length _____ = _____ft.
Friction loss (for above pipe size) per 100' = _____ x total equiv. length _____ft.÷ 100 = _____ft.

Branch #7: Straight pipe size = _____ in. Straight pipe length @ _____ gpm = _____ft.
# of elbows _____ x equiv. length _____ = _____ft.
# of tees _____ x equiv. length _____ = _____ft.
# of valves _____ x equiv. length _____ = _____ft.
Friction loss (for above pipe size) per 100' = _____ x total equiv. length _____ft.÷ 100 = _____ft.

Branch #8: Straight pipe size = _____ in. Straight pipe length @ _____ gpm = _____ft.
# of elbows _____ x equiv. length _____ = _____ft.
# of tees _____ x equiv. length _____ = _____ft.
# of valves _____ x equiv. length _____ = _____ft.
Friction loss (for above pipe size) per 100' = _____ x total equiv. length _____ft.÷ 100 = _____ft.

Friction loss over the skimmer weir @ _____gpm = _____ft.

Total skimmer / gutter line friction loss = _____ ft.
(enter on page 6)

VIII. Total Dynamic Head Required:

A. Main Drain Line Loss = _____ft.
(from page 3)

B. Return Line Loss = _____ft.
(from page 4)

C. Filter Loss When Dirty = _____ft.
(*see below)

D. Skimmer / Gutter Line Loss = _____ft.
(from page 5)

E. Heater Loss = _____ft.
(from manufacturer)

F. Other (multi-port valves, etc.) = _____ft.
(from manufacturer)

G. Total Dynamic Head Required = _____ft.

*For C. above use the following:

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

IX. Pump Selection:

A. Pump Manufacturer:_____ Model:_____ Horsepower:_____

Pump Rated: _____ gpm @ _____ TDH # of pumps:_____

X. Filter Selection:

Minimum Filter Area Required = $\frac{\text{Design flow rate}}{\text{Filter flow rate *}}$ = $\frac{\text{gpm}}{\text{gpm/sq.ft.}}$ = _____sq. ft.

*Use Manufacture's Filter Flow Rate (In absence of that information use the following Filter Flow Rates: Diatomaceous= 1 gpm / sq. ft; Hi -rate Sand=15 gpm / sq. ft; Cartridge= .3 gpm / sq. ft)

Manufacturer:_____ Model:_____ Catalog # :_____

Filter Type: _____ Diameter (each filter):_____inches

Filter Area (each): _____sq. ft. # of Filters: _____ Total Filter Area: _____sq. ft.

XI. Other Information:

Certified Contractor's Signature:_____ Date:_____

Plans Reviewed and Approved & by:_____Date:_____
EHS Staff