Pressure Manifold
Septic System Design

for

BELLS CROSSING PH 3 S/D Lot 1
Raleigh, North Carolina

Designed by:

Matt Burdette
Bateman Civil Survey Company, PC
Holly Springs, North Carolina
BCSC Project #: 120314.034

02/17/2015

BELLS CROSSING PH 3 S/D Lot 1

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BELLS CROSSING PH 3 S/D Lot 1

Contact Information

Client: Meritage Homes
Attn: Robert Price
Street Address: 11605 North Community House Road
Charlotte, NC 28277
Phone: (704) 944-8939
Fax: na

Designer: Bateman Civil Survey Company, PC
Attn: Matt Burdette
Street Address: 200 North Main Street
Holly Springs, NC 27540
Phone: 919-577-1080
Fax: 919-577-1081

BELLS CROSSING PH 3 S/D Lot 1

Layout/Design Specifications

Facility Type:	Single Family Home	
# of Bedrooms:	4	
Daily Flow:	480	**gal/day**
L.T.A.R.:	0.275	**gal/day/sq.ft**
Trench Depth:	24	**in**
Trench Width:	36	**in**
Stone Depth:	accepted	**in**
Manifold Length:	36	**in**
Manifold Diameter:	4	**in sch 80pvc**
Supply Line Length:	151	**ft**
Supply Line Diameter:	2	**in sch 40pvc**
Supply Line Volume:	26.27	**gallons**
Friction Loss + Fitting Loss:	3.93	**ft(supply line length + 70' for fittings in pump tank)**
Design Head:	2	**ft**
Elevation Head:	25.20	**ft**
Total Head:	31.13	**ft**
Dose Volume:	229.60	**gals**
% of Pipe Vol.	.80	
Drawdown:	11.39	**in @ 20.16 gal/in**
Pump Run Time:	✓7.73	**Minutes**
Control Panel:	SJE Rhombus Model112 control panel (or approved equivalent)	
Pump:	Zoeller M185 Flow-Mate (or approved equivalent)	
Tank Effluent Filter:	Zoeller 170-0144 residential effluent filter (or approved equivalent)	
Septic Tank:	1000	**gallon Shoaf**
Pump Tank:	1000	**gallon Shoaf**

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29.71 (Flow)

BELLS CROSSING PH 3 S/D Lot 1
SYSTEM TAP CHART

Bench Mark:	0	= 100.00	**Manifold elev:**	98.90	
Pump tank elevation:	79.10		**Pump elev:**	73.70	

line	color	rod read	elevation	length	hole size	flow/tap	gal/day	trench area	LINE LTAR
1-2	ORANGE/BLUE	2.10	97.90	113	1/2in SCH 40	7.11	114.87	339	0.3389
3-4	YELLOW/RED	6.10	93.90	145	3/4in SCH 80	10.1	163.18	435	0.3751
5-6	ORANGE/BLUE	9.10	90.90	183	3/4in SCH 40	12.5	201.95	549	0.3679
	P-TANK	20.90	79.10						
		total	**feet =**	**441**	**gal/min =**	**29.71**		**LTAR =**	**0.275**

	Des. Flow	480	**(ltar + 5%)** 0.29
	24 Hour Pump Run=	16.16	**(ltar W/ INOV)** 0.37
			(ltar + 5%) 0.39

Comments:

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LINE SCHEDULE

LINE NUMBER	COLOR	FIELD ELEVATION	LENGTH (FT)
1	ORANGE	2.1	52
2	BLUE	3.9	64
3	YELLOW	6.1	69
4	RED	7.5	76
5	ORANGE	9.1	87
6	BLUE	11.6	96
7	YELLOW		
8	RED		
9	ORANGE		
10	BLUE		

