EQUIPOTENTIAL BONDING GRID:

ALL METAL PARTS SPECIFIED IN 680.26(B) MUST BE BONDED TO AN EQUIPOTENTIAL BONDING GRID WITH A SOLID COPPER CONDUCTOR NOT SMALL THAN 8 AWG. THE TERMINATION OF THE BONDING CONDUCTOR MUST BE MADE BY EXOTHERMIC WELDING, LISTED PRESSURE CONNECTORS, OR LISTED CLAMPS THAT ARE LABELED AS SUITABLE FOR THE PURPOSE. THE QUIPOTENTIAL BONDING GRID MUST EXTEND UNDER PAVED WALKING SURFACES FOR 3 FEET HORZONTALLY FROM THE WATER (680.26(C)).

THE EQUIPOTENTIAL BONDING GRID MUST BE FORMED FROM EITHER OR BOTH OF:

THE STRUCTURAL REINFORCING STEEL OF A CONCERTE PERMANENTLY INSTALLED POOL, OUTDOOR SPA, OR OUTDOOR HOT TUB, TIED TOGETHER BY THE USUAL STEEL TIE WIRES.

THE METAL WALLS OF A PERMANENTLY INSTALLED POOL, OUTDOOR SPA, OR OUTDOOR HOT TUB

THE EQUIPOTENTIAL BONDING GRID CAN BE CONSTRUCTED WITH 8 AWG BARE SOLID COPPER CONDUCTORS BONDED TO EA OTHER AT ALL POINTS OF CROSSING BY EXOTHERMIC WELDING, LISTED PRESSURE CONNECTORS OF THE SET SCREW OR COMPRESSION TYPE, LISTED CLAMPS, OR OTHER LISTED FITTINGS (250.8).

THE EQUIPOTENTIAL BONDING GRID MUST COVER THE CONTOUR OF THE PERMANENTLY INSTALLED POOL, OUTDOOR SPA OR HOT TUB AND DECK EXTENDING 3 FEET HORIZONTALY FROM THE WATER. THE EQUIPOTENTIAL BONDING GRID MUST BE ARRANGED IN A 1-FOOT BY 1-FOOT NETWORK OF 8 AWG CONDUCTORS, WITH A TOLERANCE OF 4 INCHES.
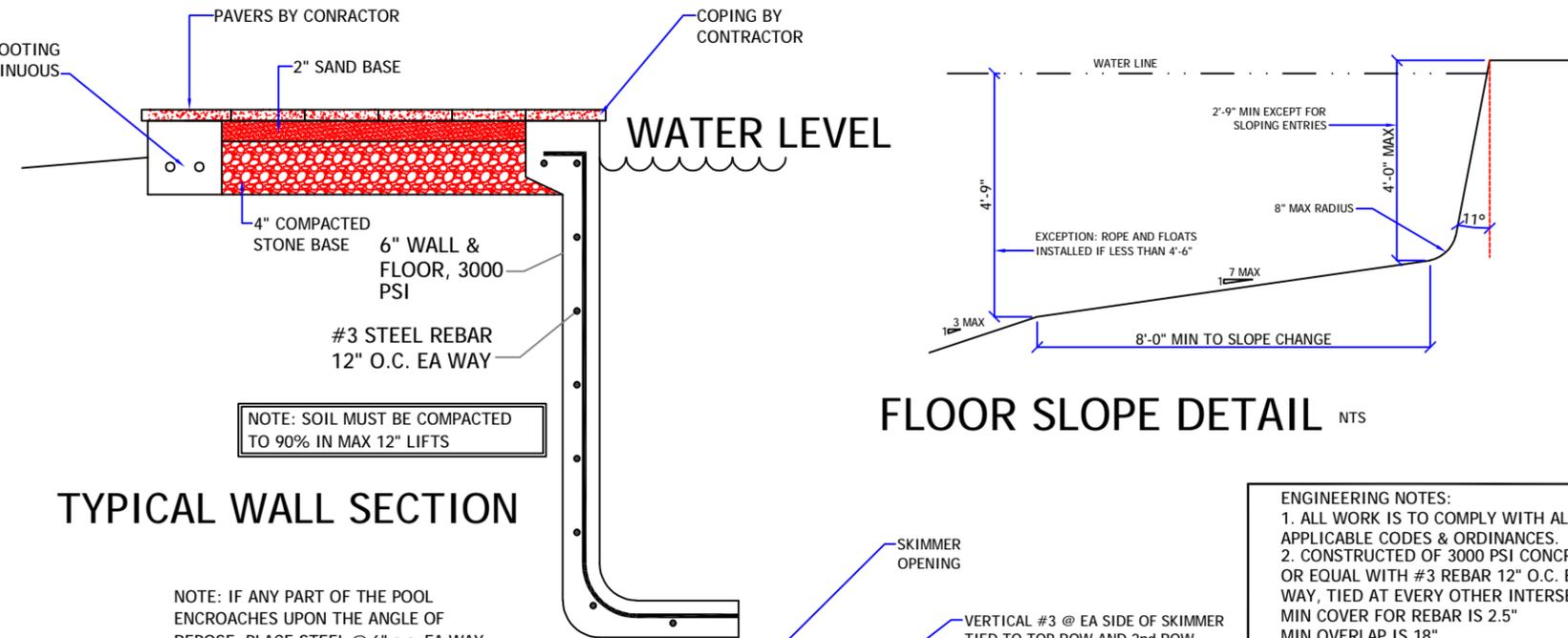
EXCEPTION: THE EQUIPOTENTIAL BONDING GRID SHALL NOT BE REQ'D TO BE INSTALLED UNDER THE BOTTOM OR VERTICALLY ALONG THE WALLS OF VINYL LINED POLYMER WALL, FIBERGLASS COMPOSITE, OR OTHER POOLS CONSTRUCTED OF NON-CONDUCTIVE MATERIALS.

