North [redacted]rolina Department of Environment, Health, and [redacted]
[redacted]sion of Environmental Health, Public Water Supply [redacted]on

SOURCE INFORMATION
GROUND WATER

Date Form Completed (M M D D Y Y): 01/17/95

PWSID: 0470743

Owner Assigned Source Code: 645

Well Name (If purchase, name of system): Holcomb Blvd 645

Code: G (G=Ground, W=Purchase/G, Y=G w/direct influence, Z=W w/direct influence)

If Purchase, seller ID#:

Source Begin Date (M M Y Y):

Source exempt—SWTR? (Y/N):

Direct Influence Date (M M D D Y Y):

Availability: P (P=Permanent, E=Emergency, S=Seasonal, I=Interim, O=Other)

Location of well within the system (If purchase, location of master meter): Brewster Blvd

Latitude (N) (Deg. Min. Sec.): 34 43 05.

Longitude (W) (Deg. Min. Sec.): 077 20 43.

How Determined: G=GPS, M=Map, S=Surveyed

GPS Data: Q# or DOP #

No. of Sats. Locked on

(If purchase, use seller's primary source lat/long)

Vulnerable (VOCs) (Y/N):

Assessment Date (M M D D Y Y):

ENTRY POINT INFORMATION

Use Code: C (C=Ground/Permanent, D=Ground/non-permanent)

Availability: P (P=Year-round, S=Seasonal, E=Emergency, I=Interim, O=Other)

Owner Assigned Entry Point Code: 200

Entry Point Name: HB645

Location:

Well Site: Owned or controlled? ____ (Y,N) Control Area (100' radius)? ____ (Y,N) If no, explain:

Sources of pollution/distance:

Surface water within 200'? (Y/N) If yes, actual distance ___ feet If yes, bact. samples collected? ____ (Y,N)

Adequate slope? ____ (Y,N) Flooding? ____ (Y,N) Maintenance:

Well House: Free of stored materials? ____ (Y,N) Properly drained? ____ (Y,N) Locked? ____ (Y,N)

Condition of house: Type of freeze protection:

Well: Diameter: 10" Type: Gravel Packed Yield (gpm): 192 Properly sealed? ____ (Y,N)

Properly vented? ____ (Y,N) Casing depth 90 ft. (If unknown, put 'UNK') Well depth: 245' Meter available? Y (Y,N)

Concrete slab adequate? Y (Y,N) If no, explain: Size:

Size of blow-off: 4" Sample tap: Before treatment? ____ (Y,N) After treatment? ____ (Y,N)

Pumps: Capacity: GPM: 260 HP: 10 Pump intake depth: 85 Auxiliary Power? Y (Y,N)

Type pump: Vertical Turbine Height above floor (pump/casing): 10½" /

Storage at well site: Elev: Hydro: Ground:

If hydroautomatic, air volume control? ____ (Y,N) Safety valves? ____ (Y,N) Coded? ____ (Y,N)

High service pumps: 1. ____ gpm ____ hp 2. ____ gpm ____ hp 3. ____ gpm ____ hp Auxiliary Power? ____ (Y,N)

Is the water treated at this well? N (Y/N) If yes, complete back of form.

If other wells are treated here, which ones? If treated elsewhere, where? HB620 PLANT

If purchase, retreat? (Y/N) If yes, complete back of form.

Contaminated Benzene

WATER ANALYSIS LABORATORY
[redacted]802 Hamlet Highway
Ben[redacted]tsville, South Carolina
29512

(803) 479-4639

[redacted] Sample 1

Date: January 29, 1971

Report To: Layne Atlantic Co.
Norfolk, Va.

Date Analyzed: 1/29/71

Sample Number: Camp Lejeune #5
90-100

Analysis Results--Parts Per Million

Determination		Determination	
pH	7.1	Carbon Dioxide (CO_2)	30
Iron (Fe)	0.125	Total Acidity ($CaCO_3$)	57
Nitrate (NO_3)	Trace	Calcium Hardness ($CaCO_3$)	204
Fluoride (F)	0.25	Magnesium Hardness ($CaCO_3$))	34
Manganese (Mn)	0	Carbonate Hardness ($CaCO_3$)	205
Total Hardness ($CaCO_3$)	238	Noncarbonate Hardness ($CaCO_3$)	33
Chlorides (Cl)	8	Alkalinity (Phenolphthalein) ($CaCO_3$)	0
Sulfate (SO_4)	5.3	Carbonate Alkalinity ($CaCO_3$)	0
Phosphate (PO_4)	0.7	Bicarbonate Alkalinity ($CaCO_3$)	205
Magnesium (Mg)	5.6	Total Alkalinity ($CaCO_3$)	205
Calcium (Ca)	82.2	Total Dissolved Solids	243
Carbonate (CO_3)	0	Specific Conductance (micromhos at 25°)	400
Bicarbonate (HCO_3)	250	Appearance When Analyzed	Clear
Hydroxide (OH)	0	Odor When Analyzed	Not Objectionalbe
		Turbidity	0

Signed: W. P. Johnson
W. P. Johnson, Laboratory Director

Remarks: _____

Analytical Methods References: 'Standard Methods for the Examination of Water and Wastewater,' Twelfth Edition, 1965, APHA, AWWA and WPCF and 'Methods for Collection and Analysis of Water Samples,' Water Supply Paper 1454 (1960), U. S. Geological Survey, Washington, D. C.

645
9-19-65

A/L	S/L	PL	D/D	PSI	GPM
75	30	38	8	44	100
		41	11	41	122
		43	13	37	140
		46	16	34	164
		48	18	30	192

used direct reading gage

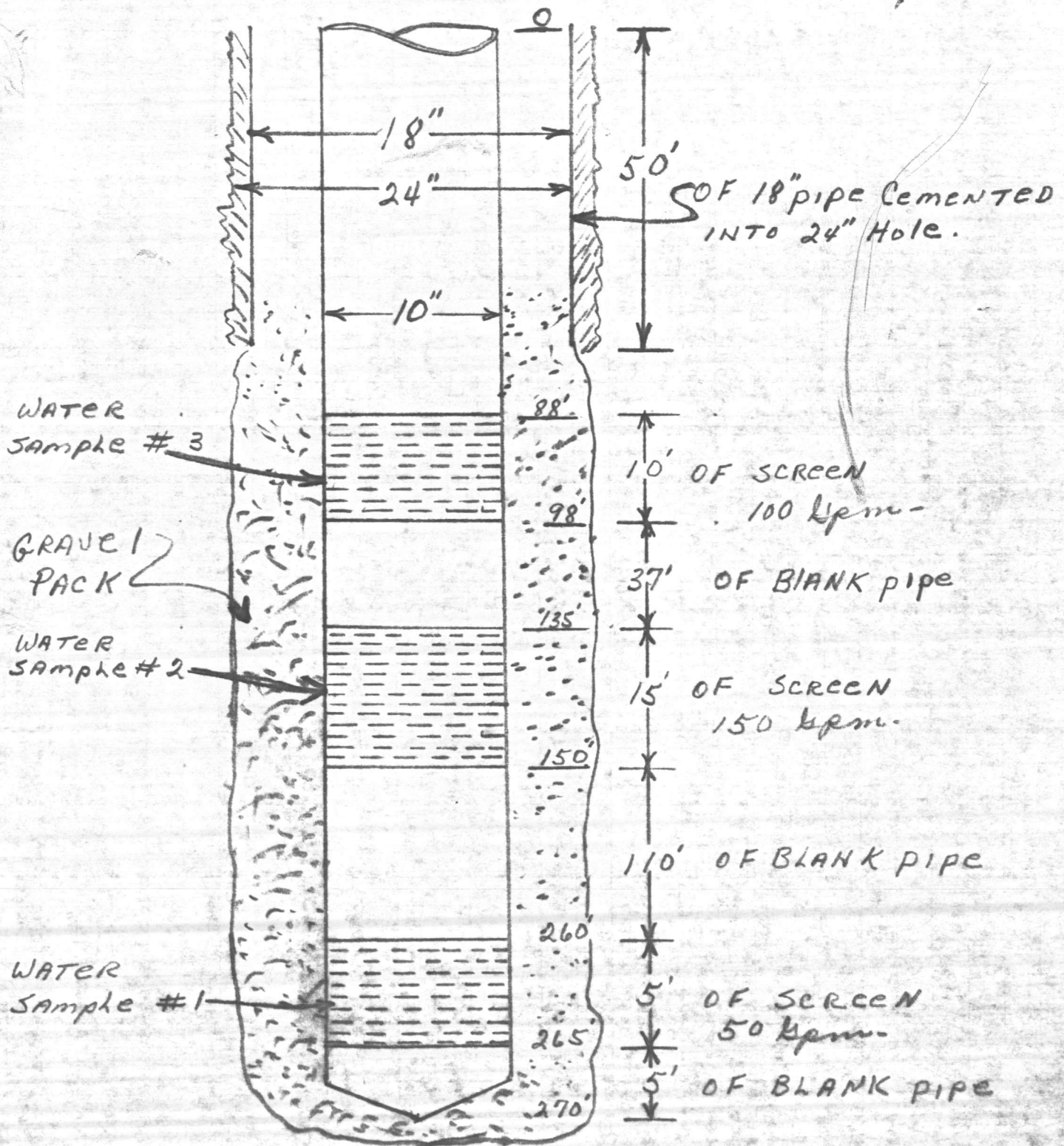
BY R.S. DATE 1-25-71 SUBJECT Well #5 SHEET NO 1 OF 1

CHKD. BY ____ DATE ____ Proposed Sketch JOB NO. 40936

Layne Atlantic Co. Corbin Construction Co.

Camp Lejeune N.C.

300 Gpm Well



CORBIN CONSTRUCTION COMPANY
Camp LeJeune, North Carolina
Pumping Test Well No. 5
March 16, 1971

Static Level 18' 2"

TIME	GPM	PUMPING LEVEL
9:00	153	
9:15	153	34'11"
9:30	153	35' 4"
9:45	153	35' 7"
10:00	153	35'11"
10:15	153	35'11 1/2"
10:30	153	36' 1"
10:45	153	36' 3"
11:00	153	36' 5"
11:15	153	36' 7"
11:45	153	36' 8"
12:15	153	36' 8"
12:45	153	36' 8"
1:15	153	36' 9"
1:30	200	42'10"
1:45	200	43' 6"
2:00	200	43' 7"
2:15	200	43' 8"
2:45	200	43' 8"
3:15	200	43'10"
3:45	200	43' 9"
4:15	200	43' 9"
4:30	250	50' 7"
4:45	250	50'11"
5:00	250	51' 0"
5:30	250	51' 2"
6:00	250	51' 3"
6:30	250	51' 5"
7:00	250	51' 5"
7:15	302	59' 2"
7:30	302	59' 7"
7:45	302	59'10"
8:00	302	59'10"
8:30	302	59'10"
9:00	302	59'11"
9:30	302	59'11"
10:00	302	59'11"
11:00	302	59'11"
12:00	302	60' 0" (3/17/71)
1:00	302	60' 0"
2:00	302	60' 0"
3:00	302	60' 3"
4:00	302	60' 3"
5:00	302	60' 3"
6:00	302	60' 3"
7:00	302	60' 4"
8:00	302	60' 6"
9:00	302	60' 9"
10:00	302	60'10"
11:00	302	60'10"
12:00	302	60'10" Noon
1:00	302	60'10"
2:00	302	60'10"
3:00	302	60'10"
4:00	302	60'10"
5:00	302	60'10"
* 8:15	357	69' 3"
8:30	357	69' 5"
8:45	357	69' 5"
9:15	357	69' 9"
9:45	357	69'11"
10:15	357	70' 0"
10:45	357	70' 1"
11:00	410	79' 6"
11:15	410	79' 8"
11:30	410	80' 0"
12:00	410	80' 1"
12:30	410	80' 3"
1:00	410	80' 3"
1:30	410	80' 3"

10' within top of screen line
Top of screen set at 88'

*	6:00	302	60'10"
	7:00	302	60'10"
	8:00	302	60'10"

WATER ANALYSIS LABORATORY
[redacted] Hamlet Highway
Bennettsville, South Carolina
29512

(803) 479-4639

[redacted] Sample #1

Date: January 29, 1971

Report To: Layne Atlantic Co.
Norfolk, Va.

Date Analyzed: 1/29/71
Sample Number: Camp Lejeune #5
90-100

Analysis Results--Parts Per Million

Determination		Determination	
pH	7.1	Carbon Dioxide (CO_2)	30
Iron (Fe)	0.125	Total Acidity ($CaCO_3$)	57
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Fluoride (F)	0.25	Magnesium Hardness ($CaCO_3$))	34
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Magnesium (Mg)	5.6	Total Alkalinity ($CaCO_3$)	205
Calcium (Ca)	82.2	Total Dissolved Solids	243
Carbonate (CO_3)	0	Specific Conductance (micromhos at 25°)	400
Bicarbonate (HCO_3)	250	Appearance When Analyzed	Clear
Hydroxide (OH)	0	Odor When Analyzed	Not Objectionalbe
		Turbidity	0

Signed: W. P. Johnson
W. P. Johnson, Laboratory Director

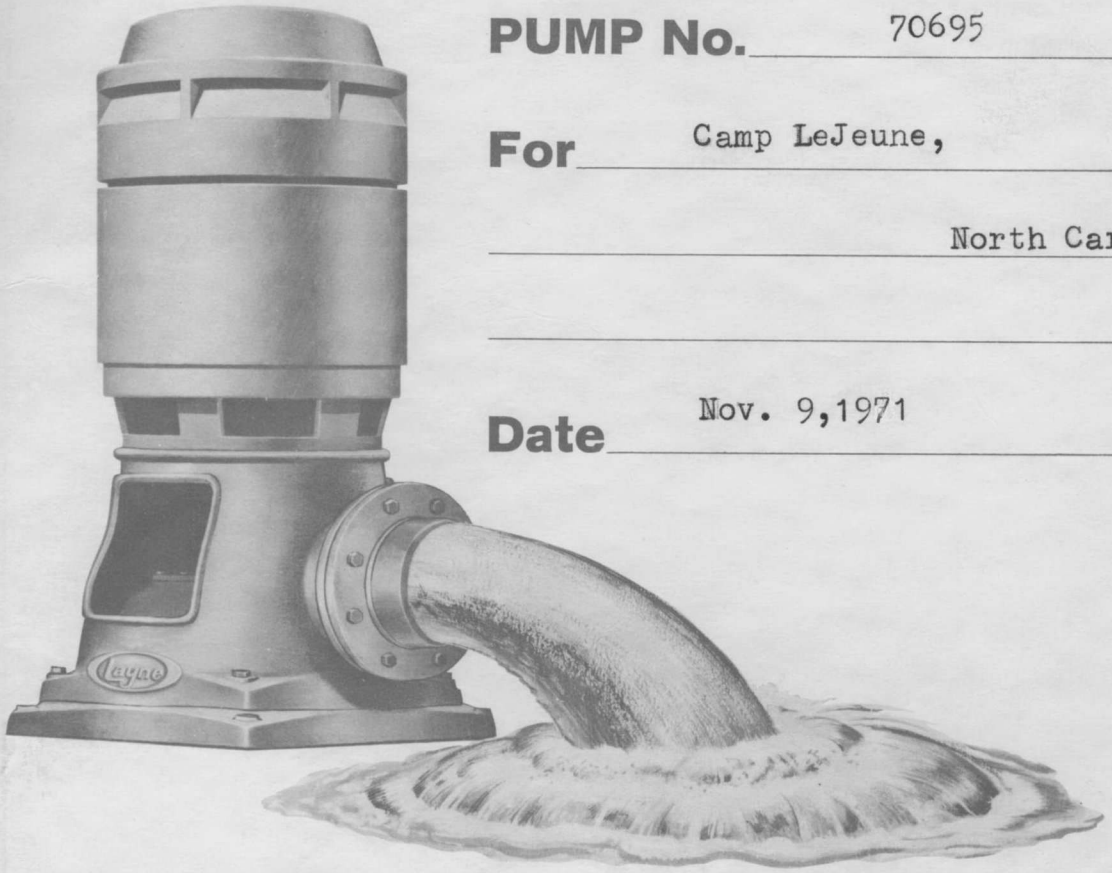
Remarks:

Analytical Methods References: 'Standard Methods for the Examination of Water and Wastewater,' Twelfth Edition, 1965, APHA, AWWA and WPCF and 'Methods for Collection and Analysis of Water Samples,' Water Supply Paper 1454 (1960), U. S. Geological Survey, Washington, D. C.

HB [redacted] WELL #5 [redacted]

Layne

PUMP RECORD



PUMP No. 70695

For Camp LeJeune,

North Carolina

Date Nov. 9,1971

Layne Atlantic Co.