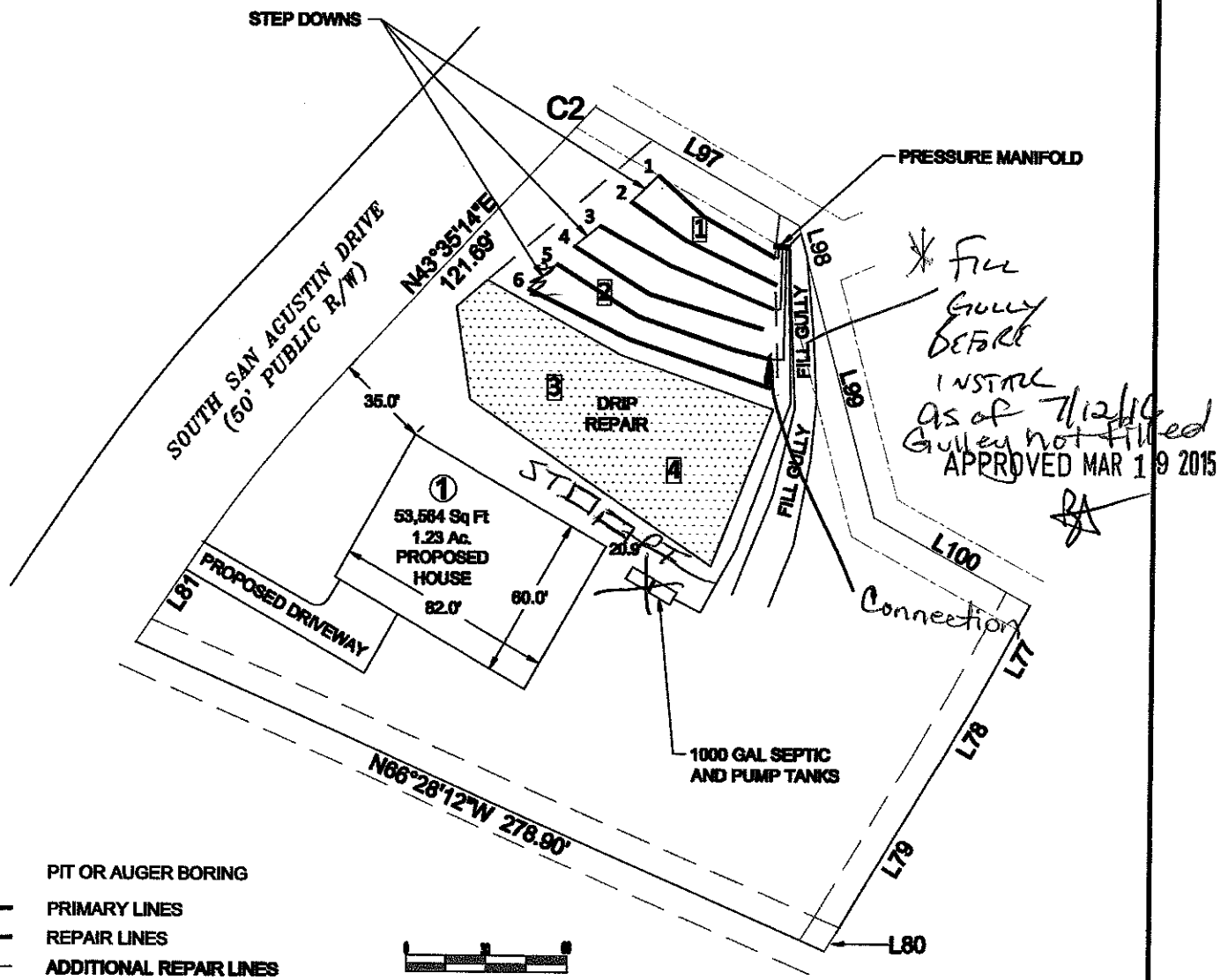
LOT 1 BELLS CROSSING SUBDIVISION

4-BEDROOM PRESSURE MANIFOLD SYSTEM
LINES 1-6 TOTAL 441 LINEAR FEET
EZFLOW OR CHAMBER
LTAR 0.275
25%REDUCTION
24" TRENCH DEPTH

4-BEDROOM DRIP REPAIR
5626 SQ FT
LTAR 0.1
6" TRENCH DEPTH

FOR GENERAL USE NOT A SURVEY
PRELIMINARY NOT FOR CONSTRUCTION

SOIL PROFILES AND ANALYSIS PROVIDED BY
PRICE ENVIRONMENTAL RESOURCE CONSULTING, PC



* Fill Gully before install as of 7/12/16 Gully not filled

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1 PIT OR AUGER BORING

PRIMARY LINES

REPAIR LINES

ADDITIONAL REPAIR LINES

DRIP IRRIGATION REPAIR AREA

SCALE:
1" = 60 ft.

