Hydraulic Modeling Study for Pump Station 016

For

PINELLAS COUNTY UTILITIES "Serving You Every Day"

PINELLAS COUNTY, FLORIDA

Prepared by

PARSONS ENGINEERING SCIENCE, INC.

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PARSONS ENGINEERING SCIENCE

HYDRAULIC MODELING STUDY FOR PUMP STATION 016

I. INTRODUCTION

Pinellas County Utilities (PCU) retained Parsons Engineering Science, Inc. (Parsons ES) to revisit the hydraulic analysis for the portion of the existing South Cross Bayou Water Reclamation Facility (SCBWRF) wastewater collection system (including force mains and pump stations) between new Pump Station 016 (P.S. 016) and the SCBWRF as shown on Figure 1. This system was analyzed to determine the cost benefit of paralleling the existing 36-inch force main from P.S. 016 to SCBWRF. In addition, the existing gravity sewer along Park Boulevard flowing to P.S. 016 was evaluated to determine the location that the flows being transferred from the McKay Creek Wastewater Treatment Facility (WWTF) could be discharged without detrimentally surcharging the system during peak flow conditions.

In order to transfer the entire McKay Creek WWTF flow to the SCBWRF via P.S. 016, various pump stations may be impacted by an increase in the system operating pressures in the wastewater collection system between P.S. 016 and the SCBWRF. The system operating pressures vary depending upon whether the existing 36-inch force main trunk line feeding the SCBWRF is used exclusively or in conjunction with a new parallel force main.

A preliminary hydraulic analysis was conducted for the McKay Creek Final Basis of Design Report (BODR) (Final April 1996) utilizing only the existing 36-inch force main between P.S. 016 and the SCBWRF. The model was run with all existing pump stations activated and P.S. 016 operating at 30 MGD (includes 18 MGD for the existing P.S. 016 and 12 MGD from the McKay Creek WWTF) to simulate peak flow conditions. This analysis indicated that all nine existing pump stations will need to be retrofitted with new pumps and/or wet wells and electrical services due to the change in head conditions required to transfer the additional McKay Creek flow to the SCBWRF via P.S. 016. The preliminary hydraulic analysis was revisited to calibrate and to determine the optimum size for a new force main to be installed parallel to the existing 36-inch force main. Although a parallel 20-inch force main exists next to the 36-inch force main along Park Boulevard, from conversations with Pinellas County Utilities personnel, it is anticipated that the expense necessary to evaluate the integrity and then rehabilitate the old line would outweigh installing a new parallel force main that would last longer.

II. EXISTING SYSTEM: GRAVITY SEWER FLOWING TO P.S. 016

The existing P.S. 016 is fed by three gravity sewer systems: one from the south, one from the west, and one from the northwest. In an effort to clarify wastewater atlas information and determine the estimated flow split of the three gravity collection systems feeding the station, Pinellas County retained King Engineering Associates, Inc. to collect manhole rim and pipe invert elevations for seven (7) manholes located in the south lane of the east bound lanes along Park Boulevard from just west of Seminole Boulevard to the existing P.S 016. In addition, Altair Environmental Group, Inc. was retained to collect flow data for each of the three (3) existing gravity sewer systems currently feeding P.S. 016 and one (1) feeding the western system from the south along Seminole Boulevard. This data was collected to determine the flow split between the northwest, west, and south gravity collection systems flowing into P.S. 016 and to ultimately identify the location in the western collection system that the flows being transferred from the McKay Creek WWTF could be discharged into that system without detrimentally surcharging the system. Since no rain data was obtained during testing, the amount of infiltration and inflow could not be determined.

Also, population and wastewater projections previously presented in the South Cross Bayou Wastewater Treatment Plant Preliminary Engineering Report (Final October 1993) were revisited to determine the future average daily flow (ADF) and future peak hourly flow (PHF) for the P.S. 016 service area. (Figure 3.3 from the South Cross Bayou Wastewater Treatment Plant Preliminary Engineering Report is in Attachment 1.) The population projections which are utilized by Pinellas County for long-range transportation and utility planning were obtained from the Pinellas County Planning Department. Pinellas County has developed its own population projections based on 1990 U.S. Census data, rather than using those developed by the University of Florida's Bureau of Economic and Business Research (BEBR). The County has chosen to develop its projections based upon local observance of population growth and growth patterns within the existing land use designations. The BEBR projections are a source utilized by counties in Florida which do not have the available resources to do planning projections.

The future population for the P.S. 016 service area was used to compute the service area wastewater peaking factor based on the formula found in Recommended Standards for Wastewater Facilities (1990 Edition) published by Health Education Services, commonly referred to as the Ten State Standards. The estimated system peaking factor was determined to be 2.2. The formula is as follows:

$$Q \text{ peak hourly} / Q \text{ design average} = (18 + P^{\wedge 1/2}) / (4 + P^{\wedge 1/2})$$

where Q peak hourly = maximum rate of wastewater flow (peak hourly flow)
Q design average = design average daily wastewater flow
P = population in thousands = 57,476/1000 for 1990 P.S. 016 service area

The existing and future (year 2030) flows for P.S. 016 and the McKay Creek WWTF service areas are presented in Table 1. A growth factor of 1.089 for the McKay Creek WWTF service area was determined from the population projections from the Pinellas County Planning

Department previously presented in Figure 3.1 of the McKay Creek WWTF Phase I Services Preliminary Engineering Report (Final August 1994) shown in Attachment 2. A growth factor of 1.085 for the P.S. 016 service area was determined from the population projections for a portion of the SCBWRF service area from the Pinellas County Planning Department previously presented in Figure 3.1 (Attachment 1) of the South Cross Bayou Wastewater Treatment Plant Preliminary Engineering Report (Final October 1993).

The flow data for the gravity sewers flowing into P.S. 016 recorded in the West Pinellas Flow Study: Boca Ciega Lift Station #16 prepared by Altair Environmental Group, Inc. (April 1998) indicates that the average daily flows for April 1998 through the 30-inch gravity sewer along Park Boulevard (west system) west of Seminole Boulevard (see Figure 1) is approximately 2.00 MGD and east of Seminole Boulevard is approximately 2.03 MGD. Since the future peak hourly flow (design capacity) for the existing P.S. 016 is 19.5 MGD and the flow study indicated an average daily flow for April 1998 for P.S. 016 of 6.67 MGD, a peaking factor of 2.92 was applied to the flows along Park Boulevard for this analysis. (Note: The 2.92 peaking factor does not represent the actual peaking factor used for pump design which was computed previously to be 2.2.) With the additional projected peak flows (12 MGD) from the proposed McKay Creek Transfer Pumping Station in addition to the future peak hourly flows to P.S. 016, the capacities necessary through the existing 30-inch gravity sewers along Park Boulevard west and east of Seminole Boulevard are calculated to be 17.8 MGD and 17.9 MGD, respectively. Parsons ES compared this data to the historical flow data from the Pinellas County Utilities SCADA reports for P.S. 016. This information did not prove useful in determining average and peak flows since it is established by multiplying the pump design flow by the recorded runtimes. This data not only misrepresents the actual flow, but it also does not consider the multi-speed drives. Furthermore, the West Pinellas Flow Study: Boca Ciega Lift Station #16 prepared by Altair Environmental Group, Inc. indicated minimal rainfall for April 1998, and therefore, infiltration and inflow were considered to be negligible.

The survey data for the sanitary sewer manholes in the West Pinellas Pipeline Improvements Project corridor and the Pinellas County Utilities Sewer Atlas were reviewed and flow capacities were calculated for each sewer pipe to determine if it would be possible to move the discharge point upstream, in an effort to reduce construction impacts to Park Boulevard. Unfortunately, calculations indicated that the existing gravity sewer along Park Boulevard west of Seminole Boulevard would not be capable of handling the projected peak flow of 17.8 MGD. Therefore, it was determined that the discharge point can not be moved upstream from the manhole located at approximately 387 feet west of the centerline of Seminole Boulevard within the northern eastbound lane of Park Boulevard (See Figure 1).

Also, the analysis of the 30-inch gravity sewer along Park Boulevard east of Seminole Boulevard discussed in the letter from Parsons ES to Pinellas County Utilities (dated November 19, 1997) was revisited to apply the projected peak flow of 17.9 MGD. All pipes east of Seminole Boulevard are estimated to have capacities exceeding the 17.9 MGD requirement, including the two sections that were previously calculated to be limited to less than 23 MGD. Therefore, the wastewater flows from the proposed McKay Creek Wastewater Transfer P.S. will travel through the proposed 24-inch force main, included in the West Pinellas Pipeline

Improvements Project, to the existing 30-inch gravity sewer approximately 387 feet west of the centerline of Seminole Boulevard, and then to the new gravity sewer associated with the new P.S. 016.

III. HYDRAULIC MODEL CALIBRATION: FORCE MAIN AND EXISTING PUMP STATIONS BETWEEN P.S. 016 AND SCBWRF

The existing wastewater transmission main system hydraulic model in KY2PLUS2+ was calibrated using additional information provided by Pinellas County Utilities.

Pinellas County Utilities performed individual pump down tests (TDH tests) on all pumps within the P.S. 016 collection system (Pump Stations #008, #011, #012, #013, #015, #016, #103, #105, #106, and #109). These pump down tests determined the TDH and flow for each individual pump within a pump station and then a combined TDH and flow with all pumps within one station set to ON. During each TDH test, the status (ON/OFF) of the pumps within the remainder of the collection system were unknown. Data from these tests are included in Attachment 3 and were plotted on the existing pump curves included in Attachment 4.

On Thursday, August 6, 1998, Pinellas County Utilities in conjunction with Parsons ES representatives performed two (2) separate system tests on the entire P.S. 016 collection system. The system tests were conducted in conjunction with the TDH test to develop a window of operation for each pump station. Prior to the commencement of each system test, information at each pump station was gathered. This information included pump type and model number, impeller size, horsepower, wet well diameter, pump discharge pipe size, and the location of the gauged pipe with respect to the top of slab. During both system tests, all primary pumps within the Madiera Beach collection system and one (1) of the 75 horsepower pumps at P.S. 016 were turned ON to maintain pressure within the transmission main prior to system test initiation. The first system test began by allowing all remaining pump stations within the P.S. 016 collection system to fill to just below the invert of the lowest gravity pipe. Once all pump stations were filled, one (1) pump in duplex stations and two (2) pumps in triplex stations were set to ON. The water level and pressure were recorded at the commencement of the system test and thereafter every 30 seconds until the first wet well drained. Once the first wet well had drained (approximately in one and 1/2 minutes), all pumps were turned OFF and recovery began. The recovery period began with an initial water level and a final water level after five minutes. Due to the short duration of the first system test, a second test was run to gather additional information. The same procedure was followed for system test two; however, once the wet wells had filled to just below the lowest gravity pipe invert, only one (1) pump in each station was set to ON. Table 2 is a summary of the information collected during the system tests. For some of the lift stations, data for only one system test was recorded, and no useful data was recorded for any of the tests for P.S. #13. Also, recovery data was not complete for all of the system tests. From the water level and pressure information collected, the flow and TDH point for each pump was calculated and is shown on the existing pump curves in Attachment 4. The individual pump down tests and system test results are in close proximity to each other when plotted on the existing pump curves for P.S.'s #015, #103, #105, #106 and #109. However, when data from the individual pump

down tests and system test results for P.S.'s #008, #011, and #012 is plotted on the existing pump curves, discrepancies in the test data is indicated. Therefore, although the system test data was considered, its accuracy was not dependable for system calibration.

The existing hydraulic KY2PLUS2+ model of the P.S. 016 collection system included pump stations #008, #011, #012, #013, #015, #016, #103, #105, #106, and #109. The individual pump stations connected to the force main from the Madiera Beach pump station (P.S. #163) were not modeled; instead the design flows contributed by the Madeira Beach pump station and pump stations #102, #111, #126, #161, and #164 were directly input into the transmission main at the appropriate junction node. The Madeira Beach pump station flows were determined from the Preliminary Engineering Report for Pinellas County Pump Station No. 163 (Madeira Beach) (January 1998) prepared by Knepper & Willard, Inc. During the data collection process for model calibration, Pinellas County Utilities supplied Parsons ES with the most current information on the existing P.S. 016 collection system. This information included surveyed wet well information, updated pump model and impeller information, and force main sizes. The surveyed wet well information, as shown in Attachment 5, includes elevations for the top of slab, wet well bottom, influent gravity pipe invert, and pump float levels. The pump model and impeller information provided by Pinellas County is shown in Attachment 6. Also, Parsons ES contacted the Sanders Company, Inc. and Ellis K. Phelps & Co. to obtain information regarding the existing Fairbanks Morse and Flygt pump station pumps respectively. (Pump curves can be found in Attachment 4.) Standard wet well design parameters found in the Flygt submersible pump manual were used to estimate the pump discharge elevations. Additional improvements to the hydraulic model such as pipe lengths and sizes were made after verification of County as-builts and minor losses were added to account for fitting and valve losses at the pump stations. Since no survey information was available for the force main elevations, force mains were assumed to be buried four feet below the ground elevations obtained by the U.S.G.S. quadrangle maps.

During calibration, dynamic losses were reduced or increased by eliminating or adding minor losses and adjusting the friction coefficient in an effort to calibrate the pump stations closer to their respective pump down test flows. It was determined that the Manning's 'C" factor should be adjusted from 110 to 130 and the minor losses should be decreased for most pump stations to move the operating points closer to the calibration data. Results of the calibration effort were plotted on the existing pump curves in Attachment 4. As was mentioned previously, the individual pump down tests and system test results are in close proximity to each other when plotted on the existing pump curves for P.S.'s #015, #103, #105, #106 and #109. For calibration, the modeled flow was within 20% of either the TDH or system test data for P.S.'s #015, #103, #105, #106 and #109. For P.S. #013 which had no system test data, the modeled flow for calibration was within 15% of one of the TDH test data points. However, for P.S.'s #008, #011, and #012 for which data from the individual pump down tests and system test results indicated system test inaccuracies, the modeled flow for calibration was 16%, 25%, and 22% from the closest TDH test data points, respectively.

IV. MODELING SCENARIOS

Once the system was considered calibrated to the existing conditions, various hydraulic modeling scenarios were conducted with the proposed P.S. 016 and the existing system pump stations operating with future average and future peak hourly system flows to determine the problem areas and possible solutions. To establish future peak hourly flow conditions, different combinations of all existing pump stations along with the new P.S. 016 were activated to equal the future peak hourly total system flow. Under this scenario the new P.S. 016 was modeled at 31.5 MGD and the existing pump stations were operated with their respective existing pump curves to determine whether the pumps would fail or run below their documented design capacity. Then, the existing pump curves were replaced with a negative demand input at the pump locations to simulate the design flows so that a new head requirement could be determined. A similar method was used for the future system average daily flow modeling scenarios as well. Since the wastewater SCADA data provided by Pinellas County Utilities indicated that P.S.'s #008, #016, #106, and #109 typically have the longest runtimes, these stations remained operational in most of the modeling scenarios to simulate the most likely combination of pumps.

The future system was modeled with only the existing 36-inch force main between P.S. 016 and the SCBWRF and then with additional different sized (24-inch, 30-inch, 36-inch, and 42-inch) parallel force mains connected from the Lake Seminole Bypass Canal to just west of Joe's Creek. The model results indicated that without an additional parallel force main, the existing pump station pumps would operate substantially below their design flows and require significant station improvements. These problems could be resolved by incorporating new higher head pumps at P.S.'s #011, #012, #013, #015, #103, #105, #106, and #109. P.S. #008 would only require larger impellers. It is anticipated that P.S.'s #013, #103, and #105 would need larger wet wells for the larger pumps and associated piping.

Preliminary Flygt pump selections were made for all pump stations in order to meet design flows and are presented with the modeling output for the three alternatives and existing conditions in Table 3. (The preliminary selected Flygt pump curves obtained from Ellis K. Phelps & Co. can be found in Attachment 7.) The new pumps selected for the existing pump stations for the 36-inch force main scenario increased in size from the preliminary selection in the final BODR due to the additional head requirements needed with the new modeling parameters. Modeling indicated that pump station improvements will be necessary whether or not an additional parallel force main is utilized. With a 30-inch parallel pipe, flow problems could be resolved by incorporating new higher head pumps at P.S.'s #011, #013, #015, #103, #105 and #106. P.S.'s #008, #012, and #109 would only require larger impellers, and it is anticipated that P.S. #105 would need a larger wet well for the larger pumps and associated piping. With a 24-inch parallel pipe, flow problems could be resolved by incorporating new higher head pumps at P.S.'s #011, #012, #013, #015, #103, #105, #106, and #109. P.S. #008 would only require larger impellers, and it is anticipated that P.S.'s #013 and #105 would need larger wet wells for the larger pumps and associated piping. The different scenarios also affected the pump selection for the new P.S. 016, as can be seen in the different system curves (Figure 2). Also, modeling indicated that the velocities

through the proposed 24-inch and 30-inch parallel pipes during average daily system flows would be 2.2 feet per second (fps) and 1.8 fps respectively.

Using historical SCBWRF wastewater production ratios, the future low monthly average daily flow from P.S. 016 is computed to be 12.5 MGD. Applying a 2.2 peaking factor, the future peak hourly low monthly flow is computed to be 27.5 MGD for P.S. 016. Modeling of the future peak hourly low monthly flow from P.S. 016 indicates that velocities of over 3 fps would occur during the peak hour of a low month. Therefore, it is anticipated that there will be at least one flush per day in the system even during a low flow month.

For minimum velocities under 2 fps, the Florida Department of Environmental Protection (FDEP) will approve the force main design with documentation that Pinellas County Utilities will take full responsibility for any additional maintenance required and the assurance that flushing will occur at least once daily in the parallel force main.

In addition, Pinellas County Utilities requested that Parsons ES consider the potential for possible catastrophic failure (i.e. primary and secondary power and/or control sources non-operational) at P.S. 016 during peak system flows. The hydraulic analyses considered the time differences for estimated detrimental system surcharging (i.e. lowest system manhole overflowing) between extending the McKay Creek 24-inch transfer force main to just downstream of P.S. 016 or discharging to the gravity manhole just upstream of P.S. 016. These analyses also considered the possible bypass pumping of P.S. 016 flows using two existing trailer mounted 12-inch Pinellas County Utilities pumps (Pump curve in Attachment 9) and estimating the approximate time before detrimental system surcharge. If a catastrophic failure occurred at P.S. 016, with the McKay Creek 24-inch transfer force main extended to the downstream side of P.S. 016 and the wastewater transfer P.S. sized to handle the additional head requirements to transfer flows to the SCBWRF, it is estimated that PCU personnel would have approximately 46 minutes (as compared to approximately 28 minutes without the extended force main) to connect the emergency bypass pumps before overflowing the lowest manhole. Once the emergency bypass pumps are operational and the McKay Creek 24-inch bypass piping is utilized, it would take approximately 2.7 hours from the time of catastrophic failure before the lowest manhole overflowed, as compared to approximately 1 hour without any bypass piping. A portion of the results for the hydraulic analysis with only the bypass pumps operational (i.e. no duty pumps) and no 24-inch bypass piping at P.S. 016 are shown below:

	P.S. 016 Flow (MGD)	P.S. 016 Head (feet)
No parallel pipe	14.5	75
24" parallel pipe	15.9	68
30" parallel pipe	16.4	65

As seen in the table above, the hydraulic analysis indicated that approximately only half of the 30 MGD design flow from the new P.S. 016 could be pumped using trailer mounted bypass pumps

during peak system flows. An additional 1.9 MGD or 1.4 MGD can be pumped during peak system flow conditions with a 30-inch or 24-inch parallel pipe downstream of P.S. 016, respectively, as compared to not having this new parallel pipe installed.

The preliminary bypass piping analysis indicated minimal time benefits regarding detrimental surcharging of the system. Therefore, it was concluded with PCU at the October progress meeting that the additional capital costs associated with the design and construction of the necessary additional 24-inch bypass piping along Park Boulevard and the modifications necessary to the proposed McKay Creek transfer pump station outweighed the remote possibility of catastrophic failure. Pinellas County Utilities indicated that they have not experienced any previous catastrophic failures of this magnitude in Pinellas County. In addition, many power and control redundancies have been included in the new P.S. 016 design.

V. COST ANALYSIS OF ALTERNATIVE SCENARIOS

A combined capital cost and anticipated operating cost analysis was conducted for the three scenarios and are presented in Tables 4 and 5. Actual monthly operating cost data obtained from Pinellas County Utilities (Attachment 8) from October 1996 to September 1997 correlated within 13 percent to the calculated total annual operating cost data for the existing stations between P.S. 016 and the SCBWRF, as shown in Table 4. The average annual operating cost per kilowatt hours (KWh) was also obtained from the Pinellas County Utilities data. Furthermore, the annual average daily runtimes used for the KWh calculations were calculated from average daily runtimes in 1996 and 1997 SCADA data obtained from Pinellas County Utilities. In addition, the pump break horse power (bhp) at modeled future annual average daily flow conditions was used to compute the annual average daily KWh usage. The additional annual operating costs for the larger horse power motors required for the larger pumps is significant when evaluated to the year 2030. The operating differential between the no parallel pipe scenario and the 24-inch parallel pipe scenario over 30 years is estimated to be approximately $2,652,100. The operating differential between the no parallel pipe scenario and the 30-inch parallel pipe scenario over 30 years is estimated to be approximately $3,282,660.

The anticipated capital costs for the alternative scenarios considered the costs for the following: new impellers, new pumps and all associated electrical equipment and appurtenances, new concrete wet wells, dewatering, excavation, backfilling, demolition of the old pump stations, new ductile iron (DI) force main piping from the new pumps, new 8-inch polyvinyl chloride (PVC) inlet piping to the new wet wells, new valves and fitting costs for new DI force main piping, new valve vaults, temporary bypass pump rental, and temporary bypass piping. The cost for possible purchase of additional land, if needed and available, was not included in this evaluation. Also, it was assumed that new transformers would be provided by Florida Power with no additional charge to Pinellas County Utilities. The cost for upgrading or transferring the existing telemetry equipment from the old pump stations to the new ones was also not included. Lastly, the capital costs of the proposed additional 2.64 miles (13,900 LF) of parallel force main was determined to be $2,440,000 (@ $175/LF) and $2,786,000 (@ $200/LF) for the 24-inch and 30-inch, respectively.

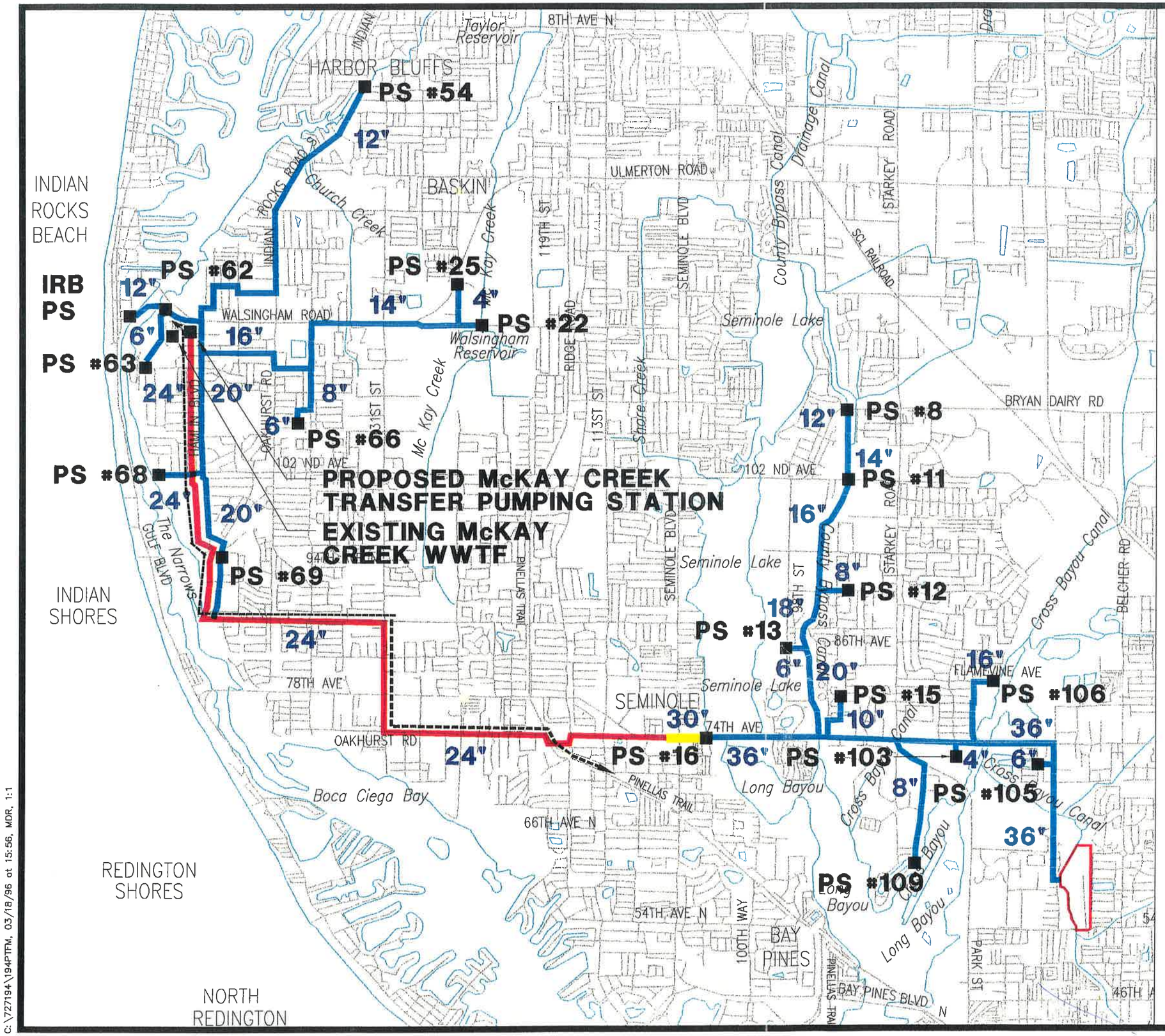
VI. CONCLUSIONS AND RECOMMENDATIONS

Although the capital costs estimated for the 24-inch, 30-inch, and no parallel pipe scenarios are $4,836,300, $4,704,700 and $2,826,700, respectively, the estimated operating costs projected to the year 2030 indicate the estimated payback period to be approximately 23 years with the 24-inch parallel pipe scenario and 17 years with the 30-inch parallel pipe scenario. Also, the cost savings anticipated at year 2030 are $1,404,700 and $642,500 for the 30-inch and 24-inch scenarios, respectively, as compared to utilizing only the existing 36-inch force main.

Besides the cost benefits, there is also an advantage to constructing a parallel pipe that will provide this portion of the SCBWRF collection system with adequate future capacity. Therefore, it is recommended that a 30-inch force main be installed parallel to the existing 36-inch force main between P.S. 016 and the SCBWRF and the necessary associated pump station improvements occur prior to the transferring of flows from the McKay Creek WWTF. As was previously stated, an additional 1.9 MGD or 1.4 MGD of flow can be pumped from the P.S. 016 bypass pumps during peak system flow conditions if a 30-inch or 24-inch parallel pipe is installed, respectively, as compared to not having a parallel pipe constructed at all. Furthermore, due to the modeled minimum velocity of 1.8 ft/s during average daily system flows, FDEP permitting of the 30-inch parallel force main will involve documentation that Pinellas County Utilities will take full responsibility for any additional maintenance required and the assurance that flushing will occur at least once daily in the parallel force main as was shown in modeling of the future low monthly peak hourly flows.

FIGURE 1

PROPOSED AND EXISTING FORCE MAIN ROUTES



3500 1750 0 3500 7000

SCALE: 1" = 3500'

LEGEND

- SOUTH CROSS BAYOU WRF
- 12" — PIPE SIZE
- PS #54 — EXISTING PUMPING STATION
- PROPOSED 24" ø TRANSFER FORCE MAIN
- FUTURE RCW MAIN
- EXISTING GRAVITY INTERCEPTOR (30" RCP)
- EXISTING FORCE MAIN

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Figure 2
Boca Ciega P.S. System Curve

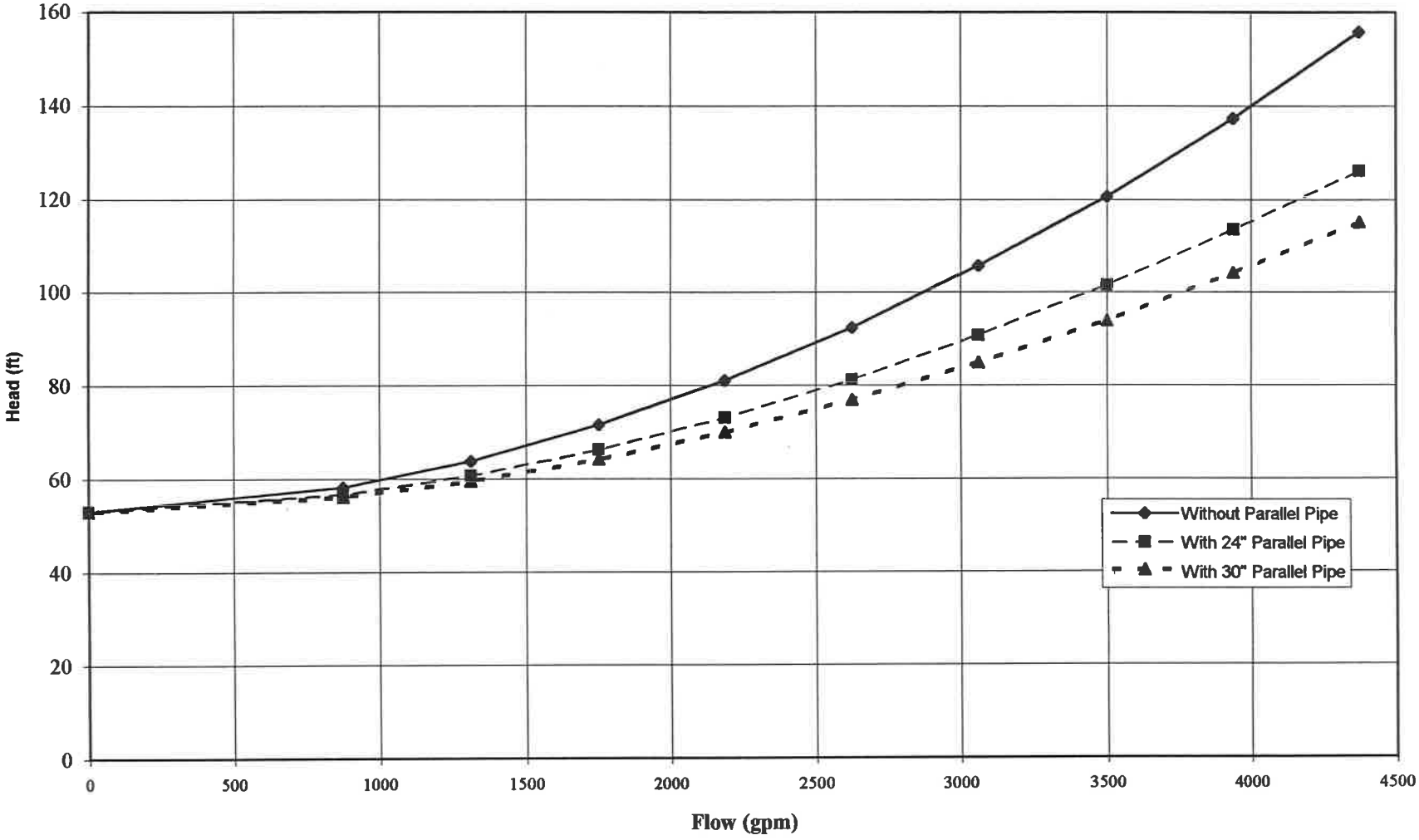


Table 1
Boca Ciega Pump Station Service Area and McKay Creek WWTF Service Area
Existing and Projected Flow Conditions

Source	Flow Condition	Equation	Flow (MGD)	Comments
Boca Ciega P.S. Service Area	**EXISTING**			
	PHF		18.0	Existing design capacity
	ADF	ExPHF/P.F.	8.2	Estimated Peaking factor=2.2
	MIN	0.40*ADF	3.3	
	FUTURE			
	PHF	FutADF*P.F.	19.5	
	ADF	ExADF*Growth	8.9	Growth Factor=1.085
	MIN	0.40*FutADF	3.6	
McKay Creek WWTF Service Area	**EXISTING**			
	PHF		10.4	Currently, no McKay Creek flows
	ADF		4.7	are sent to Boca Ciega
	MIN		1.9	
	FUTURE			
	PHF		12.0	Per McKay Creek Prelim. Eng. Report (PER)
	ADF	ExADF*Growth	5.1	Exist. ADF=4.7 MGD per McKay Creek PER
	MIN	0.40*FutADF	2.0	Growth Factor=1.089 per McKay Creek PER
Total	**EXISTING**			
	PHF		18.0	
	ADF		8.2	
	MIN		3.3	
	FUTURE			
	PHF		31.5	
	ADF		14.0	
	MIN		5.6	

TABLE 2
SYSTEM TEST DATA

SYSTEM TEST 1

Station No.	Test Commencement Pressure (psi)	Test Commencement Water Level (ft)	:30 min Water Level (ft)	1:00 min Pressure (psi)	1:30 min Water Level (ft)	2:00 min Pressure (psi)	2:30 min Water Level	Flow (gpm)	Alt.Flow (gpm)	Begin Recovery Time	Begin Recovery Water Level (ft)	End Recovery Time (min)	End Recovery Water Level (ft)	Inflow (gpm)	Average Head (ft)	Net Test Flow (gpm)	# Pumps on during test
008			18.75	30	20.00			1057.1		0	20.00	3	17.42	121.2	34.7	1178.3	1
011	**********No Data for Test 1**********							---		********No Test 1 Recovery Data********						---	1
012	18	12.50	14.67	16				1631.2		********No Test 1 Recovery Data******					39.3	1631.2	1
013	**********No Data for Test 1**********							---		********No Test 1 Recovery Data********						---	1
015	21		15.80	21	16.40	22	18.5	225.5	789.3	0	18.50	5	18.35	2.8	49.3	792.1	1
103	22	15.00	15.33	20				139.5		0	16.33	5	16.17	2.3	48.5	141.8	1
105	15	14.00	15.00	15	16.50			355.3	296.1	0	16.25	5	15.33	11.9	34.7	367.2	1
106	17	15.67	16.75					1826.6		0	16.58	5	15.46	31.6	39.3	1858.2	2
109	30	13.17	13.67	30	15.00			375.8	458.5	0	15.20	5	14.40	15.0	69.3	390.9	1

SYSTEM TEST 2

Station No.	Test Commencement Pressure (psi)	Test Commencement Water Level (ft)	:30 min Water Level (ft)	1:00 min Pressure (psi)	1:30 min Water Level (ft)	2:00 min Pressure (psi)	2:30 min Water Level	Flow (gpm)	Alt.Flow (gpm)	Begin Recovery Time	Begin Recovery Water Level (ft)	End Recovery Time (min)	End Recovery Water Level (ft)	Inflow (gpm)	Average Head (ft)	Net Test Flow (gpm)	# Pumps on during test
008	32	18.50	19.17	32	20.08	31		890.8		0	21.00	5	18.58	68.2	73.2	959.0	1
011	28	17.40	18.80	28				1052.4	864.4	0	20.50	5	20.20	5.6	64.7	870.1	1
012	16	13.42	15.33	16				1435.7		0	17.00	5	15.50	28.2	37.0	1463.9	1
013			13.40	22				---		0	13.40	5	13.70	4.2	25.4	---	1
015			16.70	21	18.60	22	20.15	714.1		0	20.15	5	18.10	38.5	49.7	752.6	1
103	21	15.00	15.17	21				71.9		0	16.00	5	15.42	8.2	48.5	80.1	1
105	**********No Data for Test 2**********							---		********No Test 2 Recovery Data********						---	1
106	15	15.63	15.68	15				84.6		0	15.68	5	15.33	9.9	34.7	94.4	2
109	30	13.20	13.58	30	14.75	30	16.08	388.4		0	16.30	5	14.11	41.2	69.3	429.5	1

TABLE 3
PINELLAS COUNTY UTILITIES PUMP STATIONS
ALTERNATIVE SCENARIOS PUMP SELECTION COMPARISON

Existing Pumps

PS#	PHF SYSTEM Design point (gpm)	PHF SYSTEM Head (ft)	ADF SYSTEM Head (ft)	Model	Type	Impeller	Rated HP	# of pumps	Wet Well Diameter (ft)
008	975	105	61 to 73	3300	Flygt	468	88	2	12
011	375	87	56 to 57	3152	Flygt	454	20	2	8
012	450	83	49 to 53	3152	Flygt	432	20	2	8
013	250	65	53 to 54	3126	Flygt	460/461	10	2	6
015	900	50	51 to 74	3152	Flygt	454	20	2	8
103	180	84	45 to 68	3127	Flygt	484/467	10	2	6
105	420	72	44	3127	Flygt	432	10	2	5.5
106	955	40	48 to 61	3152	Flygt	454	20	3	12
109	375	81	49	3152	Flygt	432	20	2	8
16	6250	150	58	612SF	Aurora	1.5 - 19.5	150	2	*
[illegible]	3000	75	---	B5445	Fairbanks	19"	75	2	*

New Proposed Pumps with Proposed 24" Parallel FM Next to Existing 36" FM Along Park Blvd.

