SANITARY SEWER COLLECTION SYSTEM MASTER PLAN
FINAL REPORT
BOARD OF WATER AND SEWER COMMISSIONERS OF THE CITY OF SARALAND
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APPENDIX A

SARALAND WASTEWATER COLLECTION SYSTEM CAPACITY ANALYSIS

By: Volkert & Associates, Inc.

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VOLKERT, INC.
1110 MONTLIMAR DR., SUITE 1050
MOBILE, ALABAMA 36609
PH (251) 342-1070

VOLKERT

SARALAND WASTEWATER COLLECTION SYSTEM CAPACITY ANALYSIS

CITY OF SARALAND, ALABAMA

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JANUARY 2005

Saraland Wastewater Collection System Capacity Analysis

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Saraland Wastewater Collection System Capacity Analysis

I. General Overview

The City of Saraland owns and operates the wastewater collection system and treatment plant that serves the Saraland area. The wastewater collection system serves approximately 4,200 customers. The wastewater collection system is comprised of over 70 miles of gravity sanitary sewer lines, over 1,300 manholes, over 11 miles of force mains, over 30 lift stations, and one wastewater treatment plant (WWTP).

Portions of the sanitary sewer collection system are over forty (40) years old. Aging sewers allow infiltration/inflow (I/I) into the sewer system. Infiltration is groundwater which enters the sanitary sewer mains and laterals through defects in the sanitary sewer system such as defective pipes, pipe joints, connections, and manhole walls. Inflow is water which enters sanitary sewer laterals and mains from the surface during rainfall events through defects in the sanitary sewer system such as storm drain cross connections, roof drains, and manhole covers. Excessive I/I diminishes the capacity of the sanitary sewer mains and increases the flow to the WWTP.

The Saraland WWTP is designed for treating flows of up to 2.6 million gallons per day (MGD). The hydraulic capacity is approximately 8 MGD. The WWTP currently receives an average flow of 1.3 MGD. During heavy rainfall events it is not unusual for the WWTP to receive flows in excess of 3 MGD with flows sometimes reaching up to 8 MGD. The additional flow experienced during rainfall events results in sanitary sewer overflows (SSOs) in areas of the collection system due to surcharging caused by capacity limitations. A pie chart showing the causes of SSOs from January 2002 to August 2004 is located in Appendix A.

The Saraland Wastewater Collection System Capacity Analysis is a process used to identify and prioritize hydraulic deficiencies in the wastewater collection system. In addition, the analysis will provide the basis to determine if sufficient capacity exists in the sanitary sewer interceptor mains (interceptor sewers). This information will assist the City of Saraland in prioritizing the construction of repairs/upgrades to the sanitary sewer system to eliminate the sanitary sewer overflows.

II. PURPOSE, SCOPE AND GOALS

The primary purpose of the analysis is to identify and prioritize deficiencies in the collection system that once repaired/upgraded will assist in eliminating sanitary sewer overflows.

The scope of the Saraland Wastewater Collection System Capacity Analysis includes the following key elements:

1. Developing a sanitary sewer collection system map from available information
2. Collecting flow monitoring data from temporary flow monitors at key locations in system
3. Perform field investigations of various critical manholes during dry weather and rainfall events to compare observed flow conditions to flow metered and modeled flows
4. Perform Lift Station inventories on all lift stations in the system
5. Generate a computer hydraulic model of the current capacity of the interceptor sewers using the flow monitoring data contained in the Flow Monitoring Analysis generated by DWC Technologies
6. Provide a summary report of the above information with recommendations for improvements and upgrades

The goals of the Saraland Wastewater Collection System Analysis includes the following:

1. Develop a workable map of the sanitary sewer collection system for use by the Saraland Sewer Department
2. Identify areas currently with limited capacity that will limit future growth so that capacity upgrades can be constructed prior to adding customers
3. Identify and prioritize sanitary sewer repairs/upgrades to the system to eliminate existing sanitary sewer overflows

III. WASTEWATER COLLECTION SYSTEM MAPPING

The wastewater collection system map located in Appendix B was developed using existing drawings, employee knowledge, and field verification. The map was created using Microstation and schematically depicts the location of the sanitary sewer manholes sanitary sewer mains, force mains and lift stations.

The collection system has been divided into six (6) basins. Each basin is comprised of a combination of gravity sewers and lift stations and is named according to its geographic location relative to the overall system. A numbering system has been developed containing unique manhole names assigned to each manhole within the system. The names identify the basin in which the manhole is located and the lift station to which it flows. The first two letters designate the basin, the next two numbers designate the lift station number ("00" if the sewers flow directly to the WWTP) and the final three numbers are the unique manhole number in that series. An example manhole number is: EC-17-024. This manhole is located in the East Celeste Basin, flows to lift station 17 and is the 24th manhole in the series. Should additional manholes be discovered in the future, the manhole will be assigned the same name as the previous upstream manhole with the addition of a letter in alphabetical order. An example of this would be EC-17-024A.

Basin names and manholes numbers will allow for easy identification of locations and of storing and organizing maintenance/improvement records. The map can be utilized by the City of Saraland's Wastewater Department to locate mains and manholes. In addition, the map will assist with the evaluation of future expansions to the collection system.

The map should periodically be corrected/updated as new field information is obtained in the future. The Sewer Department should make interim notes on the wall map located at the WWTP as additional information is discovered or as new subdivisions are added.

IV. FLOW MONITORING ANALYSIS

Flow monitoring data was collected via six (6) temporary flow monitoring stations located in the sanitary sewer trunk mains in the collection system. The Flow Monitoring Analysis generated by DWC Technologies is located in Appendix C.

Dry weather flows and wet weather flows obtained during the flow monitoring period, as well as projected extreme wet weather flows, were entered into the computer hydraulic model of the collection system interceptor sewers for capacity analysis. All interceptor sewers larger than eight (8) inches in diameter, and any smaller diameter pipes functioning as significant interceptor sewers, were included in the computer hydraulic model. Refer to Section VI – System.

Some items of note within the Flow Monitoring Analysis are as follows:

- The flow monitoring results indicate that the 10-inch, 15-inch and 18-inch interceptor sewers along Norton Creek within the Norton Creek Basin (upstream of Flow Monitor MP-5) has adequate capacity during dry weather and wet weather. However, DWC's data indicates that a large quantity of I/I is introduced in this area during wet weather. There could be many causes of this condition and further investigation is needed to determine if there are any cross connections with storm drain piping or defects allowing groundwater or creek water. Since the downstream interceptor sewers surcharge during heavy rainfall events, this area should be a priority for further investigations using internal video inspections and smoke testing.

- The 18-inch and 21-inch interceptor sewers north of Norton Creek within the East Celeste Basin (upstream of Flow Monitor MP-6) do not have adequate capacity, even during dry weather. Flow velocities are low, facilitating the deposition of solids in the sewers resulting in decreased pipe capacities. DWC's data indicates that I/I introduced into these interceptor sewers is relatively minimal. However, there was significant sedimentation and debris present in the flow monitor manhole. Subsequent field investigations have confirmed that at least moderate sedimentation is also present upstream of this point. Even during dry weather flows, it appears that greater than 50% of the available capacity is utilized. It does not appear that action to reduce I/I is warranted for this area at this time. Cleaning and video inspection, as well as maintenance cleaning, is necessary to maintain the available capacity of these sewers and to maintain higher flow velocities. Further investigation is necessary to determine the sources of the sedimentation. This includes reviewing the internal videos to identify open or cracked pipe joints or other pipe conditions that allow silt to enter the piping system. This investigation would also include measuring silt in the manholes on the 8-inch sewers feeding to these interceptor sewers.

- The 18-inch interceptor sewers along Highway 158 in the Industrial Parkway Basin appear to have adequate capacity, even in wet weather. However, the I/I introduced to this interceptor is significant, although not critical when compared to the hydraulic capacity of the main. Further investigation is needed to determine if there are any cross connections to a storm water drainage system.

It should be noted that the amount of I/I that enters a wastewater collection system depends on the duration and intensity of the rainfall events and other variables including surface water height, ground water height, condition of system components, antecedent soil moisture, size of the basin, drainage of soils, and the existence of illegal cross connections. Therefore, the flow monitoring report included in the appendix is unique to the time that flow monitoring was performed and the amount of I/I that entered the sewer system during the specified period. Therefore, the magnitude of the I/I volumes may vary with subsequent flow monitoring.

V. LIFT STATION INVENTORY

A Lift Station Inventory was performed for all thirty-three (33) lift stations maintained by the City of Saraland. An inventory of all equipment, buildings, fencing, and site conditions was performed including the conditions of these items. A pump down test was performed at each station to determine the flow rate each pump is currently pumping. This information was compared to the design flow rate when this information was available. In addition, the pumps run times were reviewed for periods of dry weather flows and wet weather flows to assist with determining the capacity limits of each pump station. The above information was logged into a spreadsheet attached in Appendix D. Also included in Appendix D are photographs taken at each lift station.

A lift station flow chart was generated to visually show which lift stations pump into subsequent lift stations. Also, schematics of the collection system basins were generated to further assist with reviewing capacity limitations of the lift station. These drawings are located in Appendix G and will assist with performing capacity analysis for potential residential or commercial development in the future.

An analysis regarding the pumping rates and influent flow rates of each station was performed. A pump down test is performed by activating a pump and noting the water level change in the wetwell. Using a special apparatus, the time required for a water level change of a certain distance is recorded. By determining the volume pumped from the wetwell and the time required to pump that volume from the wetwell, the flow rate of each pump was calculated. The results of the pump down tests and available manufacturer pump curves and design data was used to determine the current percentage of design capacity used at each lift station. Attached in Appendix E is the design pump curve for each lift station. The latest pump run-time data was further reviewed to identify pumping abnormalities in comparison with the pumping information determined as described above.

Volkert's findings indicate that there are several lift stations that are currently pumping below their original design capacities. The run times were reviewed to determine if the reduced pumping capacity was creating excessive run times. This review noted that the Scott Drive Lift Station and the Graham Street Lift Station appears to have capacity limitations.

The Scott Drive Lift Station pump down test results revealed that the lead pump could not lower the wetwell by itself during the field test. Also, the pump run-time data for the Scott Drive lift station appears to show that both pumps are not alternating and are producing high run-times especially during rain events. In addition, there is evidence that flooding occurs in the building and within the existing control panel. For these reasons, it is recommended that the Scott Drive Lift Station be replaced with a station having higher capacity that is located out of the flood plain.

The Graham Street Lift Station is producing high run times and, during rainfall events, the pumps are pumping excessively. It appears that the gravity sewers that flow to the Graham Street Lift Station are introducing a significant amount of I/I. It is recommended to replace the pumps of the Graham Street Lift Station with higher capacity pumps. In addition, the collection system that flows to this lift station should be considered for future inspection and rehabilitation work.

The Telegraph Road Lift Station is currently operating at approximately 25% of its original design capacity based on original manufacturer pump data. Records indicate that the Telegraph Road Lift Station was designed to handle 1,457 GPM; however, the pump down test indicates that the pumps are only pumping approximately of 375 GPM. A review of the run times indicate that the station is not currently running excessively even with the reduced flow rates. One item of concern is that there are three lift stations that discharge to the Telegraph Road Lift Station. When each of these three lift station are pumping at the same time, it could potentially produce a flow greater than 559 GPM. This situation may cause the influent sewers to the Telegraph Road Lift Station to surcharge since its

pumps pump at a lower flow rate. Therefore, it is recommended that the impellers and wear plates of the pumps be replaced to regain the original pump design capacity.

Of the remaining lift stations pumping below their original design capacity, it has been determined that their lowered pumping capacities can be attributed mainly to mechanical wear. It is recommended that a detailed physical inspection of pumps and appurtenances be performed and that the following parts be replaced as needed: impellers, wear plates, seal assemblies, bearings, gaskets, flap valves (Gorman Rupp Only), belts and sheaves, check valves, and plug valves. Since these lift stations do not currently appear to have a capacity problem, the repair recommendations are included on the list located in Appendix F, "Lift Station Repair Recommendations". Refer to this list for specific recommendations of each lift station.

An inspection of the overall site conditions at each of the 33 lift stations was performed. An assessment of site drainage, fencing, driveways, overall building conditions, roof conditions, wet well conditions, indications of groundwater infiltration into wet wells, amounts of grease and silt present in wet wells, overall electrical systems, and control operating conditions were noted. From the above overall site evaluation, a repair/upgrade list for each station was generated and prioritized. See Appendix F, "Lift Station Repair Recommendations", for specific recommendations of each lift station.

VI. SYSTEM MODELING

An interactive computer hydraulic model of the interceptor sewers within the wastewater collection system has been constructed using Haestad Method's SewerCAD program. The model enables evaluation of the system for potential surcharged areas and capacity-limited areas. The model also enables development of more accurate and cost-effective system maintenance and upgrade methods. Interceptor sewers with a diameter of 10 inches and larger and any 8-inch diameter mains functioning as interceptor sewers were included in the model.

A. Definition of Sewer Capacity

Capacity problems typically arise when:

1. Additional sewer service connections exceed the design capacity of the existing system.

2. The effective capacity of system components, including pump stations, are less than the design capacity.

3. Actual I/I levels exceed projected levels used in the system design.

The main objective of creating the model is to ensure that the system has sufficient wastewater collection capacity to convey the wastewater to the WWTP without the occurrence of SSOs. SSOs are caused by four general categories of conditions including:

1. Peak flows that exceed system capacity.

2. Line blockages.

3. Structural, mechanical, or electrical equipment failure.

4. Third-party actions or activities.

For the purposes of this analysis, adequate capacity for gravity sewers is defined as the condition where any gravity sewer does not surcharge (exceed 100% full capacity of the sewer) during the peak one-hour wastewater flow projected for a 3.00-inch rainfall event, based on wastewater flow projections contained in the Flow Monitoring Analysis located in Appendix C.

B. Computer Hydraulic Model Analysis Theory

Manning's equation is the discharge equation that is most often used by hydraulic engineers to calculate wastewater capacity in gravity systems. SewerCAD uses an algorithm of Manning's equation to determine the flow profile along a length of pipe.

Manning's equation is as follows,

$$Q = (1.49/n) \times A \times R^{2/3} \times S_o^{1/2}$$

where	Q	=	Discharge in the section (cfs)
	n	=	Manning's roughness coefficient (unitless)
	A	=	Flow area (ft^2)
	R	=	Hydraulic radius (ft)
	S	=	Friction slope (ft/ft)

The capacity of a gravity sewer line is calculated based on a number of variables including the pipe diameter, pipe slope, and a Manning's roughness coefficient based on the pipe material. The roughness coefficient, *n*, is calibrated using actual flow data and depth of flow measurements accumulated from flow monitors throughout the system. Inputting all of the required variables into the hydraulic model results in a calculation of the full-flow capacity in each pipe segment. The full-flow capacity, along with the calculated flow profile, is then compared to the actual flow data and depth of flow information from flow-monitoring stations to determine how much capacity is available in each pipe segment.

Numerous pipe materials are installed in the Saraland wastewater system. These different pipe materials include: vitrified clay, ductile iron, high-density polyethylene (HDPE), PVC and concrete. For a comparison of the various roughness coefficients for different pipe materials in the wastewater collection system, see Table I.

Table I. Pipe Materials and Commonly Used Roughness Coefficients

Pipe Material	Manning's Coefficient *n*
Vitrified Clay	0.011-0.017
Cast-Iron, New	0.012
Centrifugally Spun Concrete (Smooth)	0.013
Ductile Iron (New)	0.012
Plastic (PVC/HDPE)	0.009

Source: Haestad Methods SewerCAD for Windows User's Manual (Pg. 257)

C. Available System Information

Creating the schematic framework of the model required entering physical attributes for modeled system components, such as manholes, interceptor mains, lift stations, and force mains. Physical attributes for system components was obtained from various sources, including available record drawings, the "Sewer System Atlas" developed by the South Alabama Regional Planning Commission (SARPC) dated June 1997, elevation contour maps (2-foot intervals) obtained from Mobile County, field surveys, field manhole depth measurements, and employee knowledge.

Due to the advanced age of many areas within the wastewater system, it should be noted that detailed record drawings do not exist for many gravity sewers. In many instances, the available information indicates only the length and/or diameter of the interceptor sewers, but does not indicate manhole rim and invert elevations or pipe materials. These areas include large sections of the 30-inch interceptor sewers along Highway 43 near the WWTP, the 24-inch, 18-inch, 15-inch and 10-inch interceptor sewers along Norton Creek within the Norton Creek Basin, the 21-inch interceptor sewer from Norton Creek to Celeste Road in the East Celeste Basin, and the 18-inch interceptor along Celeste Road in the East Celeste Basin.

Since it was considered a critical area, Volkert performed a cursory field survey of the manholes just upstream and just downstream of the siphon crossing of Norton Creek on the west side of Highway 43.

D. Computer Hydraulic Model Construction

Based on the available record drawings, field survey data, etc. and the flow monitoring data received, the following information was input into the computer hydraulic model: pipe diameter, pipe material, upstream and downstream invert elevations, manhole rim elevations, manhole diameters, Manning's *n*-values, and historical flow data.

In any areas where the available information did not indicate manhole invert elevations, pipe diameters, pipe lengths, or pipe materials, the input data was assumed. Where there is no physical data available for a segment of gravity sewers or upstream of that segment, it is assumed that the gravity sewer was constructed at the minimum slope required to maintain a flow velocity of 2.10 feet per second for the particular pipe diameter. For a segment of gravity sewers with known manhole invert elevations upstream and downstream of the segment, it is assumed that the gravity sewer holds a constant slope between the adjacent manholes and known invert elevations. Table II shows the recommended minimum constructed slopes for various diameter sanitary sewer mains.

Manhole rim elevations were assumed to correspond to elevations shown on Light Detection and Ranging (LIDAR) elevation contour maps obtained from Mobile County. To confirm the assumed manhole invert elevations, invert depth measurements were taken at various "strategic" manholes along the Norton Creek interceptor main and the interceptor between Norton Creek and Celeste Road.

Table XIII. Minimum Constructed Slopes for Various Diameter Sewer Mains

Nominal Sewer Size (Inches)	Minimum Slope in Feet Per 100 Feet
8	0.40
10	0.28
12	0.22
14	0.17
15	0.15
16	0.14
18	0.12
21	0.10
24	0.08
27	0.067
30	0.060
33	0.052
36	0.046
39	0.041
42	0.037

Source: Recommend Standards for Sewage Works, Great Lakes-Upper Mississippi River Board of State Sanitary Engineers (Ten-States Standards) (PG. 30-2)

E. Flow Generation

The following scenarios were evaluated by the computer hydraulic model:

1. Dry Weather Average Daily Flow (ADF)
2. Wet Weather Peak Hourly Flow (PHF) measured during the 1.70-inch rain event that occurred on April 29, 2004.
3. Wet Weather Projected PHF for a 3.00-inch rain event

The flow values entered into the model were based upon the flow measurements and flow projections included in the Flow Monitoring Analysis in Appendix C. A summary of the measured dry weather flows as well as corresponding flow depths and velocities is shown in Table III. A summary of the measured wet weather flows and flows projected for a 3.00-inch rain event is shown in Table IV.

Table III. Summary of Flow Monitoring Analysis Results - Measured Dry Weather Flows

Flow Monitor	Pipe Dia. (in)	Dry Weather Summary							
		Dry Weather ADF				Dry Weather PHF			
		Flow Depth (in)	Flow Velocity (fps)	Measured Flow (MGD)	% Full Pipe	Flow Depth (in)	Flow Velocity (fps)	Measured Flow (MGD)	% Full Pipe
MP-1	18.50	4.32	1.71	0.37	23%	5.48	2.33	0.56	30%
MP-2	30.25	11.48	1.23	1.37	38%	14.23	1.55	1.90	47%
MP-3	14.25	2.06	0.51	0.04	14%	3.25	0.92	0.07	23%
MP-4	17.50	3.09	0.78	0.10	18%	3.71	1.08	0.14	21%
MP-5	14.75	3.15	1.18	0.12	21%	3.88	1.82	0.21	26%
MP-6	19.63	12.84	0.52	0.74	65%	14.78	1.17	0.90	75%

Source: Flow Monitoring Analysis, DWC Technologies, LLC (PG. 10)

Table III. Summary of Flow Monitoring Analysis Results - Measured Flows from April 29, 2004 1.70-Inch Rain Event and Projected Flows for 3.00-Inch Rain Event

Flow Monitor	Pipe Dia. (in)	Wet Weather Summary				
		1.70-Inch Rain Event PHF				3.00-Inch Rain Event Projected PHF
		Flow Depth (in)	Flow Velocity (fps)	Measured Flow (MGD)	% Full Pipe	Projected Flow (MGD)
MP-1	18.50	5.81	1.95	0.76	31%	0.94
MP-2	30.25	15.64	1.23	3.00	52%	3.79
MP-3	14.25	4.34	0.51	0.15	30%	0.16
MP-4	17.50	5.09	0.94	0.32	29%	0.53
MP-5	14.75	5.42	1.60	0.69	37%	1.28
MP-6	19.63	15.11	0.82	0.97	77%	1.34

Source: Flow Monitoring Analysis, DWC Technologies, LLC (PG. 10)

For each scenario within the computer hydraulic model, flows were introduced at manholes upstream of each flow monitor such that the cumulative flow going through each flow monitor manhole corresponds to the measured or projected flows of a particular flow scenario. To approximate the increase in flow along an interceptor sewer as flow is introduced from smaller sanitary sewer mains feeding into the interceptor sewer, the flows were applied in a "weighted" fashion along each interceptor sewer. The manholes where flows are introduced in the model correspond to manholes where sanitary sewer mains connect to the interceptor sewer. The magnitude of flow introduced to a manhole is "weighted" such that it is roughly proportional to the length of 8-inch sewers flowing to that manhole.

E. Model Calibration

The objective of model calibration is to ensure that the flow velocities and flow depths calculated by the model for a given flow scenario correlate to the corresponding measured flow velocities and flow depths indicated by flow monitor data. In general, dry weather flow calibration is performed first since more data points for dry weather flow are available from the flow monitoring data.

To calibrate the model for dry weather flows, the model is run to route the measured dry weather ADF's down to the flow-monitoring location and to calculate the velocity and depth of flow at the flow-monitoring locations. These calculated values are then compared with the actual flow monitoring data. An acceptable margin of error is a 10 to 15 percent difference in the calculated flow depth and the measured flow depth at a flow monitoring location.

If the calculated flow depth difference is outside this acceptable margin of error, Manning's *n*-values of the gravity mains are adjusted accordingly. Also, any assumed pipe slope values may be adjusted. Manning's *n*-value is dependent on many factors including pipe material, pipe age and roughness. For the purposes of this hydraulic model, it has been assumed that all identically-size consecutive interceptor sewer segments are of the same age and have similar Manning's *n*-values. Therefore, during calibration, Manning's *n*-values were adjusted as necessary to the same value for identically-sized consecutive interceptor sewer main segments.

Once the dry weather calibration has been completed, wet weather scenarios are included in the model and calculated flow depths and flow velocities are compared to the measured flow depths and flow velocities in the same manner as is done for dry weather flows. If the calculated wet weather PHF flow depths are not calibrated within the acceptable margin of error, the *n*-value is readjusted as necessary to obtain the greatest level of agreement between the calculated and actual dry weather/wet weather flow depths.

Since the *n*-value is related to the physical properties of the sewer pipe, calibrating the model based on the Manning's *n*-value can help to determine if something out of the ordinary is occurring in a sewer line. If the *n*-value is calibrated above 0.020, there may be an obstruction or accumulated sand and/or silt in the sewer.

F. Hydraulic Modeling Analysis and Results

Various dry weather flow and wet weather flow scenarios were included in the computer hydraulic model for both uncalibrated and calibrated conditions. The following is a summary of the model results:

- *Flow Monitor MP-1*
  (Extreme upper portions of the East Celeste Basin downstream of the discharge manholes of the force mains from the Forest Avenue Lift Station, the Deer Run Drive Lift Station)

  Note: Very little record drawing information is available for the interceptor sewer mains upstream of MP-1. Physical attributes such as manhole invert elevations and pipe slopes were assumed using the methods described within this report. Actual physical attributes may vary significantly from assumed values. Field confirmation of invert elevations and pipe slopes would be necessary to provide a higher degree of confidence in the model results.

Applying the projected PHF (0.94 MGD) for a 3.00-inch rain event, the model indicates that that the interceptor sewers upstream of this flow monitor have sufficient capacity to accommodate the projected flow.

- *Flow Monitor MP-6*
  (Portions of the East Celeste Basin downstream of Flow Monitor MP-1 to Norton Creek)

  Note: Very little record drawing information is available for the interceptor sewer mains upstream of MP-6. Physical attributes such as manhole invert elevations and pipe slopes were assumed using the methods described within this report. Actual physical attributes may vary significantly from assumed values. Field confirmation of invert elevations and pipe slopes would be necessary to provide a higher degree of confidence in the model results.

  For flows corresponding to the PHF (0.97 MGD) of the 1.70-inch rain event that occurred on April 29, 2004, the model indicates that several of the 21-inch interceptor sewer segments along Frances Street, West Everett Street, Ennis Street, and Shelton Beach Road are operating at approximately greater than 90% capacity. Applying the projected PHF (1.34 MGD) for a 3.00-inch rain event, the model indicates significant surcharging along these same streets (approximately greater than 120% capacity is required). Assuming that these interceptor main segments were new and clean, the model indicates that less than 50% of the available capacity would be needed to handle the projected PHF.

  For these segments of the interceptor sewers upstream of MP-6, it was necessary to calibrate the n-value to a value much greater than the upper limit value of 0.020. This condition generally indicates the presence of an obstruction in the line or significant sedimentation in the line. Subsequent cleaning of this line may decrease actual flow depths significantly.

- *Flow Monitor MP-5*
  (Upper portions of the Norton Creek Basin upstream MP-5)

  Note: Very little record drawing information is available for the interceptor sewer mains upstream of MP-5. Physical attributes such as manhole invert elevations and pipe slopes were assumed using the methods described within this report. Actual physical attributes may vary significantly from assumed values. Field confirmation of invert elevations and pipe slopes would be necessary to provide a higher degree of confidence in the model results.

  For flows corresponding to the projected PHF (1.28 MGD) for 3.00-inch rain event, the model indicates that sufficient capacity is currently available upstream of MP-5. In general, less than 50% of the available capacity is utilized during this PHF.

- *Flow Monitor MP-2*
  (Lower portions of the Norton Creek Basin downstream of MP-5 and MP-6 to just downstream of the depressed sewer under Norton Creek)

  Note: Very little record drawing information is available for the interceptor sewer mains upstream of MP-2. Physical attributes such as manhole invert elevations and pipe slopes were assumed using the methods described within this report. Actual physical attributes may vary significantly from assumed values. Field confirmation of invert elevations and pipe slopes would be necessary to provide a higher degree of confidence in the model results.

For flows corresponding to the projected PHF (3.79 MGD) of a 3.00-inch rain event, the model indicates that there is little capacity available upstream of MP-2. The model indicates that the 24-inch mains upstream of the depressed sewer under Norton Creek would utilize greater than 90% of the available capacity. Field investigations have confirmed that the 24-inch main flowing into Manhole No. NC-00-001 has an invert elevation approximately 1.5-feet *lower* than the 24-inch main flowing out of the manholes. Therefore, a "bottleneck" is present that restricts flow and leads to sedimentation collection and capacity loss upstream of this manhole.

- *Flow Monitor MP-3*
  (Interceptor mains in the Bayou Sara Basin routed to Telegraph Road Lift Station)

  For flows corresponding to the projected PHF (0.16 MGD) of a 3.00-inch rain event, the model indicates that that the interceptor sewers upstream of this flow monitor have sufficient capacity to accommodate this projected flow.

- *Flow Monitor MP-4*
  (Interceptor mains in the Industrial Parkway Basin routed to the Park Street Lift Station)

  For flows corresponding to the projected PHF (0.53 MGD) of a 3.00-inch rain event, the model indicates that that the interceptor sewers upstream of this flow monitor have sufficient capacity to accommodate this projected flow.

G. Field Investigation of Model Results

On November 2-3, 2004, a significant rain event occurred which allowed Volkert staff to perform field investigations of the interceptor sewers upstream of the former locations of Flow Monitor MP-2 and Flow Monitor MP-6. According to the City of Saraland's weather station, 1.65 inches of rain fell on November 2 and 1.08 inches of rain fell on November 3. During and after the rain event on November 3, Volkert's staff opened several manholes in these areas to observe flow depths and degrees of surcharging that were occurring during wet weather flow conditions.

It was discovered that the interceptor sewers were flowing at greater than 95% available capacity at several locations in the East Celeste Basin including the following:

- 18-inch interceptor sewers along Celeste Road near the intersection of Celeste Road and Bernard Avenue
- 21-inch interceptor sewers along Bernard Avenue, Senack Drive and Norton Avenue
- 21-inch interceptor sewers along Shelton Beach Road

Also, it was noted that some silt accumulations (1-inch to 3-inch) were present in various manholes in these areas

Although these observations are not entirely consistent with the model results for these areas, the observations concur with the model's indication that some sort of blockage exists or significant sedimentation is present.

VII. IMPLEMENTATION/RECOMMENDATIONS

The primary cause of SSOs has been surcharging of interceptor sewers. In review of the locations where SSOs have historically occurred, is has been determined that the interceptor sewers mush be significantly surcharged (to depths of eight (8) feet or greater above the top of the interceptor sewer) to cause an SSO event. Based on the available physical system information and the available wet weather flow information, it has not been possible to recreate surcharges of this magnitude. Therefore, it appears that an obstruction of some nature exists or there is very significant sedimentation within the 21-inch interceptor sewer within the East Celeste Basin. To determine the nature and location of the suspected blockage or severe sedimentation, cleaning and internal television inspection is recommended.

During installation of the flow meters, it was noted that the depth of sediments was 6 to 8 inches at the bottom of the 21-inch interceptor sewer in East Celeste Basin and the 30-inch interceptor in the Highway 43 Basin. During field investigations, it has been noted that a large amount of grease is present in some manholes on the interceptor sewers along Norton Creek, especially at Manhole No. NC-00-003. As noted elsewhere in this report, the flow monitoring revealed that certain interceptor sewer segments along Norton Creek have significantly increased flows during rain events due to I/I. The cleaning of certain interceptor sewers within the Norton Creek Basin and the East Celeste Basin will allow the condition of these sewers to be evaluated so that repair, replacement, or rehabilitation of the sewers may be recommended. Therefore, it has been determined that cleaning and internal television inspection of certain portions of the Norton Creek Basin and East Celeste Basin interceptor sewers should be priority.

- Cleaning and Internal Video Inspection of the 21-inch interceptor sewer from Celeste Road to Norton Creek, the 24-inch interceptor sewer along Norton Creek and the 30-inch interceptor sewer from Norton Creek to the WWTP

  This work could be performed in one project or separated into two or more phases.

  Phase 1 – Cleaning and internal video inspection of the 21-inch interceptor sewer from Celeste Road to Norton Creek. Approximately 8,460 linear feet of 21-inch pipe is recommended to be included in this phase.
  Estimated Cost.....$110,000
  Estimated Time Frame ..... 3 MONTHS

  Phase 2 – Cleaning and internal video inspection of the 24-inch portion of the interceptor sewers along Norton Creek from the point of intersection with the 21-inch interceptor sewer to Highway 43, including the siphon that crosses Norton Creek. Approximately 2,120 linear feet of 24-inch pipe is recommended to be included in this phase, as well as approximately 350 linear feet of 18-inch (estimated) pipe installed in parallel at the siphon.
  Estimated Cost.....$50,000
  Estimated Time Frame ..... 1 ½ MONTHS

  Phase 3 – Cleaning and internal video inspection of the 30-inch portion of the interceptor sewers beginning downstream of the Norton Creek siphon to the WWTP. Approximately 2,460 linear feet of 30-inch pipe is recommended to be included in this phase.
  Estimated Cost.....$58,000
  Estimated Time Frame ..... 1 ½ MONTHS

Upon completion of the cleaning and internal video inspection of these areas, a list of needed system repairs should be generated. This may involve replacement of sewer pipes and manholes, point repairs, and lining of sewer pipes and manholes. It is anticipated that the cleaning and these system repairs will correct conditions that lead to surcharging of the sewers and, ultimately, SSOs.

Therefore, these repairs would take precedence once known. Upon completion of cleaning and performing needed collection system repairs, the collection system will need to be monitored and evaluated for a period of time to ensure that the system is operating as anticipated. Note that field surveys performed by Volkert have revealed that the existing siphon under Norton Creek is laid against grade and at least one portion of the 24-inch interceptor sewer along Norton Creek has a lower invert elevation than manholes that are downstream and adjacent to the siphon. These conditions should be corrected and can be addressed as defects discovered by the internal video inspection are repaired.

- Replacement/Repair/Rehabilitation of Inspected Interceptor Sewers in Norton Creek Basin and East Celeste Basin
  The estimated cost and construction time frame can not be determined at this time due to the unknown number and severity of the repairs. However, typical point repair costs are as follows:

  Point repair on a 24-inch interceptor sewer located along a creek $25,000/EA
  Point repair on a 21-inch interceptor sewer located in an easement $15,000/EA
  Point repair on a 21-inch interceptor sewer located in the roadway $21,000/EA
  Replacement of the existing siphon with a depressed sewer..... $100,000/EA

  Typical rehabilitation costs are as follows:

  Cured in Place Pipe (CIPP) Lining 8-inch $30/LF
  Cured in Place Pipe (CIPP) Lining 24-inch $85/LF
  Urethane/Epoxy Manhole Lining 48-inch..... $220/VF
  Cementitious Manhole Lining 48-inch..... $120/VF

  The number of point repairs and/or rehabilitation required would be determined by the internal video inspection of the pipe.

The Flow Monitoring Analysis noted a large increase in flow due to I/I in the 15-inch and 18-inch clay interceptor sewers located along Norton Creek immediately following a rain event. Generally, this is an indicator of a cross connection of a storm drain, broken pipe, or a combination of several defects. These interceptor sewers are part of one of the oldest portions of the system. Smoke testing should be performed to determine the exact locations of pipe breaks or storm drain cross connections to be addressed. Smoke testing is a visual test using a non-irritating smoke approved by EPA. The smoke is generated and forced into the sewer lines and the locations where it escapes are noted. The smoke could be released through cracks in pipes, manholes, lateral cleanouts, drains, and downspouts. Removal of these I/I sources in this portion of the interceptor sewers should assist with reducing the increase in flow during rain events that contributes to the SSOs occurring upstream.

- Smoke Testing of 15-inch and 18-inch Interceptor Sewers Along Norton Creek
  Smoke testing equipment is estimated to cost approximately $1,500. A two-person team can typically smoke test approximately 5,000 linear feet of interceptor sewers each day. Another option would be for the City to contract the smoke testing out at a rate of approximately $0.35/linear foot.
  Estimated Cost..... $20,000
  Estimated Time Frame ..... 1 ½ months

The Flow Monitoring Analysis noted a large increase in flow in the interceptor sewer along Highway 158 in the Industrial Parkway Basin immediately following a rain event. Generally, this is an indicator of a cross connection of a storm drain, broken pipe, or a combination of several defects. Smoke testing should be performed to determine the exact locations of pipe breaks or storm drain cross connections to be addressed. The Flow Monitoring Analysis and the computer hydraulic model indicates that this area currently has sufficient available capacity, even during wet weather flows. However, addressing the located I/I sources will ensure that sufficient capacity is available for future development and will lessen the flows received by the WWTP.

- Smoke Testing of Interceptor Sewers Along Highway 158
  Smoke testing equipment is estimated to cost approximately $1,500. A two-person team can typically smoke test approximately 5,000 linear feet of interceptor sewers each day. Another option would be for the City to contract the smoke testing out at a rate of approximately $0.35/linear foot.
  Estimated Cost.....$15,000
  Estimated Time Frame .....1 month

The Scott Drive Lift Station pumps currently have excessive run times and, as discussed previously, maintenance issues of the lift station control systems have been noted. In addition, this lift station site is subject to flooding. For these reasons, it is recommended that the Scott Drive Lift Station be replaced with a station having higher capacity and that is located out of the flood plain.

- Replacement of the Scott Drive Lift Station
  The Scott Drive Lift Station should be replaced with a station having higher capacity pumps that are elevated above the flood level. The old station should be demolished in this project.
  Estimated Cost.....$150,000
  Estimated Time Frame .....6 months

The Graham Street Lift Station is producing high run times during rainfall. For these reason, it is recommended that the Graham Street Lift Station's pumps be upgraded with higher capacity pumps and motor upgrades to gain the additional capacity. This would involve control and motor upgrades.

- Graham Street Lift Station Pump Upgrades
  The impellers, controls, motor and related appurtenances can be upgraded through service contracts.
  Estimated Material Cost $20,000
  Estimated Time Frame ..... 1 week

The Telegraph Road Lift Station pumps 25% of its original design capacity. For this reason, it is recommended that the Telegraph Road Lift Station's impellers and wear plates be replaced.

- Telegraph Road Lift Station Pump Repairs
  The pump impellers and wear plates can be replaced by the Sewer Department.
  Estimated Material Cost $8,000
  Estimated Time Frame ..... 2 days

The repair recommendations for all of the lift stations are included in Appendix F. Except for those listed above the remaining lift station repair recommendations do not currently appear to affect the capacity or operation of the collection system. However, these repair recommendations should be evaluated by the Sewer Department and performed within the near future to prevent any future problems with those items listed. A materials cost list provided by a pump manufacturer is also provided in Appendix F for reference.

The Sewer Department should continue to perform pump downs and run times comparisons yearly to determine if maintenance or replacements of pumps are required to maintain the capacities needed for current conditions and future growth.

The City's current sanitary sewer construction standards need to be updated to incorporate currently available construction materials and methods. The standards should be provided to the developers of any development requiring construction of an extension of the sanitary sewer system to ensure that adequate materials and construction methods are utilized during design and construction of the new development.

- Update Construction Standards
  Estimated Cost.....$10,000

The following items are several suggestions to improve the quality and maintenance of the City's wastewater system.

- Create a subdivision plan review process
  It is recommended that the City implement a process that requires a developer to sign an agreement with the City prior to acceptance of the new sanitary sewer collection system by the City. This agreement would indicate the amount of the proposed flows generated by the new development and require validation that the system will be built in accordance with the construction standards. This process will allow the Sewer Department to determine if the discharge point of the new development has available capacity to receive the proposed flows. This process could also require the developer to submit development plans for review by the Sewer Department for approval prior to beginning construction. The agreement should state that the Sewer Department is be notified of construction activities by the developer to allow for inspection of construction by the Sewer Department to compliance with the City's standards.

- Create a sewer cleaning and internal video inspection program
  A sewer cleaning and internal video inspection program would allow for cleaning of sewer mains and reviewing the condition of aged pipes and manholes. This program should be performed methodically throughout the system on an "available funding" basis. This program will allow the Sewer Department to locate sewer mains and manholes that may not currently be shown on any available records. A list of repairs recommendations could be generated from the internal video inspection records to assist with removing I/I from the wastewater collection system.

  As pipes and manholes continue to deteriorate with age, this program would continue indefinitely. Once the system has been cleaned and inspected in its entirety, the program would begin again. The City could elect to bid an annual contract for cleaning and internal video inspection on an as needed basis. An annual contract allows the City to opportunity to obtain competitive unit prices that can be utilized on an "as needed" or "funding available" basis. Typically an annual contract can be renewed if agreed to by both the Contractor and the City for up to a total of three (3) years.

- Create a smoke testing program
  Create a program that will allow for the Sewer Department to perform smoke testing in aged system areas, in areas where I/I may be significant, and in areas where pipe defects or cross connections are suspected. Locating and repairing pipe defects and cross connections will reduce I/I flows and ultimately increase available sewer.

Smoke testing is done by introducing smoke to the collection system through manholes. Sewer plugs are used to isolate the sewer segments to which the smoke is to be introduced. Smoke will exit sewer pipes through holes, breaks, separated joints, etc. and rise upwards out of the ground. Should a cross connection exist, the smoke will exit through storm drainage structures such as storm drain inlets or house vents. The location of smoke would be noted and a picture would be taken of the defects location. Smoke testing equipment costs approximately $1,500. A two-person team is typically able to smoke test approximately 5,000 linear feet per day. Another option would be for the City to contract the smoke testing out at approximately $0.35/ linear foot.

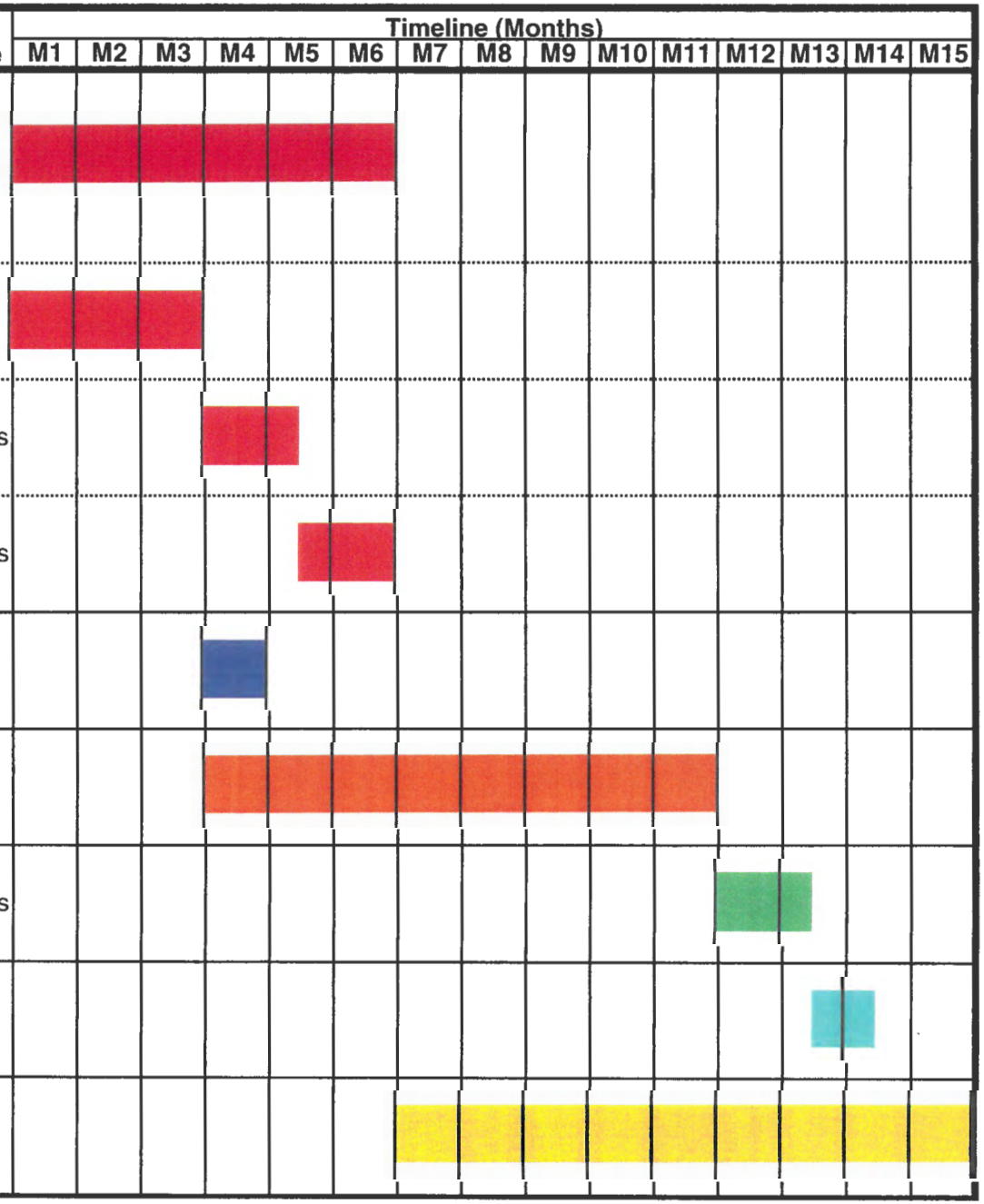
- Create a private/public lateral replacement program
  A large portion of I/I is introduced to the collection system through defects in sewer laterals. The City should consider developing a program to repair/replace defective private-side and public-side laterals systematically throughout the system.

