GWINNETT, NEWTON AND ROCKDALE COUNTY ENVIRONMENTAL HEALTH
SWIMMING POOL HYDRAULIC ANALYSIS

POOL NAME: _____

ADDRESS: _____

DATE: _____

MATERIALS OF CONSTRUCTION

CIRCLE ONE EACH: GUNITE / POURED / OTHER (Specify) _____

INDOOR / OUTDOOR

POOL GEOMETRY *ALL DIMENSIONS SHALL BE IN FEET UNLESS OTHERWISE NOTED*

SHAPE: _____

LENGTH: _____ WIDTH: _____

MIN. DEPTH: _____ MAX. DEPTH: _____ BREAK: _____

PERIMETER: _____ AREA: _____ VOLUME: _____

SLOPE: 1 FOOT IN _____ FEET

DESIGN FLOW RATE (DFR)

DFR = POOL VOLUME/TURN OVER

$$DFR = \frac{GAL}{MIN} = \underline{\hspace{2cm}} \ GPM$$

Type	Turnover Rate
1. Activity Pools	2 hours
2. Dual Use Swimming Pools (Swimming Pools with a water slide and/or one other feature with an avg. depth exceeding 24 inches)	4 hours
3. Diving Pools	8 hours
4. Interactive Water Play Pools/Spray Pads	30 minutes
5. Landing Pools (Flumes, Slides and All other	60 minutes
6. Leisure Rivers	2 hours
7. Spas/Exercise Spas	30 minutes
8. Wading Interactive Pools (max. depth 18 inches)	60 minutes
9. Wading Pools (w/o interactive equipment)	60 minutes
10. Wave Pools	2 hours
11. All other Pools	6 hours

CHECK SKIMMER FLOW RATE. IF TURNOVER RATE IS INADEQUATE FOR MINIMUM SKIMMER OPERATION (25 GPM) THEN DFR MUST BE INCREASED
TO PROVIDE MINIMUM SKIMMER FLOW RATE.

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INLETS   (SEE PAGE 9 FOR INTERACTIVE WATER PLAY POOLS/SPRAY PADS)

NUMBER OF INLETS = SQUARE FEET OF POOL SURFACE AREA/300 or POOL PERIMETER/20, WHICHEVER IS GREATER

NUMBER OF INLETS = _____   =   _____   <mark>ROUND TO NEXT WHOLE NUMBER</mark>

DETERMINING # OF RETURNS NEEDED IN WADING OR TANNING SHELF AREA OF POOL:
1. GALLONS (WADING OR TANNING SHELF AREA)/60=NEEDED GPM
2. TOTAL DFR OF POOL/TOTAL # OF RETURNS = GPM/RETURN
3. # OF RETURNS SHOWN IN WADING OR TANNING SHELF*(GPM/RETURN) SHALL BE > NEEDED GPM

EXAMPLE:
WADING AREA:825 GALLONS   825/60=13.75 (NEEDED GPM)
WADING POOL TURNOVER RATE: 60 MINUTES
TOTAL DFR: 240 GPM   240/25=9.6 (DESIGN FLOW/RETURN)
TOTAL # POOL RETURNS SHOWN: 25
RETURNS SHOWN (WADING OR TANNING): 2   2*9.6=19.2   19.2>13.75

SKIMMERS

FOR POOLS: TWO SKIMMERS SHALL BE PROVIDED FOR THE FIRST FOUR HUNDRED SQ. FT.
OR FRACTION THEREOF OF THE WATER SURFACE AREA AND ONE SKIMMER
FOR EACH ADDITIONAL 400 SQUARE FEET OF SURFACE AREA

FOR SPAS: ONE SKIMMER REQUIRED FOR EVERY 100SF OF SURFACE AREA.

          SURFACE AREA OF POOL: _____
          NUMBER OF SKIMMERS REQUIRED: _____
          NUMBER OF SKIMMERS PROVIDED: _____

SKIMMER FLOW RATE

FLOW THROUGH EACH SKIMMER

SKIMMER FLOW (from above)   =   _____ GPM = _____ GPM
#SKIMMERS PROVIDED

                                        MUST BE A MINIMUM 25GPM

PIPE SIZE SELECTION

SKIMMER LINE SIZE

SELECT PIPE SIZE THAT GIVES MAXIMUM 6 FPS VELOCITY AT DFR

	BRANCHES						
	1	2	3	4	5	6	7
NUMBER OF SKIMMERS SERVED BY PIPE							
PIPE SIZE							
FLOW IN PIPE							
VELOCITY (FPS)							

RETURN LINE SIZE

SELECT PIPE SIZE THAT GIVES MAXIMUM 8 FPS VELOCITY AT DFR

	BRANCHES						
	1	2	3	4	5	6	7
NUMBER OF INLETS SERVED BY PIPE							
PIPE SIZE							
FLOW IN PIPE							
VELOCITY (FPS)							

MAIN DRAIN SIZE   IF FEATURE FLOW IS THROUGH ADDITIONAL DRAINS, THESE PIPES MUST BE LISTED.
SELECT PIPE SIZE THAT GIVES MAX. 6 FPS VELOCITY FROM DFR FOR CIRCULATION AND PUMP CURVE MAX FLOW FOR FEATURES.

