POOL HYDRAULIC ANALYSIS

Cherokee County Environmental Health Services

Pool Name:_____

Address: _____ _____GA_____
Street Suite/Bldg. No. City Zip Code

Property Owner's Name:_____ Contact No.:_____

Address: _____GA_____
Street Suite/Bldg. No. City Zip Code

Pool Builder's Name: _____ Contact No.:_____

Designer / Engineer's Name:_____ Cert. No.:_____ Contact No.:_____

Contact: _____ _____ _____
Phone No. Fax No. E-mail

Date Plans Submitted:_____ Date Plans Initial Review:_____ Date Plans Reviewed / Approved :_____

Signature Pool Representative_____ Signature Environmental Health _____

Pool Type: ☐Swimming Pool ☐Whirlpool ☐Wading ☐Multi-Purpose ☐Waterslide ☐Special Purpose ☐Spray Pool ☐Zero-depth

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

Number of units in subdivision/apartment complex:_____

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

Min. Depth (ft.):_____ Break Depth (ft.):_____ Max. Depth (ft.):_____ Slope (< 5') = 1 ft. in _____ ft.

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

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

I. Design Flow Rate:

pool volume = _____gallons = _____gpm is Design Flow Rate
turnover rate * = minutes

*For pool - minimum turnover rate 360 minutes (6 hr), Wading pool – minimum turnover rate 120 minutes (2 hr),
Whirlpool - minimum turnover time 30 minutes (½ hr)
**Check minimum skimmer flow rate. If turnover time 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.

II. Number of Skimmers Required:

Pool Surface Area = _____sq. ft = _____ No. of skimmers required: _____No. of skimmers provided
Sq. ft. per skimmer* = sq. ft

*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 100sq. ft pool surface area

III. Skimmer / Gutter Flow Rate:

Design Flow Rate = _____gpm_____ = _____ gpm Skimmer Flow Rate
No. of skimmers provided = Skimmers

* Must be > or = 25 gpm and < or = 55 gpm or per manufacture specifications

IV. Number of Inlets Required:

Perimeter = _____ ft = _____ (use next whole number = _____.)
No. inlets per ft. = X *

* For pools X = 20 feet For wading pools or whirlpools X = 10 feet

V. Pipe Size Selection

A. Skimmer / Gutter Line Size: select pipe size, which gives max. 6 fps velocity at skimmer / gutter flow rate*:

	Branch 1	Branch 2	Branch 3	Branch 4	Branch 5	Branch 6	Branch 7	Branch 8
No. of Skimmers Served by Pipe								
Pipe Size (inches)								
Flow in Pipe (gpm)								
Velocity (fps)								

For additional branches use additional sheet(s)

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
No. of Inlets Served by Pipe								
Pipe Size (inches)								
Flow in pipe (gpm)								
Velocity (fps)								

*For additional branches use additional sheet(s)

VI. Main Drain:

A. Select pipe size that gives maximum 6 fps velocity at the Design Flow Rate:

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

B. Grate Selection: Minimum 2 main drains required; each main drain must accommodate 100% of the Design Flow Rate; each drain outlet pipe open area to drain grate open area ratio must be minimum 4 to 1; maximum 1½ fps. velocity through each drain grate:

(1) Frame / Grate Catalog Number: _____ Grate Open Area _____ sq. in.

(2). Drain outlet pipe open area to drain grate open area ratio must be minimum 4 to 1:

Pipe Size _____ in. Pipe Open Area _____ sq. in. Grate Open Area _____ sq. in.

Pipe Open Area = _____ sq. in. X 4 = _____ sq. in. < Grate Open Area _____ sq. in.

Is drain outlet pipe open area to drain grate open area ratio approved? Yes / No

(3). Maximum velocity through each grate 1½ 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

(4) Grate Approved: Yes / No

For additional drain grates use additional sheet(s)

C. Main Drain Line Head Loss

Straight pipe size = _____in. Straight pipe length @ _____ gpm = _____ft.