PS#	PHF SYSTEM Prop. Req. Flow (gpm)	PHF SYSTEM Head (ft)	ADF SYSTEM Head (ft)	Model	Type	Impeller	Rated HP	Wet Well Diam. Requ. (ft)
008	975	124	69 to 83	3300	Flygt	466	88	8
011	375	111	64 to 69	3201	Flygt	457	47	8
012	450	103	57 to 60	3170	Flygt	442	30	8
013	250	109	60 to 61	3170	Flygt	464	30	8
015	900	97	58 to 59	3201	Flygt	457	47	8
103	180	104	52 to 74	3152	Flygt	454	20	6
105	420	86	50 to 64	3152	Flygt	454	20	6
106	955	96	54 to 68	3201	Flygt	457	47	8
109	375	105	55 to 73	3170	Flygt	464	30	8
16	4375	126	69 to 74	3231	Flygt	---	185	*

New Proposed Pumps with Proposed 30" Parallel FM Next to Existing 36" FM Along Park Blvd.

PS#	PHF SYSTEM Prop. Req. Flow (gpm)	PHF SYSTEM Head (ft)	ADF SYSTEM Head (ft)	Model	Type	Impeller	Rated HP	Wet Well Diam. Requ. (ft)
008	975	105 114	66 to 80	3300	Flygt	497	60	8
011	375	97 100	61 to 67	3170	Flygt	443	30	8
012	450	92	54 to 58	3152	Flygt	454	20	6
013	250	98	58 to 59	3152	Flygt	454	20	6
015	900	86	55 to 56	3201	Flygt	457	47	8
103	180	97	50 to 73	3152	Flygt	454	20	6
105	420	81	49 to 63	3152	Flygt	454	20	6
106	955	90	53 to 66	3201	Flygt	457	47	8
109	375	97	53 to 70	3152	Flygt	454	20	6
16	4375	115	66 to 71	3231	Flygt	---	185	*

New Pumps Without Any Proposed Parallel FM Next to Existing 36" FM along Park Blvd.

PS#	PHF SYSTEM Prop. Req. Flow (gpm)	PHF SYSTEM Head (ft)	ADF SYSTEM Head (ft)	Model	Type	Impeller	Rated HP	Wet Well Diam. Requ. (ft)
008	975	154	76 to 89	3300	Flygt	464	88	8
011	375	140	71 to 76	3201	Flygt	452	47	8
012	450	133	63 to 67	3201	Flygt	452	47	8
013	250	138	68 to 75	3201	Flygt	452	47	8
015	900	126	65 to 88	3300	Flygt	466	88	8
103	180	125	57 to 80	3201	Flygt	457	47	8
105	420	99	52 to 63	3170	Flygt	464	30	8
106	955	116	58 to 73	3201	Flygt	452	47	8
109	375	129	61 to 78	3201	Flygt	457	47	8
16	4375	156	51 to 82	3312	Flygt	—	280	*

* The new Boca Ciega PS (PS 16) is currently in design. The difference in wet well sizes between the old station and new station are negligible since the new PS16 will have the same size wet well regardless of the scenario.

TABLE 4
BOCA CIEGA P.S. HYDRAULIC ANALYSIS
ALTERNATIVE COMPARISONS FOR OPERATING COSTS

VARIABLE	EXISTING SYSTEM WITHOUT MCKAY CREEK WWTF FLOWS											TOTAL
PUMP STATION NUMBER	PS008	PS011	PS012	PS013	PS015	PS103	PS105	PS106	PS109	PS016		OPERATING
DESIGN FLOW, GPM	975	375	450	250	900	180	420	955X2	375	6250X2	3000X2	COST
RATED BHP	88	20	20	10	20	10	10	20	20	150	75	PER YEAR
FLOW @ ADF, GPM	1700 to 2050	900	850 to 975	400	600 to 950	100 to 375	420	800 to 950	975	8000	---	
HEAD @ ADF. FT	61 to 73	56 to 57	49 to 53	53 to 54	51 to 74	45 to 68	44	48 to 61	49	58	---	
PUMP BHP @ ADF	46	19	19	8.5	19	7	8.5	19	19	150	75	
MOTOR EFFICIENCY (ASSUMED)	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	
INPUT KW	38	16	16	7	16	6	7	16	16	124	62	
ANNUAL AVE. DAILY RUN TIME, HR.*	11.6	1.7	4	2.3	3.3	2.8	2.8	16.9	6	30.3	0.47	
DAYS PER YEAR	365	365	365	365	365	365	365	365	365	365	365	
TOTAL ANNUAL KWh	161,373	9,768	22,984	5,912	18,962	5,927	7,198	97,108	34,476	1,374,512	10,660	
COST PER KWh**	$0.067	$0.086	$0.078	$0.097	$0.079	$0.100	$0.087	$0.064	$0.082	$0.082	$0.082	
TOTAL ESTIMATED ANNUAL OPERATING COST	$10,812	$840	$1,793	$573	$1,498	$593	$626	$6,215	$2,827	$112,710	$874	$139,361
Actual Annual Operating Costs (10/96-9/97)	$6,961	$985	$1,842	$591	$1,836	$495	$837	$8,070	$1,303	---	---	

VARIABLE	WITH PARALLEL 24-INCH FM										TOTAL
PUMP STATION NUMBER	PS008	PS011	PS012	PS013	PS015	PS103	PS105	PS106	PS109	PS016	OPERATING
DESIGN FLOW, GPM	975	375	450	250	900	180	420	955X2	375	4375X5	COST
RATED BHP	88	47	30	30	47	20	20	47	30	250	PER YEAR
FLOW @ ADF, GPM	2300 to 2500	1300 to 1450	1250 to 1350	1050	1500	700 to 950	800 to 1000	1400 to 1550	850 to 1100	off curve	
HEAD @ ADF. FT	69 to 83	64 to 69	57 to 60	60 to 61	58 to 59	52 to 74	50 to 64	54 to 68	55 to 73	69 to 74	
PUMP BHP @ ADF	65	44	29	29	44	20	20	44	29	190	
MOTOR EFFICIENCY (ASSUMED)	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	
INPUT KW	54	36	24	24	36	17	17	36	24	157	
ANNUAL AVE. OPERATION TIME, HR.*	11.6	1.7	4	2.3	3.3	2.8	2.8	16.9	6	72	
DAYS PER YEAR	365	365	365	365	365	365	365	365	365	365	
TOTAL ANNUAL KWh	228,027	22,621	35,081	20,172	43,912	16,936	16,936	224,882	52,622	4,137,144	
COST PER KWh**	$0.07	$0.09	$0.08	$0.10	$0.08	$0.10	$0.09	$0.06	$0.08	$0.06	
TOTAL ESTIMATED ANNUAL OPERATING COST	$15,278	$1,945	$2,736	$1,957	$3,469	$1,694	$1,473	$14,392	$4,315	$264,777	$312,037

VARIABLE	WITH PARALLEL 30-INCH FM										TOTAL
PUMP STATION NUMBER	PS008	PS011	PS012	PS013	PS015	PS103	PS105	PS106	PS109	PS016	OPERATING
DESIGN FLOW, GPM	975	375	450	250	900	180	420	955X2	375	4375X5	COST
RATED HP	60	30	20	20	47	20	20	47	20	185	PER YEAR
FLOW @ ADF, GPM	1850 to 2300	1000 to 1100	900 to 950	890	1500	620 to 1000	800 to 1010	1420 to 1550	720 to 950	5500 to 5570	
HEAD @ ADF,FT	66 to 80	61 to 67	54 to 58	58 to 59	55 to 56	50 to 73	49 to 63	53 to 66	53 to 70	66 to 71	
PUMP BHP @ ADF	51	25	20	20	44	19	19	44	20	180	
MOTOR EFFICIENCY (ASSUMED)	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	
INPUT KW	42	21	17	17	36	16	16	36	17	149	
ANNUAL AVE. OPERATION TIME, HR.*	11.6	1.7	4	2.3	3.3	2.8	2.8	16.9	6	72	
DAYS PER YEAR	365	365	365	365	365	365	365	365	365	365	
TOTAL ANNUAL KWh	178,913	12,853	24,194	13,911	43,912	16,089	16,089	224,882	36,291	3,919,399	
COST PER KWh**	$0.07	$0.09	$0.08	$0.10	$0.08	$0.10	$0.09	$0.06	$0.08	$0.06	
TOTAL ESTIMATED ANNUAL OPERATING COST	$11,987	$1,105	$1,887	$1,349	$3,469	$1,609	$1,400	$14,392	$2,976	$250,842	$291,017

VARIABLE	WITH NO PARALLEL FM										TOTAL
PUMP STATION NUMBER	PS008	PS011	PS012	PS013	PS015	PS103	PS105	PS106	PS109	PS016	OPERATING
DESIGN FLOW, GPM	975	375	450	250	900	180	420	955X2	375	4375X5	COST
RATED HP	88	47	47	47	88	47	30	60	47	280	PER YEAR
FLOW @ ADF, GPM	off curve	1300 to 1400	1400 to 1430	1300 to 1400	2050 to 2500	1100 to 1220	950 to 1120	1350 to 1500	1250 to 1450	off curve	
HEAD @ ADF,FT	76 to 89	71 to 76	63 to 67	68 to 75	65 to 88	57 to 80	52 to 63	58 to 73	61 to 78	51 to 82	
PUMP BHP @ ADF	88	46	46	46	65	44	29	55	46	240	
MOTOR EFFICIENCY (ASSUMED)	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	
INPUT KW	73	38	38	38	54	36	24	46	38	199	
ANNUAL AVE. OPERATION TIME, HR.*	11.6	1.7	4	2.3	3.3	2.8	2.8	16.9	6	72	
DAYS PER YEAR	365	365	365	365	365	365	365	365	365	365	
TOTAL ANNUAL KWh	308,713	23,649	55,646	31,996	64,870	37,258	24,557	281,102	83,469	5,225,866	
COST PER KWh**	$0.07	$0.09	$0.08	$0.10	$0.08	$0.10	$0.09	$0.06	$0.08	$0.06	
TOTAL ESTIMATED ANNUAL OPERATING COST	$20,684	$2,034	$4,340	$3,104	$5,125	$3,726	$2,136	$17,991	$6,844	$334,455	$400,439

* Based on historical runtime data received from Pinellas County Utilities.
** Based on historical billing rates received from Pinellas County Utilities.

TABLE 5
PINELLAS COUNTY UTILITIES PUMP STATIONS
ALTERNATIVE SCENARIOS COST COMPARISON

New Proposed Pumps with Proposed 24" Parallel FM Next to Existing 36" FM Along Park Blvd.

PS#	Pump Capital Cost (Inc. Labor)	New Conc. Wet Well Cost	Dewatering Cost	Excavation Cost	Backfill Cost	Demo. Old Sta. Cost	New PS DI Piping Cost	New PS 8" PVC Inlet Cost	New PS Pipe Fitting & Valve Cost	Temp. Bypass Pump Rental Cost	Bypass Piping Cost	New Valve Vault Cost	Total Cost w/out OH& P	Total Cost with OH& P
008	$15,000	---	---	---	---	---	---	---	---	---	---	---	$15,000	$18,750
011	$88,500	---	---	---	---	---	$700	---	$2,400	$300	$2,813	---	$94,713	$118,391
012	$81,900	---	---	---	---	---	$700	---	$2,400	$300	$2,813	---	$88,113	$110,141
013	$81,300	$8,044	$20,000	$4,284	$4,851	$5,000	$500	$2,250	$1,700	---	---	$2,500	$130,429	$163,036
015	$88,500	---	---	---	---	---	$700	---	$2,400	$300	$3,938	---	$95,838	$119,797
103	$57,750	---	---	---	---	---	$500	---	$1,700	$300	$2,813	---	$63,063	$78,828
105	$57,750	$8,044	$20,000	$4,284	$4,851	$5,000	$500	$2,250	$1,700	---	---	$2,500	$106,879	$133,599
106	$138,540	---	---	---	---	---	$700	---	$2,400	$300	$3,938	---	$145,878	$182,347
109	$81,300	---	---	---	---	---	$500	---	$1,700	$300	$2,813	---	$86,613	$108,266
016	$1,090,500	*	*	*	*	*	*	---	*	---	---	*	$1,090,500	$1,363,125
TOTALS	**$1,781,040**	**$16,088**	**$40,000**	**$8,568**	**$9,702**	**$10,000**	**$4,800**	**$4,500**	**$16,400**	**$1,800**	**$19,125**	**$5,000**	**$1,917,023**	**$2,396,279**

2.64 miles (13,930 LF) of 24-inch pipeline @ $175/LF = **$2,440,000 capital cost****

New Proposed Pumps with Proposed 30" Parallel FM Next to Existing 36" FM Along Park Blvd.

PS#	Pump Capital Cost (Inc. Inst)	New Conc. Wet Well Cost	Dewatering Cost	Excavation Cost	Backfill Cost	Demo. Old Sta. Cost	New PS DI Piping Cost	New PS 8" PVC Inlet Cost	New PS Pipe Fitting & Valve Cost	Temp. Bypass Pump Rental Cost	Bypass Piping Cost	New Valve Vault Cost	Total Cost w/out OH& P	Total Cost with OH& P
008	$15,000	---	---	---	---	---	---	---	---	---	---	---	$15,000	$18,750
011	$81,900	---	---	---	---	---	$700	---	$2,400	$300	$2,813	---	$88,113	$110,141
012	$13,500	---	---	---	---	---	---	---	---	$300	$2,813	---	$16,613	$20,766
013	$57,000	---	---	---	---	---	$500	---	$1,700	---	---	---	$59,200	$74,000
015	$88,500	---	---	---	---	---	$700	---	$2,400	$300	$3,938	---	$95,838	$119,797
103	$57,750	---	---	---	---	---	$500	---	$1,700	$300	$2,813	---	$63,063	$78,828
105	$57,750	$8,044	$20,000	$4,284	$4,851	$5,000	$700	$2,250	$2,400	---	---	$2,500	$107,779	$134,724
106	$138,533	---	---	---	---	---	$700	---	$2,400	$300	$3,938	---	$145,870	$182,338
109	$13,500	---	---	---	---	---	---	---	---	---	---	---	$13,500	$16,875
016	$930,000	*	*	*	*	*	*	---	*	---	---	*	$930,000	$1,162,500
TOTALS	**$1,453,433**	**$8,044**	**$20,000**	**$4,284**	**$4,851**	**$5,000**	**$3,800**	**$2,250**	**$13,000**	**$1,500**	**$16,313**	**$2,500**	**$1,534,974**	**$1,918,718**

2.64 miles (13,930 LF) of 30-inch pipeline @ $200/LF = **$2,786,000 capital cost****

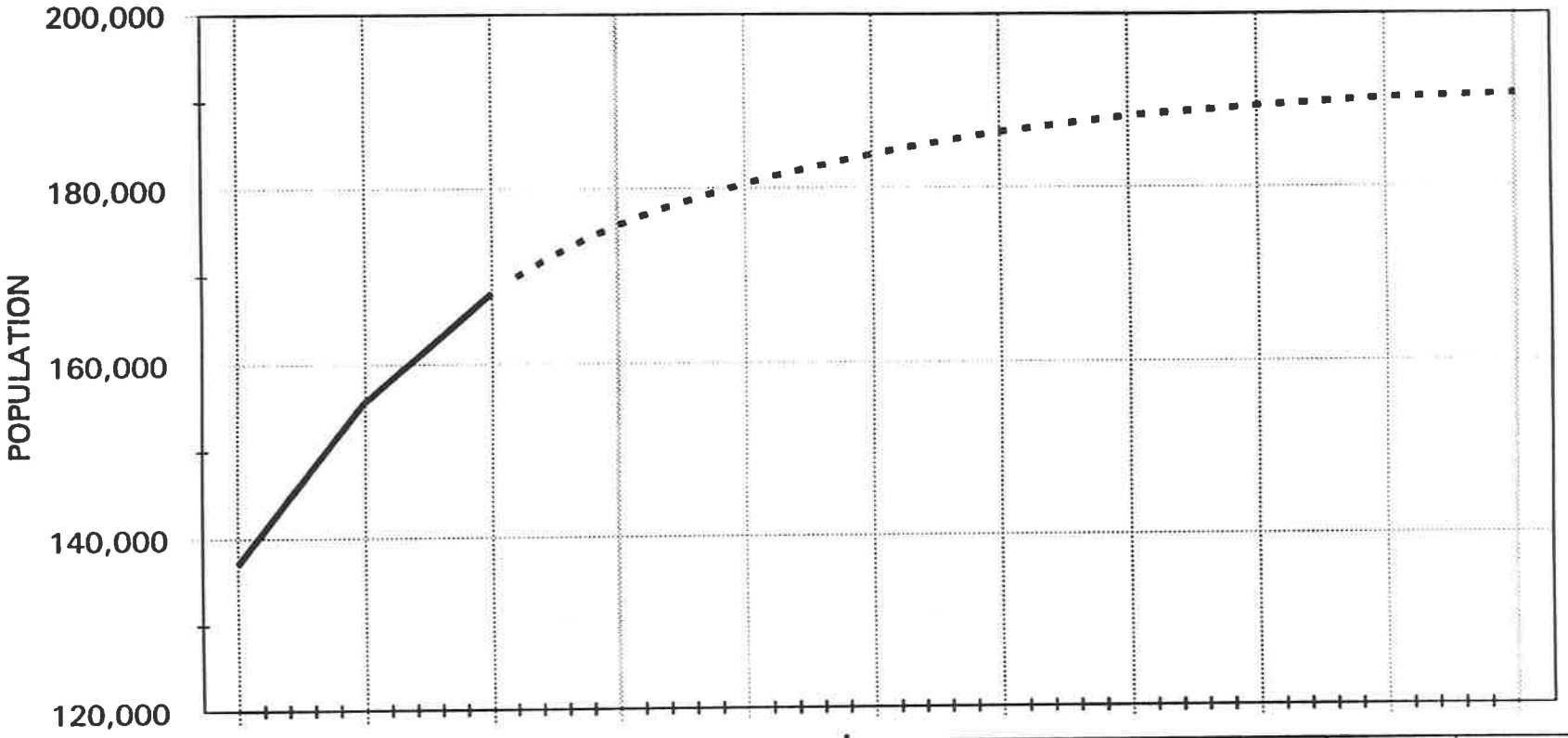
New Pumps Without Any Proposed Parallel FM Next to Existing 36" FM along Park Blvd.

PS#	Pump Capital Cost	New Conc. Wet Well Cost	Dewatering Cost	Excavation Cost	Backfill Cost	Demo. Old Sta. Cost	New PS DI Piping Cost	New PS 8" PVC Inlet Cost	New PS Pipe Fitting & Valve Cost	Temp. Bypass Pump Rental Cost	Bypass Piping Cost	New Valve Vault Cost	Total Cost w/out OH& P	Total Cost with OH& P
008	$15,000	---	---	---	---	---	---	---	---	---	---	---	$15,000	$18,750
011	$88,500	---	---	---	---	---	$700	---	$2,400	$300	$2,813	---	$94,713	$118,391
012	$88,500	---	---	---	---	---	$700	---	$2,400	$300	$2,813	---	$94,713	$118,391
013	$88,500	$8,044	$20,000	$4,284	$4,851	$5,000	$700	$2,250	$2,400	---	---	$2,500	$138,529	$173,161
015	$135,750	---	---	---	---	---	$900	---	$3,100	$300	$3,938	---	$143,988	$179,984
103	$88,500	$8,044	$20,000	$4,284	$4,851	$5,000	$700	$2,250	$2,400	---	---	$2,500	$138,529	$173,161
105	$81,300	$8,044	$20,000	$4,284	$4,851	$5,000	$500	$2,250	$1,700	---	---	$2,500	$130,429	$163,036
106	$180,000	---	---	---	---	---	$900	---	$3,100	$300	$3,938	---	$188,238	$235,297
109	$88,500	---	---	---	---	---	$700	---	$2,400	$300	$2,813	---	$94,713	$118,391
016	$1,222,500	*	*	*	*	*	*	---	*	---	---	*	$1,222,500	$1,528,125
TOTALS	**$2,077,050**	**$24,132**	**$60,000**	**$12,852**	**$14,553**	**$15,000**	**$5,800**	**$6,750**	**$19,900**	**$1,500**	**$16,313**	**$7,500**	**$2,261,350**	**$2,826,687**

* These costs were not included for new P.S. 016 since the difference between scenarios is negligible. Refer to the Boca Ciega P.S. construction cost estimate for costs for these items.
** These costs were estimated based on bid tables of similar Pinellas County projects.

ATTACHMENT 1

SOUTH CROSS BAYOU WWTP
ACTUAL AND PROJECTED POPULATION
1980 - 2030



YEAR	1980	1985	1990	1995	2000	2005	2010	2015	2020	2025	2030
ACTUAL —	136,986	155,634	168,066								
PROJECTED - -				175,763	180,517	183,913	186,404	188,215	189,347	190,252	190,705

Source: Pinellas County Planning Department

ES ENGINEERING-SCIENCE

FIGURE 3.1

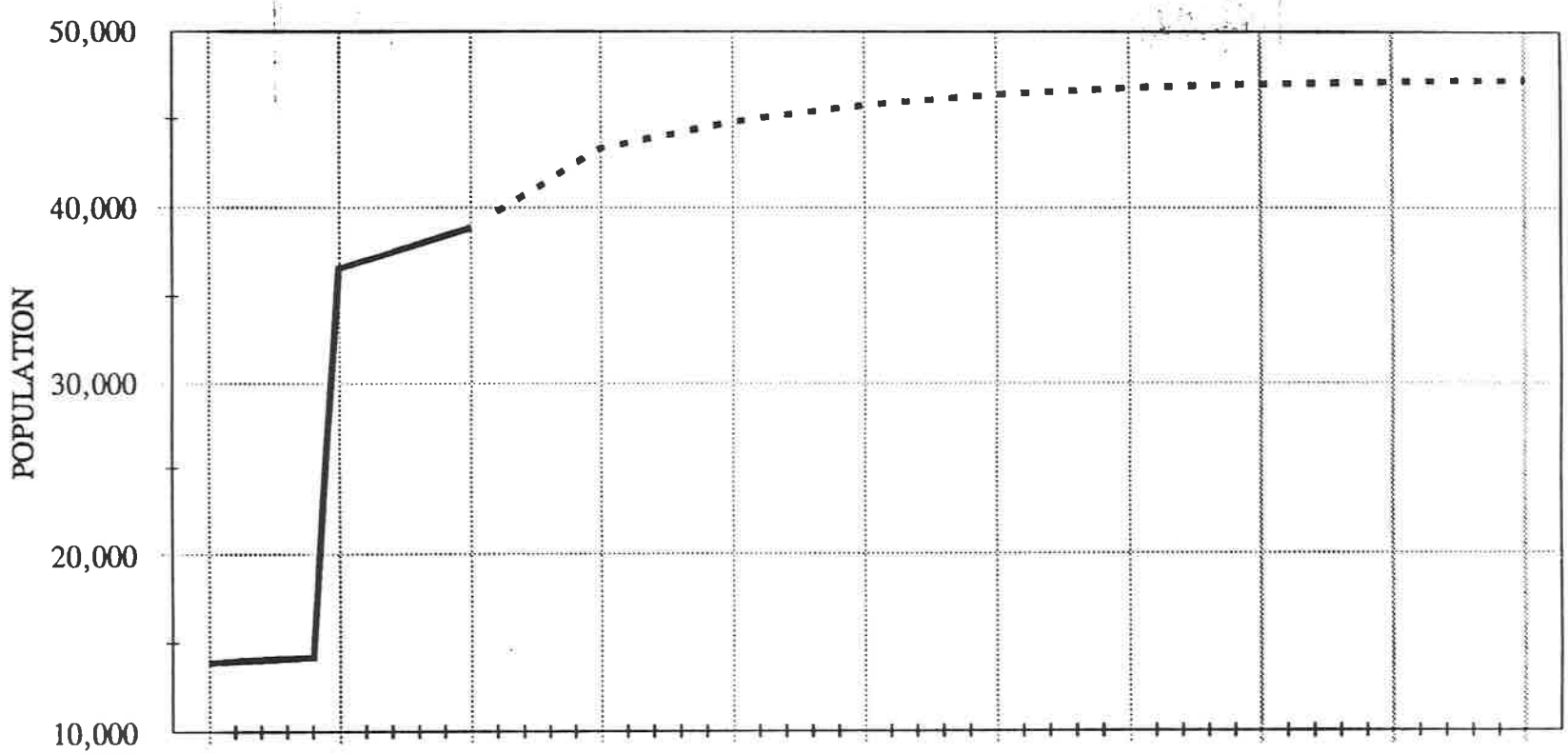
3-2

$\frac{\text{Year 2030}}{\text{Year 1995}} = \frac{190{,}705 \text{ people}}{175{,}763 \text{ people}}$

Growth factor = 1.085

ATTACHMENT 2

MCKAY CREEK WWTF
ACTUAL AND PROJECTED SERVICE AREA POPULATION
1980 - 2030



YEAR	1980	1985	1990	1995	2000	2005	2010	2015	2020	2025	2030
ACTUAL —	13,880	36,583	38,839								
PROJECTED - -				43,337	44,820	45,762	46,354	46,725	46,956	47,101	47,191

Source: Pinellas County Department of Planning,
July, 1994. Total Population figures utilized.
Note: Boca Ciega flow diverted to McKay in 1985

WK_POP

ENGINEERING-SCIENCE, INC.

Year 2030 / Year 1995 = 47,191 people / 43,337 people Growth factor = 1.089

Figure 3.1

ATTACHMENT 3

FACSIMILE TRANSMITTAL SHEET

PINELLAS COUNTY UTILITIES
ENGINEERING DEPARTMENT
14 S. Fort Harrison Avenue, 6th FL
Clearwater, FL 33756
Phone: (813) 464-3588
FAX: (813) 464-3595

Date: 6/29/98

Number of Pages: 10 (Including cover sheet)

Fax Message To: Jeff Lowe, P.E. Phone: 933-4650

Company: Parsons Engineering-Science Inc Fax No.: 932-7416

Message From: Bill Gill, P.E

Comments:

Please contact (813) 464-3588 if you do not receive all pages or if there is a problem with the transmission of this document.