ANY METAL PARTS OF THE POOL, INCLUDING METAL STRUCTURAL SUPPORTS, SHALL BE BONDED IN ACCORDANCE WITH 680.26(B). POURED CONCRETE, PNEUMATICALLY-APPLIED CONCRETE, AND CONCRETE BLOCK SHALL BE CONSIDERED CONDUCTIVE MATERIAL

GENERAL NOTES:
1) Per UL listing, pool motors require GFCI protection
2) FSPA requires the motor controller to be capable of 2 speeds, a time clock will not satisfy this unless it has 2 trip settings.
3) If heater installed (other than solar), it must comply with FBC-EC403.9.1 & have a cover per 403.9.3 (this applies to mechanical (not solar) heaters---cover required)
4) Outdoor swimming pools shall be provided with a barrier complying with Sections R4501.17.1.1 through R4501.17.1.14.
5) NEC 680.26(C) requires a conductive metal part of 9 sq., in. in direct contact with the pool water.
6) R4501.17.1.9 All doors and windows providing direct access from the home to the pool shall be equipped with an exit alarm complying with UL 2017 that has a minimum sound pressure rating of 85 dB at 10 feet.
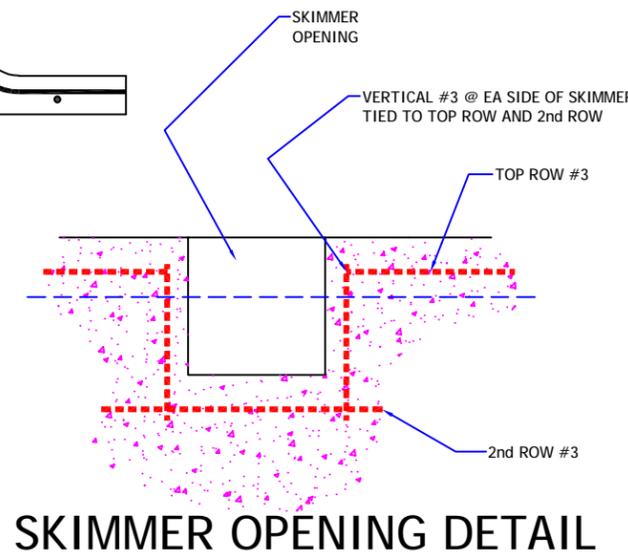
STEPS: MIN. TREAD 10" x 12", 7" MIN RISER, 12" MAX RISER.
INTERMEDIATE TREADS AND RISERS TO BE UNIFORM.