Bateman Civil Survey Company
Engineers Surveyors Planners

MeritageHomes

LOT 1
BELLS CROSSING SUBDIVISION
MOORESVILLE, NC
IREDELL COUNTY

DATE: 02/16/15 DRAWN BY: MB CHECKED BY:TMB

Client: Bateman Civil Survey Company, PC Date Evaluated: 11/24/2014

Location of site: Bells Crossing Phase 3 Lot 1

Water Supply: [ ] Public [ ] Individual [ ] Well [ ] Spring [ ] Other

Evaluation Method: [ ] Auger Boring [X] Pit [ ] Cut

Type of Wastewater: [x] Sewage [ ] Industrial Process [ ] Mixed

PROFILE #	1940 Landscape Position/ Slope%	Horizon Depth (IN.)	SOIL MORPHOLOGY 1941 1941 Structure/ Texture	1941 Consistence Mineralogy	b PROFILE FACTORS 1942 Soil Wetness/ Color	1943 Soil Depth (IN.)	1956 Sapro Class	1944 Restr Horiz	Profile Class & LTAR
1	LS 15%	0-5	W SBK / SCL	FR SS SP	>50	35	PS	NA	PS 0.275
		5-25	SBK / C	FI SS SP					
		25-35	W SBK / SCL	FI SS SP					
		35-50	SLESS SAP SL	FR SS SP					
2	LS 20%	0-30	SBK / C	FI SS SP	>48	38	PS	NA	PS 0.275
		30-38	W SBK / CL	FI SS SP					
		38-48	SLESS SAP SL	FR SS SP					
3	LS 20%	0-22	W SBK / CL	FR SS SP	>48	22	UN	22	PS DRIP 0.125
		22-39	SLESS SAP SL	FI SS SP					
		39-48	SLESS SAP SL	FR SS SP					
4	LS 20%	0-16	W SBK / SCL	FR SS SP	22	32	NA	16	PS PRE DRIP 0.1
		16-22	ABK / C	VFI EXPANSIVE					
		22-32	ABK / C	VFI EXPANSIVE	10YR 7/2 MOTTLES				
		32-53	SLESS SAP SL	FR SS SP					

COMMENTS:

Evaluation By: Steven Price

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Landscape Position	Group	Texture	.1955 LTAR
R-Ridge	I	S-Sand	1.2 - 0.8
SS-Shoulder Slope		LS-Loamy Sand	
LS-Linear Slope			
FS-Foot Slope	II	SL-Sandy Loam	0.8 - 0.6
NS-Nose Slope		L-Loam	
HS-Head Slope			
CC-Concave Slope	III	SI-Silt	0.6 - 0.3
CV-Convex Slope		SICL-Silty Clay Loam	
T-Terrace		CL-Clay Loam	
FP-Flood Plain		SCL-Sandy Clay Loam	
	IV	SC-Sandy Clay	0.4 - 0.1
		SIC-Silty Clay	
		C-Clay	

Structure
SG-Single Grain
M-Massive
CR-Crumb
GR-Granular
SBK-Subangular Blocky
ABK-Angular Blocky
PL-Platy
PR-Prismatic
W-Weak

Consistence Moist	Consistence Wet
VFR-Very Friable	NS-Non-Sticky
FR-Friable	SS-Slightly Sticky
FI-Firm	S-Sticky
VFI-Very Firm	VS-Very Sticky
EFI-Extremely Firm	NP-Non-Plastic
	SP-Slightly Plastic
	P-Plastic
	VP-Very Plastic



112	1	W	9	1	4	H	3A, 8A, 8C

MODEL 112

ALARM PACKAGE
- [ ] 0 = select options or no alarm package
- [x] 1 = alarm package (includes test/normal/silence switch, fuse, red light, horn & float)

ENCLOSURE RATING
- [ ] I = Indoor, NEMA 1 (metal)
- [x] W = Weatherproof, NEMA 4X (engineered thermoplastic)

STARTING DEVICE
- [ ] 1 = magnetic motor contactor 120/208/240V
- [x] 9 = magnetic motor contactor 120V only

PUMP FULL LOAD AMPS
- [ ] 0 = 0-7 FLA
- [x] 1 = 7-15 FLA
- [ ] 2 = 15-20 FLA
- [ ] 3 = 20-30 FLA

PUMP DISCONNECTS
- [ ] 0 = no pump disconnect
- [ ] 1 = pull-out with safety deadfront in a 10"x8" enclosure
- [x] 4 = circuit breaker 120V (select STARTING DEVICE option 9 above)
  120/208/240V (select STARTING DEVICE option 1 above)

FLOAT SWITCH APPLICATION
- [x] H or L = pump down or pump up
- [ ] X = no floats
  WITH alarm package
  WITHOUT alarm package

OPTIONS *Listed below*

★ ENCLOSURE UPSIZE - If you selected 3 or more of the ★ options, or one ★★ option, **a one-time enclosure upsize fee would apply.**

If additional features are required, call the factory for a quote on either a SJE-Rhombus Pro-Line or Engineered Custom control panel.