K:\USERS\WP\COGENG\ADMIN\FORMFAX.WPD

ALL PIPING 8"

TDH PERFORMANCE TEST

STATION # 008 DATE 06-08-98

ADDRESS :

DISCRIPTION : TYPE FLYGT MODEL 3300 IMP 468 HP 88
VOLT 460 AMPS 108 PHASE 3 W/W 11.7

RECEIVED
JUN 18 1998
PC UTILITIES - E

PUMP # 1 SERIAL #

STOP	21.65	INFLOW	21.65		21.65		
START -	20.50	-	21.35	+/⊖	3.40		
=	1.15	=	.30	=	18.25	ST.HD.	
INFLOW +	.30	PSI=	25.00	x 2.31 =	+ 57.75	FT.HD.	
=	1.45			=	76.00	TDH	
x	803.79	G.P.F.					
=	1165.49	G.P.M. @	76.00	TDH			

PUMP # 2 SERIAL #

STOP	21.60	INFLOW	21.60		21.60		
START -	20.50	-	21.30	+/⊖	3.40		
=	1.10	=	.30	=	18.20	ST.HD.	
INFLOW +	.30	PSI=	25.00	x 2.31 =	+ 57.75	FT.HD.	
=	1.40			=	75.95	TDH	
x	803.79	G.P.F.					
=	1125.30	G.P.M. @	75.95	TDH			

PUMP # ~~42~~ SERIAL #

STOP	22.10	INFLOW	22.10		22.10		
START -	20.50	-	21.60	+/⊖	3.40		
=	1.60	=	.50	=	18.70	ST.HD.	
INFLOW +	.50	PSI=	34.00	x 2.31 =	+ 78.54	FT.HD.	
=	2.10			=	97.24	TDH	
x	803.79	G.P.F.					
=	1687.95	G.P.M. @	97.24	TDH			

PUMP # SERIAL #

STOP	.	INFLOW	.		.		
START -	.	-	.	+/-	.		
=	.	=	.	=	.	ST.HD.	
INFLOW +	.	PSI=	.	x 2.31 =	+ .	FT.HD.	
=	.			=	.	TDH	
x	.	G.P.F.					
=	.	G.P.M. @	.	TDH			

ALL PIPING 4"

TDH PERFORMANCE TEST

STATION # 105 DATE 06-08-98

ADDRESS :

DISCRIPTION : TYPE FLYGT MODEL #3127 IMP 432 HP 10

VOLT 330 AMPS 26.0 PHASE 3 W/W 515

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UTILITIES - E

PUMP # 1 SERIAL

STOP	15.10	INFLOW	15.10		15.10		
START -	13.50	-	14.70	+/⊖	1.43		
=	1.60	=	.40	=	13.67	ST.HD.	
INFLOW +	.40	PSI=	13.00	x 2.31 =	+ 30.03	FT.HD.	
=	2.00			=	43.70	TDH	
x	177.62	G.P.F.					
=	355.24	G.P.M. @	43.70	TDH			

PUMP # 2 SERIAL

STOP	15.10	INFLOW	15.10		15.10		
START -	13.50	-	14.80	+/⊖	1.43		
=	1.60	=	.30	=	13.67	ST.HD.	
INFLOW +	.30	PSI=	14.00	x 2.31 =	+ 32.34	FT.HD.	
=	1.90			=	46.01	TDH	
x	177.62	G.P.F.					
=	337.47	G.P.M. @	46.01	TDH			

PUMP #1&2 SERIAL

STOP	16.30	INFLOW	16.30		16.30		
START -	13.50	-	16.00	+/⊖	1.43		
=	2.80	=	.30	=	14.87	ST.HD.	
INFLOW +	.30	PSI=	16.00	x 2.31 =	+ 36.96	FT.HD.	
=	3.10			=	51.83	TDH	
x	177.62	G.P.F.					
=	550.62	G.P.M. @	51.83	TDH			

PUMP #___ SERIAL

STOP	.	INFLOW	.		.		
START -	.	-	.	+/-	.		
=	.	=	.	=	.	ST.HD.	
INFLOW +	.	PSI=	.	x 2.31 =	+ .	FT.HD.	
=	.			=	.	TDH	
x	.	G.P.F.					
=	.	G.P.M. @	.	TDH			

8÷2 = 4 x 4 x 3.14 x 7.48 = 375.79 GPF
ALL PIPING 8"

TDH PERFORMANCE TEST

STATION # 109 DATE 06-08-98
ADDRESS :

DISCRIPTION : TYPE FLYGT MODEL 3151 IMP 432 HR 20
VOLT 208 AMPS 58 PHASE 3 W/W 8'

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JUN 1 8 1998
P.G. UTILITIES - ENG

PUMP # 1 SERIAL

STOP	14.23	INFLOW	14.23		14.23	
START -	13.40	-	14.10	+/⊖	1.30	
=	.83	=	.13	=	12.93	ST.HD.
INFLOW +	.13	PSI=	32.00	x 2.31 =	+ 73.92	FT.HD.
=	.96			=	86.85	TDH
x	375.79	G.P.F.				
=	360.75	G.P.M. @	86.85	TDH		

PUMP # 2 SERIAL

STOP	14.40	INFLOW	14.40		14.40	
START -	13.40	-	14.12	+/⊖	1.30	
=	1.00	=	.28	=	13.10	ST.HD.
INFLOW +	.28	PSI=	32.00	x 2.31 =	+ 73.92	FT.HD.
=	1.28			=	87.02	TDH
x	375.79	G.P.F.				
=	481.01	G.P.M. @	87.00	TDH		

PUMP #1+2 SERIAL

STOP	14.35	INFLOW	14.35		14.35	
START -	13.40	-	14.16	+/⊖	1.30	
=	.95	=	.19	=	13.05	ST.HD.
INFLOW +	.19	PSI=	36.00	x 2.31 =	+ 83.16	FT.HD.
=	1.14			=	96.21	TDH
x	375.79	G.P.F.				
=	428.40	G.P.M. @	96.21	TDH		

PUMP #___ SERIAL

STOP	.	INFLOW	.		.	
START -	.	-	.	+/-	.	
=	.	=	.	=	.	ST.HD.
INFLOW +	.	PSI=	.	x 2.31 =	+ .	FT.HD.
=	.			=	.	TDH
x	.	G.P.F.				
=	.	G.P.M. @	.	TDH		

ALL PIPING 4"

TDH PERFORMANCE TEST

STATION # 103 DATE 6-08-98

ADDRESS :

DISCRIPTION : TYPE FLYGT MODEL 3127 IMP 484 HP 10

VOLT 230 AMPS 25.6 PHASE 3 W/W 6"

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JUN 1 8 1998

UTILITIES - EI

PUMP # 1 SERIAL

STOP	16.25	INFLOW	16.25		16.25		
START -	15.50	-	16.23	+/⊖	2.95		
=	.75	=	.02	=	13.30	ST.HD.	
INFLOW +	.02	PSI=	20.00	x 2.31 =	+ 46.20	FT.HD.	
=	.77			=	59.50	TDH	
x	211.38	G.P.F.					
=	162.76	G.P.M. @	59.50	TDH			

PUMP # 2 SERIAL

STOP	16.33	INFLOW	16.33		16.33		
START -	15.50	-	16.30	+/⊖	2.95		
=	.83	=	.03	=	13.38	ST.HD.	
INFLOW +	.03	PSI=	19.00	x 2.31 =	+ 43.89	FT.HD.	
=	.86			=	57.27	TDH	
x	211.38	G.P.F.					
=	181.78	G.P.M. @	57.27	TDH			

PUMP # 1+2 SERIAL

STOP	16.80	INFLOW	16.80		16.60		
START -	15.80	-	16.77	+/⊖	2.95		
=	1.00	=	.03	=	13.85	ST.HD.	
INFLOW +	.03	PSI=	22.5	x 2.31 =	+ 51.97	FT.HD.	
=	1.03			=	65.82	TDH	
x	211.38	G.P.F.					
=	217.72	G.P.M. @	65.82	TDH			

PUMP # ___ SERIAL

STOP	.	INFLOW	.		.		
START -	.	-	.	+/-	.		
=	.	=	.	=	.	ST.HD.	
INFLOW +	.	PSI=	.	x 2.31 =	+ .	FT.HD.	
=	.			=	.	TDH	
x	.	G.P.F.					
=	.	G.P.M. @	.	TDH			

TDH PERFORMANCE TEST

Piping 4" To 6" force main

STATION # 013 DATE 06-08-98

ADDRESS :

DISCRIPTION : TYPE FLYGT MODEL 3126 IMP ~~461~~ ~~448~~ HP ~~10~~ 9.4

VOLT 230 AMPS 24.0 PHASE 3 W/W 6"

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UTILITIES - EN

PUMP # 1 SERIAL # _____

STOP	18.40	INFLOW	18.40		18.40	
START -	16.80	-	17.90	+/⊖	2.90	
=	1.60	=	.50	=	15.50	ST.HD.
INFLOW +	.50	PSI=	20.00	x 2.31 =	+ 46.20	FT.HD.
=	2.10			=	61.70	TDH
x	211.38	G.P.F.				
=	443.89	G.P.M. @	61.70	TDH		

PUMP # 2 SERIAL # _____

STOP	18.10	INFLOW	18.10		18.10	
START -	16.80	-	18.00	+/⊖	2.90	
=	1.30	=	.10	=	15.20	ST.HD.
INFLOW +	.10	PSI=	20.50	x 2.31 =	+ 47.35	FT.HD.
=	1.40			=	62.55	TDH
x	211.38	G.P.F.				
=	295.93	G.P.M. @	62.55	TDH		

PUMP #1+2 SERIAL # (30 SECONDS) _____

STOP	18.50	INFLOW	18.50		18.50	
START -	17.50	-	18.44	+/⊖	2.90	
=	1.00	=	.06	=	15.60	ST.HD.
INFLOW +	.06	PSI=	24.00	x 2.31 =	+ 55.44	FT.HD.
=	1.06			=	71.04	TDH
x	211.38	G.P.F.				
=	~~224.06~~	G.P.M. @	71.04	TDH		
	224.06					
	448.12 (60 SECOND)					

PUMP #____ SERIAL # _____

STOP	.	INFLOW	.		.	
START -	.	-	.	+/-	.	
=	.	=	.	=	.	ST.HD.
INFLOW +	.	PSI=	.	x 2.31 =	+ .	FT.HD.
=	.			=	.	TDH
x	.	G.P.F.				
=	.	G.P.M. @	.	TDH		

Piping to To (8" force main)

TDH PERFORMANCE TEST

STATION # 011 DATE 06-04-98

ADDRESS :

DISCRIPTION : TYPE FLYGT MODEL 3152 IMP 454 HP 20

VOLT 230 AMPS 54 PHASE 3 W/W 8"

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P.U. UTILITIES - EI

PUMP # 1 SERIAL

STOP	20.20	INFLOW	20.20		20.20	
START -	18.30	-	19.90	+/⊖	2.00	
=	1.90	=	.30	=	18.20	ST.HD.
INFLOW +	.30	PSI=	18.00	x 2.31 =	+ 41.58	FT.HD.
=	2.20			=	59.78	TDH
x	375.79	G.P.F.				
=	826.73	G.P.M. @	59.78	TDH		

PUMP # 2 SERIAL

STOP	20.40	INFLOW	20.40		20.40	
START -	18.30	-	20.30	+/⊖	2.0	
=	2.10	=	.10	=	18.40	ST.HD.
INFLOW +	.10	PSI=	18.00	x 2.31 =	+ 41.58	FT.HD.
=	2.20			=	59.98	TDH
x	375.79	G.P.F.				
=	826.73	G.P.M. @	59.98	TDH		

PUMP #1+2 SERIAL # (30 seconds)

STOP	19.45	INFLOW	19.45		19.45	
START -	18.30	-	18.40	+/⊖	2.0	
=	1.15	=	1.05	=	17.45	ST.HD.
INFLOW +	.05	PSI=	25.00	x 2.31 =	+ 57.75	FT.HD.
=	1.20			=	75.20	TDH
x	375.79	G.P.F.				
=	450.94	G.P.M. @	75.20	TDH		

901.88 (60 seconds)

PUMP # SERIAL

STOP	.	INFLOW	.		.	
START -	.	-	.	+/-	.	
=	.	=	.	=	.	ST.HD.
INFLOW +	.	PSI=	.	x 2.31 =	+ .	FT.HD.
=	.			=	.	TDH
x	.	G.P.F.				
=	.	G.P.M. @	.	TDH		

Piping 6"

TDH
PERFORMANCE
TEST

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UTILITIES - ENG.

STATION # 015 DATE
ADDRESS :

DISCRIPTION : TYPE FLYGT MODEL 3152 IMP 454 HP 20
VOLT 230 AMPS 58 PHASE 3 W/W 8.0"

PUMP # 1 SERIAL #

STOP	16.30	INFLOW	16.30			16.30	
START -	15.00	-	15.95		+/-	2.50	
=	1.30	=	.35		=	13.80	ST.HD.
INFLOW +	.35	PSI=	21.50	x 2.31	= +	49.66	FT.HD.
=	1.65				=	63.46	TDH
x	375.79	G.P.F.					
=	626.05	G.P.M. @	63.46	TDH			

PUMP # 2 SERIAL #

STOP	16.45	INFLOW	16.45			16.45	
START -	15.00	-	16.10		+/-	2.50	
=	1.45	=	.35		=	13.95	ST.HD.
INFLOW +	.35	PSI=	21.50	x 2.31	= +	49.66	FT.HD.
=	1.80				=	63.61	TDH
x	375.79	G.P.F.					
=	676.42	G.P.M. @	63.61	TDH			

PUMP # 62 SERIAL #

STOP	17.35	INFLOW	17.35			17.35	
START -	15.00	-	17.00		+/-	2.50	
=	2.35	=	.35		=	14.85	ST.HD.
INFLOW +	.35	PSI=	28.0	x 2.31	= +	64.68	FT.HD.
=	2.70				=	79.53	TDH
x	375.79	G.P.F.					
=	1014.63	G.P.M. @	79.53	TDH			

PUMP # SERIAL #

STOP	.	INFLOW	.			.	
START -	.	-	.		+/-	.	
=	.	=	.		=	.	ST.HD.
INFLOW +	.	PSI=	.	x 2.31	= +	.	FT.HD.
=	.				=	.	TDH
x	.	G.P.F.					
=	.	G.P.M. @	.	TDH			

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PG&E UTILITIES - ENG.

TDH PERFORMANCE TEST

PIPING 6"

STATION # 012 DATE 06/15/98

ADDRESS :

DISCRIPTION : TYPE FLYGT MODEL 3152 IMP 432 HP 70
VOLT 230 AMPS 40 PHASE 3 W/W 7.70 FT

PUMP # 1 SERIAL # _____

STOP	15.80	INFLOW	15.80		15.80		
START -	14.00	-	15.30	+/⊖	2.80		
=	1.80	=	.50	=	13.00		ST.HD.
INFLOW +	.50	PSI=	21.00	x 2.31 =	+ 48.51		FT.HD.
=	2.30			=	61.51		TDH
x	348.13	G.P.F.					
=	800.69	G.P.M. @	61.51	TDH			

PUMP # 2 SERIAL # _____

STOP	15.80	INFLOW	15.80		15.80		
START -	14.00	-	15.30	+/⊖	2.80		
=	1.80	=	.50	=	13.00		ST.HD.
INFLOW +	.50	PSI=	22.00	x 2.31 =	+ 50.82		FT.HD.
=	2.30			=	63.82		TDH
x	348.13	G.P.F.					
=	800.69	G.P.M. @	63.82	TDH			

PUMP # 1+2 SERIAL # VOID (OUT OF WATER)

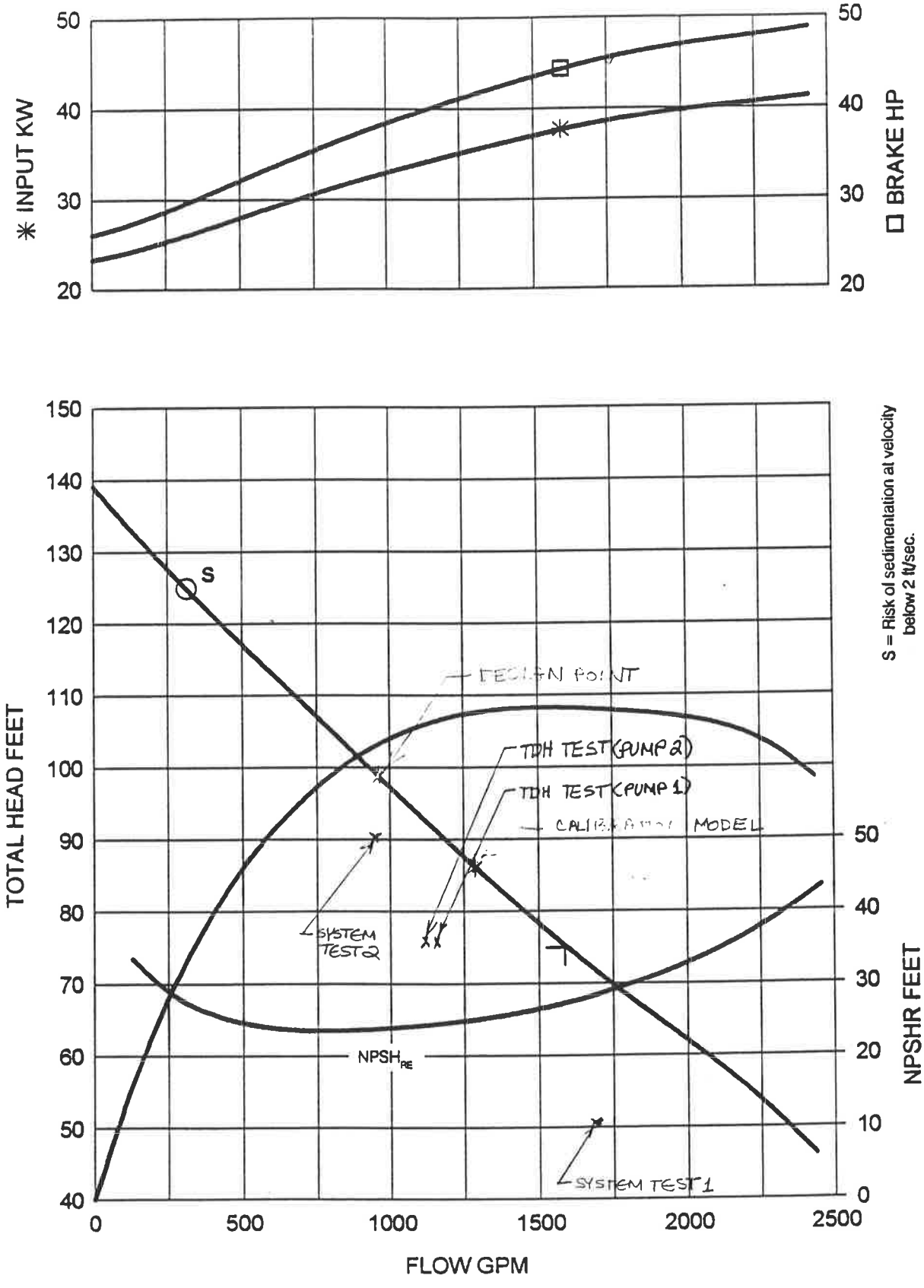
STOP	.	INFLOW	.		.		
START -	14.00	-	.	+/⊖	2.80		
=	.	=	.	=	.		ST.HD.
INFLOW +	.	PSI=	22.00	x 2.31 =	+ 50.82		FT.HD.
=	.			=	.		TDH
x	348.13	G.P.F.					
=	.	G.P.M. @	.	TDH			

PUMP # 1+2 SERIAL # _____

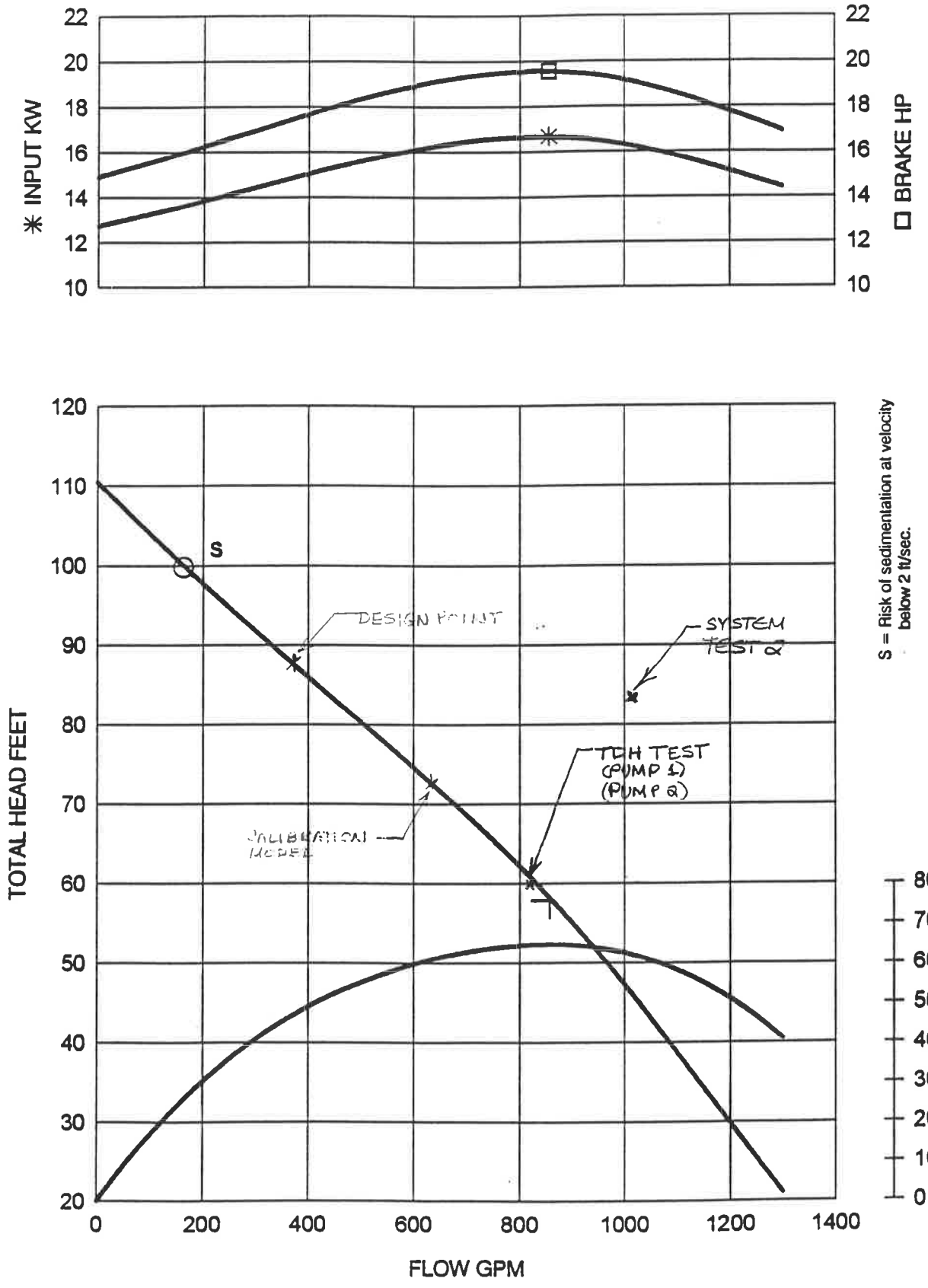
STOP	16.30	INFLOW	16.30		16.30		
START -	13.00	-	16.00	+/⊖	2.80		
=	3.30	=	.30	=	13.50		ST.HD.
INFLOW +	.30	PSI=	26.00	x 2.31 =	+ 60.06		FT.HD.
=	3.60			=	73.56		TDH
x	348.13	G.P.F.					
=	1252.80	G.P.M. @	73.56	TDH			

ATTACHMENT 4

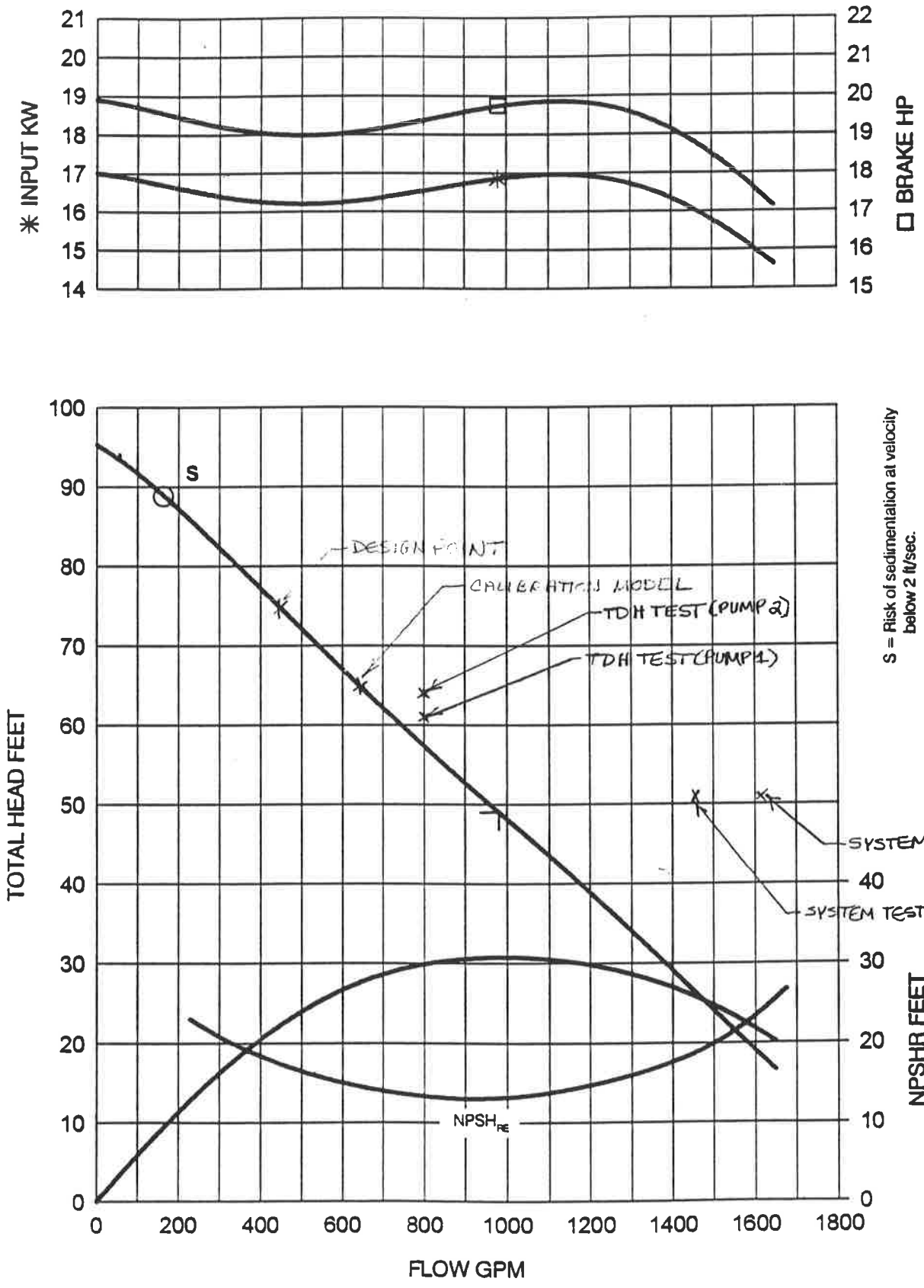
CONFIG.		C-3300	SECTION	PAGE
CP/CT/CS		468 Impeller	3	15
PHASE	VANES	EXISTING P.S. 008 (AA FIXED GRADE NODE)	SUPERSEDES	ISSUED
3	2		2/88	6/94



CONFIG.		C-3152	SECTION	PAGE
CP/CT/CS		**454 Impeller** (6" volute)	3	15
PHASE	VANES	EXISTING P.S. 011 (BB FIXED GRADE NODE)	SUPERSEDES	ISSUED
3	1		2/88	6/94



CONFIG.		C-3152	SECTION	PAGE
CP/CT/CS		432 Impeller	3	9
PHASE	VANES	EXISTING P.S.012 (CC FIXED GRADE NODE)	SUPERSEDES	ISSUED
3	1		2/88	6/94



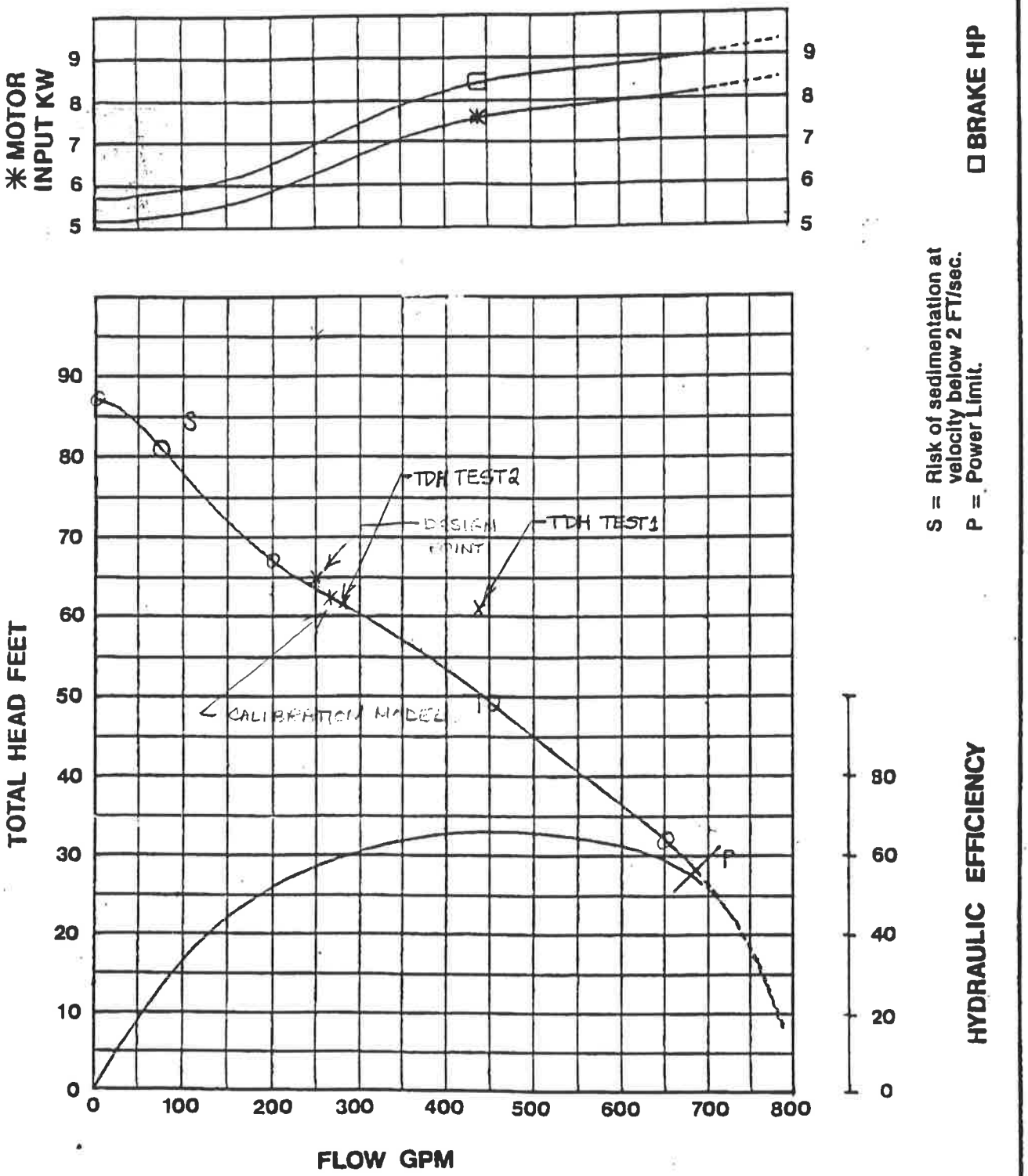
EX PS # 013 (DD)

9.4 HP - 1750 RPM
3ϕ: 200, 230/460, 575V

H.H. C-3126

Wastewater Impeller 461

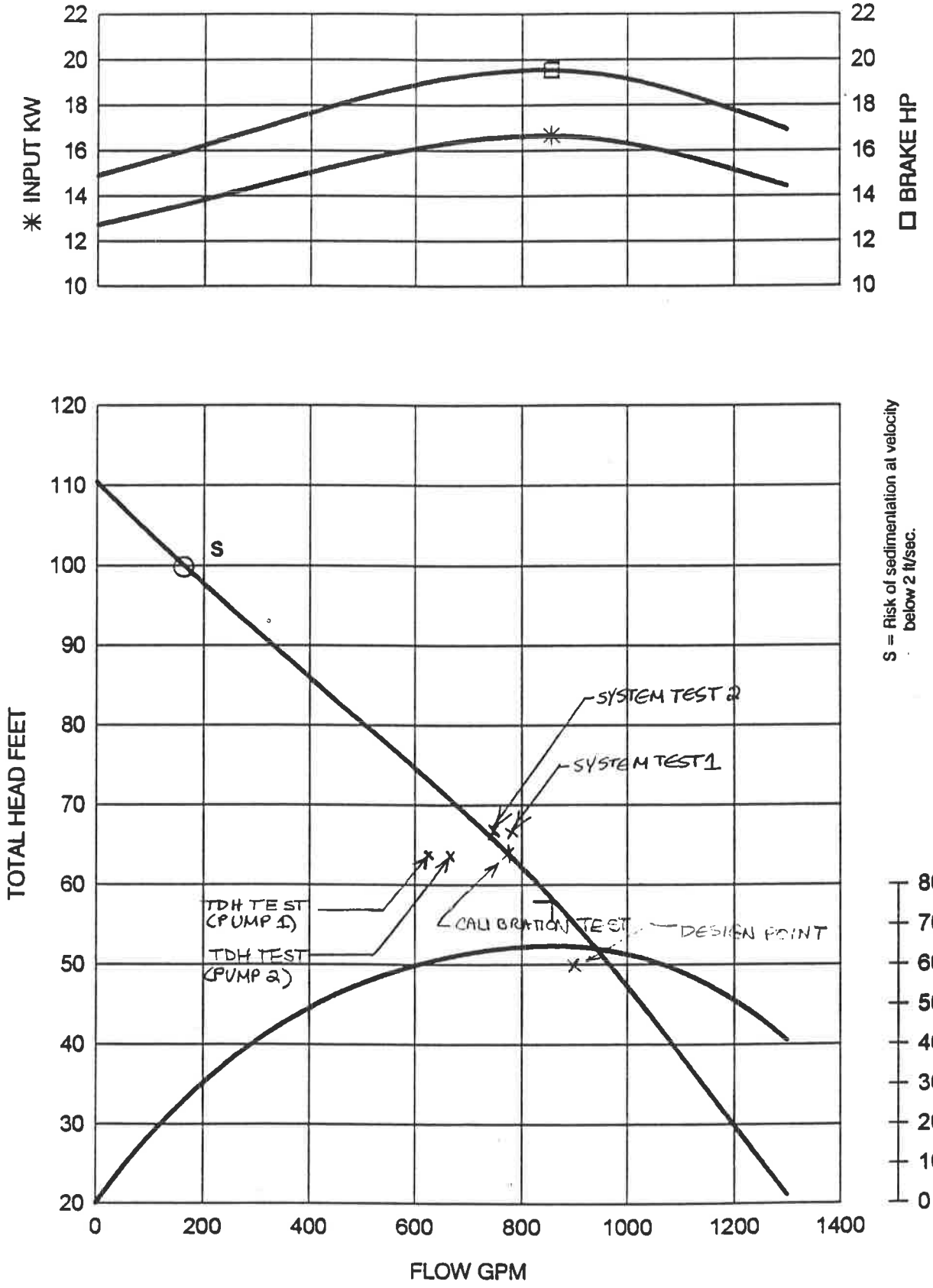
SECTION	PAGE
3126	8D
SUPERSEDES	ISSUED
3/79	6/81



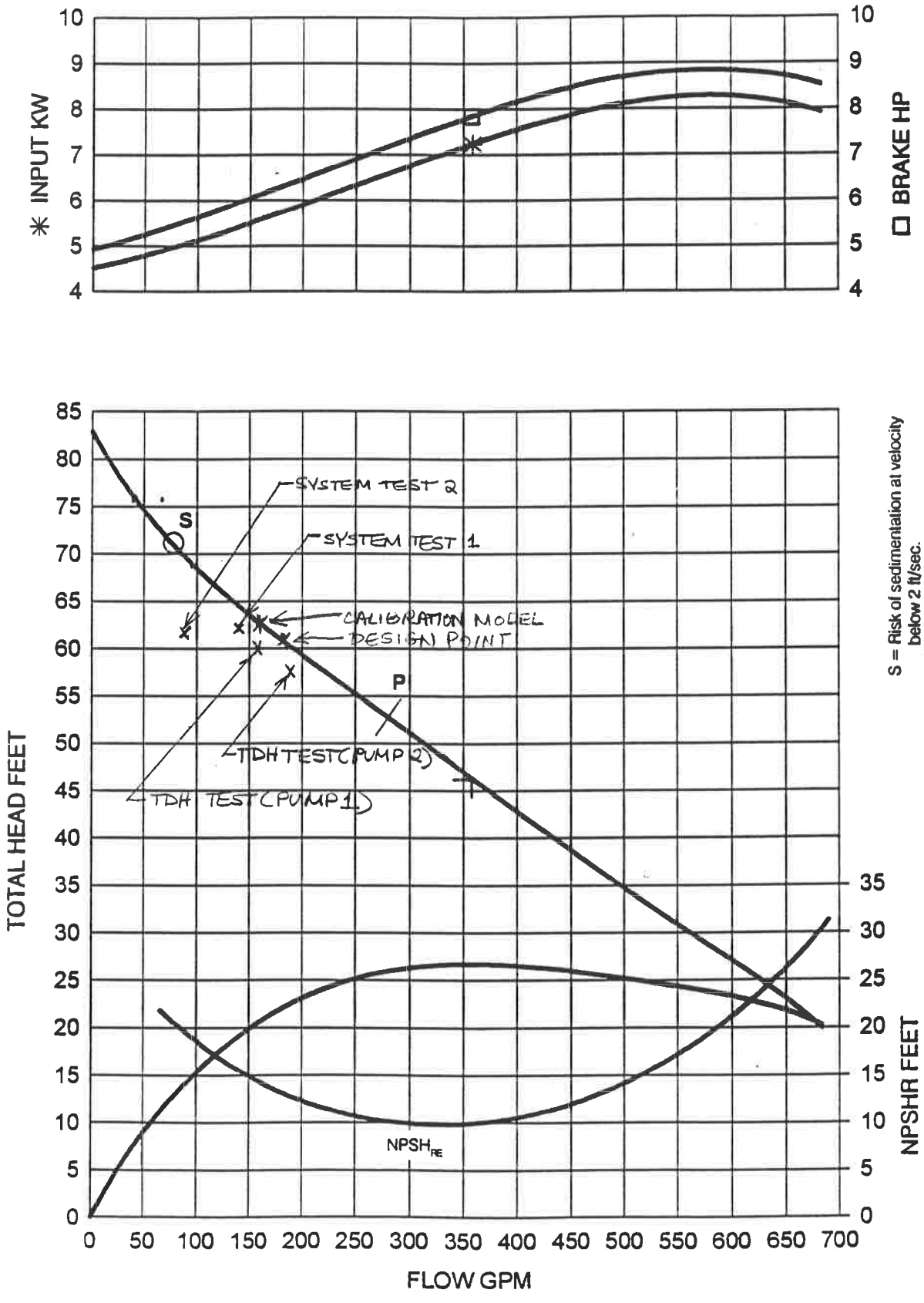
PERFORMANCE CURVES ARE BASED ON TESTS WITH CLEAR WATER AT AMBIENT TEMPERATURE.