PAVERS BY CONRACTOR
10" x 12" DEEP STRIP FOOTING w/ (2) #5's CONTINUOUS
2" SAND BASE
COPING BY CONTRACTOR

WATER LEVEL

4" COMPACTED STONE BASE
6" WALL & FLOOR, 3000 PSI
#3 STEEL REBAR 12" O.C. EA WAY

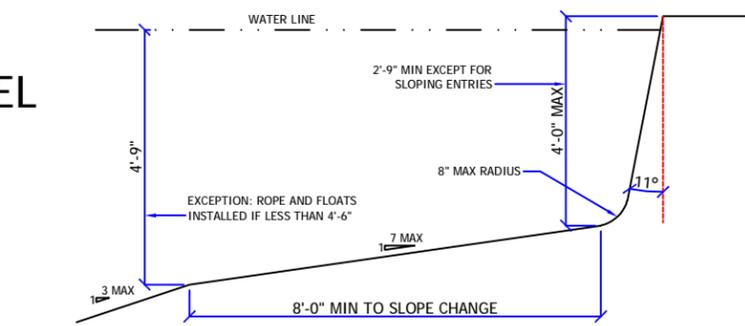NOTE: SOIL MUST BE COMPACTED TO 90% IN MAX 12" LIFTS

TYPICAL WALL SECTION

NOTE: IF ANY PART OF THE POOL ENCROACHES UPON THE ANGLE OF REPOSE, PLACE STEEL @ 6" o.c. EA WAY IN AREAS OF QUESTION

NOTE: IF ANY PART OF THE POOL ENCROACHES UPON THE ANGLE OF REPOSE, PLACE STEEL @ 6" o.c. EA WAY IN AREAS OF QUESTION

WATER LINE
2'-9" MIN EXCEPT FOR SLOPING ENTRIES
4'-9"
4'-0" MAX
8" MAX RADIUS
11°
EXCEPTION: ROPE AND FLOATS INSTALLED IF LESS THAN 4'-6"
7 MAX
3 MAX
8'-0" MIN TO SLOPE CHANGE

FLOOR SLOPE DETAIL NTS

SKIMMER OPENING
VERTICAL #3 @ EA SIDE OF SKIMMER TIED TO TOP ROW AND 2nd ROW
TOP ROW #3
2nd ROW #3

SKIMMER OPENING DETAIL

ENGINEERING NOTES:
1. ALL WORK IS TO COMPLY WITH ALL APPLICABLE CODES & ORDINANCES.
2. CONSTRUCTED OF 3000 PSI CONCRETE OR EQUAL WITH #3 REBAR 12" O.C. EACH WAY, TIED AT EVERY OTHER INTERSECTION. MIN COVER FOR REBAR IS 2.5" MIN OVERLAP IS 18".
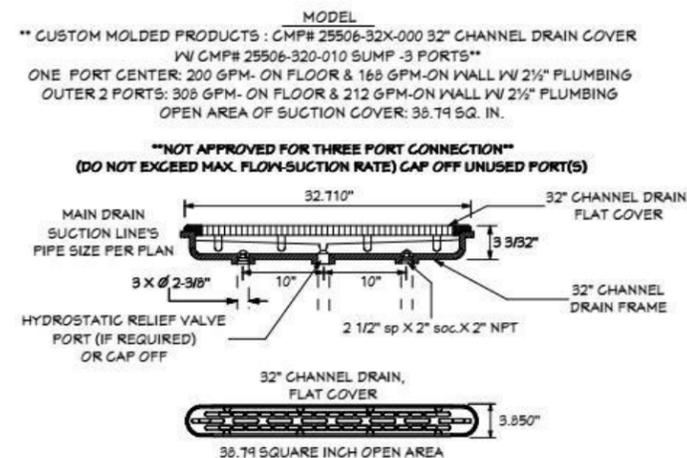3. N/A
4. ASSUMED SOIL BEARING = 2 KSF
5. CIRCULATION SYSTEMS, COMPONENTS, & EQUIPMENT SHALL COMPLY W/ NSF 50.
6. INSTALL CONTROL JOINTS @ 20'-0" ON CENTER IN POOL DECKING.
7. PLANS TO CONFORM TO NEC 2020
8. 2023 FBC RESIDENTIAL 8th EDITION APSP13
9. CONCRETE STAIRS ARE 12" TREAD WIDTH AND 10" MAXIMUM HEIGHT
10. ALL CONSTRUCTION SHALL COMPLY WITH ANSI 5-03, 2020 NEC ARTICLE 680, & ANSI-NSPI 3-99 IN-GROUND SPA CONSTR.