Norfolk,

Virginia

Manufactured By:

SINGER

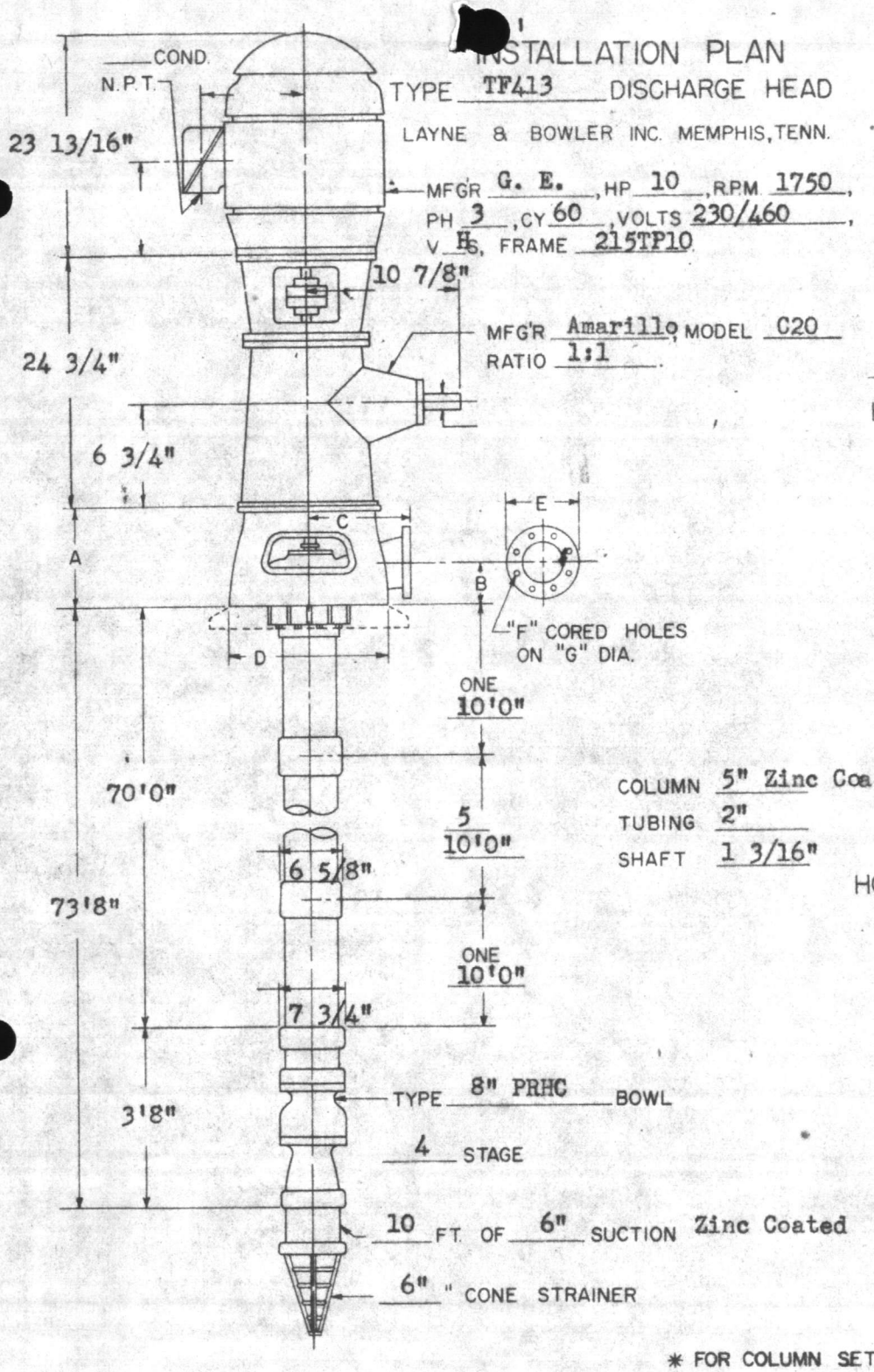
LAYNE & BOWLER DIVISION

MEMPHIS, TENNESSEE U.S.A.

INSTALLATION PLAN

TYPE TF413 DISCHARGE HEAD

LAYNE & BOWLER INC. MEMPHIS, TENN.



MFG'R G. E., HP 10, R.P.M. 1750, PH 3, CY 60, VOLTS 230/460, V Hz, FRAME 215TP10

MFG'R Amarillo, MODEL C20

RATIO 1:1

COLUMN 5" Zinc Coated

TUBING 2"

SHAFT 1 3/16"

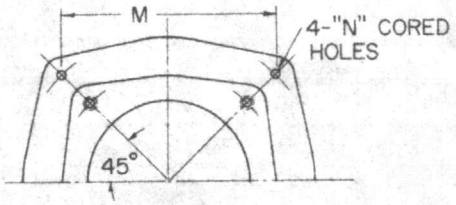
TYPE 8" PRHC BOWL

4 STAGE

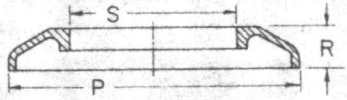
10 FT. OF 6" SUCTION Zinc Coated

6" " CONE STRAINER

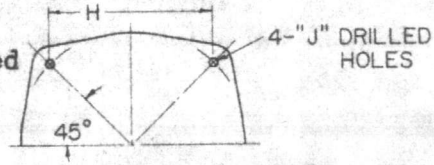
USE THESE DIMENSIONS ONLY WHEN CERTIFIED BY FACTORY



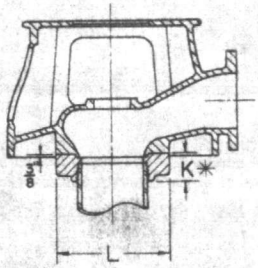
HOLES IN BASE PLATE



BASE PLATE



HOLES IN BASE OF HEAD



SECTION THRU HEAD

* FOR COLUMN SETTINGS OF 200' OR GREATER, "K"=11"

CUSTOMER: Camp LeJeune, N. C.	YOUR NO: N-157-71	G.P.M. 260
LOCATION:	OUR NO: 71D-5020	T.D.H. 103
FOR APPROVAL	PUMP NO: 70695	R.P.M. 1750
CERTIFIED: John Zenker	DATE: Oct. 14, 1971	B.H.P.

HEAD	A	B	C	D	E	F	G	H	J	K*	L	M	N	P	R	S
TF413	13	6	11	18	9	8-3/4	7 1/2	14 1/8	11/16	2 13/16	10	16 15/16	7/8	21	2	17
TF613	14	6	11	18	11	8-7/8	9 1/2	14 1/8	11/16	2 7/8	11	16 15/16	7/8	21	2	17
TF418	13	6	14 1/4	23	9	8-3/4	7 1/2	17 5/16	13/16	2 13/16	10	20 1/16	7/8	26 1/2	2 3/4	21 3/4
TF618	15	6	14 1/4	23	11	8-7/8	9 1/2	17 5/16	13/16	2 7/8	12 1/2	20 1/16	7/8	26 1/2	2 3/4	21 3/4
TF818	18	7 3/32	14 1/4	23	13 1/2	8-7/8	11 3/4	17 5/16	13/16	3 1/16	13 1/2	20 1/16	7/8	26 1/2	2 3/4	21 3/4
TF1018	18	8 1/8	14 1/4	23	16	12-1	14 1/4	17 5/16	13/16	3 11/16	16	20 1/16	7/8	26 1/2	2 3/4	21 3/4
TF1218	20	9 5/8	16 1/4	26	19	12-1	17	19 5/8	13/16	3 11/16	19	23 11/16	7/8	32	3 1/4	24

HEAD	A	B	C	D	E	F	G	H	J	K*	L	M	N	P	R	S
TF625	15	8 1/8	18 1/4	31	11	8-7/8	9 1/2	23 11/16	13/16	2 7/8	12 1/2	29	1	38	3 3/4	29
TF825	20	8 1/8	18 1/4	31	13 1/2	8-7/8	11 3/4	23 11/16	13/16	3 1/16	13 1/2	29	1	38	3 3/4	29
TF1025	20	8 1/8	18 1/4	31	16	12-1	14 1/4	23 11/16	13/16	3 11/16	16	29	1	38	3 3/4	29
TF1225	21	9 5/8	18 1/4	31	19	12-1	17	23 11/16	13/16	3 11/16	19	29	1	38	3 3/4	29
TF1225I	21	9 5/8	18 1/4	31	19	12-1	17	23 11/16	13/16	4 7/16	21	29	1	38	3 3/4	29
TF1425	21	10 5/8	18 1/4	31	21	12-1 1/8	18 3/4	23 11/16	13/16	4 7/16	21	29	1	38	3 3/4	29
TF1227	24 1/2	9 3/4	21	36	19	12-1	17	27 5/8	13/16	3 11/16	19	33 3/8	1	43	4 1/4	33 7/8

PBO 179

VERTICAL CENTRIFUGAL PUMP-INSTALLATION OF PUMP HEADS WITH STYLE 60 STUFFING BOX
HOLLOW SHAFT-MOTOR DRIVEN BUTT-JOINT TOP COLUMN FLANGE

DISASSEMBLE AND CLEAN Before installation, the pump head should be disassembled and all parts thoroughly cleaned with kerosene. Remove the stuffing box from the discharge ell.

MOUNT DISCHARGE ELL With the style 60 packing box a butt-joint, top-column flange is used. Therefore, no adjustment is necessary. Clean the face of the top flange and the bottom flange of the discharge ell and coat with Layncote. Note condition of top of the projecting tubing and remove with a file any burrs or sharp edges that might cut the O ring when it is installed. Bolt discharge ell and column together.

PACKING BOX Clean the tension bearing and stuffing box thoroughly before continuing with installation. Insert the stuffing box first, having the "O" ring in place (a light coat of oil should be given the "O" ring). The tension bearing can now be installed, the threaded portion being coated with Layncote. Slip bearing over shaft and screw into tubing until the bearing flange butts the stuffing box. (This should be a hand tight snug fit). The bearing is now ready to take the tension.

TENSION The amount of tension should be based on 1/8" tube travel per 100 ft. of setting, this is put in terms of No. of turns of the tension bearing in the table below:

SIZE TUBING	NUMBER THREADS	NUMBER OF TURNS PER 100 FEET OF SETTING
1 1/4"	16	2
1 1/2"	12	1 1/2
2"	10	1 1/4
2 1/2", 3" & 3 1/2"	8 OLD STD.	1
2 1/2", 3" & 3 1/2"	10 NEW STD.	1 1/4
4" & UP	10	1 1/4

ALIGNMENT The pump shaft MUST now be in the exact center of the pump head and exactly perpendicular to the machined surface of the discharge ell. This can be checked with a stright edge, square, and pair of calipers. The discharge ell can be shaifted slightly on the concrete foundation or tilted with shims until the shaft is properly aligned.

MOTOR MOUNT Lower the hollow shaft motor over the drive shaft, taking care not to disturb the alignment. To insure proper operation of the pump it is necessary that the motor be centered exactly, so great care should be taken in this operation. Bolt motor to discharge ell or motor stand with cap screws.

When a hollow shaft motor is used the drive shaft is keyed to a removable motor coupling. Screw on and tighten the drive shaft nut, lifting the shaft until the impellers are drawn against the top of the pump bowl. In this position the shaft cannot be rotated. The nut should then be loosened 1/4 to 1/2 turn or until the shaft turns freely. A gib key is then inserted to prevent the drive shaft nut from working loose.

GROUT BASE AND CONNECT DISCHARGE Grout the discharge ell in position, being careful not to disturb the alignment of the pump head. In case the discharge nipple is to be connected to a water main, a Dresser Coupling should be used. The main should be placed as nearly as possible in line with the discharge nipple. The Dresser Coupling prevents throwing any strain on the pump head if the discharge nipple and main are not exactly in line.

LUBRICATING SYSTEM Connect the hand oil pump, drip feed lubricator or automatic solenoid lubricator to the oil connection in the tension bushing. When first connected allow about one cup full oil to enter the tubing. Then adjust the drip cup or automatic lubricator to allow the following quantity of oil to enter the tubing:

For setting up to 50 feet - 5 drops per minute
For setting up to 100 feet - 10 drops per minute
For setting up to 150 feet - 15 drops per minute
For setting up to 200 feet - 20 drops per minute
For setting up to 250 feet - 25 drops per minute
For setting up to 300 feet - 30 drops per minute

When using a force feed oil pump inject about one cup full of oil for each 24 hours of operation.

The oil should be of a good grade of mineral oil free from grit or foreign matter, with a viscosity rating of approximately S.A.E. 10 and having a relatively low cold pour point.

STARTING PUMP CHECK DIRECTION OF MOTOR ROTATION very carefully before applying power. The pump must operate in a left hand or counter clock-wise direction.

Open pet cock located adjacent to packing box to release air from discharge column, and close as soon as water discharges from pet cock.

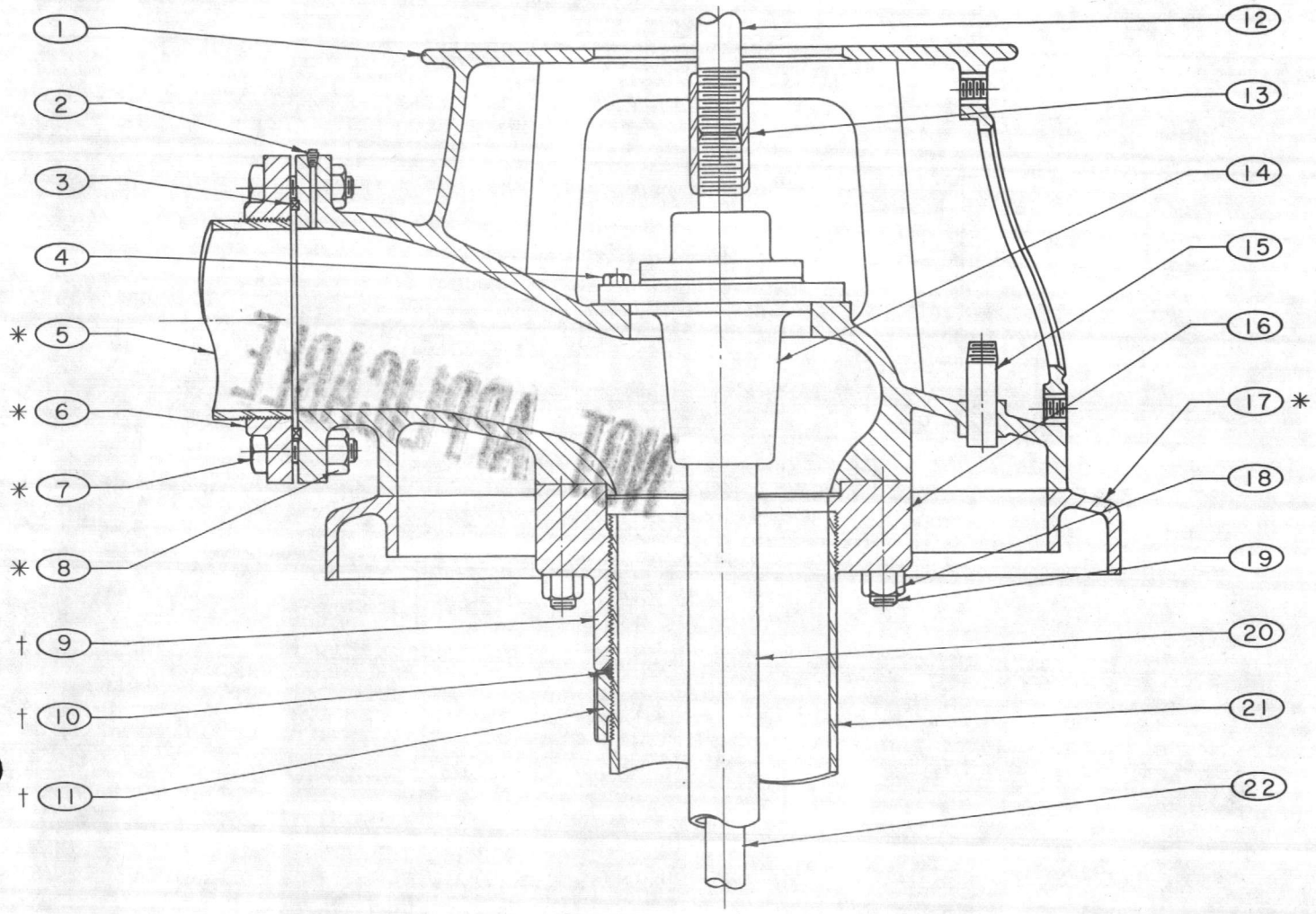
After the pump has been in operation a few hours, shut down and check the adjustment of the pump runners. The pump shaft may have been screwed up tighter by the power applied and thereby shortened.

PRINTED IN U. S. A.

TYPE TF DISCHARGE HEAD

ENCLOSED LINE SHAFT

SINGER
LAYNE & BOWLER DIVISION
MEMPHIS, TENNESSEE U.S.A.
Layne



*NOT FURNISHED UNLESS SPECIFIED BY CUSTOMER

ITEM NO.		DESCRIPTION
1		DISCHARGE HEAD
2		PIPE PLUG, PRESSURE GAUGE
3		PACKING, COMPANION FLANGE
4		CAPSCREW (STUFFING BOX)
5		DISCHARGE PIPE
6		COMPANION FLANGE
7		MACHINE BOLT, COMPANION FLG.
8		HEX NUT, COMPANION FLANGE
9		ADJ. TOP COLUMN FLANGE
10		PACKING
11		PACKING RING

† USED FOR SETTINGS GREATER THAN 200 FT.

ITEM NO.		DESCRIPTION
12		MOTOR DRIVE SHAFT
13		HEAD COUPLING
14		STUFFING BOX (ASSEMBLY)
15		PIPE NIPPLE (AUXILIARY OPN'G)
16		TOP COLUMN FLANGE
17		BASE PLATE
18		HEX NUT
19		STUD
20		TUBING
21		TOP COLUMN PIPE
22		LINE SHAFT, TOP PIECE

IN ORDERING REPLACEMENT PARTS, SPECIFY PART DESCRIPTION & PUMP SERIAL NO.