	CODE	DESCRIPTION
[ ]	1A	Red beacon only / no audio *(must select 1E if floats included)*
[ ]	1C	Horn only / no visual *(must select 1E if floats included)*
[ ]	1E	Alarm float
[x]	3A	Alarm flasher
[ ]	★ 3B	Manual alarm reset
[ ]	★ 4A	Low level cutout *(select option 4D if floats included)*
[ ]	★ 4B	Red low-level indicator & alarm *(must select 4A also)*
[ ]	4D	Low-level float
[ ]	★ 5A	Thermal cutout/heat sensor auto reset (for pumps w/thermal switch leads)
[ ]	★★5E	Seal failure circuit & red indicator (2 wire)
[ ]	6A	Auxiliary alarm contact, form C type
[x]	★ 8A	Elapsed time meter
[x]	★ 8C	Event (cycle) counter
[ ]	★★9_A	Pump overload specify amperage after number 9 followed by letter "A". Example: 912A = 12 amp pump.
	★★ [ ]	0-25 FLA
	★★ [ ]	25-30 FLA
[ ]	10E	Lockable latch - NEMA 4X
[ ]	10E	Lockable latch - NEMA 1
[ ]	★10F	Lightning arrester
[ ]	★10K	Anti-condensation heater

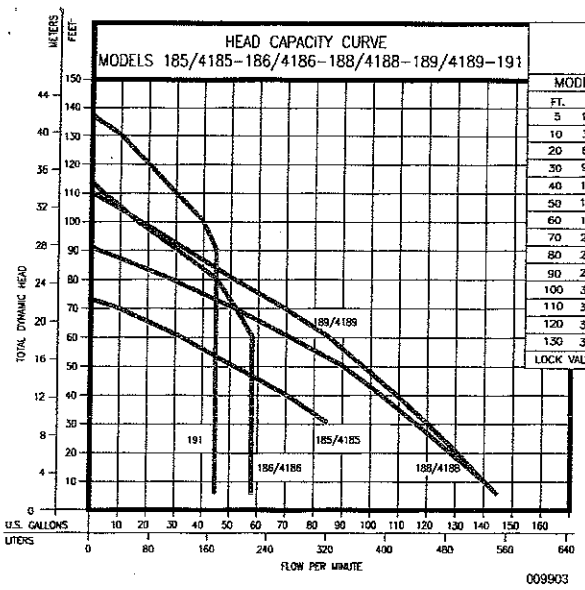
	CODE	DESCRIPTION
[ ]	11C	NEMA 1 alarm panel *must select option 6A*
[ ]	11D	NEMA 4X alarm panel *must select option 6A*
[ ]	★★14B	Main disconnect (rotary style, mounted through door) non-fused
	★★ [ ]	0-20 FLA (total of both pumps)
	★★ [ ]	20-30 FLA (total of both pumps)
[ ]	15A	Control / alarm circuit breaker *Does not include the circuit board as in standard.*
[ ]	16A	10' cord in lieu of 20' *(per float)*
[ ]	16B	15' cord in lieu of 20' *(per float)*
[ ]	16C	30' cord in lieu of 20' *(per float)*
[ ]	16D	40' cord in lieu of 20' *(per float)*
[ ]	17A	SJE SignalMaster® / mounting strap ● *(per float)*
[ ]	17B	SJE SignalMaster® / externally weighted ● *(per float)*
[ ]	17C	Sensor Float® / internally weighted ▲ *(per float)*
[ ]	17D	Sensor Float® / externally weighted ▲ *(per float)*
[ ]	17E	Sensor Float® Mini / pipe clamp ▲ *(per float)*
[ ]	17F	Sensor Float® Mini / externally weighted ▲ *(per float)*
[ ]	19T	TOA (Test/Off/Automatic) switch and pump run light through door mounted
[ ]	19U	HOA (Hand/Off/Automatic) switch and pump run light through door mounted
[ ]	19X	Door mounted pump run indicator
[ ]	21A	SJE PumpMaster® in lieu of on/off switches ●
[ ]	21B	SJE PumpMaster® Plus in lieu of on/off switches ●
[ ]	21C	Super Single® in lieu of on/off switches ▲
[ ]	21D	Double Float® in lieu of on/off switches ▲

● Mechanically-activated ▲ Mercury-activated

SAMPLE

MODEL	112	1	W	9	1	4	H	3A 8A
		Alarm Package	Enclosure Rating	Starting Device	Pump Full Load Amps	Pump Disconnect	Float Switch Application	Options: Flasher, Elapsed Time Meter