- Create a grease control public information program
  Create a public education program including developing an informational pamphlet to inform all sewer customers about proper grease disposal methods and the negative affects of grease on the collection system.

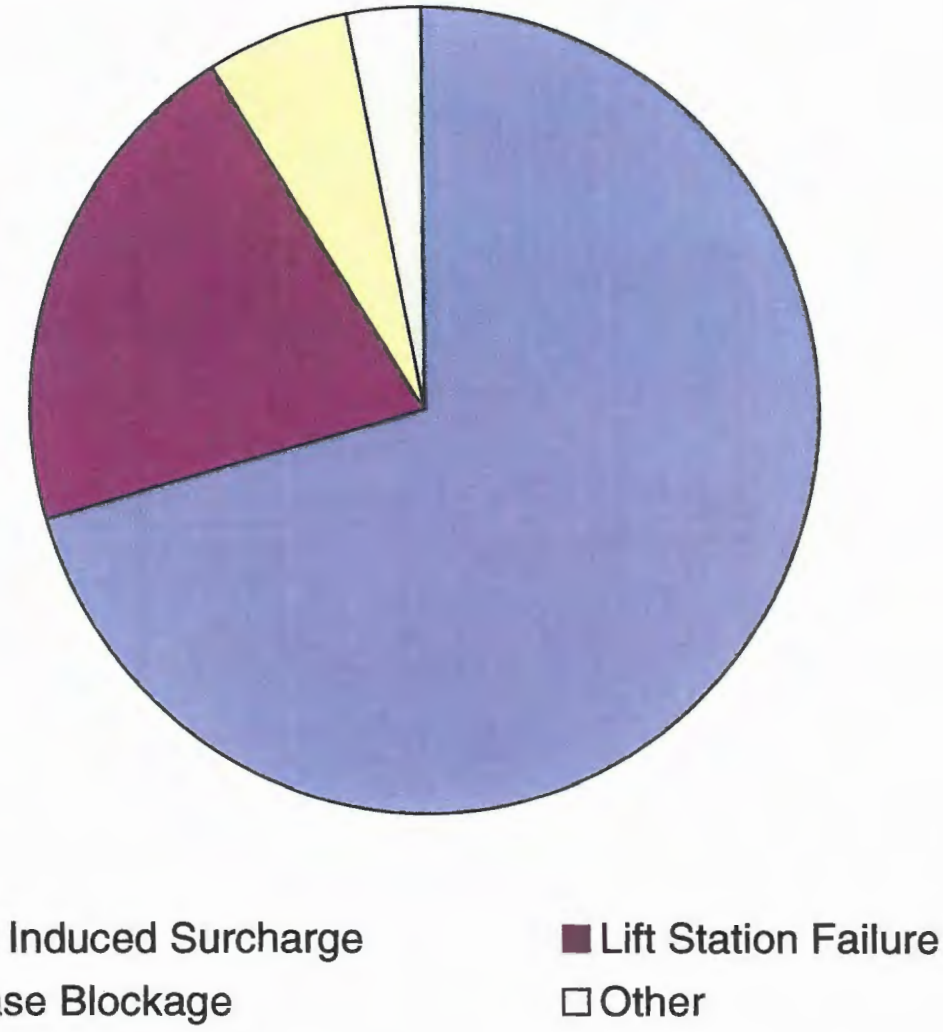
IMPLEMENTATION/RECOMMENDATIONS

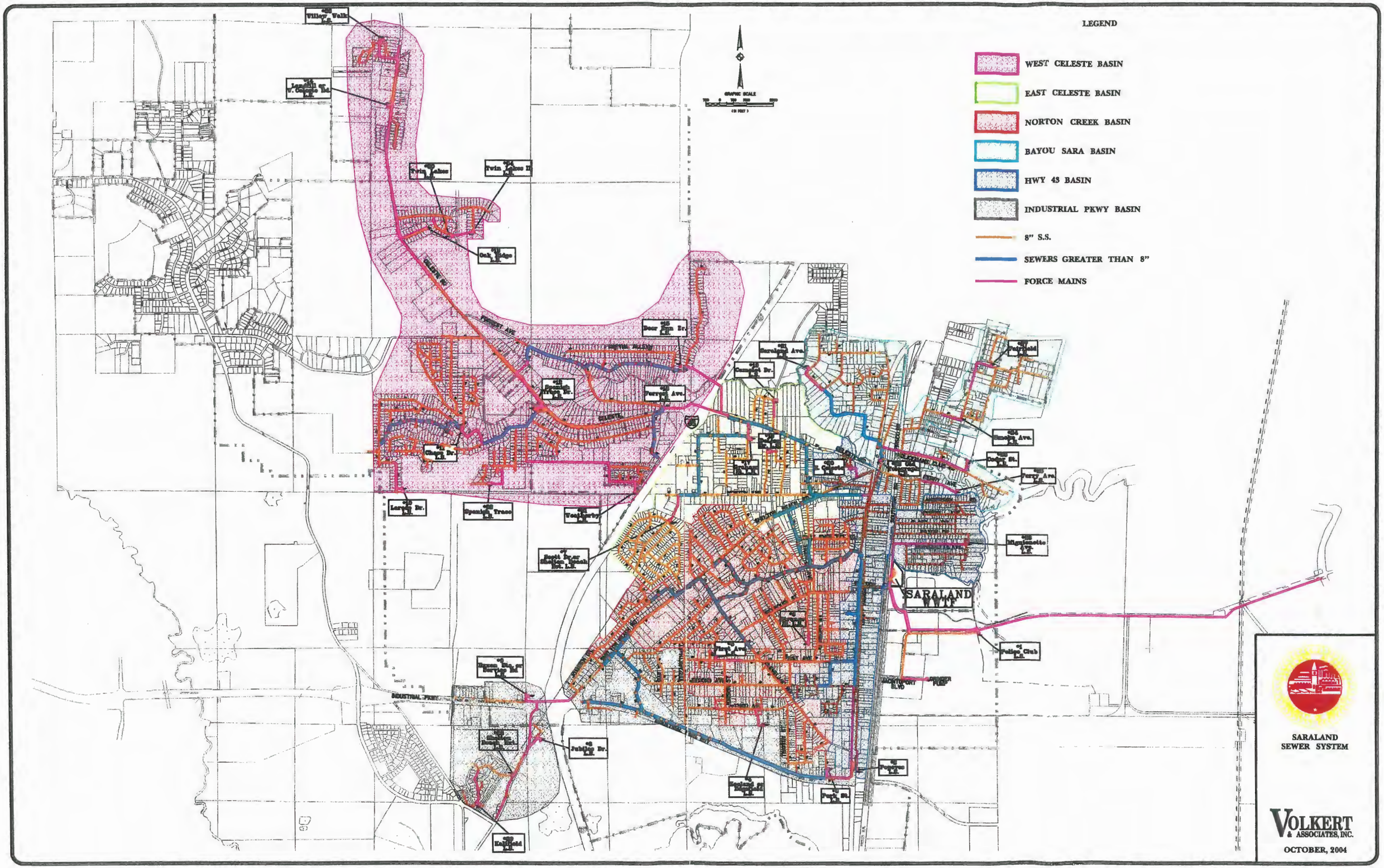
TIMELINE

Priority Rank	Task Description	Est. Cost	Est. Time
1	Cleaning and Internal Video Inspection of the 21-inch interceptor sewer from Celeste Road to Norton Creek, the 24-inch interceptor sewer along Norton Creek and the 30-inch interceptor sewer from Norton Creek to the WWTP	Included in A, B & C	
1A	Phase 1 - 21-inch interceptor sewer from Celeste Road to Norton Creek	$110,000	3 Months
1B	Phase 2 - 24-inch interceptor sewer along Norton Creek	$50,000	1.5 Months
1C	Phase 3 - 30-inch interceptor sewer from Norton Creek to the WWTP	$58,000	1.5 Months
2	Replacement of inverted siphon under Norton Creek	$100,000	1 Month
3	Replacement/Repair/Rehabilitation of Inspected Interceptor Sewers in Norton Creek Basin and East Celeste Basin	TBD	TBD
4	Smoke Testing of 15-inch and 18-inch Interceptor Sewers along Norton Creek	$20,000	1.5 Months
5	Smoke Testing of Interceptor Sewers along Highway 158	$15,000	1 Month
6	Replacement of Scott Drive Lift Station	$150,000	6 Months



Causes of Sanitary Sewer Overflows (SSOs)
January 2002 to August 2004




LEGEND
WEST CELESTE BASIN
EAST CELESTE BASIN
NORTON CREEK BASIN
BAYOU SARA BASIN
HWY 45 BASIN
INDUSTRIAL PKWY BASIN
8" S.S.
SEWERS GREATER THAN 8"
FORCE MAINS
GRAPHIC SCALE
CELESTE ST.
FERRY AVE.
INDUSTRIAL PKWY.
SARALAND W.W.T.P.
SARALAND
SEWER SYSTEM
VOLKERT & ASSOCIATES, INC.
OCTOBER, 2004

SEWER SYSTEM
TEMPORARY FLOW MONITORING
REPORT
OF THE
SARALAND COLLECTION SYSTEM

FOR

VOLKERT & ASSOCIATES, INC
Mobile, Alabama

PROVIDED BY

437 INDUSTRIAL LN
BIRMINGHAM, AL 35211
(205) 822-5205

AUGUST 10, 2004

Table of Contents

Executive Summary

The City of Saraland, Alabama, sanitary sewer system has experienced problems related to infiltration/inflow during wet weather periods. The Sanitary Sewer System is composed of 364,780 L.F. of pipe. The city requested that their consulting engineer, Volkert and Associates, Inc., undertake action to determine the location, nature and quantity of infiltration/inflow that was entering their sewer system and to develop a hydraulic model of the collection system

Volkert and Associates, Inc. contracted with DWC Technologies to accomplish flow monitoring and reporting for an I/I Analysis of the Saraland Sanitary Sewer System. DWC collected and analyzed flow and rainfall data at six (6) monitoring and one (1) rain gauge location from March 10th through May 7th, 2004.

The monitoring indicated four of the six monitoring sites (1,2,4 & 5), totaling 259,804 L.F., showed significant quantities of inflow. These four basins contributed 1.67 million gallons per day (MGD) of inflow during the April 29th rain event. This is compared to an average day weather flow for the total system of 1.74 MGD. A Sewer System Evaluation to locate and recommend rehabilitation of inflow causing defects should be undertaken. The monitoring also indicated that two (2) of the six (6) monitoring sites (2 & 5), totaling 100,584 L.F., should be evaluated for infiltration. These two (2) basins contributed 243,000 gallons per day (GPD) of infiltration during the April 29th rain event. Also, maintenance on a regular basis should be undertaken to reclaim lost capacity in the two (2) of the six (6) basins.

Section I: Introduction

Purpose

DWC Technologies analyzed flow and rainfall data from the period between March 10 and May 7, 2004, for the Saraland Sanitary Sewer System. The study included data from six (6) temporary flow meters and one (1) rain gauge. This report includes a wet weather analysis of infiltration and inflow (I/I) and collection system capacity. Hydrographs, beginning in Section III, exhibiting Continuity and Manning's flow qualities, were created for each site in conjunction with velocity/depth charts and scattergraphs to furnish an overview of dry and wet weather site conditions. Storm reaction evaluations were also implemented to establish a base for inflow and infiltration (I/I) predictions and full pipe capacity performance. A map, displaying the location and connectivity of sub basin monitor areas within the Saraland Sewer System is presented at the end of this section.

Basin Data Graphs

Flow hydrographs, in Section III, help to evaluate hydraulic system behavior patterns for both base flow characteristics and rain responses. Relationships between Continuity and Manning's flow quantities normally track closely with the exception of variations during and immediately following storms. For analysis purposes, Continuity is used unless there is missing or invalid velocity data. In those cases, Manning's can be substituted unless there are backwater conditions present. Using the principle that Manning's and Continuity values are similar in free flow conditions, a range of Continuity data was selected at each site to reverse calculate an appropriate coefficient for use in place of both the slope and roughness factor.

Depth and velocity values are also charted in both continuous and scattergraph format. Changes in the repeatable relationship between the two components could indicate altered site hydraulics due to restrictions or flow diversions downstream, lift station failures, or sensor performance issues. Comparison of these flow elements highlight system behavior patterns and assist in diagnosis of surcharging, downstream bottlenecks, and overflow problems.

Storm Analysis

The goal of storm selection is to establish a consistency in the analysis of I/I trends by limiting events to storms that can be characterized as producing reasonable repeatable I/I flow patterns. In some cases, significant variations in antecedent conditions, rainfall patterns, and rainfall durations can drastically impact the I/I peak flow rate and 24-hour volume of similar sized rain events. Storms were examined at the monitoring points for reasonable compliance with general selection principles. Since event selection procedures were intended to serve more as guidelines than as precise rules, an attempt was made to reconcile application of the guidelines with the desire to gather statistics from as many significant storms as was practical.

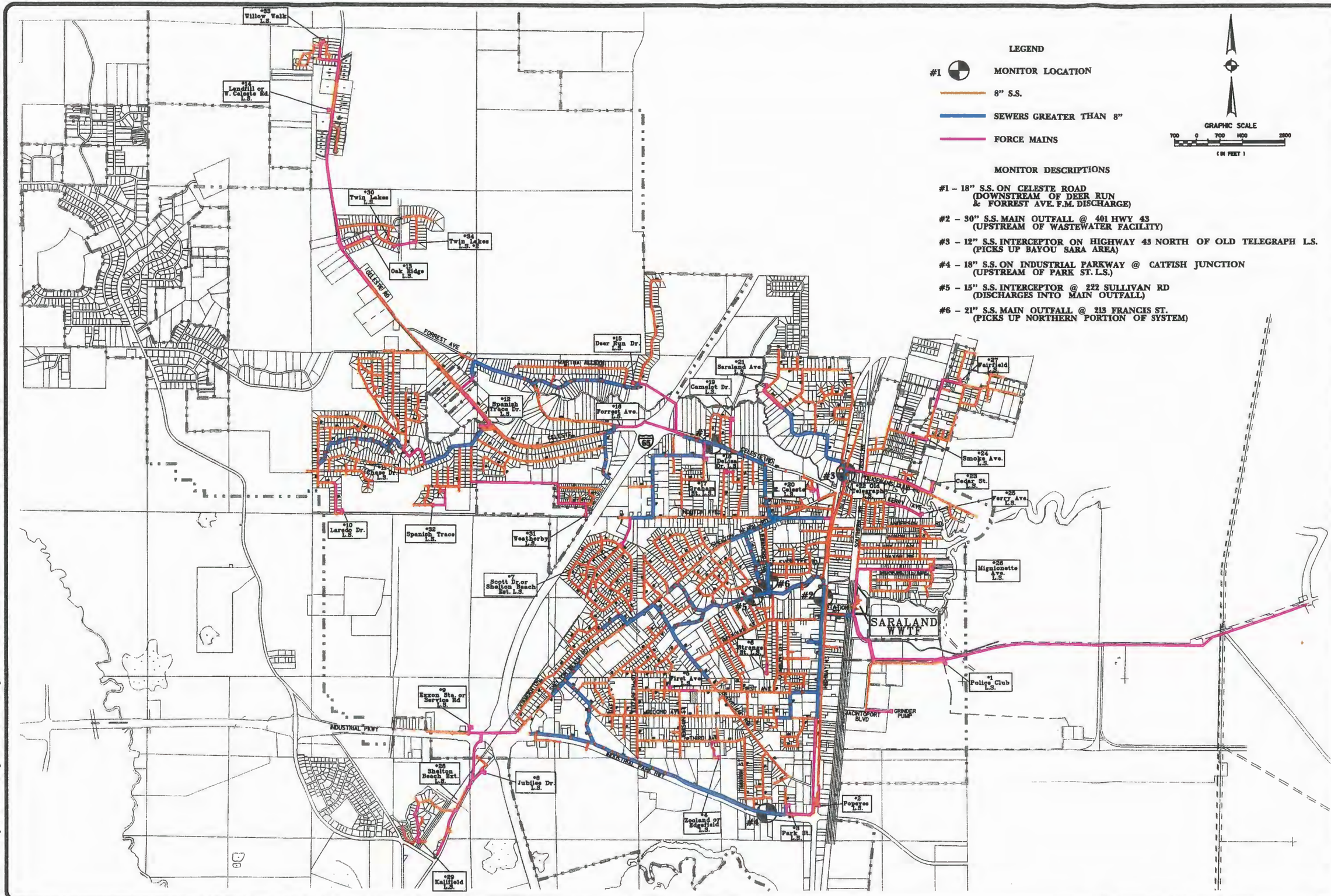
Basic selection guidelines include short duration storms, appropriate antecedent conditions, and general I/I flow characteristics. Rainfall associated with the storm event should conclude before the end of the 24-hour I/I measurement period, preferably in the first half of the period. This criteria ensures that the largest I/I volume associated with rainfall has developed prior to the measurement interval. Rain events selected should not be significantly impacted by

preceding storm events so as not to overstate I/I peak rates and volumes. Exceptions may be applied when the event hydrograph has fallen to pre-storm levels prior to the onset of the second storm. Due to the short term nature of the project and the limitation of available rain events, the impact on the sewer system was somewhat limited but, deemed adequate to assess the infiltration/inflow problem.

Flow Meter Identification and Location

The following chart coordinates flow monitor location and manhole identification number. A general schematic of the Saraland System and its meter sub basins are included on the following page.

FLOW MONITORING ID	LOCATION
MP 1	18" S.S. on Celeste Road (Downstream of Deer Run & Forrest Ave. F.M. Discharge)
MP 2	30" S.S. Main Outfall (Upstream of Wastewater Facility)
MP 3	Relocated to 12" line (just Upstream of Lift Station #22 East of Hwy 43 & South of Policeman's Club Rd.)
MP 4	18" S.S. on Industrial Parkway (Upstream of Park St. L.S.)
MP 5	15" S.S. Interceptor (Discharges into Main Outfall)
MP 6	21" S.S. Main Outfall (Picks up Northern portion of system)



MONITOR DESCRIPTIONS

#1 – 18" S.S. ON CELESTE ROAD (DOWNSTREAM OF DEER RUN & FORREST AVE. F.M. DISCHARGE)

#2 – 30" S.S. MAIN OUTFALL @ 401 HWY 43 (UPSTREAM OF WASTEWATER FACILITY)

#3 – 12" S.S. INTERCEPTOR ON HIGHWAY 43 NORTH OF OLD TELEGRAPH L.S. (PICKS UP BAYOU SARA AREA)

#4 – 18" S.S. ON INDUSTRIAL PARKWAY @ CATFISH JUNCTION (UPSTREAM OF PARK ST. L.S.)

#5 – 15" S.S. INTERCEPTOR @ 222 SULLIVAN RD (DISCHARGES INTO MAIN OUTFALL)

#6 – 21" S.S. MAIN OUTFALL @ 213 FRANCIS ST. (PICKS UP NORTHERN PORTION OF SYSTEM)

PROJECT NO.: 111905.10

DRAWING NO.:

NO.	DATE	DESCRIPTION	BY
		REVISIONS	

PROJECT NAME: SARALAND SEWER CAPACITY ANALYSIS

SHEET NAME: MONITOR LOCATIONS

VOLKERT & ASSOCIATES, INC.

CERTIFICATION:

DATE:

DESIGNED:	CHECKED:
DRAWN:	CHECKED:
DATE: 03 / 09 / 04	
PROJECT NO.: 111905.10	
PLAN SHEET DRAWING NO.:	

Sheet____ Of____

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Section II: Analysis Summary

Inflow and Infiltration (I/I)

Flow data for four (4) storm events during the study period April 11th, April 25th, April 29th, and May 1st were examined for both Peak I/I and 24-hour I/I volume reactions at monitoring locations. Net Peak I/I per mile and net 24-hour I/I per mile, with Inflow and Infiltration Ranking, are shown in the "I/I Analysis" section of the "Flow Monitoring Analysis" table on page no.10.

The average dry day profile for each monitoring site (see "Average Dry Day Charts" in Section III) was adjusted to match the base flow prior to the rain interval and differences between the two hydrographs constitute the I/I portion of the wet day flow. These individual "Storm Data" graphs for all four (4) of the above mentioned rains are shown for all six (6) sites in Section III. Rain response summaries ("Flow Monitoring Data Sheets") for each site are also shown in Section III, as well as "Linear I/I Regression" charts for each site. The regression analysis charts can be used to project the effects of the response from the actual storm events encountered to a certain design storm. In this report, since there were only four (4) storms to use in the regression, actual storm data was used for I/I basin ranking instead of projected design storm flows from the regression analysis.

Net values of Peak I/I and 24-hour I/I volume were calculated for the largest actual storm event during the study period, 1.70 inches of rain on April 29th. When these values were normalized using the length of sewer line in each monitored area, MP5, MP2, MP4 and MP1 exhibited the largest effects for both Peak I/I and 24-hour I/I volume. "Basin Ranking" charts in this section use bar graphs for visual representation of I/I quantities for all six (6) meter locations. Another visual representation compares the flows for all six (6) basins for an average dry day; for the wet day of April 25th and the cumulative I/I at each monitoring site; and then again for the wet day of April 29, 2004 with its cumulative I/I at each monitoring site.

Conclusions and Recommendations

Monitoring Point 1

MP1 was located on the 18 inch line in Celeste Road downstream of Deer Run and Forrest Ave. lift stations force main discharge. This monitoring point measures flow from the Northwest area of town. There is a total of 123,721 L.F., of sewer line in Basin 1.

There was no silt or settled solids at this site, and the flow data were complete and accurate. The scattergraph showed the classic "cigar" shape of a good hydraulic situation and closely followed the theoretical Manning pipe curve for the duration of the study.

Dry weather capacity or velocity is not a problem at this monitoring point, with a measured peak dry weather depth of 5.48 inches in an 18 inch line; and with a corresponding velocity of 1.7 feet per second. During the storm event of April 25th, the peak wet flow only reached 35% of full pipe capacity. Peak flow went from 560,000 GPD (dry) to 760,000 GPD during this storm event. From the linear regression analysis, it is estimated that a 3.0 inch rain would

produce flows of approximately 940,000 GPD, or 58% of the sewer lines 1.6 MGD capacity. Thus, this would indicate no capacity problems. However, visual observations by our staff, and comments from the City staff, indicate evidence of surcharging in these lines. This could be from problems with the lift stations down stream.

MP1 showed 280,000 GPD of net peak I/I during the April 29th storm, which produced an overall inflow ranking of fourth out of the six (6) sites. This site also showed 127,000 gallons of Net 24-hour I/I. This also produced an infiltration ranking of fourth overall.

Based on the amount of inflow, and the surcharge problems the City staff has seen, it is recommended that the sewer lines tributary to MP1 be evaluated in order to locate reduce inflow. It is further recommended that records from the two (2) above mentioned lift stations be reviewed to see if they are responsible for the surcharge evidence in these lines.

Monitoring Point 2

Monitoring Point 2 was located on the 30 inch main outfall just upstream of the Saraland Waste Water Treatment Facility. In addition to flows from its immediate basin, the site receives flows from the basins tributary to MP's 1 and 6, MP3 and MP5. There is a total of 48,664 L.F. of sewer line in Basin 2.

Dry weather average flow velocity was a problem at 1.23 feet per second (fps), which is less than the recommended 1.50 fps required to prevent settling of solids. There was 8 inches of silt in this 30 inch line when meters were installed, and the sensor was placed at the "eight o'clock" position in the pipe. Silt on the sensors was a constant problem requiring frequent cleaning during the study period. Although the scattergraphs show the hydraulics at this site were impacted by the silt and debris, the data was good enough to allow for calculating both a Continuity and Manning flow value for the duration of the study.

During the storm event of April 29th, a peak depth of nearly 16 inches was reached in the 30 inch line. Peak flow at this time was 3.0 MGD, or 52% of full pipe capacity. From the linear regression analysis, a 3.0 inch storm event would produce a projected peak flow of 3.79 MGD. This is 65% of capacity. Thus capacity is not a problem at this time.

MP2 showed 500,000 GPD of net peak I/I during the April 29th storm event. This produced an overall inflow ranking of second out of six (6) sites. This site also showed 118,000 gallons of Net 24-hour I/I. This produced an infiltration ranking of second also.

Based on the amount of infiltration and inflow measured, it is recommended that the sewer line tributary to MP2 be evaluated in order to locate and reduce both infiltration and inflow. It is also recommended that regular maintenance be scheduled as required to keep this line clean.

Monitoring Point 3

MP3 was relocated on March 31, 2004, to the 12 inch line just upstream of Lift Station #22, east of Hwy 43 and south of Policeman's Club Road. Thus flow information was available only for the period March 31, 2004 through May 7, 2004. There are 40,138 L.F. of sanitary sewer in Basin 3.

Average dry weather flow velocity is a major concern at only 0.51 fps. Peak velocities only reached 0.92 fps during the monitoring period. There was debris in the line at the time the monitors were installed and the sensor was installed at the "seven o'clock" position in the pipe. Silt and debris on the sensors required frequent cleaning. Although the scattergraphs show the hydraulics at this site was impacted during some periods by the light silt and debris, the data was good most of the flow monitoring period.

During the storm event of April 29th, a peak depth of only 4 ½ inches of flow was recorded in a 15 inch line. Peak flow at that time was only 150,000 GPD, or 30% of pipe capacity. This capacity is not a problem, even in wet weather, at this monitoring site.

MP3 showed 79,000 GPD of net peak I/I during the April 29th storm event, which produced an overall inflow ranking of fifth, or next to last for the six (6) monitoring sites. This site also showed 40,000 GPD of Net 24-hour I/I, which produced an infiltration ranking of fifth.

Based on the limited quantities of infiltration and inflow measured at this site, Basin 3 is not recommended for any further action to correct I/I. Light silt and debris could require an occasional cleaning.

Monitoring Point 4

MP4 was located on the 18 inch sewer line on Industrial Parkway upstream of Park St. lift station. It receives flow from the southwest area of town primarily along Industrial Park Highway. There is a total of 35,499 L.F. of pipe in Basin 4.

The dry weather average flow velocity of 0.78 fps did not appear adequate to prevent solids from settling out in the monitoring manhole. However, the peak dry weather velocity, coupled with the PVC lines in this area were enough to keep debris and solids from being a problem at this site. The scattergraph pattern also indicated adequate hydraulics at this site.

During the storm event of April 29th, a peak depth of only slightly over 5 inches of flow was recorded. Peak flow at that time of 320,000 GPD, or 29% of full pipe capacity was reached. The projected flow from a 3.0 inch rain was estimated to be 530,000 GDP. Thus adequate capacity, even in wet weather, does not appear to be a problem.

MP4 showed 98,000 GPD of net peak I/I from the April 29th storm event, which produced an overall inflow ranking of third out of the six (6) sites. This site also showed 53,000 gallons of Net 24-hour I/I. This produced an infiltration ranking of third also.

Based on the amount of inflow located, it is recommended that an evaluation of this basin be undertaken to locate and remove inflow sources.

Monitoring Point 5

MP5 was located on the 15 inch sewer line interceptor that discharges into the main outfall. It receives flow from several subdivisions north and south of Shelton Beach Road. There is a total of 51,920 L.F. in Basin 5.

The dry weather average flow velocity of 1.18 fps was adequate to prevent solids from settling out in the monitoring manhole. Scattergraphs also indicate good hydraulics at this site.

During the storm event of April 29th, a peak depth of only slightly over 5.4 inches of flow was recorded. Peak flow at that time of 690,000 GPD, or 37% of full pipe capacity was reached. The projected flow from a 3.0 inch rain was estimated to be 1.28 MGD. This adequate capacity, even in wet weather, does not appear to be a problem.

MP5 showed 636,000 GPD of net peak I/I from the April 29th storm event, which produced an overall inflow ranking of first out of the six (6) sites. This site also showed 125,000 gallons of Net 24-hour I/I. This produced an infiltration ranking of first also.

Based on the large quantity of inflow encountered at this site, an evaluation to locate sources of inflow is recommended. It is also recommended that an evaluation to locate sources of infiltration be undertaken as well.

Monitoring Point 6

MP6 was located on the 21 inch main outfall and picks up the middle of the town. The flow from MP1 also flows through this monitoring point. There is a total of 30,630 L.F. of pipe in Basin 6.

The dry weather average flow velocity of only 0.52 fps allowed for the deposition of silt and solids. Heavy debris and silt in the line was 6 inches deep. The sensor was placed at "eight o'clock" in the pipe to avoid the debris. Even with the sensor on the side of the pipe, settling solids continued to be a problem. The monitor worked extremely well just after installation or cleaning, but velocity measurements began to deteriorate within a few days of being cleaned. In these instances of erratic velocities, Manning's equation only was used to calculate Q. The scatter graphs show these problems with a "shotgun" pattern instead of the classic "cigar" pattern following the Manning curve. However, when the sensor was cleaned, the scattergraph returned to the classic "cigar" pattern showing good hydraulics.

During the storm event of April 29th, a peak depth of over 15 inches was recorded in this 20 inch pipe. Peak flow at that time of 970,000 GPD, or 77% of full pipe capacity was reached. The projected flow during a 3.0 inch rain was estimated to be 1.340 MGD. Thus, this line would be right at capacity. Even during dry weather, due to the buildup of 6 inches of debris,

capacity is a problem. The average dry weather depth of flow was 12.84 inches, and the peak dry weather depth was 14.78 inches.

MP6 showed no net peak I/I, which produced an overall inflow ranking of sixth out of the six (6) sites. This site also showed only 28,000 gallons of Net 24-hour I/I. This produced an infiltration ranking of sixth also.

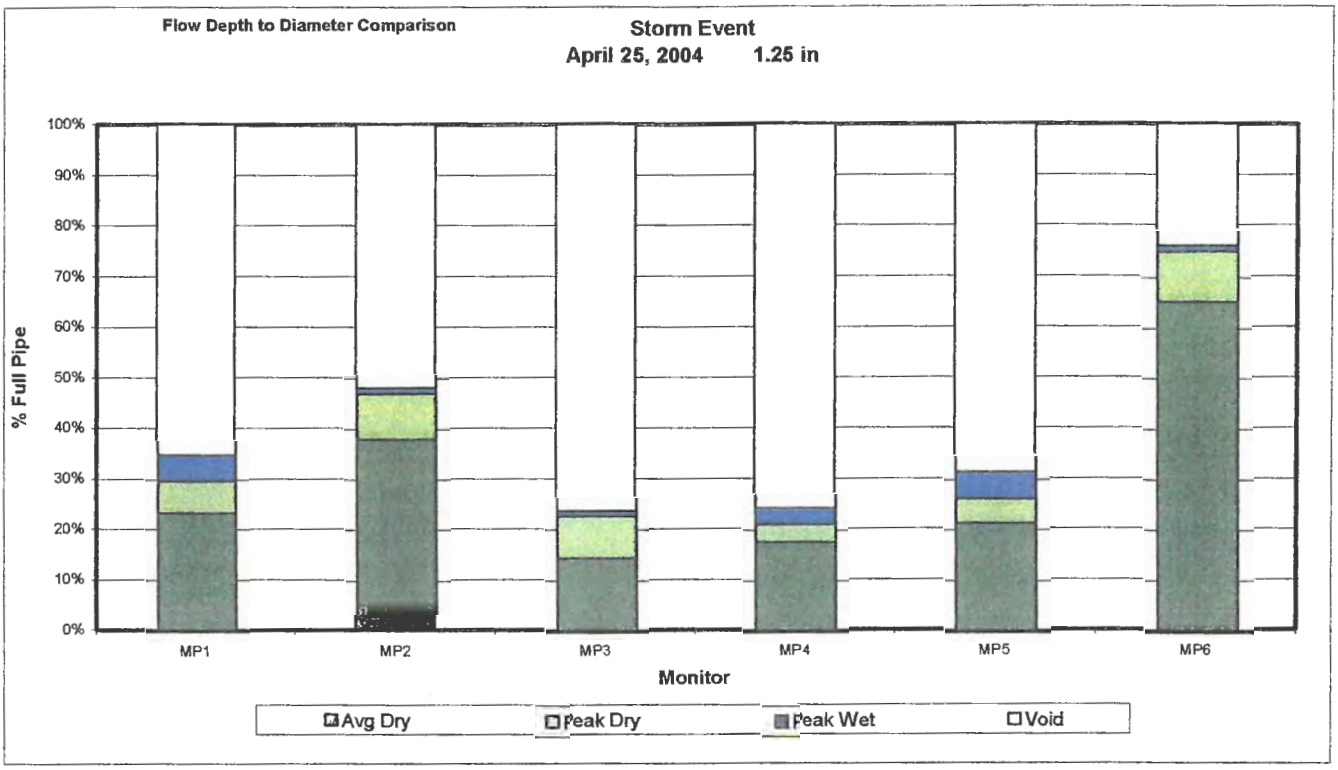
Based on no inflow and very limited infiltration, no action to reduce I/I is required in Basin 6. However, capacity, even in dry weather, is a problem. And much of the capacity problem is brought on by heavy deposition in the line. It is recommended that regular maintenance be scheduled as required to keep this line clean.

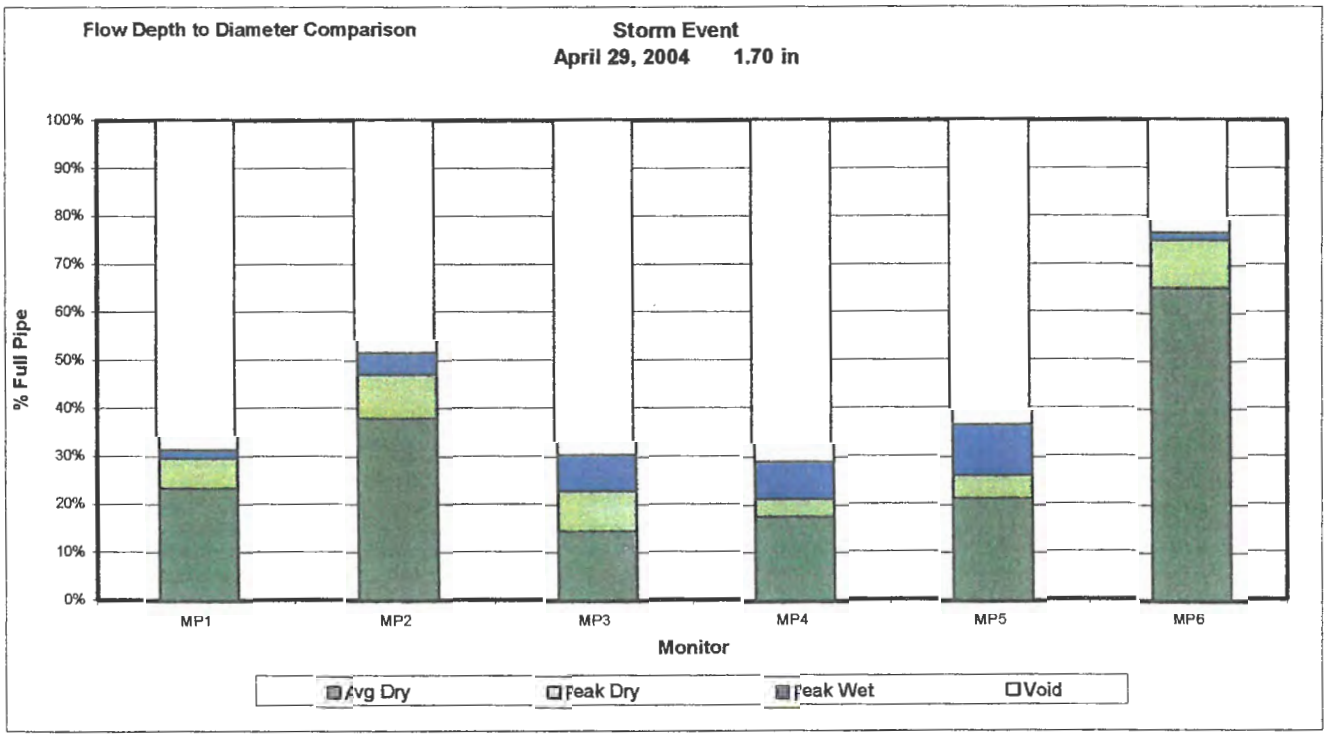
SARALAND COLLECTION SYSTEM
FLOW MONITORING ANALYSIS
Time Period: March 10, 2004 - May 7, 2004

Monitor			Dry Weather Summary								Infiltration/Inflow Analysis								Wet Weather Capacity									
			Average				Peak				Net I/I 1.70 Inch April 29, 2004 Event								Storm Event 1.25 Inch, 25-April-04					Storm Event 1.70 Inch, 25-April-04				
Monitor	Pipe Diameter	LF	Depth	Velocity	Flow	% Full Pipe	Depth	Velocity	Flow	% Full Pipe	Cummulative Peak II	Net Peak II	Net Peak II / mi	Inflow Rank	Cummulative 24-Hr II	Net 24-Hr II	Net 24-Hr II / mi	Infiltration Rank	Avg Depth	Peak Depth	Avg Velocity	Peak Flow	% Full Pipe	Avg Depth	Peak Depth	Avg Velocity	Peak Flow	% Full Pipe
	in	lf	in	fps	mgd	%	in	fps	mgd	%	Mgd	Mgd	Mgd/Mi		Mg	Mg	Mg/Mi		in	in	fps	mgd	%	in	in	fps	mgd	%
MP_1	18.5	123,721	4.32	1.71	0.37	23%	5.48	2.33	0.56	30%	0.280	0.280	0.012	4	0.127	0.127	0.005	4	5.30	6.44	1.77	0.90	35%	4.76	5.81	1.95	0.76	31%
MP_2	30.25	48,664	11.48	1.23	1.37	38%	14.23	1.55	1.90	47%	1.495	0.500	0.054	2	0.437	0.118	0.013	2	11.90	14.55	1.22	2.14	48%	13.40	15.64	1.23	3.00	52%
MP_3	14.25	40,138	2.06		0.04	14%	3.25	0.92	0.07	23%	0.079	0.079	0.010	5	0.040	0.040	0.005	5	2.37	3.38	0.57	0.13	24%	3.66	4.34	0.51	0.15	30%
MP_4	17.5	35,499	3.09		0.10	18%	3.71	1.08	0.14	21%	0.257	0.257	0.038	3	0.053	0.053	0.008	3	3.23	4.26	0.94	0.24	24%	3.51	5.09	0.94	0.32	29%
MP_5	14.75	51,920	3.15	1.18	0.12	21%	3.88	1.82	0.21	26%	0.636	0.636	0.065	1	0.125	0.125	0.013	1	3.23	4.65	1.56	0.51	32%	3.36	5.42	1.60	0.69	37%
MP_6	19.63	30,630	12.84		0.74	65%	14.78	1.17	0.90	75%	0.280	0.001	0.0002	6	0.155	0.028	0.005	6	13.42	14.99		0.94	76%	13.62	15.11	0.82	0.97	77%

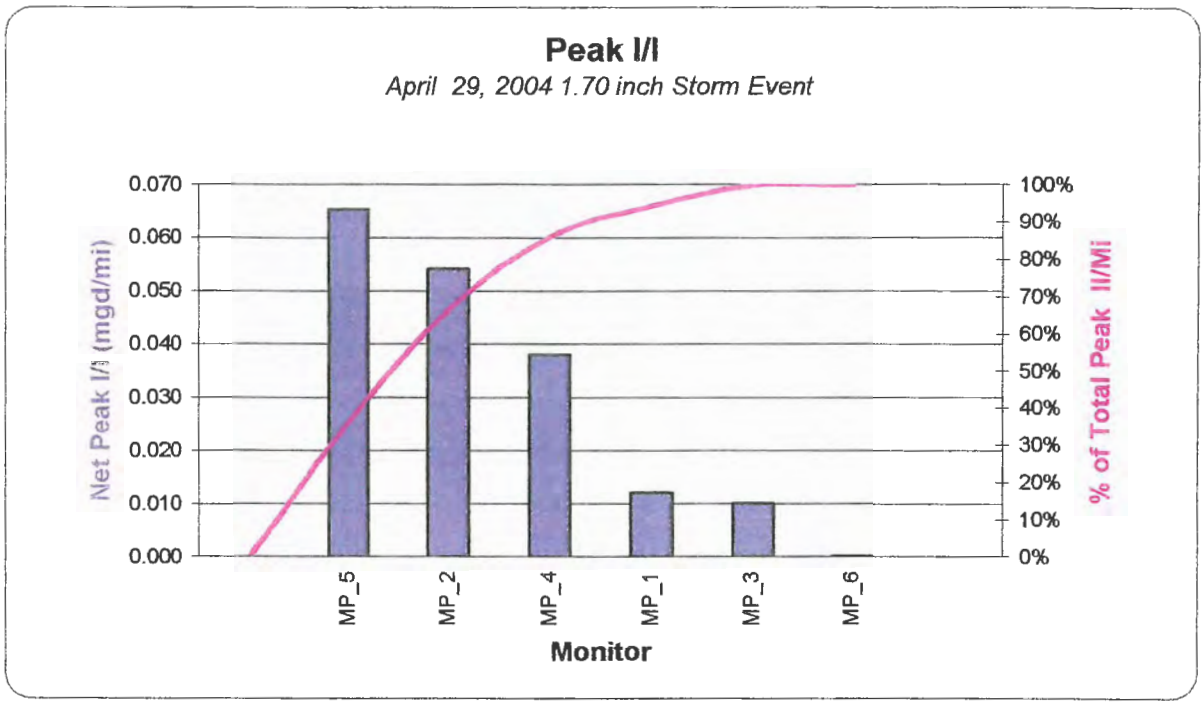
Color Key
Velocity < 1.5 fps
Velocity < 1.0 fps
Capacity >= 75%