REVISED 10-1-67
SUPERSEDES ORIGINAL PRICE BOOK ISSUE

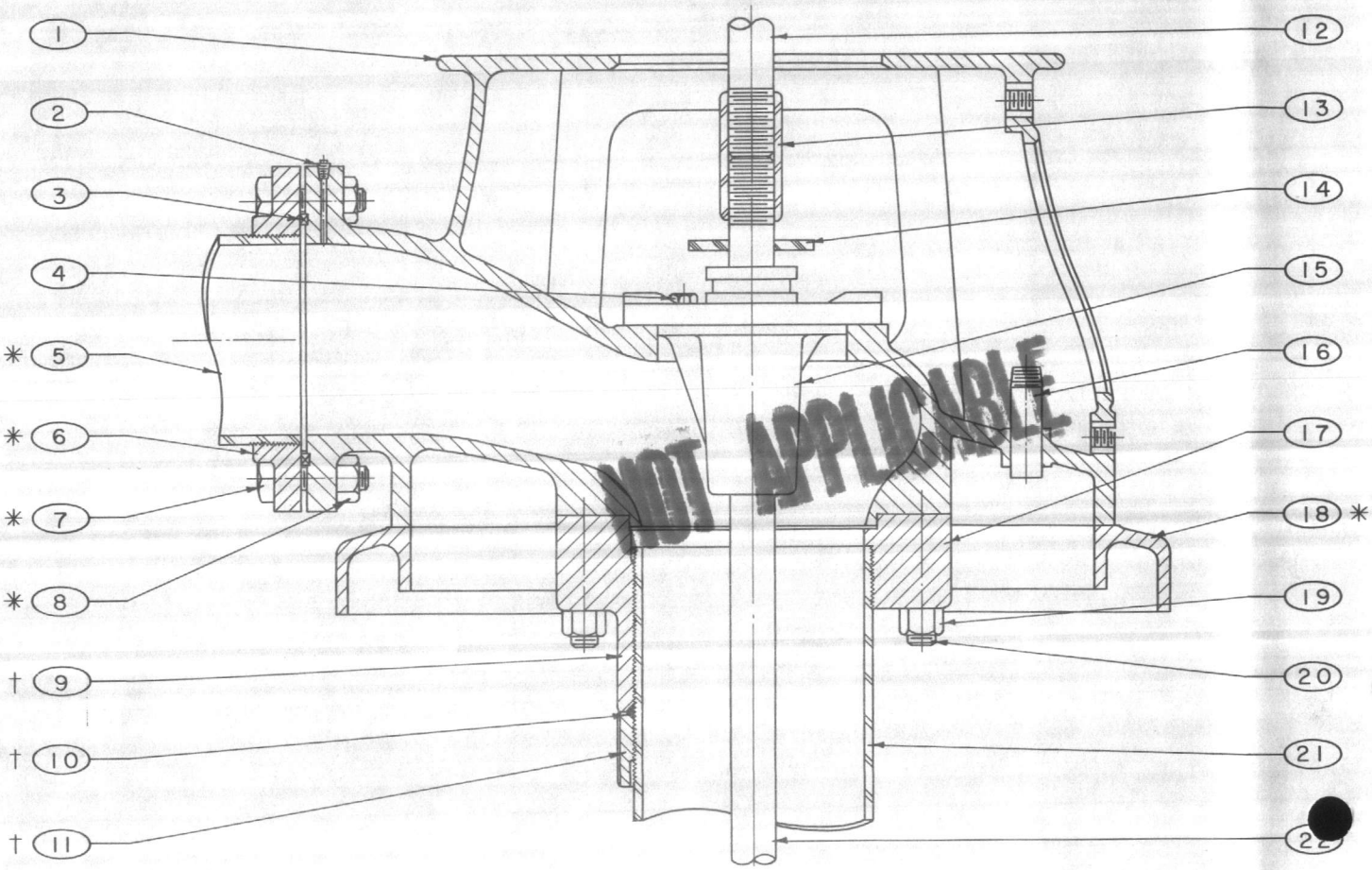
PBS 193

PRINTED IN U.S.A.

TYPE TF DISCHARGE HEAD

OPEN LINE SHAFT

SINGER
LAYNE & BOWLER DIVISION
MEMPHIS, TENNESSEE U.S.A.
Layne



*NOT FURNISHED UNLESS SPECIFIED BY CUSTOMER

ITEM NO.		DESCRIPTION
1		DISCHARGE HEAD
2		PIPE PLUG, PRESSURE GAUGE
3		PACKING, COMPANION FLANGE
4		CAPSCREW (STUFFING BOX)
5		DISCHARGE PIPE
6		COMPANION FLANGE
7		MACHINE BOLT, COMPANION FLG.
8		HEX NUT, COMPANION FLANGE
9		ADJ. TOP COLUMN FLANGE
10		PACKING
11		PACKING RING

†USED FOR SETTINGS GREATER THAN 200 FT.

ITEM NO.		DESCRIPTION
12		MOTOR DRIVE SHAFT
13		HEAD COUPLING
14		WATER SLINGER
15		STUFFING BOX (ASSEMBLY)
16		PIPE NIPPLE (AUXILIARY OPN'G)
17		TOP COLUMN FLANGE
18		BASE PLATE
19		HEX NUT
20		STUD
21		TOP COLUMN PIPE
22		LINE SHAFT, TOP PIECE

IN ORDERING REPLACEMENT PARTS, SPECIFY PART DESCRIPTION & PUMP SERIAL NO.

REVISED - 10-1-67
SUPERSEDES ORIGINAL PRICE BOOK ISSUE

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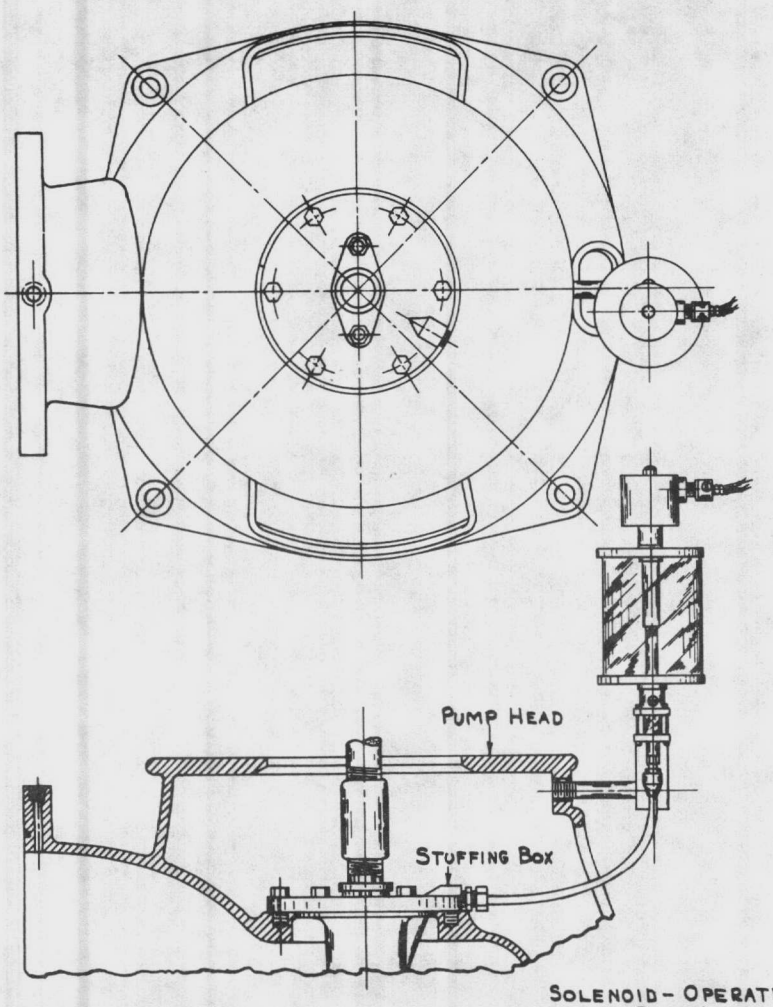
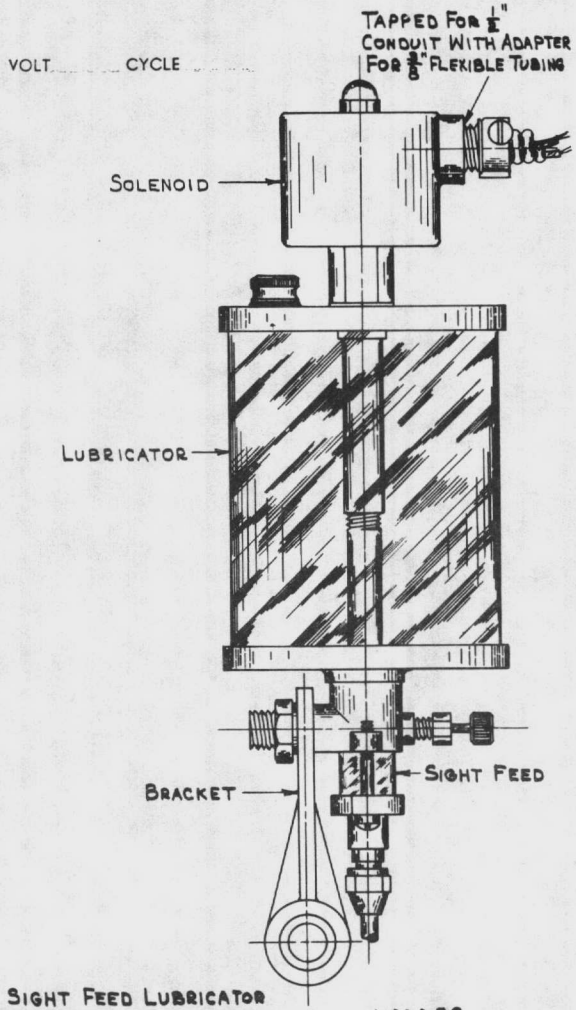




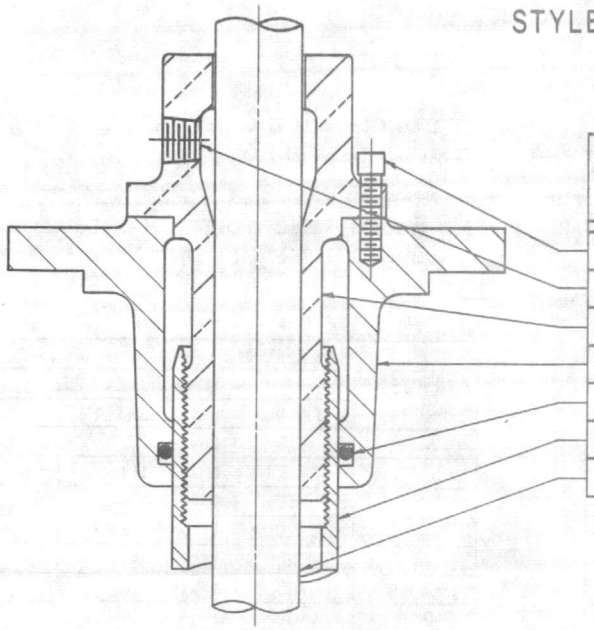
SOLENOID - OPERATED SIGHT FEED LUBRICATOR FOR AUTOMATIC OPERATION

LMA99

PRINTED IN U.S.A.

SINGER
LAYNE & BOWLER DIVISION
MEMPHIS, TENNESSEE U.S.A.

STUFFING BOX ASSEMBLY
OIL LUBRICATION
STYLE 60



PART NAME	MATERIAL	
	STANDARD	SPECIAL
LOCK SCREW	STEEL	
OIL INLET		
TENSION BEARING	BRONZE	
TENSION BOX	CAST IRON	
O-RING	BUNA-N	
TUBING	C.S.-SCH. 80 PIPE	
LINE SHAFT	C-1045 CAR. STL.	

IN ORDERING REPLACEMENT PARTS, SPECIFY PARTS DESCRIPTION AND PUMP SERIAL NO.

INSTALLATION AND OPERATING INSTRUCTIONS

1. REMOVE THE LOCK SCREW AND THE O-RING AND THOROUGHLY CLEAN THE TENSION BOX INCLUDING THE O-RING GROOVE. REMOVE ANY NICKS OR BURRS FROM THE UPPER AND LOWER MOUNTING FACES AND MALE REGISTER WITH A FINE FLAT FILE. RE-INSTALL AND LIGHTLY OIL THE EXPOSED SURFACE OF THE O-RING.

2. CLEAN THE SURFACE OF THE HEAD THAT RECEIVES THE TENSION BOX AND REMOVE ANY NICKS OR BURRS WITH A FINE FLAT FILE.

3. CAREFULLY INSTALL THE TENSION BOX, ALIGN THE MOUNTING HOLES WITH THE TAPS IN THE HEAD AND SEAT THE BOX TO THE HEAD. INSTALL AND EVENLY TIGHTEN THE MOUNTING CAPSCREWS.

4. CLEAN THE TENSION BEARING THOROUGHLY AND REMOVE ANY NICKS OR BURRS FROM THE MOUNTING FACE AND REGISTER WITH A FINE FLAT FILE. REMOVE ANY NICKS OR BURRS FROM THE THREADS WITH A THREE CORNERED FILE.

5. OIL THE THREADS AND THE BORE AND CAREFULLY PLACE THE TENSION BEARING OVER THE SHAFT AND THREAD (RIGHT HAND) INTO THE TUBING. CONTINUE THREADING UNTIL THE LOWER FLANGE FACE FIRMLY CONTACTS THE TENSION BOX FACE.

6. FOR THE PROPER AMOUNT OF TUBE TENSION, REFER TO INSTRUCTIONS PBI 100 PAGE 1 OR 2. FOR SETTINGS LESS THAN 100 FEET, TIGHTEN TO THE NEAREST LOCKING POSITION.

   CHART 1 BELOW GIVES THE AMOUNT OF PULL-UP FOR EACH COMPLETE TURN. OF THE TENSION BEARING.

CHART 1

SIZE TUBING	1 1/4"	1 1/2"	2"	2 1/2"	3" 3 1/2"	4" & UP
NO. THD'S/IN	16	12	10	10	8	10
"A"	.063"	.083"	.100"	.100"	.125"	.100"

"A" = AMOUNT OF PULL-UP FOR EACH COMPLETE TURN OF THE TENSION BEARING. THE TOTAL NUMBER OF TURNS REQUIRED CAN BE CALCULATED BY DIVIDING THE FIGURE ABOVE INTO THE TENSION FIGURE FROM PBI 100.

EXAMPLE: 500 FEET OF 10" (.279" WALL) x 1 11/16" x 2 1/2": FROM PBI 100, THE PROPER TENSION OR PULL-UP IS FOUND TO BE 0.529" AND FROM CHART 1, THE PULL-UP PER COMPLETE TURN IS 0.100" FOR 2 1/2" 10 THD. TUBING.

TOTAL NO. OF TURNS = $\frac{0.529}{0.100}$ = 5.29 OR APPROXIMATELY 5 1/4.

IF AFTER ADJUSTING THE TENSION BEARING THE PROPER NUMBER OF TURNS, NO SLOT ALIGNS WITH THE LOCK SCREW TAP IN THE BOX, IT IS RECOMMENDED THAT THE BEARING BE BACKED OFF TO THE NEAREST ALIGNMENT POSITION IE IT TAKES MORE THAN AN EIGHTH TURN FORWARD TO ACHIEVE ALIGNMENT.

7. INSTALL AND TIGHTEN THE LOCK SCREW.

8. CONNECT THE LUBRICATOR TO THE OIL CONNECTION IN THE TENSION BEARING.

   FILL THE LUBRICATOR WITH A GOOD GRADE MINERAL OIL HAVING A VISCOSITY RATING OF APPROXIMATELY S.A.E. 10 AND HAVING A RELATIVELY LOW COLD POUR POINT.

CONTINUED ON PAGE 2

SINGER
LAYNE & BOWLER DIVISION
MEMPHIS, TENNESSEE U.S.A.

STYLE 60 INSTALLATION AND OPERATING INSTRUCTIONS

(CONTINUED)

IMPORTANT:

PRIOR TO INITIAL START-UP AND AFTER A SHUT DOWN OF 150 HOURS OR LONGER, THE LUBRICATOR SHOULD BE ADJUSTED FOR THE RECOMMENDED NUMBER OF DROPS PER MINUTE AS OUTLINED IN CHART 2 AND ALLOWED TO OPERATE AT THIS RATE FOR 20 MINUTES FOR EACH 100 FEET OF SETTING.

FOR NORMAL OPERATION, THE LUBRICATOR SHOULD BE ADJUSTED IN ACCORDANCE WITH CHART 2.

CHART 2

SHAFT SIZE	"A" LUBRICATOR SETTING IN DROPS PER MIN.	"B" DROPS PER MIN.PER EACH 100 FT. SETTING
7/8 - 1 3/16	5	2
1 1/2 - 1 11/16	7	3
1 15/16 - 2 7/16	10	4
2 11/16	12	5

$$\text{TOTAL DROPS/MIN.} = \text{"A"} + \left(\frac{\text{SETTING}}{100} \times \text{"B"}\right)$$

EXAMPLE: 500 FEET OF 1 11/16" x 2 1/2"

$$\text{TOTAL DROPS/MIN.} = 7 \times \left(\frac{500}{100} \times 3\right) = 7 + (5 \times 3) = 7 + 15 = 22$$

9. THE LUBRICATOR SHOULD BE CHECKED PERIODICALLY AND RESET IF REQUIRED TO MAINTAIN THE PROPER FLOW.

THE APPROXIMATE NUMBER OF HOURS OF CONTINUOUS OPERATION AT VARIOUS FLOW RATES CAN BE FOUND IN CHART 3. IT IS GENERALLY RECOMMENDED THAT THE LUBRICATION BE RE-FILLED WHEN IT IS NO LESS THAN ONE QUARTER FULL.