FLYGT CORPORATION
A SUBSIDIARY OF ITT
129 GLOVER AVE., NORWALK, CT. 06856

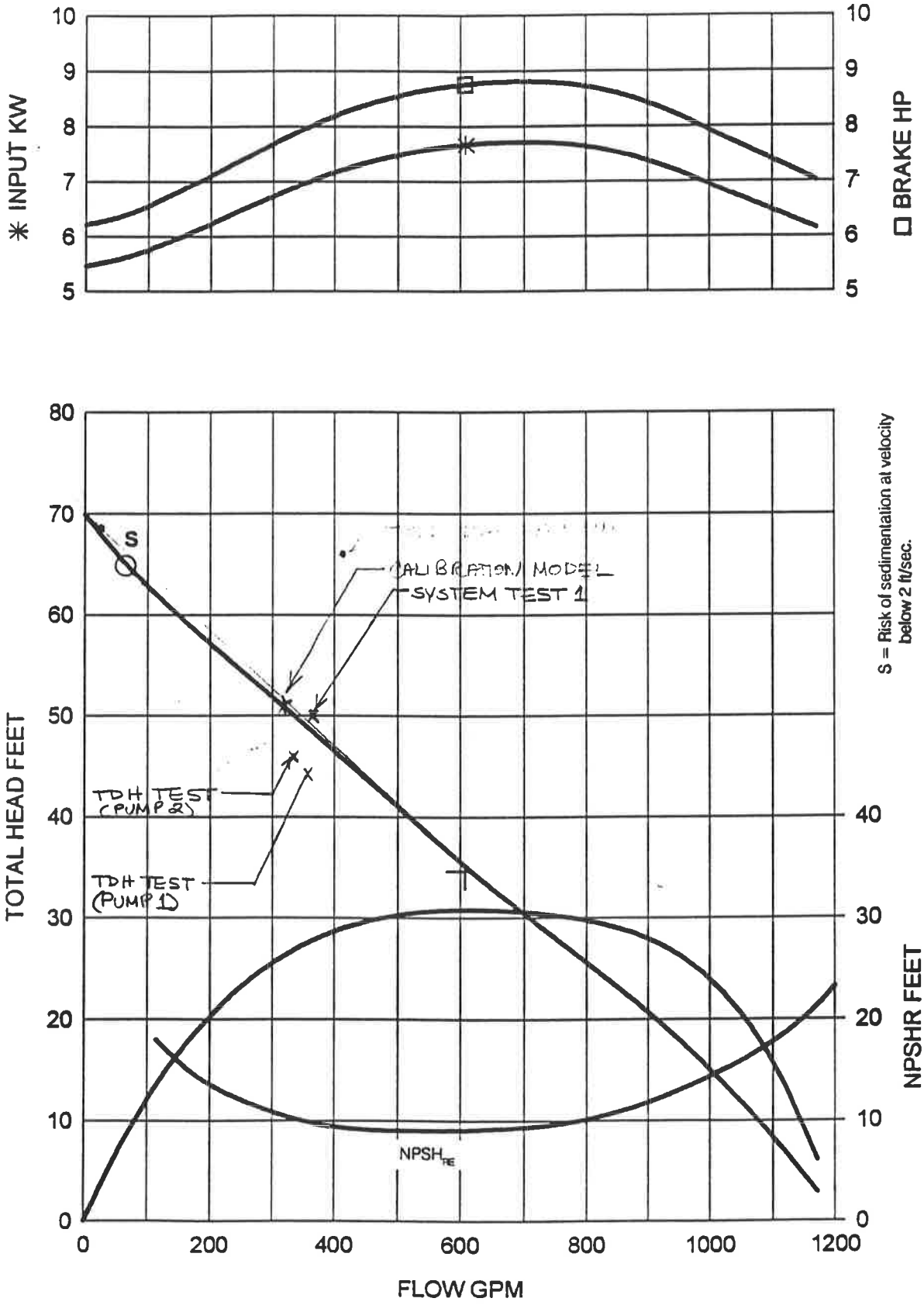
CONFIG.		C-3152	SECTION	PAGE
CP/CT/CS		**454 Impeller** (6" volute)	3	15
PHASE	VANES	EXISTING P.S. 015 (FF FIXED GRADE NODE)	SUPERSEDES	ISSUED
3	1		2/88	6/94



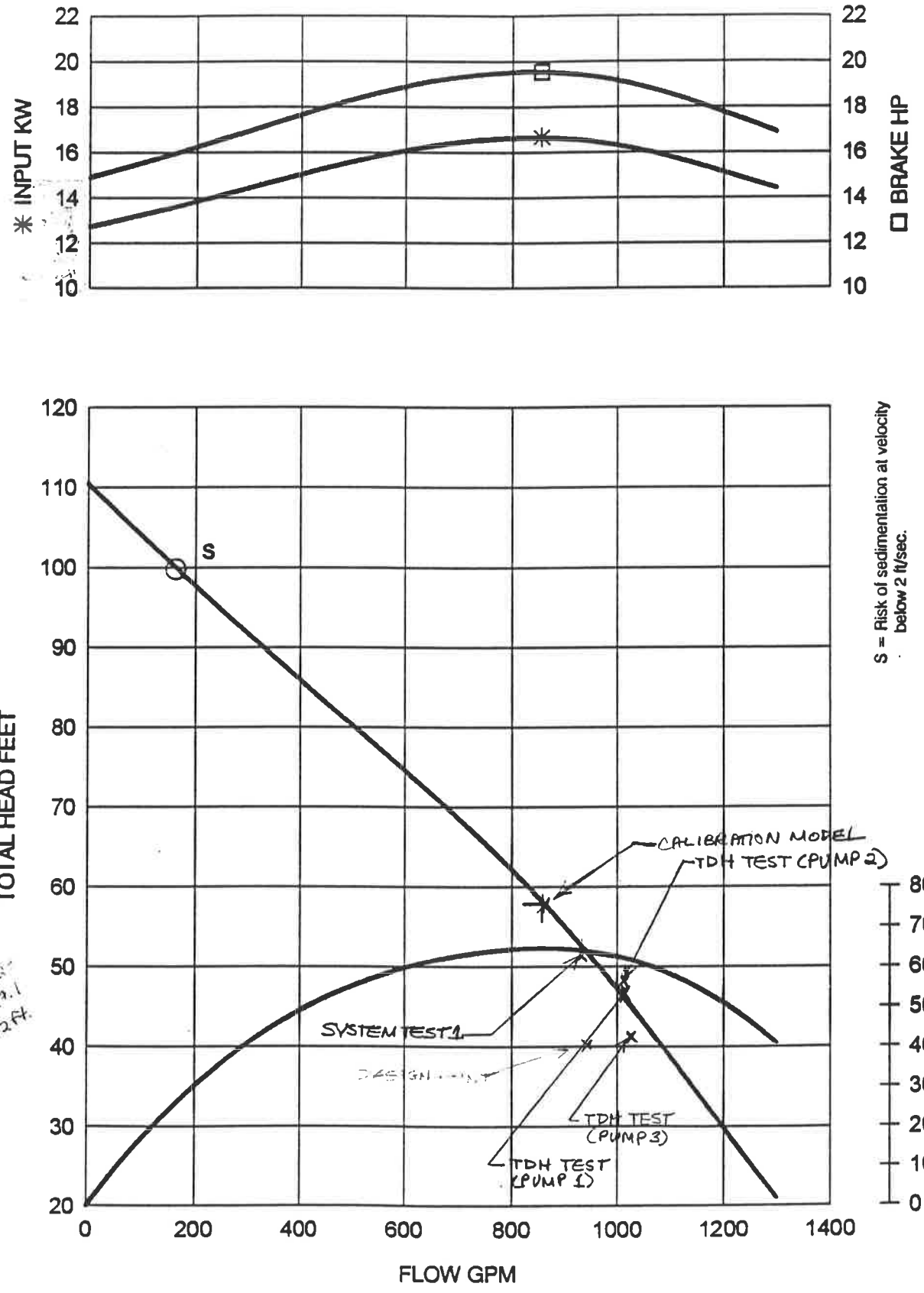
CONFIG.		C-3127	SECTION	PAGE
CP/CS		484 Impeller	3	29
PHASE	VANES	EXISTING PS 103 (HH FIXED GRADE NODE)	SUPERSEDES	ISSUED
1	1		2/88	6/94



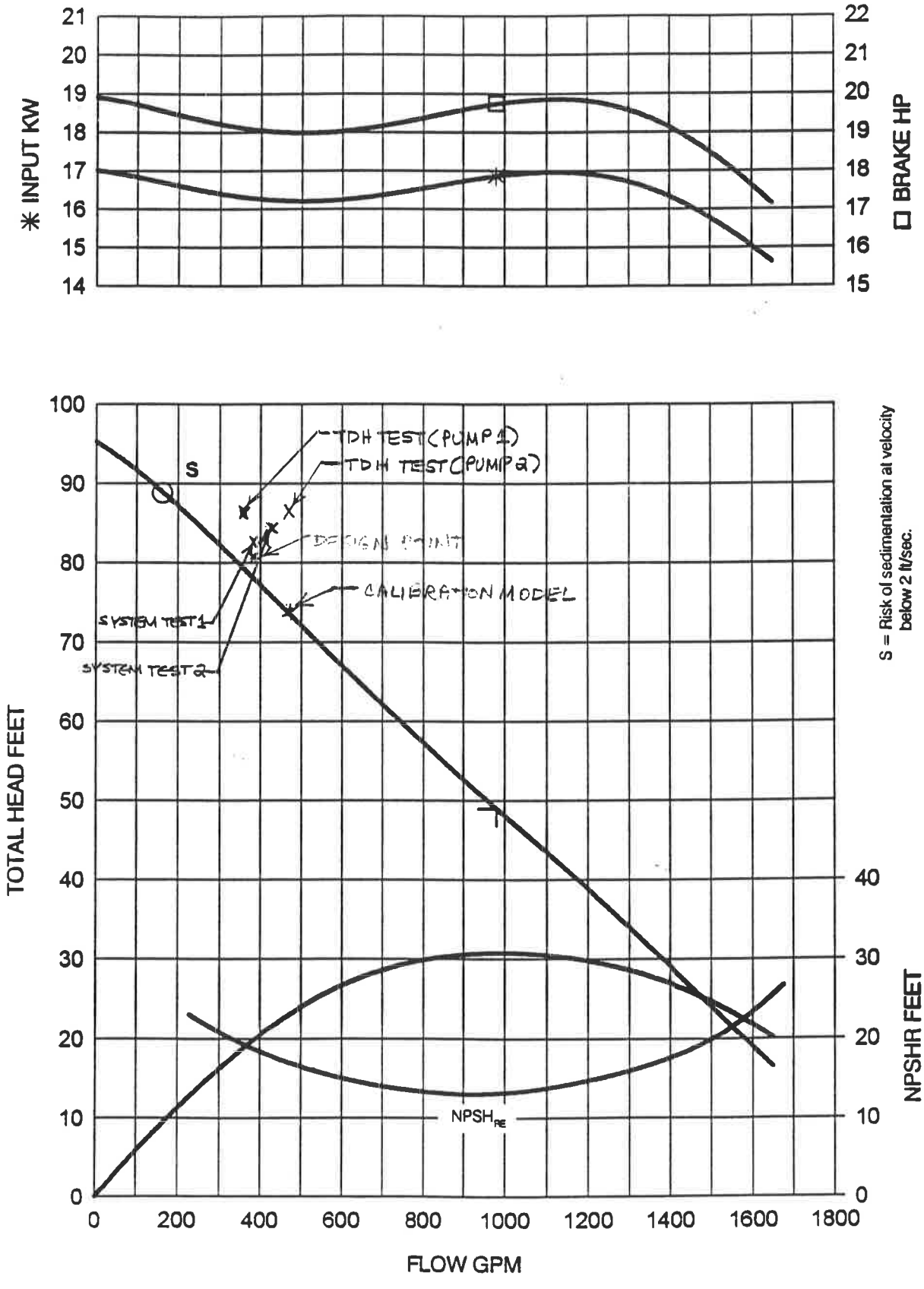
CONFIG.		C-3127	SECTION	PAGE
CP/CS		**432 Impeller** (4" volute)	3	9
PHASE	VANES	EXISTING P.S. 105 (JJ FIXED GRADE NODE)	SUPERSEDES	ISSUED
3	1		2/88	6/94



CONFIG.		C-3152	SECTION	PAGE
CP/CT/CS		**454 Impeller** (6" volute)	3	15
PHASE	VANES	EXISTING P.S. 106 (IT FIXED GRADE NODE)	SUPERSEDES	ISSUED
3	1		2/88	6/94

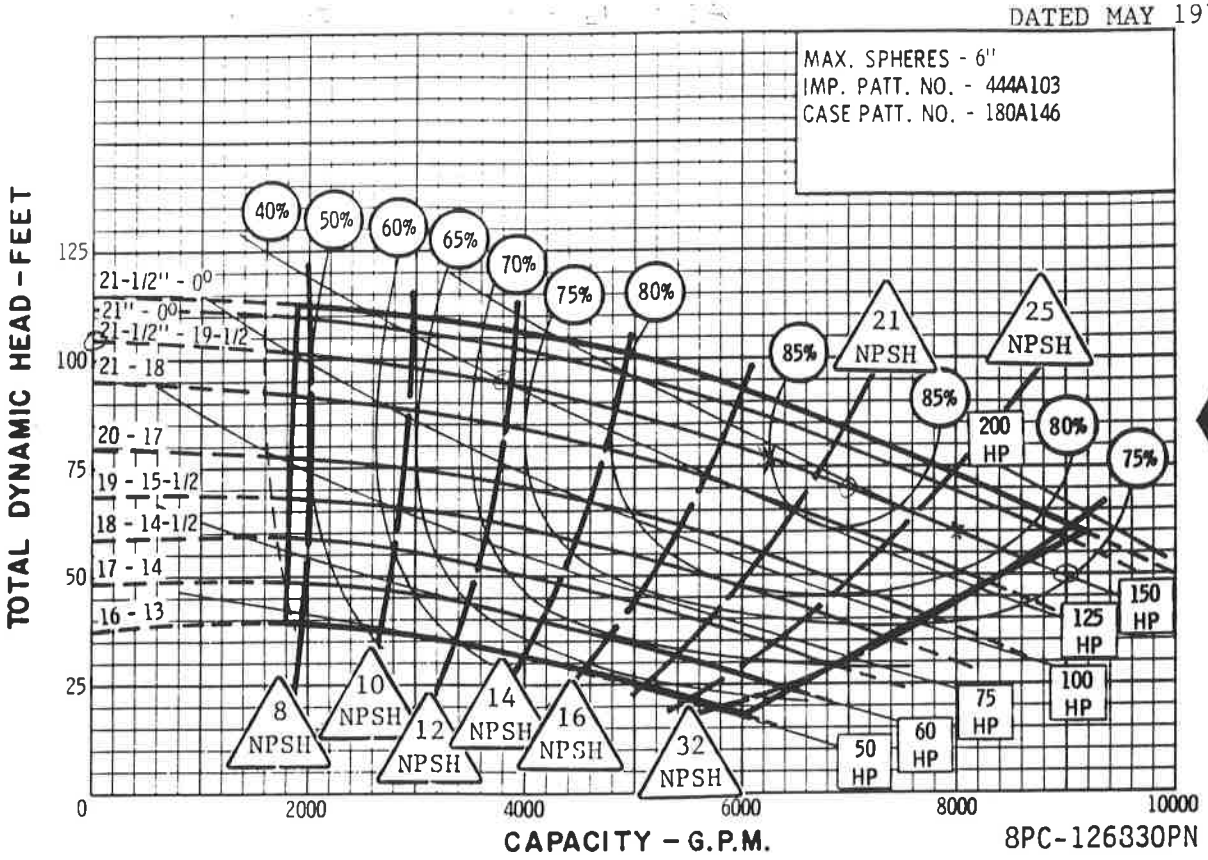


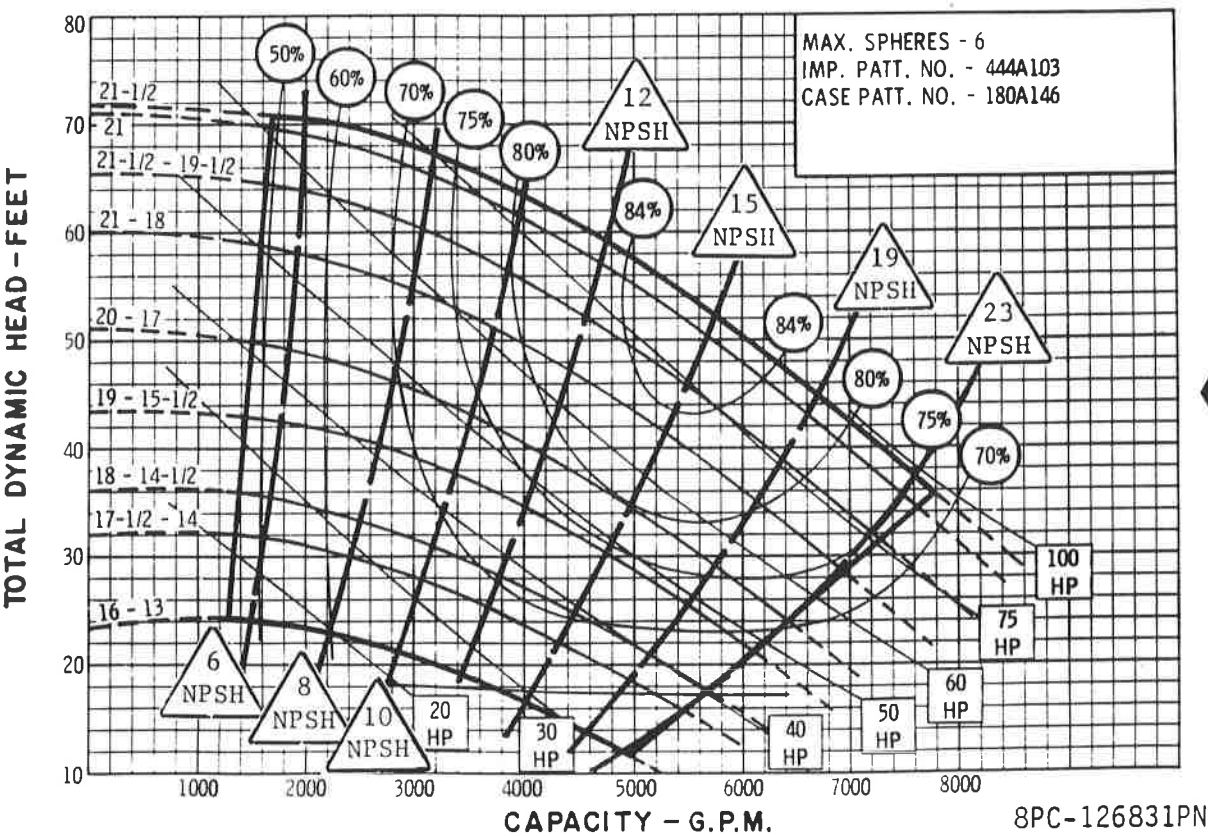
CONFIG.		C-3152	SECTION	PAGE
CP/CT/CS		432 Impeller	3	9
PHASE	VANES	EXISTING P.S. 109 (GG FIXED GRADE MODEL)	SUPERSEDES	ISSUED
3	1		2/88	6/94



12X14X22 A SPHER-FLO

ENCLOSED IMPELLER

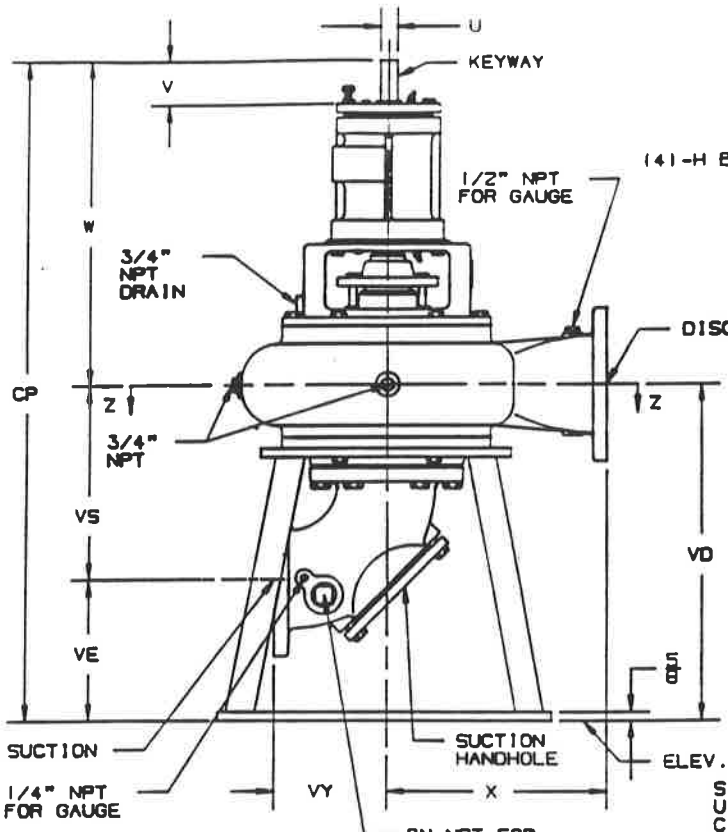


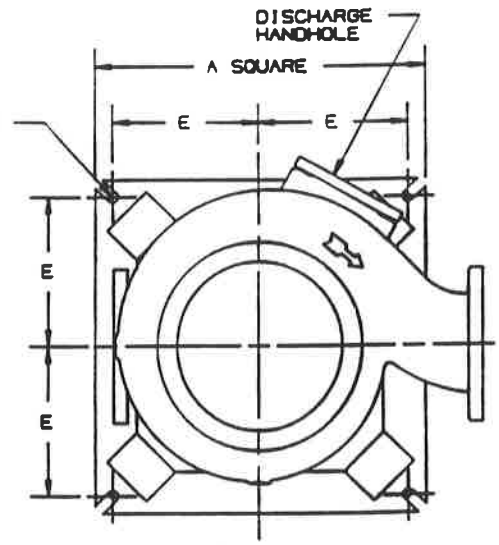


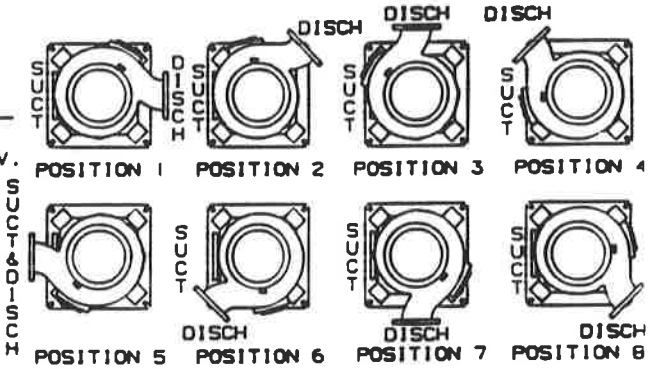
AURORA PUMP
A UNIT OF GENERAL SIGNAL
800 AIRPORT ROAD · NORTH AURORA ILLINOIS · 60542

CURVES

AURORA MODEL 612A PUMP
6", 8", 10", 12" & 14" PUMPS







DISCHARGE POSITIONS AVAILABLE (VIEW Z-Z)

NOTES:
1. ALL DIMENSIONS IN INCHES.
2. DIMENSIONS MAY VARY ± 1/2".
3. NOT FOR CONSTRUCTION PURPOSES UNLESS CERTIFIED.
4. TWO (2) 1/2" NPT CONNECTIONS 180° APART, ON THE STUFFING BOX FOR LUBRICATION PURPOSES ARE FURNISHED AS STANDARD. ON PACKED PUMPS AN ALEMITE FITTING IS PROVIDED IN ONE TAP AND THE REMAINING TAP IS PLUGGED.
5. DISCHARGE POSITION 1 IS FURNISHED AS STANDARD UNLESS SPECIFIED.
6. SUCTION AND DISCHARGE FLANGES ARE AMERICAN STANDARD 125 LBS.

POWER FRAME	U	V	KEYWAY		
			LENGTH	WIDTH	DEPTH
4C, 4D	1 1/4	3 3/16	2	1/4	1/8
5E, 5F 5G, 5H	2 3/8	6 3/8	4	5/8	5/16
6D	2 7/8	6 5/8	5	3/4	3/8
6E	2 7/8	5 3/4	4	3/4	3/8

DISCH SUCT CASE BORE	POWER FRAME	A	BN	E	H	VY	W	X	CP	VD	VE	VS	HANDHOLE	
													DISCH.	SUCT
6x6x12	4C, 4D	24	1 1/2	10 3/4	5/8	8	23 5/16	14	47 9/16	24 1/4	10 1/8	14 1/8	5x5	6
6x6x12	5E, 5F	24	1 1/2	10 3/4	5/8	8	34 3/16	14	58 7/16	24 1/4	10 1/8	14 1/8	5x5	6
6x6x12B	4C, 4D	24	1 1/2	10 3/4	5/8	8	23 7/16	16	47 9/16	24 1/8	10 1/8	14	5x5	6
6x6x12B	5E, 5F	24	1 1/2	10 3/4	5/8	8	34 5/16	16	58 7/16	24 1/8	10 1/8	14	5x5	6
6x8x15	5E, 5F	30	1 1/2	13 3/4	3/4	9	33 3/4	16	65 7/8	32 1/8	17	15 1/8	5x5	6
6x8x18	5E, 5F	30	1 1/2	13 3/4	3/4	9	34 1/16	18	66 7/16	32 3/8	17	15 3/8	5x5	6
8x8x15A	5E	30	1 1/2	13 3/4	3/4	9	34 1/8	19	66 1/2	32 3/8	14 1/4	18 1/8	5x7	6
8x10x18	5G, 5H	30	1 1/2	13 3/4	3/4	11	34 5/8	19	67 5/8	33	15 3/16	17 13/16	5x7	6
8x10x22	5G, 5H	37	1 1/2	17	7/8	11	34 5/8	22	69 1/8	34 1/2	16 5/8	17 7/8	5x7	6
10x10x15	5E, 5F	30	1 1/2	13 3/4	3/4	11	34 13/16	20	67 3/4	32 15/16	11 7/8	21 1/16	5x7	6
10x10x22	6E	37	1 1/2	17	7/8	11	37 1/8	22 1/2	71 5/8	34 1/2	16 5/8	17 7/8	5x7	6
10x12x22	5G, 5H	37	1 1/2	17	7/8	12	35 1/16	22 1/2	70 3/16	35 1/8	15 9/16	19 9/16	5x7	8
10x12x22	6D	37	1 1/2	17	7/8	12	37 9/16	22 1/2	72 11/16	35 1/8	15 9/16	19 9/16	5x7	8
12x12x22	6E	37	1 1/2	17	7/8	12	37 5/8	22 1/2	72 3/4	35 1/8	15 9/16	19 9/16	5x7	8
12x14x22A	5G, 5H	37	2 1/2	17	7/8	14	35 1/8	24	70 1/4	35 1/8	13 7/8	21 1/4	5x7	8
12x14x22A	6D	37	2 1/2	17	7/8	14	37 5/8	24	72 3/4	35 1/8	13 7/8	21 1/4	5x7	8
12x14x22B	5G, 5H	37	2 1/2	17	7/8	14	35 1/8	24	70 1/4	35 1/8	13 7/8	21 1/4	5x7	8
12x14x22B	6D	37	2 1/2	17	7/8	14	37 5/8	24	72 3/4	35 1/8	13 7/8	21 1/4	5x7	8
14x14x22A	6E	37	2 1/2	17	7/8	14	37 5/8	24	72 3/4	35 1/8	13 7/8	21 1/4	5x7	8

AURORA PUMP
A UNIT OF GENERAL SIGNAL
800 AIRPORT ROAD • NORTH AURORA, ILLINOIS 60542

AUG-31-1998 10:11 FROM SANDERS CO INC

SANDERS
COMPANY, INC.
2816 SOUTHEAST MONROE STREET • STUART, FLORIDA 34997
(561) 220-2900 (800) 247-0880 FAX (561) 220-3088

FACSIMILE

TO: Katrina Bendis
FROM: Bob Whitley
DATE: 8/31/98
SUBJECT: Pinellas Co.
Boca Ciega L.S.