*11. ENGINEERS DESIGN IS FOR STRUCTURAL ONLY. DESIGN OF PIPING/EQUIPMENT ETC.

BY POOL CONTRACTOR

FENCE REQUIREMENTS:
1. MINIMUM 48" HEIGHT
2. 2" MAX VERTICAL CLEARANCE BETWEEN GRADE & BARRIER BOTTOM.
3. MAX OPENING SHALL NOT ALLOW PASSAGE OF 4" SPHERE.
4. FENCE POSTS WILL BE LOCATED ON POOL-SIDE OF FENCE.
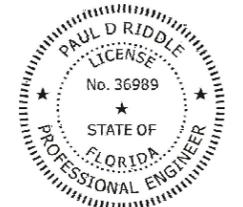5. GATE WILL BE SELF-LOCKING WITH APPROVED LOCKING DEVICE.

MODEL
** CUSTOM MOLDED PRODUCTS : CMP# 25506-32X-000 32" CHANNEL DRAIN COVER W CMP# 25506-320-010 SUMP -3 PORTS**
ONE PORT CENTER: 200 GPM- ON FLOOR & 168 GPM-ON WALL W/ 2½" PLUMBING
OUTER 2 PORTS: 308 GPM- ON FLOOR & 212 GPM-ON WALL W/ 2½" PLUMBING
OPEN AREA OF SUCTION COVER: 38.74 SQ. IN.

NOT APPROVED FOR THREE PORT CONNECTION
(DO NOT EXCEED MAX. FLOW-SUCTION RATE) CAP OFF UNUSED PORT(S)

32.710"
32" CHANNEL DRAIN, FLAT COVER
MAIN DRAIN SUCTION LINE'S PIPE SIZE PER PLAN
3 3/32"
9 X Ø 2-3/8"
10"   10"
32" CHANNEL DRAIN FRAME
HYDROSTATIC RELIEF VALVE PORT (IF REQUIRED) OR CAP OFF
2 1/2" sp X 2" soc.X 2" NPT
32" CHANNEL DRAIN, FLAT COVER
3.850"
38.74 SQUARE INCH OPEN AREA