DFR: _____

PIPE SIZE: _____

VELOCITY: _____

MAIN DRAIN GRATE SELECTION

IF FEATURE FLOW IS THROUGH ADDITIONAL DRAINS, THESE DRAINS MUST LISTED.

PIPE SIZE: _____   GRATE SIZE: _____

FLOW AREA (EACH): _____   TOTAL FLOW (DFR): _____

FLOW RATE GPM (SPEC SHEET): _____

MAXIMUM FLOW OF PUMP (PUMP CURVE): _____

FRAME AND GRATE CATALOG NUMBER: _____   QUANTITY: _____

CALCULATE RETURN LINE LOSS

STATE WHICH CHART USED: <u>Williams and Hazen</u>

<u>BRANCH 1</u>
PIPE SIZE _____ @ GPM _____ PIPE LENGTH = _____

_____ ELBOWS X EQUIV. LENGTH _____ = _____

_____ TEES X EQUIV. LENGTH _____ = _____

_____ VALVES X EQUIV. LENGTH _____ = _____

TOTAL EQUIVALENT LENGTH = _____

FRICTION LOSS PER 100FT _____ X TOT EQ LENGTH _____ /100 = ☐

<u>BRANCH 2</u>
PIPE SIZE _____ @ GPM _____ PIPE LENGTH = _____

_____ ELBOWS X EQUIV. LENGTH _____ = _____

_____ TEES X EQUIV. LENGTH _____ = _____

_____ VALVES X EQUIV. LENGTH _____ = _____

TOTAL EQUIVALENT LENGTH = _____

FRICTION LOSS PER 100FT _____ X TOT EQ LENGTH _____ /100 = ☐

<u>BRANCH 3</u>
PIPE SIZE _____ @ GPM _____ PIPE LENGTH = _____

_____ ELBOWS X EQUIV. LENGTH _____ = _____

_____ TEES X EQUIV. LENGTH _____ = _____

_____ VALVES X EQUIV. LENGTH _____ = _____

TOTAL EQUIVALENT LENGTH = _____

FRICTION LOSS PER 100FT _____ X TOT EQ LENGTH _____ /100 = ☐

<u>BRANCH 4</u>
PIPE SIZE _____ @ GPM _____ PIPE LENGTH = _____

_____ ELBOWS X EQUIV. LENGTH _____ = _____

_____ TEES X EQUIV. LENGTH _____ = _____

_____ VALVES X EQUIV. LENGTH _____ = _____

TOTAL EQUIVALENT LENGTH = _____

FRICTION LOSS PER 100FT _____ X TOT EQ LENGTH _____ /100 = ☐

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CALCULATE RETURN LINE LOSS (continued)

STATE WHICH CHART USED: <u>Williams and Hazen</u>

<u>BRANCH 5</u>
PIPE SIZE _____ @ GPM _____ PIPE LENGTH = _____

_____ ELBOWS X EQUIV. LENGTH _____ = _____

_____ TEES X EQUIV. LENGTH _____ = _____

_____ VALVES X EQUIV. LENGTH _____ = _____

TOTAL EQUIVALENT LENGTH = _____

FRICTION LOSS PER 100FT _____ X TOT EQ LENGTH _____ /100 = [_____]

<u>BRANCH 6</u>
PIPE SIZE _____ @ GPM _____ PIPE LENGTH = _____

_____ ELBOWS X EQUIV. LENGTH _____ = _____

_____ TEES X EQUIV. LENGTH _____ = _____

_____ VALVES X EQUIV. LENGTH _____ = _____

TOTAL EQUIVALENT LENGTH = _____

FRICTION LOSS PER 100FT _____ X TOT EQ LENGTH _____ /100 = [_____]