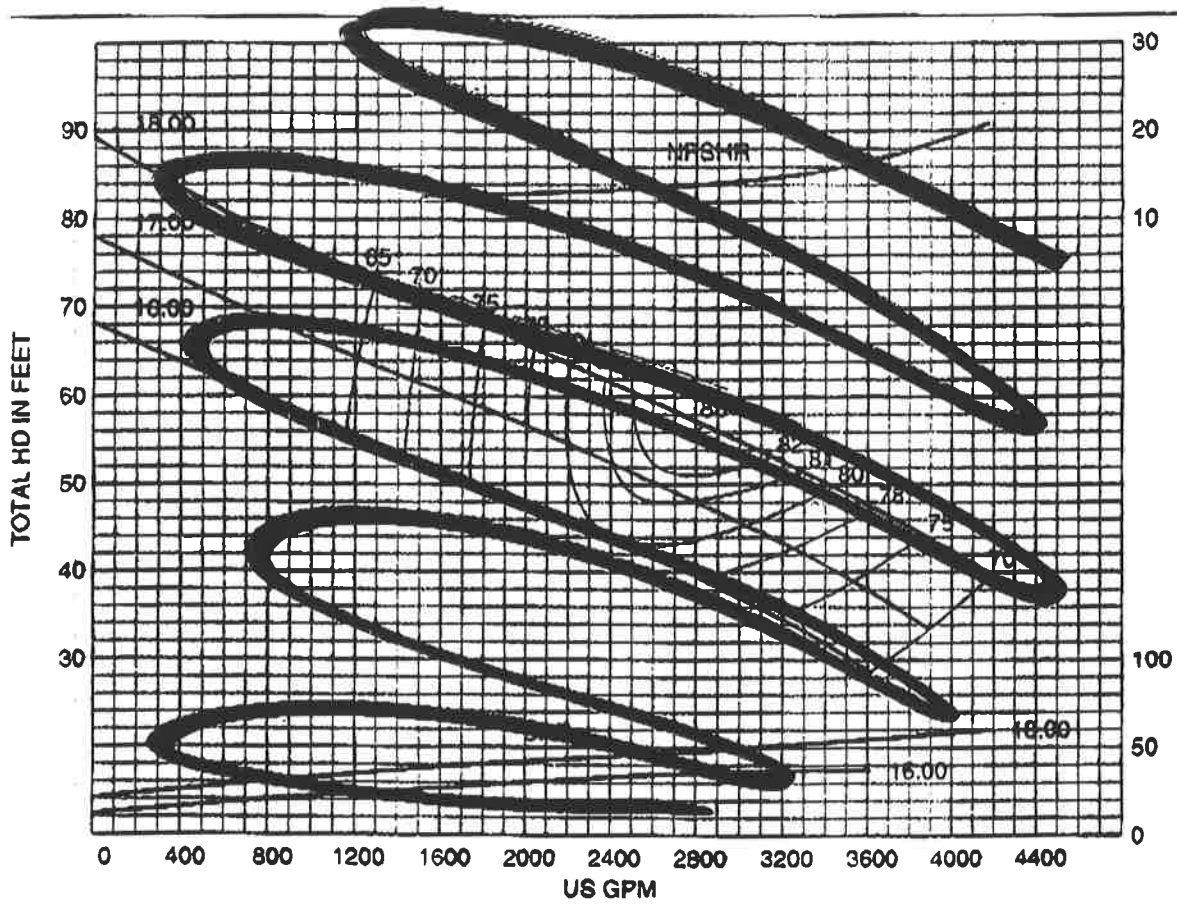
NUMBER OF PAGES TO FOLLOW 3

IF TRANSMISSION IS INCOMPLETE, PLEASE ADVISE US AT THE OFFICE INDICATED BELOW

Following is book curve for FM 5445, 8" 885 RPM marked for 3000 GPM @ 65' TDH. Our BHP curve on this pump is not correct.
Also following are 1-line curves of H.O/O stamped with correct HP curves.
Note that 5445 is same as 5415 hydraulically, but with a different mounting configuration.
Please call, if questions.
Regards

REPLY TO:

☐	☑	☐	☐	☐	☐
HUGH DUNCAN ORANGE PARK (904) 264-6392 FAX: (904) 269-6796	BOB WHITLEY, P.E. LAND O'LAKES (813) 929-0088 FAX: (813) 929-0105	DAVE MARTINEZ, P.E. PEMBROKE PINES (954) 704-9860 FAX: (954) 435-6627	RON ROBINETTE ORLANDO (407) 282-6622 FAX: (407) 282-9300	JAMES SMITH FT. LAUDERDALE (954) 739-0883 FAX: (954) 739-0881	STUART OFFICE STUART (561) 220-2 FAX:(561) 220



8"

5415
VERTICAL FOR FLEXIBLE SHAFTING

5425
HORIZONTAL

5435
VERTICAL BILTOGETHER

5435M&W
SUBMERSIBLE

5445
VERTICAL CLOSE COUPLED

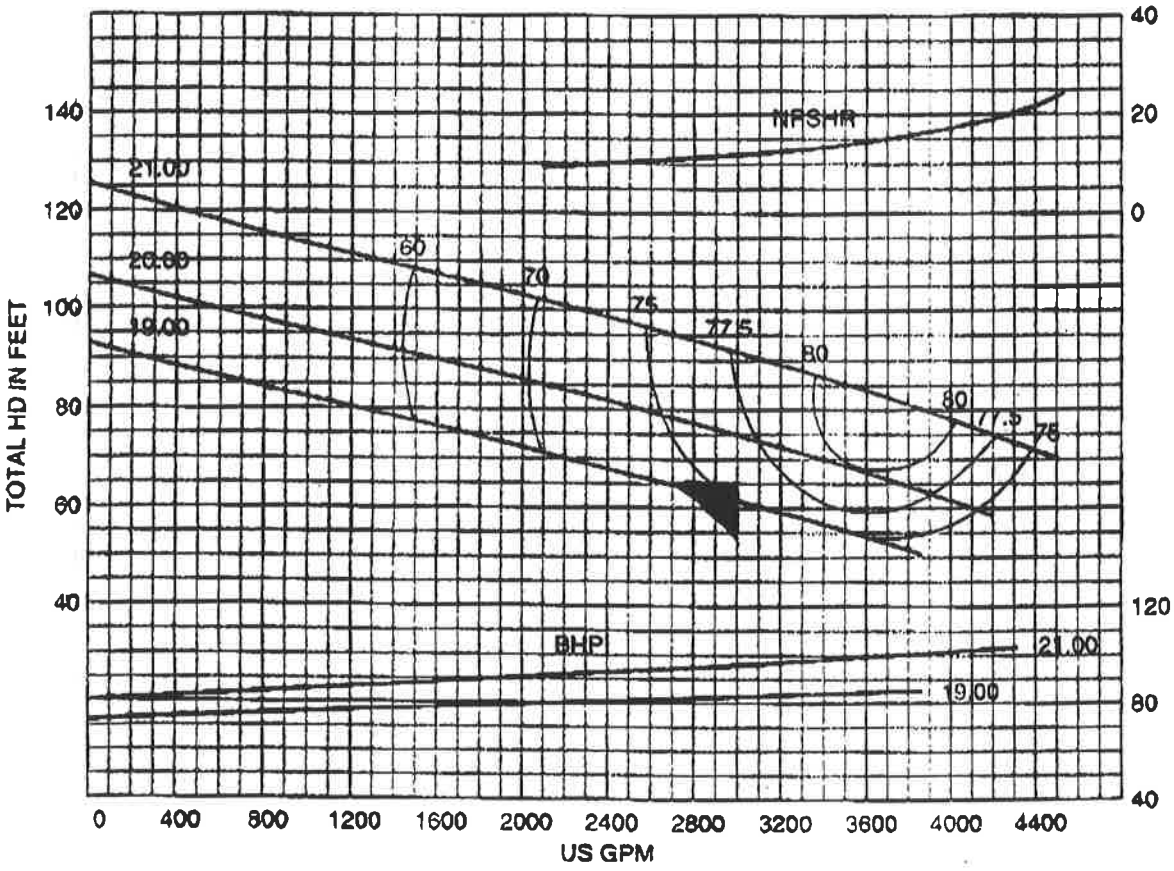
885 RPM
NO.OF VANES 2

SUCTION SIZE
5425:8"
OTHER:8" OR 10"

IMPELLER TAKE5N

INLET AREA
130.29 SQ.IN.

MAX.SPHERE 5"



8"

5415
VERTICAL FOR FLEXIBLE SHAFTING

5425
HORIZONTAL

5435
VERTICAL BILTOGETHER

5435M&W
SUBMERSIBLE

5445
VERTICAL CLOSE COUPLED

885 RPM
NO.OF VANES 2

SUCTION SIZE
5425:8"
OTHER:8" OR 10"

IMPELLER TAKE5U

INLET AREA
108.36 SQ.IN.

MAX.SPHERE 5"

Sanders Co. for Parsons Engineering
Project: Pinellas County
by: Tim Ritz

H2Optimize ver: 3.0
File: (untitled)
Aug 31, 1998

PUMP DATA SHEET

Fairbanks Morse Pump, 60 Hz Catalog: FMCENT60 v. 2.0

CURVE: 150808U

TYPE - SPEED: 5400-NONCLOG - 900

PUMP Size: 8"5415,
Speed: 885 rpm
Imp dia: 19.3125 in

Max Temperature: 150 °F
Max Pressure: 75 psi_g

Max Sphere Size: 5 in

Specific Speed Ns: 1967
Suction Nss: 7063

Suction size: 8 in
Discharge size: 8 in

FLUID Water tmp: 60 °F
SG: 1
vec: 1.122 cP
vapor: 0.2568 psi
atm: 14.7 psi

NPSHa: - ft

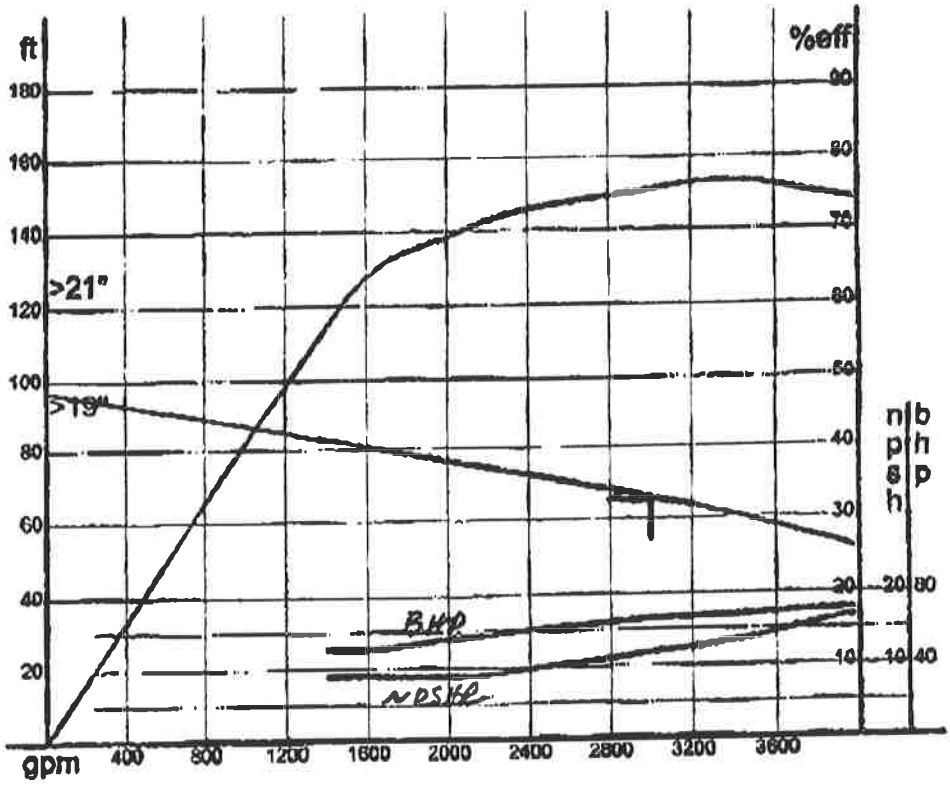
PIPING Pressure: - psi
Suction elev: - ft
size: - in
Discharge size: - in

DESIGN POINT
Flow: 3000 gpm
Head: 65 ft

DATA POINT
Flow: 3000 gpm
Head: 65.5 ft
Eff: 75 %
Power: 66.2 bhp
NPSHr: 11.9 ft

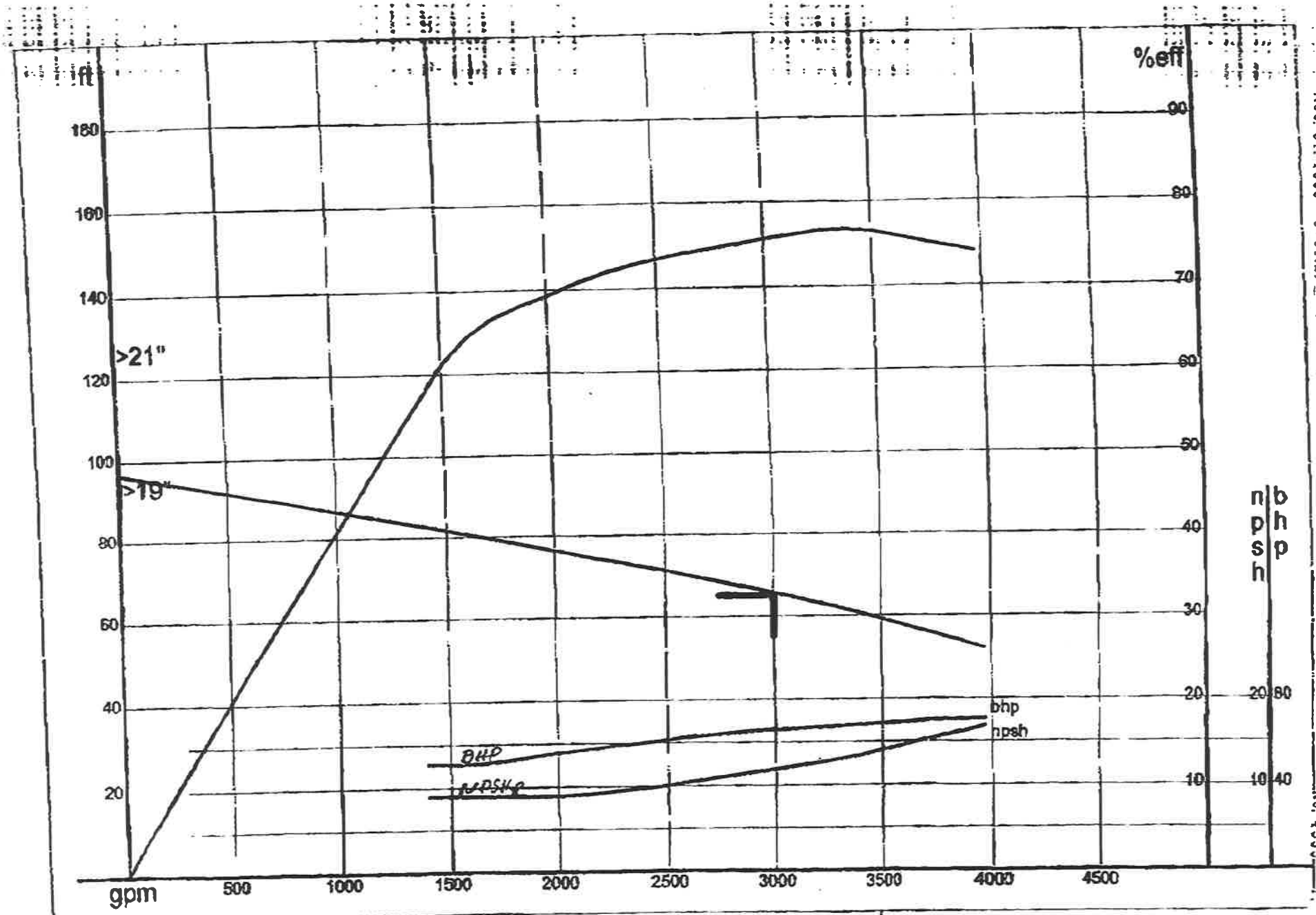
DESIGN CURVE
Shutoff Head: 96.7 ft
Pressure: 41.9 psi_g
Min Flow: 1400 gpm
BEP: 77 %eff @ 3460
Max: 70.6 bhp @ 3971

MAX DIAMETER
Max: 107 bhp @ 4518



PERFORMANCE EVALUATION

Flow gpm	Speed rpm	Head ft	Pump %eff	Power bhp	NPSHr ft	Motor %eff	Power kW	Hrs/yr	Cost
3600	885	57.7	76	69.1	14.6				
3000	885	65.5	75	66.2	11.9				
2400	885	72.2	72	60.7	10.0				
1800	885	78.5	65	54.9	9.0				
1200	Flow Rate is Out of Range for this Pump								



Sanders Co. for Parsons Engineering

Pinellas County

Date: 08/31/98 File:

Fairbanks Morse Pump, 60 Hz

Catalog: FMCENT60 ver 2.0

Curve: 150808U

Type: 5400-NONCLOG

Size: 8"5415,

Speed: 885 Dia: 19.3125

H2O

ATTACHMENT 5

BOCA CIEGA PUMP STATION IMPROVEMENTS 1/30/98

(PUMP STATION NO. 16)

734 - 617114 - 0878

LIFT STATION No. 008

TOP SLAB ELEV. 8.33
SIZE : 12' Dia. (Inside)
WETWELL DEPTH : ELEV. (-)17.7
INFLUENT PIPE (18") : ELEV. (-)7.2
FLOATS (TO TOP OF FLOAT)
1. ELEV. (-)8.8
2. ELEV. (-)9.5
3. ELEV. (-)10.8
4. ELEV. (-)14.3
BENCH MARK : T.B.M. ELEV. 8.50
DISCHARGE IS A 12" D.I. FORCEMAIN

LIFT STATION No. 011

TOP SLAB ELEV. 8.50
SIZE : 8' Dia. (Inside)
WETWELL DEPTH : ELEV. (-)13.0
INFLUENT PIPE (10") : ELEV. (-)6.7
FLOATS (TO TOP OF FLOAT)
1. ELEV. (-)3.8
2. ELEV. (-)5.9
3. ELEV. (-)7.1
4. ELEV. (-)11.9
BENCH MARK : B.M. STARKEY O
(MAP No. 1450) ELEV. 13.248
DISCHARGE IS A 16" D.I. FORCEMAIN

LIFT STATION No. 012

TOP SLAB ELEV. 8.82
SIZE : 8' Dia. (Inside)
WETWELL DEPTH : ELEV. (-)8.5
INFLUENT PIPE (10") : ELEV. (-)1.6
FLOATS (TO TOP OF FLOAT)
1. ELEV. (-)1.8
2. ELEV. (-)2.9
3. ELEV. (-)4.0
4. ELEV. (-)5.8
BENCH MARK : T.B.M. ELEV. 8.44
DISCHARGE IS AN 8" D.I. FORCEMAIN

LIFT STATION No. 013

TOP SLAB ELEV. 7.17
SIZE : 6' Dia. (Inside)
WETWELL DEPTH : ELEV. (-)13.0
INFLUENT PIPE (8") : ELEV. (-)7.3
FLOATS (TO TOP OF FLOAT)
1. ELEV. (-)6.0
2. ELEV. (-)6.9
3. ELEV. (-)8.5
4. ELEV. (-)10.1
BENCH MARK : T.B.M. ELEV. 8.96
DISCHARGE IS A 6" D.I. FORCEMAIN

LIFT STATION No. 015

TOP SLAB ELEV. 8.56
SIZE : 8' Dia. (Inside)
WETWELL DEPTH : ELEV. (-)12.0
INFLUENT PIPE (8") : ELEV. (-)6.2
INFLUENT PIPE (8") : ELEV. (-)7.7
FLOATS (TO TOP OF FLOAT)
1. ELEV. (-)3.1
2. ELEV. (-)4.8
3. ELEV. (-)5.6
4. ELEV. (-)7.9
BENCH MARK : B.M. 406 (MAP No. 1396)
ELEV. 5.504
DISCHARGE IS A 10" D.I. FORCEMAIN

LIFT STATION No. 106

TOP SLAB ELEV. 12.05
SIZE : 12' Dia. (Inside)
WETWELL DEPTH : ELEV. (-)10.8
INFLUENT PIPE (24") : ELEV. (-)7.7
FLOATS (TO TOP OF FLOAT)
1. ELEV. (-)0.1
2. ELEV. (-)1.3
3. ELEV. (-)2.6
4. ELEV. (-)3.4
5. ELEV. (-)6.6
BENCH MARK : B.M. 408 (MAP No. 1400)
ELEV. 13.118
DISCHARGE IS A 16" D.I. FORCEMAIN

BOCA CIEGA PUMP STATION IMPROVEMENTS

1/30/98

(PUMP STATION NO. 16)

734 - 617114 - 0878

LIFT STATION No. 103

TOP SLAB ELEV. 10.98
SIZE : 6' Dia. (Inside)
WETWELL DEPTH : ELEV. (-)7.4
INFLUENT PIPE (8") : ELEV. (-)3.5
FLOATS (TO TOP OF FLOAT)
1. ELEV. (-)2.7
2. ELEV. (-)3.4
3. ELEV. (-)4.2
4. ELEV. (-)5.4
BENCH MARK : B.M. 453 (FDOT)
MAP No. 1709)
ELEV. 14.206
DISCHARGE IS A 4" D.I. FORCEMAIN

LIFT STATION No. 105

TOP SLAB ELEV. 8.34
SIZE : 6' Dia. (Inside)
WETWELL DEPTH : ELEV. (-)8.7
INFLUENT PIPE (8") : ELEV. (-)3.2
INFLUENT PIPE (8") : ELEV. (-)3.6
FLOATS (TO TOP OF FLOAT)
1. ELEV. (-)0.6
2. ELEV. (-)4.1
3. ELEV. (-)5.0
4. ELEV. (-)7.2
BENCH MARK : B.M. STARKEY F
(MAP No. 1401)
ELEV. 9.746
DISCHARGE IS A 6" D.I. FORCEMAIN

LIFT STATION No. 016 (BOGIE 1)

TOP OF SLAB ELEV. 8.52
(ALSO FLOOR OF BUILDING)
SIZE : 31.5' x 9.5' (Approximate)
WETWELL DEPTH : ELEV. (-)16.3
(Approximate)
DISCHARGE IS A 36" D.I. FORCEMAIN

LIFT STATION No. 109

TOP SLAB ELEV. 7.07
SIZE : 8' Dia. (Inside)
WETWELL DEPTH : ELEV. (-)11.0
INFLUENT PIPE (10") : ELEV. (-)5.8
FLOATS (TO TOP OF FLOAT)
1. ELEV. (-)1.5
2. ELEV. (-)3.3
3. ELEV. (-)5.5
4. ELEV. (-)7.1
BENCH MARK : B.M. 453 (FDOT)
(MAP No.1709)
ELEV. 14.206
DISCHARGE IS AN 8" D.I. FORCEMAIN

BOCA CIEGA PUMP STATION IMPROVEMENTS

3/12/98

(PUMP STATION NO. 16)

734 - 617114 - 0878

LIFT STATION No. 164

TOP SLAB ELEV. 7.06
SIZE : 12' Dia. (Inside)
WETWELL DEPTH : ELEV. (-)18.1
INFLUENT PIPE (18") : ELEV. (-)8.1
FLOATS (TO TOP OF FLOAT)
1. ELEV. (-)6.6
2. ELEV. (-)9.4
3. ELEV. (-)10.5
4. ELEV. (-)12.2
BENCH MARK :B.M. 209 (SDR) (MAP No. 704)
ELEV. 20.035
DISCHARGE IS A 12" D.I. FORCEMAIN

LIFT STATION No. 163

TOP SLAB ELEV. 7.95
SIZE : 25'x7'
WETWELL DEPTH : ELEV. (-)10.9
INFLUENT PIPE (24") : ELEV.
FLOATS (TO TOP OF FLOAT)
1. ELEV. (-)3.6
2. ELEV. (-)5.1

BENCH MARK :B.M. 209 (SDR) (MAP No. 704)
ELEV. 20.035
DISCHARGE IS A 20" D.I. FORCEMAIN

LIFT STATION No. 161

TOP SLAB ELEV. 16.85
SIZE : 8' Dia. (Inside)
WETWELL DEPTH : ELEV. 3.1
INFLUENT PIPE (8") : ELEV. 8.9
INFLUENT PIPE (8") : ELEV. 9.4
FLOATS (TO TOP OF FLOAT)
1. ELEV. 4.5
2. ELEV. 6.6
3. ELEV. 8.2
4. ELEV. 9.3
BENCH MARK : PINELLAS COUNTY
SURVEY DEPT.
YB2970, PG. 9
DISCHARGE IS A 4" D.I. FORCEMAIN

LIFT STATION No. 102

TOP SLAB ELEV. 6.69
SIZE : 10' Dia. (Inside)
WETWELL DEPTH : ELEV. (-)17.7
INFLUENT PIPE (12") : ELEV. (-)10.0
FLOATS (TO TOP OF FLOAT)
1. ELEV. (-)8.3
2. ELEV. (-)10.8
3. ELEV. (-)12.3
4. ELEV. (-)14.1
BENCH MARK : PINELLAS COUNTY
SURVEY DEPT.
YB2970, PG. 13
DISCHARGE IS A 6" D.I. FORCEMAIN

]

BOCA CIEGA PUMP STATION IMPROVEMENTS	3/20/98
(PUMP STATION No. 16)	
734 - 617114 - 0878	
LIFT STATION No. 111	**LIFT STATION No. 126**
TOP SLAB ELEV. 9.71	TOP OF SLAB ELEV. 11.25
SIZE : 7' Dia. (Inside)	SIZE : 8' Dia. (Inside)
WETWELL DEPTH : ELEV. (-)17.5	WETWELL DEPTH : ELEV. (-)7.0
INFLUENT PIPE (10") : ELEV. (-)6.6	INFLUENT PIPE (8") : ELEV. (-)0.7
FLOATS (TO TOP OF FLOAT)	FLOATS (TO TOP OF FLOAT)
1. ELEV. (-)3.9	1. ELEV. 1.4
2. ELEV. (-)4.2	2. ELEV. (-)1.0
3. ELEV. (-)7.6	3. ELEV. (-)2.0
4. ELEV. (-)12.3	4. ELEV. (-)4.1
BENCH MARK : PINELLAS COUNTY SURVEY	BENCH MARK : T.B.M. ELEV. 12.447
DEPT. YB2970, PG. 11	DISDHARGE IS A 6"D.I. FORCEMAIN
DISCHARGE IS A 10" D.I. FORCEMAIN	(TO BE VERIFIED BY PAUL KNAPP)
LIFT STATION No. 110	
TOP SLAB ELEV. 7.76	
SIZE : 8' Dia. (Inside)	
WETWELL DEPTH : ELEV. (-)11.4	
INFLUENT PIPE (8") : ELEV. (-)6.4	
FLOATS (TO TOP OF FLOAT)	
1. ELEV. (-)4.0	
2. ELEV. (-)5.5	
3. ELEV. (-)7.7	
4. ELEV. (-)8.4	
BENCH MARK : PINELLAS COUNTY SURVEY	
DEPT. YB2970, PG. 13	
DISCHARGE IS A 4" D.I. FORCEMAIN	

ATTACHMENT 6

PUMP STATION INFORMATION SOUTH

AREA # 1

STA#	ADDRESS	QTY	TYPE	MODEL/IMP	HP	VOLTS	AMPS	PH	PUMPTO	MAP	GPM	TDH	DOWN	NAME	FL.PWR ACCT #	METER #	GENERATOR
# 001	8101 Starkey Road	2	Flygt	3152/464	20	230	64	3	#106	N17G	300	90	2	FlamVine	02-1412-06001	4626442	100kw
# 002	7700 Cumberland Rd. N.	2	Flygt	3101/436	5	230	13	3	#106	N18G	240	42	3	BardClub	02-1448-31151	6626931	60kw
# 003	8697 Bardmoor Place	2	Flygt	3101/461	9.4	230	26	3	#106	S19G	410	63	3	BardBack	02-1566-40361	2626790	60kw
# 004	11299 Starkey Road	2	Flygt	3127/432	10	230	26	3	#008	N19G	? 660	? 16	2	MissionP	02-1582-30261	6623782	60kw
# 005	8200 Somerset Drive N.	2	Flygt	3102/436	5	230	13	3	#008	S20G	260	26	3	Somerset	02-1610-02701	2627698	60kw
# 006	2391 10th Street S.E.	2	Flygt	3127/432	10	230	26	3	#021	S21F	410	37	1.5	Unclaim	04-1820-86421	2629062	60kw
# 007	9811 126th Avenue N.	2	Flygt	3101/436	5	230	13	3	#008	N20F	320	31	2.5	BlueWatr	04-1941-08001	2621702	60kw
# 008	9280 Fairweather Drive N.	2	Smith-love	14132	40	230	98	3	#016FM	N19F	976	42	1.5	FairWeth	02-1644-04401	2624298	125kw
# 009	11388 Tradewinds Blvd.	2	Flygt	3086/434	5	230	9	3	#010FM	N19F	110	30	3	LakeSide	02-1674-41151	4620149	60kw
# 010	9743 106th Avenue N.	2	Flygt	3101/436	5	230	13	3	#008	S19F	260	30	1.5	LakePark	02-1674-41201	2629396	60kw
# 011	9220 102nd Avenue N.	2	Flygt	3152/464	20	230	64	3	#008FM	N18F	376	87	2.5	Canal	02-1662-18851	6627846	100kw
# 012	9398 90th Avenue N.	2	Fairbanks	54128	20	230	54	3	#008FM	S18F	460	76	2	FencBldg	02-1326-01151	4626396	100kw
# 013	9701 86th Avenue N.	2	Flygt	3126/460	10	230	24	3	#008FM	N17F	260	66	2	TimberWd	02-1328-48201	6626692	60kw
# 014	8390 Jennifer lane	2	Flygt	3086/434	3	230	9	3	#016	N17F	?	?	3	Jennifer	02-1324-00051	2629679	60kw
# 015	9301 78th Avenue N.	2	Flygt	3152/464	20	230	64	3	#016FM	S17F	900	50	1.5	LakePerl	02-1316-02151	4626461	100kw
# 016	10401 74th Avenue N.	2	Aurora	612SF	150	460	197	3	FM-SCP	S17E	6250	76	.5	Bogie #1	02-1362-00101	2960443	STA 385kw
# "	"	2	Fairbanks	B6446/19"	75	460	90	3	"	"	3000	65	.5	"	"	"	"
# 017	10513 94th Avenue N.	2	Flygt	3086/434	3	230	9	3	#016	S18E	50	14	8	PreHospt	02-1368-00051	6626036	60kw
# 018	9676 Seminole Blvd.	2	ABS	AF30/CB32	4	230	12	3	#016	N18E	100	20	3	SemHospt	02-1366-14851	6622148	60kw
# 019	10620 101st Avenue N.	2	Flygt	3082/436	2.6	230	9	3	#016	N18E	76	24	4	Mash	02-1368-00101	6620081	60kw
# 020	10114 106th Terrace N.	2	Smith-love	/4B3	7.6	220	22	3	#016	S19E	500	38	2	LakeTube	04-0120-14621	6626942	60kw
# 021	10137 118th Avenue N.	2	Flygt	3152/432	20	230	64	3	#016	N19E	870	50	1.5	PiglyWgy	04-0137-11001	2626260	100kw
# 022	12198 Walsingham Rd.	2	Flygt	3300/646	60	460	73	3	#069FM	S20D	1500	59	1	Walsingh	04-0934-79001	2921389	125kw
# 023	13301 110 Avenue N.	2	Flygt	3085/	3	230		3	#066	N19C	?	?	6	110kVonn	04-0960-18601	2628370	80kw
# 024	12950 126th Avenue N.	2	Flygt	3086/434	2.6	230	7	3	#052	S20C	110	30	2	Glenwood	04-0322-21201	4622690	60kw
# 025	12295 125th Street N.	2	Flygt	3127/462	7.5	230	20	3	#022FM	S20C	308	57	4	EMS COOP	04-0372-92361	2626061	60kw
# 026	10025 Ulmerton Road	2	Flygt	3127/432	10	230	20	3	#006FM	S21F	319	40	2	Fleet	04-1820-86391	6628660	60kw