ENGINEER'S SEAL

PAUL D. RIDDLE, P.E.
P.E. 36989

PAUL D RIDDLE
LICENSE
No. 36989
STATE OF
FLORIDA
PROFESSIONAL ENGINEER

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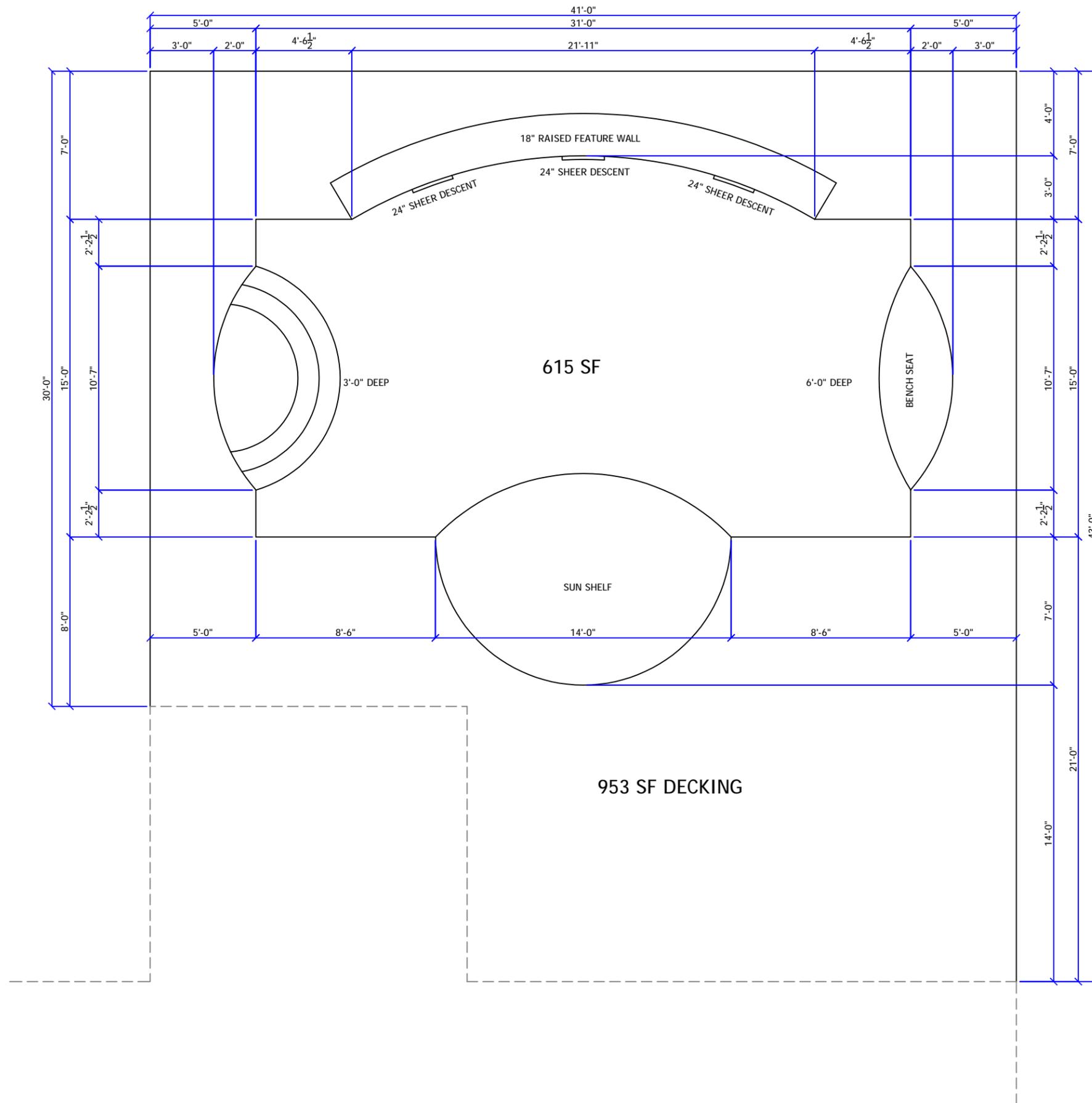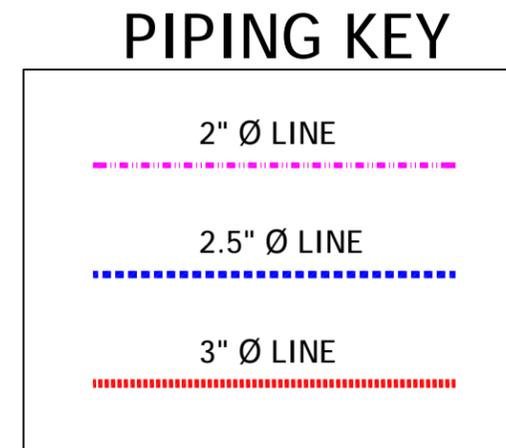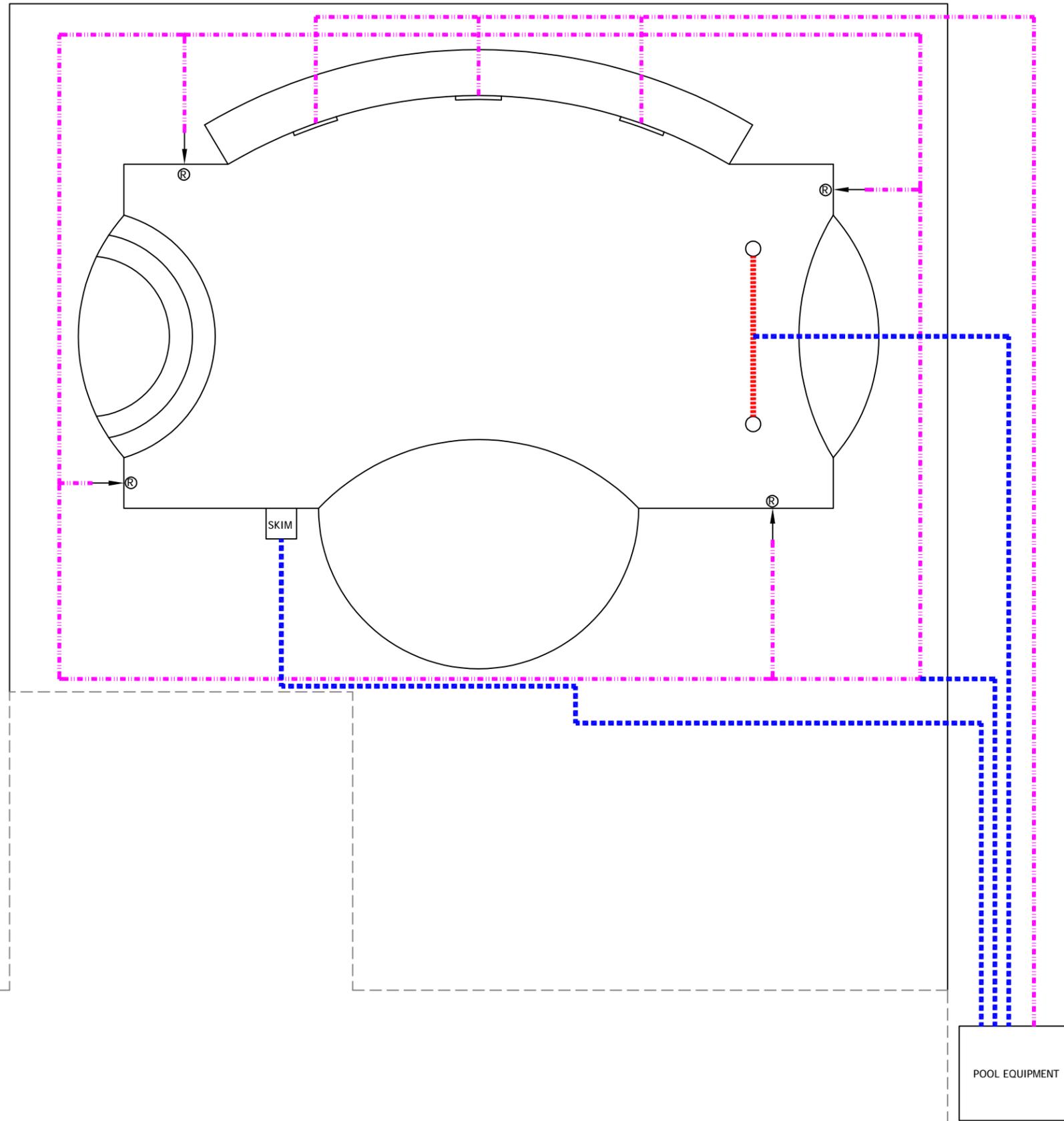
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A CUSTOM DESIGN FOR
THE RICHRDSON RESIDENCE
AQUATIC ART POOLS AND SPAS