CHART 3

NUMBER OF HOURS OF CONTINUOUS OPERATION			
FLOW RATE	LUBRICATOR CAPACITY		
DROPS/MIN.	1 QUART	2 QUART	3 QUART
5	110	220	440
10	55	110	220
15	38	75	150
20	28	55	110
25	22	45	90
30	19	38	75
40	14	28	55
50	11	22	45

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LAYNE & BOWLER DIVISION
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TUBE TENSION ADJUSTMENT CHART

COLUMN SIZE	SHAFT AND TUBING SIZE	TUBE TENSION IN INCHES SETTING IN FEET									
		100	200	300	400	500	600	700	800	900	1000
3" MC*	1 1/4 x 7/8	0.025	0.103	0.233	0.415	0.649					
(.187)	1 1/2 x 1	0.028	0.115	0.261	0.465	0.726					
4" *	1 1/4 x 7/8	0.020	0.083	0.186	0.333	0.520	0.750	1.021	1.334	1.688	2.084
(.237)	1 1/2 x 1	0.022	0.090	0.202	0.361	0.564	0.813	1.107	1.447	1.831	2.260
SCH. 40S	2 x 1 3/16	0.025	0.103	0.233	0.416	0.650	0.936	1.275	1.666	2.108	2.603
5" *	1 1/4 x 7/8	0.018	0.075	0.171	0.305	0.476	0.686	0.934	1.220	1.544	1.906
(.258)	1 1/2 x 1	0.020	0.081	0.182	0.325	0.508	0.733	0.998	1.303	1.650	2.036
SCH. 40S	2 x 1 3/16	0.022	0.091	0.205	0.366	0.571	0.824	1.121	1.465	1.854	2.289
	1 1/4 x 7/8	0.017	0.071	0.160	0.286	0.447	0.644	0.878	1.146	1.451	1.791
6" *	1 1/2 x 1	0.018	0.075	0.169	0.302	0.472	0.681	0.927	1.211	1.532	1.892
(.280)	2 x 1 3/16	0.020	0.083	0.187	0.333	0.521	0.751	1.022	1.335	1.690	2.086
SCH 40S	2 1/2 x 1 1/2	0.024	0.098	0.220	0.393	0.613	0.884	1.204	1.572	1.990	2.457
	2 1/2 x 1 11/16	0.025	0.102	0.231	0.412	0.643	0.927	1.263	1.649	2.088	2.577
	3 x 1 15/16	0.029	0.119	0.269	0.480	0.750	1.080	1.471	1.922	2.432	3.003
	1 1/2 x 1	0.017	0.071	0.161	0.287	0.449	0.647	0.881	1.151	1.457	1.798
	2 x 1 3/16	0.019	0.077	0.175	0.313	0.488	0.704	0.958	1.252	1.584	1.956
7" *	2 1/2 x 1 1/2	0.022	0.089	0.202	0.360	0.563	0.811	1.105	1.443	1.827	2.255
(.300)	2 1/2 x 1 11/16	0.023	0.093	0.211	0.376	0.587	0.846	1.153	1.506	1.906	2.353
	3 x 1 15/16	0.026	0.107	0.242	0.431	0.673	0.970	1.321	1.726	2.184	2.696
	3 1/2 x 2 3/16	0.030	0.121	0.272	0.485	0.757	1.092	1.486	1.941	2.457	3.034
	3 1/2 x 2 7/16	0.031	0.127	0.287	0.512	0.800	1.153	1.570	2.050	2.595	3.204
	2 x 1 3/16	0.019	0.076	0.173	0.308	0.481	0.694	0.945	1.234	1.562	1.928
8" *	2 1/2 x 1 1/2	0.022	0.088	0.198	0.354	0.552	0.796	1.084	1.416	1.793	2.213
(.277)	2 1/2 x 1 11/16	0.022	0.091	0.206	0.368	0.575	0.829	1.129	1.475	1.867	2.306
SCH 30	3 x 1 15/16	0.026	0.105	0.236	0.421	0.657	0.947	1.290	1.684	2.132	2.632
	3 1/2 x 2 3/16	0.029	0.117	0.265	0.472	0.737	1.062	1.447	1.890	2.392	2.953
	3 1/2 x 2 7/16	0.031	0.124	0.279	0.498	0.778	1.121	1.526	1.993	2.522	3.114
	2 x 1 3/16	0.018	0.074	0.166	0.297	0.464	0.668	0.910	1.189	1.505	1.858
8"	2 1/2 x 1 1/2	0.020	0.083	0.188	0.336	0.525	0.757	1.031	1.347	1.704	2.104
(.322)	2 1/2 x 1 11/16	0.021	0.087	0.196	0.349	0.545	0.786	1.070	1.398	1.769	2.184
SCH. 40S	3 x 1 15/16	0.024	0.098	0.221	0.394	0.616	0.887	1.208	1.579	1.998	2.467
	3 1/2 x 2 3/16	0.027	0.109	0.246	0.439	0.685	0.987	1.344	1.756	2.223	2.744
	3 1/2 x 2 7/16	0.028	0.115	0.259	0.461	0.720	1.038	1.413	1.846	2.336	2.884
	2 x 1 3/16	0.018	0.072	0.163	0.291	0.455	0.655	0.892	1.166	1.476	1.822
	2 1/2 x 1 1/2	0.020	0.081	0.183	0.327	0.511	0.737	1.003	1.311	1.659	2.048
9" *	2 1/2 x 1 11/16	0.021	0.084	0.190	0.339	0.530	0.763	1.040	1.358	1.719	2.122
(.312)	3 x 1 15/16	0.023	0.095	0.213	0.381	0.595	0.857	1.167	1.524	1.929	2.382
	3 1/2 x 2 3/16	0.026	0.105	0.236	0.422	0.658	0.949	1.292	1.688	2.136	2.637
	3 1/2 x 2 7/16	0.027	0.110	0.248	0.442	0.690	0.995	1.355	1.770	2.240	2.766
	2 x 1 3/16	0.018	0.072	0.163	0.291	0.454	0.655	0.891	1.164	1.474	1.819
	2 1/2 x 1 1/2	0.020	0.081	0.183	0.327	0.510	0.736	1.002	1.309	1.656	2.045
10" *	2 1/2 x 1 11/16	0.021	0.084	0.190	0.338	0.529	0.762	1.038	1.355	1.716	2.118
(.279)	3 x 1 15/16	0.023	0.094	0.213	0.380	0.593	0.855	1.164	1.521	1.925	2.377
	3 1/2 x 2 3/16	0.026	0.104	0.236	0.420	0.657	0.946	1.289	1.683	2.131	2.630
	3 1/2 x 2 7/16	0.027	0.110	0.247	0.441	0.689	0.992	1.351	1.765	2.234	2.758
	4 x 2 11/16	0.030	0.122	0.276	0.492	0.769	1.108	1.509	1.971	2.494	3.079
	2 x 1 3/16	0.017	0.071	0.159	0.285	0.445	0.641	0.873	1.141	1.444	1.783
	2 1/2 x 1 1/2	0.019	0.079	0.178	0.318	0.496	0.715	0.974	1.272	1.610	1.988
10"	2 1/2 x 1 11/16	0.020	0.081	0.184	0.328	0.513	0.739	1.007	1.315	1.664	2.055
(.307)	3 x 1 15/16	0.022	0.091	0.205	0.366	0.572	0.824	1.122	1.466	1.855	2.290
SCH. 30	3 1/2 x 2 3/16	0.025	0.100	0.226	0.403	0.629	0.907	1.235	1.614	2.042	2.521
	3 1/2 x 2 7/16	0.026	0.105	0.236	0.422	0.659	0.949	1.292	1.688	2.137	2.638
	4 x 2 11/16	0.029	0.116	0.263	0.469	0.732	1.055	1.436	1.876	2.374	2.931

NOTE: ALL PIPE MARKED * IS SINGER-LAYNE & BOWLER DIV. STANDARD

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LAYNE & BOWLER DIVISION
MEMPHIS, TENNESSEE U.S.A.

Layne

TUBE TENSION ADJUSTMENT CHART

COLUMN SIZE	SHAFT AND TUBING SIZE	TUBE TENSION IN INCHES SETTING IN FEET									
		100	200	300	400	500	600	700	800	900	1000
10" (.365) 40S	2 x 1 3/16	0.017	0.068	0.154	0.276	0.430	0.620	0.845	1.104	1.397	1.725
	2 1/2 x 1 1/2	0.018	0.075	0.170	0.303	0.474	0.683	0.930	1.215	1.538	1.899
	2 1/2 x 1 11/16	0.019	0.077	0.175	0.312	0.488	0.703	0.958	1.251	1.583	1.955
	3 x 1 15/16	0.021	0.085	0.193	0.344	0.538	0.775	1.055	1.378	1.745	2.154
	3 1/2 x 2 3/16	0.023	0.093	0.210	0.376	0.586	0.845	1.151	1.504	1.903	2.349
	3 1/2 x 2 7/16	0.024	0.097	0.219	0.391	0.611	0.881	1.199	1.567	1.983	2.448
	4 x 2 11/16	0.026	0.107	0.242	0.431	0.673	0.970	1.321	1.725	2.183	2.695
12" * (.330) SCH. 30	2 1/2 x 1 1/2	0.018	0.074	0.166	0.297	0.464	0.670	0.912	1.191	1.508	1.861
	2 1/2 x 1 11/16	0.019	0.076	0.171	0.306	0.477	0.688	0.937	1.225	1.550	1.913
	3 x 1 15/16	0.020	0.083	0.188	0.335	0.524	0.755	1.028	1.342	1.699	2.098
	3 1/2 x 2 3/16	0.022	0.090	0.204	0.364	0.569	0.820	1.116	1.458	1.846	2.278
	3 1/2 x 2 7/16	0.023	0.094	0.212	0.379	0.592	0.853	1.161	1.517	1.919	2.370
	4 x 2 11/16	0.025	0.103	0.233	0.415	0.649	0.935	1.273	1.663	2.105	2.599
12" (.375) "S"	2 1/2 x 1 1/2	0.018	0.072	0.162	0.289	0.451	0.650	0.886	1.157	1.464	1.808
	2 1/2 x 1 11/16	0.018	0.073	0.166	0.296	0.463	0.667	0.908	1.187	1.502	1.854
	3 x 1 15/16	0.020	0.080	0.181	0.322	0.503	0.726	0.988	1.291	1.634	2.017
	3 1/2 x 2 3/16	0.021	0.086	0.195	0.348	0.543	0.783	1.066	1.393	1.763	2.177
	3 1/2 x 2 7/16	0.022	0.090	0.202	0.361	0.563	0.812	1.106	1.444	1.828	2.257
	4 x 2 11/16	0.024	0.098	0.220	0.393	0.614	0.885	1.205	1.574	1.992	2.459
14" * (.375) SCH. 30S	2 1/2 x 1 1/2	0.017	0.070	0.158	0.283	0.442	0.637	0.868	1.133	1.435	1.771
	2 1/2 x 1 11/16	0.018	0.072	0.162	0.290	0.452	0.652	0.888	1.160	1.468	1.813
	3 x 1 15/16	0.019	0.078	0.175	0.313	0.489	0.705	0.961	1.255	1.588	1.961
	3 1/2 x 2 3/16	0.021	0.084	0.189	0.337	0.526	0.758	1.032	1.348	1.706	2.106
	3 1/2 x 2 7/16	0.021	0.086	0.195	0.348	0.544	0.784	1.067	1.394	1.765	2.179
	4 x 2 11/16	0.023	0.094	0.212	0.378	0.590	0.850	1.157	1.512	1.914	2.362
16" * (.375) SCH. 30S	3 x 1 15/16	0.018	0.075	0.169	0.302	0.472					
	3 1/2 x 2 3/16	0.020	0.080	0.180	0.322	0.503					
	3 1/2 x 2 7/16	0.020	0.082	0.186	0.332	0.519					
	4 x 2 11/16	0.022	0.089	0.201	0.358	0.559					

NOTE: ALL PIPE MARKED * IS SINGER-LAYNE & BOWLER DIV. STANDARD.

VERTICAL CENTRIFUGAL PUMP

Installation of Pump Bowls and Column

Butt Joint Column

Enclosed Line Shaft

Derrick Installation of a Layne Pump requires a derrick 30 to 40 feet in height and a hand winch or power hoist of sufficient size to handle the total weight.

Foundation The concrete foundation for the pump base should be built in accordance with foundation plans furnished by the factory. Where a separate pump base plate is used it should be set in position in the concrete foundation before the pump bowls and column are installed but not grouted into position until the installation is completed.

Dimensions of Well Check the inside diameter of the well and the outside diameter of the pump bowls and column flanges or couplings to be sure that the pump and column will go in the well with ample clearance. The well casing must be straight and without obstructions that might bend the line shaft. Measure the static level of the water in the well to determine if the pump has been furnished with the proper depth of setting. The pump bowls should be submerged when the pump is operating and we do not recommend or guarantee satisfactory operation with a suction lift.

Check Material Check all parts of the pump against the packing list to find out whether all parts have been received. If any parts are missing claim should be made at once to the railroad company.

Clean All Joints All threads and flanged couplings of the discharge pipe and protective tubing should be carefully cleaned and at the time of installation coated with L A Y N C O T E. Care should be taken that there be absolutely no sand or grit between flanges or couplings when making up the joints.

Suction If a basket suction is used it should be lowered into the well first and held by pipe clamps. The suction pipe is picked up and screwed into the coupling at top of basket suction. The basket suction and suction pipe are then lowered into the well until about 18 inches of suction pipe extend above the well casing. The suction pipe is clamped in this position with pipe clamps. When the suction pipe has only threads at the top end care should be taken to place the clamps under the small lug welded on the pipe.

Pump Bowls The pump bowls should be carefully inspected before placing in the well. Rotate impeller shaft several times by hand to be sure that it does not bind at any point. The impeller shaft should have about ¼-inch or more end play. DO NOT STRAIN SHAFT IN ANY WAY THAT MIGHT BEND IT AND DO NOT LIFT PUMP BOWLS BY THE SHAFT. The pump bowls can best be handled by a pair of pipe clamps. The bowls should be lifted into position and screwed or bolted to the suction pipe. The clamps on the suction pipe are then removed and the bowls and suction pipe lowered into the well until the top of the discharge nozzle is about 18 inches above the well casing or top of foundation. The bowls are then supported at this point by pipe clamps.

Discharge Column Pipe Check the enclosed chart to determine the correct spacing of the spiders in the discharge column. If the discharge pipe screws into the pump bowl be sure to have the coupling at the top end of the first section either with the spider or without the spider as shown on the chart. If the lower section of discharge pipe has a special flange to connect to the pump bowls be sure to arrange the pipe with this flange at the lower end.

Protective Tubing and Shaft The shaft and protective tubing are shipped assembled in 20-ft. or 10-ft. lengths and packed with sufficient lubricant to prevent rusting. A 20-ft. length or 10-ft. length of shaft and tubing is required for each 20-ft. or 10-ft. length of pipe. Remove the protecting cap only from the top end of the tubing, which is the end fitted with the bronze shaft bearing and tubing coupling. Slide the assembled tubing and shafting into the discharge column pipe, making sure that the bronze bearing end of the assembly will be on top.

Installing Discharge Column Pull the tubing about six inches below the lower end of the discharge pipe and tie them together in this position with a piece of rope by taking several half hitches around the pipe and then the tubing.

Raise the assembled section of pipe, tubing and shafting until it is hanging vertically in the derrick with the lower end of the tubing about one inch above a board placed on the foundation. Remove the lower plug from the tubing to release the shaft. Raise the discharge pipe about six inches and take several half hitches around the shaft. This method avoids straining the shaft as the column is swung under the derrick. Swing the discharge pipe into position over the pump bowls and screw the shaft into the shaft coupling until it butts aginst the impeller shaft.

THE THREADS AND THE ENDS OF THE SHAFTING AND THE SHAFT COUPLINGS MUST BE PERFECTLY CLEAN.

Lower the discharge pipe and tubing and screw the tubing onto the main bearing box about 3 or 4 threads Then coat the threads on the bronze box with L A Y N C O T E and screw the tubing on the box until it butts. The discharge pipe is then bolted or screwed to the pump bowls.

Remove the clamps from the pump bowls and lower the pump bowls with the section of discharge column until the column extends about 18 inches above the well casing or foundation. Clamp the discharge column in this position.

Remove the bronze shaft bearing and tubing coupling and pour about one pint of oil into the tubing. The oil used should be a good grade of mineral oil free from grit and foreign matter, with a viscosity rating approximately SAE 10 and having a relatively low cold pour point.

When the next section of discharge column is in position in the derrick replace the bronze bearing, screwing it into the tubing about 3 or 4 threads. After the spider and spider bushing or aligning ring have been installed (as described below) and the shaft connection is made, lower the discharge pipe and tubing and screw the tubing onto the bronze bearing about 3 or 4 threads. Then coat the threads of the bearing with L A Y N C O T E and screw the tubing on the bearing until the ends butt tightly together. IT IS VERY IMPORTANT THAT EVERY TUBING JOINT BE TIGHT AND to form a seal the ends of the tubing must be smooth and square. While handling and installing the tubing use care to keep from scoring or damaging the ends in any way.

When flanged column is used, slip a bronze spider or aligning ring over the top of the tubing and fit it into the recess in the flange. (Refer to spider spacing chart to determine whether a flange or aligning ring should be used at the joint in question). When screw coupled column is used the spider is cast integral with the coupling. The rubber spider bushings are installed in the spiders before shipment from the factory.

Each section of discharge column is installed as described above. When screw couplings are used care should be taken in starting the pipe in the coupling. The pipe should start by hand and screw by hand to within 5 or 6 threads of butting. If the thread appears tighter than this check carefully for a damaged thread as the pipe should not be forced into the coupling. The last 5 or 6 threads should be made up with a chain tong, making sure that the joint is tight with the pipe butting against the shoulder in the coupling or against the end of the pipe in the coupling as the case might be.

When the line shaft connects to the motor drive shaft below the tension assembly, the motor drive shaft should be attached to the line shaft in the top section of tubing before the top length of discharge column is installed.

The top length of discharge pipe will usually have a special flange or special threads to connect to the bottom of the discharge ell and the top length of shaft will be of special length.

In case the discharge column does not check out within reasonable limits notify the factory to furnish the correct lengths.

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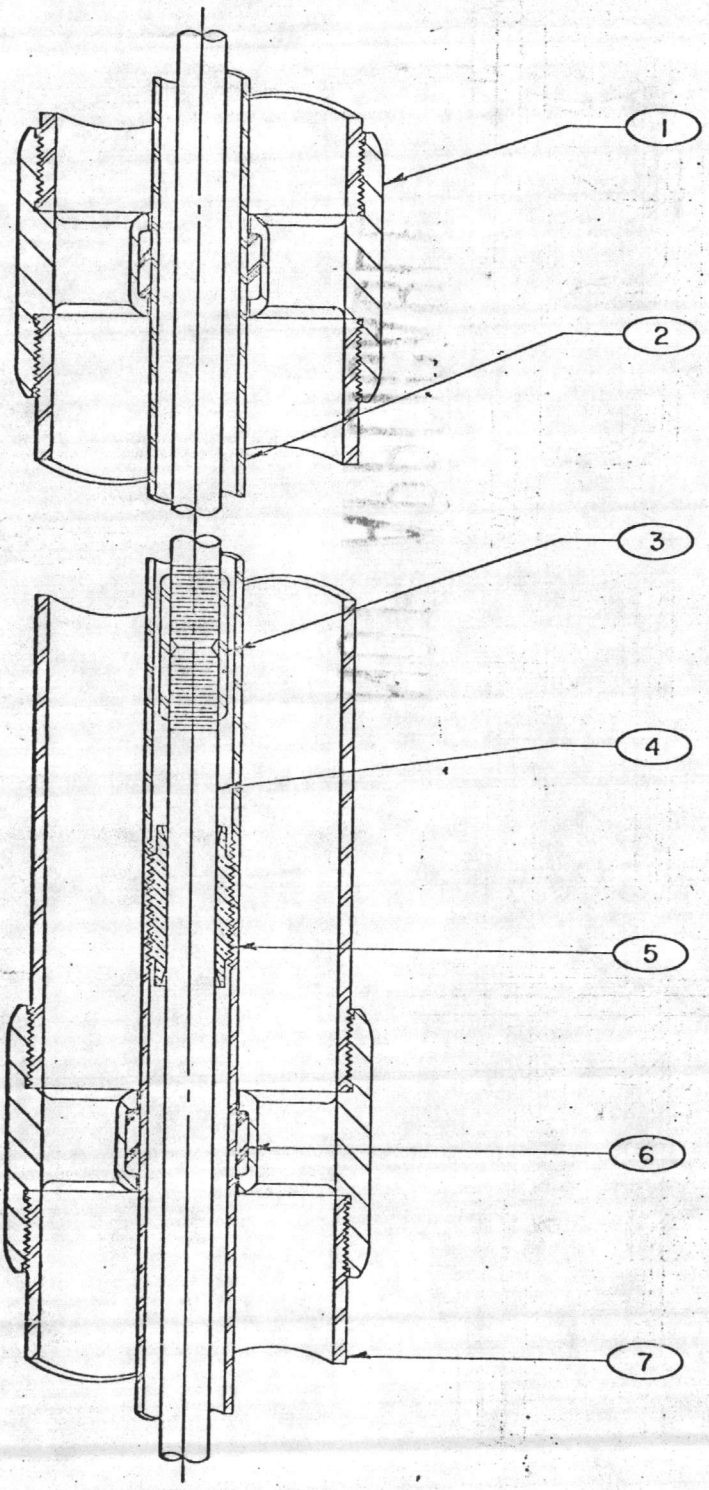
SINGER
LAYNE & BOWLER DIVISION
MEMPHIS, TENNESSEE U.S.A.