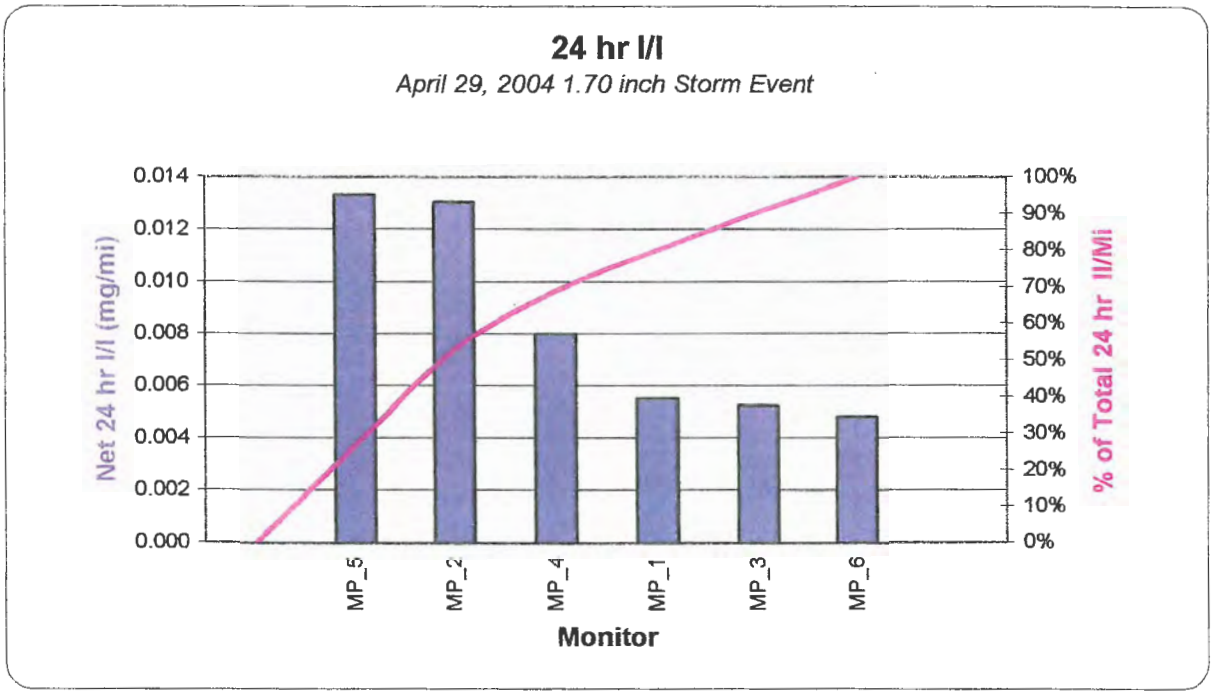
No Data Available

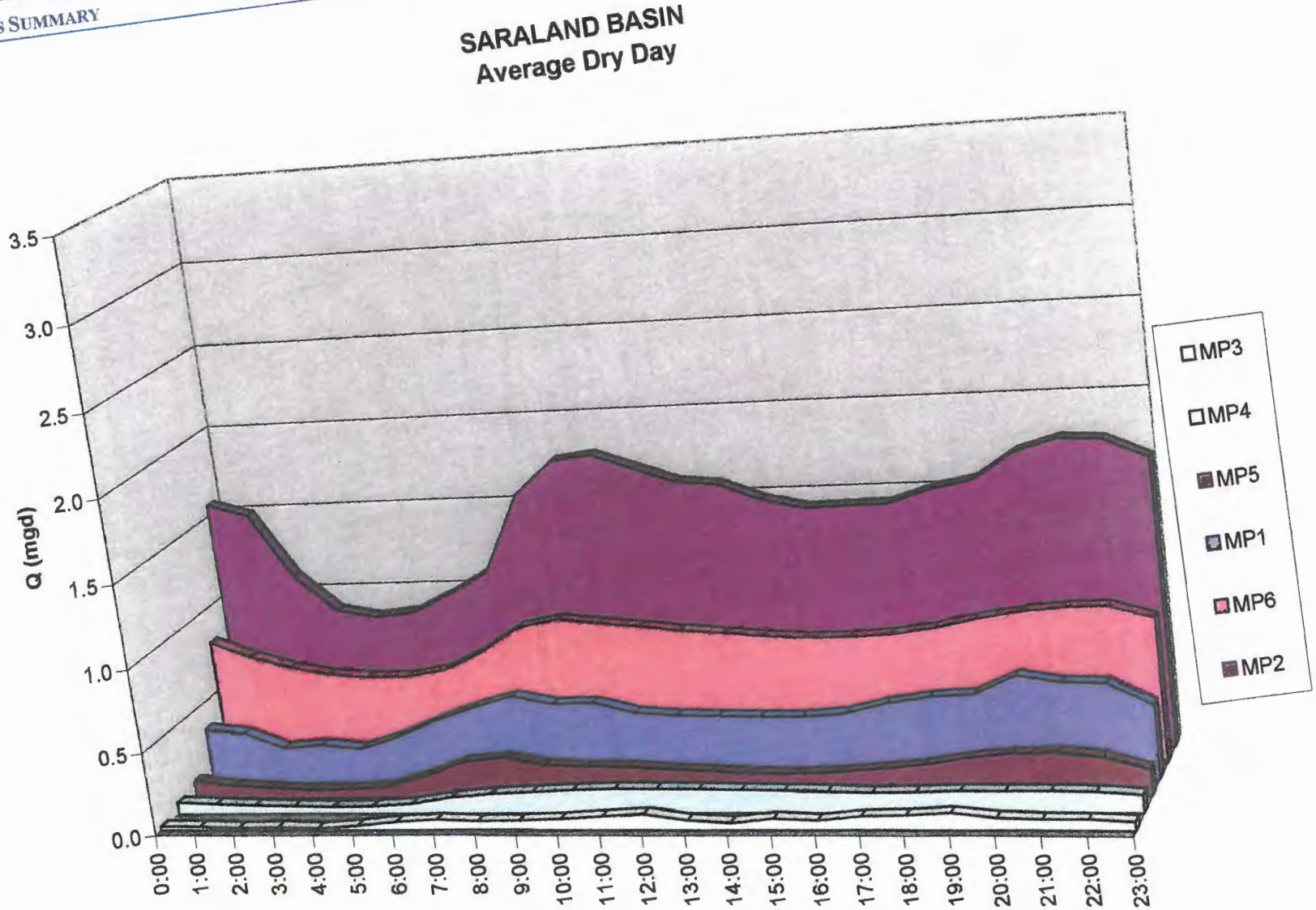

Flow Depth to Diameter Comparison
Storm Event
April 25, 2004 1.25 in
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
% Full Pipe
MP1
MP2
MP3
MP4
MP5
MP6
Monitor
Avg Dry
Peak Dry
Peak Wet
Void

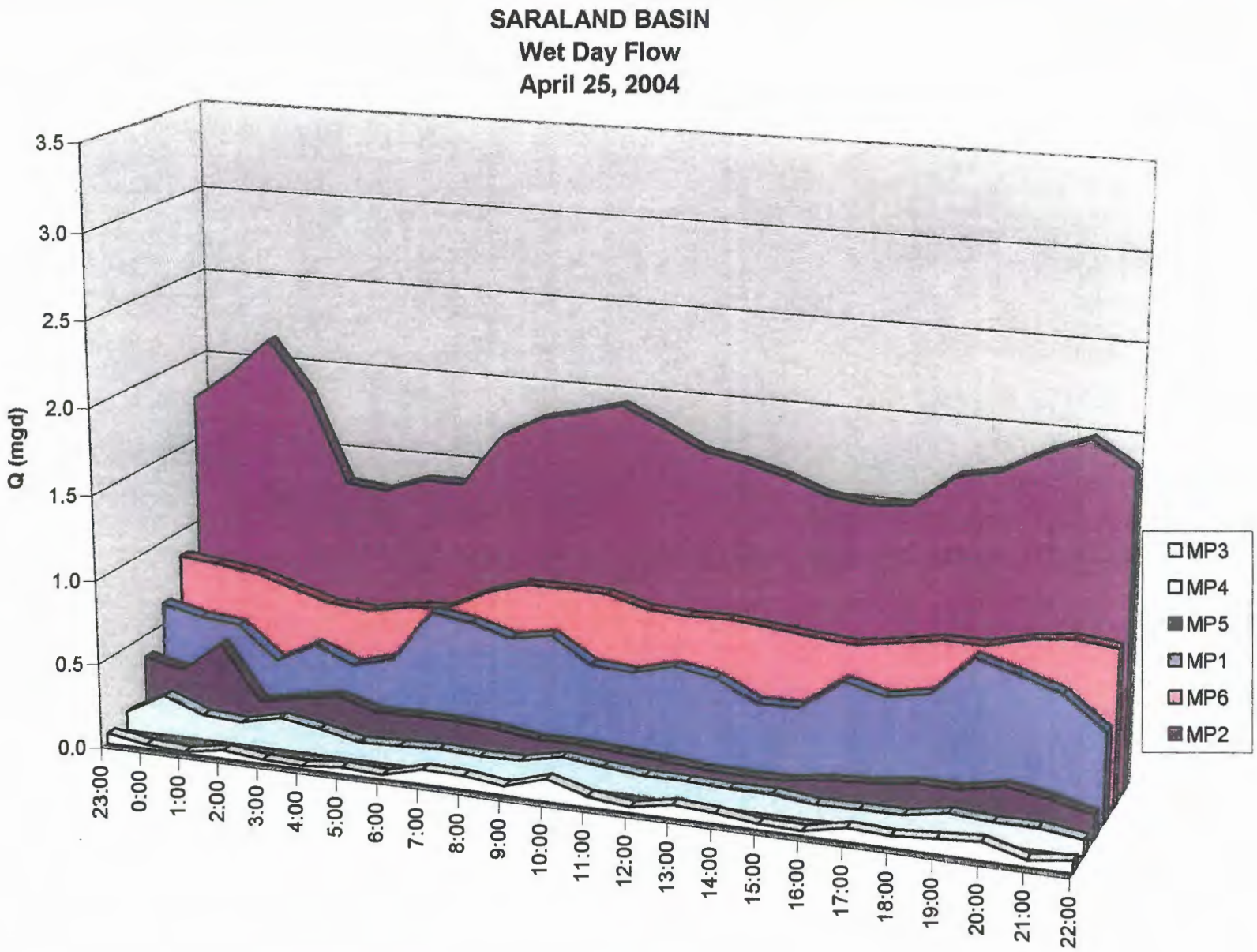

Flow Depth to Diameter Comparison
Storm Event
April 29, 2004 1.70 in
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
% Full Pipe
MP1
MP2
MP3
MP4
MP5
MP6
Monitor
Avg Dry
Peak Dry
Peak Wet
Void

Saraland Sewer Basin Ranking

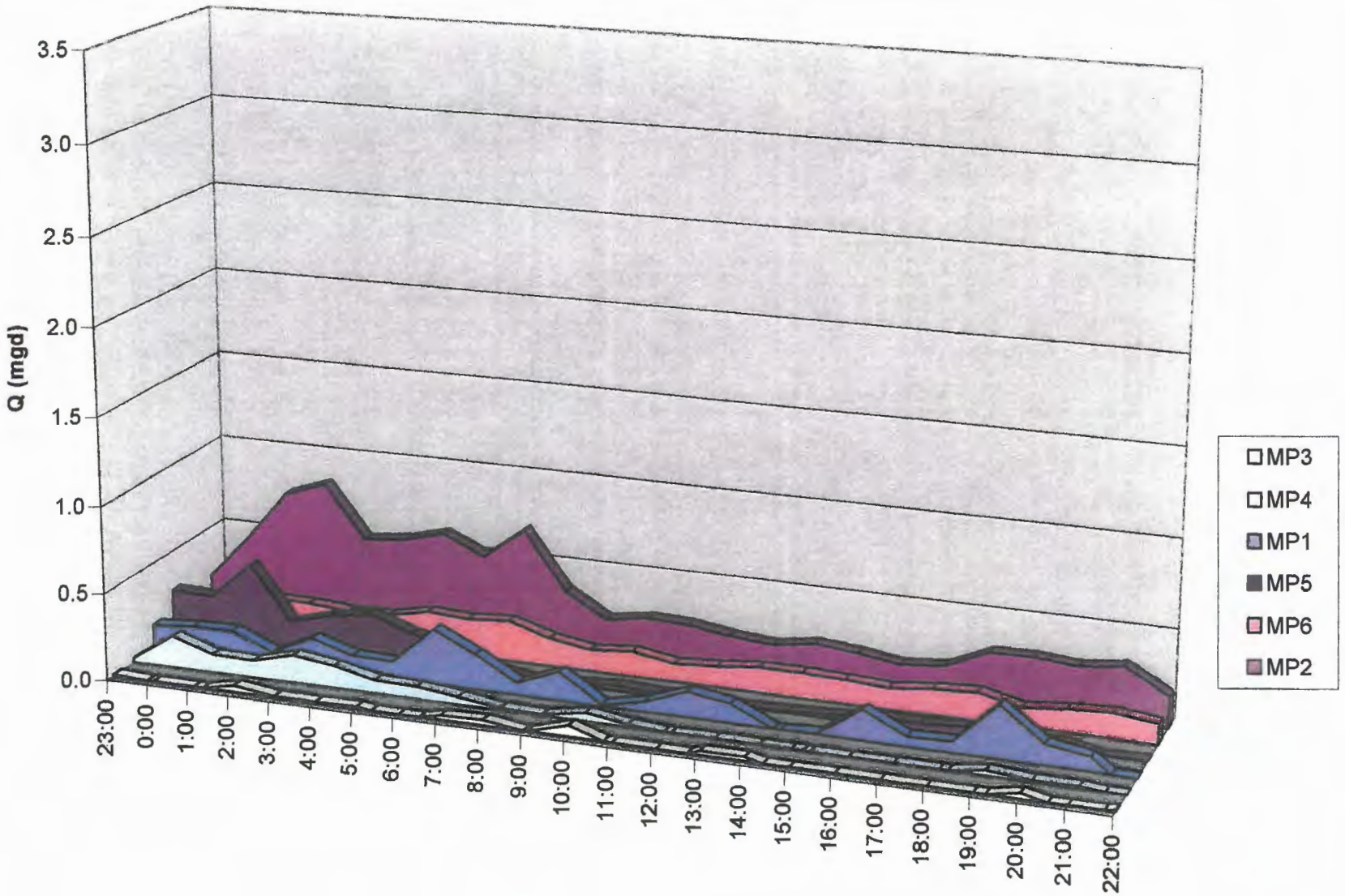


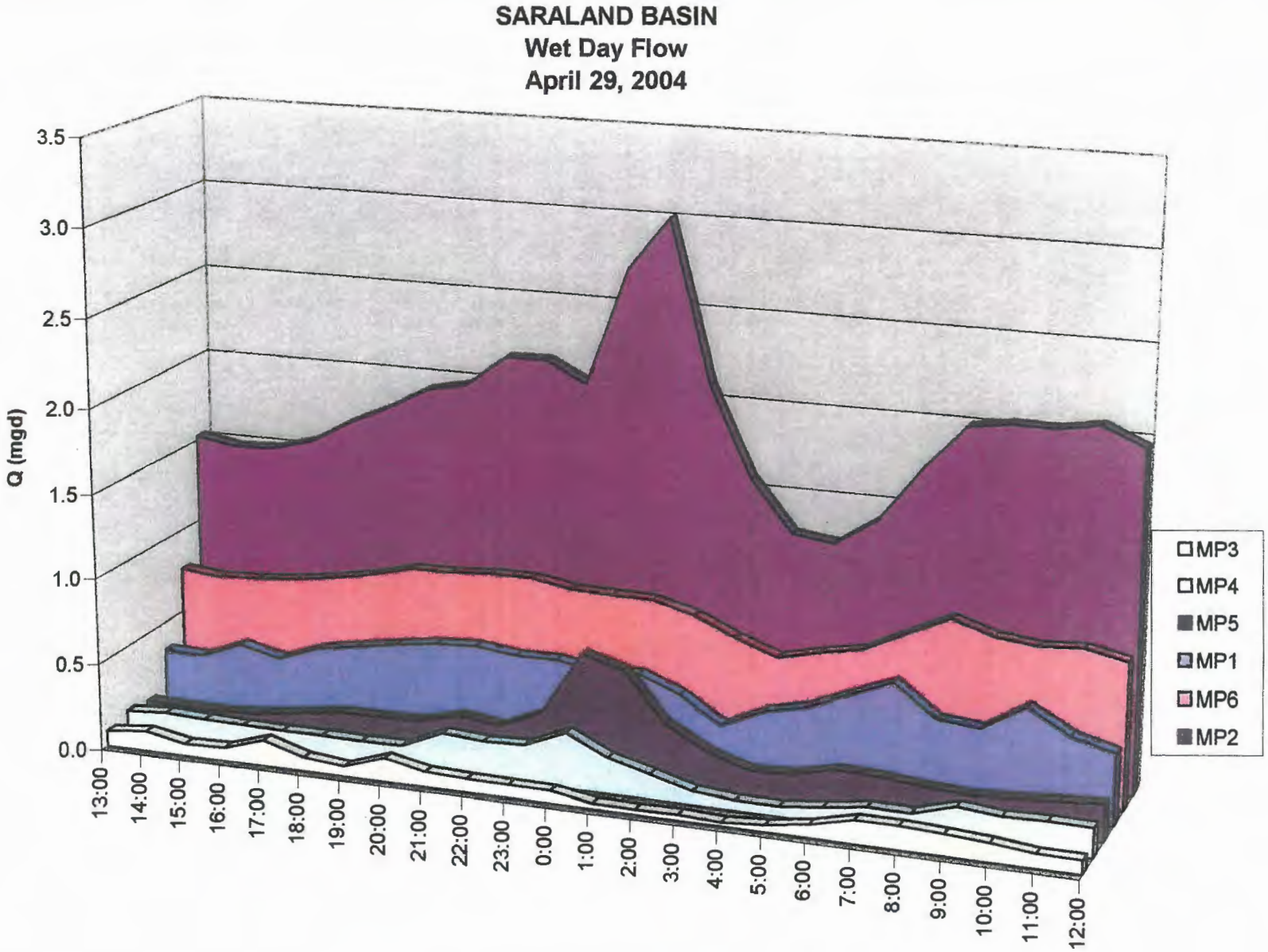



SARALAND BASIN
Average Dry Day
Q (mgd)
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
MP3
MP4
MP5
MP1
MP6
MP2

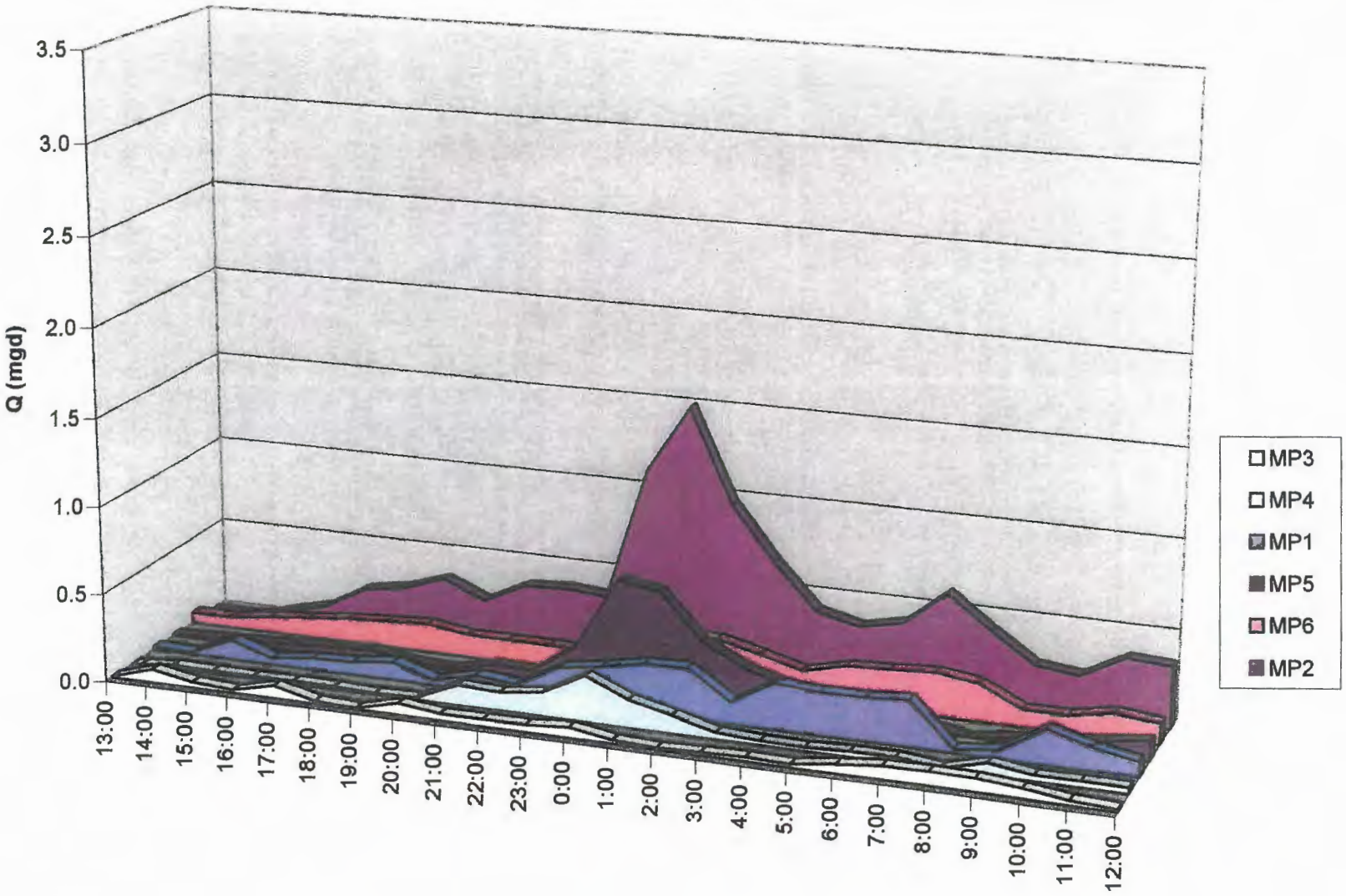

SARALAND BASIN
Wet Day Flow
April 25, 2004
Q (mgd)
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
23:00
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
MP3
MP4
MP5
MP1
MP6
MP2

SARALAND BASIN
Cummulative I/I at Monitoring Points
April 25, 2004 1.25in Event




SARALAND BASIN
Wet Day Flow
April 29, 2004
Q (mgd)
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
MP3
MP4
MP5
MP1
MP6
MP2

SARALAND BASIN
Cummulative I/I at Monitoring Points
April 29, 2004 1.70in Event



Section III: Monthly Graphs

*Hydrographs, Scattergraphs, Dry Day Profiles, Storm Profiles,
Rainfall / Flow Summaries, and Regression Analysis

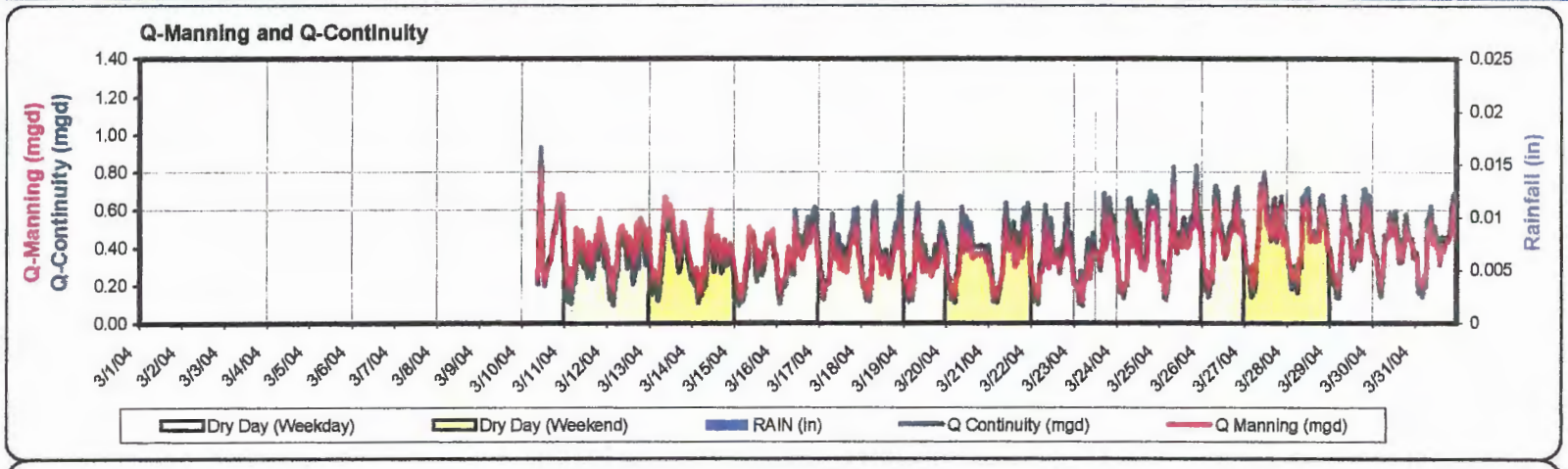
MP1 to MP6

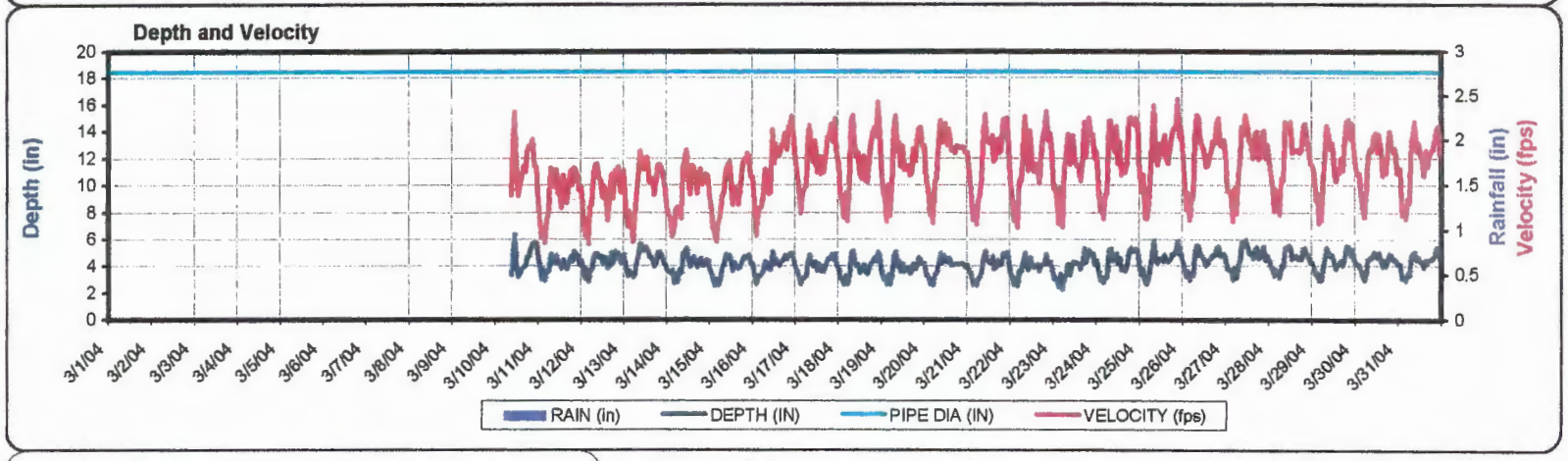
Monthly Flow Charts

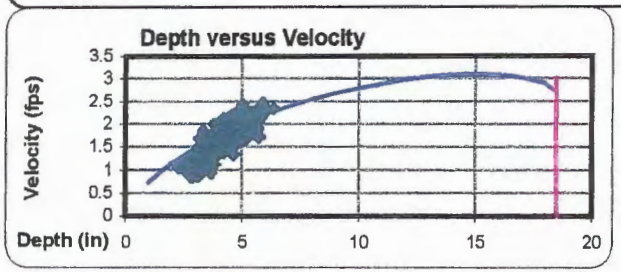
Depth versus Q

Monitor: MP1 **Pipe Dia:** 18.5 in **Date Range:** 03/01/04 to 03/31/04

Location: Celeste Rd MARCH





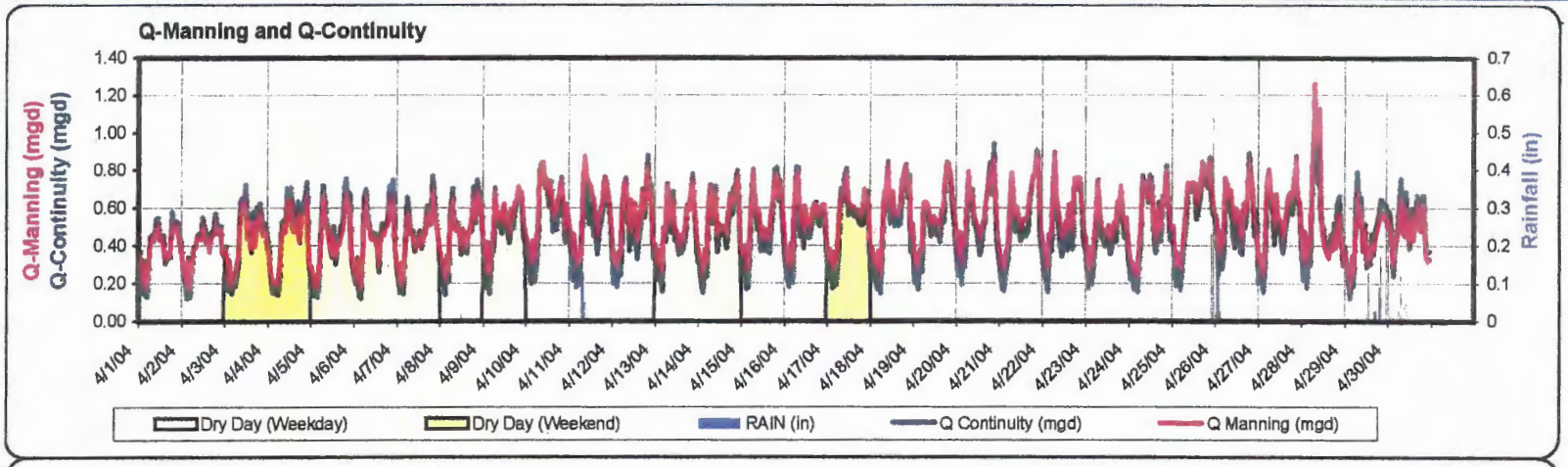


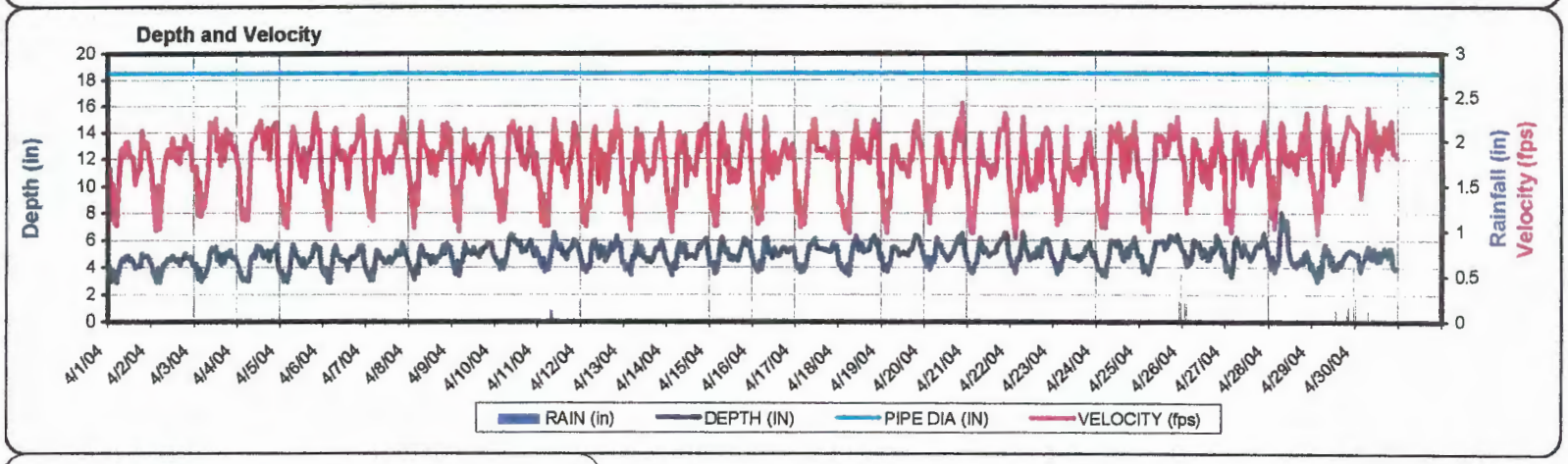
Monthly Flow Charts

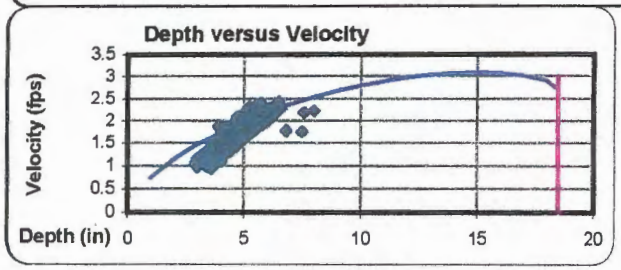
Depth and Velocity, Q, Depth versus Velocity

Monitor: MP1 **Pipe Dia:** 18.5 in **Date Range:** 04/01/04 to 04/30/04

Location: Celeste Rd **APRIL**





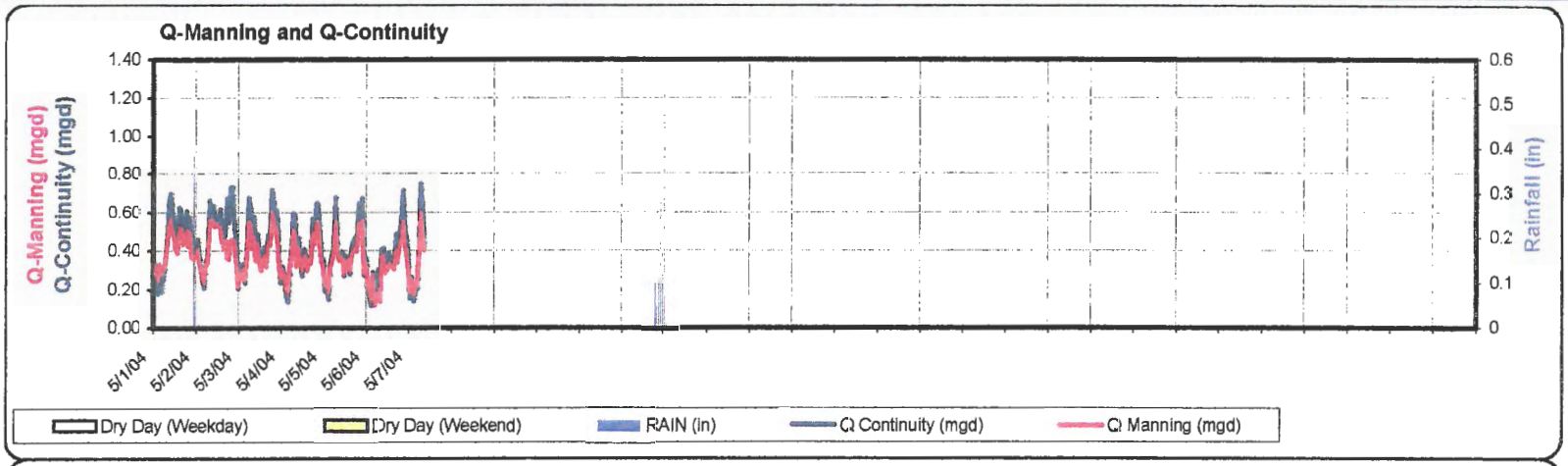


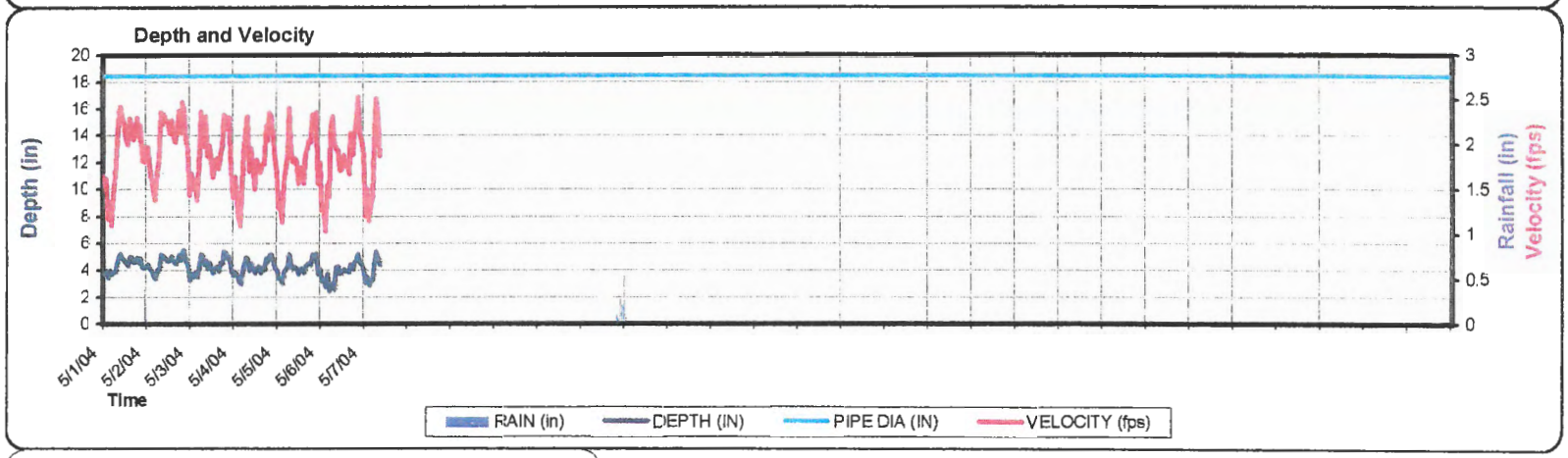
Monthly Flow Charts

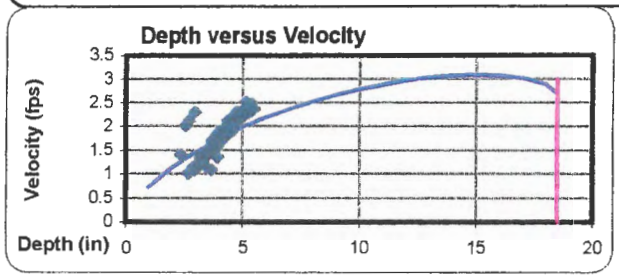
Depth and Velocity, Q, Depth versus Velocity

Monitor: MP1 **Pipe Dia:** 18.5 in **Date Range:** 05/01/04 to 05/07/04

Location: Celeste Rd MAY





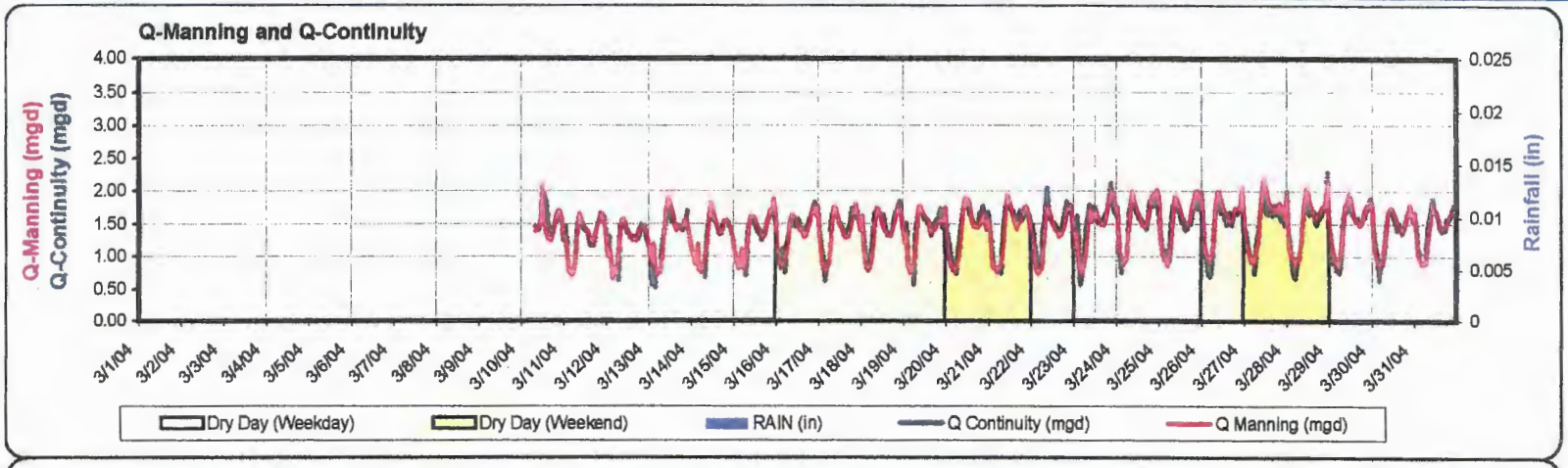


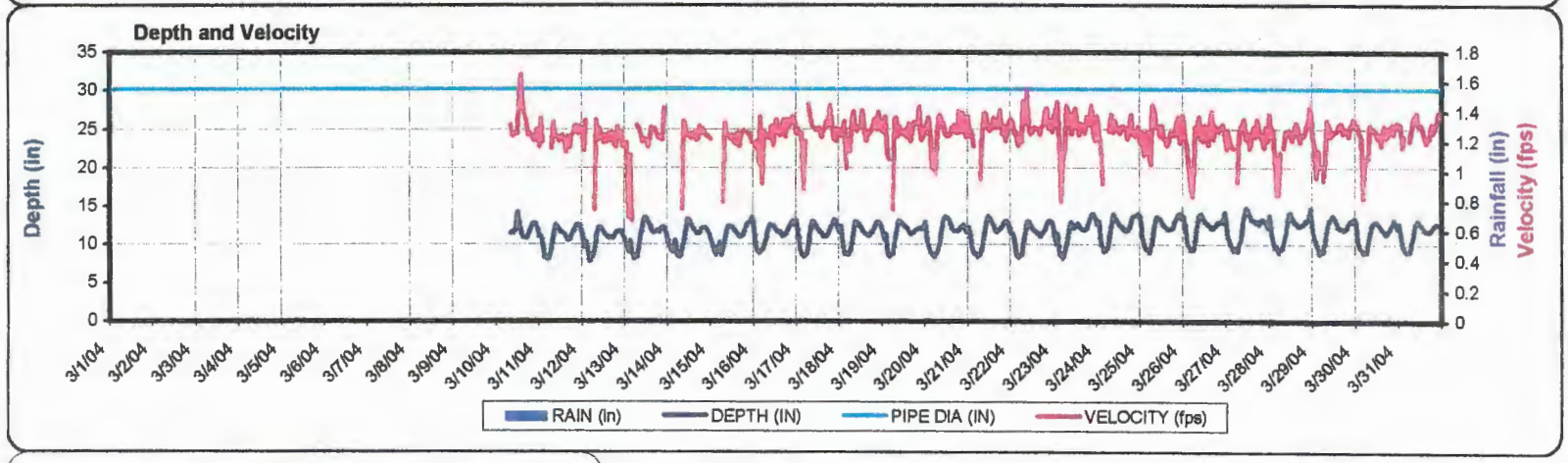
Monthly Flow Charts

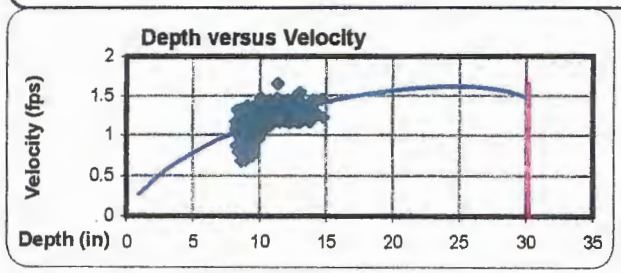
Depth and Velocity, Q, Depth versus Velocity