ENGINEER'S SEAL

PAUL D. RIDDLE, P.E.
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A CUSTOM DESIGN FOR
THE RICHRDSON
RESIDENCE
AQUATIC ART POOLS AND SPAS

Page:

2 of 4

3/16" = 1'-0" SCALE

18" RAISED FEATURE WALL

24" SHEER DESCENT

24" SHEER DESCENT

24" SHEER DESCENT

615 SF

3'-0" DEEP

6'-0" DEEP

BENCH SEAT

SUN SHELF

953 SF DECKING

41'-0"
31'-0"
5'-0"
5'-0"
3'-0"
2'-0"
4'-6½"
21'-11"
4'-6½"
2'-0"
3'-0"

7'-0"
4'-0"
7'-0"
3'-0"
2'-2½"
2'-2½"

30'-0"
15'-0"
10'-7"
10'-7"
15'-0"
43'-0"

2'-2½"
2'-2½"

8'-0"
7'-0"
5'-0"
8'-6"
14'-0"
8'-6"
5'-0"

21'-0"
14'-0"

DATE

ENGINEER'S SEAL

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A CUSTOM DESIGN FOR
THE RICHRDSON
RESIDENCE
AQUATIC ART POOLS AND SPAS

SKIM

POOL EQUIPMENT

PIPING KEY

2" Ø LINE

2.5" Ø LINE

3" Ø LINE

Riddle Consulting Engineers, Inc.