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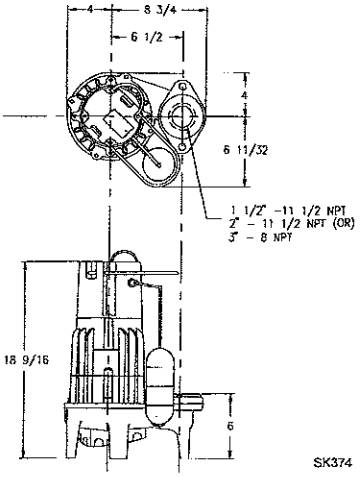


TOTAL DYNAMIC HEAD/ FLOW PER MINUTE EFFLUENT AND DEWATERING

MODEL	185/4185		186/4186		188/4188		189/4189		191	
FT. M.	GAL.	LTRS.	GAL.	LTRS.	GAL.	LTRS.	GAL.	LTRS.	GAL.	LTRS.
5 1.52			58	220	145	549	145	549	45	170
10 3.05			58	220	140	530	140	530	45	170
20 6.10			58	220	128	484	130.5	494	45	170
30 9.14	85	322	58	220	116	439	120	454	45	170
40 12.19	70	265	58	220	103.5	392	109	413	45	170
50 15.24	51	193	58	220	90	341	97	367	45	170
60 18.29	32	121	58	220	71	269	85	322	45	170
70 21.34	9	34	52	197	51	193	69	261	45	170
80 24.38			45	170	28	106	51	193	45	170
90 27.43			30.5	115	2	8	34	129	45	170
100 30.48			16	60			17	64	40	151
110 32.00			4	15					30	114
120 36.58									20	76
130 39.62									10	38
LOCK VALVE:	73'		114'		91'		110'		137'	

WARNING: Model 185 should not be subjected to heads less than 30 feet TDH.

Single Seal-180 Series Automatic Design Weight 82-89 lbs.



185 MODELS	4185 MODELS	Standard all models - 20 ft. cord - 1 H.P.			Control Selection		Listings	
Single Seal	Double Seal	Volts - Ph	Mode	Amps	Simplex	Duplex	CSA	UL
D185	—	230 1	Auto	9.8	1 or 1 & 8		Y	Y
E185	E4185	230 1	Non	9.8	2 or 2 & 7	3 or 5 & 6	Y(2)	Y
* H185	—	200-208 1	Auto	11.5	1 & 8		N	N
* I185	* I4185	200-208 1	Non	11.5	2 & 7	3 or 5 & 6	N	N
* F185	* F4185	230 3	Non	7.4	4 & 6	3 & 4 or 5 & 6	Y	Y
* J185	* J4185	200-208 3	Non	7.5	4 & 6	3 & 4 or 5 & 6	Y	Y
* G185	* G4185	460 3	Non	3.7	4 & 6	3 & 4 or 5 & 6	Y	Y
* BA185	—	575 3	Non	3.3	4 & 6	3 & 4 or 5 & 6	Y	N

186 MODELS	4186 MODELS	Standard all models - 20 ft. cord - 1½ H.P.			Control Selection		Listings	
Single Seal	Double Seal	Volts - Ph	Mode	Amps	Simplex	Duplex	CSA	UL
D186	—	230 1	Auto	13.7	1 or 1 & 8		N	N
E186	E4186	230 1	Non	13.7	2 or 2 & 7	3 or 5 & 6	N	N
* F186	* F4186	230 3	Non	9.2	4 & 6	3 & 4 or 5 & 6	N	N
* G186	* G4186	460 3	Non	4.6	4 & 6	3 & 4 or 5 & 6	N	N

