Facility _____ Date _____

Physical Address _____

SWIMMING POOL PLAN REVIEW CALCULATIONS, COMPONENTS AND PIPING (February 2024)

(√) beside item # if correct; (X) if need info or not approved for plan review letter.

1. Pool Type and required turnover rate denominator in minutes

_____

(Use chart to the right)

2. Pool perimeter (lengths + widths) _____**FT**

(circle perimeter = πd)

3. Pool surface area (length X width) _____**SF**

(circle area $A = \pi r^2$)

4. Pool volume _____**GAL**

(length X width X avg. depth X 7.48),

(circular is πr^2 X avg depth X 7.48)

5. Minimum turnover flow rate required

(pool volume (**Ref #4**) ÷ assigned denominator (**Ref #1**))

Ex. 36,000 ÷ 360 = 100 gpm _____ GPM

6. Design Flow per Engineer or Architect _____ GPM

.2518 (h) Use circulation design flow rate for:
1. Calculating # of inlets
2. Determining filter size
3. Determining pipe size for returns, skimmers, and drains.

Pool Type and Turnover Rates
6 Hour Turnover USE (360) Swimming pool (standing water 0+' but usually 3' min water depth) .2518(b), Water slide landing pool >60,000 gal .2543(b), Scuba pool, .2544(e)(2)
3 Hour Turnover USE (180) Water slide landing pool <60,000 gal with auto chemical controller .2543(b)
2 Hour Turnover USE (120) Wading pool (24" max depth).2531(a)(3), Water slide pools <60,000 gal without auto chemical controller .2543(b), Training pools (24-36" depth) .2543(e)(1) Exercise therapy spa >1000 gal .2544(d)(2)
1 Hour Turnover USE (60) Stand- alone children's activity pool(CAP) .2531(b)(2)
.5 Hour Turnover USE (30) Recreational spas, all swim spas, hot tubs .2532(1), Interactive Play Attractions (IAPA), Spray grounds .2543(d)(5), Exercise therapy spa <1000 gal .2544(d)(2) Float Tank .2544(b)(4) 2X every hr. not in use and 2X between @ user

CIRCULATION COMPONENTS

Circulation Pump: Either single speed OR variable speed: Pumps greater than 3 HP require NSF 50 or 3rd party approval

_____**Single Speed Pumps** - TDH is assumed at 65 feet of head unless design engineer provided calculated TDH.

Pump mfg.; _____Model #: _____HP _____

6a. Design Flow: _____GPM at 65 FT TDH.

Max flow per curve _____ GPM

_____**Variable speed pumps OR pumps with variable frequency drives**. This set up allows the designer to establish a "custom designed flow range" using the infinite flow ranges available on energy efficient pumps. This range will include the minimum turnover rate **(#5)** and the maximum flow rating allowed by the system (i.e., pipe size, # of inlets, # of skimmers, filter, etc.) The pump can be set to a custom design flow, which must fall within this range. The designer must specify the most limiting component of the system and provide a supporting pump curve for the chosen pump.

Pump Mfg.: _____Model #: _____

6b. Design Flow Range: _____ to _____GPM Limiting Factors _____.

Max flow per curve _____ GPM* for drain covers and sumps.

* Use the highest GPM from the fastest speed unless a limiting factor yields a flow range maximum.

7. Number of inlets required _____ , Plan shows _____ (Design flow in **Ref #6 ÷ 20 GPM)**, min 4 for pools, min 2 for wading pools and spas, and no part of pool more than 25 ft. from any inlet AND adjustable as required per .2518(i)(1-4), .2531(a)(2),.2532(3) For spas, uniform location for providing uniform circulation of water .2532(2) Inlet Mfg. & Model # _____

8. Filter (sand, DE, cartridge) sized properly per .2519 **Reference NSF.org**

Type Filter	Filter Rate / SF
High-Rate Sand	**15 – 20** gpm per sf of filter surface area
Rapid Rate Sand	**3** gpm per sf of filter surface area
Vacuum Sand	**15** gpm per sf of filter surface area
DE with slurry	**2.5** gpm per sf of filter surface area
DE without slurry	**2** gpm per sf of filter surface area
Cartridge	**.375** gpm per sf of filter surface area

Filter Mfg. & Model # _____

Number of Filters: _____

Design Flow (**6**):_____≤ Filter Flow Rate_____

Design Flow Rate **Ref # 6 ÷ FILTER RATE** listed in chart above = SF of filter surface area required. Refer to filter specification sheet for filter surface area provided. If the filter square footage is not adequate for design flow rate, more than 1 filter will be needed or a different model # required.