structural
civil
mechanical

Paul D. Riddle, P.E.
Senior Engineer
COA: 00004759

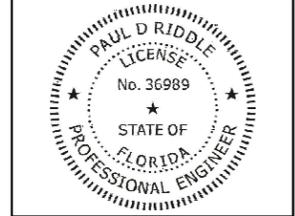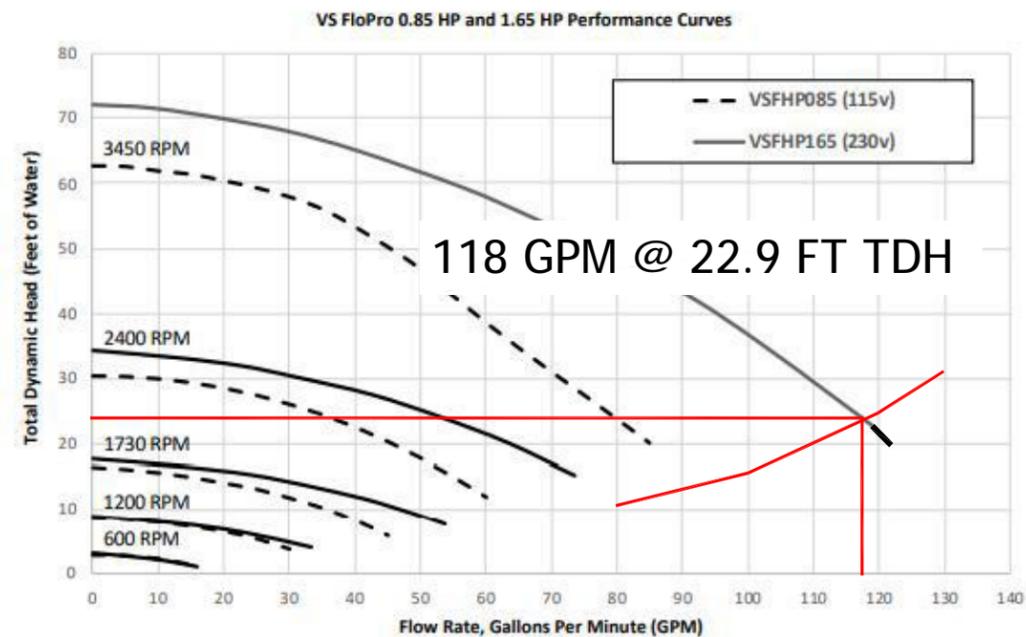| ADDRESS | 1720 SE CTY HWY 484 |
	BELLEVIEW, FL 34420
PHONE	(352) 245-7041
FAX	(352) 245-5458
WEB	WWW.RIDDLEENGINEERING.COM

SPECIFICATIONS

Model No.	THP	WEF⁵	Voltage	Max Watts	Amps	Union Size	Rec. Pipe Size⁴	Carton Weight	Overall Length
VSFHP165JEP VSFHP165AUT	1.65	9.118	230VAC	1,600 W	10.5	2" × 2"	1 1/2 – 2 1/2"	46 lbs	24"
VSFHP085JEP VSFHP085AUT	0.85	11.900	115VAC	975 W	10.0	2" × 2"	1 1/2 – 2"	46 lbs	24"

PERFORMANCE

VS FloPro 0.85 HP and 1.65 HP Performance Curves

- - - VSFHP085 (115v)
——— VSFHP165 (230v)

118 GPM @ 22.9 FT TDH

(Chart: Total Dynamic Head (Feet of Water) vs Flow Rate, Gallons Per Minute (GPM); curves labeled 3450 RPM, 2400 RPM, 1730 RPM, 1200 RPM, 600 RPM)

AQUATIC ART   **RICHARDSON**
1/8/2026
==

MINIMUM FLOW REQ'D =   129.50 GPM
POOL VOLUME : SURFACE AREA X AVG DEPTH X 7.48 GAL / CF
VOL = **615** SF X **4.5** FT DEEP **20700.9** Gallons
TURNOVER TIME: No. Hours X 60 min / ho e
6 hours x 60=   **360** minutes
MAX POOL FLOW RATE: GALLONS / TURNOVER = FLOW RATE
   20700.9 GAL /   360 minutes =   57.5025 GPM
   POOL FEATURES
JETS, SHEER DE   **3** WATER FEATURE   GPM EA =   **72** GPM
   TOTAL SUGGESTED POOL FLOW RATE: **129.50** GPM