Monitor: MP2 **Pipe Dia:** 30.25 In **Date Range:** 03/01/04 to 03/31/04

Location: 401 Hwy 43 MARCH





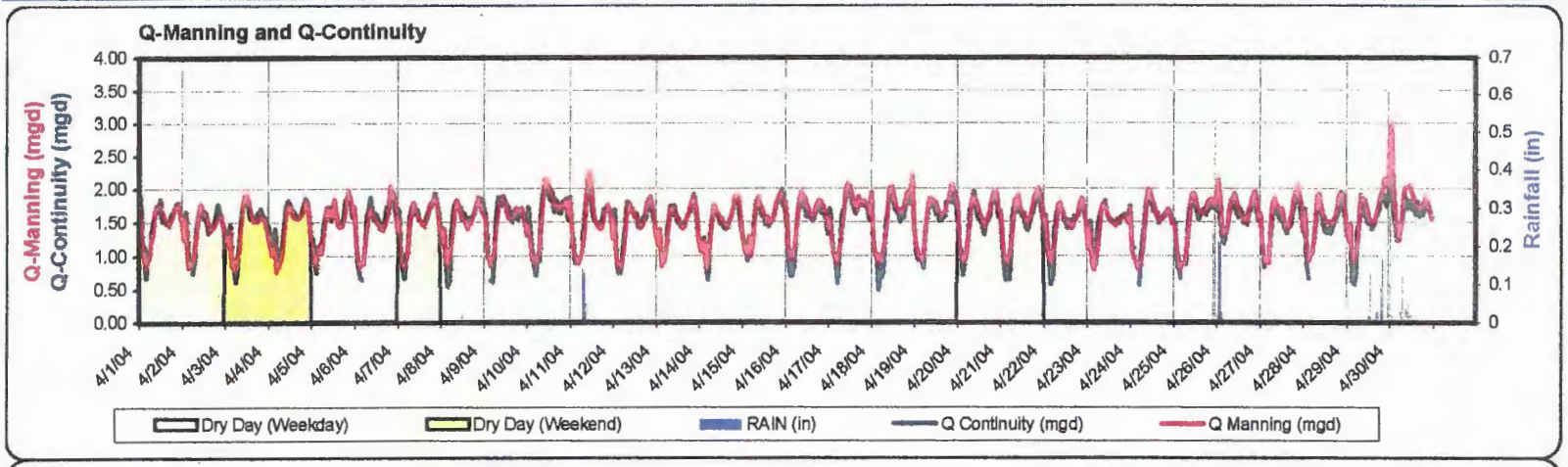


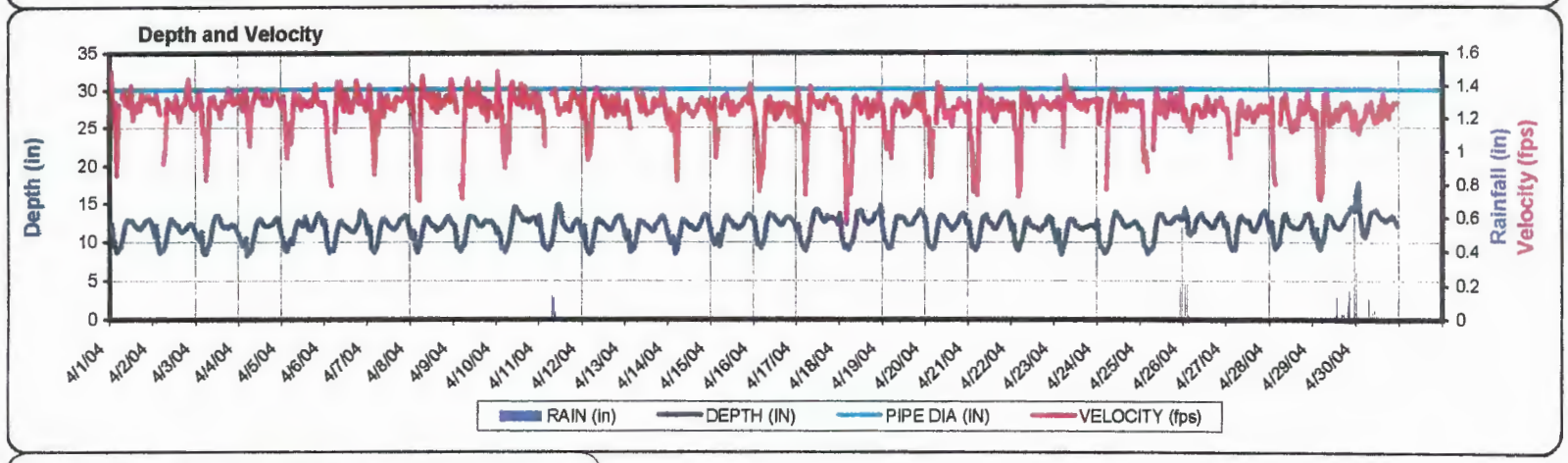
Monthly Flow Charts

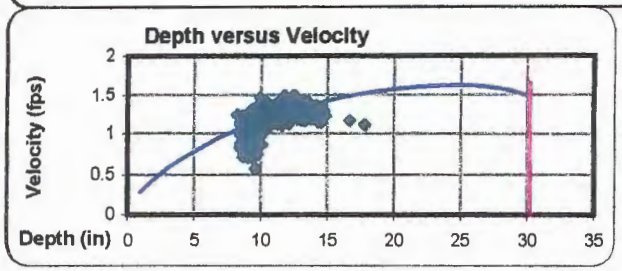
Depth and Velocity, Q, Depth versus Velocity

Monitor: MP2 **Pipe Dia:** 30.25 in **Date Range:** 04/01/04 to 04/30/04

Location: 401 Hwy 43 APRIL





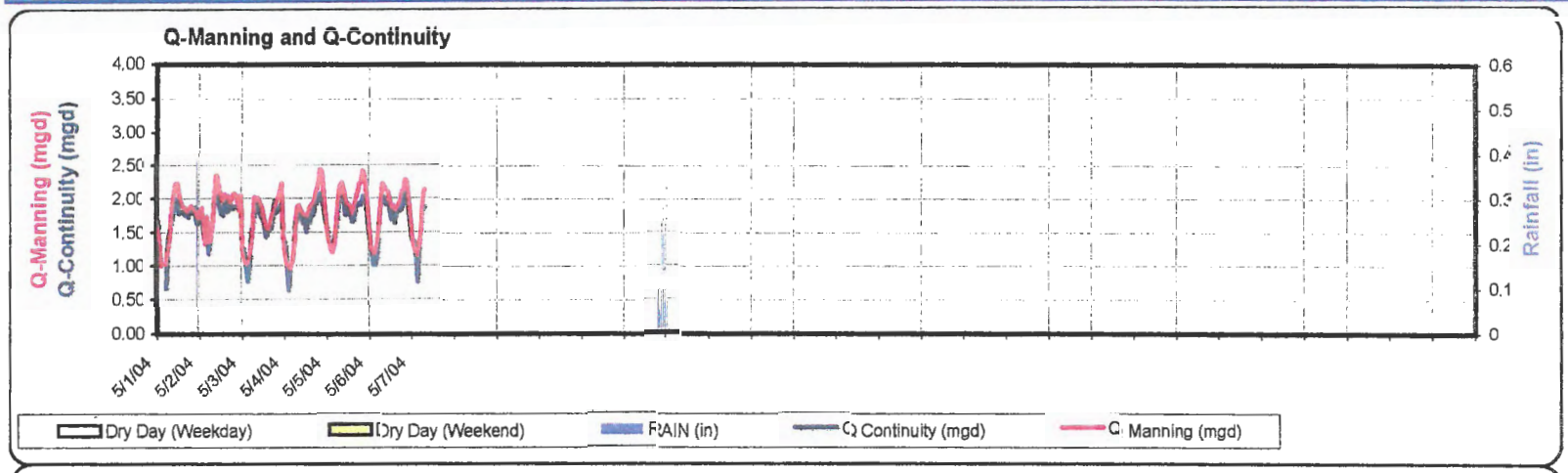


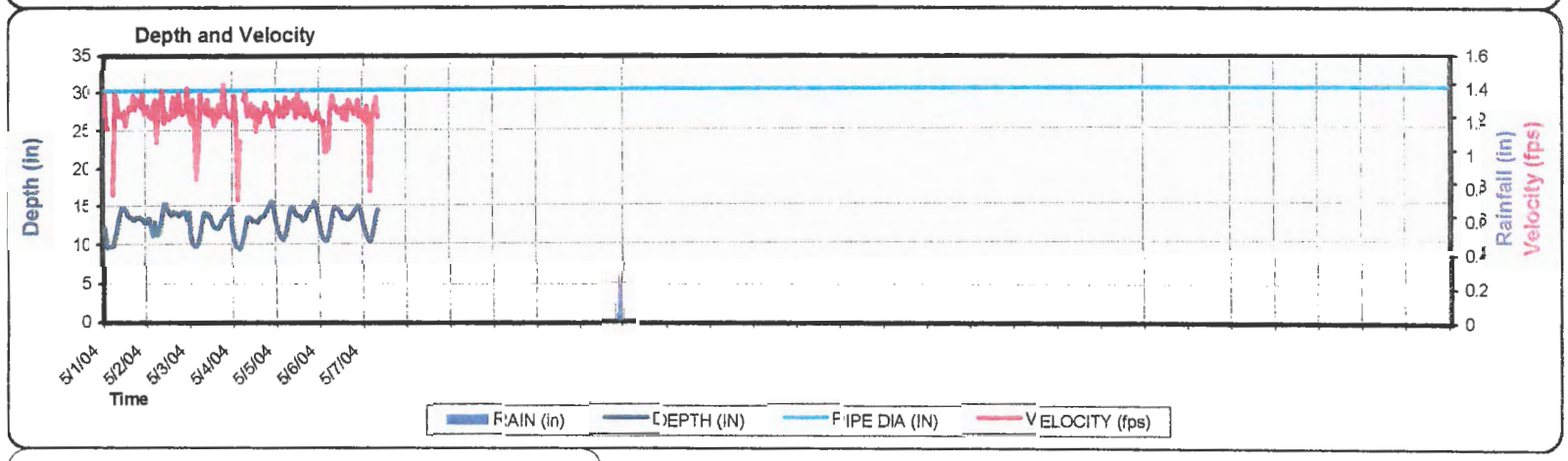
Monthly Flow Charts

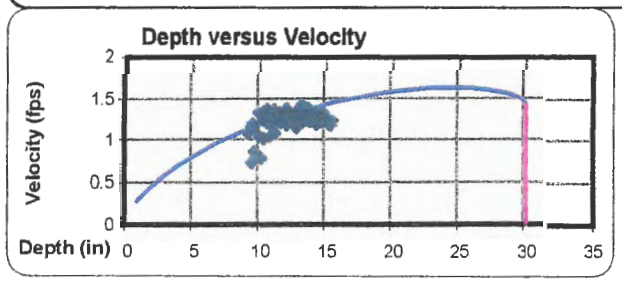
Depth and Velocity, Q, Depth versus Velocity

Monitor: MP2 **Pipe Dia:** 30.25 in **Date Range:** 05/01/04 to 05/07/04

Location: 401 Hwy 43 MAY





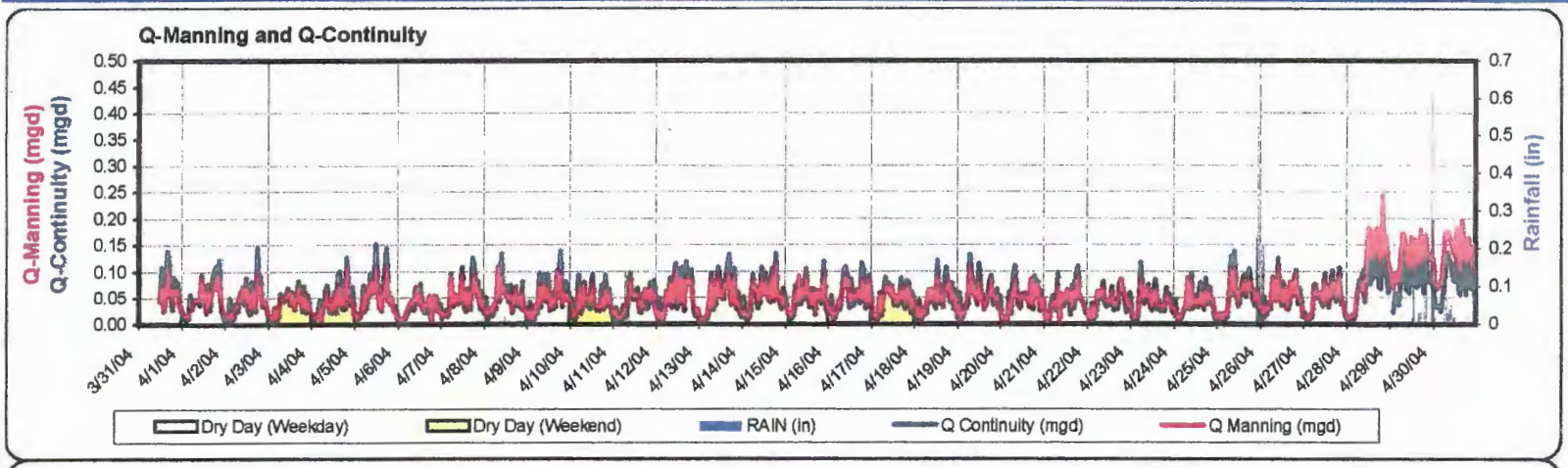


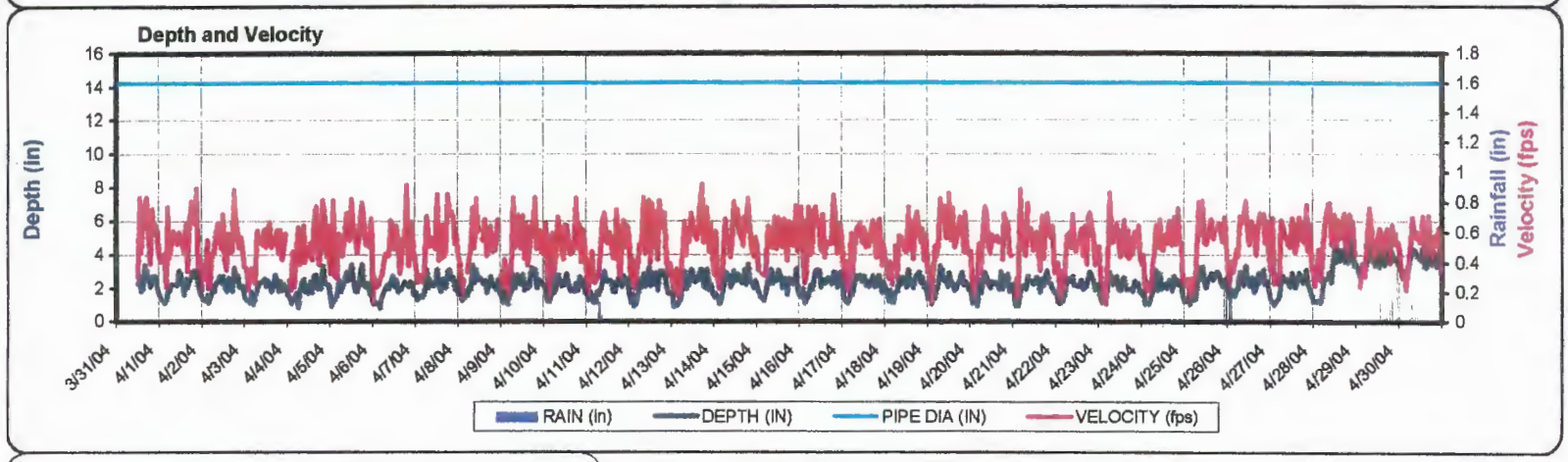
Monthly Flow Charts

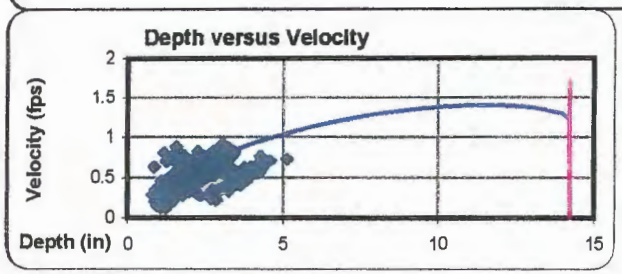
Depth and Velocity, Q, Depth versus Velocity

Monitor: MP3 **Pipe Dia:** 14.25 in **Date Range:** 03/31/04 to 04/30/04

Location: Hwy 43 Lift Station 22 **APRIL**





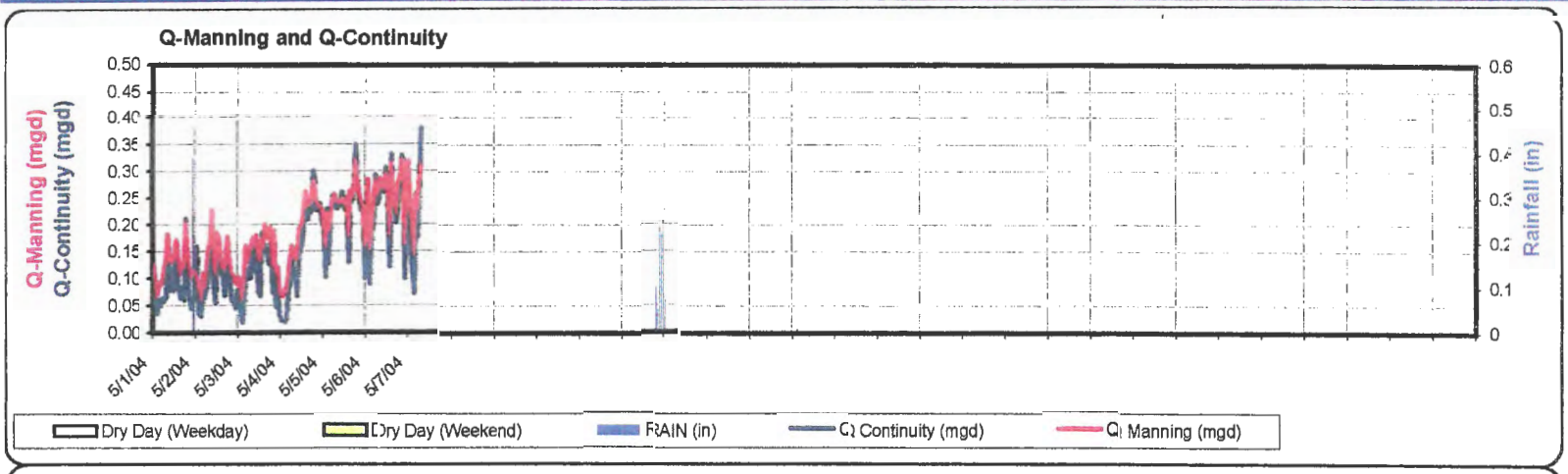


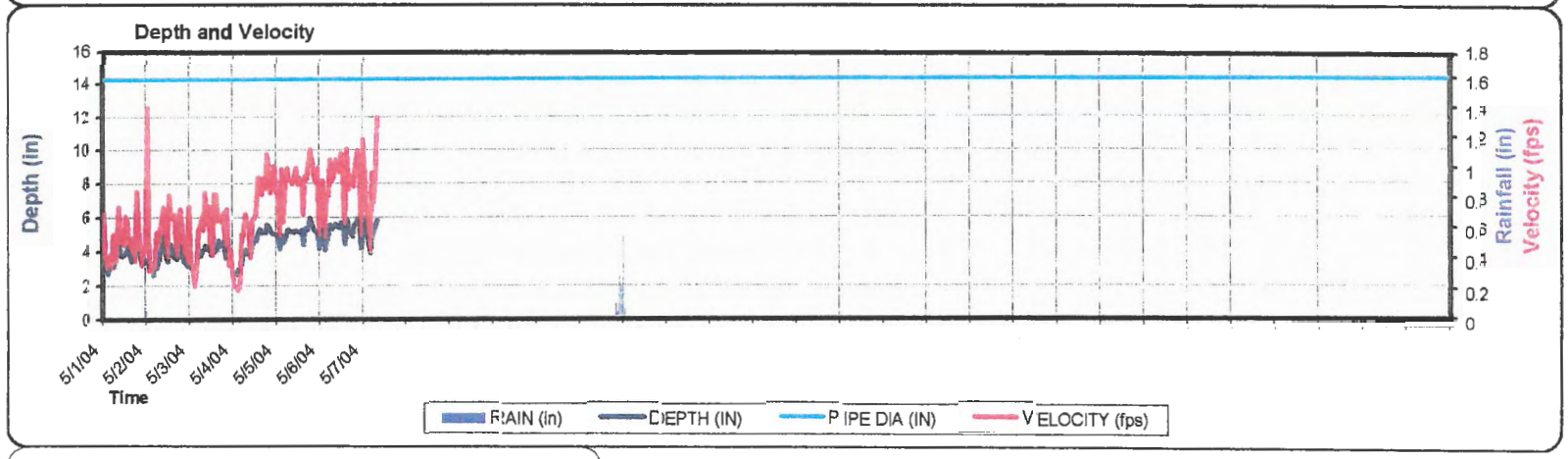
Monthly Flow Charts

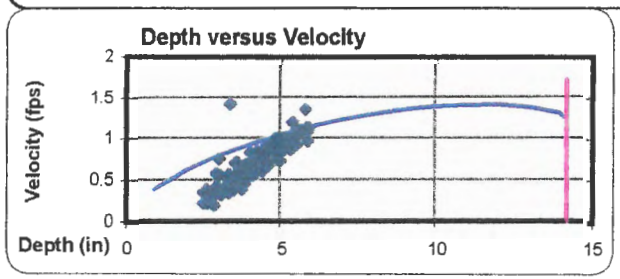
Depth and Velocity, Q, Depth versus Velocity

Monitor: MP3 **Pipe Dia:** 14.25 in **Date Range:** 05/01/04 to 05/07/04

Location: Hwy 43 Lift Station 22 MAY





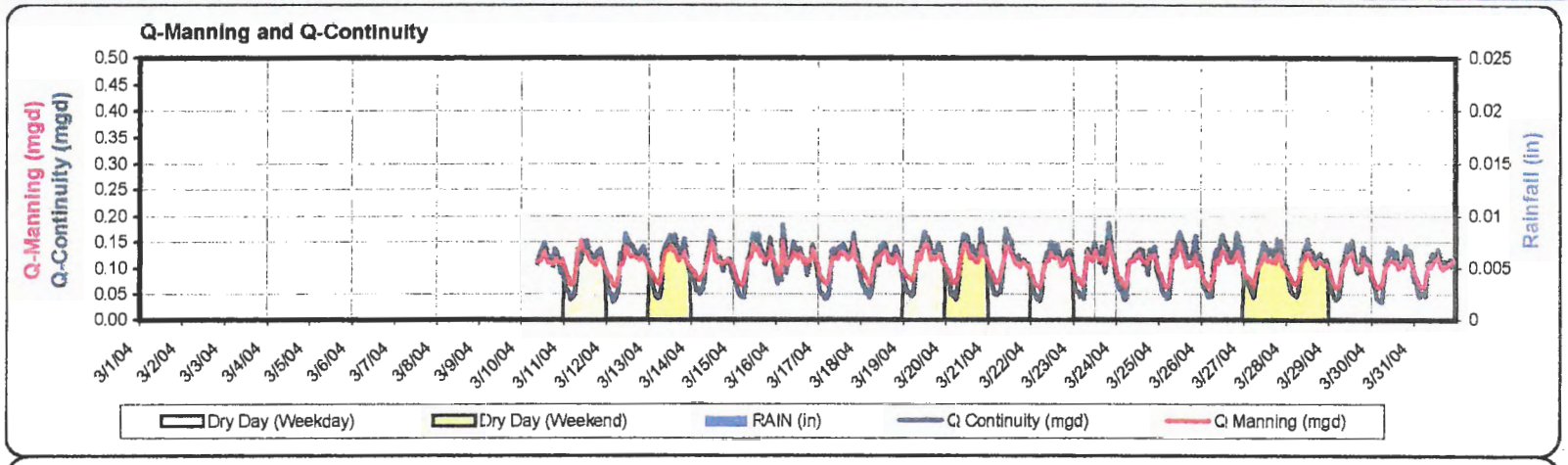


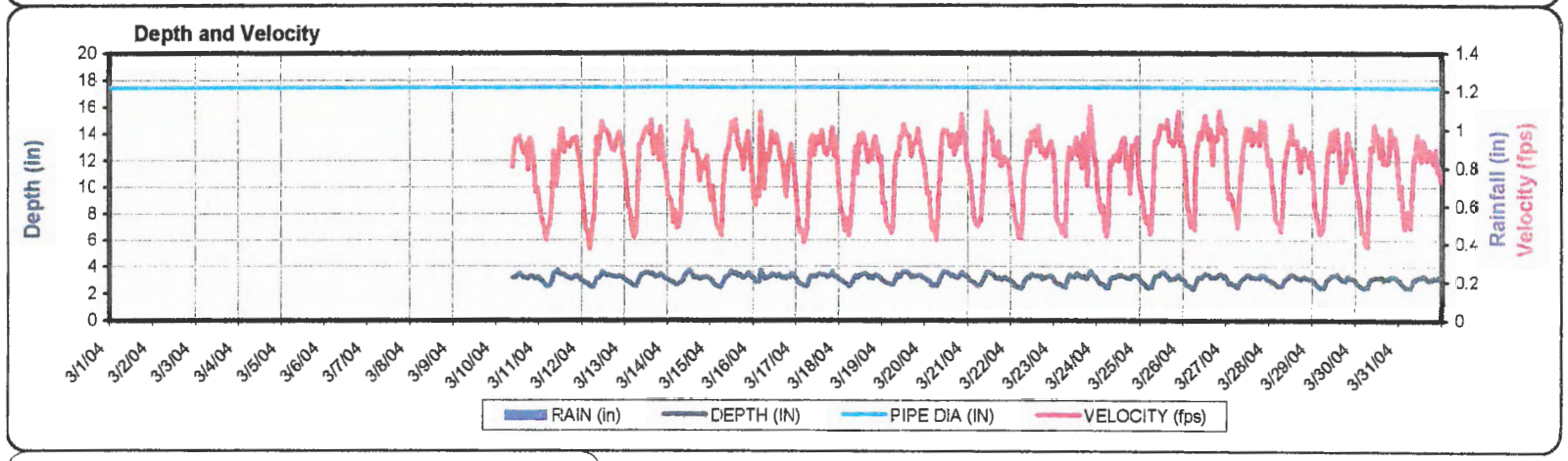
Monthly Flow Charts

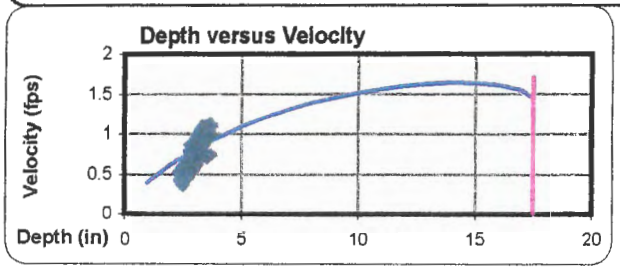
Depth and Velocity, Q, Depth versus Velocity

Monitor: MP4 **Pipe Dia:** 17.5 in **Date Range:** 03/01/04 to 03/31/04

Location: Industrial Pkwy US of Park St. LS MARCH





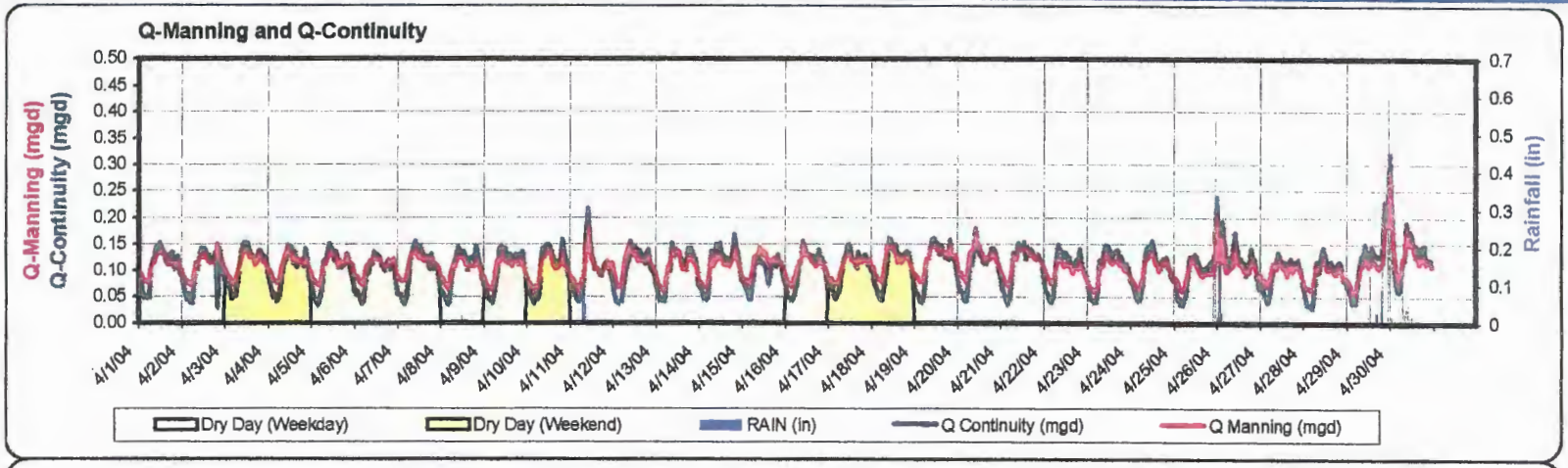


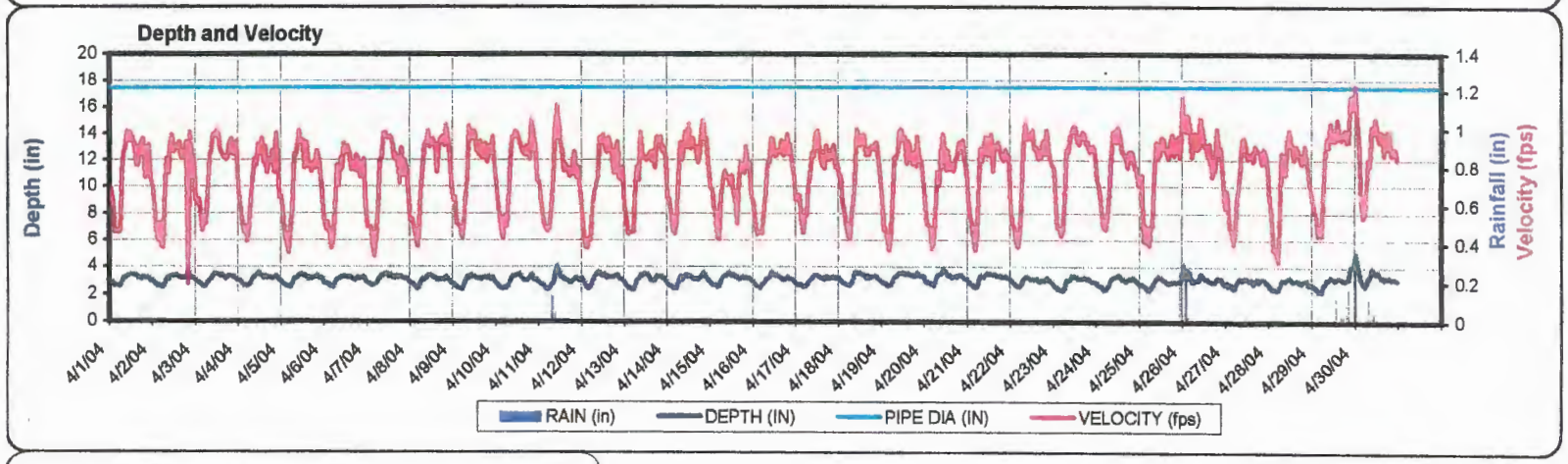
Monthly Flow Charts

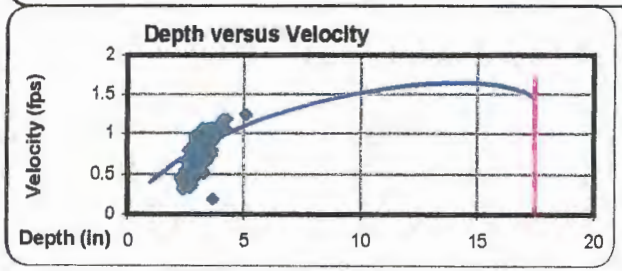
Depth and Velocity, Q, Depth versus Velocity

Monitor: MP4 **Pipe Dia:** 17.5 in **Date Range:** 04/01/04 to 04/30/04

Location: Industrial Pkwy US of Park St. LS **APRIL**





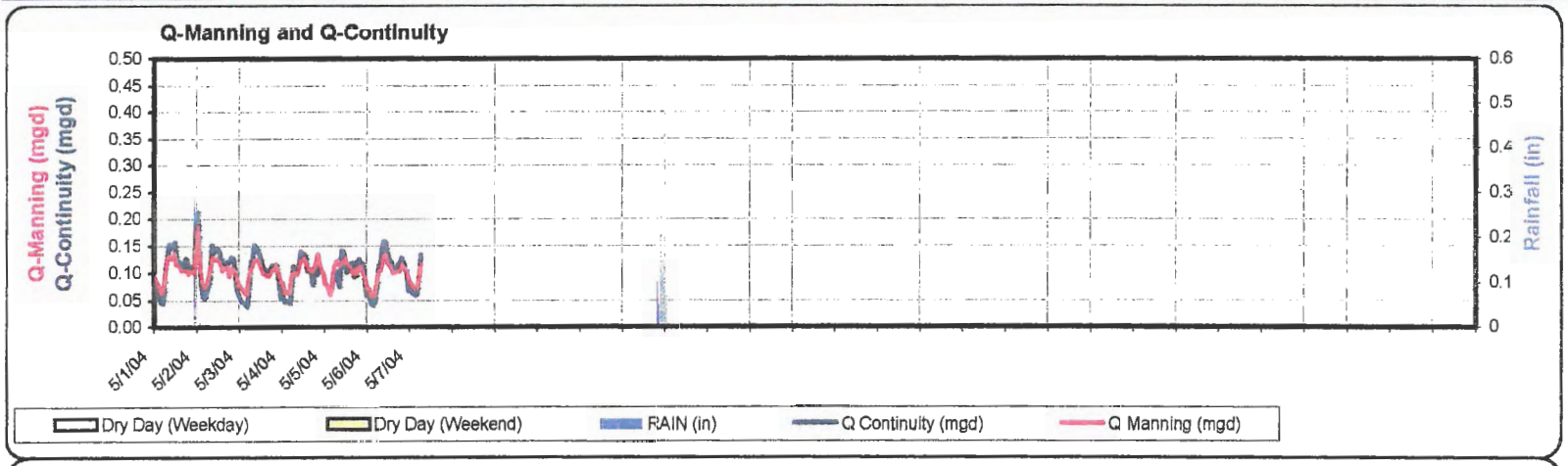


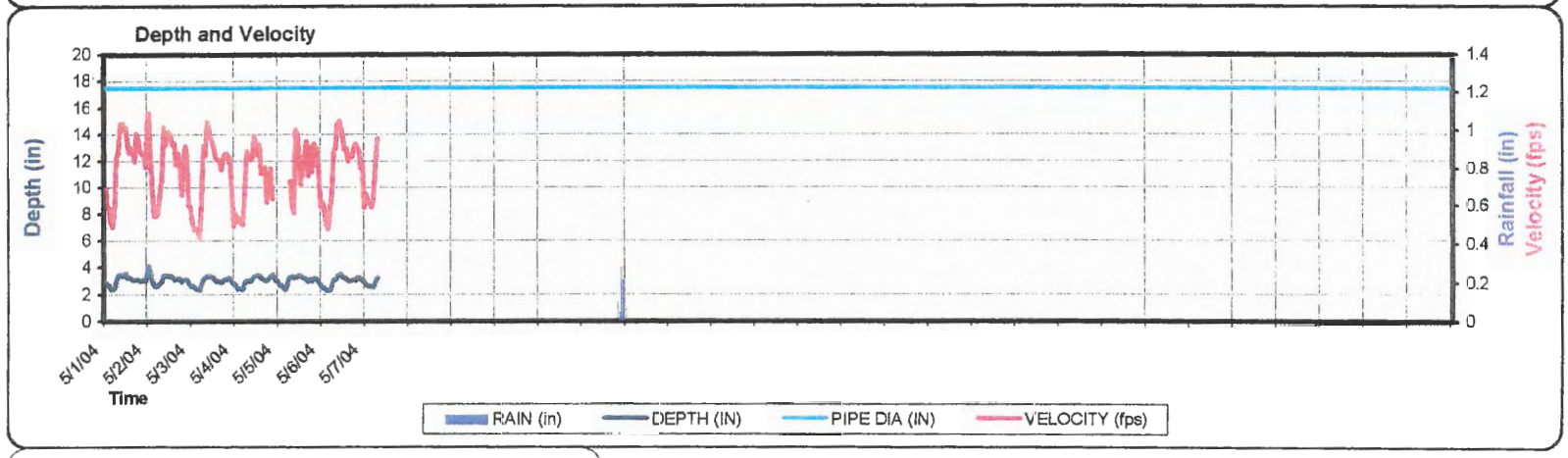
Monthly Flow Charts

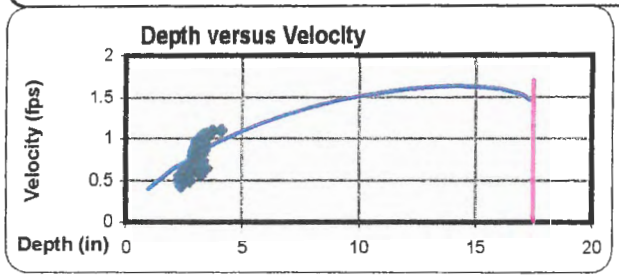
Depth and Velocity, Q, Depth versus Velocity