9. Surface Overflow systems: Skimmers, Gutter System or Combined

Number of NSF skimmers required: _____ Plan shows _____ (Pool surface area **Ref #3 ÷ 400sf** or fraction thereof for swimming and wading pools, **Ref #3 ÷ 100 sf** for spas or fraction thereof per .2518(k)(3), .2531(a)(2) and .2532(4)(b), G.S. 130A-282(c)) & protected from air entrapment by auto-fill, fill spout/ hose or flooded suction on the pump per .2518 (l). Auto-fill mfg. # _____
No skimmer equalizers allowed for new construction.
Skimmer Mfg. _____& Model # _____
Max flow for Skimmer provided per NSF Listing. _____ GPM; may require additional skimmers if allowed flow per skimmer is inadequate.

If Gutter pool with Balance Surge Tank Capacity, plan shows tank capacity: _____ gallons
Ex: 1 gal X **(Ref #3)** = required size of surge tank in gallons.
Note: This can include capacity of the piping system if submitted. (1 gallon per SF of pool surface area required per .2518(k)(2)(b))

CIRCULATION PIPING AND SUCTION OUTLETS

10. **Circulation Drain Covers & SUMPS – (Bather accessible submerged suction outlets SOFAs are not allowed in wading pools less than 18" deep References: .2518(J) (1-3), .2532(4)(a) for spas, .2539 (a-c), ANSI/ PHTA/ ICC 7 – 2020 and ANSI/ APSP/ ICC -16 2017**
Number of drains provided: _____
    - Blockable or unblockable per manufacturer (circle one)
    - Located within 15 ft. from a side wall
    - Located in deepest section or other means for draining pool provided
    - Dual drains connected by T pipe at least 3' apart at center or on different planes of pool structure.
    - Connected dual drains are less than 30' apart
    - Configuration must meet ANSI/ PHTA/ ICC page 7 and 8
    - If no drains are provided, provisions for emptying pool completely provided

Cover Mfg. & Model # _____VGBA – 2017 spec sheet? _____ Life Span of Cover _____ years
Maximum Flow of Drain Cover: _____ GPM, floor_____ or wall _____, Does flow rating exceed max flow of pump (#6a or b)? Y/N

Feature drain sump Use **VGB 2017 drain cover Manufacturer Installation Instructions** to verify sump requirements
***** FIELD BUILT SUMPS ARE ANY SUMP NOT SUPPLIED BY THE COVER MANUFACTURER per ANSI-PHTA-ICC 7 - 2020**

Matching Manufactured Sump	OR Field Built Sump Measurements
Model #	Field built sump as specified by cover manufacturer. Y/N Pipe size outlet of sump_____, Pipe depth _____ Pipe Orientation: side/ bottom, Sump Depth _____

Hydrostatic Relief Valve or Drainage Provided per .2515 (b). Manufacturer and Model # _____
***Obtain a copy of final drain safety data compliance form for the file signed by the engineer or architect prior to first permit.**

11. **Circulation main drain pipe size** required using pipe sizing chart below: _____**"** Plan shows _____**"**
Pipe size must be capable of carrying **100% design flow of** circulation pump **(Ref #6)** per .2518(c)
Any flexible piping on spa shells must meet .2518(d)) In spas, T piping must be the same diameter of the main drain outlet per .2532(4)(a).

12. **Skimmers pipe size** required _____**"** (Use Suction pipe sizing at bottom of page) Plan shows _____"
(Pipe must handle **100% of design flow rate** (**Ref #6**) per.2518(c).

Or gutter system overflow pipe size required _____**"** Plan shows _____"
Must handle 100% of design flow per **.**2518(c) (**Ref #6**) Use pipe sizing chart to check max flow per pipe.

13. **Inlet return pipe size** required _____**"** Plan shows _____"
Must handle 100% design flow of discharge (**Ref #6**) per **.**2518(d) and reduction in pipe branches must be sized to handle flow of inlets in each branch.

PVC Sch. 40 Pipe Sizing Chart per .2518(d)										
pipe size	1"	1.5"	2"	2.5"	3"	4"	6"	8"	10"	12"
Suction PVC pipe @6ft/sec (all drains, skimmers, gutters)	16	38	62	89	138	238	539	935	1474	2093
Discharge or Returns (inlets) PVC pipe @10ft/sec	27	63	104	149	230	396	899	1559	2457	3488

14. **Disinfectant Method**: Verify NSF & properly sized per volume of pool per manufacturer spec sheet? _____ **Reference NSF.org**
Mfg. & Model # _____
If salt system, cell capacity/ # cells _____. If salt generator is primary disinfectant, review manufacturer sizing. Per .2535 (6), "Automatic chlorine, bromine (and acid) pumps shall be automatically prevented from operating when the circulation pump is not in operation."