<u>BRANCH 7</u>
PIPE SIZE _____ @ GPM _____ PIPE LENGTH = _____

_____ ELBOWS X EQUIV. LENGTH _____ = _____

_____ TEES X EQUIV. LENGTH _____ = _____

_____ VALVES X EQUIV. LENGTH _____ = _____

TOTAL EQUIVALENT LENGTH = _____

FRICTION LOSS PER 100FT _____ X TOT EQ LENGTH _____ /100 = [_____]

FRICTION LOSS DUE TO INLET RESISTANCE AT _____ GPM = [_____] FEET

TOTAL RETURN LINE FRICTION LOSS = _____ FEET
(ENTER ON PAGE 8)

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CALCULATE SKIMMER LINE LOSS

STATE WHICH CHART USED: <u>Williams and Hazen</u>

<u>BRANCH 1</u>
PIPE SIZE _____ @ GPM _____ PIPE LENGTH = _____

_____ ELBOWS X EQUIV. LENGTH _____ = _____

_____ TEES X EQUIV. LENGTH _____ = _____

_____ VALVES X EQUIV. LENGTH _____ = _____

TOTAL EQUIVALENT LENGTH = _____

FRICTION LOSS PER 100FT _____ X TOT EQ LENGTH _____ /100 = [_____]

<u>BRANCH 2</u>
PIPE SIZE _____ @ GPM _____ PIPE LENGTH = _____

_____ ELBOWS X EQUIV. LENGTH _____ = _____

_____ TEES X EQUIV. LENGTH _____ = _____

_____ VALVES X EQUIV. LENGTH _____ = _____

TOTAL EQUIVALENT LENGTH = _____

FRICTION LOSS PER 100FT _____ X TOT EQ LENGTH _____ /100 = [_____]

<u>BRANCH 3</u>
PIPE SIZE _____ @ GPM _____ PIPE LENGTH = _____

_____ ELBOWS X EQUIV. LENGTH _____ = _____

_____ TEES X EQUIV. LENGTH _____ = _____

_____ VALVES X EQUIV. LENGTH _____ = _____

TOTAL EQUIVALENT LENGTH = _____

FRICTION LOSS PER 100FT _____ X TOT EQ LENGTH _____ /100 = [_____]

<u>BRANCH 4</u>
PIPE SIZE _____ @ GPM _____ PIPE LENGTH = _____

_____ ELBOWS X EQUIV. LENGTH _____ = _____

_____ TEES X EQUIV. LENGTH _____ = _____

_____ VALVES X EQUIV. LENGTH _____ = _____

TOTAL EQUIVALENT LENGTH = _____

FRICTION LOSS PER 100FT _____ X TOT EQ LENGTH _____ /100 = [_____]

CALCULATE SKIMMER LINE LOSS (continued)

STATE WHICH CHART USED: <u>Williams and Hazen</u>

<u>BRANCH 5</u>
PIPE SIZE   _____ @ GPM _____   PIPE LENGTH   =   _____

                   _____ ELBOWS X EQUIV. LENGTH _____ = _____

                   _____ TEES X EQUIV. LENGTH _____ = _____

                   _____ VALVES X EQUIV. LENGTH _____ = _____

                          TOTAL EQUIVALENT LENGTH = _____

FRICTION LOSS PER 100FT _____ X TOT EQ LENGTH _____ /100 = [_____]

<u>BRANCH 6</u>
PIPE SIZE   _____ @ GPM _____   PIPE LENGTH   =   _____

                   _____ ELBOWS X EQUIV. LENGTH _____ = _____

                   _____ TEES X EQUIV. LENGTH _____ = _____

                   _____ VALVES X EQUIV. LENGTH _____ = _____

                          TOTAL EQUIVALENT LENGTH = _____

FRICTION LOSS PER 100FT _____ X TOT EQ LENGTH _____ /100 = [_____]

<u>BRANCH 7</u>
PIPE SIZE   _____ @ GPM _____   PIPE LENGTH   =   _____

                   _____ ELBOWS X EQUIV. LENGTH _____ = _____

                   _____ TEES X EQUIV. LENGTH _____ = _____

                   _____ VALVES X EQUIV. LENGTH _____ = _____

                        TOTAL EQUIVALENT LENGTH = _____

FRICTION LOSS PER 100FT _____ X TOT EQ LENGTH _____ /100 = [_____]

FRICTION LOSS OVER THE WEIR AT _____ GPM = [_____] FEET

TOTAL SKIMMER LINE FRICTION LOSS = _____ **FEET**
(ENTER ON PAGE 8)

TOTAL DYNAMIC HEAD (TDH) REQUIRED

RETURN LINE LOSS = _____ FEET (PAGE 5)

FILTER LOSS (WHEN DIRTY)= _____ FEET (FROM BELOW)