Monitor: MP4 **Pipe Dia:** 17.5 in **Date Range:** 05/01/04 to 05/07/04

Location: Industrial Pkwy US of Park St. LS MAY





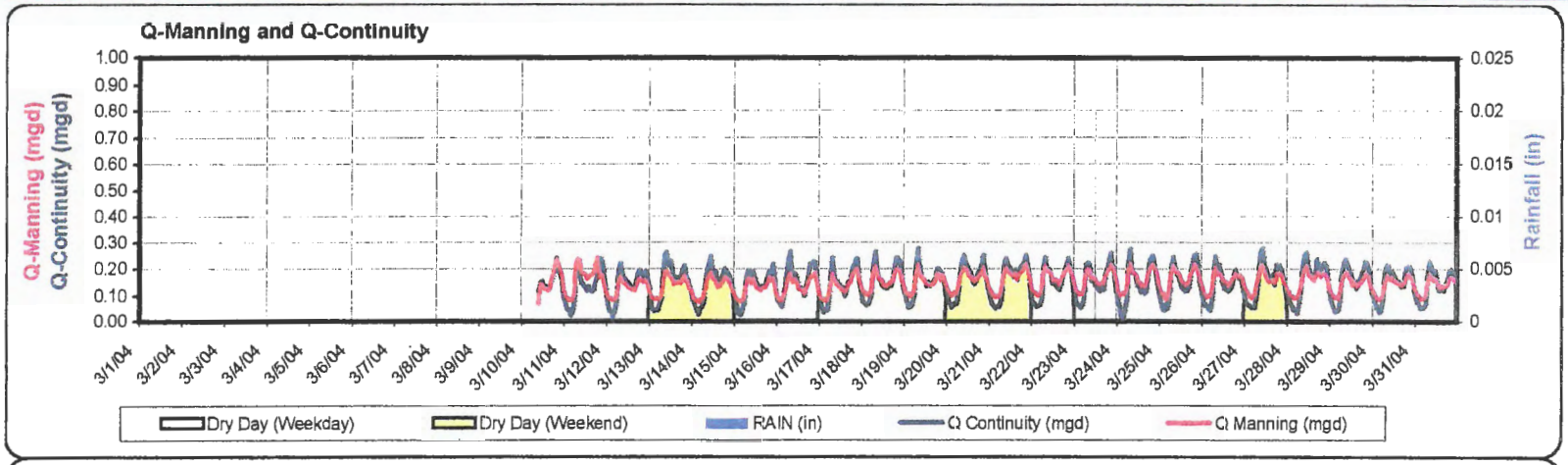


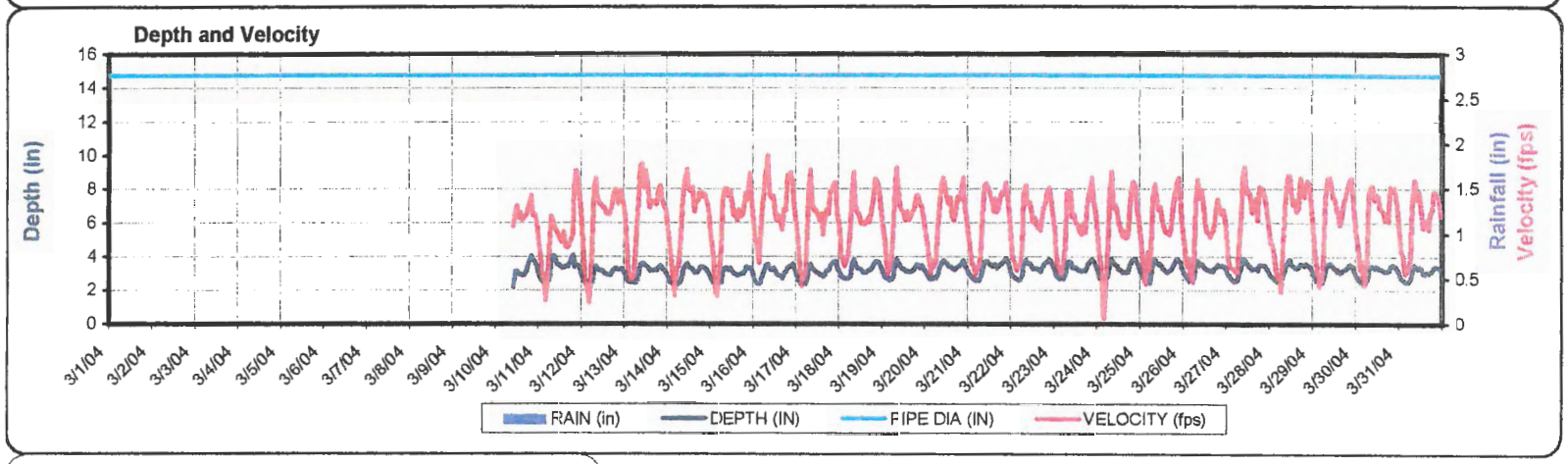
Monthly Flow Charts

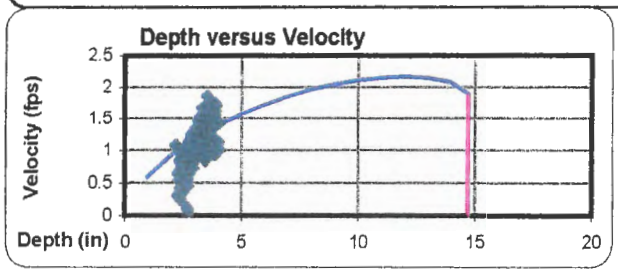
Depth and Velocity, Q, Depth versus Velocity

Monitor: MP5 **Pipe Dia:** 14.75 in **Date Range:** 03/01/04 to 03/31/04

Location: 222 Sullivan Dr MARCH





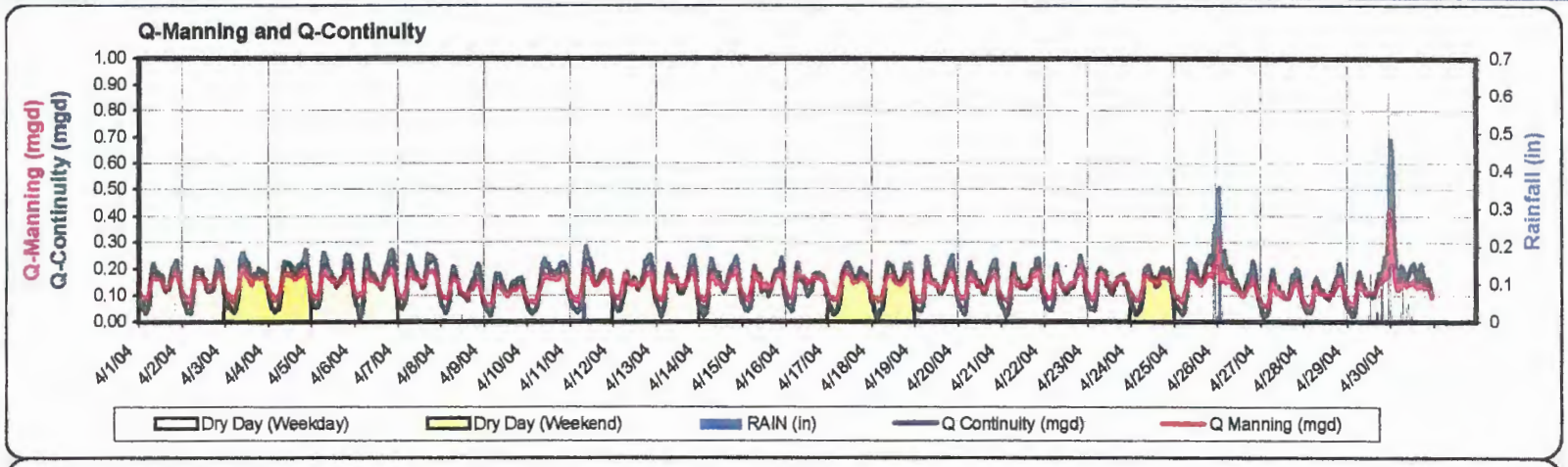


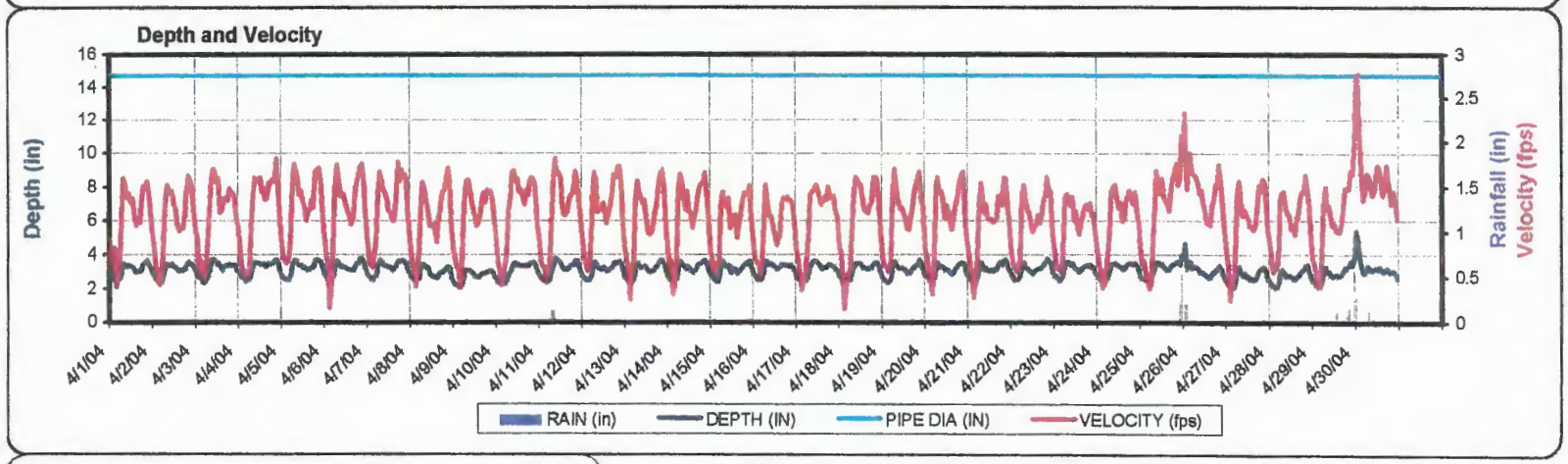
Monthly Flow Charts

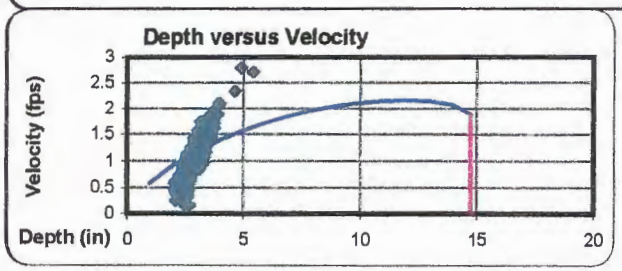
Depth and Velocity, Q, Depth versus Velocity

Monitor: MP5 **Pipe Dia:** 14.75 in **Date Range:** 04/01/04 to 04/30/04

Location: 222 Sullivan Dr **APRIL**





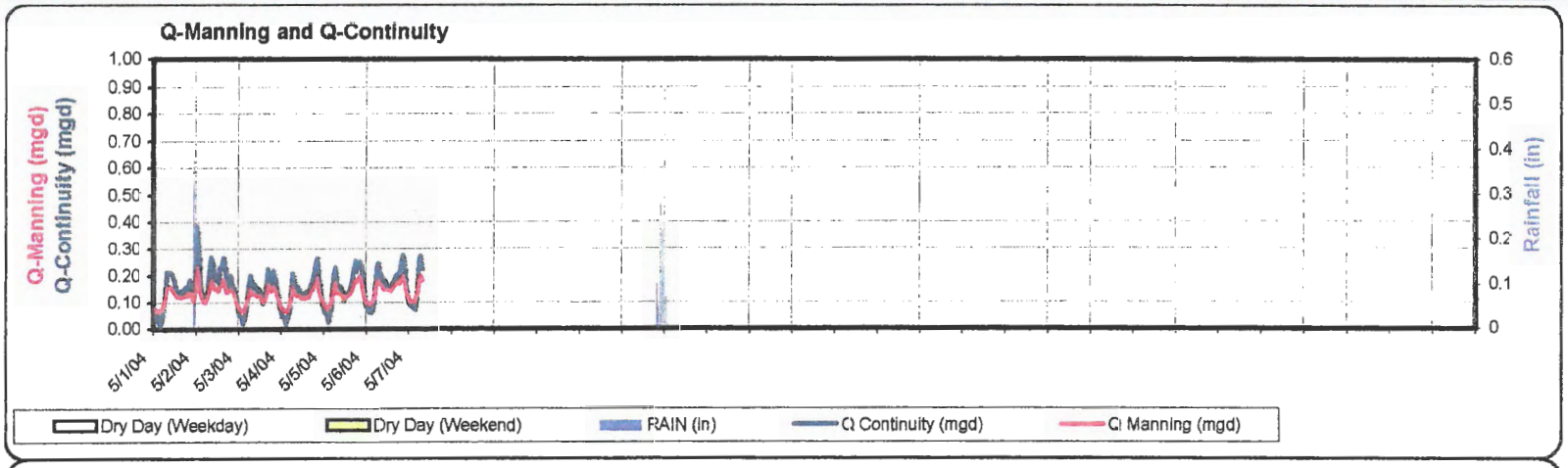


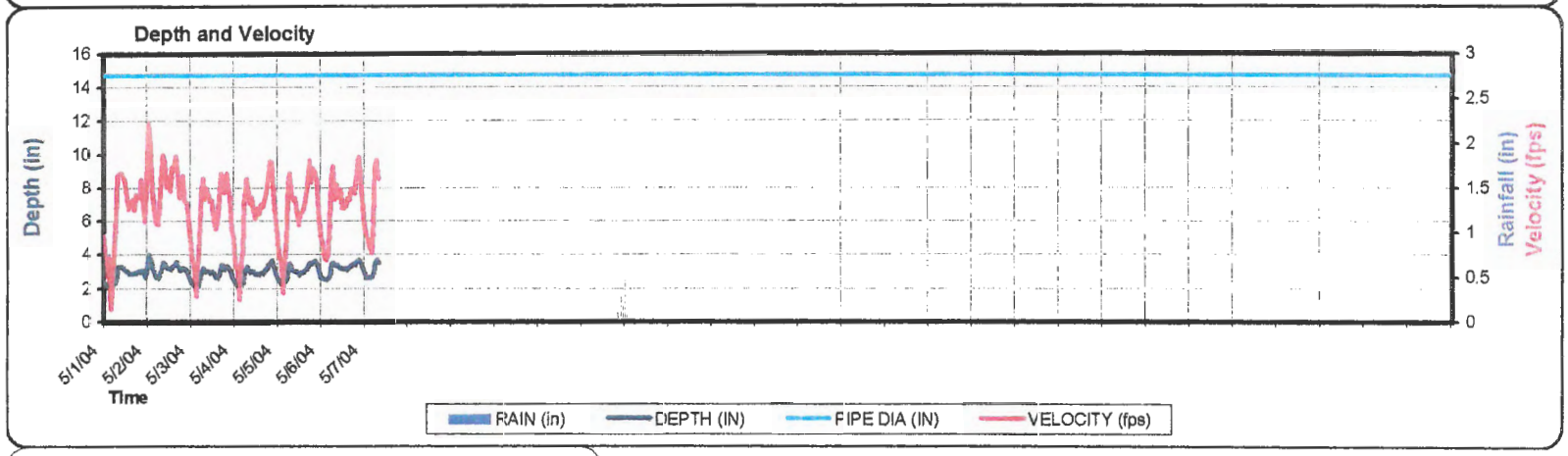
Monthly Flow Charts

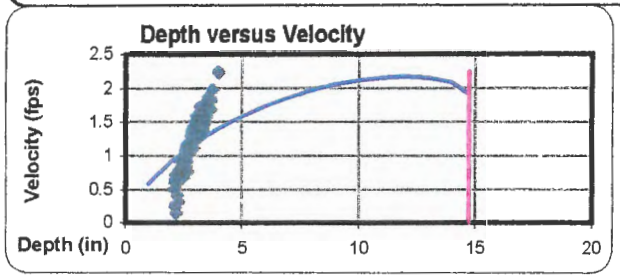
Depth and Velocity, Q, Depth versus Velocity

Monitor: MP5 **Pipe Dia:** 14.75 In **Date Range:** 05/01/04 to 05/07/04

Location: 222 Sullivan Dr MAY





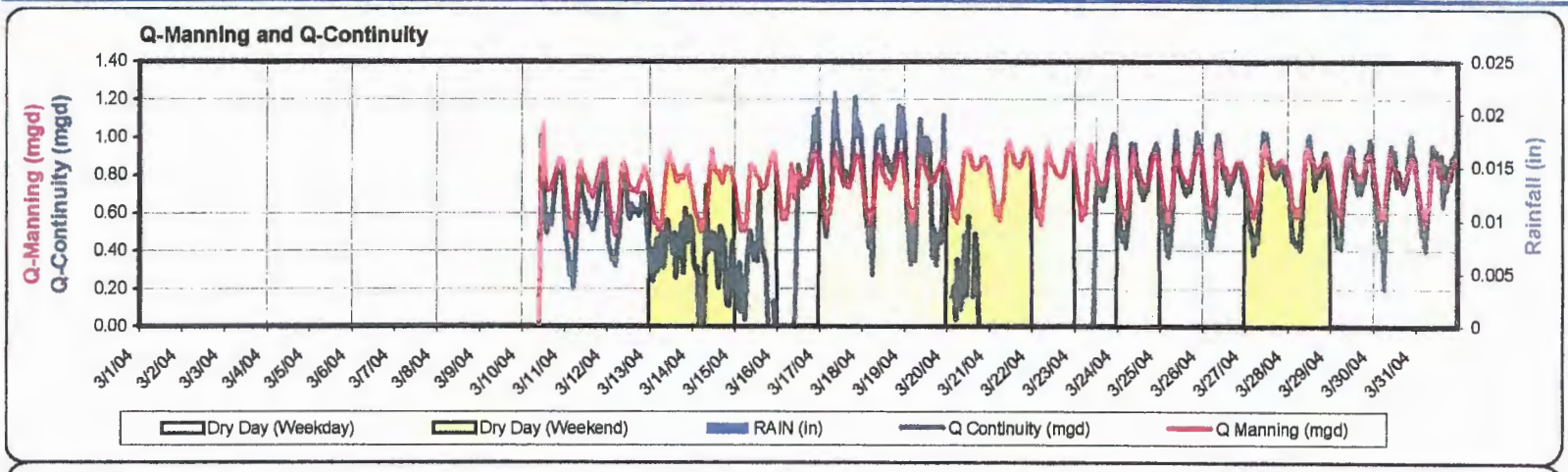


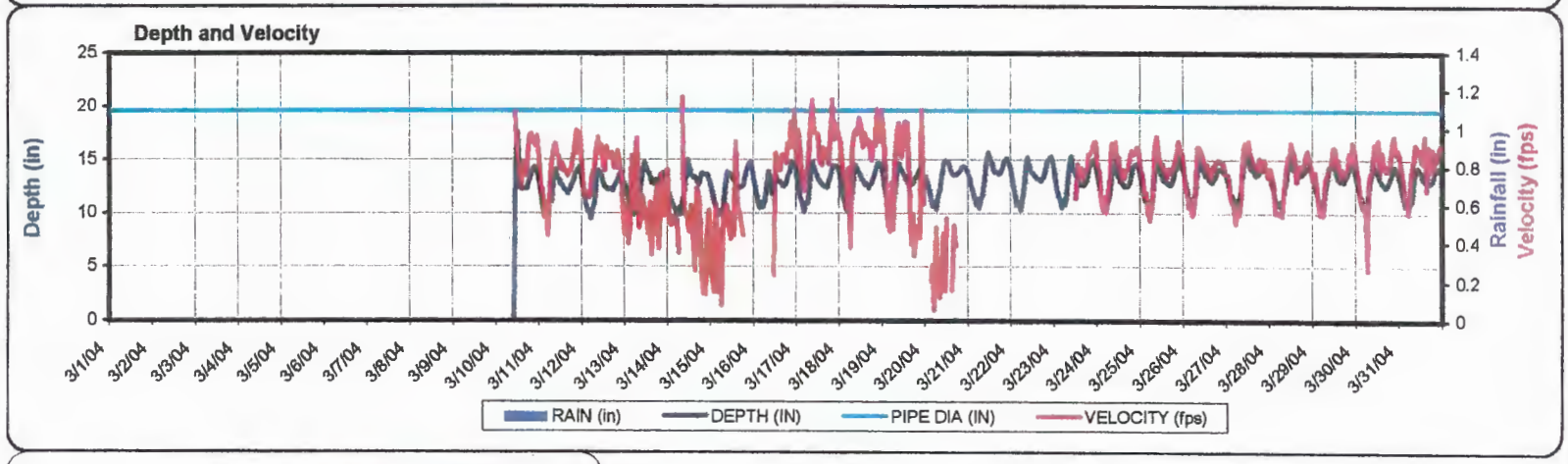
Monthly Flow Charts

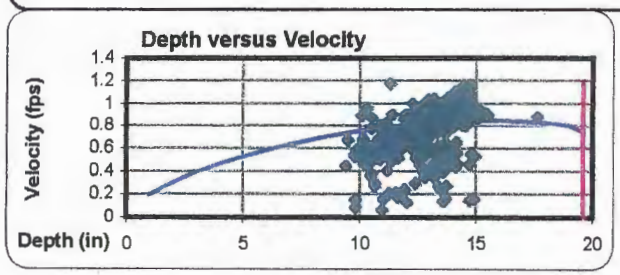
Depth and Velocity, Q, Depth versus Velocity

Monitor: MP6 **Pipe Dia:** 19.63 in **Date Range:** 03/01/04 to 03/31/04

Location: Frances Ave MARCH





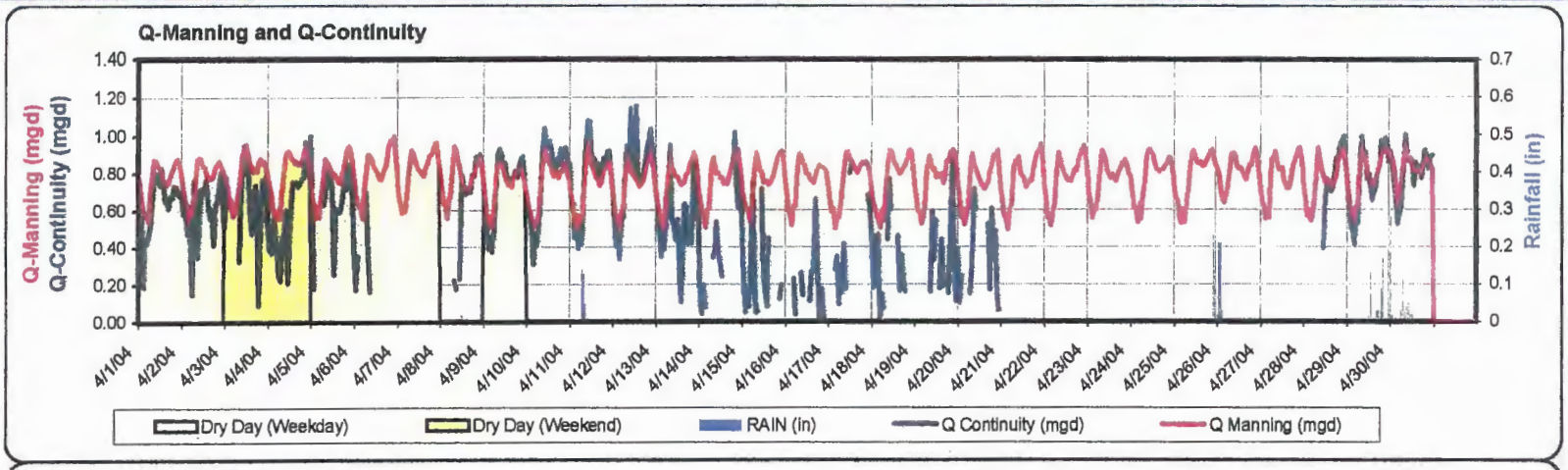


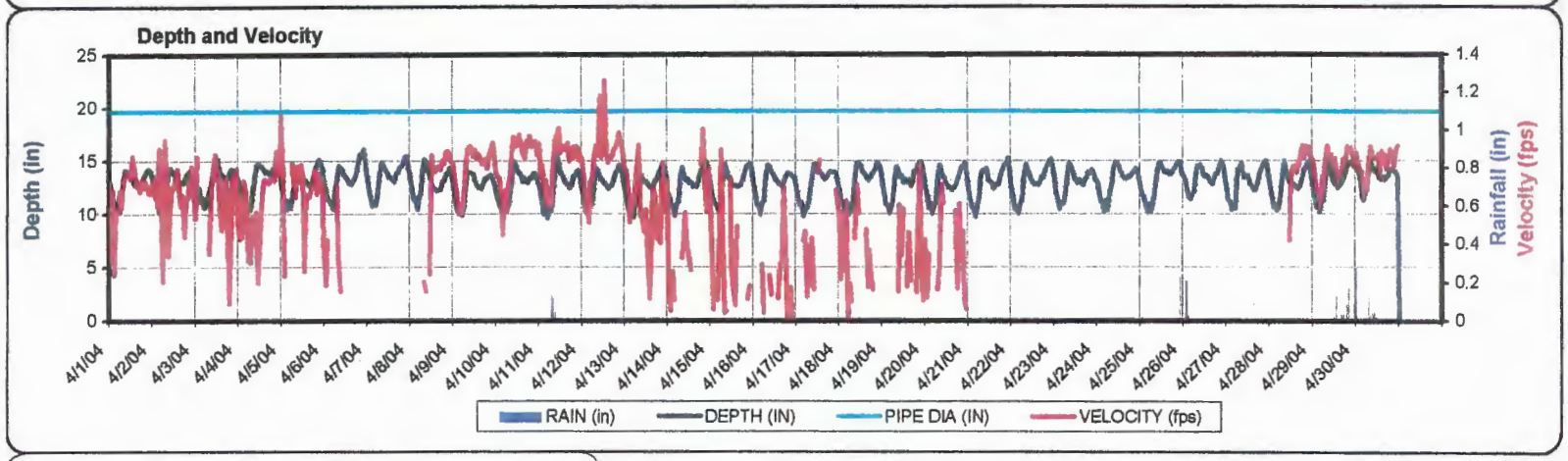
Monthly Flow Charts

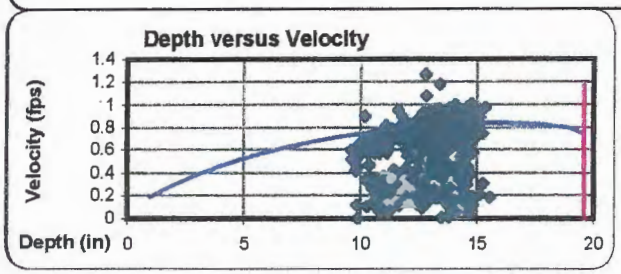
Depth and Velocity, Q, Depth versus Velocity

Monitor: MP6 **Pipe Dia:** 19.63 in **Date Range:** 04/01/04 to 04/30/04

Location: Frances Ave **APRIL**





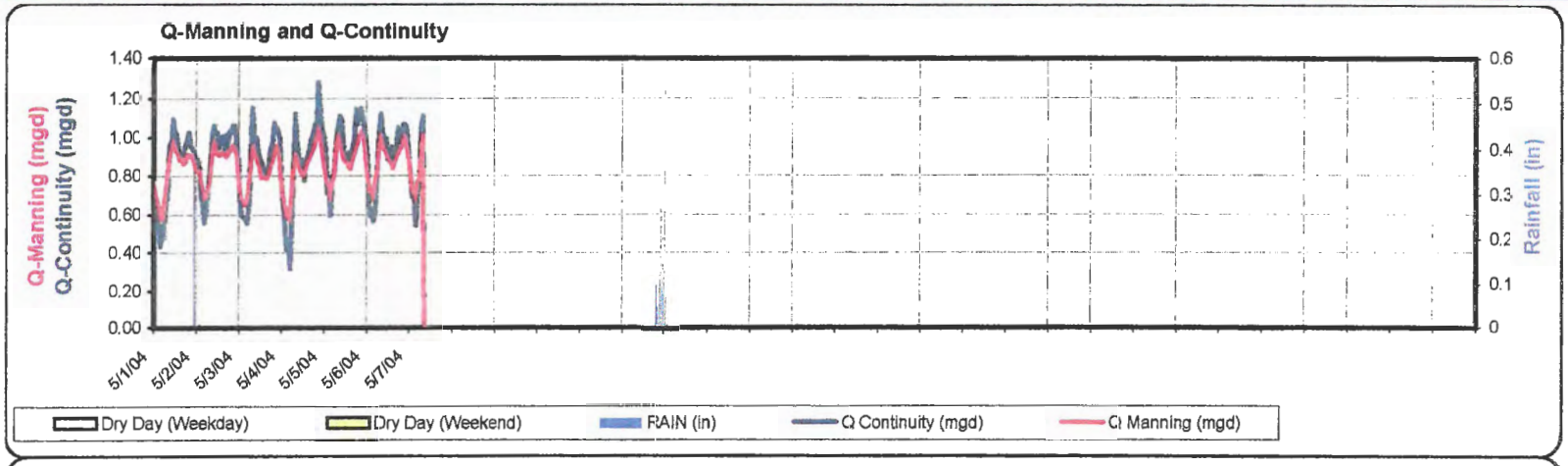


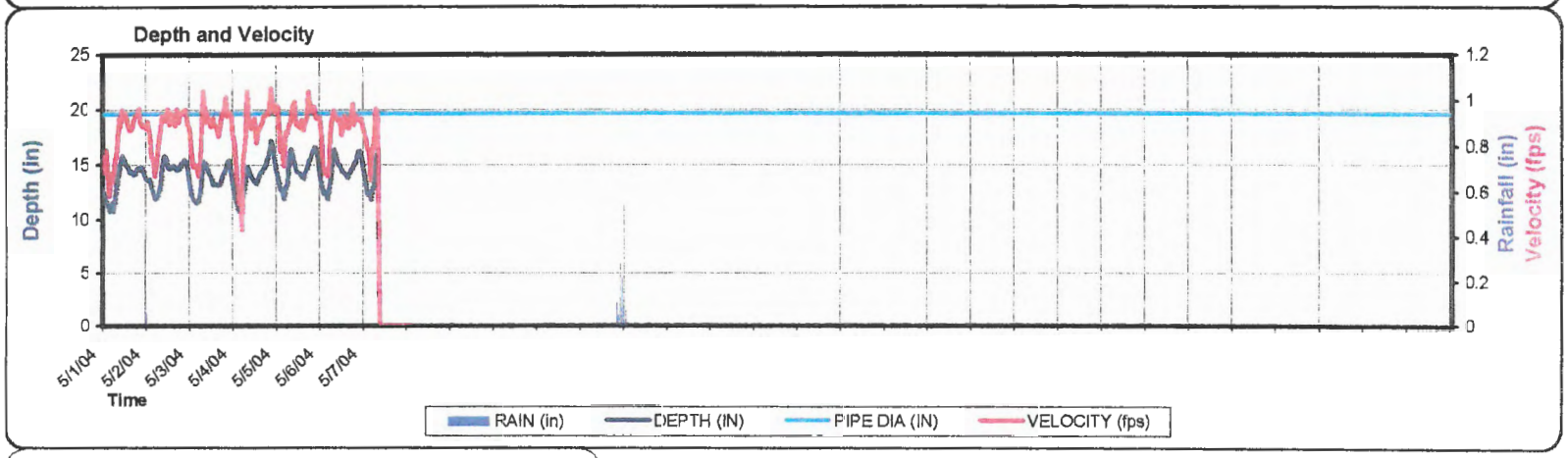
Monthly Flow Charts

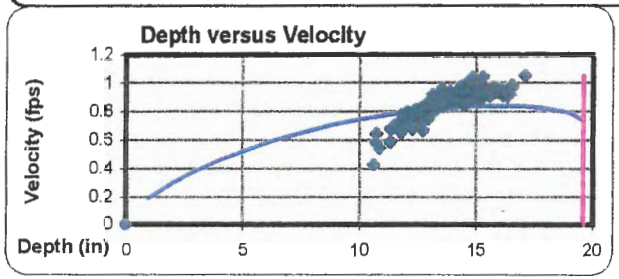
Depth and Velocity, Q, Depth versus Velocity

Monitor: MP6 **Pipe Dia:** 19.63 in **Date Range:** 05/01/04 to 05/07/04

Location: Frances Ave MAY

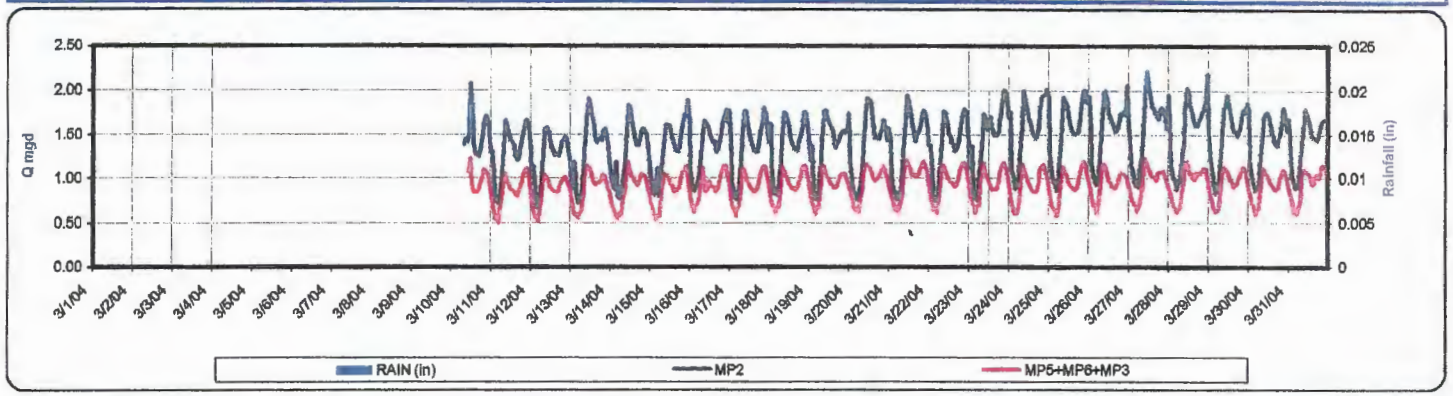




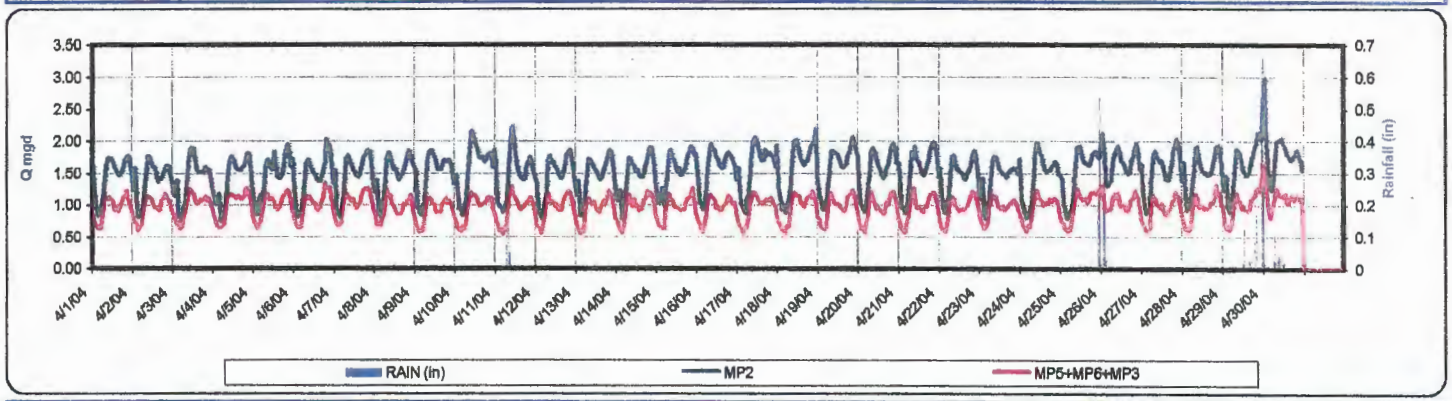


Dependent Sites - Monthly Flow Charts

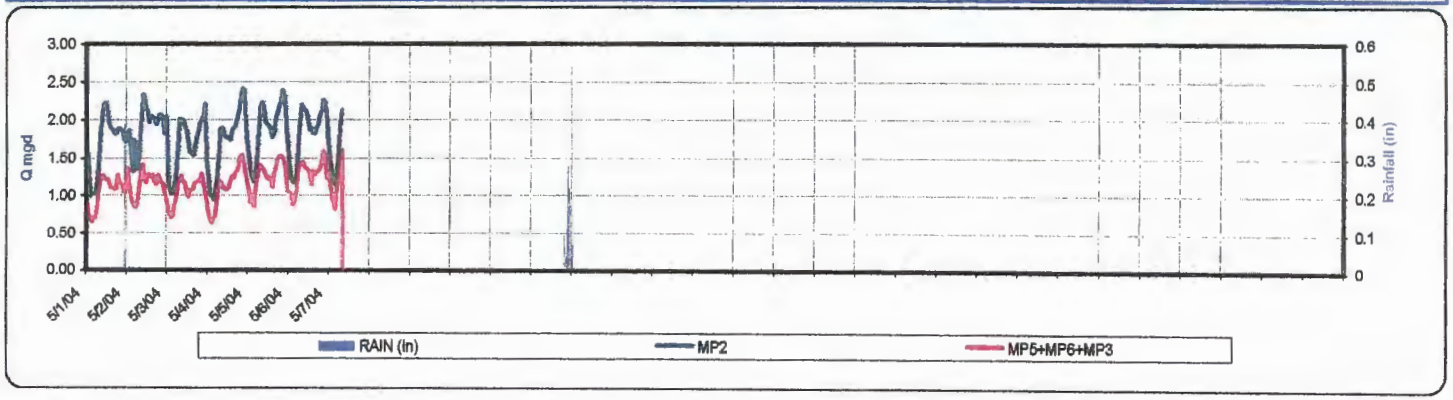
Monitor: MP_2 **Date Range:** 03/01/04 to 03/31/04



Monitor: MP_2 **Date Range:** 04/01/04 to 04/30/04

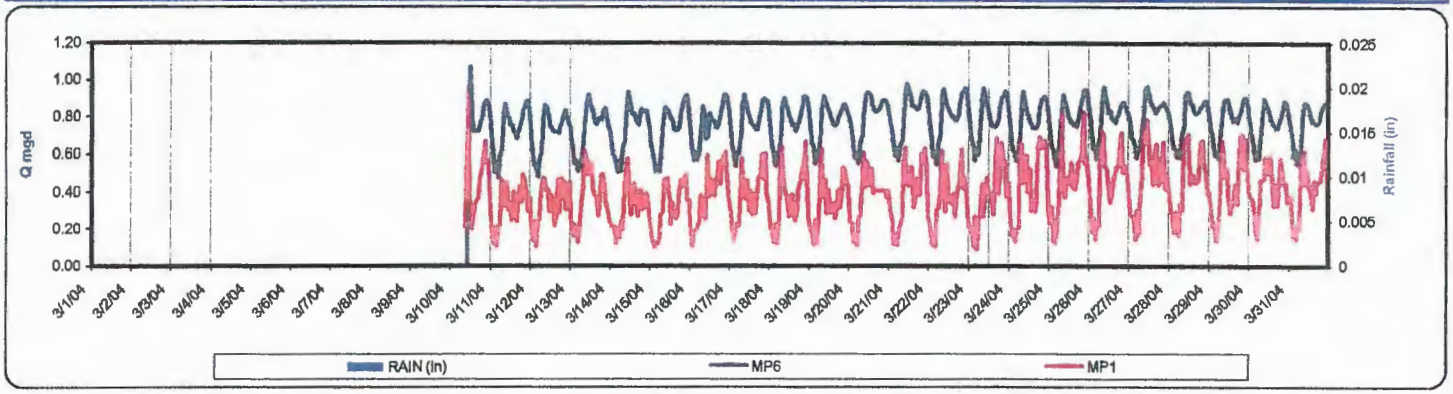


Monitor: MP_2 **Date Range:** 05/01/04 to 05/07/04

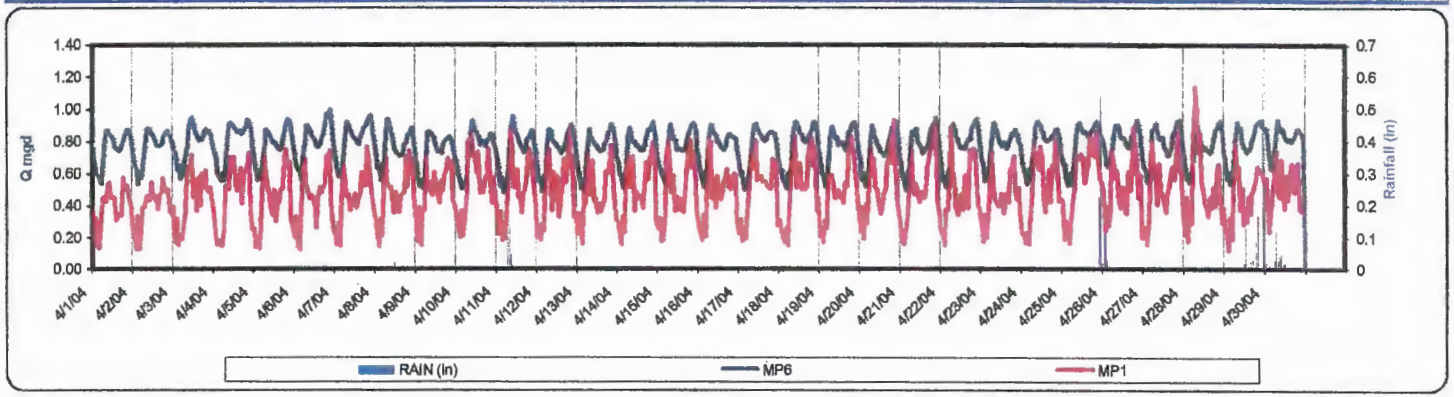


Dependent Sites - Monthly Flow Charts

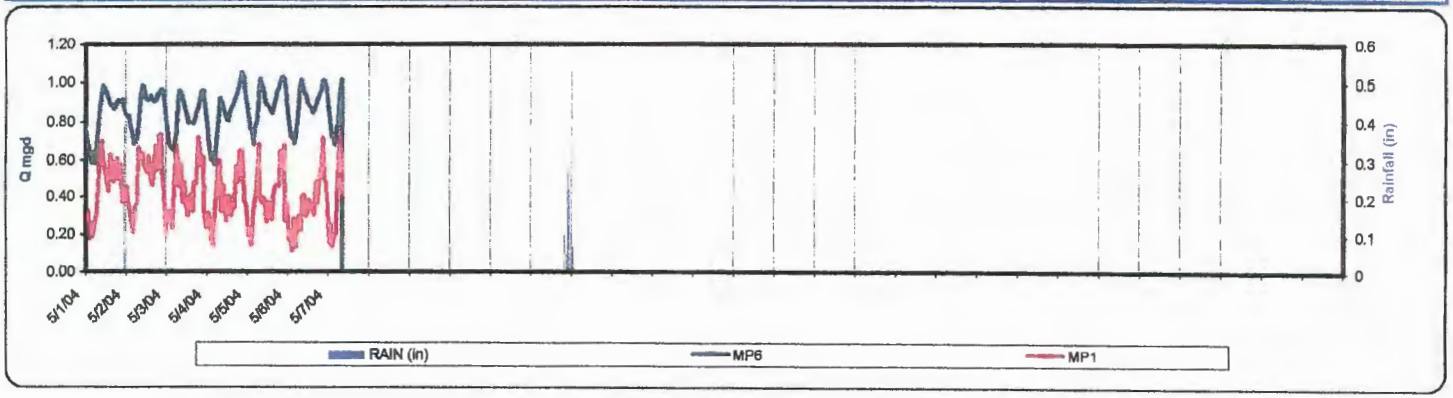
Monitor: MP_6 **Date Range:** 03/01/04 to 03/31/04