FLORIDA POWER PHONE NUMBERS 896-8711 / 443-2641

Updated: 01/20/94

PUMP STATION INFORMATION SOUTH
AREA # 3

STA#	ADDRESS	QTY	TYPE	MODEL/IMP	HP	VOLTS	AMPS	PH	PUMPTO	MAP	GPH	TDH	DOWN	NAME	FL.PWR ACCT. #	METER #	GENERATOR
# 101	6800 Westchester Blvd.	2	Flygt	3101/432	5	230	13	3	#126	S16H	120	35	2	Westchst	02-0722-00101	6626710	60kw
# 102	6401 Park Street N.	2	Flygt	3152/454	20	230	50	3	#163FM	S16G	660	90	2	EaglesPk	02-0764-20451	4627807	100kw
# 103	7255 84th Lane N.	2	Flygt	3127/484	10	230	26	3	#016FM	S17G	180	84	8	Prk-Prk	02-0762-00651	4620373	60kw
# 104	8100 Park Blvd. N.	2	Flygt	3086/434	3	230	9	3	#105	S17G	170	27	8	Toyota	02-0730-03661	6627270	60kw
# 105	7200 79th Street N.	2	Fairbanks	5432/8.4"	15	220	40	3	#016FM	S17G	420	65	2	Gold-Ltn	02-0714-24901	6629097	60kw
# 106	7895 83rd Street N.	3	Flygt	3152/454	20	230	50	3	#016FM	N17G	965	40	1	CrossSta	02-1408 00061	6661509	STA 125kw
"	"	1	Demins	SP-426892	30	230	76	3	"	"	1200	40	1	"	"	"	"
# 107	6820 Greenbriar Drive N.	2	Flygt	3101/433	3.8	230	13	1	#108	N16F	110	34	2	BehindHa	02-0760-38401	1077024	60kw
# 108	8935 Pinehurst Drive N.	2	Flygt	3101/436	5	230	13	3	#109	N16F	230	43	2	HalfwayH	02-0760-38361	4622326	60kw
# 109	6301 Burning Tree Drive N	2	Flygt	3152/432	20	208	58	3	#016FM	N16G	375	81	1.5	BurnTree	02-0756-40961	6627619	100kw
# 110	4090 85th Street N.	2	Fairbanks	5433B/9.6	15	220	39	3	SCTP	S15G	150	87	2.5	JungleTr	02-0852-03401	4627496	60kw
# 111	10010 Bay Pines Blvd.	2	Smith-Love	6C3/9"	25	220	66	3	#163FM	N15F	1100	48	2	BayPines	02-0802-01601	4627853	125kw
# 112	6930 Orkney Avenue N.	2	Fairbanks	5432/8.35	3	230	17	1	SCTP	S16H	150	25	1.5	BonniBay	02-0662-00051	6077110	60kw
# 113	6083 60th Street N.	2	Flygt	3086/436	2	230	9	3	SCTP	S16I	166	20	6	60Av60St	03-0227-60601	4629392	60kw
# 114	5961 49th Avenue N.	2	Gor-Rupp	T4A3-B	15	230	38	3	SCTP	N15I	368	63	2	Ken-City	03-0615-38951	4627973	60kw
# 115	6165 58th Street	2	Flygt	3086/434	3	230	9	3	SCTP	S16J	269	21	3	TownHous	03-1818-07801	2620229	60kw
# 116	6001 49th Street N.	2	Flygt	3086/ ?	3	220	9	3	SCTP	S16J	?	?	1	49St W/W	03-1945-00051	6628386	60kw
# 117	5997 44th Street N.	2	Fairbanks	5432A/	10	220	26	3	SCTP	S16K	275	50	2	BoatYard	03-0249-10651	6626781	60kw
# 118	3100 72nd Avenue N.	2	Flygt	3300/467	88	480	108	3	#120FM	S17L	1275	112	.75	WaffleHa	03-1733-17551	4624464	125kw
# 119	6698 27th Way N.	2	Flygt	3086/434	3	200	10	3	#118	N16L	100	30	2	Wtr-Tank	03-1623-01301	6627017	60kw
# 120	2100 62nd Avenue N.	2	Fairbanks	5433B-28	20	220	52	3	SCTP	S16M	500	90	1.5	PetDairy	01-0282-20001	6626541	100kw
# 121	2010 57 Avenue N.	2	Fairbanks	5432A/	5	220	14	3	#120	S16M	125	35	6	N.E.High	01-0883-29801	6626367	60kw
# 122	3120 46 Avenue N.	2	Flygt	3101/434	5	230	13	3	#123	S15L	165	30	3	Milk-Sta	03-1727-63261	2629911	60kw
# 123	4490 28th Street N.	2	Fairbanks	5432/	10	220	30	3	SCTP	S15L	566	31	2	SemElect	03-1727-63201	4627119	60kw
# 124	3260 1/2 Windsor Blvd.	1	Smith-Love	SK963J	2	230	13.6	1	#123	S16L	50	15	8	Ace-Auto	03-1727-63161	1228863	60kw
# 125	6400 Joe's Creek Drive	2	Flygt	3086/438	2.7	230	8	3	SCTP	S15J	150	15	4	Cont-Row	03-0338-00501	6628810	60kw
# 126	7665 54th Avenue N.	2	Flygt	3127/462	10	230	26.6	3	SCTP	S16H	360	47	2	FSBCanal	02-0724-00161	4624360	60kw

FLORIDA POWER PHONE NUMBERS 896-8711/443-2641

Updated: 01/20/94

ATTACHMENT 7

FACSIMILE COVER PAGE

FROM: ELLIS K. PHELPS & CO.
PHONE 407-880-2900
FAX 407-880-2962
RICHARD COLE

DATE: 5-30-96

TO: Pierson's Eng.
ATT: Katrina Bond's
Fax No. (813) -932-7416

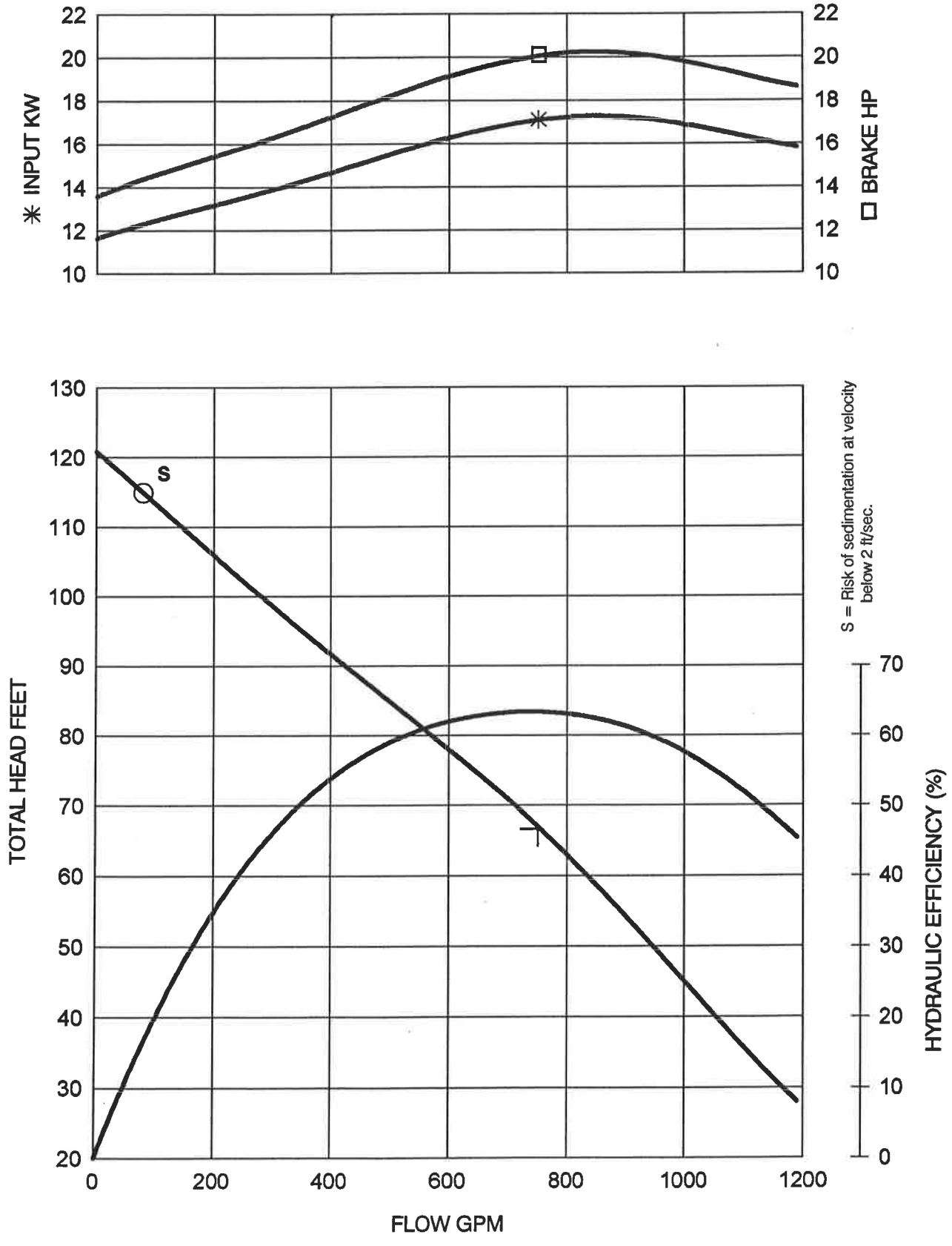
NUMBER OF PAGES INCLUDING COVER PAGE 22

MESSAGE:

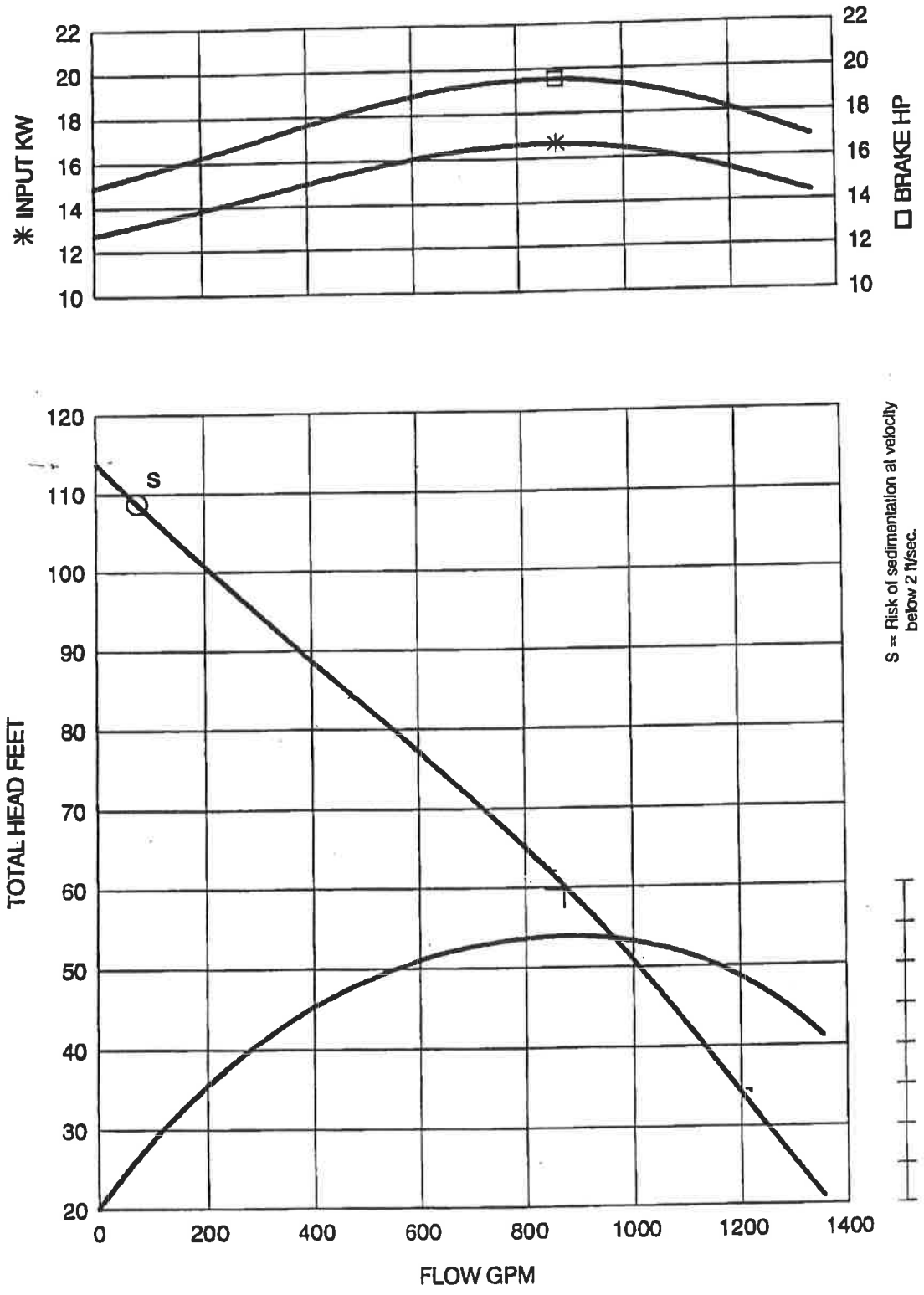
Pinellas Co. Plat Review

Rick

PAGE	SECTION		CONFIG.	
14	3	**C-3152**	CP/CT/CS	
ISSUED	SUPERSEDES	**454 Impeller** (4" volute)	VANES	PHASE
6/94	2/88		1	3



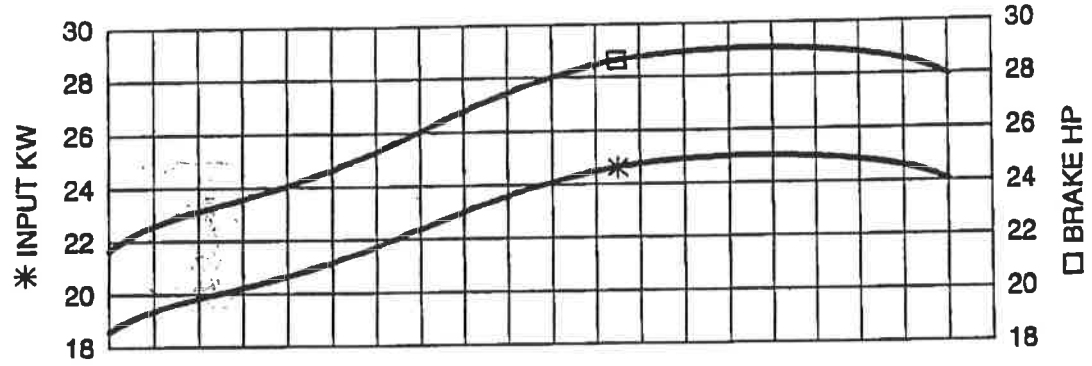
CONFIG.		C-3152	SECTION	PAGE
CP/CT/CZ/CS		**454 Impeller** (6" volute)	3	15
PHASE	VANES		SUPERSEDES	ISSUED
3	1		6/94	2/96