15. **Vacuum cleaning system** provided per .2518(f) (vacuum ports located on pool wall 6" - <18" below water level.) **If separate vacuum port is required**, self-closing caps requiring tools provided per .2518 (f) Skimmer vacuums may be used in pools with 2 or fewer skimmers and negate the need for a separate vacuum port.

    Vacuum piping, if separated from skimmer operation may be suction or discharge and should be sized according to vacuum manufacturer's requirements.

16. **Valves provided** to control flow from drains, surface skimmers or surface overflow systems, and vacuuming cleaning system .2518 (c) and (f)

17. **Drainage discharged through air gap** from pool overflow, deck drains and filter backwash per .2513(b)

18. **Lighting Required – Pool Lights** .5 lumens X SF of pool = wattage minimum. Compare to lighting on plans and if night swimming is requested. Nighttime swimming must meet .2524(b).

19. **Minimum deck** width required _____ ft. per .2522 (a) – (e) & (i) (**Ref #3** pool surface area)

Minimum Deck Requirements

	Outdoor Pool	Indoor Pool	Wading Pool	Spa	Interactive Play	Permanent Structure
Deck Clearance	< 1600 sf = 6 ft > 1600sf = 8 ft	5 ft	4 ft	4 ft at least ½ around	Not Required	5 ft around diving board, handrail, slide, or other permanent structure
Vertical Clearance	NA	7 ft	7 ft	7 ft	Not Required	13 ft above board See Rule .2517

.2522 (a-e, i), .2543 (10), Special purpose pools such as waterslides and wave pools may vary from the minimum requirements to accommodate features. ADA Chairs – NC Building Code enforced. New constructed pools over 300' perimeter may be required 2 access entries (lift and ramp). Lifts are permitted to infringe on pool decks but cannot block emergency egress corridors required for fire safety. Deck slope ¼ to ½"/ft to drain and slip resistant.

20. **Ladders, steps, stairs, handrails** required _____

    If >2' deep and ≤5' at least 1 exit required for every 75' of perimeter. For areas > 5' deep, 1 ladder or recessed step is needed in the deep portion. If pool width is > 30 ft, 2 ladders/recessed steps are required on either side near the deep portion. Read all of .2521. Sun shelf with stair counts as a set of stairs.

21. **Pool bather load** _____ (Pool surface area (**Ref #3**) ÷ applicable # in chart below and round down) **POOL DEPTH(s)** _____

Portion of Pools <5 ft	**15**sf/person per .2529(1)
Portion of Pools >5 ft (-300sqft at diving boards)	**24**sf/person per .2529(2)
Spas, wading pools, CAP	**10**sf/person per .2529(3) &.2531(a)(8)
Interactive play attraction splash zone	**25**sf/person per **.**2529(4)

22. **Restroom fixtures** based on bather load. (.2526) Use chart for bath houses for male/ female facilities. At hotel, motel, condo, or apartment complex where the farthest unit is more than 300' from the pool as measured along walkways, only a toilet and lavatory are required.

    Divide **Ref #22** bather load equally between men and women.

Men	Toilet	Lavatory	Urinal	Showers	**Women**	Toilet	Lavatory	Showers
0-50	1	1	0	1	0-50	1	1	1
51-100	1	1	1	1	51-100	2	2	1
101-200	2	2	2	1	101-200	3	3	1
201-300	2	2	2	2	201-300	4	4	2
301-400	3	3	3	2	301-400	5	5	2
401-500	3	3	3	3	401-500	6	6	3
501-750	5	5	5	3	501-750	8	7	3

*****If rinse showers are located on pool deck, 1 per every 200 bathers
***Shower drains are enforced by the building codes department.**
Typically, showers in bathhouses drain to sewer and cold-water showers on pool decks drain to the deck drains.

23. **Chemical storage room** minimum size: _____ sf (min 5sf for 10Kgal + 1sf @ additional 3000gal per .2534(2))

24. **Flow Meter:** Mfg. & Model _____

The flow meter must have a range that is inclusive of the minimum turnover rate, design flow, and include head space above the design flow.