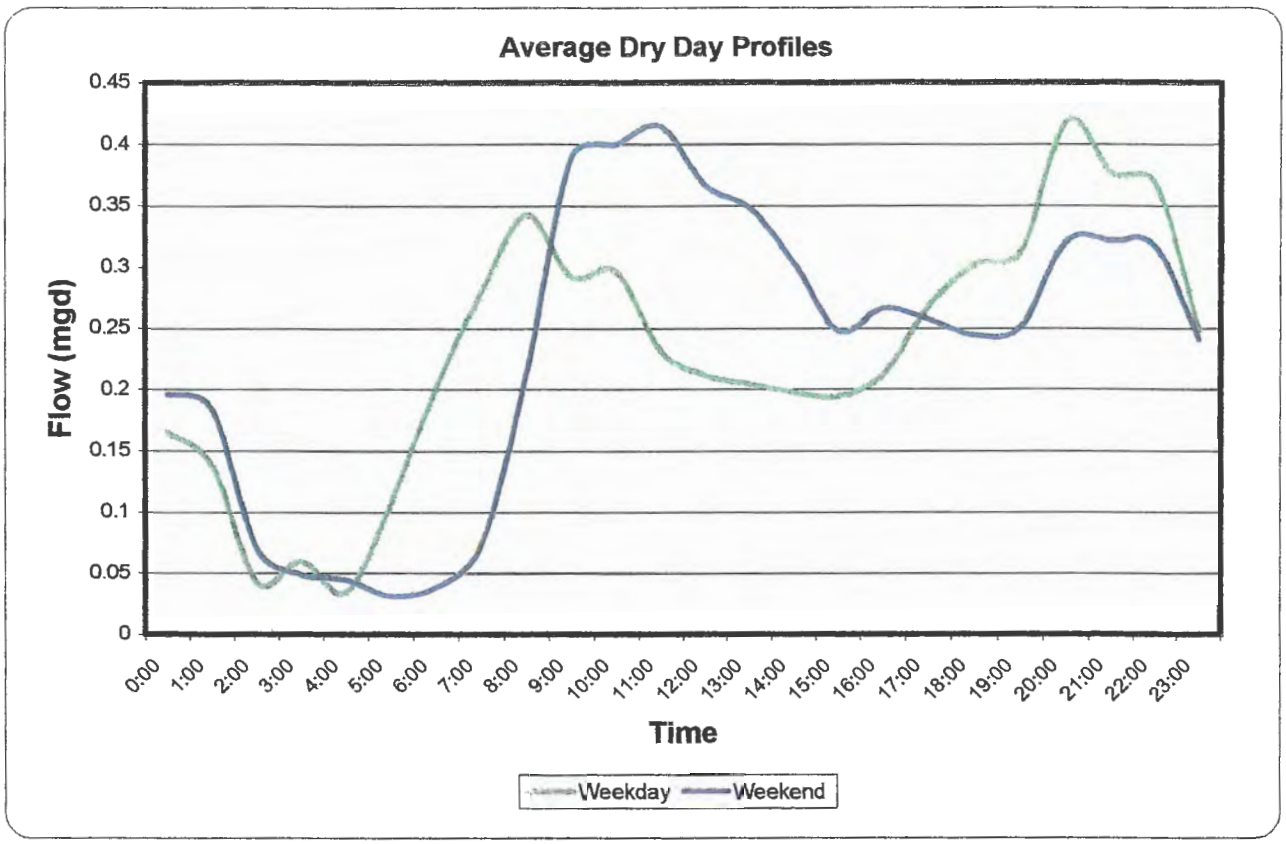
Monitor: MP_6 **Date Range:** 04/01/04 to 04/30/04



Monitor: MP_6 **Date Range:** 05/01/04 to 05/07/04



MP1



Dry Day Profiles

Weekday and Weekend Periods

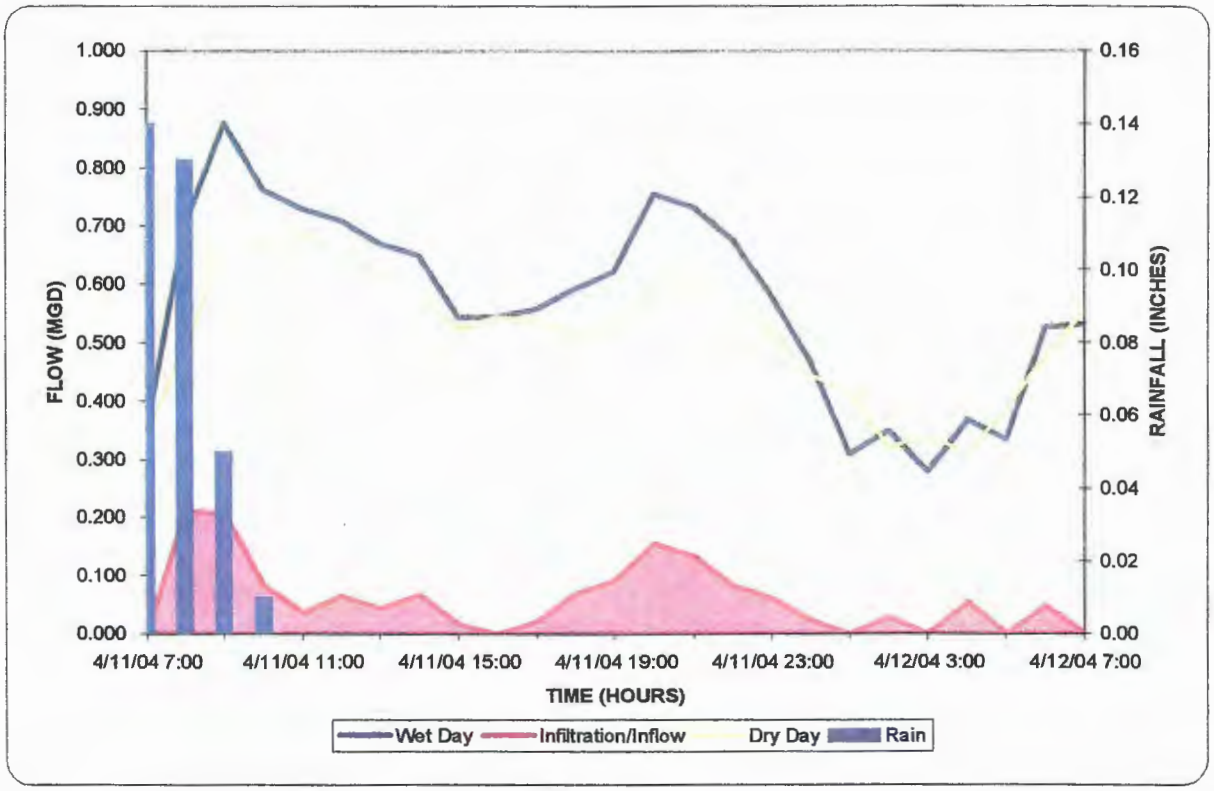
Date Range: ***03/01/04*** to ***05/07/04***

Monitor: **MP1** **Address:** **Celeste Rd**

Pipe Dia: **18.5 in**

FLOW MONITOR ANALYSIS
STORM DATA

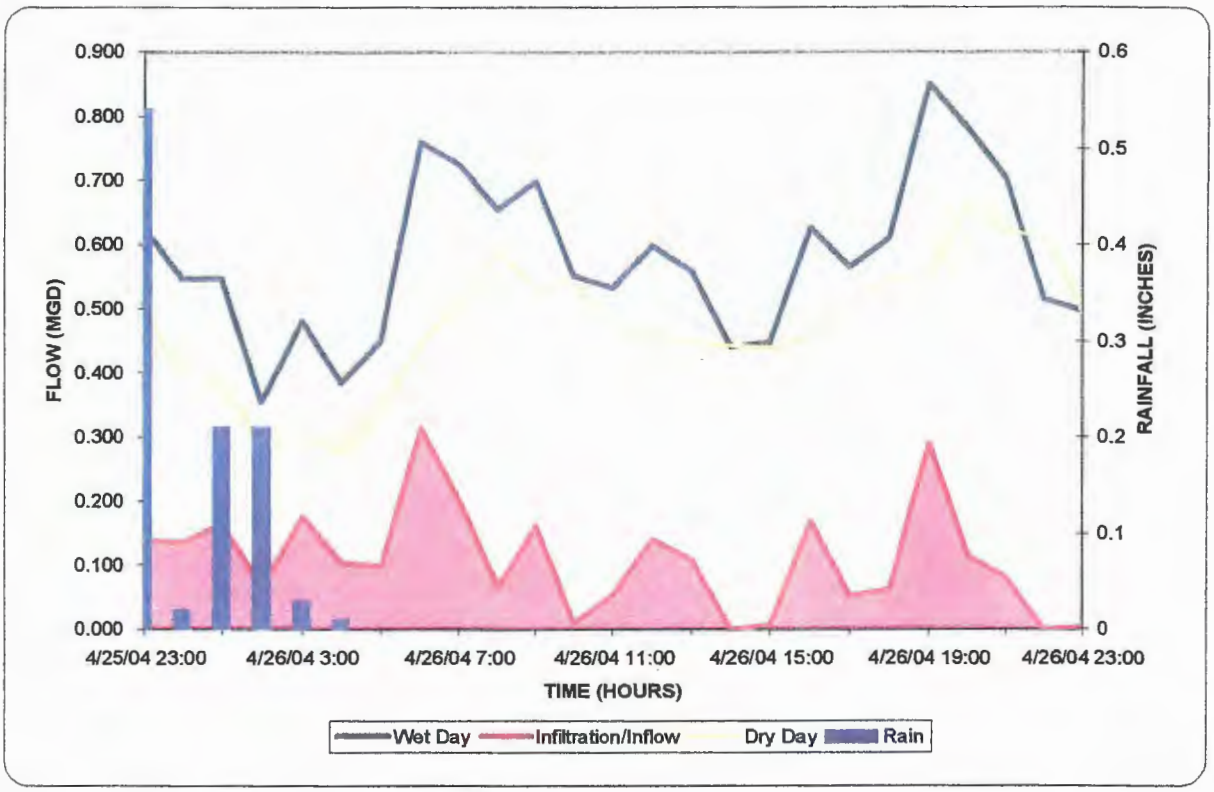
Monitor Name:	MP1	Day of Week:	Sunday
Storm date:	11-Apr-04	Total Rainfall:	0.33 Inches
Rain Start Hour:	11-Apr-04 07:00	Rainfall Duration (hr):	4



ADJUSTED AVERAGE BASE FLOW (mgd)	0.518
TOTAL FLOW (mg)	0.569
PEAK FLOW (mgd)	0.877
PEAK HOUR RAIN (in)	0.140
24 HR II VOLUME (MG)	0.075
PEAK II (MGD)	0.210

FLOW MONITOR ANALYSIS
STORM DATA

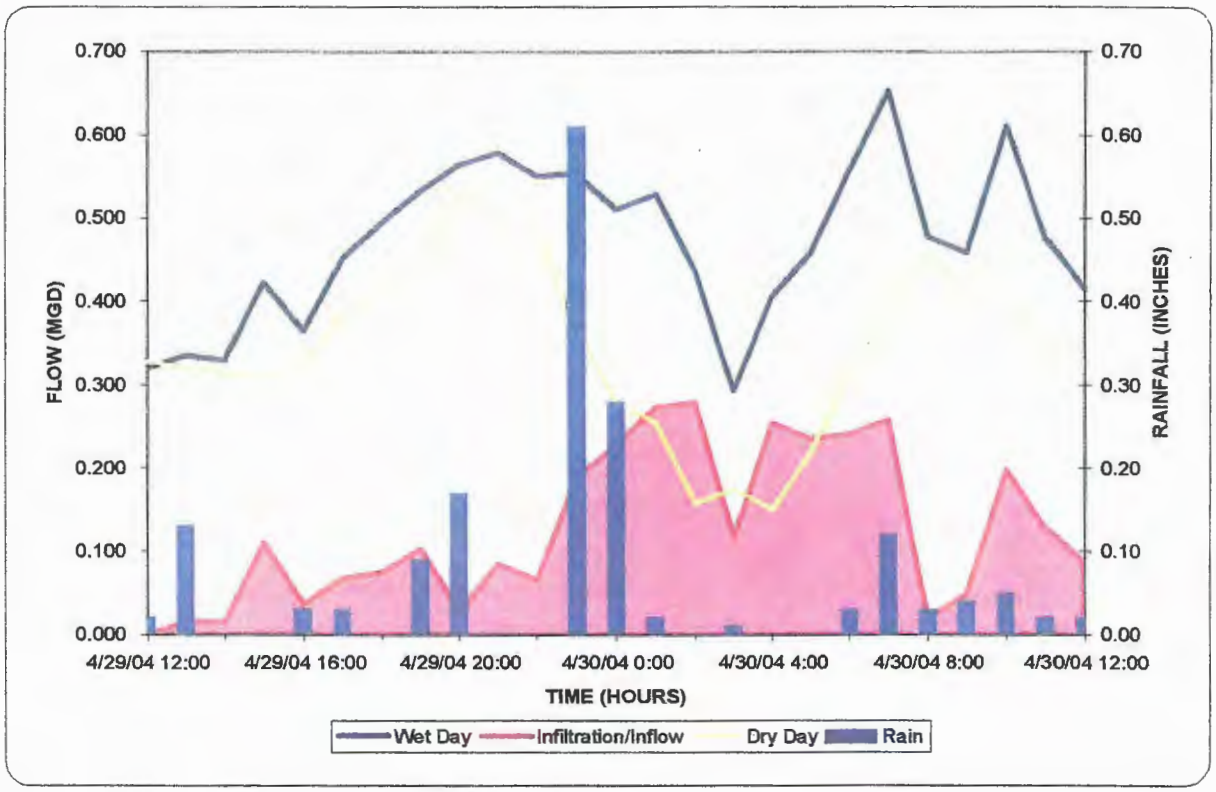
Monitor Name:	MP1	Day of Week:	Sunday
Storm date:	25-Apr-04	Total Rainfall:	1.25 Inches
Rain Start Hour:	25-Apr-04 22:00	Rainfall Duration (hr):	7



ADJUSTED AVERAGE BASE FLOW (mgd)	0.475
TOTAL FLOW (mg)	0.580
PEAK FLOW (mgd)	0.850
PEAK HOUR RAIN (in)	0.540
24 HR II VOLUME (MG)	0.118
PEAK II (MGD)	0.314

FLOW MONITOR ANALYSIS
STORM DATA

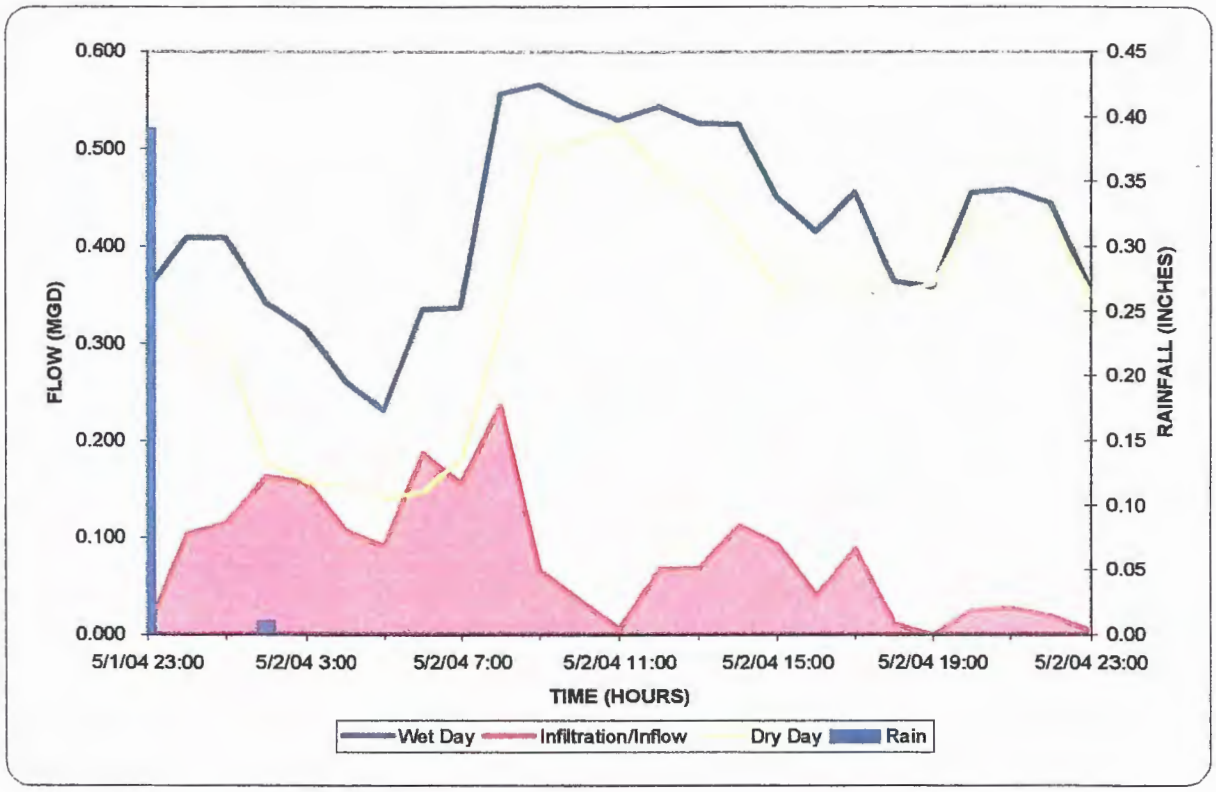
Monitor Name:	MP1	Day of Week:	Thursday
Storm date:	29-Apr-04	Total Rainfall:	1.70 Inches
Rain Start Hour:	29-Apr-04 12:00	Rainfall Duration (hr):	17



ADJUSTED AVERAGE BASE FLOW (mgd)	0.345
TOTAL FLOW (mg)	0.472
PEAK FLOW (mgd)	0.653
PEAK HOUR RAIN (in)	0.610
24 HR II VOLUME (MG)	0.132
PEAK II (MGD)	0.280

FLOW MONITOR ANALYSIS
STORM DATA

Monitor Name:	MP1	Day of Week:	Saturday
Storm date:	01-May-04	Total Rainfall:	0.46 Inches
Rain Start Hour:	01-May-04 23:00	Rainfall Duration (hr):	3



ADJUSTED AVERAGE BASE FLOW (mgd)	0.343
TOTAL FLOW (mg)	0.422
PEAK FLOW (mgd)	0.566
PEAK HOUR RAIN (in)	0.390
24 HR II VOLUME (MG)	0.083
PEAK II (MGD)	0.236

Saraland FLOW MONITORING STUDY
FLOW MONITORING DATA SHEET

Monitor Name: MP1
Basin Name: Saraland
Monitoring Period: 1-Mar-04 to 7-May-04

Date	Day of Week	Rainfall Start Date	Rainfall Start Time	24-hour Rainfall (inches)	24-hour Rainfall I/I (mgd)	Peak Hour Rainfall (inches)	Peak Hour Flow (mgd)	Peak I/I (mgd)
11-Apr-04	Sun	11-Apr	7:00	0.33	0.051	0.14	0.877	0.210
25-Apr-04	Sun	25-Apr	22:00	1.25	0.105	0.54	0.850	0.314
29-Apr-04	Thu	29-Apr	12:00	1.70	0.127	0.61	0.653	0.280
1-May-04	Sat	1-May	23:00	0.46	0.080	0.39	0.566	0.236

Average Dry Weather Flow (MGD):	0.370
Peak Dry Weather Flow (MGD):	0.558
Minimum Dry Weather Flow (MGD)	0.170

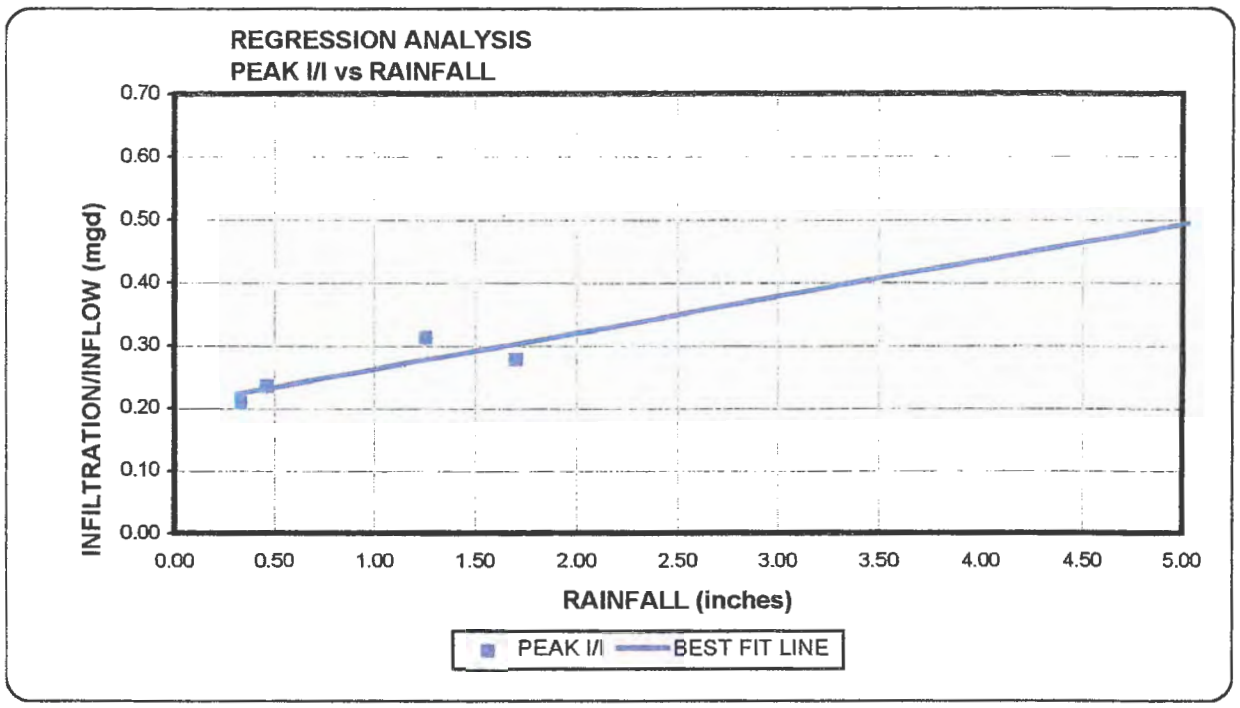
I. LINEAR REGRESSION ANALYSES

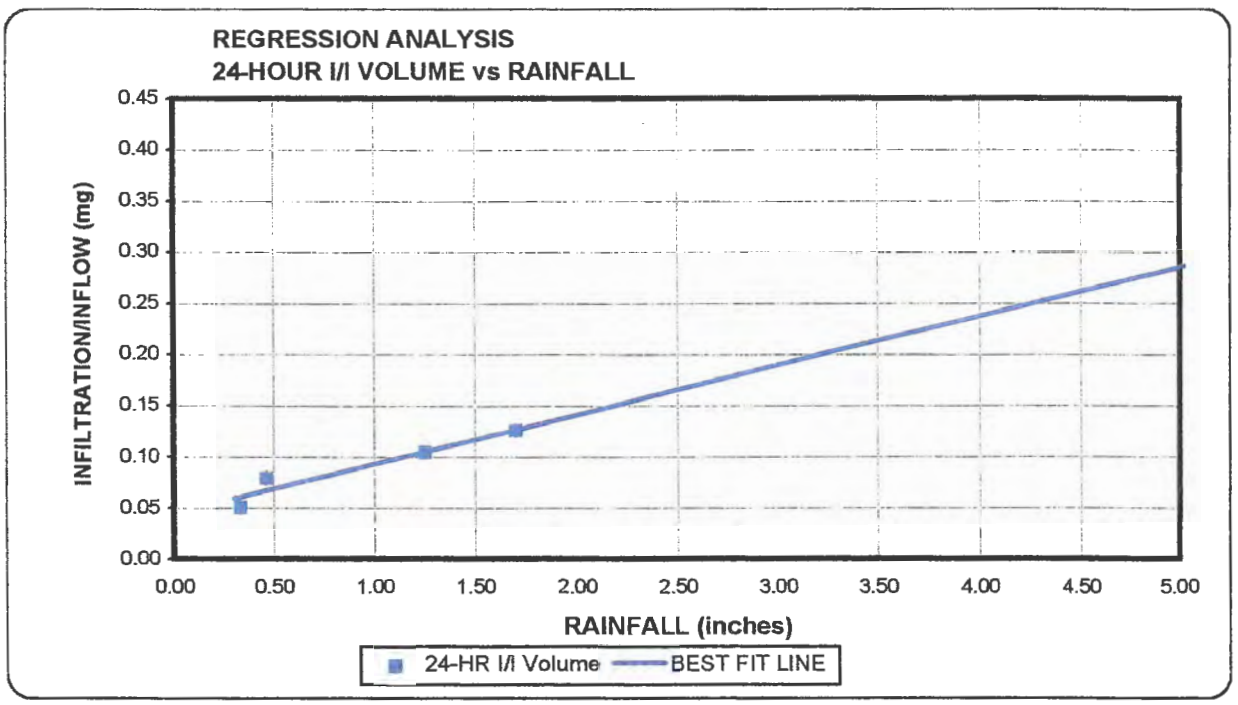
	Slope	y-intercept	r
A. 24-HR I/I VS. 24-HR RAINFALL	0.05	0.05	0.96
B. PEAK I/I VS. 24-HR RAINFALL	0.06	0.21	0.82

II. PROJECTED FLOWS (MGD)

	24-Hour Rain I/I	Peak Hour Rain I/I	Projected Peak Flow*
A. 1.00 in.	0.09	0.26	0.82
B. 2.00 in.	0.14	0.32	0.88
C. 3.00 in.	0.19	0.38	0.94

Peak hour I/I plus peak dry weather flow





Regression Analyses

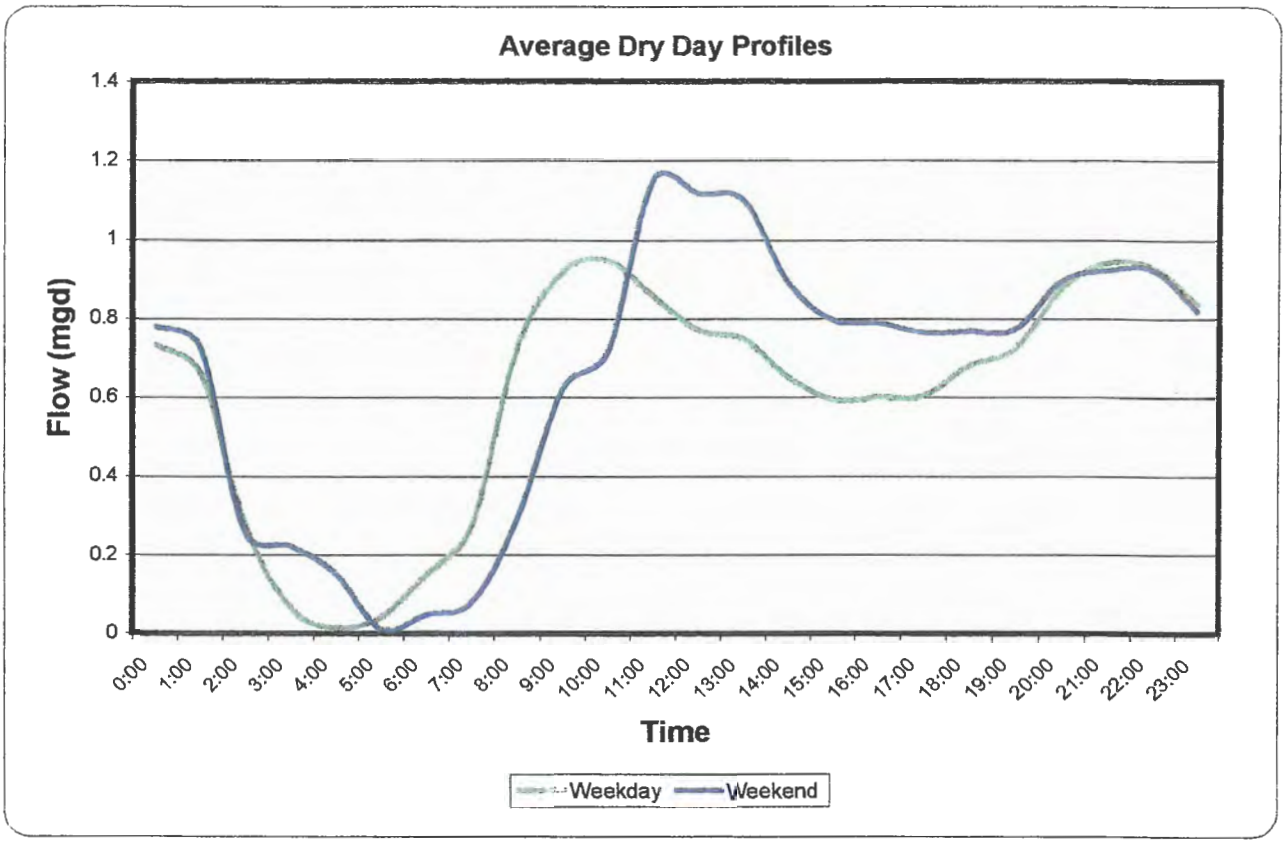
24-hr II Vol, Peak II

Date Range: ***03/01/04*** to ***05/07/04***

Monitor: MP1 **Address:** Celeste Rd

Pipe Dia: 18.5 in

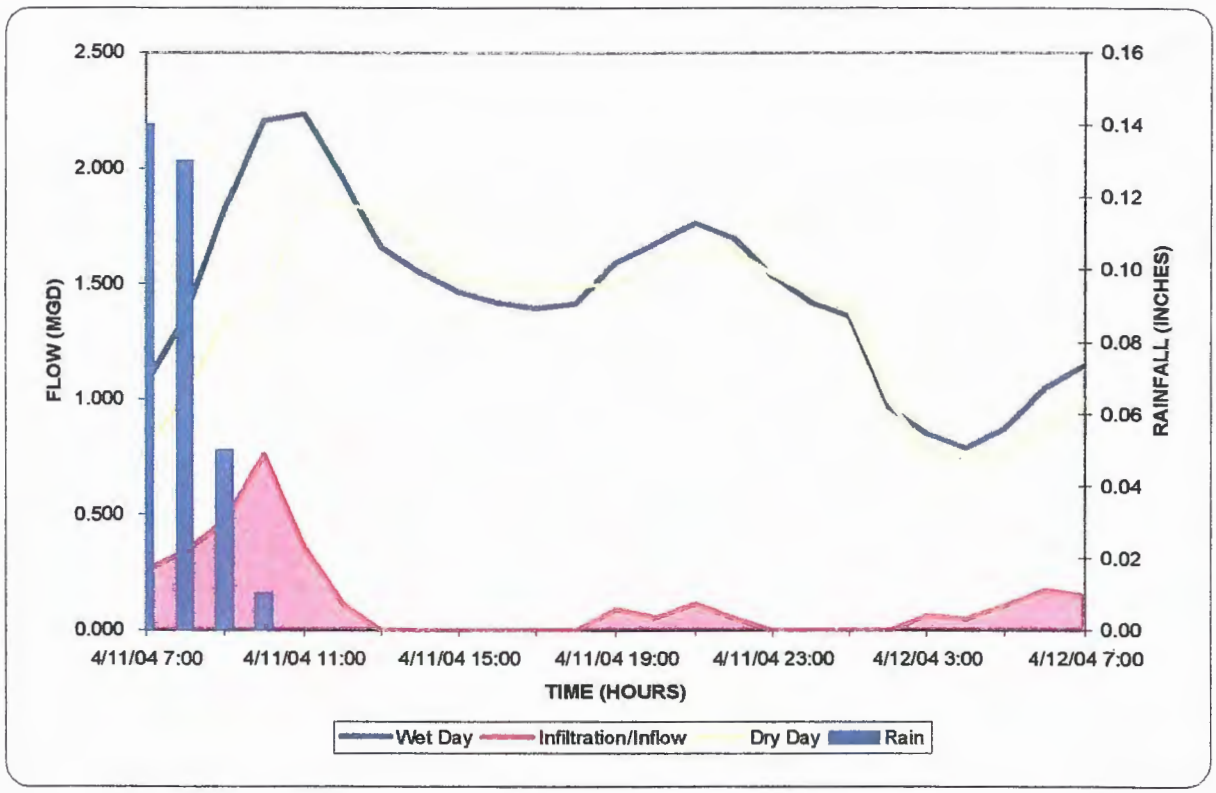
MP2



Dry Day Profiles			
Weekday and Weekend Periods			
Date Range:	***03/01/04*** to ***05/07/04***		
Monitor:	**MP2**	**Address:**	**401 Hwy 43**
Pipe Dia:	**30.25 in**		

FLOW MONITOR ANALYSIS
STORM DATA

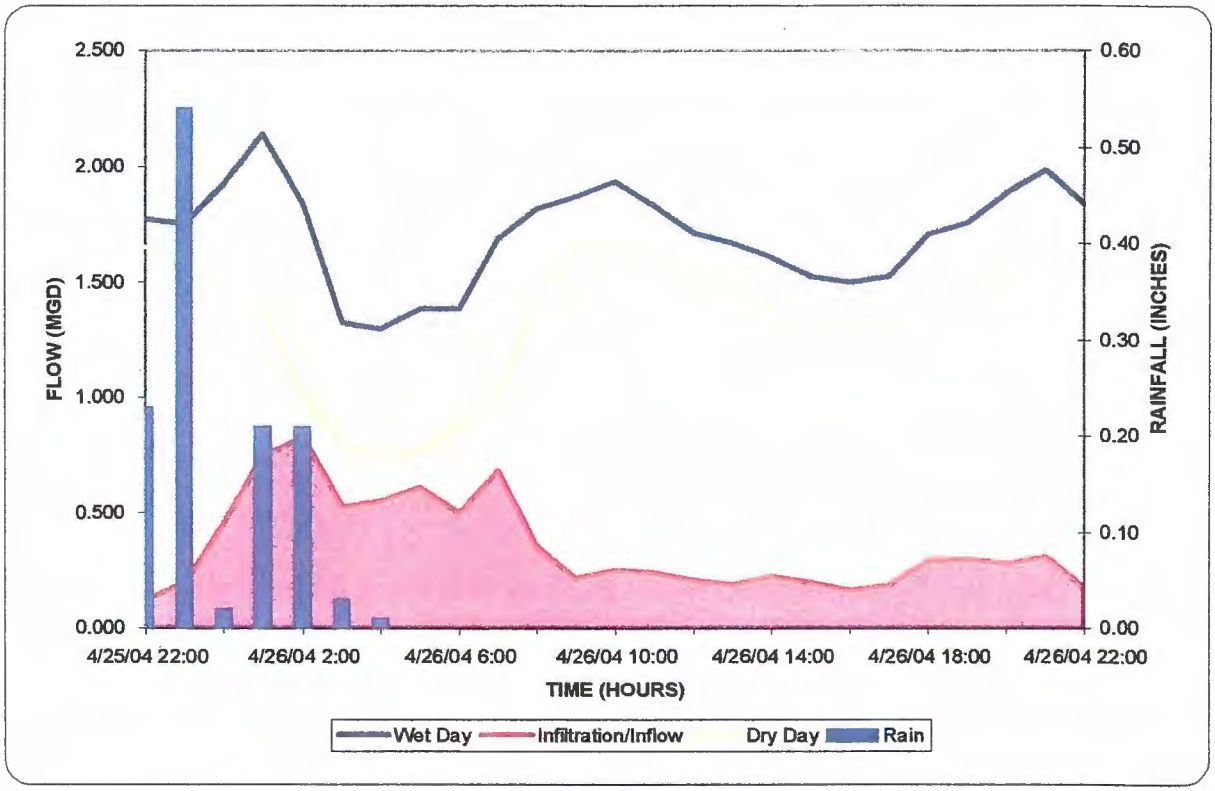
Monitor Name:	MP2	Day of Week:	Sunday
Storm date:	11-Apr-04	Total Rainfall:	0.33 Inches
Rain Start Hour:	11-Apr-04 07:00	Rainfall Duration (hr):	4



ADJUSTED AVERAGE BASE FLOW (mgd)	1.350
TOTAL FLOW (mg)	1.452
PEAK FLOW (mgd)	2.235
PEAK HOUR RAIN (in)	0.140
24 HR II VOLUME (MG)	0.213
PEAK II (MGD)	0.762

FLOW MONITOR ANALYSIS
STORM DATA

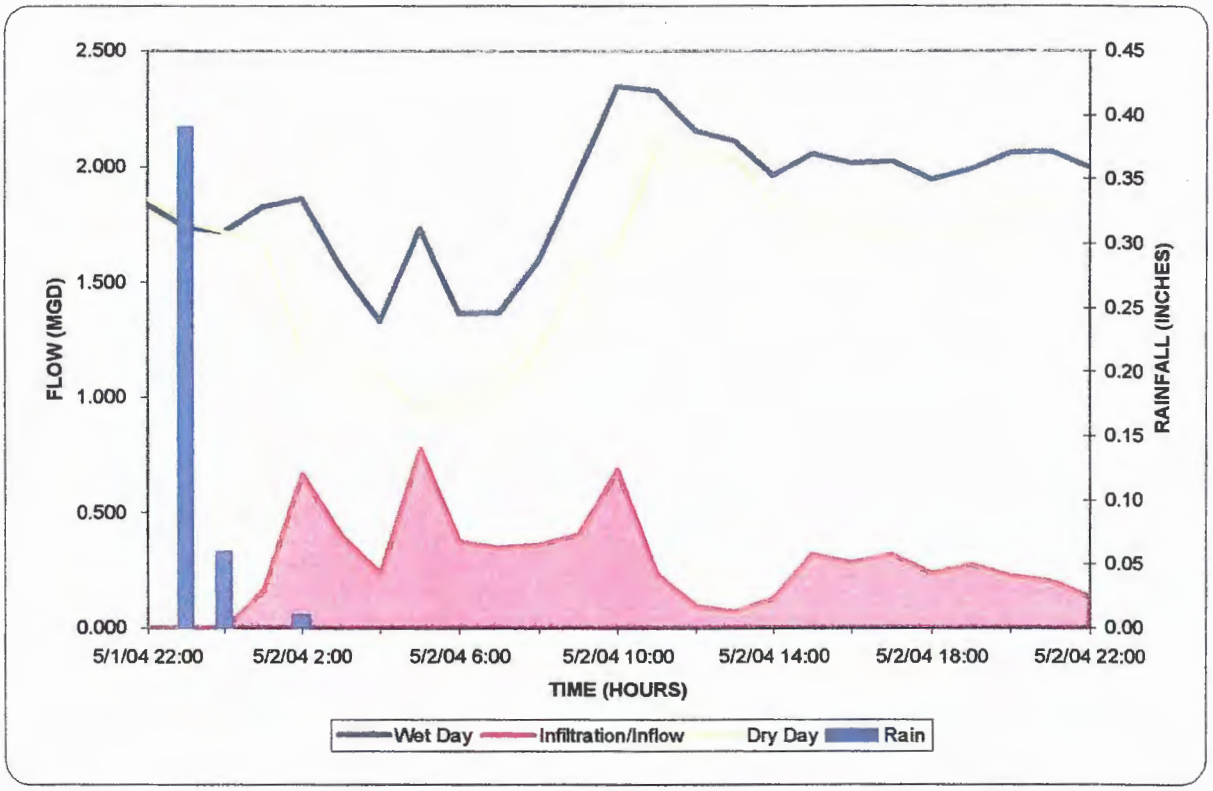
Monitor Name:	MP2	Day of Week:	Sunday
Storm date:	25-Apr-04	Total Rainfall:	1.25 Inches
Rain Start Hour:	25-Apr-04 22:00	Rainfall Duration (hr):	7



ADJUSTED AVERAGE BASE FLOW (mgd)	1.352
TOTAL FLOW (mg)	1.707
PEAK FLOW (mgd)	2.140
PEAK HOUR RAIN (in)	0.540
24 HR II VOLUME (MG)	0.356
PEAK II (MGD)	0.830

FLOW MONITOR ANALYSIS
STORM DATA

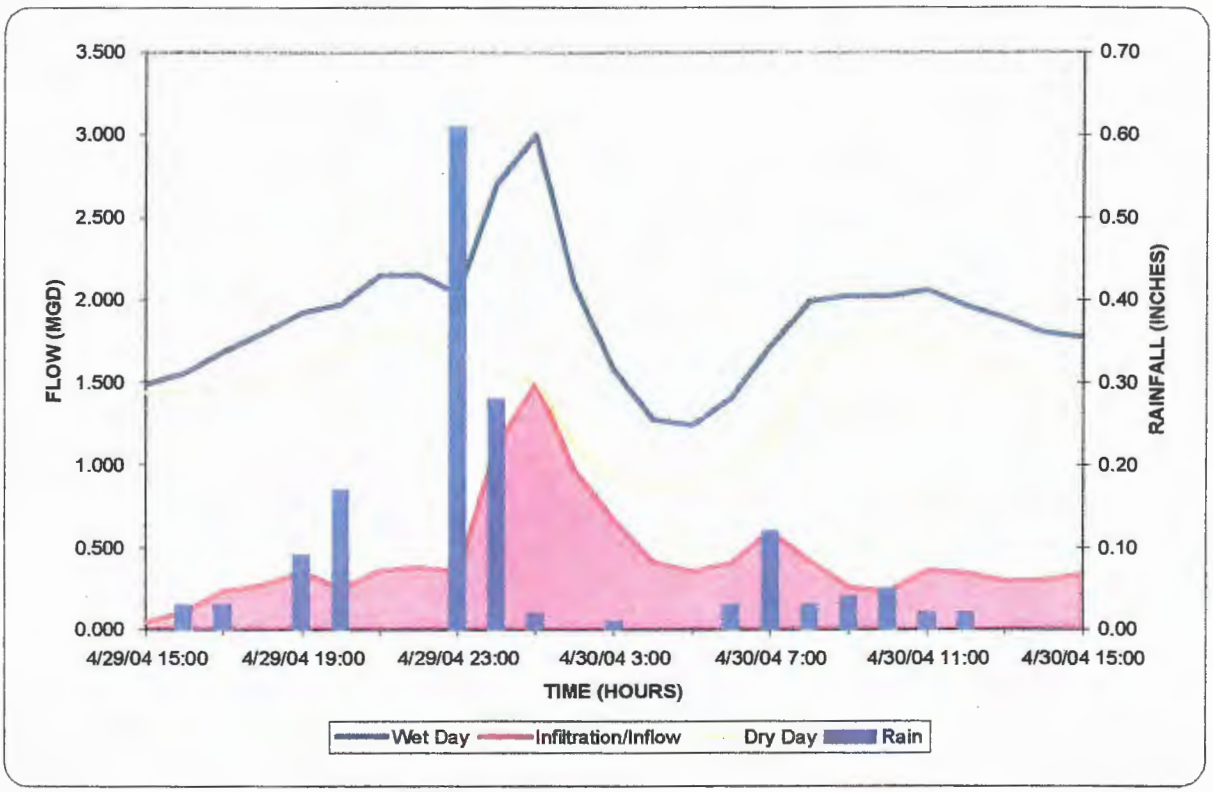
Monitor Name:	MP2	Day of Week:	Saturday
Storm date:	01-May-04	Total Rainfall:	0.46 Inches
Rain Start Hour:	01-May-04 23:00	Rainfall Duration (hr):	3



ADJUSTED AVERAGE BASE FLOW (mgd)	1.601
TOTAL FLOW (mg)	1.878
PEAK FLOW (mgd)	2.348
PEAK HOUR RAIN (in)	0.390
24 HR II VOLUME (MG)	0.317
PEAK II (MGD)	0.780