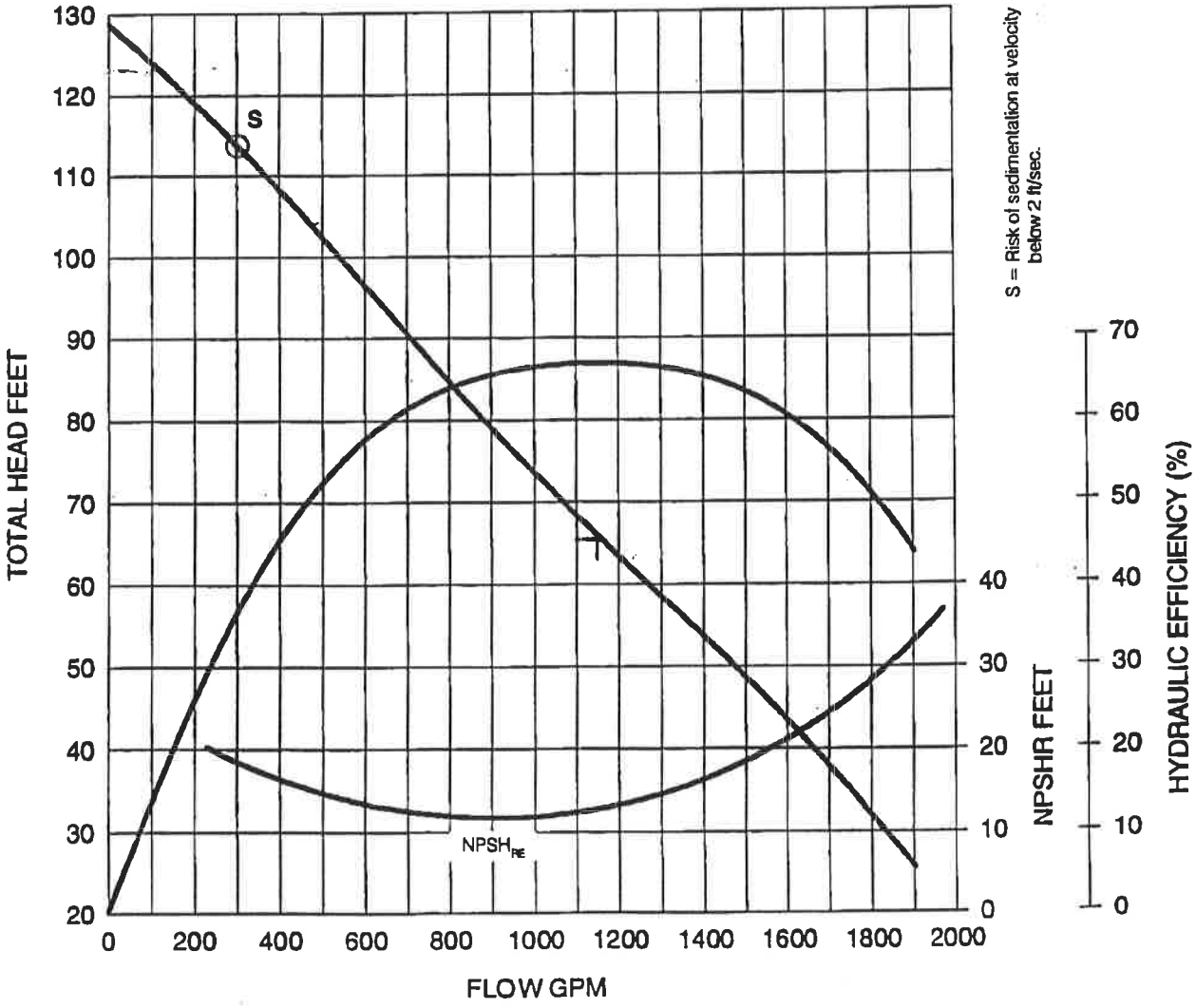


PAGE	SECTION
4	3
ISSUED	SUPERSEDES
2/96	6/94

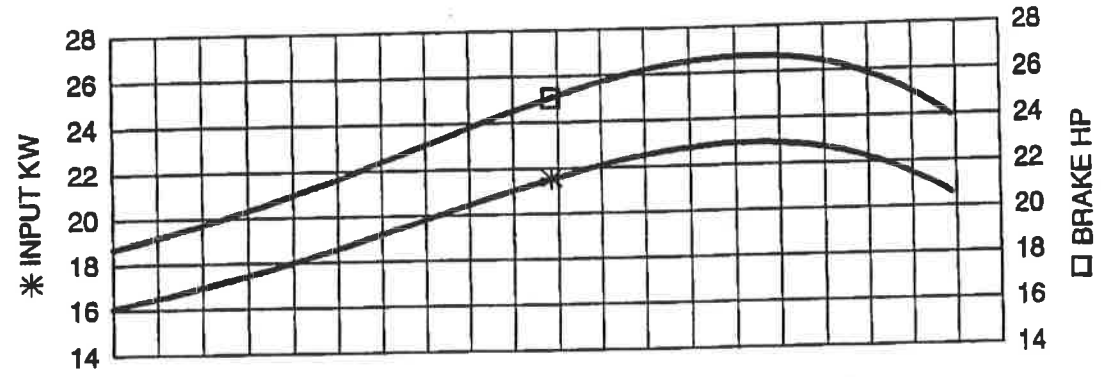
C-3170
442 Impeller

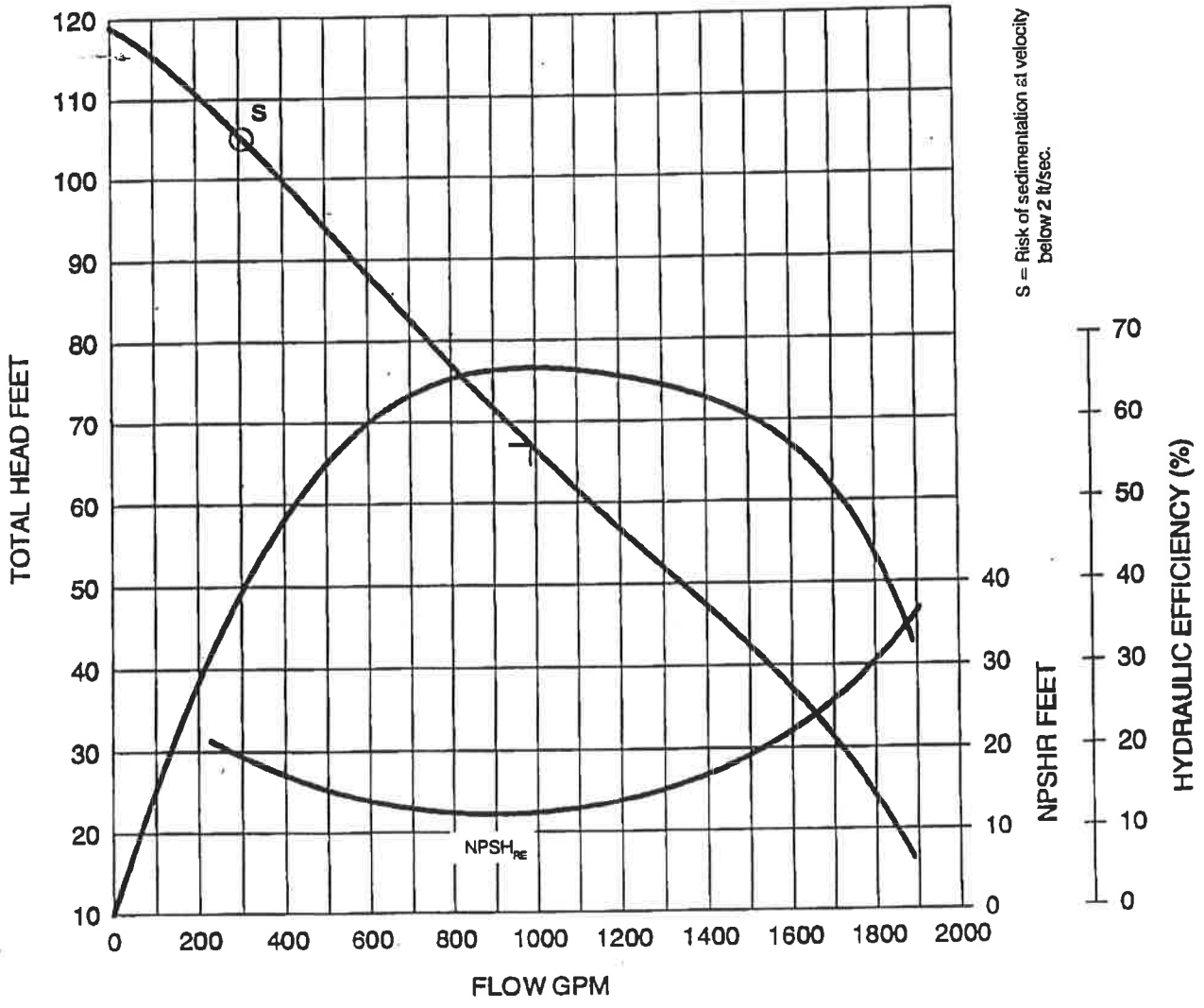
CONFIG.	
CP/CT/CZ/CS	
VANES	PHASE
1	3



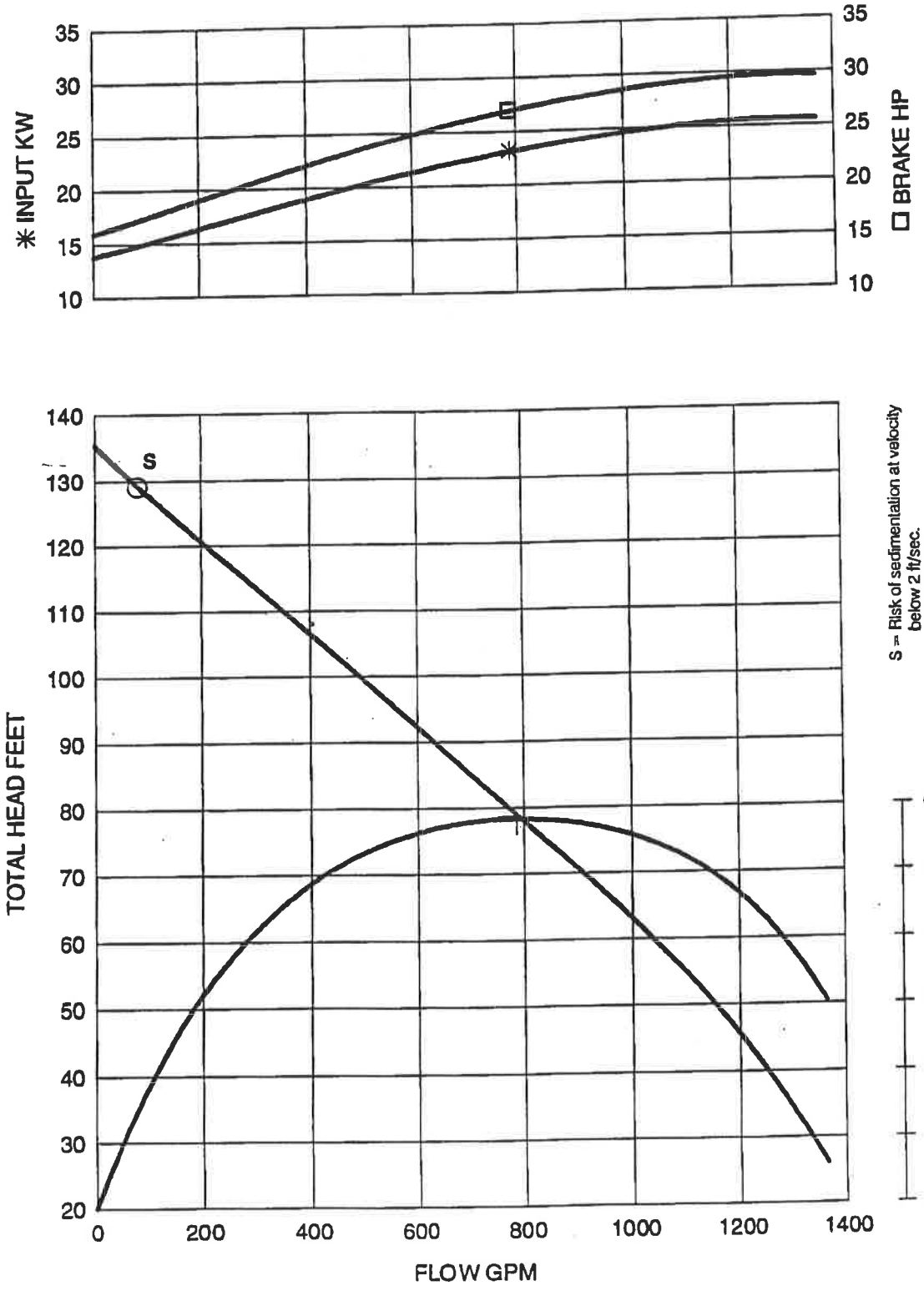


CONFIG.		C-3170	SECTION	PAGE
CP/CT/CZ/CS		443 Impeller	3	5
PHASE	VANES		SUPERSEDES	ISSUED
3	1		6/94	2/96

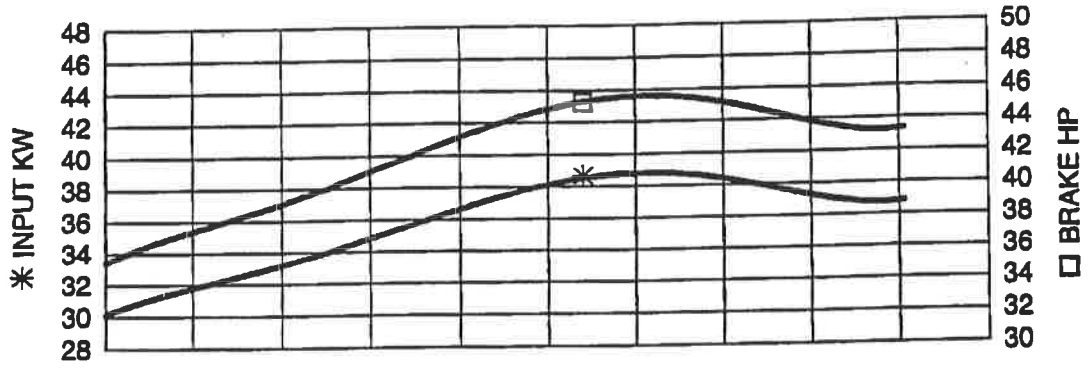


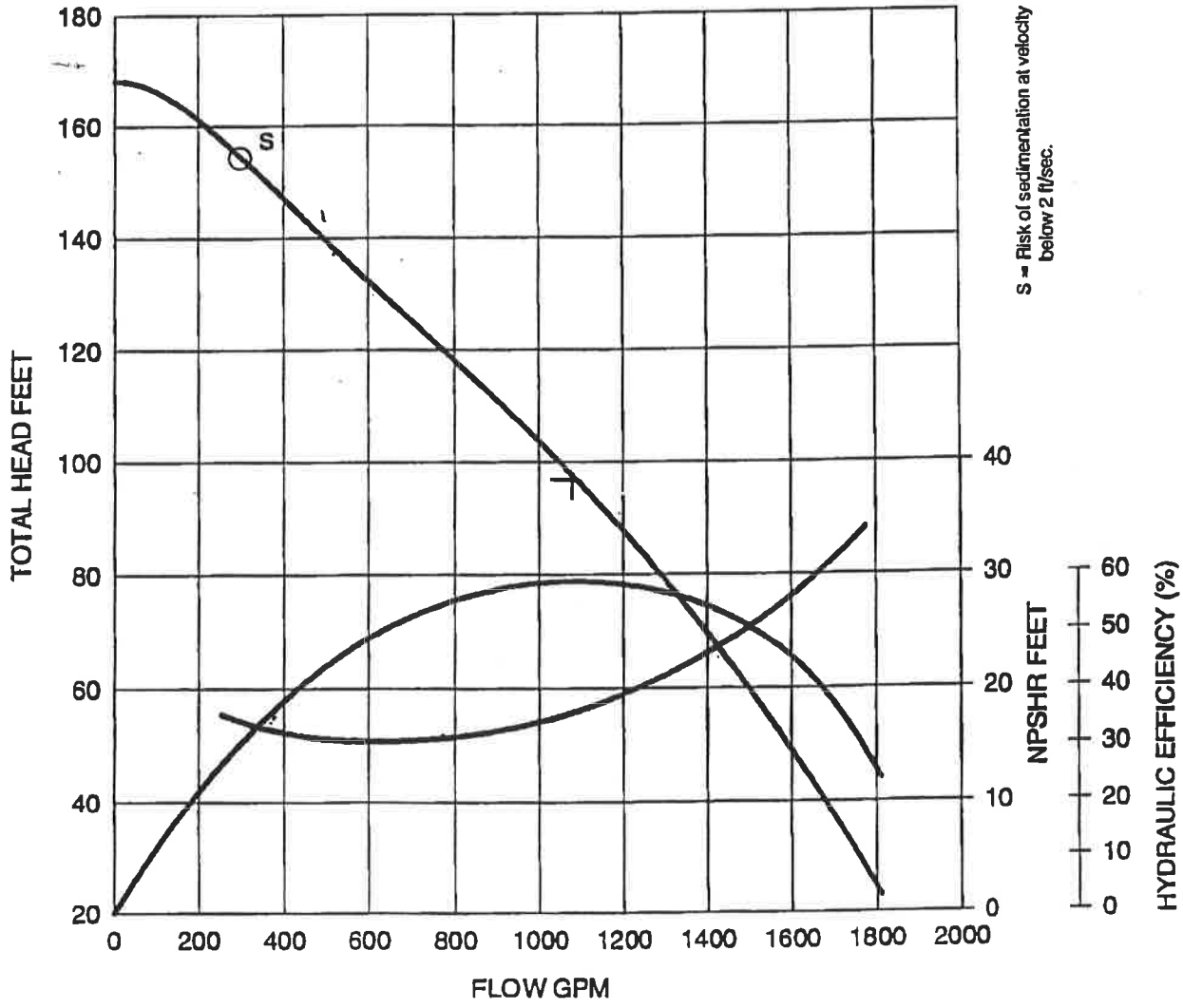


CONFIG.		C-3170	SECTION	PAGE
CP/CT/CS		464 Impeller	3	7
PHASE	VANES		SUPERSEDES	ISSUED
3	1		6/94	2/96

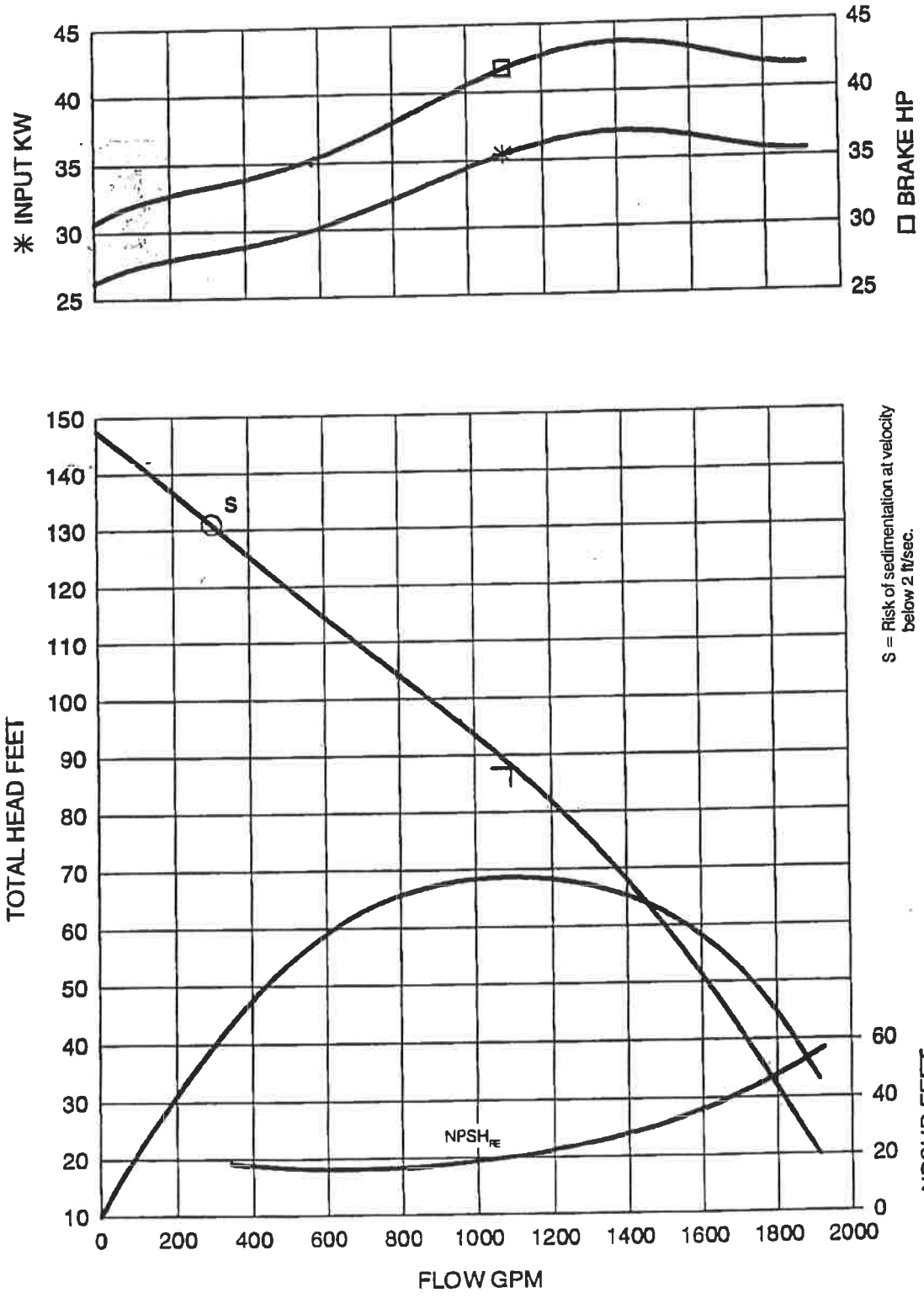


CONFIG.		C-3201 452 Impeller	SECTION	PAGE
CP/CT/CZ/CS			3	5
PHASE	VANES		SUPERSEDES	ISSUED
3	1		6/94	2/96

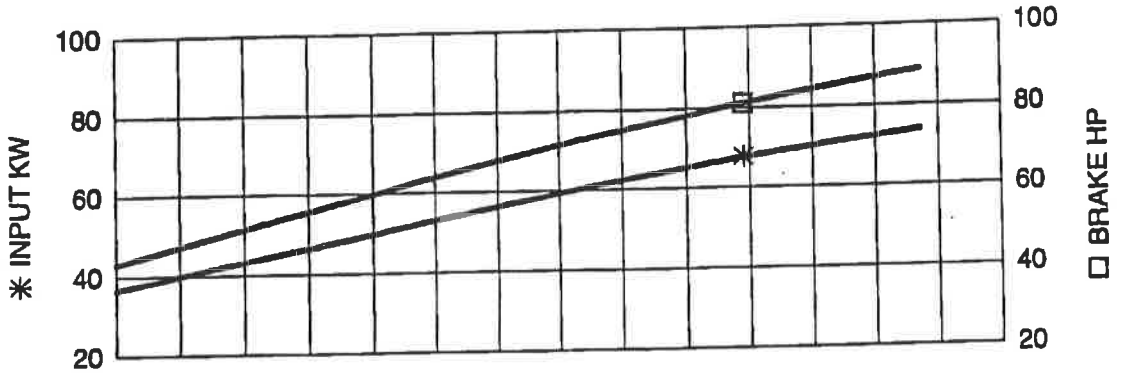


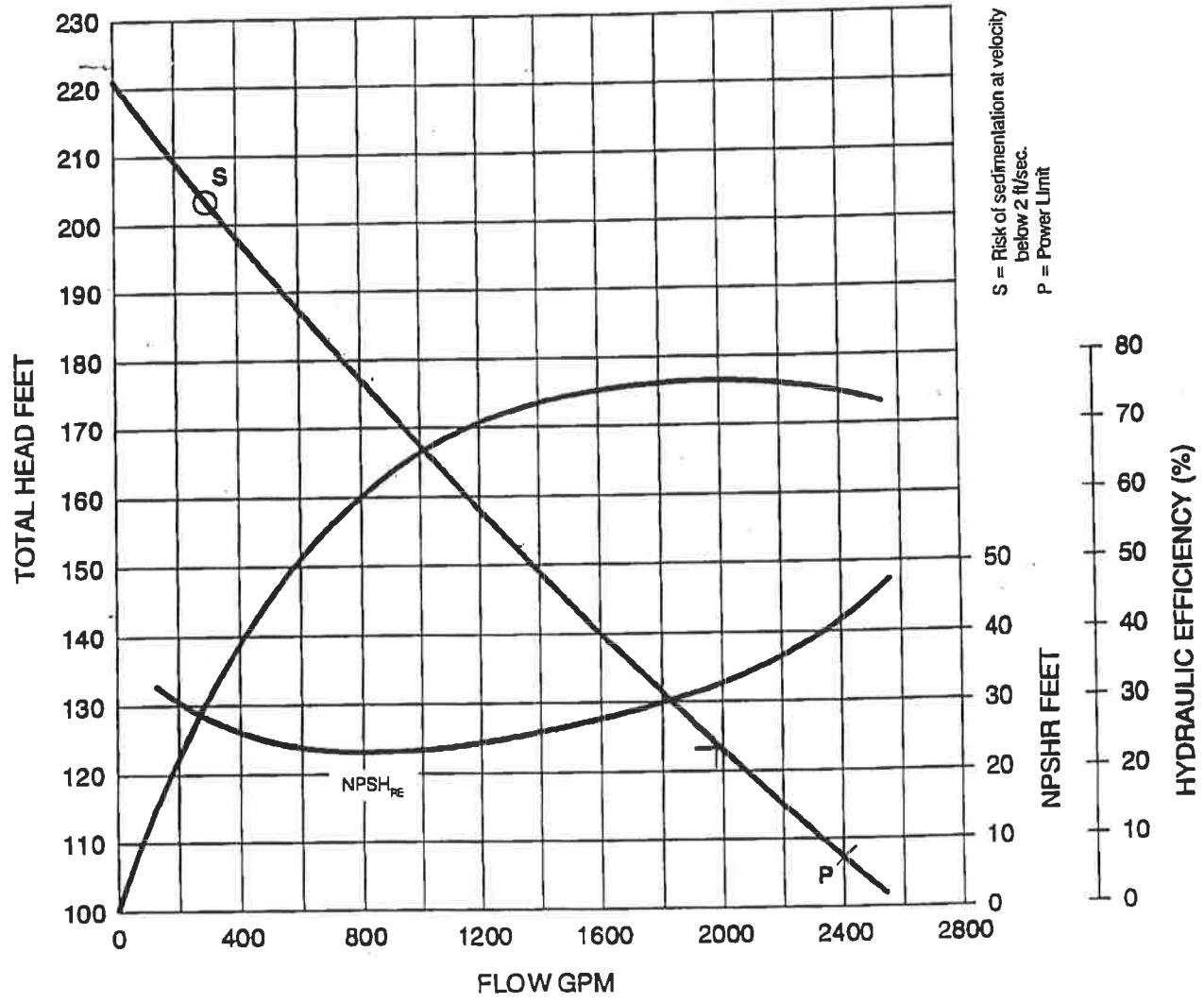


CONFIG.		C-3201	SECTION	PAGE
CP/CT/CZ/CS		457 Impeller	3	7
PHASE	VANES		SUPERSEDES	ISSUED
3	1		6/94	2/96

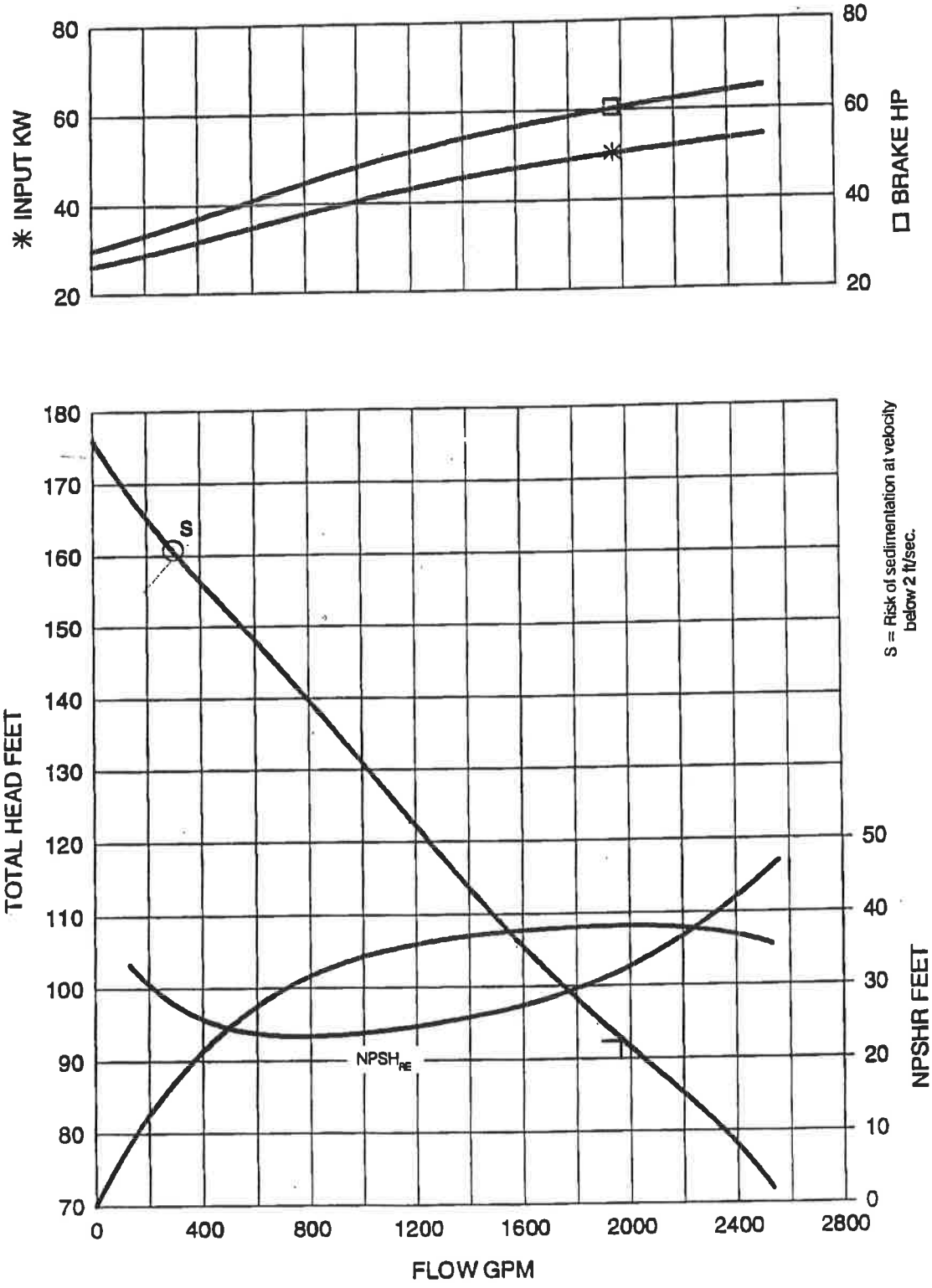


CONFIG.		C-3300	SECTION	PAGE
CP/CT/CZ/CS		464 Impeller	3	11
PHASE	VANES		SUPERSEDES	ISSUED
3	2		6/94	2/96





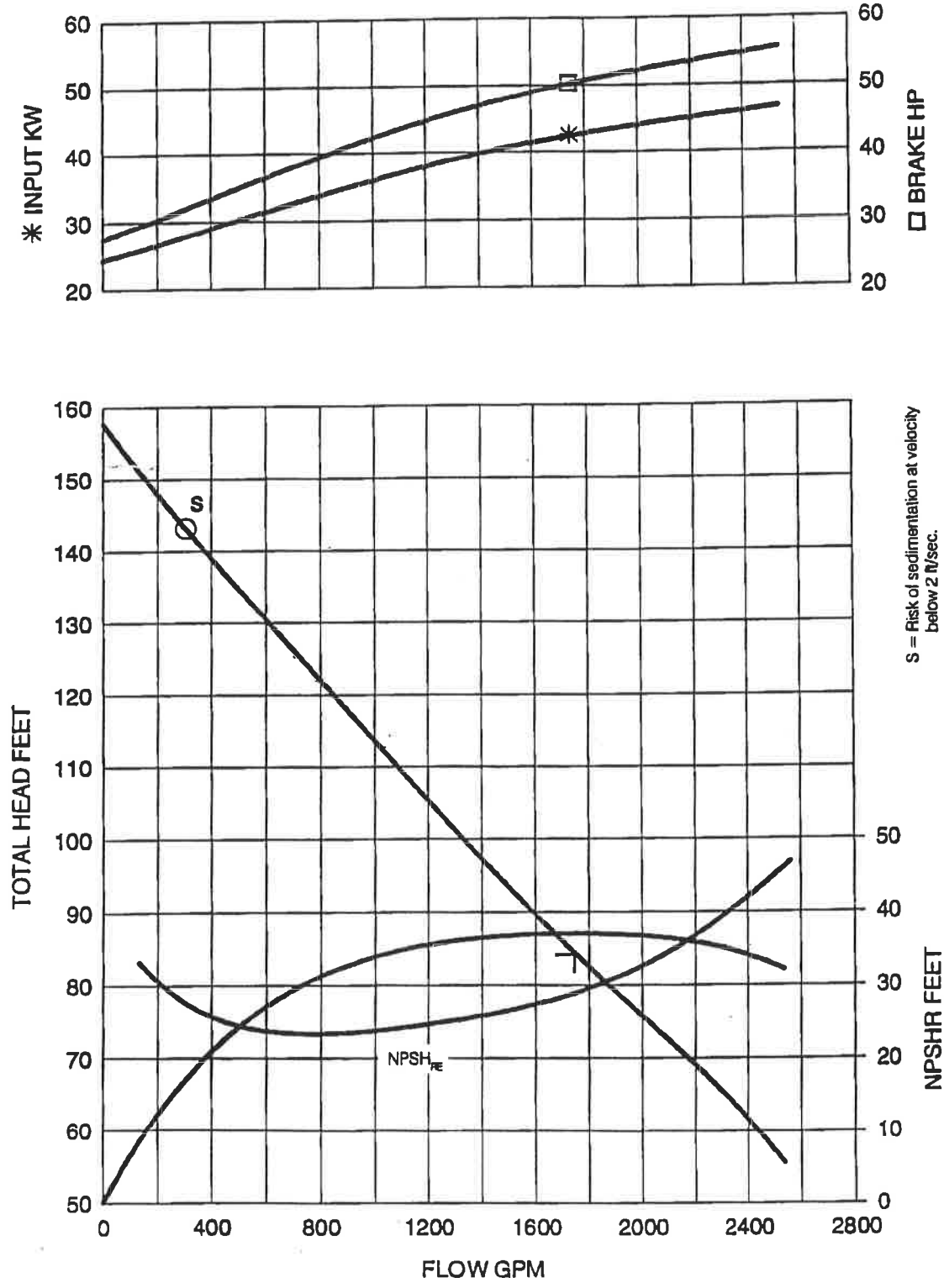
CONFIG.		C-3300	SECTION	PAGE
CP/CT/CZ/CS		466 Impeller	3	13
PHASE	VANES		SUPERSEDES	ISSUED
3	2		6/94	2/96



PAGE	SECTION
14	3
ISSUED	SUPERSEDES
2/96	6/94

C-3300
467 Impeller

CONFIG.	
CP/CT/CZ/CS	
VANES	PHASE
2	3



PERFORMANCE CURVE

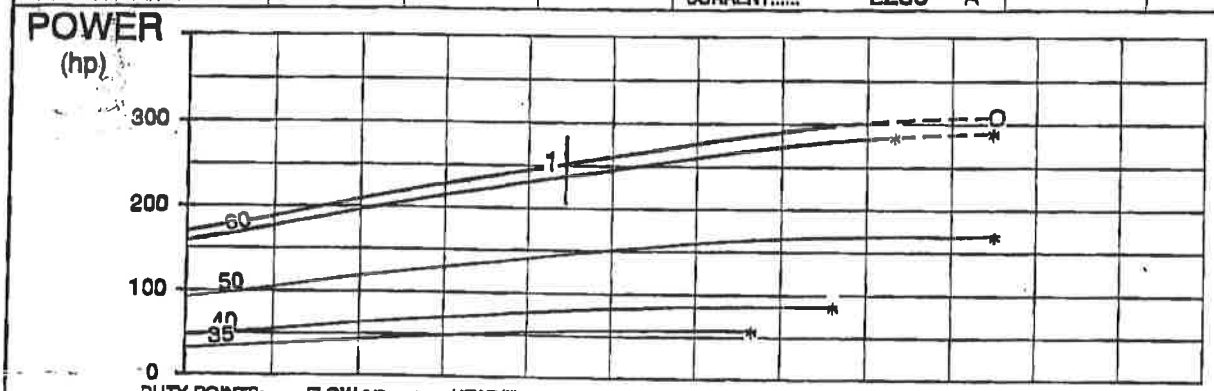
NO FM

DATE	PROJECT	ISSUE	PROD.
1998-09-29	BOGEY # 1	5	C3312/765

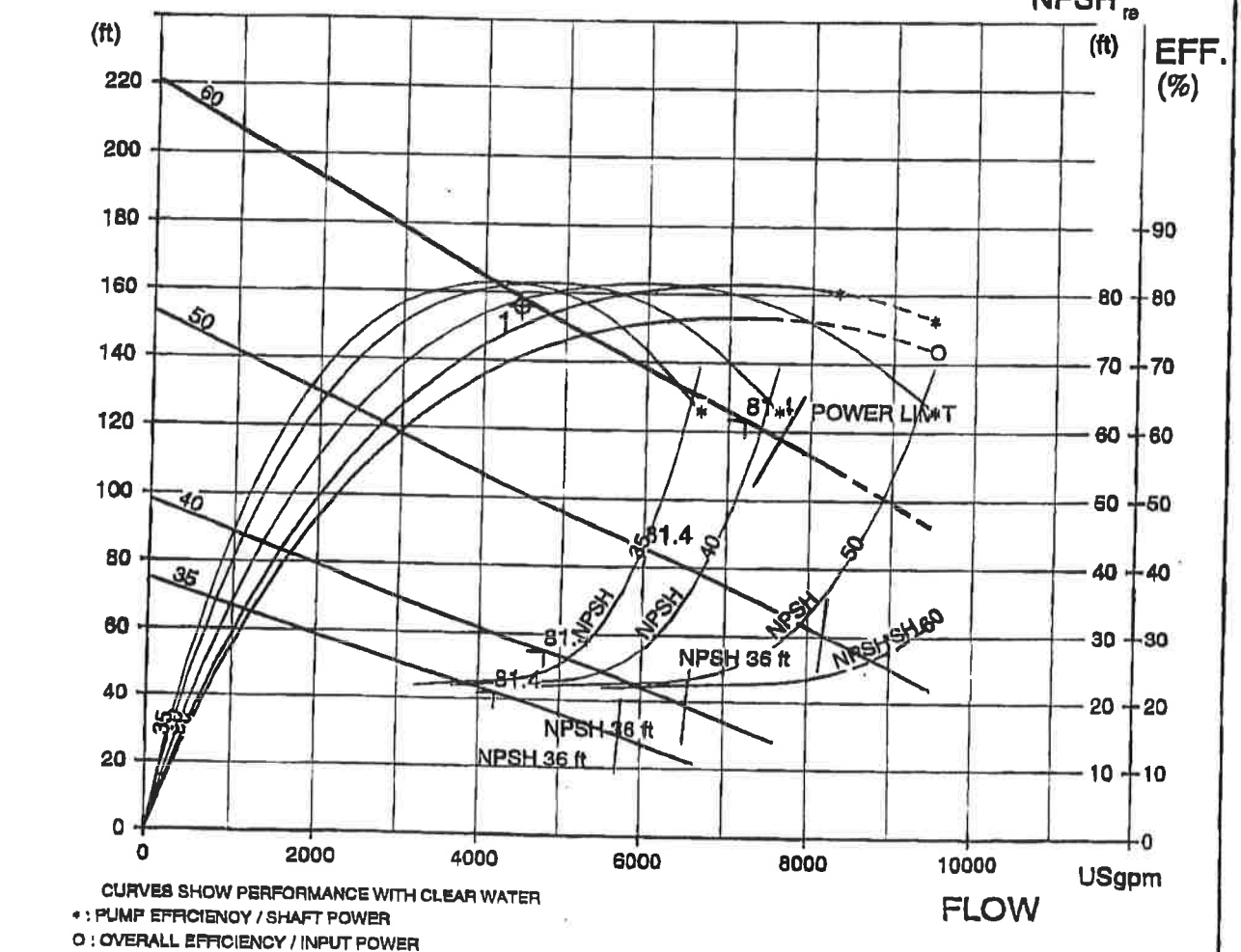
NO. OF BLADES.....	3	TOT.MOM.OF INERTIA.....	5.10	KGM²	POLES: 6	FREQ: 60	HZ
IMPELLER THROUGHLET...	103*103 Circul.	RATED SPEED.....	1185	RPM	VOLTAGE.....	460	V
					MOTOR SHAFT POWER.....	209 (280 hp)	KW
					STARTING TORQUE.....	2470	NM
					MAX TORQUE.....	4800	NM
					RATED CURRENT.....	345	A
					STARTING CURRENT.....	2230	A

	1/1-LOAD	3/4-LOAD	1/2-LOAD
MOTOR COS FI	0.80	0.75	0.63
MOTOR EFFICIENCY	94.0%	94.0%	93.0%
GEAR EFFICIENCY			

CURVE NO	IMPELLER DIAMETER	MOTOR TYPE	GEAR TYPE	RATIO
63-630	510 MM	43-56-6BC/01 (12)		



DUTY POINTS:	FLOW (USgpm)	HEAD(ft)	EFF. (%)	NPSH(ft)	GUARANTEE
1	4456	156.0	69.8 (74.2)	22.3	HI lev-A



CURVES SHOW PERFORMANCE WITH CLEAR WATER
* : PUMP EFFICIENCY / SHAFT POWER
O : OVERALL EFFICIENCY / INPUT POWER

unix AUTHOR: FUS114 CUPF (rev:6.6)

034159

1

09/30/98

No PFM

SAME

NEW

NONE SFD NET 30 DAYS 01 PREPAID

PINELAS CO
PS 16 BOGI 1
280HP OPTION

CP3312 Flygt pump	6 EA
50' motor & pilot cable	6 EA
(shipped part of pump)	
12x12 discharge connectio	6 EA
control panel	1 EA
TO PINELLAS CO standards	1 EA
(shipped part of panel)	
with a MELTRIC 37-27-043	1 EA
(shipped part of panel)	
with a 4X 304SS enclosure	1 EA
(shipped part of panel)	
fused disconnect	2 EA
304ss junction box w/term	2 EA
seal off	1 EA
60' PSM MECHANICAL FLOAT	6 EA
3/4"x12" heavy duty ancho	24 EA
304SS	
3" upper guide bracket	6 EA
304SS	
3" mid rail bracket 304SS	6 EA
cable holder 304SS	1 EA
48x60 alum frame & cover	6 EA
300# load	
48x60 alum frame & cover	6 EA
300# load	
20'x3" guide rail 304SS	12 EA
20'x5/8" lift chain 304SS	6 EA
3/4" shackle	
One trip startup service	1 EA
mix flush valve	6 EA
mount mix flush valve	6 EA
SAFETY NET	6 EA
WET WELL ONLY	6

814324.00	.00	.00	.00	814324.00

FLYGT

PERFORMANCE CURVE

2 cliff

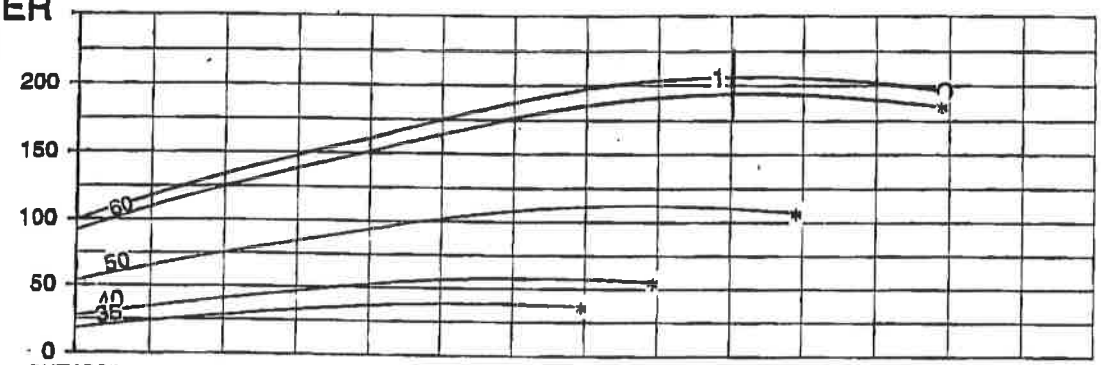
DATE	PROJECT	ISSUE	PROD
1998-09-29	BOGEY # 1	2	C3231/735

NO. OF BLADES.....	2	TOT.MOM.OF INERTIA.....	2.79	KGM²	POLES: 4	FREQ: 60	HZ
IMPELLER THROUGHLET...	88*88 Circul.	RATED SPEED.....	1780	RPM	VOLTAGE.....	460	V
					MOTOR SHAFT POWER..... STARTING	186 250	KW hp
					TORQUE.....	1200	NM
					MAX TORQUE.....	3140	NM
					RATED CURRENT.....	284	A
					STARTING CURRENT.....	2030	A

	1/1-LOAD	3/4-LOAD	1/2-LOAD
MOTOR COS FI	0.88	0.84	0.76
MOTOR EFFICIENCY	93.5%	94.0%	93.0%
GEAR EFFICIENCY			

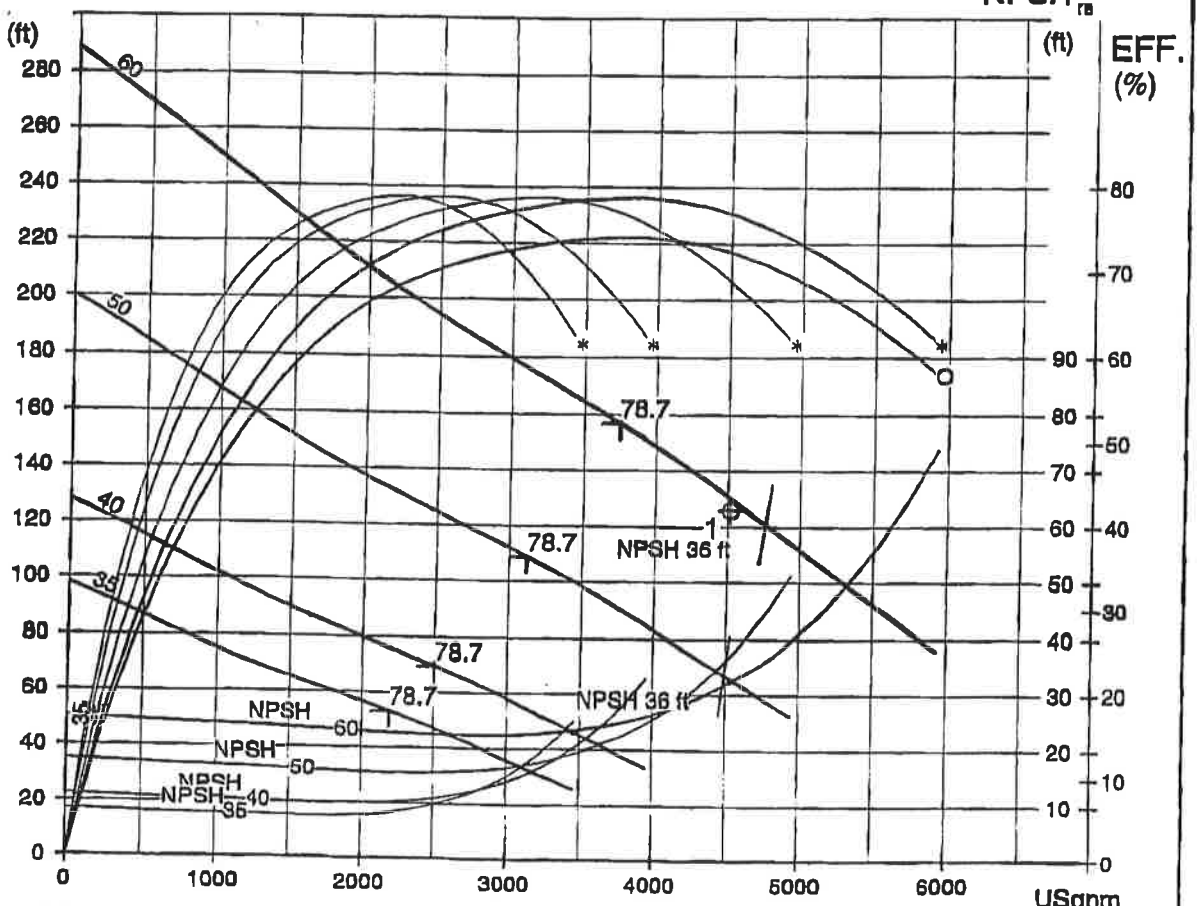
CURVE NO	IMPELLER DIAMETER	MOTOR TYPE	GEAR TYPE	RATIO
63-430	395 MM	43-44-4AA/01 (12)		

POWER (hp)



DUTY POINTS:	FLOW (USgpm)	HEAD(ft)	EFF. (%)	NPSH(ft)	GUARANTEE
1	4617	126.0	69.7 (74.2)	34.8	HI ev-A

HEAD (ft) — NPSH$_{re}$ (ft) — EFF. (%)



FLOW

CURVES SHOW PERFORMANCE WITH CLEAR WATER
*: PUMP EFFICIENCY / SHAFT POWER
O : OVERALL EFFICIENCY / INPUT POWER

unix AUTHOR: FUS114 CUPF (rev:6.6)

034159

1

09/30/98

24" P FM

SAME

NEW

NONE SFD NET 30 DAYS 01 PREPAID

PINELAS CO
PS 16 BOGI 1
250HP OPTION

Flygt CP3231 pump	6 EA
50' motor & pilot cable	6 EA
(shipped part of pump)	
8x8 discharge connection	6 EA
control panel	1 EA
TO PINELLAS CO standards	1 EA
(shipped part of panel)	
with a MELTRIC 37-27-043	1 EA
(shipped part of panel)	
with a 4X 304SS enclosure	1 EA
(shipped part of panel)	
fused disconnect	2 EA
304ss junction box w/term	2 EA
seal off	1 EA
60' PSM MECHANICAL FLOAT	6 EA
3/4"x12" heavy duty ancho	24 EA
304SS	
3" upper guide bracket	6 EA
304SS	
3" mid rail bracket 304SS	6 EA
cable holder 304SS	1 EA
48x60 alum frame & cover	6 EA
300# load	
48x60 alum frame & cover	6 EA
300# load	
20'x3" guide rail 304SS	12 EA
20'x5/8" lift chain 304SS	6 EA
3/4" shackle	
One trip startup service	1 EA
mix flush valve	6 EA
mount mix flush valve	6 EA
SAFETY NET	6 EA
WET WELL ONLY	6

725932.00	.00	.00	.00	725932.00

PERFORMANCE CURVE

30" FM

DATE	PROJECT	ISSUE	PROD
1998-09-29	BOGEY # 1	2	C3231/705

NO. OF BLADES.....	2	TOT.MOM.OF INERTIA.....	2.16	KGM²	POLES: 4	FREQ: 60	HZ
IMPELLER THROUGHLET...	88*88 Circul.	RATED SPEED.....	1780	RPM	VOLTAGE.....	460	V
					MOTOR SHAFT POWER.....	138 / 185	KW / hp
					STARTING TORQUE.....	840	NM
					MAX TORQUE.....	2280	NM
					RATED CURRENT.....	220	A
					STARTING CURRENT.....	1530	A