DISCHARGE COLUMN ASSEMBLY
SCREWED TYPE - ENCLOSED LINE SHAFT



ITEM NO.		DESCRIPTION
1		COMBINATION COUPLING
2		SHAFT TUBING
3		SHAFT COUPLING
4		LINE SHAFT

ITEM NO.		DESCRIPTION
5		SHAFT BOX
6		RUBBER BEARING
7		COLUMN PIPE

IN ORDERING REPLACEMENT PARTS, SPECIFY PART DESCRIPTION & PUMP SERIAL NO.

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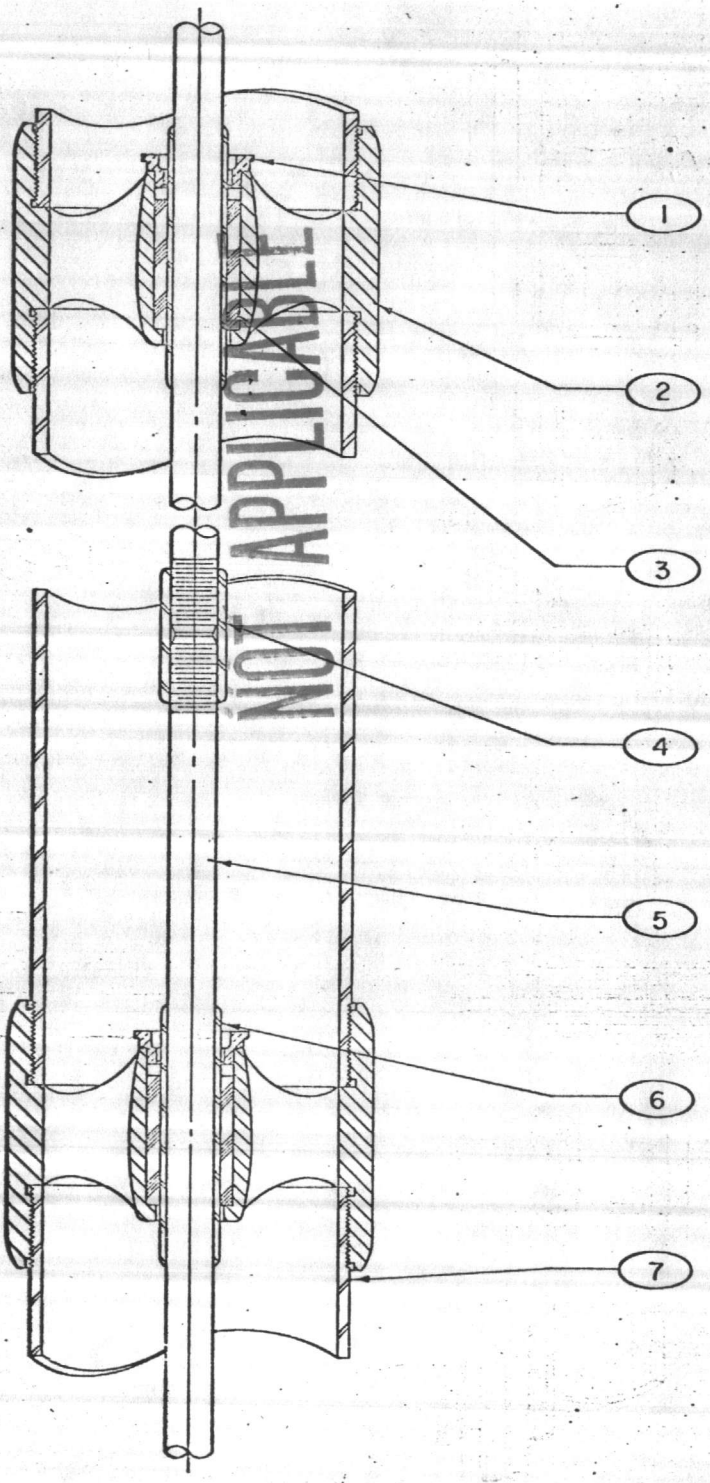
SINGER
LAYNE & BOWLER DIVISION
MEMPHIS, TENNESSEE U.S.A.

DISCHARGE COLUMN ASSEMBLY
SCREWED COUPLED - OPEN LINE SHAFT



ITEM NO.		DESCRIPTION
1		LOCK RING
2		COMBINATION COUPLING
3		RUBBER BEARING
4		SHAFT COUPLING

ITEM NO.		DESCRIPTION
5		LINE SHAFT
6		MONEL SLEEVE
7		COLUMN PIPE

IN ORDERING REPLACEMENT PARTS, SPECIFY PART DESCRIPTION & PUMP SERIAL NO.

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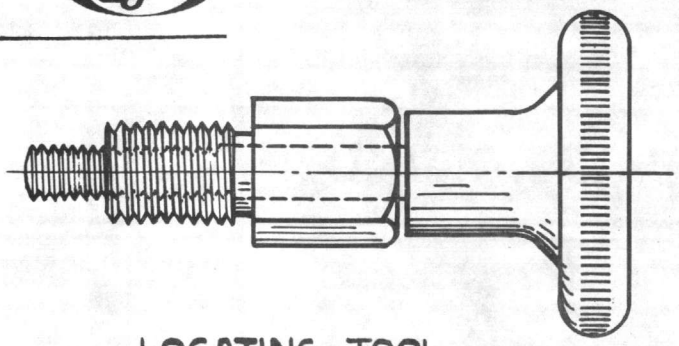
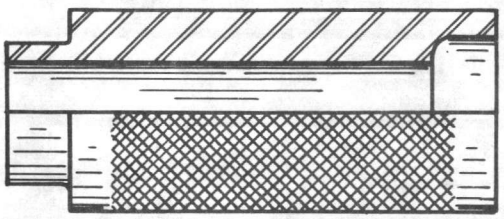
SINGER
LAYNE & BOWLER DIVISION
MEMPHIS, TENNESSEE U.S.A.

Layne

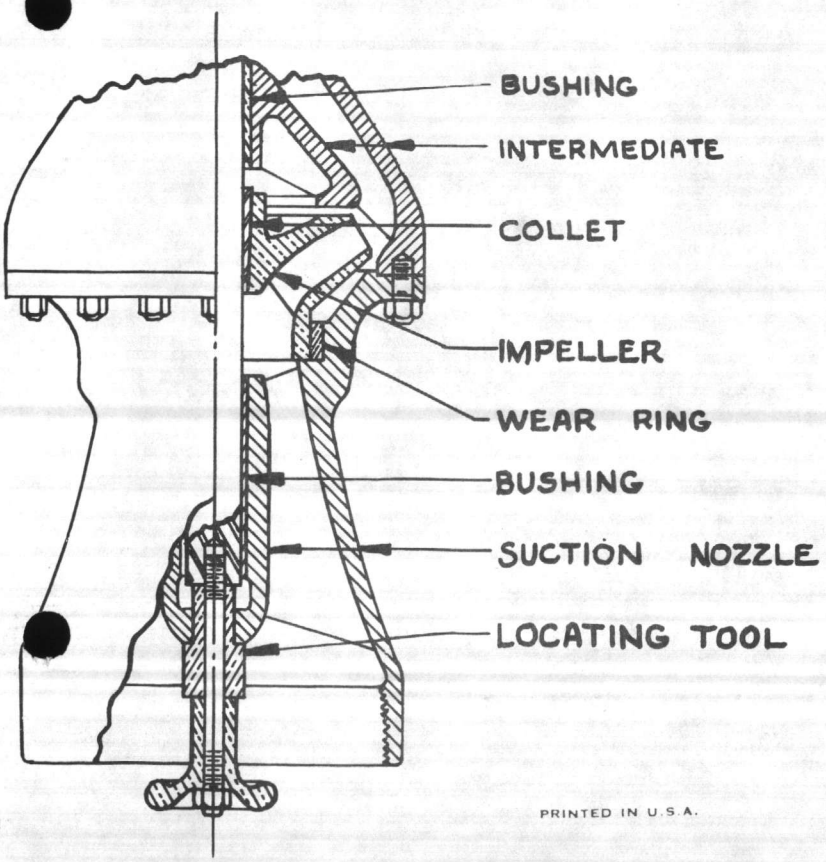
INSTRUCTIONS FOR ASSEMBLYING AND DISMANTLING PUMP BOWLS WITH COLLETS



LOCATING TOOL



COLLET DRIVER



TO ASSEMBLE BOWL

1. Remove cap screw from the bottom of the suction nozzle.
2. Screw locating tool into bottom end of suction nozzle hub.
3. Insert impeller shaft into suction nozzle bearing and turn handwheel of locating tool until impeller shaft is pulled down tight against the shoulder of the tool.
4. Place the impeller over the shaft. Slip the collet over the shaft with the small end first. (A screw driver can be used to spread collet for ease in slipping over shaft). Hold the impeller firmly into the wear ring recess and drive the collet into place with the male end of the collet driver.
5. Remove collet driver and assemble first intermediate stage. Place the next impeller over the shaft and continue to assemble as explained above.
6. When the bowl is completely assembled remove locating tool and replace cap screw in suction nozzle.

TO DISMANTLE BOWL

1. Remove discharge nozzle. Place collet driver over shaft with the female end first and while holding the impeller out of the wear ring recess, drive the impeller off of the collet. Remove the collet and impeller.
2. Remove the intermediate shell and drive the impeller off of the next collet. Continue to dismantle in like manner.

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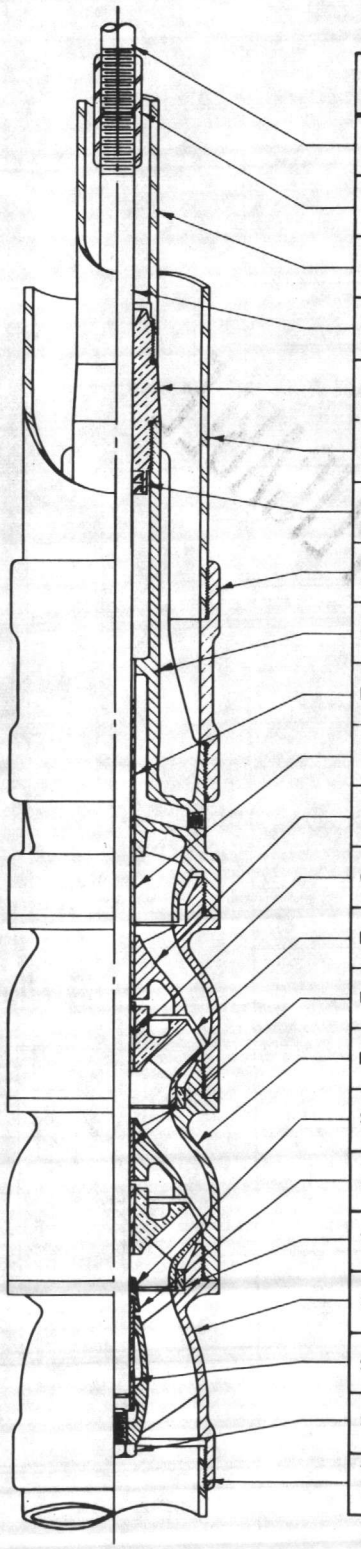
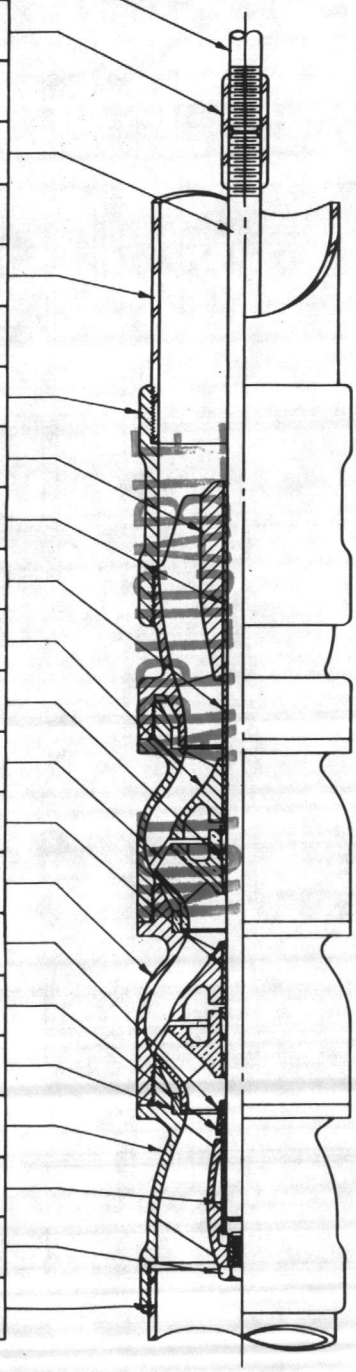
SINGER
LAYNE & BOWLER DIVISION
MEMPHIS, TENNESSEE U.S.A.

VERTICAL TURBINE PUMP
DEEP WELL

8" B, DR, PR, RK, T, UR - 10" RK, T, U - 12" T, UR



PART NAME	MATERIAL	
	STANDARD	SPECIAL
LINE SHAFT	CARBON STEEL C-1045	
SHAFT COUPLING	CARBON STEEL	
SHAFT TUBING	EXTRA HEAVY PIPE	
BOWL SHAFT	STAINLESS STEEL 416	
MAIN BEARING	BRONZE	
DISCHARGE COLUMN	ASTM-A 53-58 GRADE A OR B	
SEALS	BRONZE CASE SYN. RUBBER	
DISCHARGE ADAPTOR	CAST IRON CLASS 30	
DISCHARGE NOZZLE	CAST IRON CLASS 30	
DISCHARGE BEARING	BRONZE	
TOP INTERMEDIATE BRG.	BRONZE	
TOP INTERMEDIATE	CAST IRON CLASS 30	
COLLET	BRONZE	
IMPELLER	BRONZE	
INTERMEDIATE BRG.	BRONZE	
INTERMEDIATE	CAST IRON CLASS 30	
SET SCREW	STAINLESS STEEL	
‡ SAND COLLAR	BRONZE	
WEAR RING	BRONZE	
SUCTION NOZZLE	CAST IRON CLASS 30	
SUCTION NOZZLE BRG.	BRONZE	
SUCTION CAPSCREW	CARBON STEEL	
* SUCTION PIPE	ASTM-A 53-58 GRADE A OR B	



* NOT FURNISHED UNLESS SPECIFIED BY CUSTOMER
‡ HARD RUBBER USED ON 8" BOWLS

☐ ENCLOSED LINE SHAFT

☐ OPEN LINE SHAFT

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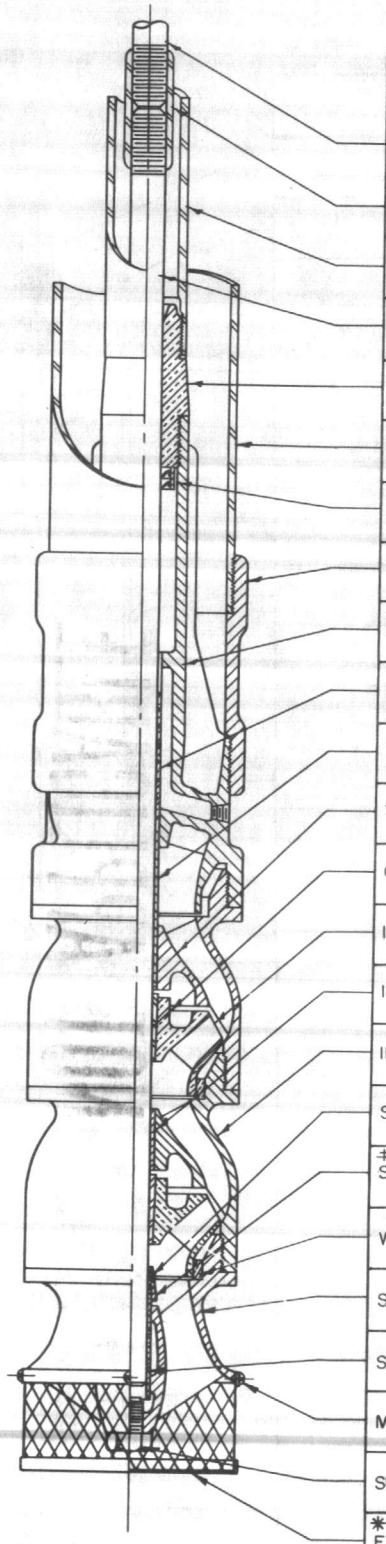
REVISED 3-26-68
SUPERSEDES ORIGINAL PRICE BOOK ISSUE