Range: _____**-** _____**. Minimum turnover:** _____**Design flow:** _____**. Upper limit:** _____

Fits return pipe diameter: Y/N _____"
Require horizontal length of pipe **before**_____" flow meter; **after**_____" flow meter

WATER FEATURES OR HYDROTHERAPY JETS (if available) Use additional sheets for extra pumping systems.

Features such as water slides, waves, rapids, lazy rivers, interactive play features can be included in main circulation system **IF** the drain(s) and pipe(s) are sized to handle the flow of all pumps without exceeding flow velocities in .2518 per .2543 (d) (3). Pump and piping reference is .2518. 2531(b)(1) requires separate feature pumps in children's activity pools so they can be turned off at times.

25. **Features such as waterfalls and decorative fountains located ON POOL DECKS** must meet the following per .2515(g)(1-6):
__not occupy more than 20% or the pool perimeter in **Ref #2**
__if located next to water > 5', feature shall not be more than 20' wide
__not encourage climbing above deck level with handholds and footholds.
__walkway provided to permit free access around decorative feature as wide as the lesser of 5 feet or required deck width in .2522(e)
__shall not obstruct the view of any part of the pool from any seating area
__ Feature with moving water must be separate from pool re-circulation system. (separate plumbing with an isolation valve)

26. **Fountains installed WITHIN SWIMMING POOL must meet the following per .2516(f)(1-5):**
__ be located in water <18" in depth
__ must be recommended by manufacturer for use in public pools (not residential)
__ shall be installed in accordance with manufacturer's instructions
__ shall be separate from the circulation system
__ shall not releasee water at a velocity > 10' per second above water.

27. **Feature(s) Design Flow**: **The designer must provide manufacturer spec sheets with flow ranges for features to operate properly and a supporting pump curve for the chosen pump to assure pump is adequate. Include ALL features on the same pumping system.**

Feature List with applicable flows: Example – Pentair ColorVision LED bubbler @ 15 GPM with ½" nozzle diameter
a_____ **b.** _____**c.** _____ **d.** _____
Design Flow Range for TOTAL features connected to feature pump to function properly: _____ **to** _____**GPM**
Pump(s) mfg.; _____**Model #**: _____
Max flow per pump curve _____ **GPM** (Use the lowest TDH on highest speed for VSP. If more than one feature pump connects to feature drains, add both flows for total maximum flow for sizing VGB cover): Total maximum flow of both pumps _____ GPM

28. **Feature pump suction pipe size** required _____**" Plan shows**_____**"**
Use pipe sizing chart on page 2 per .2518 (d); Pipe size must be capable of carrying **100% design flow (Ref #25)** of feature pump provided per .2518(c). Use top of the feature flow range for sizing pipe. Any flexible piping on spa shells meets .2518(d)

29. **Feature Drain Covers & SUMPS – (Bather accessible submerged suction outlets SOFAs are not allowed in wading pools less than 18" deep References: .2518(j)(1), 2518(j)(3), .2532(4)(a) for spas, ANSI/ PHTA/ ICC 7 – 2020 and ANSI/ APSP/ ICC -16 2017**
Number of drains provided: _____
- Blockable or unblockable per manufacturer (circle one)
- Located within 15 ft. from a side wall
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- Dual drains connected by T pipe at least 3' apart at center or on different planes of pool structure.
- Connected dual drains are less than 30' apart
- Configuration must meet ANSI/ PHTA/ ICC page 7 and 8
- If no drains are provided, provisions for emptying pool completely provided
- (Use VGB 2017 drain cover **Manufacturer Installation Instructions** to verify sump requirements

Cover Mfg. & Model # _____**VGBA – 2017 spec sheet?** _____ **Life Span of Cover** _____ years
Maximum Flow of Drain Cover: _____ **GPM, floor**_____ **or wall** _____**,**
(Cover rating must be higher than max feature pump flow per *.2539(c)(2).)
Feature drain sump
***** FIELD BUILT SUMPS ARE ANY SUMP NOT SUPPLIED BY THE COVER MANUFACTURER per ANSI-PHTA-ICC 7 - 2020**

Matching Manufactured Sump	OR Field Built Sump Measurements
Model #	Field built sump as specified by cover manufacturer. Pipe size outlet of sump____, Pipe depth _____ Pipe Orientation: side/ bottom

***Maintain a copy of final drain safety data compliance form for the file signed by the engineer or architect at final construction visit and prior to first permit.**

30. **Feature return pipe size** required _____**" Plan shows**_____**"** (Use chart below.)
(Pipe size must carry 100% discharge design flow of feature pump provided (**Ref #28**). Use top of the range for sizing pipe. Check branch pipe sizes for flow to each feature.)