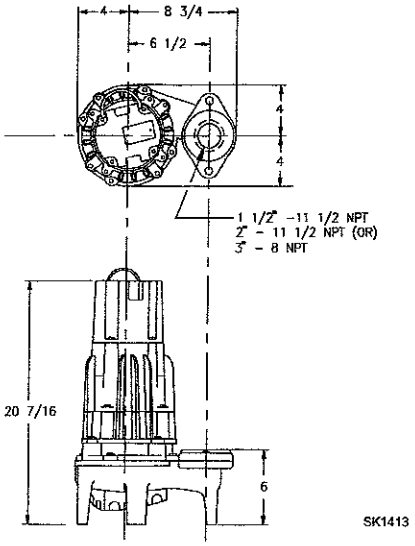
188 MODELS	4188 MODELS	Standard all models - 20 ft. cord - 1½ H.P.			Control Selection		Listings	
Single Seal	Double Seal	Volts - Ph	Mode	Amps	Simplex	Duplex	CSA	UL
D188	—	230 1	Auto	13.3	1 or 1 & 8		N	Y(1)
E188	E4188	230 1	Non	13.3	2 or 2 & 7	3 or 5 & 6	Y(2)	Y(1)
* H188	—	200-208 1	Auto	16.8	1 & 8		N	N
* I188	* I4188	200-208 1	Non	16.8	2 & 7	3 or 5 & 6	N	N
* F188	* F4188	230 3	Non	8.9	4 & 6	3 & 4 or 5 & 6	Y	Y
* J188	* J4188	200-208 3	Non	10.3	4 & 6	3 & 4 or 5 & 6	Y	Y
* G188	* G4188	460 3	Non	4.6	4 & 6	3 & 4 or 5 & 6	Y	Y
* BA188	—	575 3	Non	3.5	4 & 6	3 & 4 or 5 & 6	Y	N

189 MODELS	4189 MODELS	Standard all models - 20 ft. cord - 2 H.P.			Control Selection		Listings	
Single Seal	Double Seal	Volts - Ph	Mode	Amps	Simplex	Duplex	CSA	UL
⊖ D189	—	230 1	Auto	17.1	1 or 1 & 8		N	Y(1)
⊖ E189	⊖ E4189	230 1	Non	17.1	2 & 7	3 or 5 & 6	Y(2)	Y(1)
* H189	—	200-208 1	Auto	20.5	1 & 8		N	N
* I189	* I4189	200-208 1	Non	20.5	2 & 7	3 or 5 & 6	N	N
* F189	* F4189	230 3	Non	11.2	4 & 6	3 & 4 or 5 & 6	Y	Y
* J189	* J4189	200-208 3	Non	13.2	4 & 6	3 & 4 or 5 & 6	Y	Y
* G189	* G4189	460 3	Non	6.0	4 & 6	3 & 4 or 5 & 6	Y	Y
* BA189	—	575 3	Non	5.8	4 & 6	3 & 4 or 5 & 6	Y	N
⊖ WD189	* WD4189	230 1	Auto	17.1	2 or 2 & 8		N	N

191 MODEL		Standard all models - 20 ft. cord - 2 H.P.			Control Selection		Listings	
SiSingle Seal	Double Seal	Volts - Ph	Mode	Amps	Simplex	Duplex	CSA	UL
E191	—	230 1	Non	14.5	2 or 2 & 7	3 or 5 & 6	N	N

* No Molded Plug
(1) UL Listed unit available with 20 Amp Plug.
(2) CSA Approval without plug cap.
(3) 20 Amp Outlet, P/N 10-0060 must be used.

Double Seal-4180 Series / Weight 89-94 lbs.



SELECTION GUIDE

1. Integral float operated 2-pole mechanical switch, no external control required.
2. Single piggyback variable level float switch or double piggyback variable level float switch. Refer to FM0477.
3. Mechanical alternator M-Pak 10-0072 or 10-0075. Refer to FM0495
4. Simplex three phase control panel. Refer to FM1228.
5. See FM0712 for correct model of Electrical Alternator.
6. Variable level control switch 10-0225 used as control activator, specify simplex (3) float or duplex (3) or (4) float system.

⚠ CAUTION

All installation of controls, protection devices and wiring should be done by a qualified licensed electrician. All electrical and safety codes should be followed including the most recent National Electric Code (NEC) and the Occupational Safety and Health Act (OSHA).