FLOW MONITOR ANALYSIS
STORM DATA

Monitor Name:	MP2	Day of Week:	Thursday
Storm date:	29-Apr-04	Total Rainfall:	1.70 Inches
Rain Start Hour:	29-Apr-04 12:00	Rainfall Duration (hr):	17



ADJUSTED AVERAGE BASE FLOW (mgd)	1.455
TOTAL FLOW (mg)	1.893
PEAK FLOW (mgd)	3.003
PEAK HOUR RAIN (in)	0.610
24 HR II VOLUME (MG)	0.437
PEAK II (MGD)	1.495

SARALAND FLOW MONITORING STUDY
FLOW MONITORING DATA SHEET

Monitor Name: MP2
Basin Name: SARALAND
Monitoring Period: 1-Mar-04 to 7-May-04

Date	Day of Week	Rainfall Start Date	Rainfall Start Time	24-hour Rainfall (inches)	24-hour Rainfall I/I (mgd)	Peak Hour Rainfall (inches)	Peak Hour Flow (mgd)	Peak I/I (mgd)
11-Apr-04	Sun	11-Apr	7:00	0.33	0.102	0.14	2.235	0.762
25-Apr-04	Sun	25-Apr	22:00	1.25	0.356	0.54	2.140	0.830
29-Apr-04	Thu	29-Apr	12:00	1.70	0.437	0.61	3.003	1.495
1-May-04	Sat	1-May	23:00	0.46	0.277	0.39	2.348	0.780

Average Dry Weather Flow (MGD):	1.375
Peak Dry Weather Flow (MGD):	1.897
Minimum Dry Weather Flow (MGD)	0.757

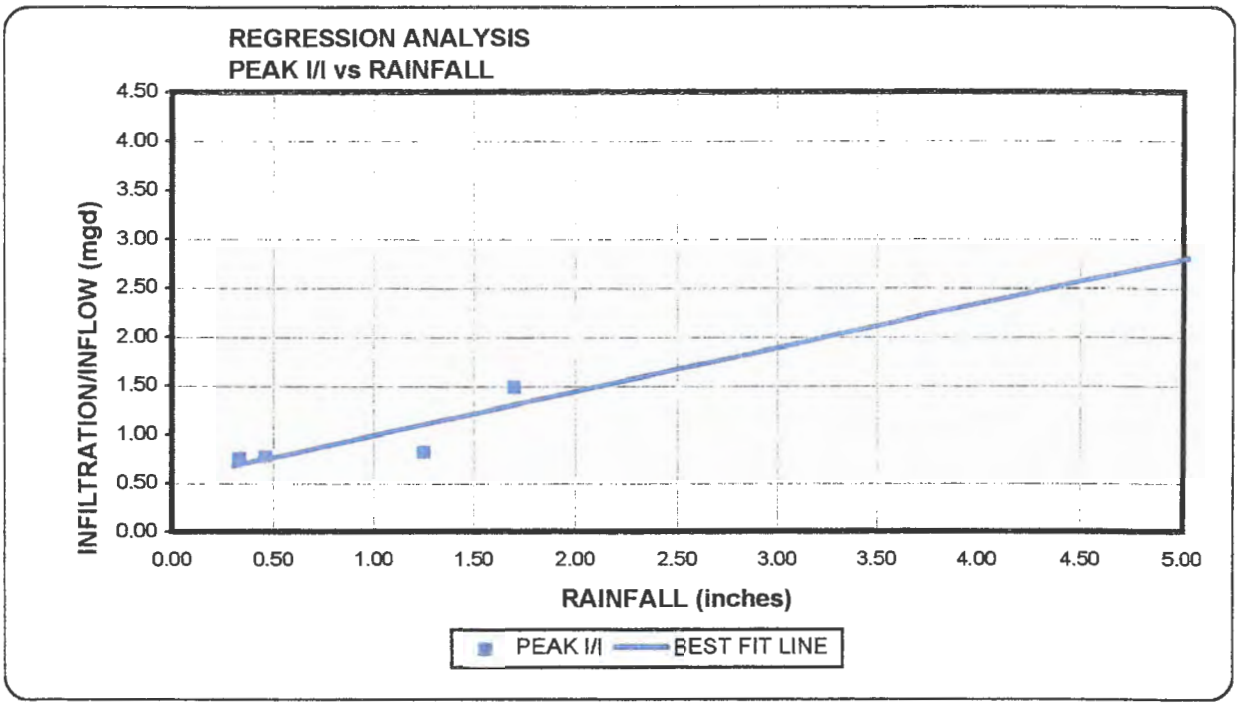
I. LINEAR REGRESSION ANALYSES

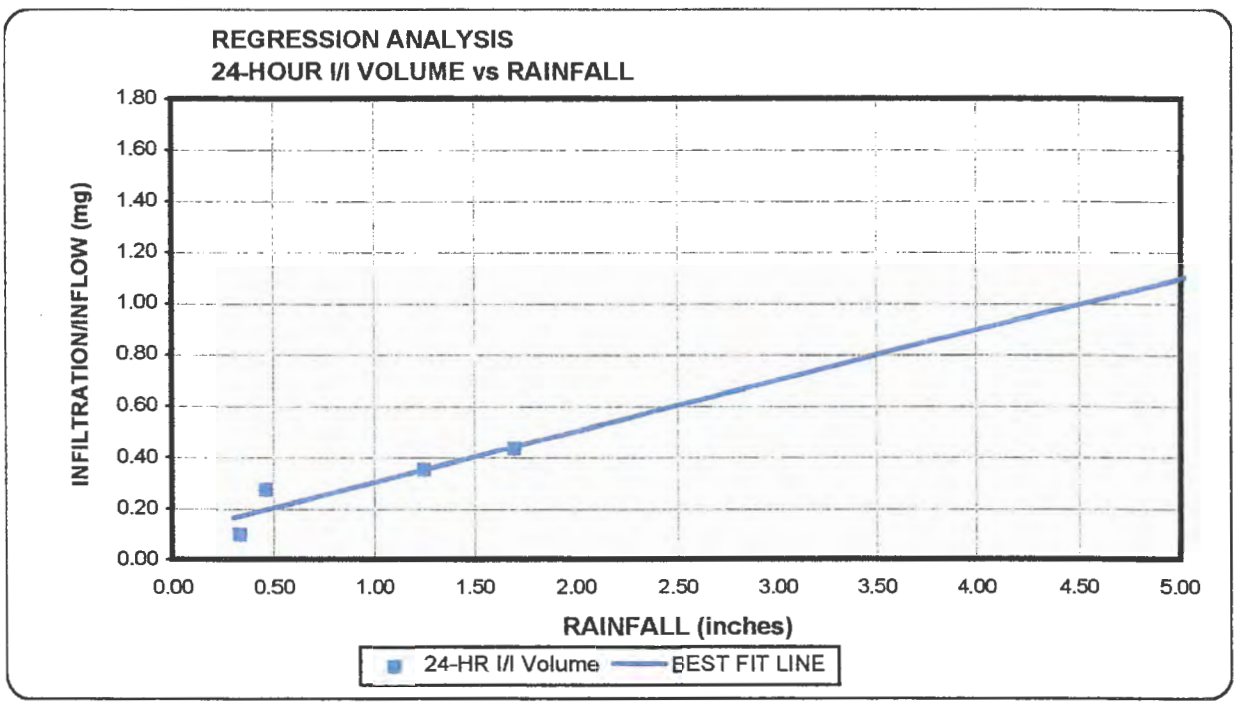
	Slope	y-intercept	r
A. 24-HR I/I VS. 24-HR RAINFALL	0.20	0.11	0.90
B. PEAK I/I VS. 24-HR RAINFALL	0.45	0.55	0.83

II. PROJECTED FLOWS (MGD)

	24-Hour Rain I/I	Peak Hour Rain I/I	Projected Peak Flow*
A. 1.00 in.	0.31	1.00	2.89
B. 2.00 in.	0.50	1.45	3.34
C. 3.00 in.	0.70	1.90	3.79

**Peak hour I/I plus peak dry weather flow*





Regression Analyses

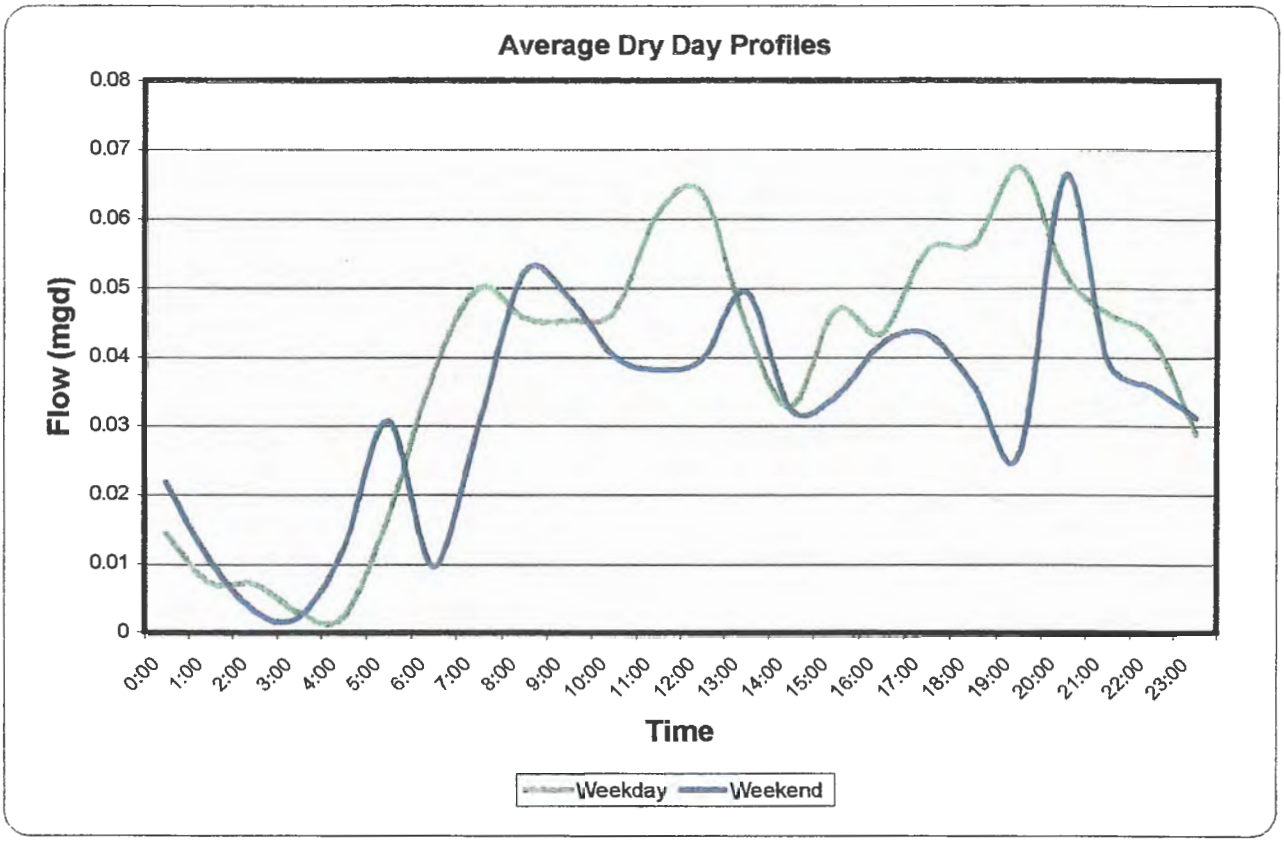
24-hr II Vol, Peak II

Date Range: ***03/01/04*** to ***05/07/04***

Monitor: **MP2** **Address:** **401 Hwy 43**

Pipe Dia: **30.25 in**

MP3



Dry Day Profiles

Weekday and Weekend Periods

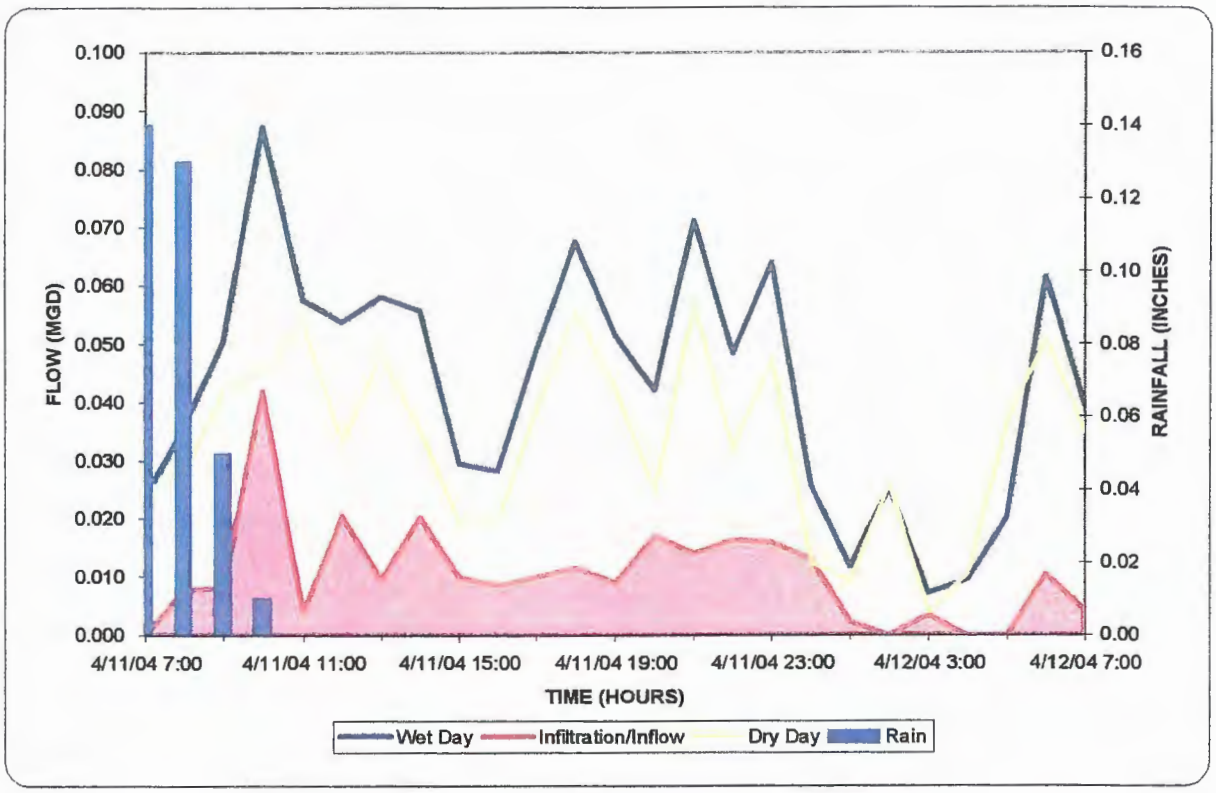
Date Range: ***03/01/04*** to ***05/07/04***

Monitor: **MP3** **Address:** **Hwy 43 Lift Station 22**

Pipe Dia: **14.25 in**

FLOW MONITOR ANALYSIS
STORM DATA

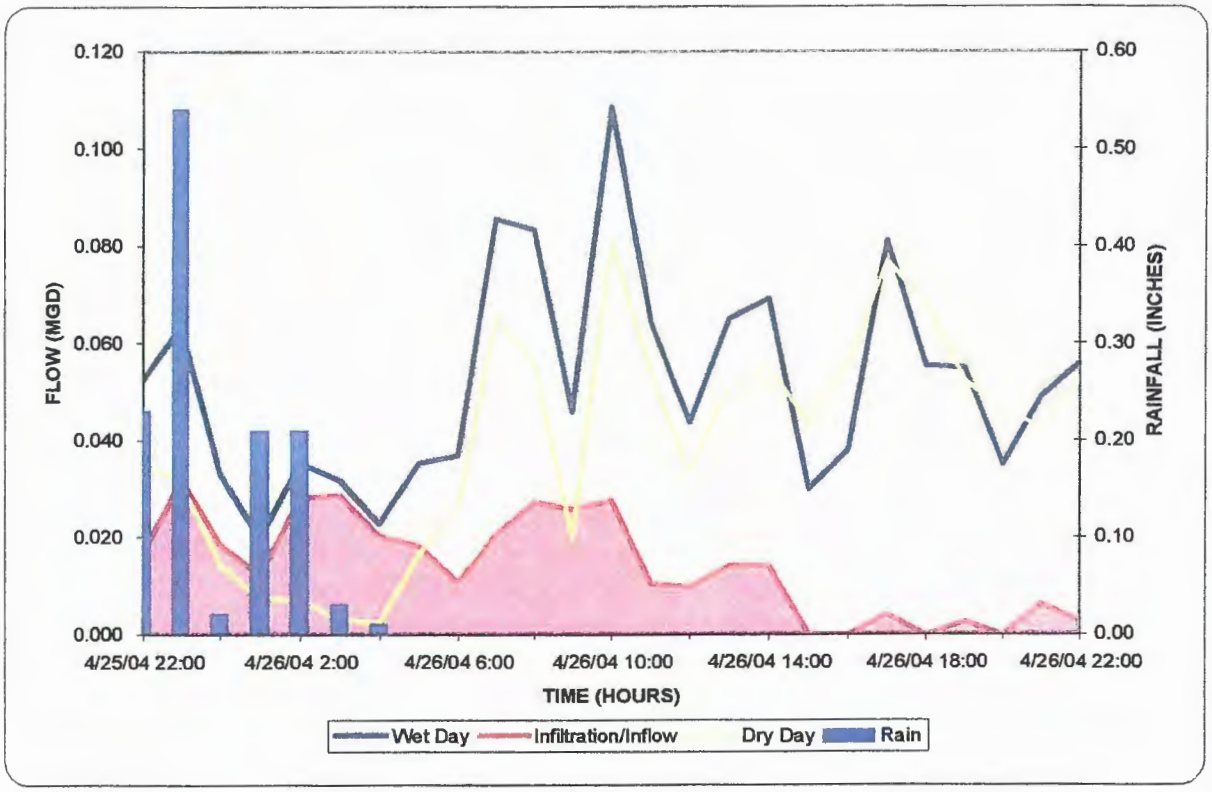
Monitor Name:	MP3	Day of Week:	Sunday
Storm date:	11-Apr-04	Total Rainfall:	0.33 Inches
Rain Start Hour:	11-Apr-04 07:00	Rainfall Duration (hr):	4



ADJUSTED AVERAGE BASE FLOW (mgd)	0.042
TOTAL FLOW (mg)	0.043
PEAK FLOW (mgd)	0.087
PEAK HOUR RAIN (in)	0.140
24 HR II VOLUME (MG)	0.012
PEAK II (MGD)	0.042

FLOW MONITOR ANALYSIS
STORM DATA

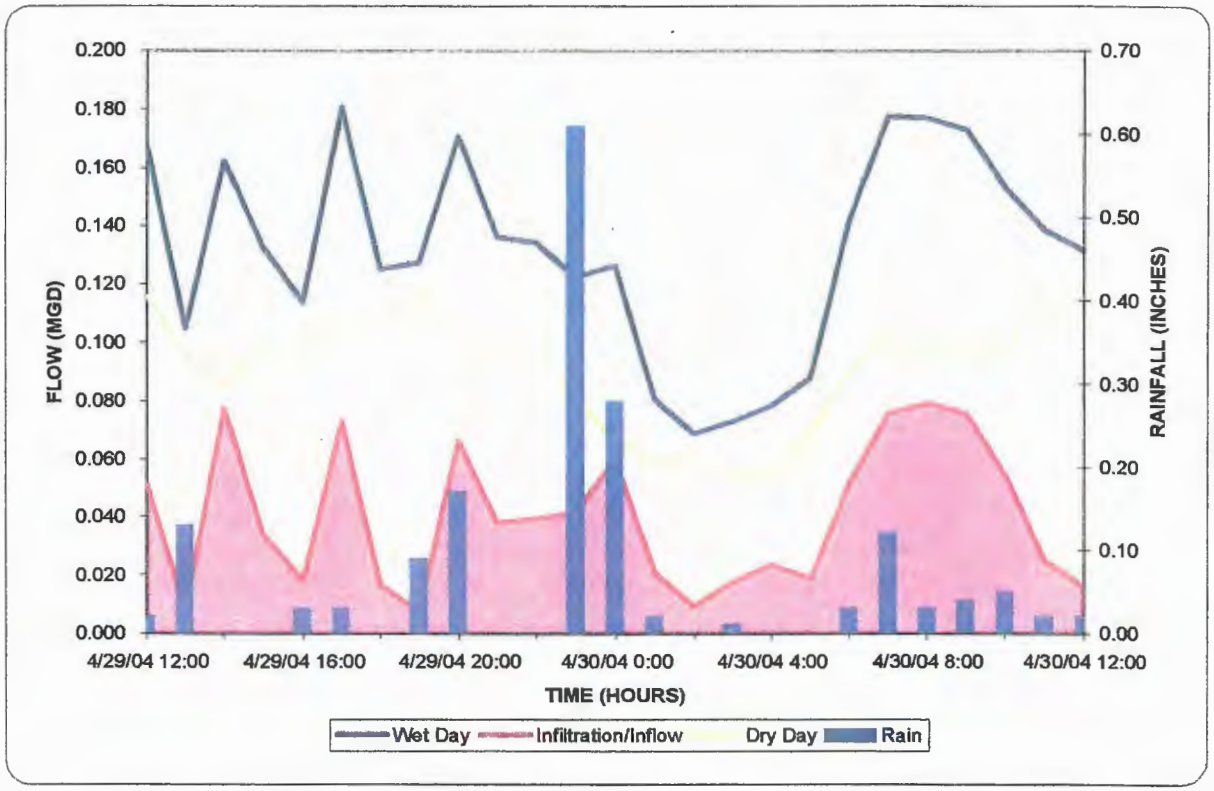
Monitor Name:	MP3	Day of Week:	Sunday
Storm date:	25-Apr-04	Total Rainfall:	1.25 Inches
Rain Start Hour:	25-Apr-04 22:00	Rainfall Duration (hr):	7



ADJUSTED AVERAGE BASE FLOW (mgd)	0.040
TOTAL FLOW (mg)	0.052
PEAK FLOW (mgd)	0.109
PEAK HOUR RAIN (in)	0.540
24 HR II VOLUME (MG)	0.017
PEAK II (MGD)	0.032

FLOW MONITOR ANALYSIS
STORM DATA

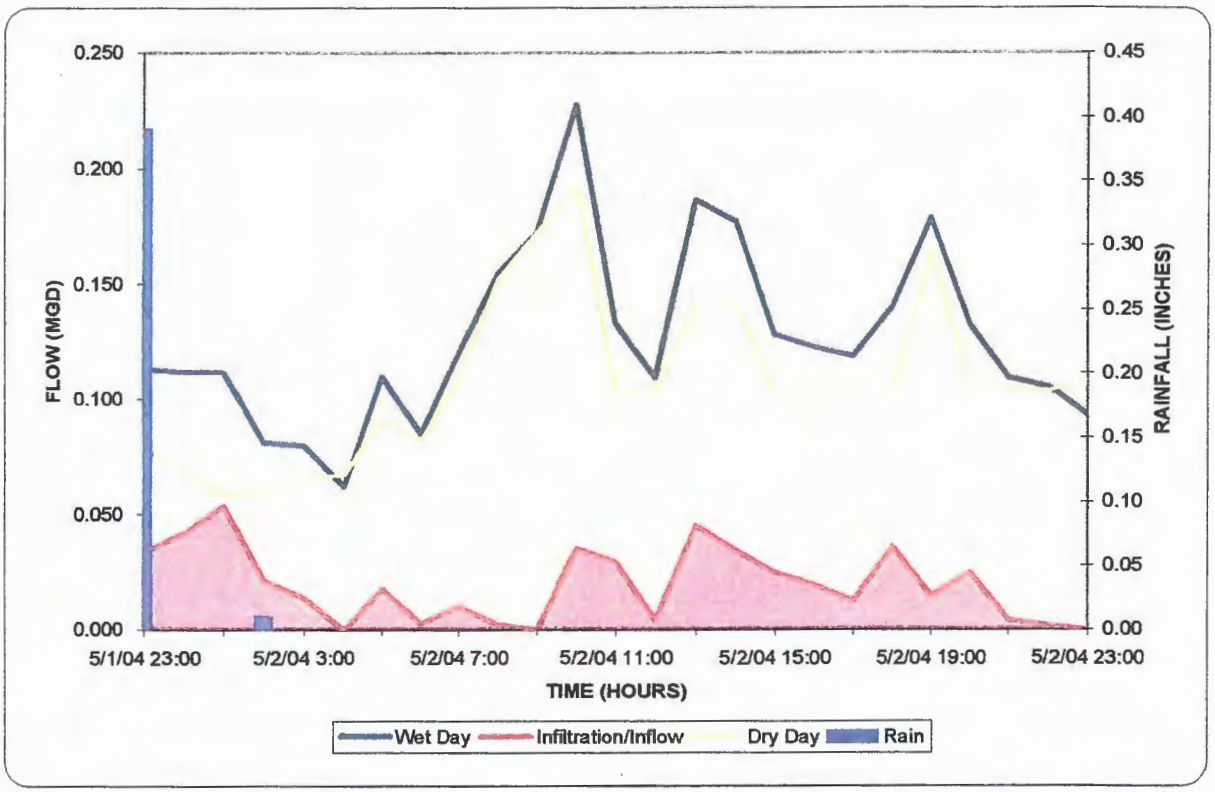
Monitor Name:	MP3	Day of Week:	Thursday
Storm date:	29-Apr-04	Total Rainfall:	1.70 Inches
Rain Start Hour:	29-Apr-04 12:00	Rainfall Duration (hr):	17



ADJUSTED AVERAGE BASE FLOW (mgd)	0.091
TOTAL FLOW (mg)	0.131
PEAK FLOW (mgd)	0.181
PEAK HOUR RAIN (in)	0.610
24 HR II VOLUME (MG)	0.040
PEAK II (MGD)	0.079

FLOW MONITOR ANALYSIS
STORM DATA

Monitor Name:	MP3	Day of Week:	Saturday
Storm date:	01-May-04	Total Rainfall:	0.46 Inches
Rain Start Hour:	01-May-04 23:00	Rainfall Duration (hr):	3



ADJUSTED AVERAGE BASE FLOW (mgd)	0.108
TOTAL FLOW (mg)	0.127
PEAK FLOW (mgd)	0.228
PEAK HOUR RAIN (in)	0.390
24 HR II VOLUME (MG)	0.021
PEAK II (MGD)	0.054

SARALAND FLOW MONITORING STUDY
FLOW MONITORING DATA SHEET

Monitor Name: MP3
Basin Name: SARALAND
Monitoring Period: 1-Mar-04 to 7-May-04

Date	Day of Week	Rainfall Start Date	Rainfall Start Time	24-hour Rainfall (inches)	24-hour Rainfall I/I (mgd)	Peak Hour Rainfall (inches)	Peak Hour Flow (mgd)	Peak I/I (mgd)
11-Apr-04	Sun	11-Apr	7:00	0.33	0.010	0.14	0.087	0.042
25-Apr-04	Sun	25-Apr	22:00	1.25	0.012	0.54	0.109	0.032
29-Apr-04	Thu	29-Apr	12:00	1.70	0.040	0.61	0.181	0.079
1-May-04	Sat	1-May	23:00	0.46	0.019	0.39	0.228	0.054

Average Dry Weather Flow (MGD):	0.042
Peak Dry Weather Flow (MGD):	0.074
Minimum Dry Weather Flow (MGD)	0.009

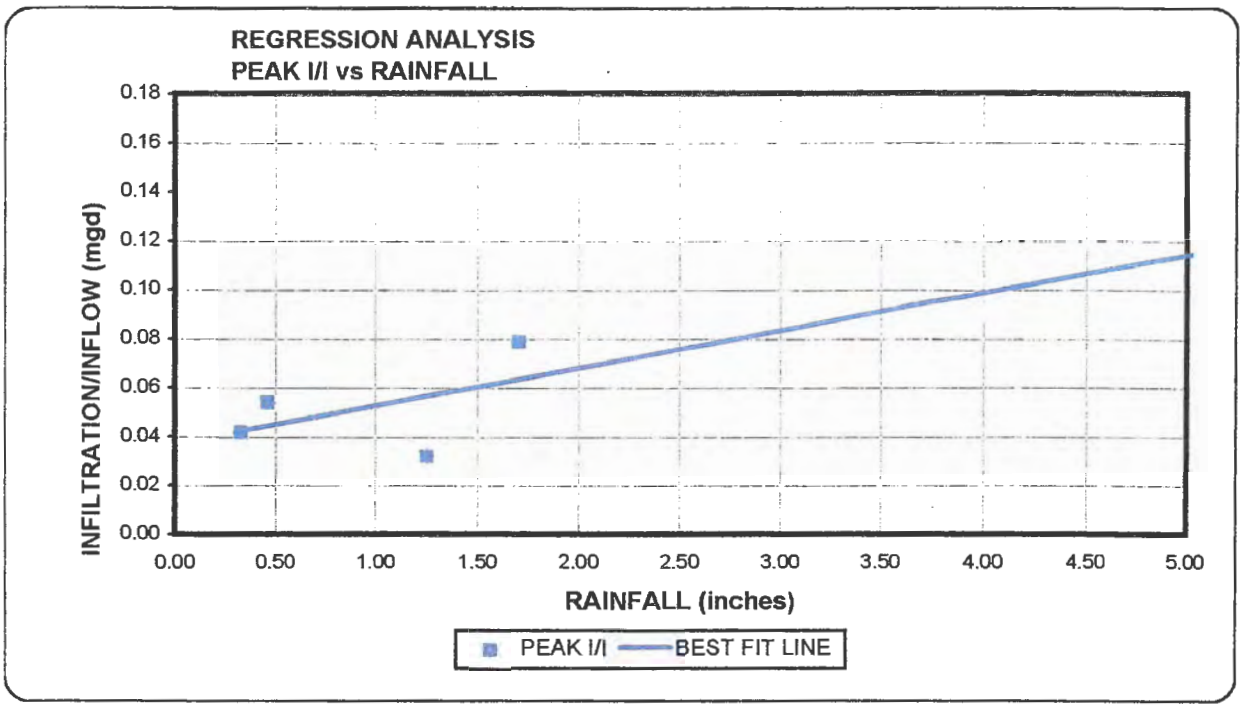
I. LINEAR REGRESSION ANALYSES

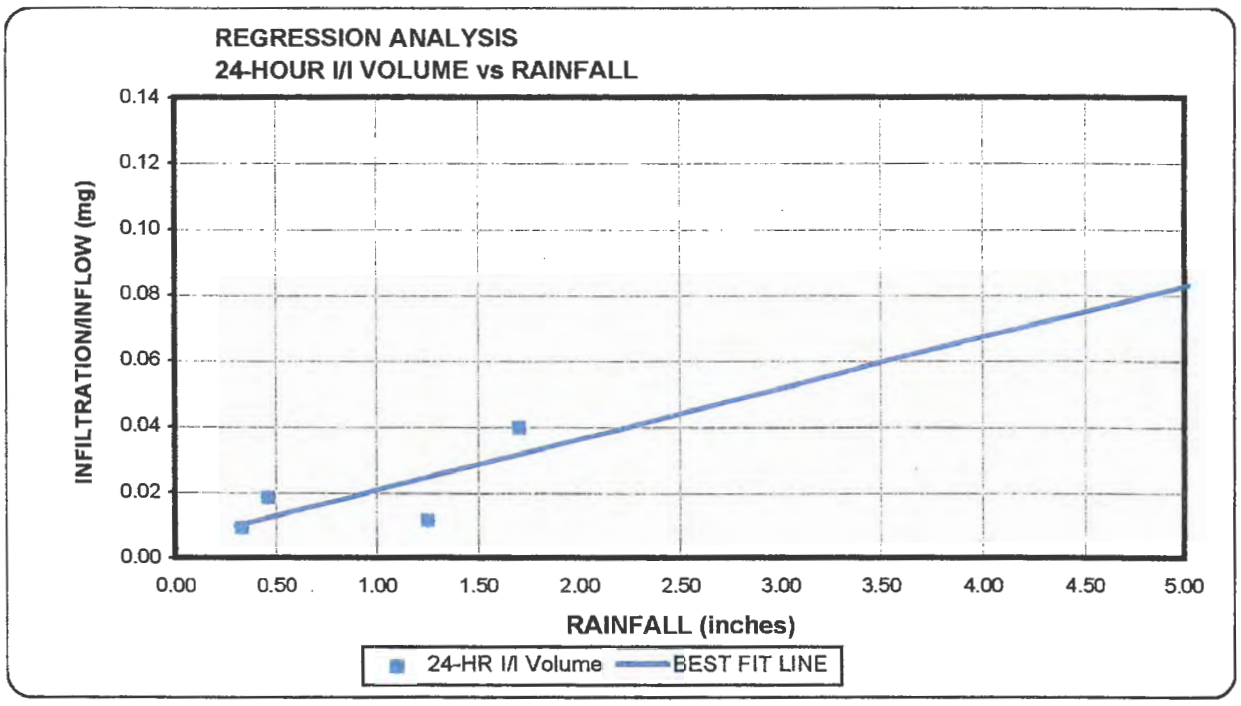
	Slope	y-intercept	r
A. 24-HR I/I VS. 24-HR RAINFALL	0.02	0.01	0.73
B. PEAK I/I VS. 24-HR RAINFALL	0.02	0.04	0.49

II. PROJECTED FLOWS (MGD)

	24-Hour Rain I/I	Peak Hour Rain I/I	Projected Peak Flow*
A. 1.00 in.	0.02	0.05	0.13
B. 2.00 in.	0.04	0.07	0.14
C. 3.00 in.	0.05	0.08	0.16

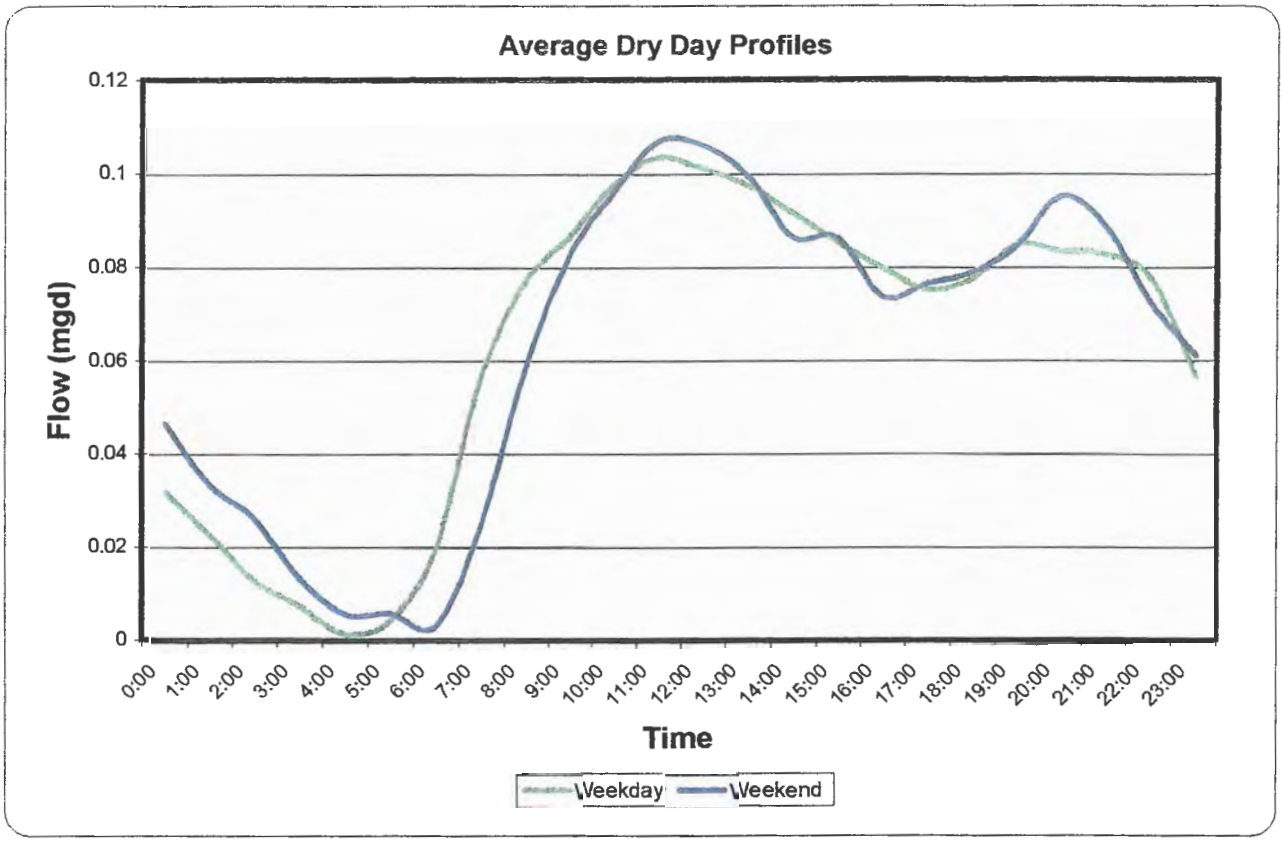
*Peak hour I/I plus peak dry weather flow





Regression Analyses			
	24-hr II Vol, Peak II		
Date Range:	***03/01/04*** to ***05/07/04***		
Monitor:	**MP3**	**Address:**	**Hwy 43 Lift Station 22**
Pipe Dia:	**14.25 in**		

MP4



Dry Day Profiles

Weekday and Weekend Periods

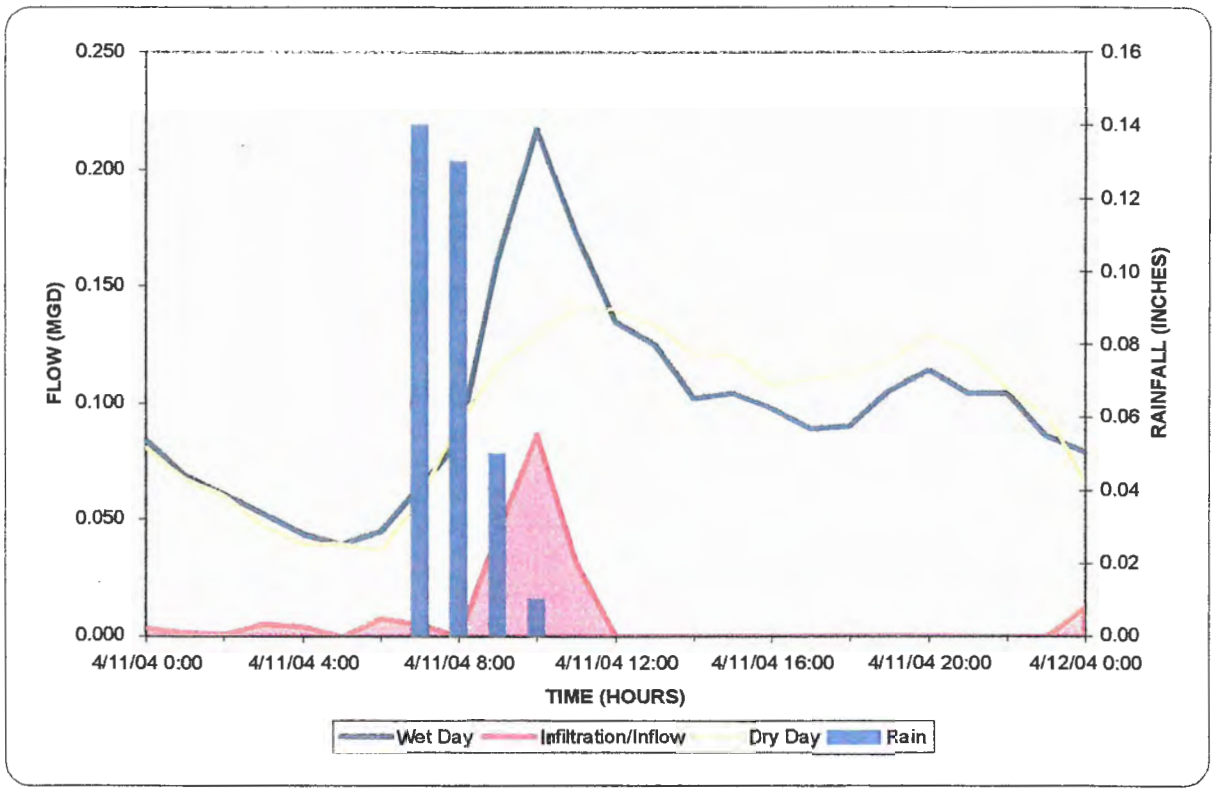
Date Range: ***03/01/04*** to ***05/07/04***

Monitor: MP4 **Address:** Industrial Pkwy US of Park St, LS

Pipe Dia: 17.5 in

FLOW MONITOR ANALYSIS
STORM DATA

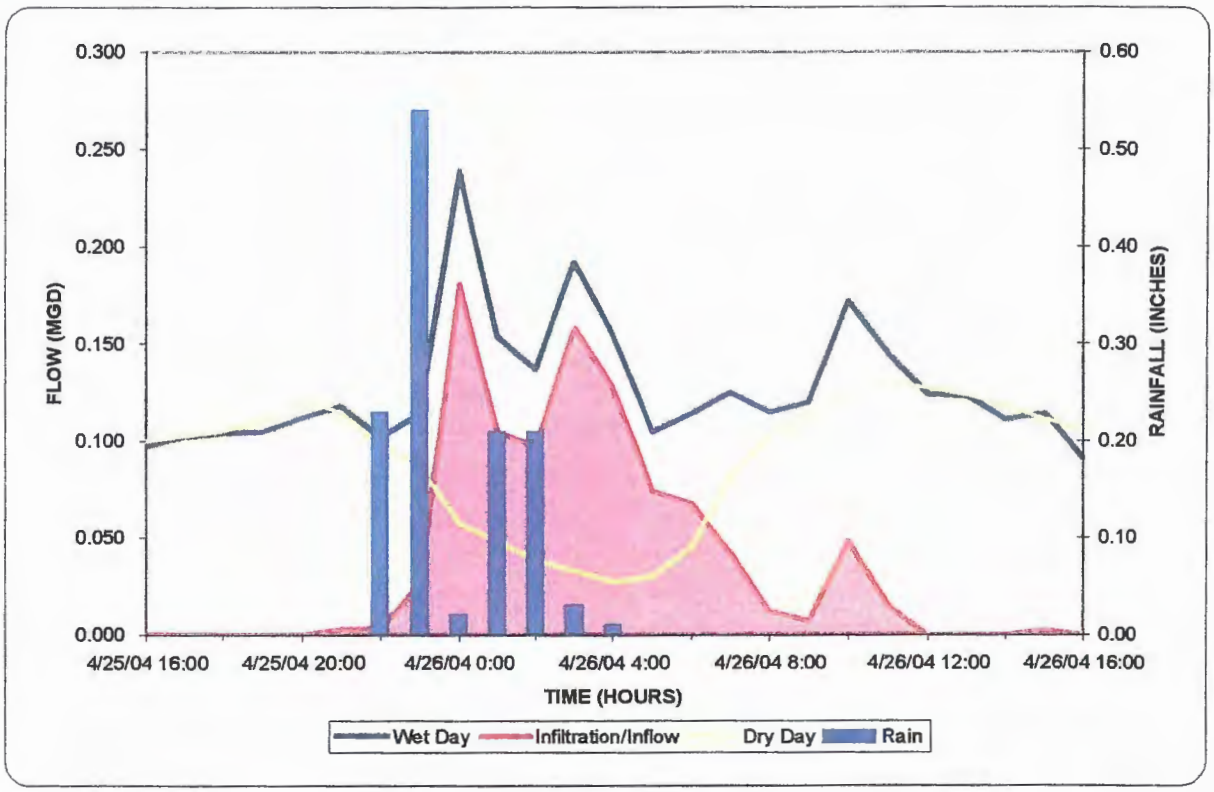
Monitor Name:	MP4	Day of Week:	Sunday
Storm date:	11-Apr-04	Total Rainfall:	0.33 Inches
Rain Start Hour:	11-Apr-04 07:00	Rainfall Duration (hr):	4