VERTICAL TURBINE PUMP
SHORT COUPLED

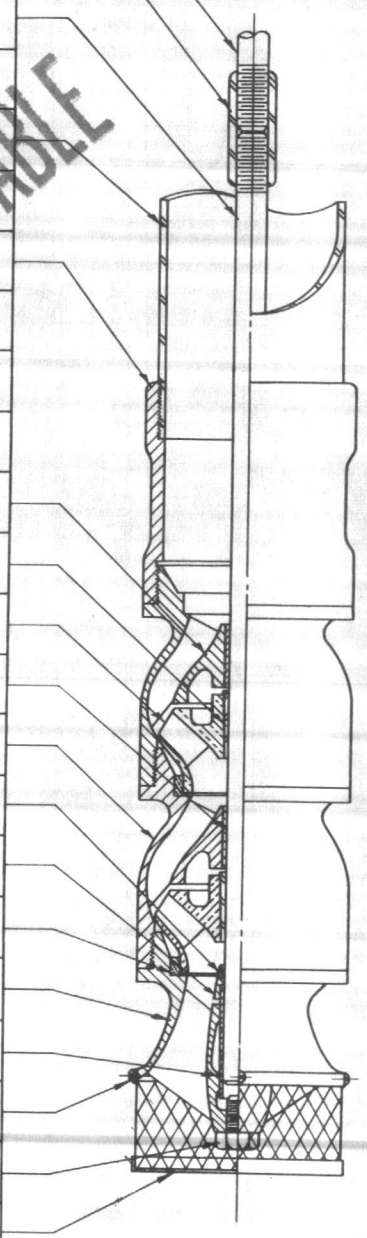
SINGER
LAYNE & BOWLER DIVISION
MEMPHIS, TENNESSEE U.S.A.
Layne

8" B, DR, PR, RK, T, UR – 10" RK, T, U – 12" T, UR



PART NAME	MATERIAL	
	STANDARD	SPECIAL
LINE SHAFT	CARBON STEEL C – 1045	
SHAFT COUPLING	CARBON STEEL	
SHAFT TUBING	EXTRA HEAVY PIPE	
BOWL SHAFT	STAINLESS STEEL 416	
MAIN BEARING	BRONZE	
DISCHARGE COLUMN	ASTM-A 53-58 GRADE A OR B	
SEALS	BRONZE CASE SYN. RUBBER	
DISCHARGE ADAPTOR	CAST IRON CLASS 30	
DISCHARGE NOZZLE	CAST IRON CLASS 30	
DISCHARGE BEARING	BRONZE	
TOP INTERMEDIATE BRG.	BRONZE	
TOP INTERMEDIATE	CAST IRON CLASS 30	
COLLET	BRONZE	
IMPELLER	BRONZE	
INTERMEDIATE BRG.	BRONZE	
INTERMEDIATE	CAST IRON CLASS 30	
SET SCREW	STAINLESS STEEL	
‡ SAND COLLAR	BRONZE	
WEAR RING	BRONZE	
SUCTION NOZZLE	CAST IRON CLASS 30	
SUCTION NOZZLE BRG.	BRONZE	
MACHINE SCREWS	STAINLESS STEEL	
SUCTION CAPSCREW	CARBON STEEL	
* EXPANDO STRAINER	STEEL CADMIUM PLT'D	

NOT APPLICABLE



ENCLOSED LINE SHAFT ☐

* NOT FURNISHED UNLESS SPECIFIED BY CUSTOMER
‡ HARD RUBBER USED ON 8" BOWLS

☐ OPEN LINE SHAFT

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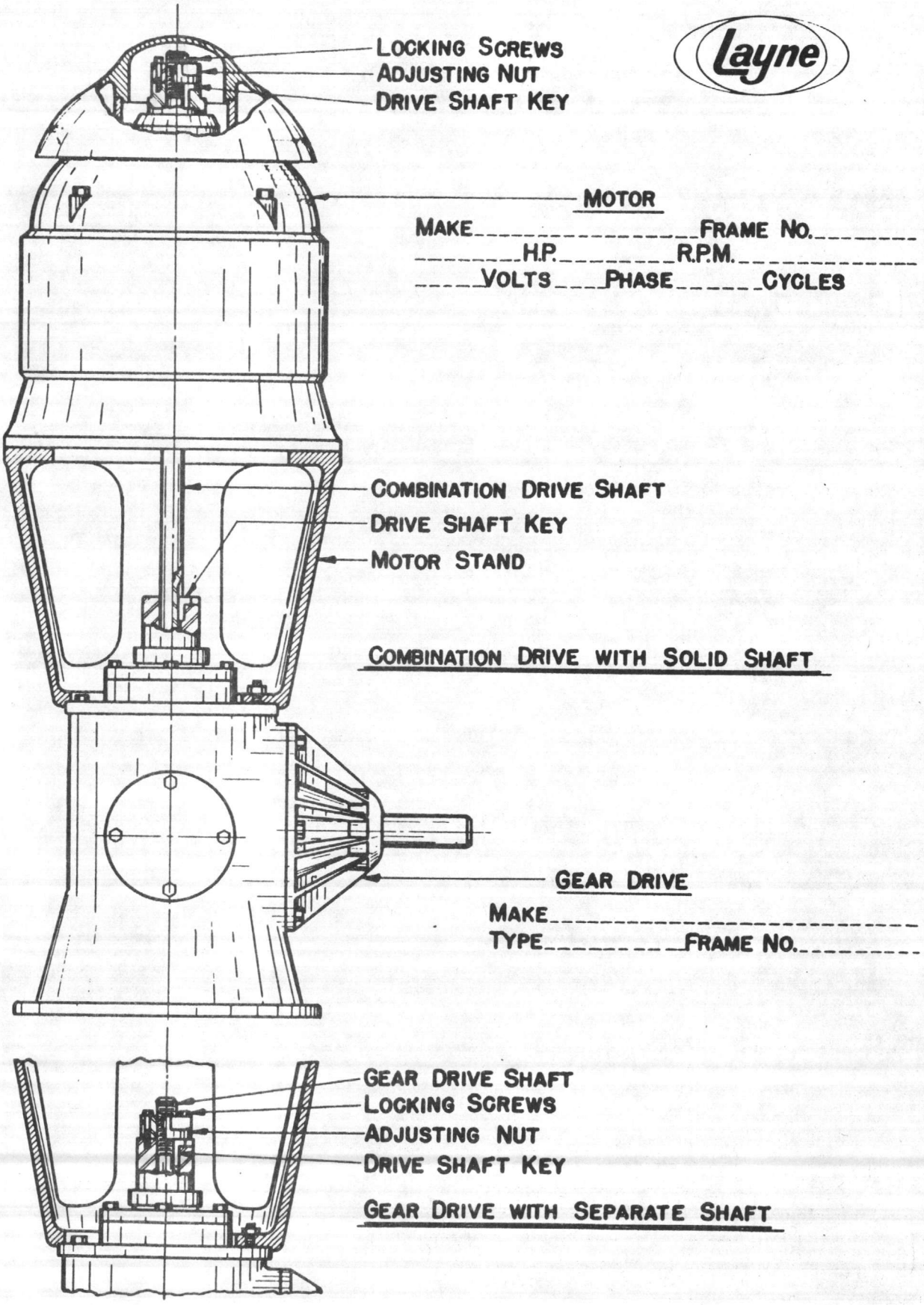
REVISED 3-26-68
SUPERSEDES ORIGINAL PRICE BOOK ISSUE



COMBINATION GEAR DRIVE AND HOLLOW SHAFT MOTOR

USING SOLID COMBINATION SHAFT & SEPARATE GEAR SHAFT

645

D.R.

12-12-80

W/L	F/L	Pressure	G.P.M.
	56'	35 LBS	149
	57'	33 LBS	167
Lofton →	59'	30 LBS	185
	61'	27 LBS	203

70' air line

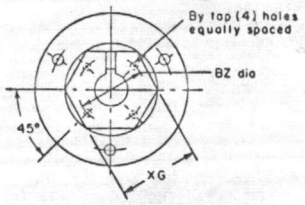
Coupling - 1" Non=reverse

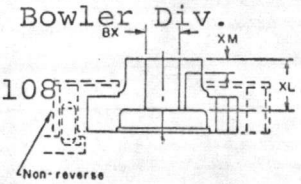
FRAMES 215TP & 215TP (GEM-2296A)
UPPER BEARING MRC 208SFF
LOWER BEARING MRC 7308

COUPLING DIMENSIONS

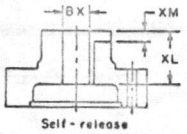
4-Singer
Layne Atlantic Co.
P.O. Box 7095
Norfolk, Va.23509

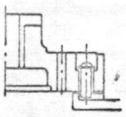
5-Singer - Layne & Bowler Div.
P.O. Box 8097
Memphis, Tenn.38108
Att: Mr. Stone





B324TP-B445TP





Non-reverse
213TP-B286TP

DIMENSIONS OF COUPLINGS IN INCHES

Frame No.	Cat. No. Self-release or Bolted	Cat. No. Nonreverse	BX Bore Nominal	BX Bore Actual □	BY	BZ	XG	XL	XM	KEYWAY Width	KEYWAY Depth
~~213TP~~	~~148X420G7~~	148X421G2	¾	0.751	10–32	1⅜	2¼	1 3/16	11/32	3/16	3/32
215TP	~~148X420G8~~	~~148X421G3~~	⅞	.876	10–32	1⅜	2¼	1 3/16	7/16	¼	⅛
~~B254TP~~	~~148X420G6~~	148X421G1	1	1.001	10–32	1⅜	2¼	1 3/16	7/16	¼	⅛
	148X250G15	148X251G3	¾	.751	10–32	1⅜	2¼	1½	11/32	3/16	3/32
254TP	148X250G17	148X251G5	⅞	.876	10–32	1⅜	2¼	1½	7/16	¼	⅛
256TP	148X250G13	148X251G1	1	1.001	10–32	1⅜	2¼	1½	7/16	¼	⅛
B284TP	148X250G14	148X251G2	1 3/16	1.188	¼–20	1¾	2¼	1½	7/16	¼	⅛
B286TP	148X250G16	148X251G4	1¼	1.251	¼–20	1¾	2¼	1½	7/16	¼	⅛
	148X250G22	148X251G7	1¼	1.251	¼–20	1¾	2¼	1½	9/16	⅜	3/16
	148X399G3	148X400G1	1	1.001	10–32	1⅜	2⅝	1 13/16	7/16	¼	⅛
	148X399G2	Use	1 3/16	1.188	¼–20	1¾	2⅝	1 13/16	7/16	¼	⅛
B324TP	148X399G6	with	1¼	1.251	¼–20	1¾	2⅝	1 13/16	7/16	¼	⅛
B326TP	148X399G5	Self-	1¼	1.251	¼–20	1¾	2⅝	1 13/16	9/16	⅜	3/16
	148X399G7	release	1 7/16	1.438	¼–20	2⅛	2⅝	1 13/16	9/16	⅜	3/16
	148X399G1	Coupling	1½	1.501	¼–20	2⅛	2⅝	1 13/16	9/16	⅜	3/16
	148X403G5		1	1.001	10–32	1¾	3¼	2	7/16	¼	⅛
	148X403G6	148X404G1	1 3/16	1.188	¼–20	1¾	3¼	2	7/16	¼	⅛
	148X403G9	Use	1¼	1.251	¼–20	1¾	2¼	2	9/16	⅜	3/16
B364TP	148X403G2	with	1⅜	1.376	¼–20	2⅛	3¼	2	9/16	⅜	3/16
B365TP	148X403G10	Self-	1 7/16	1.438	¼–20	2⅛	3¼	2	9/16	⅜	3/16
	148X403G4	release	1½	1.501	¼–20	2⅛	3¼	2	9/16	⅜	3/16
	148X403G8	Coupling	1 11/16	1.688	¼–20	2½	3¼	2	9/16	⅜	3/16
	148X403G1		1¾	1.751	¼–20	2½	3¼	2	9/16	⅜	3/16
	148X455G6	174L509G5	1 3/16	1.188	¼–20	1¾	3¼	2¼	7/16	¼	⅛
	148X455G5	Use	1¼	1.251	¼–20	1¾	3¼	2¼	9/16	⅜	3/16
B404TP	148X455G2	with	1 7/16	1.438	¼–20	2⅛	3¼	2¼	9/16	⅜	3/16
B405TP	148X455G3	Self-	1½	1.501	¼–20	2⅛	3¼	2¼	9/16	⅜	3/16
	148X455G4	release	1 11/16	1.688	¼–20	2½	3¼	2¼	9/16	⅜	3/16
	148X455G7	Coupling	1¾	1.751	¼–20	2½	3¼	2¼	9/16	⅜	3/16
	148X455G1		1 15/16	1.938	¼–20	2½	3¼	2¼	11/16	½	¼
B4[illegible]TP	148X499G2	174L511G1	1 3/16	1.188	¼–20	1¾	2¾	2¼	7/16	¼	¼
[illegible]	148X499G1	Use with	1¼	1.251	¼–20	1¾	2¾	2¼	9/16	⅜	3/16
([illegible] only)	148X499G3	Self-release Coupling	1½	1.501	¼–20	2⅛	2¾	2¼	9/16	⅜	3/16
	148X460G7	148X461G1	1 3/16	1.188	¼–20	1¾	3¾	2¾	7/16	¼	⅛
	148X460G5	Use	1 7/16	1.438	¼–20	2⅛	3¾	2¾	9/16	⅜	3/16
B444TP	148X460G4	with	1½	1.501	¼–20	2⅛	3¾	2¾	9/16	⅜	3/16
B445TP	148X460G3	Self-	1 11/16	1.688	¼–20	2½	3¾	2¾	9/16	⅜	3/16
	148X460G6	release	1 13/16	1.813	¼–20	2½	3¾	2¾	11/16	½	¼
	148X460G2	Coupling	1 15/16	1.938	¼–20	2½	3¾	2¾	11/16	½	¼
	148X460G1		2 3/16	2.188	⅜–16	3¼	3¾	2¾	11/16	½	¼

□Tolerances for the "BX" dimensions are +0.001 inch, −0.000 inch, up to and including 1½ inch diameter, and +0.0015 inch, −0.000 inch for larger diameters.

Nonreverse coupling assemblies, frames 213TP—B286TP are complete, nonreverse assemblies, frames B324TP—B445TP, must be used together with appropriate self-release coupling.

GEM-2296E

L. Atl. #n-161-71
L&B #M-0603, 71D-5017, 71D-5020

10 HP 1750 RPM 3 Ph 60 Cycle 230/460 Volts

Prints are: For Approval ☐

Prints are: Approved for Construction ☒

Customer Singer - Layne & Bowler Division

Customer's Order No. M-0603 Item

Our Req. No. 405-28966 Item Approved by Ken Tuck

9/8/71

INDUCTION MOTORS—INTEGRAL-HP, 3- AND 2-PHASE

VERTICAL — SQUIRREL-CAGE

TRI/CLAD • Hollow-shaft • Shielded (Dripproof)*

High-thrust • Normal-starting-torque • NEMA Type P Base

Type K

Frames 213TP10 to B405TP20, 3600 Rpm and Below

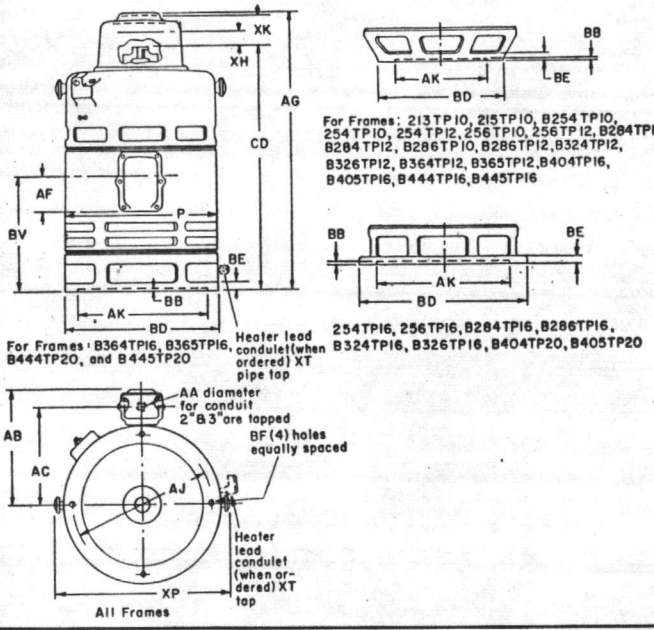
Frames B444TP16 to B445TP20, 1800 Rpm and Below*θ*

Self-release, Bolted or Nonreverse Coupling

GEM-2296E

Sept. 8, 1970

DIMENSIONS



FOR 3600-RPM MOTORS ONLY

For a given pump-shaft diameter, the following table gives the maximum distance between the motor's top coupling and the pump's first line-shaft bearing. This table is based on keeping the headshaft critical at least 25% above operating speed. The selection of a small headshaft diameter may make it necessary to support the headshaft in a close-fitting bushing in the lower end of the motor shaft.