_____ No. elbows x equiv. length _____ = _____ft.
_____ No. tees x equiv. length _____ = _____ft.
_____ No. 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)

VII. Skimmer / Gutter Line Loss

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

Branch No.1: Straight pipe size = _____ in. Straight pipe length @ _____ gpm = _____ft.
No. of elbows _____ x equiv. length _____ = _____ft.
No. of tees _____ x equiv. length _____ = _____ft.
No. of valves _____ x equiv. length _____ = _____ft.
Friction loss (for above pipe size) per 100' = _____ x total equiv. length _____ft.÷ 100 = _____ft.

Branch No.2: Straight pipe size = _____ in. Straight pipe length @ _____ gpm = _____ft.
No. of elbows _____ x equiv. length _____ = _____ft.
No. of tees _____ x equiv. length _____ = _____ft.
No. of valves _____ x equiv. length _____ = _____ft.
Friction loss (for above pipe size) per 100' = _____ x total equiv. length _____ft.÷ 100 = _____ft.

Branch No.3: Straight pipe size = _____ in. Straight pipe length @ _____ gpm = _____ft.
No. of elbows _____ x equiv. length _____ = _____ft.
No. of tees _____ x equiv. length _____ = _____ft.
No. of valves _____ x equiv. length _____ = _____ft.
Friction loss (for above pipe size) per 100' = _____ x total equiv. length _____ft.÷ 100 = _____ft.

Branch No.4: Straight pipe size = _____ in. Straight pipe length @ _____ gpm = _____ft.
No. of elbows _____ x equiv. length _____ = _____ft.
No. of tees _____ x equiv. length _____ = _____ft.
No. of valves _____ x equiv. length _____ = _____ft.
Friction loss (for above pipe size) per 100' = _____ x total equiv. length _____ft.÷ 100 = _____ft.

Branch No.5: Straight pipe size = _____ in. Straight pipe length @ _____ gpm = _____ft.
No. of elbows _____ x equiv. length _____ = _____ft.
No. of tees _____ x equiv. length _____ = _____ft.
No. of valves _____ x equiv. length _____ = _____ft.
Friction loss (for above pipe size) per 100' = _____ x total equiv. length _____ft.÷ 100 = _____ft.

Branch No.6 Straight pipe size = _____ in. Straight pipe length @ _____ gpm = _____ft.
No. of elbows _____ x equiv. length _____ = _____ft.
No. of tees _____ x equiv. length _____ = _____ft.
No. of valves _____ x equiv. length _____ = _____ft.
Friction loss (for above pipe size) per 100' = _____ x total equiv. length _____ft.÷ 100 = _____ft.

Branch No.7. Straight pipe size = _____ in. Straight pipe length @ _____ gpm = _____ft.
No. of elbows _____ x equiv. length _____ = _____ft.
No. of tees _____ x equiv. length _____ = _____ft.
No. of valves _____ x equiv. length _____ = _____ft.
Friction loss (for above pipe size) per 100' = _____ x total equiv. length _____ft.÷ 100 = _____ft.

Branch No.8: Straight pipe size = _____ in. Straight pipe length @ _____ gpm = _____ft.
No. of elbows _____ x equiv. length _____ = _____ft.
No. of tees _____ x equiv. length _____ = _____ft.
No. of valves _____ x equiv. length _____ = _____ft.
Friction loss (for above pipe size) per 100' = _____ x total equiv. length _____ft.÷ 100 = _____ft.

For additional branches use additional sheet(s)

Friction loss over the skimmer weir @ _____gpm = _____ft.

Total skimmer/gutter line friction loss = _____ ft.

(enter on page 6)

VIII. Return Line

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

Branch No.1: Straight pipe size = _____ in. Straight pipe length @ _____ gpm = _____ft.
No. of elbows _____ x equiv. length _____ = _____ft.
No. of tees _____ x equiv. length _____ = _____ft.
No. of valves _____ x equiv. length _____ = _____ft.
Friction loss (for above pipe size) per 100' = _____ x total equiv. length _____ft.÷ 100 = _____ft.