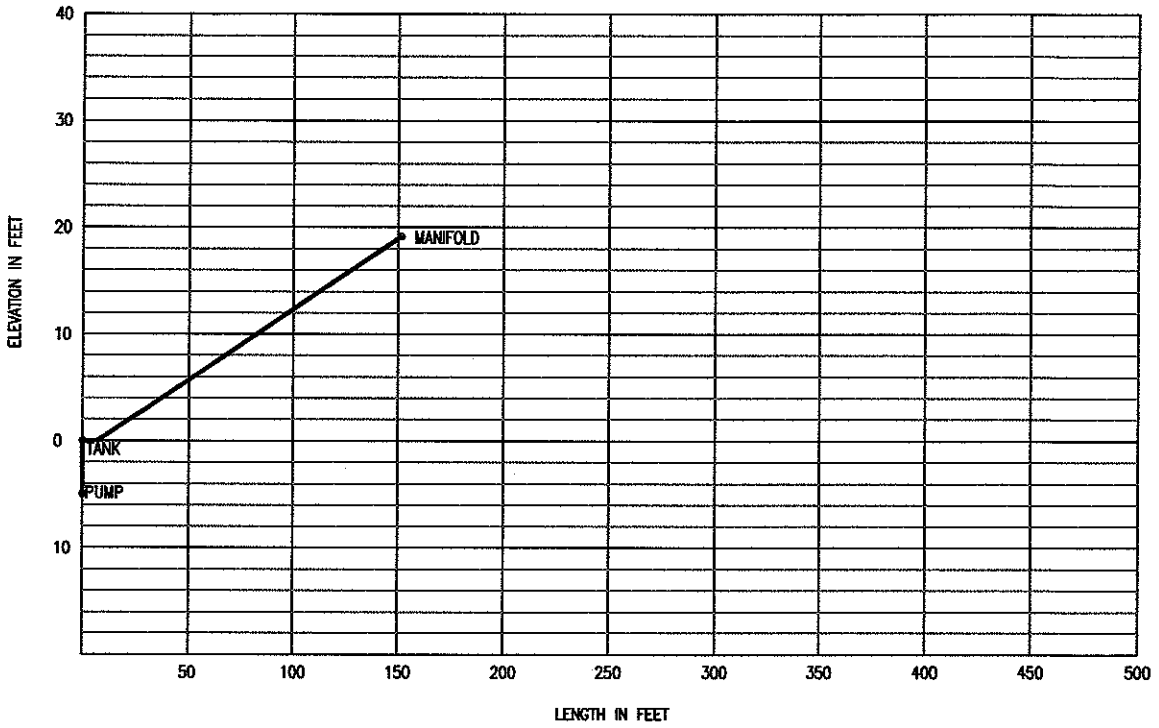
For information on additional Zoeller products refer to catalog on Piggyback Variable Level Float Switches, FM0477; Electrical Alternator, FM0486; Mechanical Alternator, FM0495; Sump/Sewage Basins, FM0487; Simplex Pump Control, FM1596; Alarm Systems, FM0732; and Disconnect/Rail Systems, FM0787.

RESERVE POWERED DESIGN

For unusual conditions a reserve safety factor is engineered into the design of every Zoeller pump.

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SUPPLY LINE
HYDRAULIC PROFILE

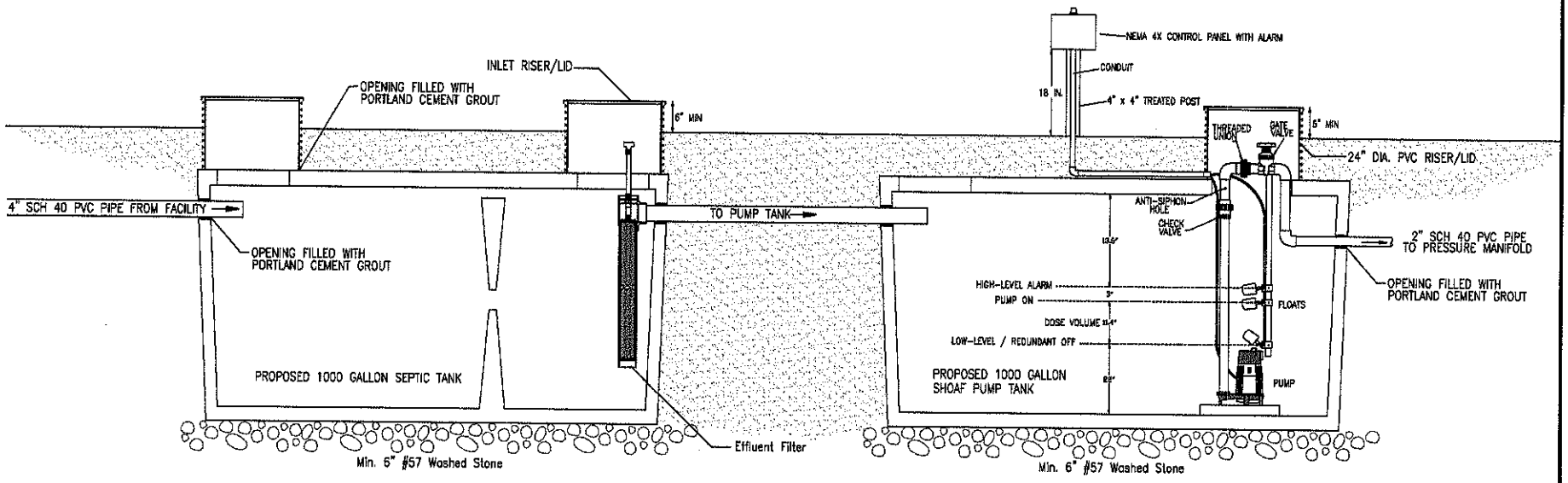


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NCBELS Firm No. C-0570

MeritageHomes

LOT 1

BELLS CROSSING SUBDIVISION
MOORESVILLE, NC IREDELL COUNTY
DATE: 02/16/15
DRAWN BY: TMB CHECKED BY: TMB



NOTES:

1. **CONTROL PANEL SHALL HAVE A VISUAL AND AUDIO ALARM**
2. **FINAL GRADE SHOULD SHED WATER AWAY FROM TANKS**
3. **TANKS SHALL BE CONSTRUCTED IN ACCORDANCE WITH STATE RULE 15A NCAC 18A .1953**

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TANK DETAILS - LOT 1

FOR

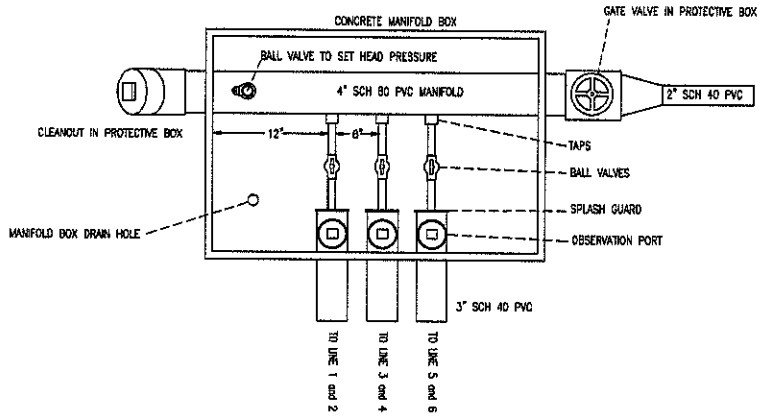
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BELLS CROSSING SUBDIVISION LOT 1
MOORESVILLE, NC
IREDELL COUNTY

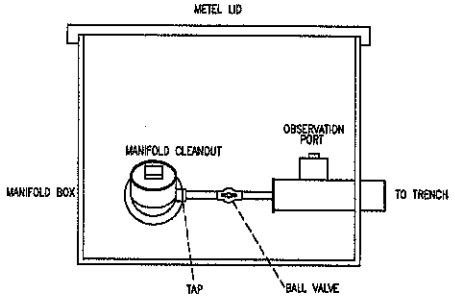
DATE: 02/16/15 DRAWN BY: TMB CHECKED BY: TMB

SCALE: AS SHOWN

PRESSURE MANIFOLD DETAILS
TOP VIEW

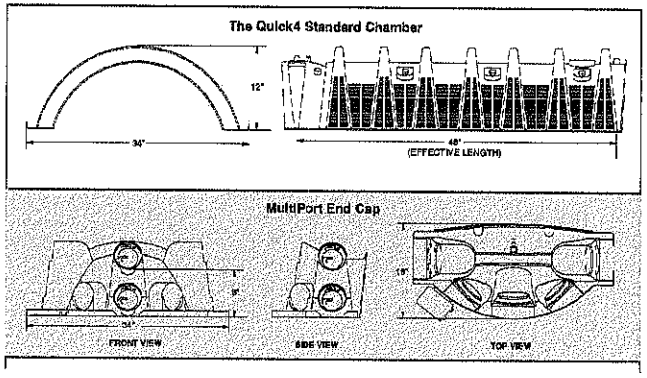


PRESSURE MANIFOLD DETAILS
END VIEW



TAP SCHEDULE	
LINE #	TAP
1 and 2	1" SCH 40
3 and 4	3/4" SCH 80
5 and 6	3/4" SCH 40

The
Quick4® Standard
Chamber



INFILTRATOR CHAMBER DETAILS

MANIFOLD DETAILS - LOT 1
FOR
MeritageHomes

Bateman Civil Survey Company
Engineers • Surveyors • Planners
200 N. Main Street, Holly Springs, NC 27540 Ph: 919.577.1080 Fax: 919.577.1081
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MOORESVILLE, NC
IREDELL COUNTY
DATE: 02/16/15 DRAWN BY: TMB CHECKED BY: TMB
SCALE: AS SHOWN