SKIMMER LINE LOSS = _____ FEET (PAGE 7)

HEATER LOSS = _____ FEET (PER MANUFACTURER)

OTHER (MULTIPORT, ETC.) = _____ FEET (PER MANUFACTURER)

TDH = _____ FEET

FILTER LOSS WHEN DIRTY
CARTRIDGE FILTER = 23.1 FT   PRESSURE D.E. = 57.8
SAND FILTER = 34.7 FT   VACUUM D.E. = 4.3

PUMP SELECTION   *(SUBMIT CURVE)*

MAKE: _____   MODEL: _____

HORSEPOWER: _____   NUMBER OF PUMPS: _____

_____ GPM @ TDH _____

MAXIMUM FLOW OF PUMP: _____

FILTER SELECTION   *(SUBMIT SPECIFICATIONS)*

FILTER AREA REQUIRED = DFR/FLOW RATE PER SF

FILTER AREA = _____ / _____ = _____

FLOW RATE PER SF:
VACUUM PRE-COAT = 2 GPM/SF, or 2.5GPM/SF WHEN USED WITH CONTINUOUS PRE-COAT MEDIA FEED.
PRESSURE PRE-COAT = 2GPM/SF OF EFFECTIVE FILTER SURFACE AREA
HIGH RATE SAND = 15 GPM/SF (BED DEPTH 15 INCHES)
, 12GPM/SF (BED DEPTH <15 INCHES)
CARTRIDGE = 0.3 GPM/SF

FILTER AREA: _____   NUMBER OF TANKS: _____

SIZE: _____

CATALOG: _____   **MODEL:** _____

INTERACTIVE WATER PLAY POOLS/ SPRAY PADS

1. THE MINIMUM SIZE OF THE TANK SHALL BE EQUAL TO THE VOLUME OF TWO
OF THE COMBINED FLOW OF ALL THE FEATURE PUMPS AND THE FILTER PUMP.

2. WHEN AN UNDERGROUND RESERVOIR IS UTILIZED, AN AUTOMATIC SKIMMER SYSTEM
PROVIDED. A VARIABLE HEIGHT SKIMMER MAY BE USED OR A CUSTOM SURFACE SKIMMER DEVICE MAY
BE SUBSTITUTED IF DEEMED APPROPRIATE BY BOTH THE DESIGN ENGINEER AND THE HEALTH
AUTHORITY.

3. THE FILTER SYSTEM SHALL BE CAPABLE OF FILTERING AND TREATING THE ENTIRE WATER VOLUME OF
THE RESERVOIR TANK WITHIN THIRTY MINUTES.THE FILTER SYSTEM SHALL DRAFT FROM THE TANK AND
RETURN FILTERED AND TREATED WATER TO THE TANK THROUGH EQUALLY SPACED INLET FITTINGS.

4. THE FLOW RATE THROUGH THE FEATURE NOZZLES OF THE WATER FEATURES SHALL BE SUCH AS
NOT TO HARM THE PATRONS AND SHALL NOT EXCEED TWENTY FEET PER SECOND UNLESS JUSTIFIED
BY THE FOUNTAIN SYSTEM MANUFACTURER.

NUMBER OF INLET FITTINGS = SQUARE FEET OF RESERVOIR TANK/300 or PERIMETER OF RESERVOIR
TANK/20, WHICHEVER IS GREATER

NUMBER OF INLET FITTINGS =   _____   =   _____   ROUND TO NEXT WHOLE NUMBER

NOTE:
WHERE WATER IS DRAWN FROM THE POOL TO SUPPLY WATER TO AQUATIC FEATURES THE WATER
MAY BE REUSED PRIOR TO FILTRATION IF;

1. THE DISINFECTANT AND pH LEVELS OF THE SUPPLY WATER ARE MAINTAINED AT REQUIRED LEVELS
AND THE RATIO OF INTERACTIVE PLAY FEATURE, SLIDE, OR OTHER APPARATUS UNFILTERED WATER TO
FILTERED WATER CIRCULATED IN THE RESERVOIR OR POOL SHALL BE NO MORE THAN 3:1 IN ORDER
TO MAINTAIN THE EFFICIENCY OF THE FILTRATION SYSTEM, OR

2. THE APPARATUS OR DEVICE SHALL USE ONLY WATER THAT HAS BEEN FILTERED AND DISINFECTED
IMMEDIATELY PRIOR TO BEING DISCHARGED INTO THE POOL. THAT INCLUDES, BUT IS NOT LIMITED TO,
SLIDES, FOUNTAINS, WATER WHEELS, "MUSHROOMS", AND SQUIRT GUNS.

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