$V = 1.318 \, C \, R^{.63} \, S^{.54}$

SUPPLY (RETURN) PIPING

- **2.5** in = NOMINAL DIAMETER
- 2.45 in = D ACTUAL diam
- 0.2038 ft = D diam
- 140 = C, coefficient of roughness
- 4.6951 in^2 = A pipe
- 0.0326 ft^2 = A pipe
- **118.00** gpm / line   0.2629234 cfs
- 118.00 gpm = TOTAL FLOW IN 1 LINES
- 0.2629 cfs = Q flow M
- 8.0639 f/sec = V = Velocity
- 0.0509 ft = R = Hydraulic Radius = A / P

- 0.0979 ft/ft = S hydraulic gradient
- **18** ft = pipe length average
- **1.76** ft = hf = head loss due to friction
- 0.76 psi   0.00763

SUCTION PIPING

- **2.5** in = NOMINAL DIAMETER
- 2.45 in = D ACTUAL diam
- 0.2038 ft = D diam
- 140 = C, coefficient of roughness
- 4.6951 in^2 = A pipe
- 0.0326 ft^2 = A pipe
- **59.00** gpm =   0.1314617 cfs
- **2** No of Suction Pipes
- 0.1315 cfs = Q flow rate
- 4.0319 f/sec = V = Velocity
- 0.0509 ft = R = Hydraulic Radius = A / P

- 0.0271 ft/ft = S hydraulic gradient
- **46** ft = pipe length average
- **1.25** ft = hf = head loss due to friction
- 0.54 psi   0.0054019

   FT   PSI
   22.9   9.91373

BRANCH P model

				FLOW	STR		
2 in @ 6 fps max BRANCH =	61.54	GPM		GPM	FT	PSI	
2 in @ 8 fps max TRUNK =	82.06	GPM		80.00	10.5	4.55	
2 in @ 10 fps max RETURN =	102.57	GPM		100.00	16.0	6.93	
3 in @ 3 fps max RETURN =	67.95	GPM MAIN		120.00	24.3	10.52	
			DRAIN	130.00	30.2	13.07	
				140.00	36.6	15.84	

OTHER PRESSURE LOSSES   per mnfg
- **6.98** FT = FILTER TDH LOSS   **JANDY PRO SERIES CS150-250 CARTRIDGE FILTER**
- FT = HEATER TDH LOSS
- **6.98** FT = TOTAL TDH LOSS

MINOR LOSSES (SUPPLY & SUCTION COMBINED)
$h (lost) = KL * V^2 / (2*g)$

		K	h (lost) ft
2 ea = # tees thru side outlet		1.75	3.53
2 ea = # gate valves		1	2.02
1 ea = # check valves		0.2	0.20
0 THERAPY JET		21.73	0.00
0 ea = # 45 deg ELL		0.4	0.00
6 ea = # 90 deg ELL		0.75	4.54
0 ea = Reducer D2=	0.5	0.0871791	0.00 D1/D2= 4.89
		TOTAL =	10.30 ft

PAUL D. RIDDLE
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RIDDLE CONSULTING ENGINEEERS
1720 SE COUNTY HWY 484
BELLEVIEW, FLORIDA 344TO
CERT OF AUTH: 4759

ELEVATION DIFFERENCE
0.00 ft = delta Z
   model

2.62 FT = TOTAL FRICTION HEAD LOSS AFTER SPLIT @ LOOP

22.90 FT = TOTAL HEAD LOSS IN SYSTEM @   **118.00** GPM
9.91 PSI

PUMP SELECTION :   **JANDY 1.65 VS PUMP**
   model: **VARIABLE SPEED**

SUCTION OUTLET COVER: **MUST EXCEED**   **118.00** GPM FLOW RATE
   model   **32" CHANNEL DRAIN OR 2 OUTLET COVERS**

SYSTEM FLOW RATE MUST NOT EXCEED APPROVED COVER FLOW RATE   **O.K.**
PER FBC 2023 8TH EDITION ANSI / APSP 13
MOTOR TO BE GFCI PROTECTED PER NEC 680.21©

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