Pump-shaft Diameter in Inches	Maximum Distance Between Top Coupling and Lower Support in Inches
0.750	33
1.000	38
1.187	42
1.437	45
1.500	47
1.688	50
1.750	51

Frame No.	Approx Net Wt in Lb	Dimensions in Inches																
		P	AA	AB	AC	AF	AG	AJ	AK †	BB Min	BD	BE	BF	BV	CD	XH ‡	XK	XP	XT
~~213TP10~~	165	10⅞	1¼	9⅜	7⁵⁄₁₆	3½	23 13⁄₁₆	9⅛	8¼	3⁄₁₆	10	¾	7⁄₁₆	10 15⁄₁₆	20 15⁄₁₆	1¾	2¾	....	½
215TP10	180	10⅞	1¼	9⅜	7⁵⁄₁₆	3½	23 13⁄₁₆	9⅛	8¼	3⁄₁₆	10	¾	7⁄₁₆	10 15⁄₁₆	20 15⁄₁₆	1¾	2¾	....	½
~~B254TP10~~	205	10⅞	1½	9⅜	7⁵⁄₁₆	3½	23 13⁄₁₆	9⅛	8¼	3⁄₁₆	10	¾	7⁄₁₆	10 15⁄₁₆	20 15⁄₁₆	1¾	2¾	....	½
254TP10	270	12 15⁄₁₆	1½	10⅜	8⁵⁄₁₆	3½	26½	9⅛	8¼	3⁄₁₆	10	¾	7⁄₁₆	13	23 9⁄₁₆	1¾	2¾	....	½
254TP12	270	12 15⁄₁₆	1½	10⅜	8⁵⁄₁₆	3½	26½	9⅛	8¼	3⁄₁₆	12	¾	7⁄₁₆	13	23 9⁄₁₆	1¾	2¾	....	½
254TP16	270	12 15⁄₁₆	1½	10⅜	8⁵⁄₁₆	3½	26½	14¾	13½	¼	16½	¾	11⁄₁₆	13	23 9⁄₁₆	1¾	2¾	....	½
256TP10	310	12 15⁄₁₆	1½	10⅜	8⁵⁄₁₆	3½	26½	9⅛	8¼	3⁄₁₆	10	¾	7⁄₁₆	13	23 9⁄₁₆	1¾	2¾	....	½
256TP12	310	12 15⁄₁₆	1½	10⅜	8⁵⁄₁₆	3½	26½	9⅛	8¼	3⁄₁₆	12	¾	7⁄₁₆	13	23 9⁄₁₆	1¾	2¾	....	½
256TP16	310	12 15⁄₁₆	1½	10⅜	8⁵⁄₁₆	3½	26½	14¾	13½	¼	16½	¾	11⁄₁₆	13	23 9⁄₁₆	1¾	2¾	....	½
B284TP10	330	12 15⁄₁₆	2	11⅜	8⅞	4⅜	26½	9⅛	8¼	3⁄₁₆	10	¾	7⁄₁₆	13	23 9⁄₁₆	1¾	2¾	....	½
B284TP12	330	12 15⁄₁₆	2	11⅜	8⅞	4⅜	26½	9⅛	8¼	3⁄₁₆	12	¾	7⁄₁₆	13	23 9⁄₁₆	1¾	2¾	....	½
B284TP16	330	12 15⁄₁₆	2	11⅜	8⅞	4⅜	26½	14¾	13½	¼	16½	¾	11⁄₁₆	13	23 9⁄₁₆	1¾	2¾	....	½
B286TP10	355	12 15⁄₁₆	2	11⅜	8⅞	4⅜	26½	9⅛	8¼	3⁄₁₆	10	¾	7⁄₁₆	13	23 9⁄₁₆	1¾	2¾	....	½
B286TP12	355	12 15⁄₁₆	2	11⅜	8⅞	4⅜	26½	9⅛	8¼	3⁄₁₆	12	¾	7⁄₁₆	13	23 9⁄₁₆	1¾	2¾	....	½
B286TP16	355	12 15⁄₁₆	2	11⅜	8⅞	4⅜	26½	14¾	13½	¼	16½	¾	11⁄₁₆	13	23 9⁄₁₆	1¾	2¾	....	½
B324TP12	460	14¼	2§	12 3⁄₁₆	9 11⁄₁₆	4⅜	32 7⁄₁₆	9⅛	8¼	3⁄₁₆	12	⅞	7⁄₁₆	15 7⁄₁₆	28 3⁄₁₆	3⅛	4	15¾	½
B324TP16	460	14¼	2§	12 3⁄₁₆	9 11⁄₁₆	4⅜	32 7⁄₁₆	14¾	13½	¼	16½	⅞	11⁄₁₆	15 7⁄₁₆	28 3⁄₁₆	3⅛	4	15¾	½
B326TP12	510	14¼	3	13 15⁄₁₆	10 5⁄₁₆	6½	32 7⁄₁₆	9⅛	8¼	3⁄₁₆	12	⅞	7⁄₁₆	15 7⁄₁₆	28 3⁄₁₆	3⅛	4	15¾	½
B326TP16	510	14¼	3	13 15⁄₁₆	10 5⁄₁₆	6½	32 7⁄₁₆	14¾	13½	¼	16½	⅞	11⁄₁₆	15 7⁄₁₆	28 3⁄₁₆	3⅛	4	15¾	½
B364TP12	600	16¼	3	14 13⁄₁₆	11 3⁄₁₆	6½	35 7⁄₁₆	9⅛	8¼	3⁄₁₆	12	1⅛	7⁄₁₆	16⅛	31 3⁄₁₆	3⅛	4	17⅞	¾
B364TP16	600	16¼	3	14 13⁄₁₆	11 3⁄₁₆	6½	35 7⁄₁₆	14¾	13½	¼	16½	1	11⁄₁₆	16⅛	31 3⁄₁₆	3⅛	4	17⅞	¾
B365TP12	660	16¼	3	14 13⁄₁₆	11 3⁄₁₆	6½	35 7⁄₁₆	9⅛	8¼	3⁄₁₆	12	1⅛	7⁄₁₆	16⅛	31 3⁄₁₆	3⅛	4	17⅞	¾
B365TP16	660	16¼	3	14 13⁄₁₆	11 3⁄₁₆	6½	35 7⁄₁₆	14¾	13½	¼	16½	1	11⁄₁₆	16⅛	31 3⁄₁₆	3⅛	4	17⅞	¾
B404TP16	890	18 7⁄₁₆	3	15¾	12⅛	6½	41¼	14¾	13½	¼	16½	⅞	11⁄₁₆	19½	36 7⁄₁₆	3¼	4½	20⅛	¾
B404TP20	890	18 7⁄₁₆	3	15¾	12⅛	6½	41¼	14¾	13½	¼	20	⅞	11⁄₁₆	19½	36 7⁄₁₆	3¼	4½	20⅛	¾
B405TP16	990	18 7⁄₁₆	3	15¾	12⅛	6½	41¼	14¾	13½	¼	16½	⅞	11⁄₁₆	19½	36 7⁄₁₆	3¼	4½	20⅛	¾
B405TP20	990	18 7⁄₁₆	3	15¾	12⅛	6½	41¼	14¾	13½	¼	20	⅞	11⁄₁₆	19½	36 7⁄₁₆	3¼	4½	20⅛	¾
B444TP16	1180	20⅜	3	16 15⁄₁₆	13 5⁄₁₆	6½	47⅛	14¾	13½	¼	16½	1⅛	11⁄₁₆	23¼	41⅞	3⅞	5	22	¾
B444TP20	1180	20⅜	3	16 15⁄₁₆	13 5⁄₁₆	6½	47⅛	14¾	13½	¼	20	1⅛	11⁄₁₆	23¼	41⅞	3⅞	5	22	¾
B445TP16	1330	20⅜	3	16 15⁄₁₆	13 5⁄₁₆	6½	47⅛	14¾	13½	¼	16½	1⅛	11⁄₁₆	23¼	41⅞	3⅞	5	22	¾
B445TP20	1330	20⅜	3	16 15⁄₁₆	13 5⁄₁₆	6½	47⅛	14¾	13½	¼	20	1⅛	11⁄₁₆	23¼	41⅞	3⅞	5	22	¾

Coupling dimensions on reverse side.

* These motors meet NEMA specifications for weather-protected Type 1 motors.

† 'AK' diameters of 8¼ inches will come within the limits of +0.003 inch, −0.000 inch; diameters of 13½ inches will come within the limits of +0.005 inch, −0.000 inch.

‡ The total height of pump shaft and locking nut above top of coupling must not exceed dimension XH.

§ For 3600 rpm, Frames B324TP12 and B324TP16, conduit box dimensions are same as for Frames B326TP12 and B326TP16.

θ For 3600 rpm in this frame size, refer to the Company.

Frames 213TP10 through B286TP16 have grease-lubricated upper guide and lower thrust bearings. All other frames have oil-lubricated upper thrust bearing and grease-lubricated lower guide bearing.

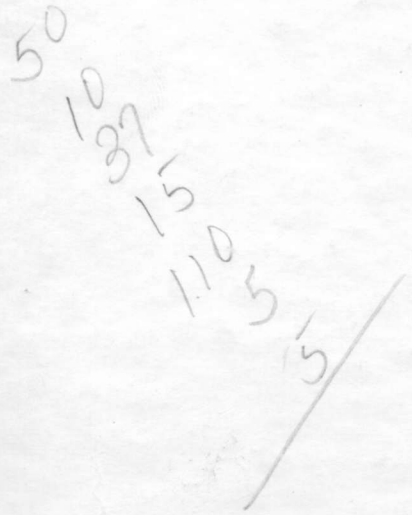
For 3600 rpm, Frames B404TP16 through B405TP20 inclusive maximum shaft permissible 1.751 inches.

Nonreverse coupling assemblies, Frames 213TP to B286TP are complete, nonreverse assemblies, Frame B324TP to B445TP, must be used together with appropriate self-release coupling.

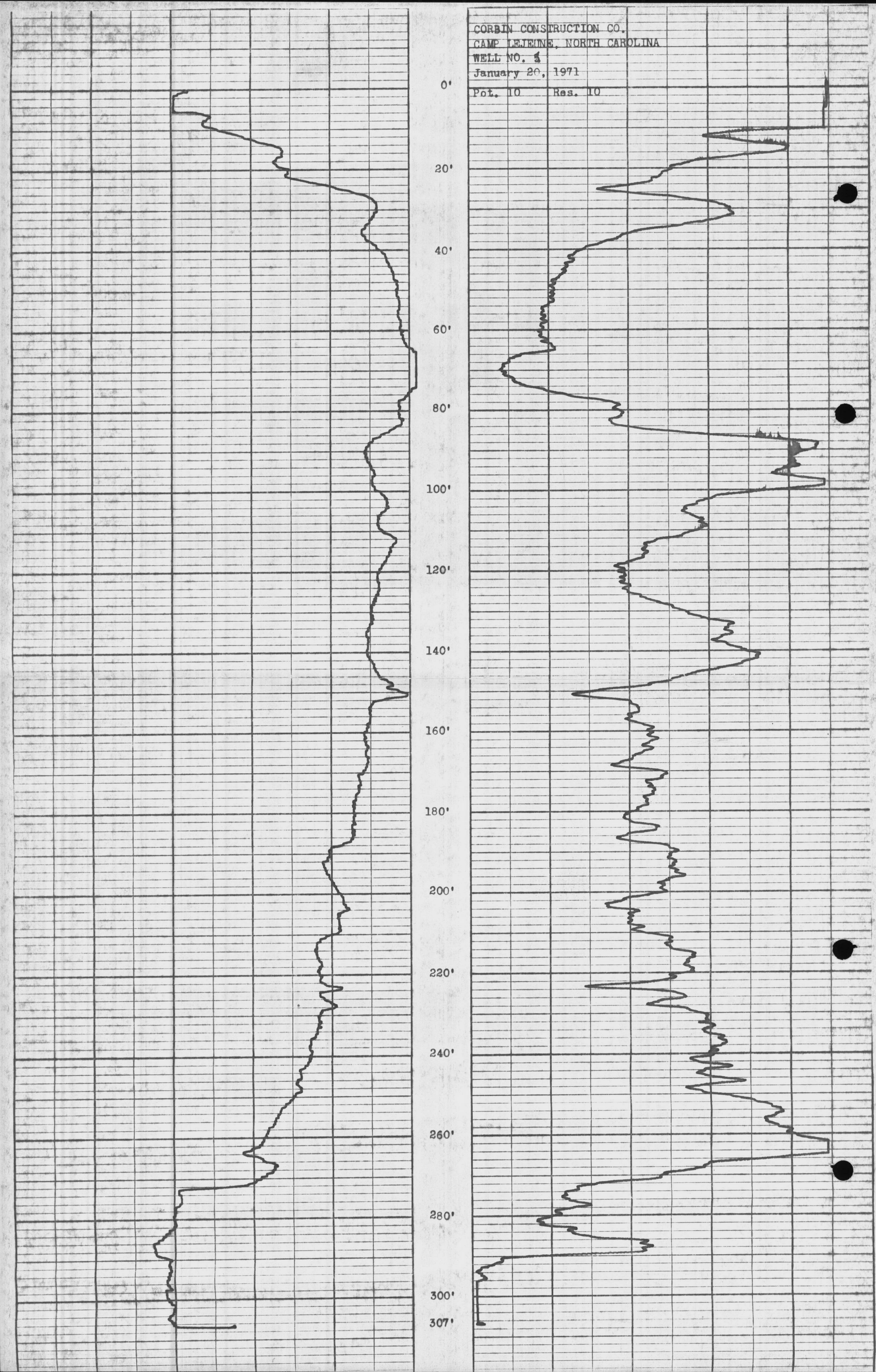
Provided mounting conditions permit, conduit box may be turned so that entrance can be made upward, downward, or from either side.

For shipping weight add 5 per cent to the above net weights.

For ESTIMATING ONLY unless endorsed for construction.



CORBIN CONSTRUCTION CO.
CAMP LEJEUNE, NORTH CAROLINA
WELL NO. 1
January 20, 1971
Pot. 10 Res. 10



FILE 15D #5

#5

5 #

Well # 5

Discharge head per section 11A, par. 11A.3.1	----	50
Pumping level @ 260 gpm	----	53
Total head	----	103

Pump

8" PRHC 4 stage 10 hp

CURVE NO. PB 1810

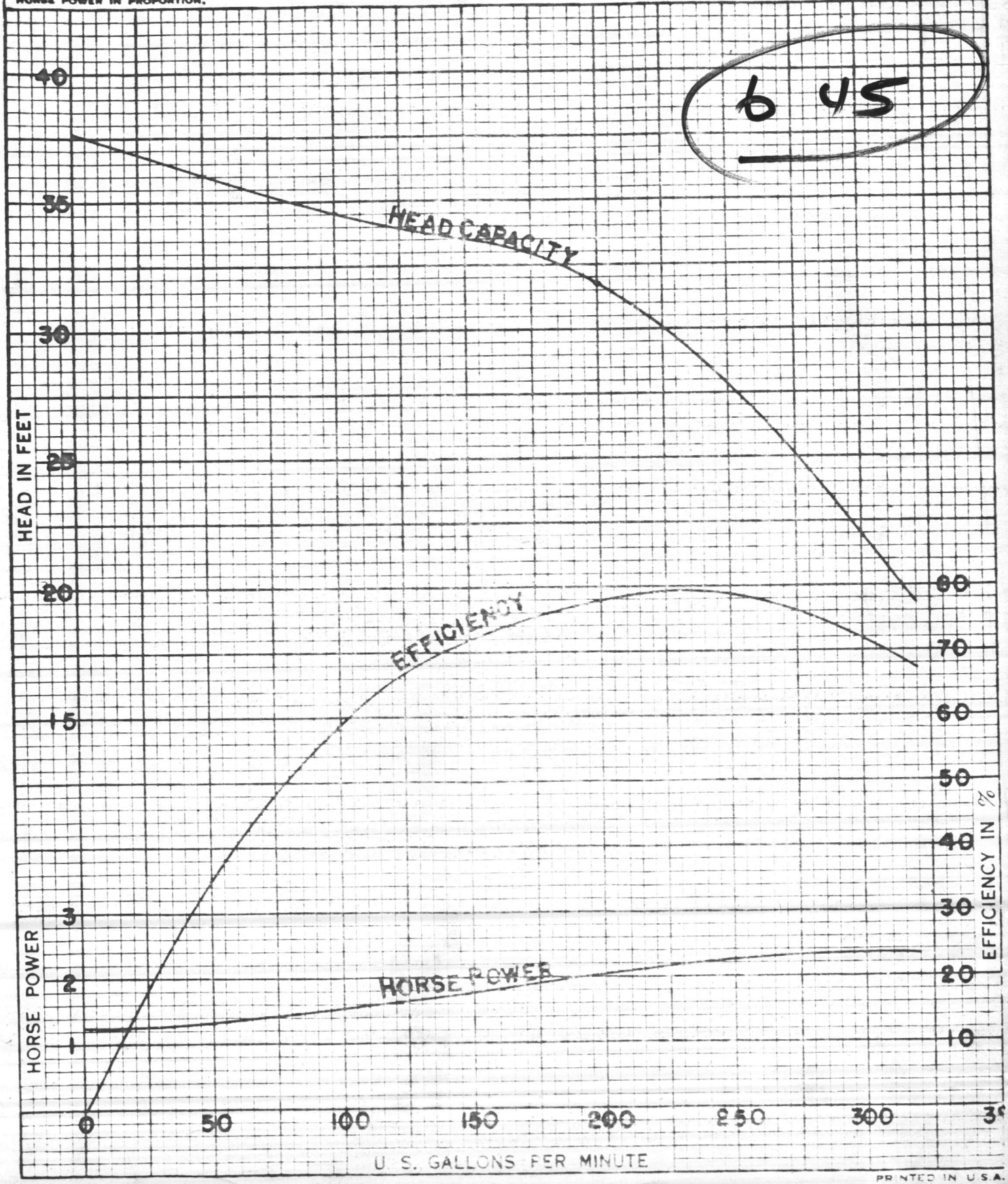
CHANGE EFFICIENCY AS FOLLOWS	NUMBER OF POINTS	FOR NUMBER OF STAGES
LOWER	5.5	1
LOWER	4.0	2
LOWER	2.5	3
LOWER	1.0	4

NOTE: ANY CHANGE IN EFFICIENCY CHANGES EITHER THE HEAD OR HORSE POWER IN PROPORTION.