Branch No.2: Straight pipe size = _____ in. Straight pipe length @ _____ gpm = _____ft.
No. of elbows _____ x equiv. length _____ = _____ft.
No. of tees _____ x equiv. length _____ = _____ft.
No. of valves _____ x equiv. length _____ = _____ft.
Friction loss (for above pipe size) per 100' = _____ x total equiv. length _____ft.÷ 100 = _____ft.

Branch No.3: Straight pipe size = _____ in. Straight pipe length @ _____ gpm = _____ft.
No. of elbows _____ x equiv. length _____ = _____ft.
No. of tees _____ x equiv. length _____ = _____ft.
No. of valves _____ x equiv. length _____ = _____ft.
Friction loss (for above pipe size) per 100' = _____ x total equiv. length _____ft.÷ 100 = _____ft.

Branch No.4: Straight pipe size = _____ in. Straight pipe length @ _____ gpm = _____ft.
No. of elbows _____ x equiv. length _____ = _____ft.
No. of tees _____ x equiv. length _____ = _____ft.
No. of valves _____ x equiv. length _____ = _____ft.
Friction loss (for above pipe size) per 100' = _____ x total equiv. length _____ft.÷ 100 = _____ft.

Branch No.5: Straight pipe size = _____ in. Straight pipe length @ _____ gpm = _____ft.
No. of elbows _____ x equiv. length _____ = _____ft.
No. of tees _____ x equiv. length _____ = _____ft.
No. of valves _____ x equiv. length _____ = _____ft.
Friction loss (for above pipe size) per 100' = _____ x total equiv. length _____ft.÷ 100 = _____ft.

Branch No.6: Straight pipe size = _____ in. Straight pipe length @ _____ gpm = _____ft.
No. of elbows _____ x equiv. length _____ = _____ft.
No. of tees _____ x equiv. length _____ = _____ft.
No. of valves _____ x equiv. length _____ = _____ft.
Friction loss (for above pipe size) per 100' = _____ x total equiv. length _____ft.÷ 100 = _____ft.

Branch No.7: Straight pipe size = _____ in. Straight pipe length @ _____ gpm = _____ft.
No. of elbows _____ x equiv. length _____ = _____ft.
No. of tees _____ x equiv. length _____ = _____ft.
No. of valves _____ x equiv. length _____ = _____ft.
Friction loss (for above pipe size) per 100' = _____ x total equiv. length _____ft.÷ 100 = _____ft.

Branch No.8: Straight pipe size = _____ in. Straight pipe length @ _____ gpm = _____ft.
No. of elbows _____ x equiv. length _____ = _____ft.
No. of tees _____ x equiv. length _____ = _____ft.
No. of valves _____ x equiv. length _____ = _____ft.
Friction loss (for above pipe size) per 100' = _____ x total equiv. length _____ft.÷ 100 = _____ft.

For additional branches use additional sheet(s)

Friction loss due to inlet resistance @ _____gpm = _____ft.

Total return line friction loss = _____ ft.

(enter on page 6)

IX. Total Dynamic Head Required:

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

Use Main Drain Line Loss or Skimmer / Gutter Line Loss, whichever is greater

B. Skimmer / Gutter Line Loss = _____ft.
(from page 4)

C. Return Line Loss = _____ft.
(from page 5)

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

E. Heater Loss = _____ft.
(from manufacturer)

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

G. Total Dynamic Head Required = _____ft.

*For D. above use the following: Cartridge Filter = 23.1 ft. (or per manufacturer's specifications)
Sand Filter = 34.7 ft. (or per manufacturer's specifications)
Pressure D.E. = 57.8 ft. (or per manufacturer's specifications)
Vacuum D.E. = 4.3 ft. (or per manufacturer's specifications)

X. Pump Selection:

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

Pump Rated: _____gpm @ _____TDH Number of pumps: _____

Pump specification sheet with performance curve submitted: Yes No

XI. 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 manufacturer'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 No. :_____

Filter Type: _____ Diameter (each filter):_____inches

Filter Area (each): _____sq. ft. No. of Filters: _____ Total Filter Area: _____sq. ft.

XII. Other Information:

Indicate which chart used for equivalent lengths: _____

Certified Contractor's Signature:_____ Date:_____

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