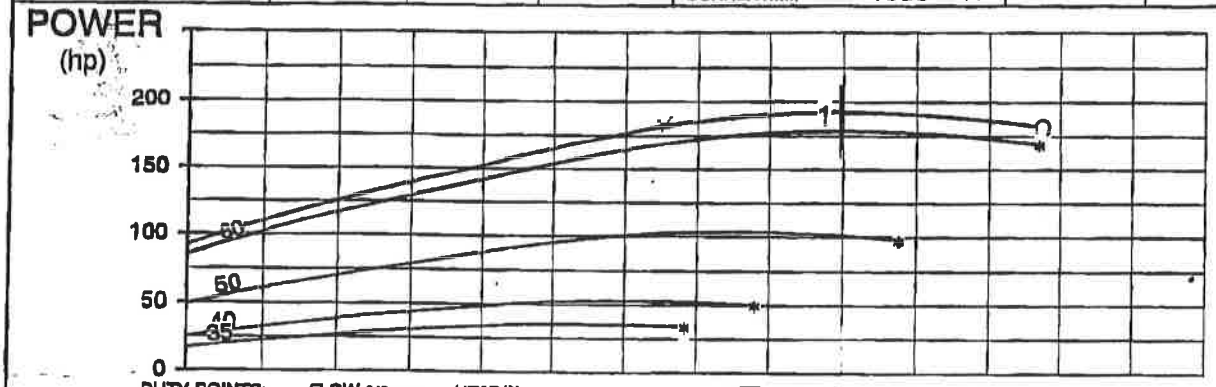
CURVE NO: 63-430

IMPELLER DIAMETER: 385 MM

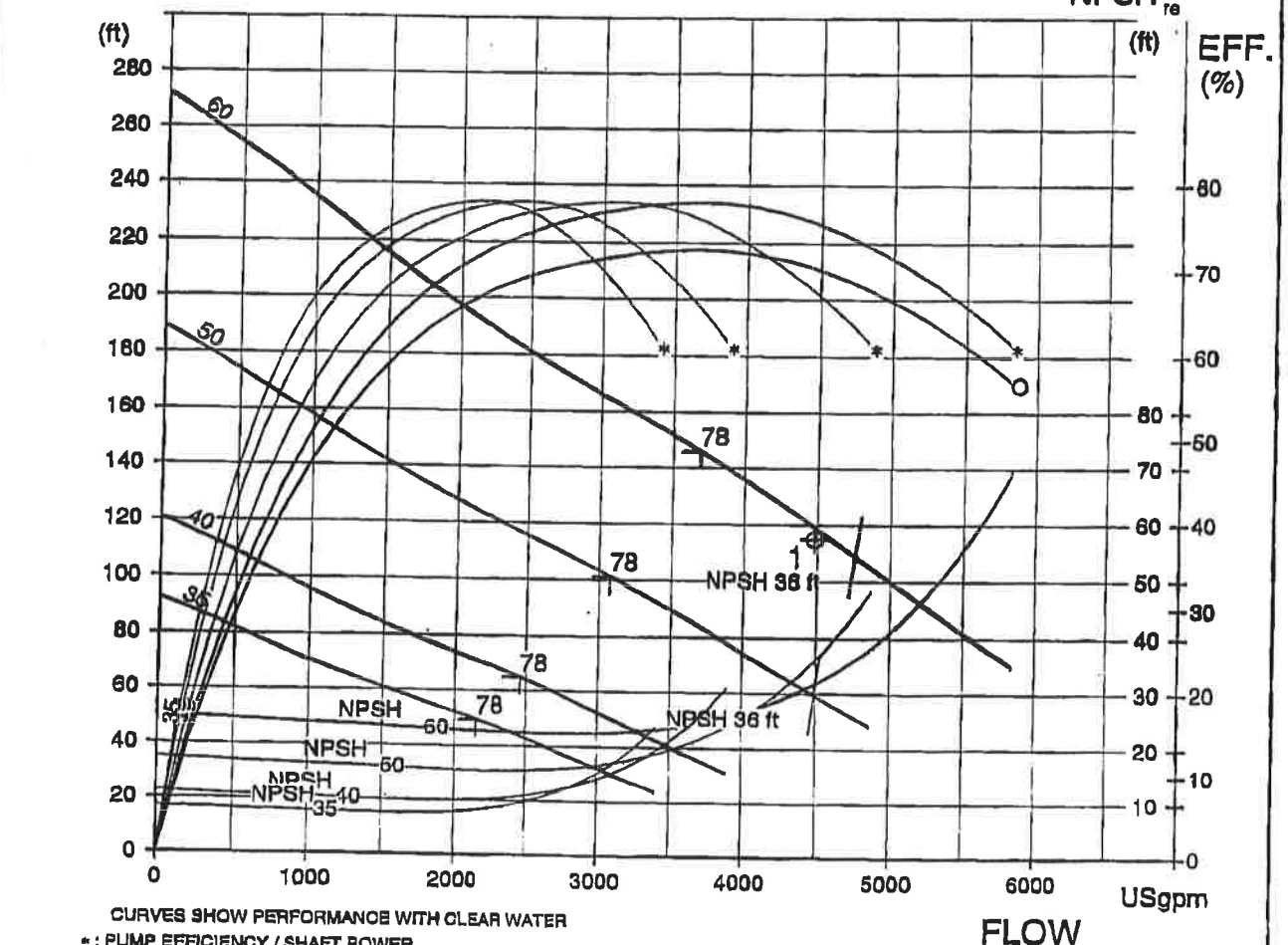
MOTOR TYPE: 43-30-4AA/01 (12)

GEAR TYPE: RATIO:

	1/1-LOAD	3/4-LOAD	1/2-LOAD
MOTOR COS FI	0.85	0.81	0.71
MOTOR EFFICIENCY	92.5%	93.0%	92.0%
GEAR EFFICIENCY			



DUTY POINTS:	FLOW (USgpm)	HEAD(ft)	EFF. (%)	NPSH(ft)	GUARANTEE
1	4481	118.0	67.8 (72.8)	34.2	HI lev-A



CURVES SHOW PERFORMANCE WITH CLEAR WATER

*: PUMP EFFICIENCY / SHAFT POWER

O: OVERALL EFFICIENCY / INPUT POWER

unix AUTHOR: FUS114 CUPF (rev:6.6)

034159

1

09/30/98

SAME

30" P PM NEW

NONE SFD NET 30 DAYS 01 PREPAID

PINELAS CO
PS 16 BOGI 1
185HP OPTION

CP3312 Flygt pump	6 EA
50' motor & pilot cable	6 EA
(shipped part of pump)	
8x8 discharge connection	6 EA
control panel	1 EA
TO PINELLAS CO standards	1 EA
(shipped part of panel)	
with a MELTRIC 37-27-043	1 EA
(shipped part of panel)	
with a 4X 304SS enclosure	1 EA
(shipped part of panel)	
fused disconnect	2 EA
304ss junction box w/term	2 EA
seal off	1 EA
60' PSM MECHANICAL FLOAT	6 EA
3/4"x12" heavy duty ancho	24 EA
304SS	
3" upper guide bracket	6 EA
304SS	
3" mid rail bracket 304SS	6 EA
cable holder 304SS	1 EA
48x60 alum frame & cover	6 EA
300# load	
48x60 alum frame & cover	6 EA
300# load	
20'x3" guide rail 304SS	12 EA
20'x5/8" lift chain 304SS	6 EA
3/4" shackle	
One trip startup service	1 EA
mix flush valve	6 EA
mount mix flush valve	6 EA
SAFETY NET	6 EA
WET WELL ONLY	6

614356.00	.00	.00	.00	614356.00

034157

1

09/30/98

SAME

NEW

NONE SFD NET 30 DAYS 01 PREPAID

PINELLAS CO
PS13 24"FM

6" CP3170/442 Flygt pump	2 EA
30HP 3/60/230 volt	
40' of 4/7 cable	2 EA
(shipped part of pump)	
6x6 discharge connection	2 EA
30hp 3ph 230 volt panel	1 EA
TO PINELLAS CO standards	1 EA
(shipped part of panel)	
with a MELTRIC 37-27-043	1 EA
(shipped part of panel)	
with a 4X 304SS enclosure	1 EA
(shipped part of panel)	
fused disconnect	1 EA
304ss junction box w/term	1 EA
seal off	1 EA
40' mechanical PSM float	4 EA
3/4"x8-1/2" threaded rod	8 EA
304SS	
3" upper guide bracket	2 EA
304SS	
3" mid rail bracket 304SS	2 EA
cable holder 304SS	1 EA
APS 3048 ACTUAL 300LB ALU	2 EA
FRAME & COVER 3449 CO	
APD 72X72 ACTUAL 300LB AL	1 EA
FRAME & COVER (73X80 CO)	
22'x3" guide rail 304SS	4 EA
20'x3/8" lift chain 304SS	2 EA
One trip startup service	1 EA
mix flush valve	2 EA
mount mix flush valve	2 EA
SAFETY NET	2 EA
WET WELL ONLY	2

54556.00	.00	.00	.00	54556.00

034157

1

09/30/98

SAME

NEW

NONE SFD NET 30 DAYS 01 PREPAID

PINELLAS CO
88HP

8" CP3300/466 Flygt pump	2 EA
88HP 3/60/460 volt	
40' of 1/7 cable	2 EA
(shipped part of pump)	
6x8 discharge connection	2 EA
duplex control panel	1 EA
.	
TO PINELLAS CO standards	1 EA
(shipped part of panel)	
with a MELTRIC 37-27-043	1 EA
(shipped part of panel)	
with a 4X 304SS enclosure	1 EA
(shipped part of panel)	
fused disconnect	2 EA
304ss junction box w/term	1 EA
seal off	1 EA
40' mechanical PSM float	4 EA
3/4"x8-1/2" threaded rod	8 EA
304SS	
3" upper guide bracket	2 EA
304SS	
3" mid rail bracket 304SS	2 EA
cable holder 304SS	1 EA
APS 3648 ACTUAL 300LB ALU	2 EA
FRAME & COVER 4049 CO	
APD 72X72 ACTUAL 300LB AL	1 EA
FRAME & COVER (73X80 CO)	
20'x3" guide rail 304SS	4 EA
20'x3/8" lift chain 304SS	2 EA
One trip startup service	1 EA
mix flush valve	2 EA
mount mix flush valve	2 EA
SAFETY NET	2 EA

$ 90127.00

CONTINUED

034157

1

09/30/98

SAME

NEW

NONE SFD NET 30 DAYS 01 PREPAID

PINELLAS CO
60HP

8" CP3300/467 Flygt pump	2 EA
60hp 3ph 460volt	
40' of 4/7 cable	2 EA
(shipped part of pump)	
6x8 discharge connection	2 EA
duplex control panel	1 EA
TO PINELLAS CO standards	1 EA
(shipped part of panel)	
with a MELTRIC 37-27-043	1 EA
(shipped part of panel)	
with a 4X 304SS enclosure	1 EA
(shipped part of panel)	
fused disconnect	2 EA
304ss junction box w/term	1 EA
seal off	1 EA
40' mechanical PSM float	4 EA
3/4"x8-1/2" threaded rod 304SS	8 EA
3" upper guide bracket 304SS	2 EA
3" mid rail bracket 304SS	2 EA
cable holder 304SS	1 EA
APS 3648 ACTUAL 300LB ALU FRAME & COVER 4049 CO	2 EA
APD 72X72 ACTUAL 300LB AL FRAME & COVER (73X80 CO)	1 EA
20'x3" guide rail 304SS	4 EA
20'x3/8" lift chain 304SS	2 EA
One trip startup service	1 EA
mix flush valve	2 EA
mount mix flush valve	2 EA
SAFETY NET	2 EA

78253 60

CONTINUED

ATTACHMENT 8

Pinellas County Solid Waste Operations
3095 - 114th Avenue North
St Petersburg, Florida 33716
(813) 464-7565 ✉ Fax (813) 464-7715

FAX TRANSMITTAL

DATE: 12/21/97 NO. OF PAGES (including cover sheet) 11

TO: Bill Gill

COMPANY/DEPARTMENT: Engineering

PHONE NO: _____ FAX NO. _____

FROM: Cynthia Harris

COMPANY/DEPARTMENT: Solid Waste 464-7524

PHONE NO: (813) 464-7565 FAX NO: (813) 464-7713 or 464-7712

TRANSMITTAL SENT BY: _____

COMMENTS: _____

If this transmittal is not legible, missing pages, or you need additional information, please call (813) 464-7565

Thank you!!

Sort # / Company #008 FLORIDA POWER CORP
Service Location #008 9280 FAIRWEATHER DR N

Full Account No 52936-61033
Meter Number 004763319

Fiscal Year 96/97
Account Number 0551 / 5431100 / 6610500
Constant Applied

Trx No	Meter #	Date Read	Present Reading	Energy Consumed	Amount Paid	Amount Credited
01	2624298	10/26/1996	6,560	3,240 KWH	649.45	
		Demand:	1.75	21 KW		
02	2624298	11/27/1996	310	3,786 KWH	551.88	
		Demand:	0.69	32 KW		
03	2624298	12/31/1996	481	7,958 KWH	516.65	
		Demand:	0.71	33 KW		
04	2624298	01/29/1997	694	9,706 KWH	716.16	
		Demand:	1.36	53 KW		
05	2624298	02/27/1997	861	7,682 KWH	468.52	
		Demand:	0.52	24 KW		
06	2624298	03/28/1997	1,040	8,234 KWH	498.50	
		Demand:	0.54	25 KW		
07	2624298	04/29/1997	1,235	8,970 KWH	567.88	
		Demand:	0.60	28 KW		
08	2624298	05/29/1997	1,428	8,878 KWH	641.24	
		Demand:	1.04	45 KW		
09	2624298	06/27/1997	1,593	7,820 KWH	495.02	
		Demand:	0.52	24 KW		
10	004763319	07/28/1997	1,827	10,534 KWH	574.72	
		Demand:	0.67	31 KW		
11	004763319	08/26/1997	2,053	10,626 KWH	653.01	
		Demand:	0.76	35 KW		
12	004763319	09/25/1997	2,281	10,258 KWH	627.73	
		Demand:	0.71	33 KW		
52936-61033	total for service from 10/26 to 09/25/1997 ---->			103,592	$6,960.77	$0.00

Transaction Log

Sort # / Company #011 FLORIDA POWER CORP
Service Location #011 9220 102ND AV N

Full Account No 53804-99066
Meter Number 006627846

Fiscal Year 96/97
Account Number 0551 / 543:100 / 6610500
Constant Applied

Trx No	Meter #	Date Read	Present Reading	Energy Consumed	Amount Paid	Amount Credited
01	6627846	10/26/1996	84,742	1,061 KWH	89.89	
		Demand:	0.00	0 KW		
02	6627846	11/27/1996	85,727	985 KWH	84.10	
		Demand:	0.00	0 KW		
03	6627846	12/31/1996	86,665	938 KWH	80.66	
		Demand:	0.00	0 KW		
04	6627846	01/29/1997	87,602	937 KWH	80.58	
		Demand:	0.00	0 KW		
05	6627846	02/27/1997	88,424	821 KWH	72.17	
		Demand:	0.00	0 KW		
06	6627846	03/28/1997	89,372	948 KWH	81.39	
		Demand:	0.00	0 KW		
07	6627846	04/29/1997	90,367	995 KWH	87.39	
		Demand:	0.00	0 KW		
08	6627846	05/29/1997	91,338	971 KWH	85.57	
		Demand:	0.00	0 KW		
09	6627846	06/27/1997	92,180	842 KWH	75.81	
		Demand:	0.00	0 KW		
10	006627846	07/28/1997	93,160	980 KWH	78.56	
		Demand:	0.00	0 KW		
11	006627846	08/26/1997	94,263	1,103 KWH	93.03	
		Demand:	0.00	0 KW		
12	006627846	09/25/1997	95,134	871 KWH	75.98	
		Demand:	0.00	0 KW		
53804-99066	Total for service from 10/26 to 09/25/1997 ---->			11,456	$985.13	$0.00

012

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Pinellas County Utilities

Transaction Log

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Sort # / Company #012 FLORIDA POWER CORP
Service Location #012 9398 70TH AVE N

Full Account No 99584-81011
Meter Number 004633721

Fiscal Year 96/97
Account Number 0551 / 5431100 / 6610500
Constant Applied

Trx No	Meter #	Date Read	Present Reading	Energy Consumed	Amount Paid	Amount Credited
01	4626396	11/19/1996	85,180	1,143 KWH	299.97	
		Demand:	7.00	7 KW		
02	4626396	12/19/1996	4,295	2,237 KWH	191.75	
		Demand:	19.00	19 KW		
03	4626396	01/21/1997	6,373	2,078 KWH	133.58	
		Demand:	6.00	6 KW		
04	4626396	02/18/1997	8,229	1,856 KWH	123.09	
		Demand:	6.00	6 KW		
05	4626396	03/20/1997	10,355	2,126 KWH	139.73	
		Demand:	7.00	7 KW		
06	4626396	04/19/1997	12,396	2,041 KWH	133.14	
		Demand:	5.00	5 KW		
07	4626396	05/20/1997	15,386	2,990 KWH	227.18	
		Demand:	17.00	17 KW		
08	4626396	06/19/1997	17,515	2,129 KWH	141.43	
		Demand:	6.00	6 KW		
09	004633721	07/18/1997	19,676	2,161 KWH	129.93	
		Demand:	7.00	7 KW		
10	004633721	08/18/1997	22,122	2,446 KWH	178.82	
		Demand:	13.00	13 KW		
11	004633721	09/17/1997	24,396	2,274 KWH	143.37	
		Demand:	6.00	6 KW		
99584-81011	total for service from 11/19 to 09/17/1997 ---->			23,481	$1,841.99	$0.00

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Pinellas County Utilities

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Transaction Log

Fiscal Year 96/97
Sort # / Company #013 FLORIDA POWER CORP
Service Location #013 9701 86TH AVE N

Full Account No 00165-80359
Meter Number 004630427

Fiscal Year 96/97
Account Number 0551 / 5431100 / 6610500
Constant Applied

Trx No	Meter #	Date Read	Present Reading	Energy Consumed	Amount Paid	Amount Credited
01	004630427	10/18/1996	4,675	651 KWH	59.65	
		Demand:	4.00	4 KW		
02	004630427	11/19/1996	5,294	619 KWH	57.31	
		Demand:	2.00	2 KW		
03	004630427	12/19/1996	5,824	530 KWH	50.80	
		Demand:	2.00	2 KW		
04	004630427	01/21/1997	6,288	464 KWH	45.97	
		Demand:	2.00	2 KW		
05	004630427	02/19/1997	6,721	433 KWH	43.69	
		Demand:	1.00	2 KW		
06	004630427	03/20/1997	7,218	497 KWH	48.38	
		Demand:	1.00	1 KW		
07	004630427	04/19/1997	7,775	557 KWH	54.21	
		Demand:	2.00	2 KW		
08	004630427	05/20/1997	8,257	482 KWH	48.52	
		Demand:	4.00	4 KW		
09	004630427	06/19/1997	8,692	435 KWH	44.95	
		Demand:	1.00	1 KW		
10	004630427	07/18/1997	9,156	464 KWH	43.51	
		Demand:	2.00	2 KW		
11	004630427	08/18/1997	9,601	445 KWH	44.69	
		Demand:	2.00	2 KW		
12	004630427	09/17/1997	10,108	507 KWH	49.24	
		Demand:	2.00	2 KW		
00165-80359	total for service from 10/18 to 09/17/1997 ---->			6,084	$590.92	$0.00

Pinellas County Utilities

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Transaction Log

Sort # / Company #015 FLORIDA POWER CORP
Service Location #015 9301 78TH AV N

Full Account No 98498-16770
Meter Number 004626451

Fiscal Year 96/97
Account Number 0551 / 5431100 / 6610500
Constant Applied

Trx No	Meter #	Date Read	Present Reading	Energy Consumed	Amount Paid	Amount Credited
01	4626451	10/18/1996	65,077	1,593 KWH	135.53	
		Demand:	8.00	8 KW		
02	4626451	11/19/1996	66,751	1,674 KWH	134.53	
		Demand:	5.00	5 KW		
03	4626451	12/19/1996	68,704	1,953 KWH	154.95	
		Demand:	10.00	10 KW		
04	4626451	01/21/1997	70,571	1,867 KWH	148.66	
		Demand:	6.00	6 KW		
05	4626451	02/16/1997	72,434	1,863 KWH	148.37	
		Demand:	12.00	12 KW		
06	4626451	03/20/1997	74,454	2,020 KWH	159.87	
		Demand:	13.00	13 KW		
07	4626451	04/19/1997	76,401	1,947 KWH	159.53	
		Demand:	6.00	6 KW		
08	4626451	05/20/1997	78,771	2,370 KWH	191.59	
		Demand:	14.10	14 KW		
09	4626451	06/19/1997	80,775	2,004 KWH	163.85	
		Demand:	12.10	12 KW		
10	004626451	07/18/1997	82,710	1,935 KWH	143.42	
		Demand:	11.10	11 KW		
11	004626451	08/18/1997	84,509	1,799 KWH	144.15	
		Demand:	8.00	8 KW		
12	004626451	09/17/1997	86,410	1,901 KWH	151.64	
		Demand:	5.00	5 KW		
98498-16770	total for service from 10/18 to 09/17/1997 ---->			23,026	$1,336.19	$0.00

016

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Pinellas County Utilities

Transaction Log

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Sort # / Company #016 FLORIDA POWER CORP
Service Location #016 10401 74TH AVE N

Full Account No 01577-44933
Meter Number 00296:613

Fiscal Year 96/97
Account Number 0551 / 5431100 / 6610500
Constant Applied

Trx No	Meter #	Date Read	Present Reading	Energy Consumed	Amount Paid	Amount Credited
01	2961613	10/18/1996	14,827	44,400 KWH	2,651.64	
		Demand:	1.44	144 KW		
02	2961613	11/19/1996	15,273	44,600 KWH	2,525.21	
		Demand:	0.86	86 KW		
03	2961613	12/19/1996	15,720	44,700 KWH	2,440.95	
		Demand:	1.12	112 KW		
04	2961613	01/21/1997	16,169	44,900 KWH	2,446.92	
		Demand:	1.06	106 KW		
05	2961613	02/16/1997	16,541	37,200 KWH	2,141.88	
		Demand:	1.07	107 KW		
06	2961613	03/20/1997	16,962	42,100 KWH	2,397.12	
		Demand:	1.23	123 KW		
07	2961613	04/19/1997	17,382	42,000 KWH	2,605.70	
		Demand:	1.32	132 KW		
08	2961613	05/20/1997	17,816	43,400 KWH	2,881.03	
		Demand:	2.17	217 KW		
09	2961613	06/19/1997	18,210	39,400 KWH	2,224.58	
		Demand:	0.78	78 KW		
10	002961613	07/18/1997	18,616	40,600 KWH	2,146.08	
		Demand:	1.00	100 KW		
11	002961613	08/18/1997	19,038	42,200 KWH	2,487.82	
		Demand:	1.13	113 KW		
12	002961613	09/17/1997	19,432	39,400 KWH	2,191.03	
		Demand:	1.12	112 KW		
01977-44933	Total for service from 10/18 to 09/17/1997 ---->			504,900	29,:39.96	$0.00

Pinellas County Utilities

CMH Page: $0

Transaction Log

Sort # / Company #103 FLORIDA POWER CORP
Service Location #103 7255 94TH LA N

Full Account No 53849-98588
Meter Number 004520373

Fiscal Year 96/97
Account Number 0551 / 5431100 / 6610500
Constant Applied

Trx No	Meter #	Date Read	Present Reading	Energy Consumed	Amount Paid	Amount Credited
01	4520373	11/07/1996	23,371	562 KWH	53.14	
		Demand:	0.00	0 KW		
02	4520373	12/10/1996	23,817	446 KWH	44.65	
		Demand:	0.00	0 KW		
03	4520373	01/10/1997	24,264	447 KWH	44.72	
		Demand:	0.00	0 KW		
04	4520373	02/08/1997	24,612	358 KWH	38.21	
		Demand:	0.00	0 KW		
05	4520373	03/11/1997	24,997	375 KWH	39.46	
		Demand:	0.00	0 KW		
06	4520373	04/10/1997	25,411	414 KWH	43.36	
		Demand:	0.00	0 KW		
07	4520373	05/09/1997	25,919	508 KWH	50.49	
		Demand:	0.00	0 KW		
08	4520373	06/10/1997	26,348	429 KWH	44.50	
		Demand:	0.00	0 KW		
09	4520373	07/10/1997	26,815	467 KWH	43.72	
		Demand:	0.00	0 KW		
10	004520373	08/07/1997	27,282	467 KWH	46.31	
		Demand:	0.00	0 KW		
11	4520373	09/08/1997	27,753	471 KWH	46.59	
		Demand:	0.00	0 KW		
53849-98588	total for service from 11/07 to 09/08/1997 ---->			4,944	$495 15	$0.00

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Transaction Log

Sort # / Company: #105 FLORIDA POWER CORP
Service Location: #105 7200 79TH ST N

Full Account No: 47957-09665
Meter Number: 004633351

Fiscal Year: 96/97
Account Number: 0551 / 5431100 / 6618500
Constant Applied:

Trx No	Meter #	Date Read	Present Reading	Energy Consumed	Amount Paid	Amount Credited
01	6629097	11/07/1996	5,284	850 KWH	74.22	
		Demand:	0.00	0 KW		
02	6629097	12/10/1996	6,000	716 KWH	64.42	
		Demand:	0.00	0 KW		
03	6629097	01/10/1997	6,837	837 KWH	73.27	
		Demand:	0.00	0 KW		
04	6629097	02/08/1997	7,599	762 KWH	67.77	
		Demand:	0.00	0 KW		
05	6629097	03/11/1997	3,624	843 KWH	73.71	
		Demand:	2.00	2 KW		
06	6629097	04/10/1997	4,523	899 KWH	80.11	
		Demand:	6.00	6 KW		
07	6629097	05/09/1997	5,568	1,085 KWH	94.22	
		Demand:	7.00	7 KW		
08	6629097	06/10/1997	6,565	897 KWH	79.97	
		Demand:	3.00	3 KW		
09	6629097	07/10/1997	7,402	837 KWH	68.85	
		Demand:	5.00	5 KW		
10	004633351	08/07/1997	8,338	936 KWH	80.75	
		Demand:	3.00	3 KW		
11	6629097	09/08/1997	9,266	928 KWH	80.16	
		Demand:	3.00	3 KW		
47957-09665	total for service from 11/07 to 09/08/1997 ---->			8,590	$837.45	$0.00

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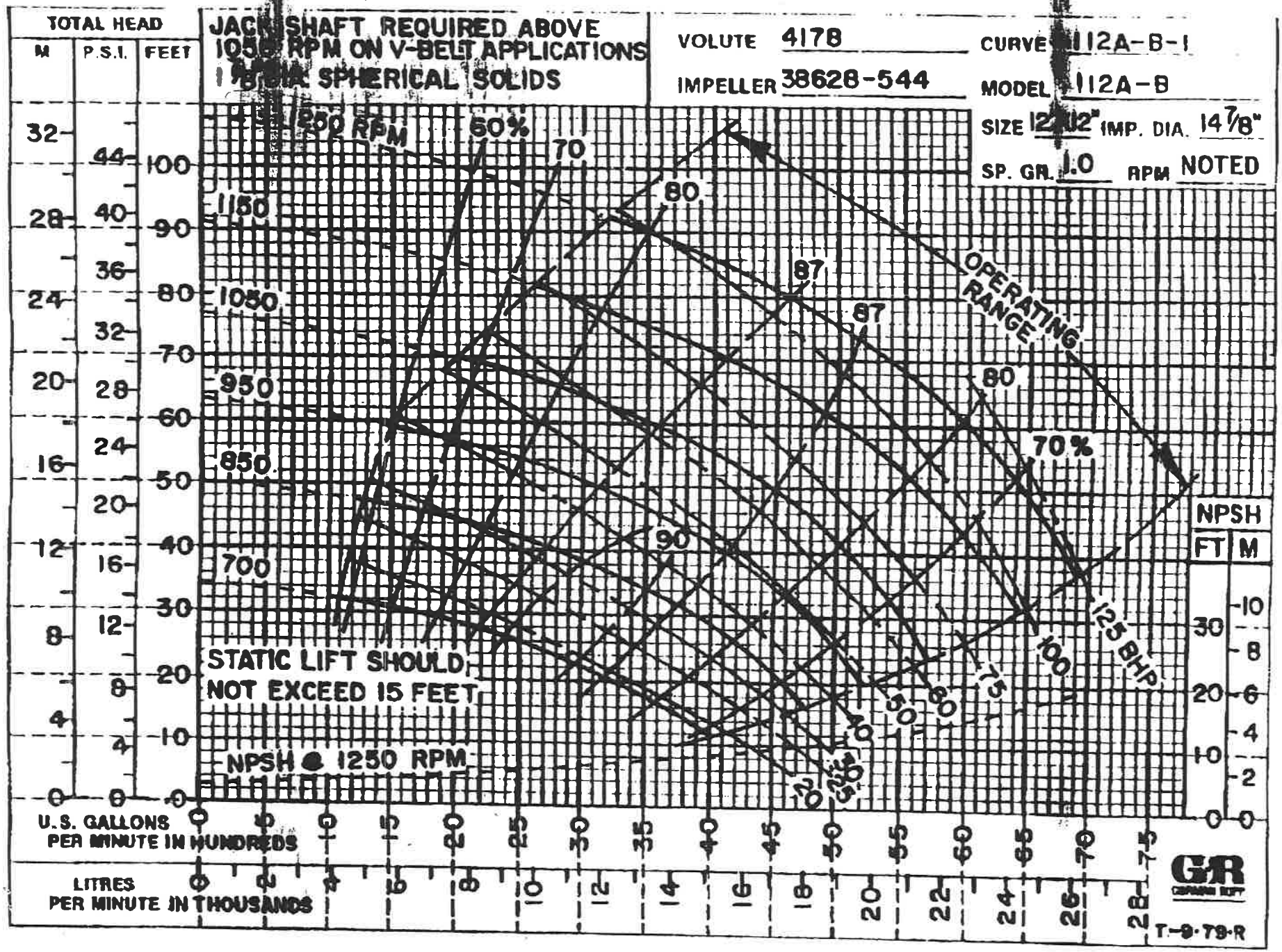
Transaction Log

Sort # / Company #106 FLORIDA POWER CORP — Full Account No — Fiscal Year 96/97
Service Location #106 7695 83RD ST N — 24635-87397 — Account Number 0551 / 5431100 / 6610500
Meter Number 004661064 — Constant Applied

Trx No	Meter #	Date Read	Present Reading	Energy Consumed	Amount Paid	Amount Credited
01	004661064	10/18/1996	6,299	10,480 KWH	651.41	
		Demand:	0.92	37 KW		
02	004661064	11/19/1996	6,544	9,800 KWH	619.26	
		Demand:	0.92	37 KW		
03	004661064	12/19/1996	6,816	10,880 KWH	678.09	
		Demand:	0.97	39 KW		
04	004661064	01/21/1997	7,054	9,520 KWH	711.26	
		Demand:	1.60	64 KW		
05	004661064	02/16/1997	7,281	9,080 KWH	585.25	
		Demand:	0.92	37 KW		
06	004661064	03/20/1997	7,549	10,720 KWH	658.84	
		Demand:	0.90	36 KW		
07	004661064	04/19/1997	7,803	10,160 KWH	658.33	
		Demand:	0.90	36 KW		
08	004661064	05/20/1997	8,102	11,960 KWH	818.13	
		Demand:	1.35	54 KW		
09	004661064	06/19/1997	8,347	9,800 KWH	635.50	
		Demand:	0.87	35 KW		
10	004661064	07/18/1997	8,633	11,440 KWH	682.87	
		Demand:	1.22	49 KW		
11	004661064	08/19/1997	8,933	12,000 KWH	726.05	
		Demand:	0.92	37 KW		
12	004661064	09/17/1997	9,190	10,280 KWH	644.38	
		Demand:	0.92	37 KW		
24635-87397	total for service from 10/18 to 09/17/1997 ---->			125,120	$8,070.37	$0.00

ATTACHMENT 9


TOTAL HEAD
M
P.S.I.
FEET
JACKSHAFT REQUIRED ABOVE 1050 RPM ON V-BELT APPLICATIONS
1/8 DIA. SPHERICAL SOLIDS
VOLUTE 4178
CURVE 112A-B-1
IMPELLER 38628-544
MODEL 112A-B
SIZE 12" x 12" IMP. DIA. 14 7/8"
SP. GR. 1.0 RPM NOTED
1250 RPM
1150
1050
950
850
700
50%
70
80
87
90
OPERATING RANGE
70%
125 BHP
100
75
60
50
40
30
STATIC LIFT SHOULD NOT EXCEED 15 FEET
NPSH @ 1250 RPM
NPSH
FT
M
U.S. GALLONS PER MINUTE IN HUNDREDS
LITRES PER MINUTE IN THOUSANDS
G&R
T-9-79-R