SINGER
LAYNE & BOWLER DIVISION
MEMPHIS, TENNESSEE U.S.A.
Layne

8" PRHC
1750 RPM
SINGLE STAGE LABORATORY
HEAD & HORSE POWER
THRUST "K" = 4

645



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p 92

BY R.S. DATE 1-25-71 SUBJECT Well #5 SHEET NO. 1 OF 1

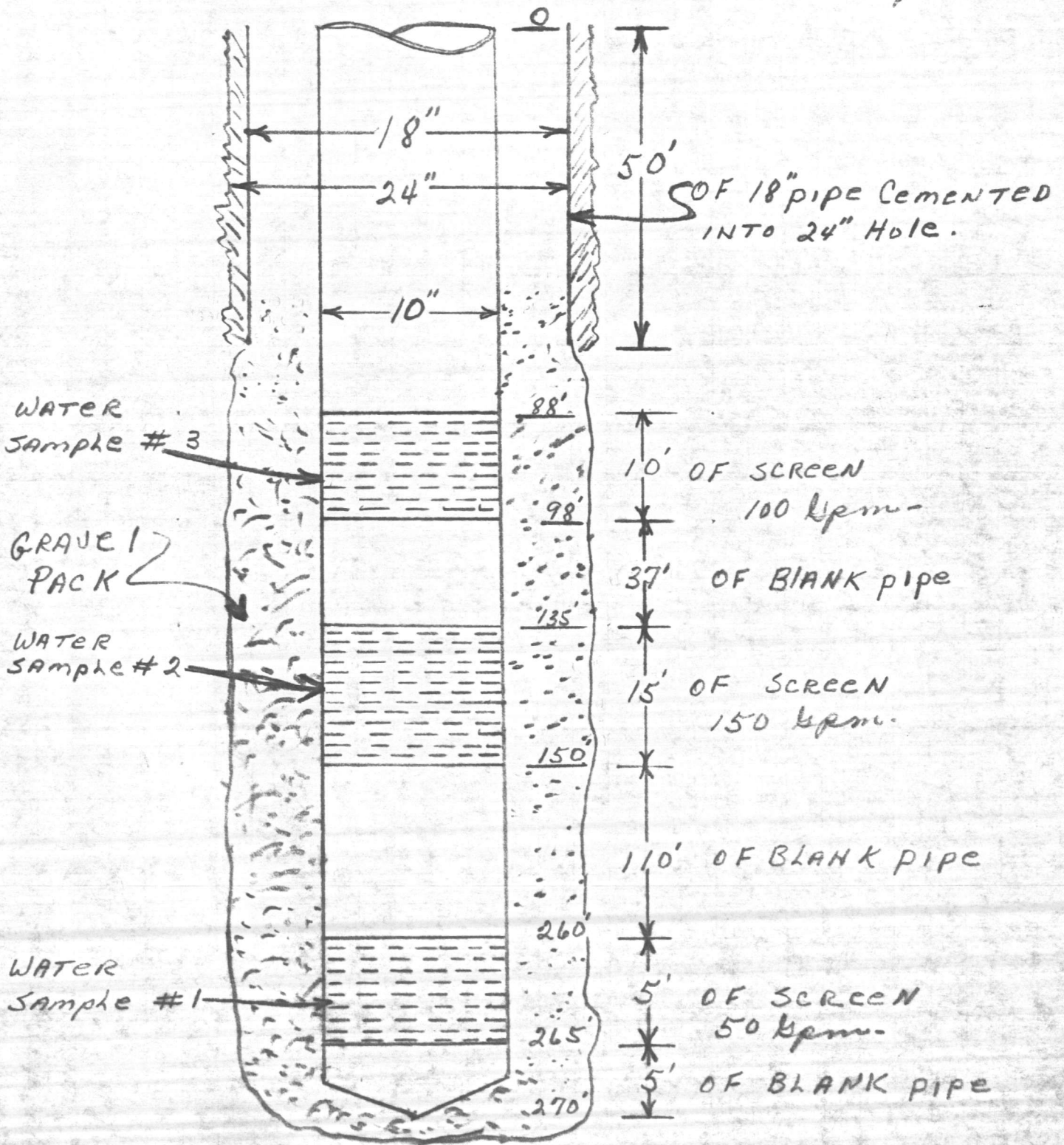
CHKD. BY ____ DATE ____ Proposed Sketch JOB NO. 40936

LAYNE ATLANTIC CO. CORBIN CONSTRUCTION CO.

CAMP LEJEUNE N.C.

#5

300 gpm Well



WATER ANALYSIS LABORATORY
302 Hamlet Highway
Bennettsville, South Carolina
29512

(803) 479-4639

Sample #2

Date: January 29, 1971

Report To: Layne Atlantic Co.
Norfolk, Va.

Date Analyzed: 1/29/71

Sample Number: Camp Lejeune #5
135-145

Analysis Results--Parts Per Million

Determination		Determination	
pH	7.3	Carbon Dioxide (CO_2)	30
Iron (Fe)	0.15	Total Acidity ($CaCO_3$)	47
Nitrate (NO_3)	Trace	Calcium Hardness ($CaCO_3$)	153
Fluoride (F)	0.3	Magnesium Hardness ($CaCO_3$))	28
Manganese (Mn)	0	Carbonate Hardness ($CaCO_3$)	181
Total Hardness ($CaCO_3$)	181	Noncarbonate Hardness ($CaCO_3$)	0
Chlorides (Cl)	12	Alkalinity (Phenolphthalein) ($CaCO_3$)	0
Sulfate (SO_4)	6.3	Carbonate Alkalinity ($CaCO_3$)	0
Phosphate (PO_4)	1.1	Bicarbonate Alkalinity ($CaCO_3$)	240
Magnesium (Mg)	4.5	Total Alkalinity ($CaCO_3$)	240
Calcium (Ca)	61.2	Total Dissolved Solids	210
Carbonate (CO_3)	0	Specific Conductance (micromhos at 25°)	350
Bicarbonate (HCO_3)	292	Appearance When Analyzed	Clear
Hydroxide (OH)	0	Odor When Analyzed	Not Objectionable
		Turbidity	0

Signed: W. P. Johnson
W. P. Johnson, Laboratory Director

Remarks: _____

Analytical Methods References: 'Standard Methods for the Examination of Water and Wastewater,' Twelfth Edition, 1965, APHA, AWWA and WPCF and 'Methods for Collection and Analysis of Water Samples,' Water Supply Paper 1454 (1960), U. S. Geological Survey, Washington, D. C.

[redacted]ER ANALYSIS LABORATORY
802 Hamlet Highway
Bennettsville, South Carolina
29512

(803) 479-4639

Sample #3

Date: January 29, 1971

Report To: Layne Atlantic Company
Norfolk, Va.

Date Analyzed: 1/29/71

Sample Number: Camp Lejeune #5
255-265

Analysis Results--Parts Per Million

Determination		Determination	
pH	7.3	Carbon Dioxide (CO_2)	25
Iron (Fe)	0.15	Total Acidity ($CaCO_3$)	36
Nitrate (NO_3)	Trace	Calcium Hardness ($CaCO_3$)	120
Fluoride (F)	0.5	Magnesium Hardness ($CaCO_3$))	34
Manganese (Mn)	0	Carbonate Hardness ($CaCO_3$)	154
Total Hardness ($CaCO_3$)	154	Noncarbonate Hardness ($CaCO_3$)	0
Chlorides (Cl)	15	Alkalinity (Phenolphthalein) ($CaCO_3$)	0
Sulfate (SO_4)	35	Carbonate Alkalinity ($CaCO_3$)	0
Phosphate (PO_4)	1.6	Bicarbonate Alkalinity ($CaCO_3$)	260
Magnesium (Mg)	5.4	Total Alkalinity ($CaCO_3$)	260
Calcium (Ca)	48	Total Dissolved Solids	249
Carbonate (CO_3)	0	Specific Conductance (micromhos at 25°)	415
Bicarbonate (HCO_3)	317	Appearance When Analyzed	Clear
Hydroxide (OH)	0	Odor When Analyzed	Not Objectionable
		Turbidity	0

Signed: W. P. Johnson
W. P. Johnson, Laboratory Director

Remarks: _____

Analytical Methods References: 'Standard Methods for the Examination of Water and Wastewater,' Twelfth Edition, 1965, APHA, AWWA and WPCF and 'Methods for Collection and Analysis of Water Samples,' Water Supply Paper 1454 (1960), U. S. Geological Survey, Washington, D. C.

1-20-71

Corbin Construction Co.

Camp LeJeune, N. C.

Formation Log Well #5

~~[illegible]~~

645

0-10'	Hard clay
10'-60'	Clay soft
60'-75'	Clay, shells, sand soft
75'-150'	Limestone & sand
150'-180'	Sand & limestone
180'-250'	Sand & limestone soft
250'-260'	Hard rock streaks of sand
260'-270'	Hard Rock
270'-309'	Sand, black pepper sand streaks of Rock.

BY R.S. DATE 1-25-71 SUBJECT Well #5 SHEET NO 1 OF 1

CHKD. BY ____ DATE ____ PROPOSED SKETCH JOB NO. 40936

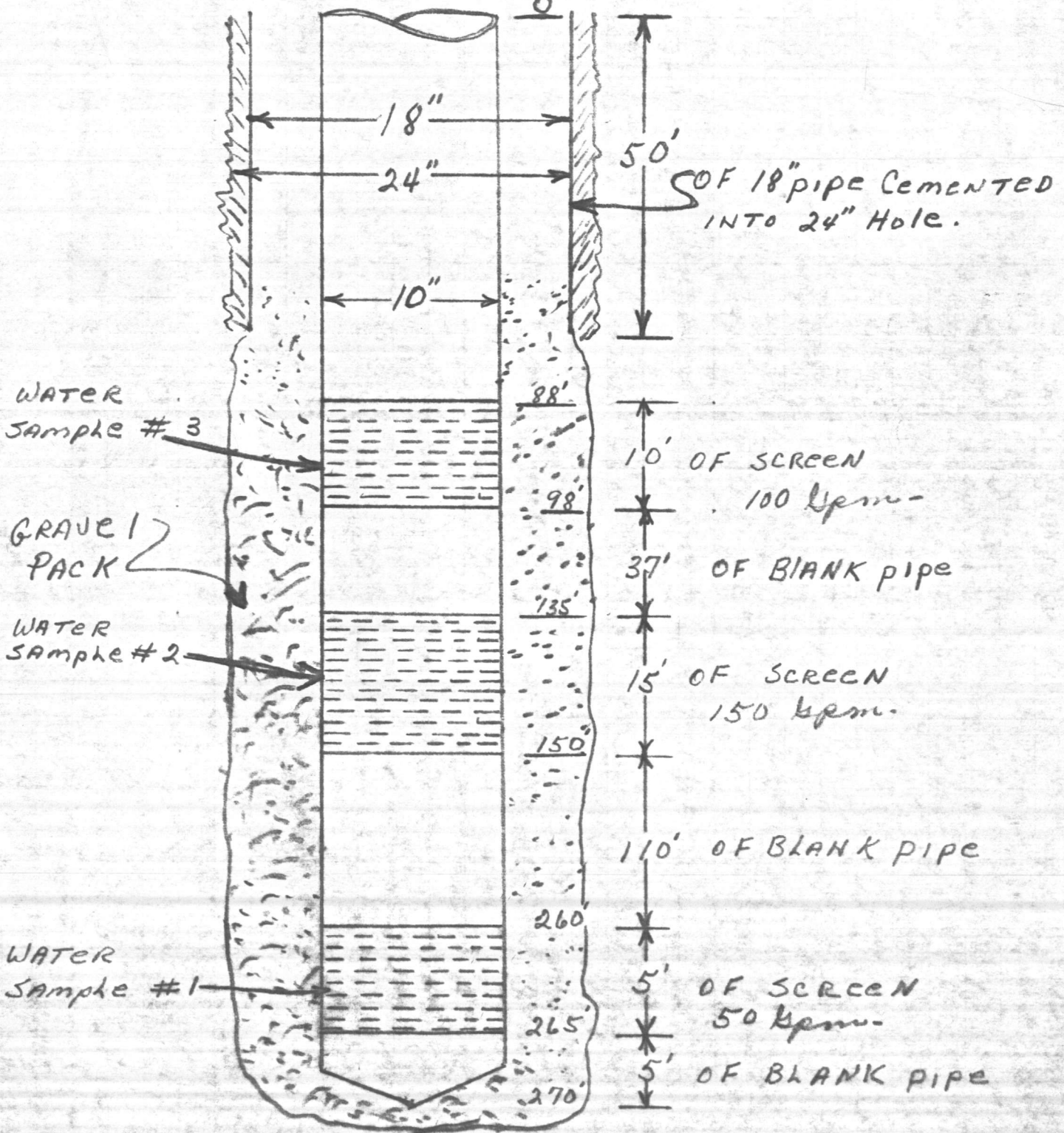
Layne Atlantic Co. CORBIN CONSTRUCTION CO.

CAMP LEJEUNE N.C.

FILE 15D #6

~~HB 48~~ 645

300 Gpm Well



FORM A-4
(MAY '70)

U.S. DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
OFFICE OF WATER DATA COORDINATION
INVENTORY OF HYDROLOGIC DATA STATIONS
QUALITY OF WATER

APPROVED.
Budget Bureau No. 42-R1485
Approval Expires June 30, 1976

1. AGENCY CODE	2. TYPE	3. LATITUDE	4. LONGITUDE	5.
MC	Q	34 ° 43 ' 05 " N	77 ° 20 ' 43 " W	

6. AGENCY STATION NO.	7. STATION NAME
HP-645	HP-670-645

8. DRAINAGE BASIN CODE No.	Letter	9. STATE CODE	10. COUNTY CODE	11. COUNTY NAME
06	N	32	133	Onslow

12. PERIOD OF RECORD
Began: 1972
Discontinued:
Y ☐ Continuous Interruption Exceeds 1 Year

13.

14.

15. SITE

☐ 101 Stream ☐ 104 Reservoir ☒ 107 Well
☐ 102 Canal ☐ 105 Estuarine zone ☐ 108 Drain
☐ 103 Lake ☐ 106 Spring ☐ 109 Other

16. TYPES OF DATA AVAILABLE AND FREQUENCY OF MEASUREMENT (Enter appropriate number (1-8) beside each parameter to indicate frequency of measurement. For parameters telemetered, enter "T".)

1 Continuous 3 Daily 5 Monthly 7 Annual
2 Seasonal 4 Weekly 6 Quarterly 8 Other Periodic

Physical
311 ___ Temperature
312 ___ Specific conductance
313 ___ Turbidity
314 ___ Color
315 ___ Odor
316 ___ pH (field)
317 8 pH (lab)
318 ___ Eh
319 ___ Suspended solids
320 ___ Other

Chemical
331 ___ Dissolved solids
332 8 Chloride
333 ___ Nutrients (nitrogen)
334 ___ Nutrients (phosphorus)
335 ___ Common ions
336 8 Hardness
337 ___ Radiochemical
338 ___ Dissolved oxygen
339 ___ Other gases
340 ___ Minor elements
341 ___ Pesticides (insecticides, herbicides, etc.)
342 ___ Detergents - MBS
343 ___ Biochemical oxygen demand
344 ___ Carbon (total, dissolved, etc.)

Biologic
361 ___ Coliforms
362 ___ Other micro-organisms (Benthic organism, phytoplankton, etc.)
363 ___ Other

Sediment
371 ___ Concentration (suspended)
372 ___ Particle size (suspended)
373 ___ Particle size (bed load material)
374 ___ Other

17. SUPPLEMENTARY DATA AVAILABLE FOR STATION

☐ 421 Surface water station ☐ 423 Water stage or level ☐ 425 Time of travel
☐ 422 Ground water station ☒ 424 Water discharge ☐ 426 Drainage area

18. STORAGE OF DATA

☐ 501 Published ☐ 503 Data on punchcard ☐ 505 Other
☒ 502 Not published ☐ 504 Data on magnetic tape, disc, data cell, etc.

19. INQUIRIES ABOUT DATA SHOULD BE SENT TO:

Office: Base Maintenance Department, Utilities Division
Street No.: Marine Corps Base
City, State, Zip: Camp Lejeune, North Carolina 28542
City Code: 0735

20. DATA ARE AVAILABLE TO PUBLIC ON REQUEST ☒ Yes ☐ No

21. OFFICE COMPLETING FORM
BASE MAINTENANCE DEPARTMENT

22. COMPILER'S NAME
BOB WILSON

23. DATE
Month: 12
Year: 19 76

WELL NUMBER	645	BY	THOMAS / BROWN		DATE	12-7-84
AIR LINE	STATIC LEVEL	PUMPING LEVEL	DRAIN DOWN	DISCHARGE PRESSURE	GPM	START TIME 1102
75'	19'	27	8	45	104	1110
		30	11	42	125	1120
		33	14	39	146	1130
		37	18	34	175	1140
		40	21	30	201	1150

REMARKS Left set at 30 PSI 201 GPM

MANUFACTURER	STAGE	S.N.	TOTAL HEAD	SIZE

WATER ANALYSIS LABORATORY
802 Hamlet Highway
Bennettsville, South Carolina
29512

(803) 479-4639

Date: February 24, 1971

645

Report To: Layne Atlantic Co.
Norfolk, Va.

Date Analyzed: 2/24/71
Sample Number: WO# 40936
90-100 Feet

Analysis Results--Parts Per Million

Determination		Determination	
pH	7.3	Carbon Dioxide (CO_2)	40
Iron (Fe)	0.15	Total Acidity ($CaCO_3$)	57
Nitrate (NO_3)	0.7	Calcium Hardness ($CaCO_3$)	153
Fluoride (F)	0.4	Magnesium Hardness ($CaCO_3$))	17
Manganese (Mn)	Trace	Carbonate Hardness ($CaCO_3$)	170
Total Hardness ($CaCO_3$)	170	Noncarbonate Hardness ($CaCO_3$)	0
Chlorides (Cl)	15	Alkalinity (Phenolphthalein) ($CaCO_3$)	0
Sulfate (SO_4)	9.3	Carbonate Alkalinity ($CaCO_3$)	0
Phosphate (PO_4)	1.8	Bicarbonate Alkalinity ($CaCO_3$)	278
Magnesium (Mg)	4.1	Total Alkalinity ($CaCO_3$)	278
Calcium (Ca)	61	Total Dissolved Solids	202
Carbonate (CO_3)	0	Specific Conductance (micromhos at 25°)	320
Bicarbonate (HCO_3)	339	Appearance When Analyzed	Clear
Hydroxide (OH)	0	Odor When Analyzed	Not Objectionable

Signed: W. P. Johnson
W. P. Johnson, Laboartory Director

Remarks:

Analytical Methods References: 'Standard Methods for the Examination of Water and Wastewater,' Twelfth Edition, 1965, APHA, AWWA and WPCF and 'Methods for Collection and Analysis of Water Samples,' Water Supply Paper 1454 (1960), U. S. Geological Survey, Washington, D. C.

1-20-71

Corbin Construction Co.

Camp LeJeune, N. C.

Formation Log Well #5

0-10'	Hard clay
10'-60'	Clay soft
60'-75'	Clay, shells, sand soft
75'-150'	Limestone & sand
150'-180'	Sand & limestone
180'-250'	Sand & limestone soft
250'-260'	Hard rock streaks of sand
260'-270'	Hard Rock
270'-309'	Sand, black pepper sand streaks of Rock.

#5 Well

H.B. 645 WELL #15

645
BENZENE

645
BENZENE

H.B. 645 WELL #15