ADJUSTED AVERAGE BASE FLOW (mgd)	0.096
TOTAL FLOW (mg)	0.097
PEAK FLOW (mgd)	0.217
PEAK HOUR RAIN (in)	0.140
24 HR II VOLUME (MG)	0.017
PEAK II (MGD)	0.087

FLOW MONITOR ANALYSIS
STORM DATA

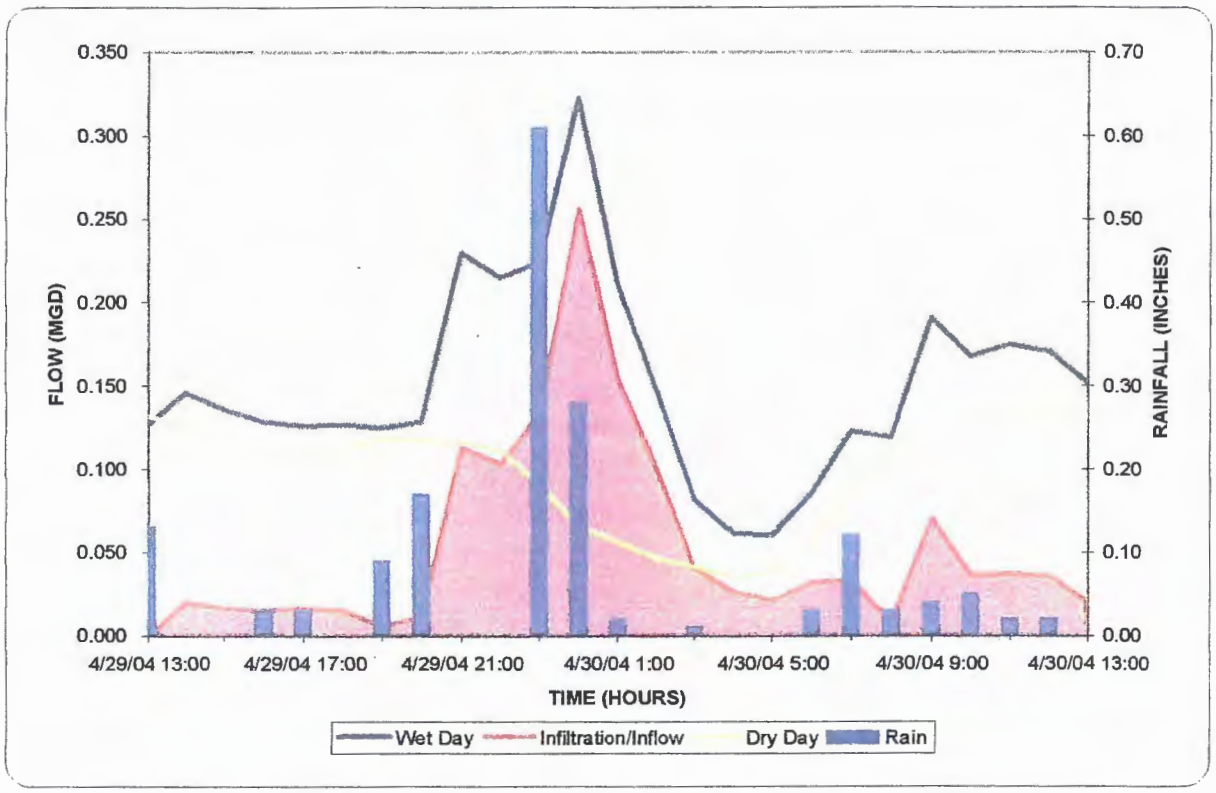
Monitor Name:	MP4	Day of Week:	Sunday
Storm date:	25-Apr-04	Total Rainfall:	1.25 Inches
Rain Start Hour:	25-Apr-04 22:00	Rainfall Duration (hr):	7



ADJUSTED AVERAGE BASE FLOW (mgd)	0.090
TOTAL FLOW (mg)	0.128
PEAK FLOW (mgd)	0.239
PEAK HOUR RAIN (in)	0.540
24 HR II VOLUME (MG)	0.061
PEAK II (MGD)	0.181

FLOW MONITOR ANALYSIS
STORM DATA

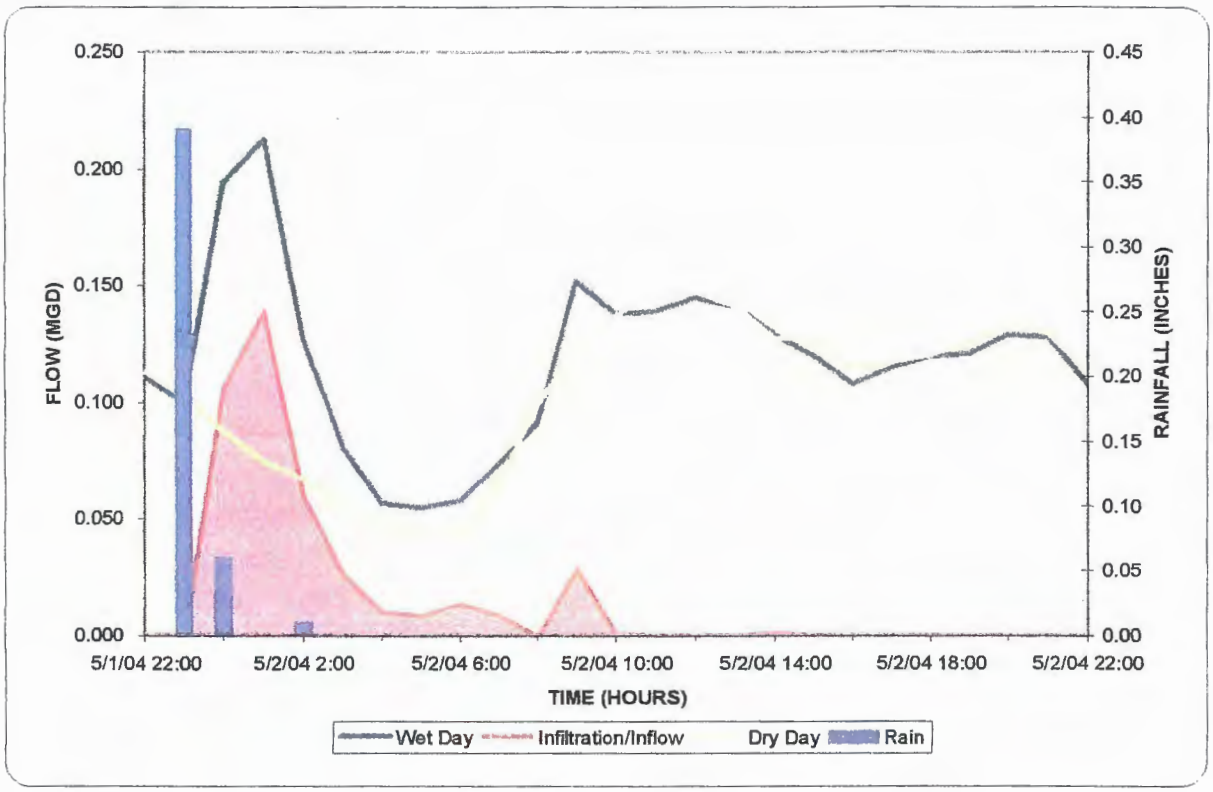
Monitor Name:	MP4	Day of Week:	Thursday
Storm date:	29-Apr-04	Total Rainfall:	1.70 Inches
Rain Start Hour:	29-Apr-04 12:00	Rainfall Duration (hr):	17



ADJUSTED AVERAGE BASE FLOW (mgd)	0.099
TOTAL FLOW (mg)	0.151
PEAK FLOW (mgd)	0.323
PEAK HOUR RAIN (in)	0.610
24 HR II VOLUME (MG)	0.055
PEAK II (MGD)	0.257

FLOW MONITOR ANALYSIS
STORM DATA

Monitor Name:	MP4	Day of Week:	Saturday
Storm date:	01-May-04	Total Rainfall:	0.46 Inches
Rain Start Hour:	01-May-04 23:00	Rainfall Duration (hr):	3



ADJUSTED AVERAGE BASE FLOW (mgd)	0.104
TOTAL FLOW (mg)	0.118
PEAK FLOW (mgd)	0.213
PEAK HOUR RAIN (in)	0.390
24 HR II VOLUME (MG)	0.037
PEAK II (MGD)	0.138

SARALAND FLOW MONITORING STUDY
FLOW MONITORING DATA SHEET

Monitor Name: MP4
Basin Name: SARALAND
Monitoring Period: 1-Mar-04 to 7-May-04

Date	Day of Week	Rainfall Start Date	Rainfall Start Time	24-hour Rainfall (inches)	24-hour Rainfall I/I (mgd)	Peak Hour Rainfall (inches)	Peak Hour Flow (mgd)	Peak I/I (mgd)
11-Apr-04	Sun	11-Apr	7:00	0.33	0.001	0.14	0.217	0.087
25-Apr-04	Sun	25-Apr	22:00	1.25	0.037	0.54	0.239	0.181
29-Apr-04	Thu	29-Apr	12:00	1.70	0.053	0.61	0.323	0.257
1-May-04	Sat	1-May	23:00	0.46	0.014	0.39	0.213	0.138

Average Dry Weather Flow (MGD):	0.098
Peak Dry Weather Flow (MGD):	0.142
Minimum Dry Weather Flow (MGD)	0.037

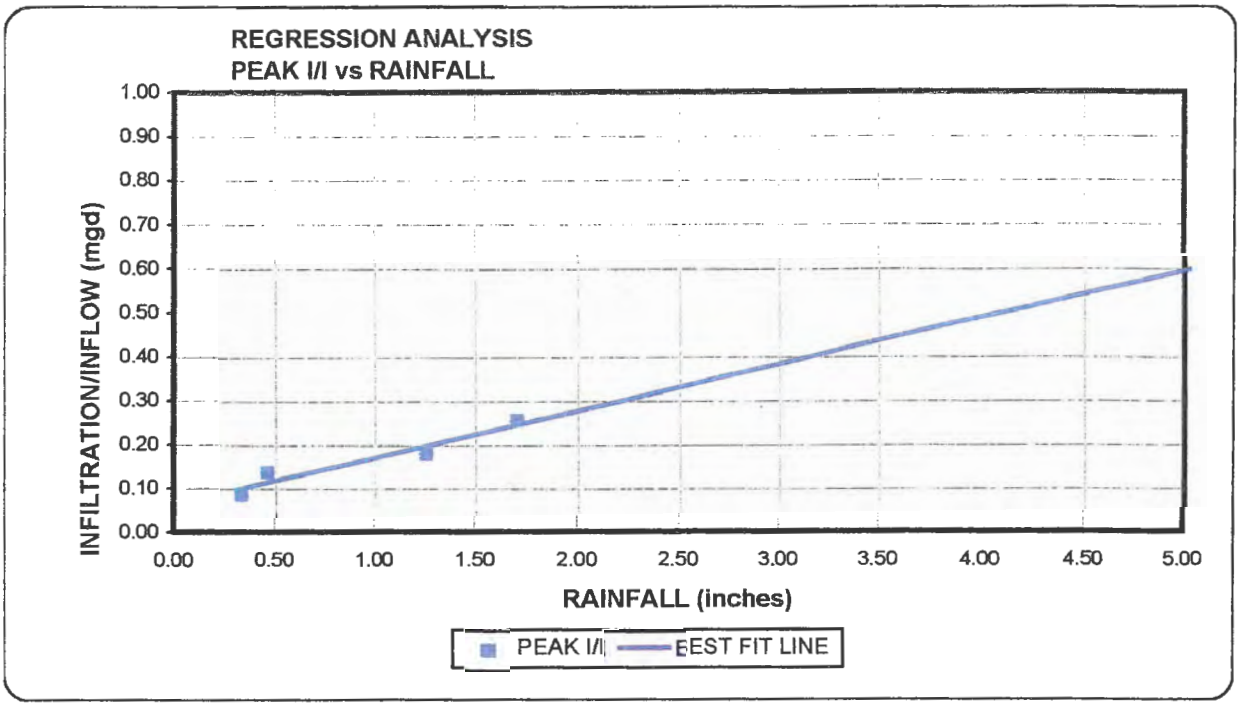
I. LINEAR REGRESSION ANALYSES

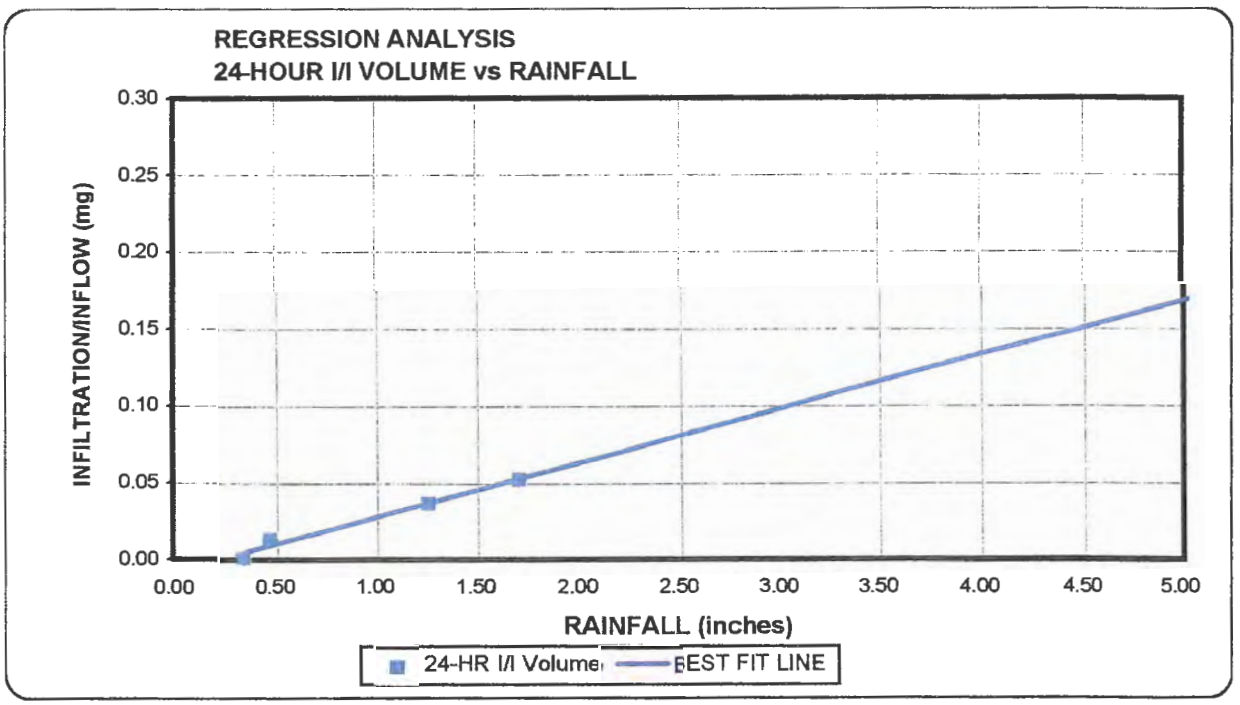
	Slope	y-intercept	r
A. 24-HR I/I VS. 24-HR RAINFALL	0.04	-0.01	0.99
B. PEAK I/I VS. 24-HR RAINFALL	0.11	0.07	0.96

II. PROJECTED FLOWS (MGD)

	24-Hour Rain I/I	Peak Hour Rain I/I	Projected Peak Flow*
A. 1.00 in.	0.03	0.17	0.31
B. 2.00 in.	0.06	0.28	0.42
C. 3.00 in.	0.10	0.38	0.53

*Peak hour I/I plus peak dry weather flow





Regression Analyses

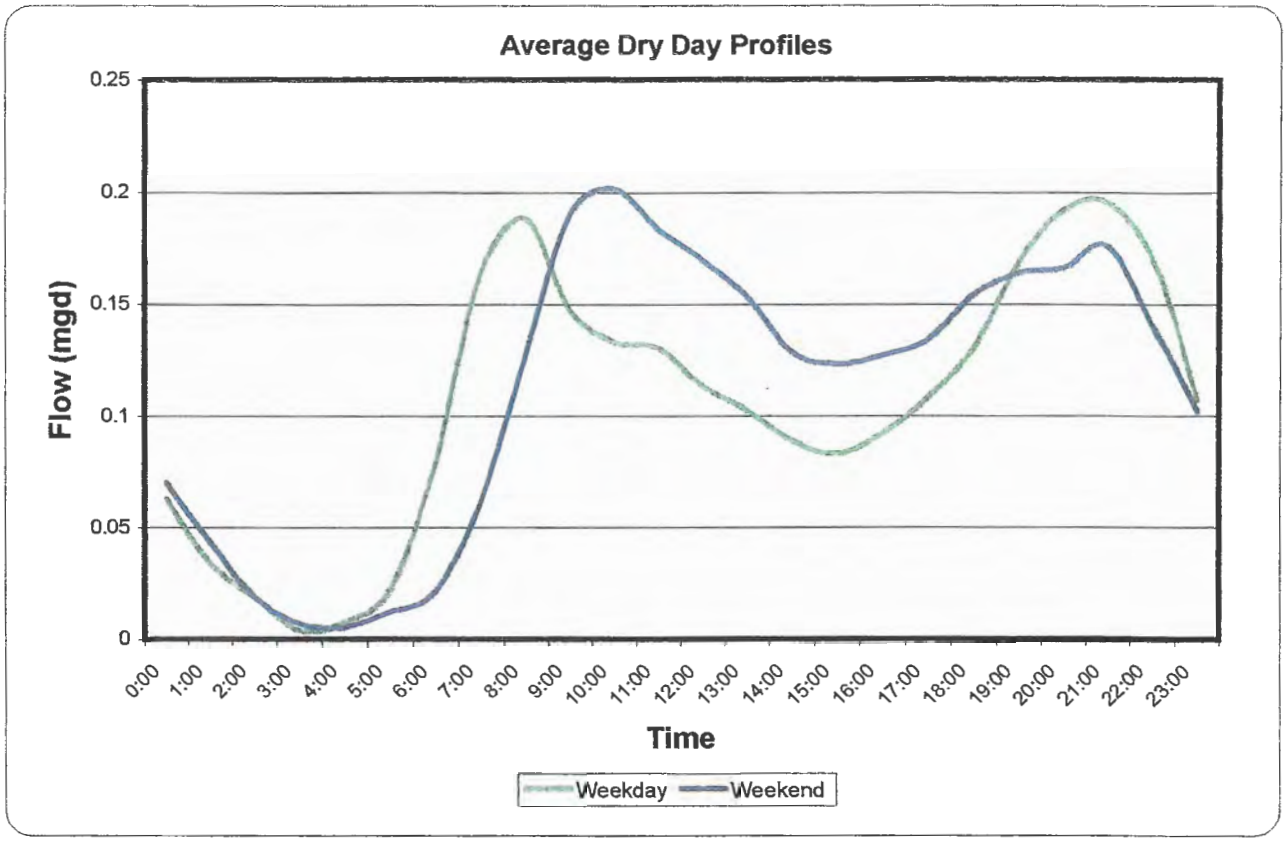
24-hr II Vol, Peak II

Date Range: ***03/01/04*** to ***05/07/04***

Monitor: **MP4** **Address:**

Pipe Dia: **17.5 in** **Industrial Pkwy US of Park St. LS**

MP5



Dry Day Profiles

Weekday and Weekend Periods

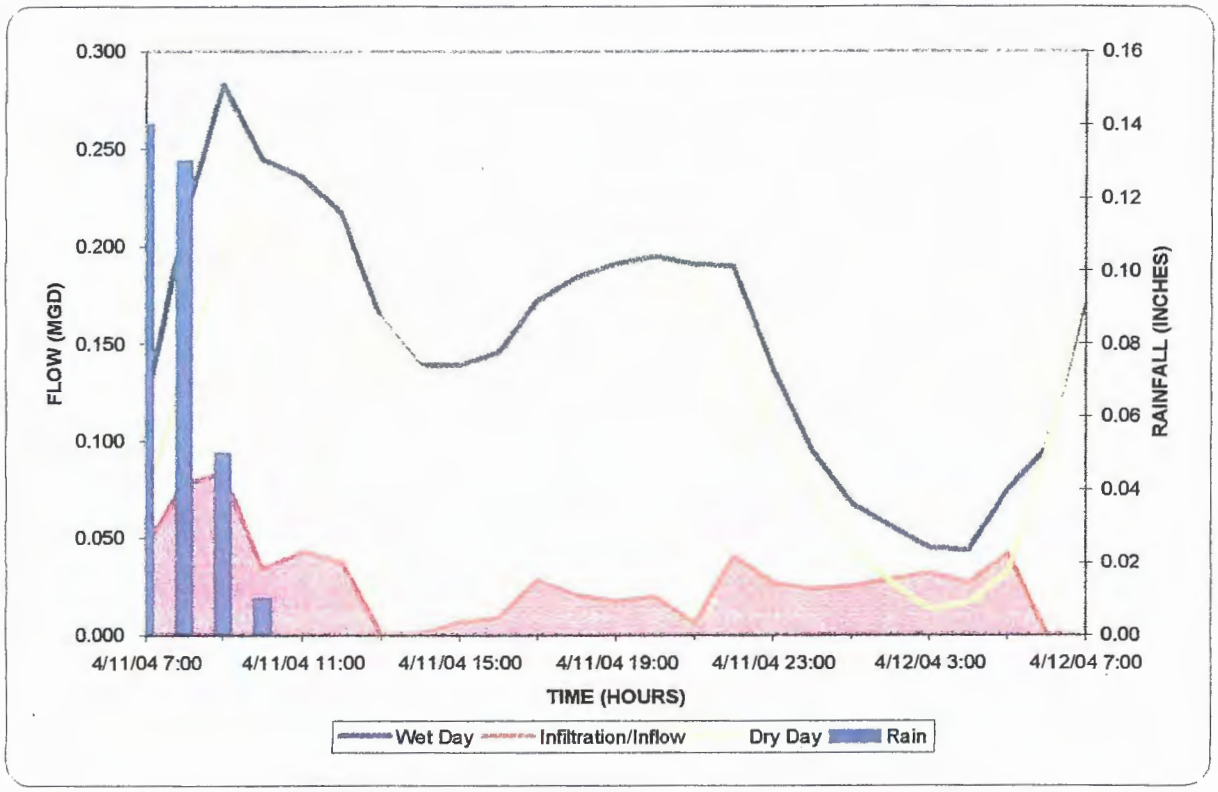
Date Range: ***03/01/04*** to ***05/07/04***

Monitor: **MP5** **Address:** **222 Sullivan Dr**

Pipe Dia: **14.75 in**

FLOW MONITOR ANALYSIS
STORM DATA

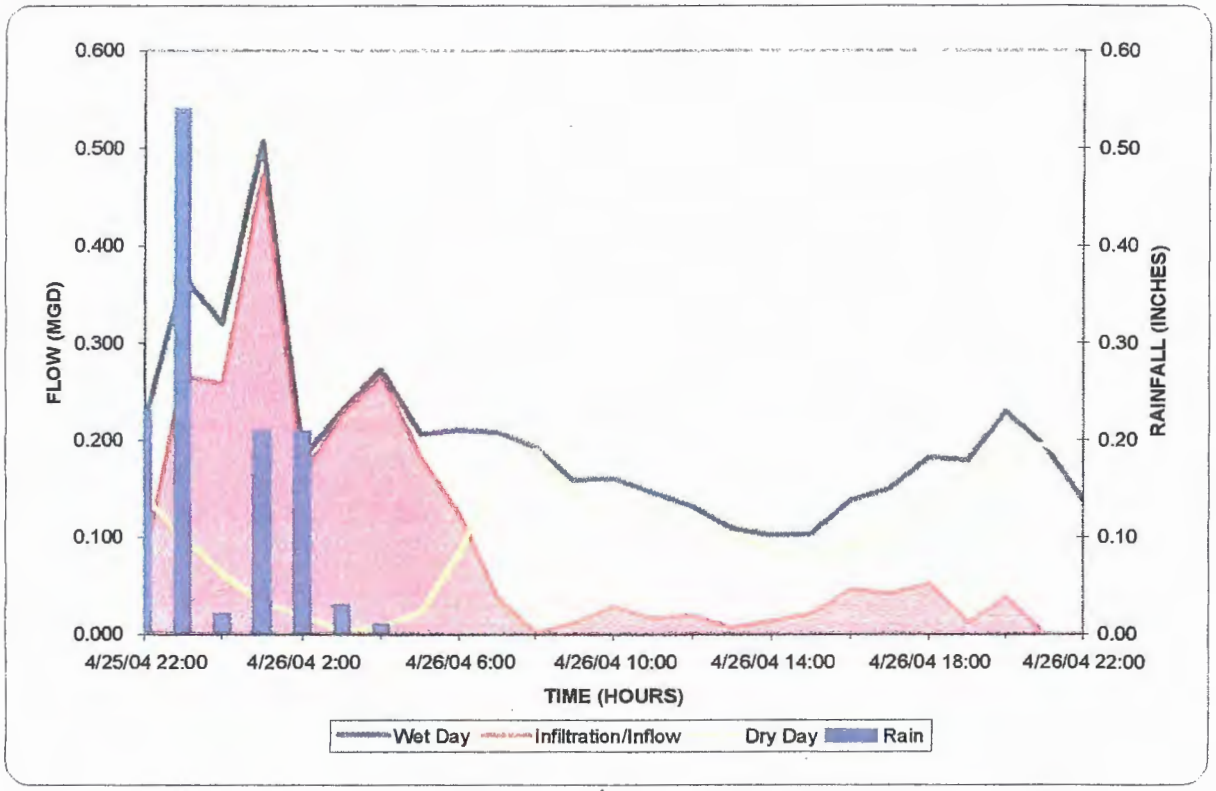
Monitor Name:	MP5	Day of Week:	Sunday
Storm date:	11-Apr-04	Total Rainfall:	0.33 Inches
Rain Start Hour:	11-Apr-04 07:00	Rainfall Duration (hr):	4



ADJUSTED AVERAGE BASE FLOW (mgd)	0.125
TOTAL FLOW (mg)	0.153
PEAK FLOW (mgd)	0.283
PEAK HOUR RAIN (in)	0.140
24 HR II VOLUME (MG)	0.028
PEAK II (MGD)	0.084

FLOW MONITOR ANALYSIS
STORM DATA

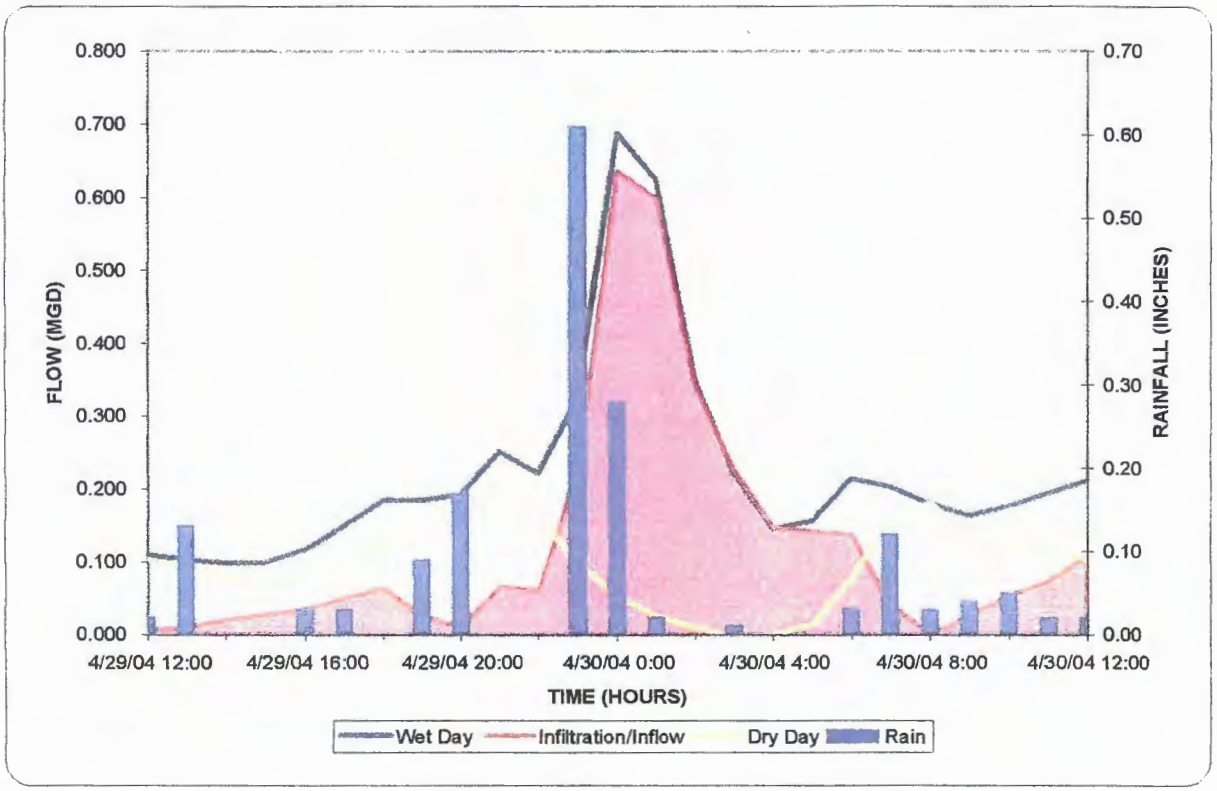
Monitor Name:	MP5	Day of Week:	Sunday
Storm date:	25-Apr-04	Total Rainfall:	1.25 Inches
Rain Start Hour:	25-Apr-04 22:00	Rainfall Duration (hr):	7



ADJUSTED AVERAGE BASE FLOW (mgd)	0.108
TOTAL FLOW (mg)	0.202
PEAK FLOW (mgd)	0.507
PEAK HOUR RAIN (in)	0.540
24 HR II VOLUME (MG)	0.104
PEAK II (MGD)	0.473

FLOW MONITOR ANALYSIS
STORM DATA

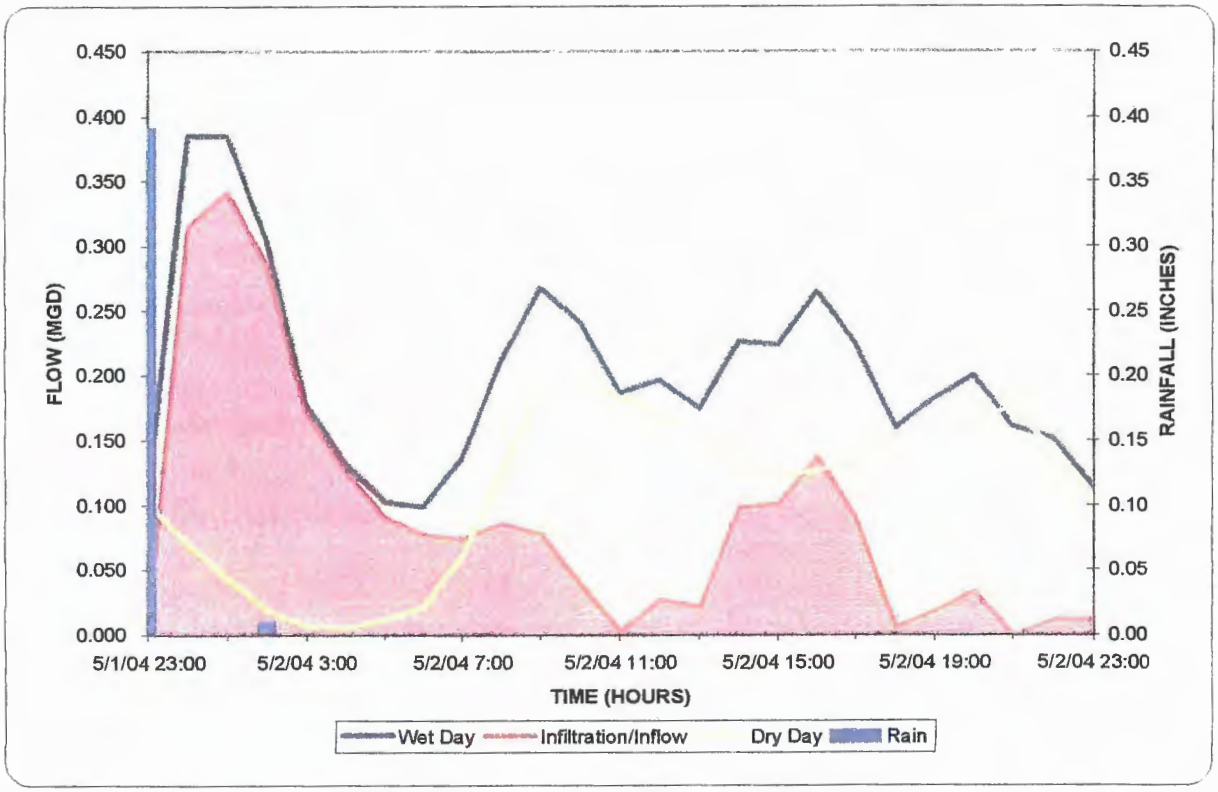
Monitor Name:	MP5	Day of Week:	Thursday
Storm date:	29-Apr-04	Total Rainfall:	1.70 Inches
Rain Start Hour:	29-Apr-04 12:00	Rainfall Duration (hr):	17



ADJUSTED AVERAGE BASE FLOW (mgd)	0.098
TOTAL FLOW (mg)	0.223
PEAK FLOW (mgd)	0.689
PEAK HOUR RAIN (in)	0.610
24 HR II VOLUME (MG)	0.130
PEAK II (MGD)	0.636

FLOW MONITOR ANALYSIS
STORM DATA

Monitor Name:	MP5	Day of Week:	Saturday
Storm date:	01-May-04	Total Rainfall:	0.46 Inches
Rain Start Hour:	01-May-04 23:00	Rainfall Duration (hr):	3



ADJUSTED AVERAGE BASE FLOW (mgd)	0.111
TOTAL FLOW (mg)	0.201
PEAK FLOW (mgd)	0.385
PEAK HOUR RAIN (in)	0.390
24 HR II VOLUME (MG)	0.094
PEAK II (MGD)	0.342

SARALAND FLOW MONITORING STUDY
FLOW MONITORING DATA SHEET

Monitor Name: MP5
Basin Name: SARALAND
Monitoring Period: 1-Mar-04 to 7-May-04

Date	Day of Week	Rainfall Start Date	Rainfall Start Time	24-hour Rainfall (inches)	24-hour Rainfall I/I (mgd)	Peak Hour Rainfall (inches)	Peak Hour Flow (mgd)	Peak I/I (mgd)
11-Apr-04	Sun	11-Apr	7:00	0.33	0.027	0.14	0.283	0.084
25-Apr-04	Sun	25-Apr	22:00	1.25	0.094	0.54	0.507	0.473
29-Apr-04	Thu	29-Apr	12:00	1.70	0.125	0.61	0.689	0.636
1-May-04	Sat	1-May	23:00	0.46	0.089	0.39	0.385	0.342

Average Dry Weather Flow (MGD):	0.121
Peak Dry Weather Flow (MGD):	0.214
Minimum Dry Weather Flow (MGD)	0.016

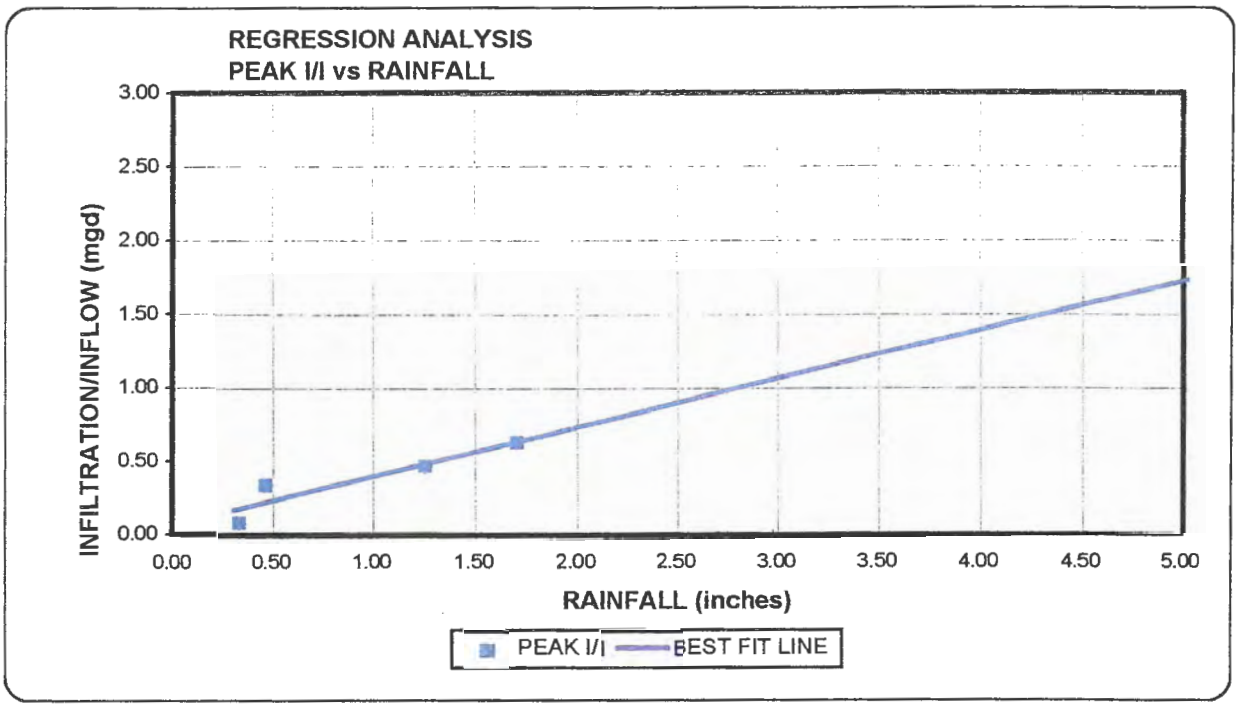
I. LINEAR REGRESSION ANALYSES

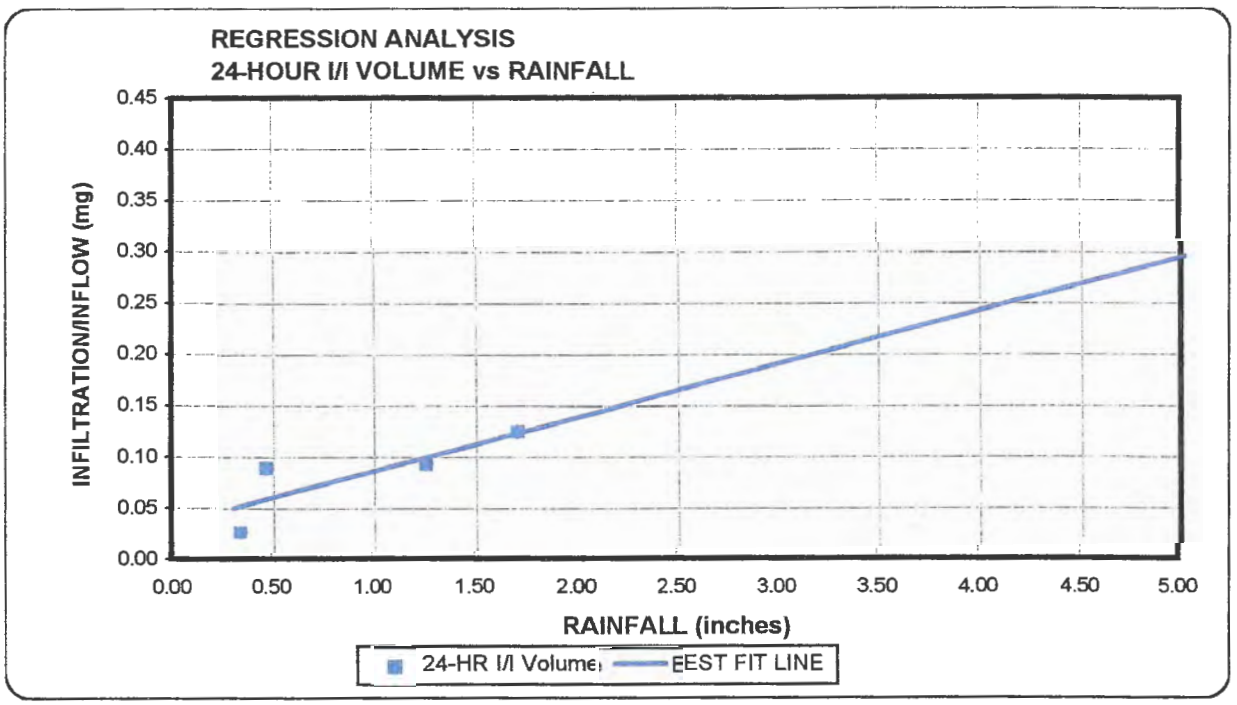
	Slope	y-intercept	r
A. 24-HR I/I VS. 24-HR RAINFALL	0.05	0.04	0.93
B. PEAK I/I VS. 24-HR RAINFALL	0.33	0.07	0.93

II. PROJECTED FLOWS (MGD)

	24-Hour Rain I/I	Peak Hour Rain I/I	Projected Peak Flow*
A. 1.00 in.	0.09	0.40	0.62
B. 2.00 in.	0.14	0.74	0.95
C. 3.00 in.	0.19	1.07	1.28

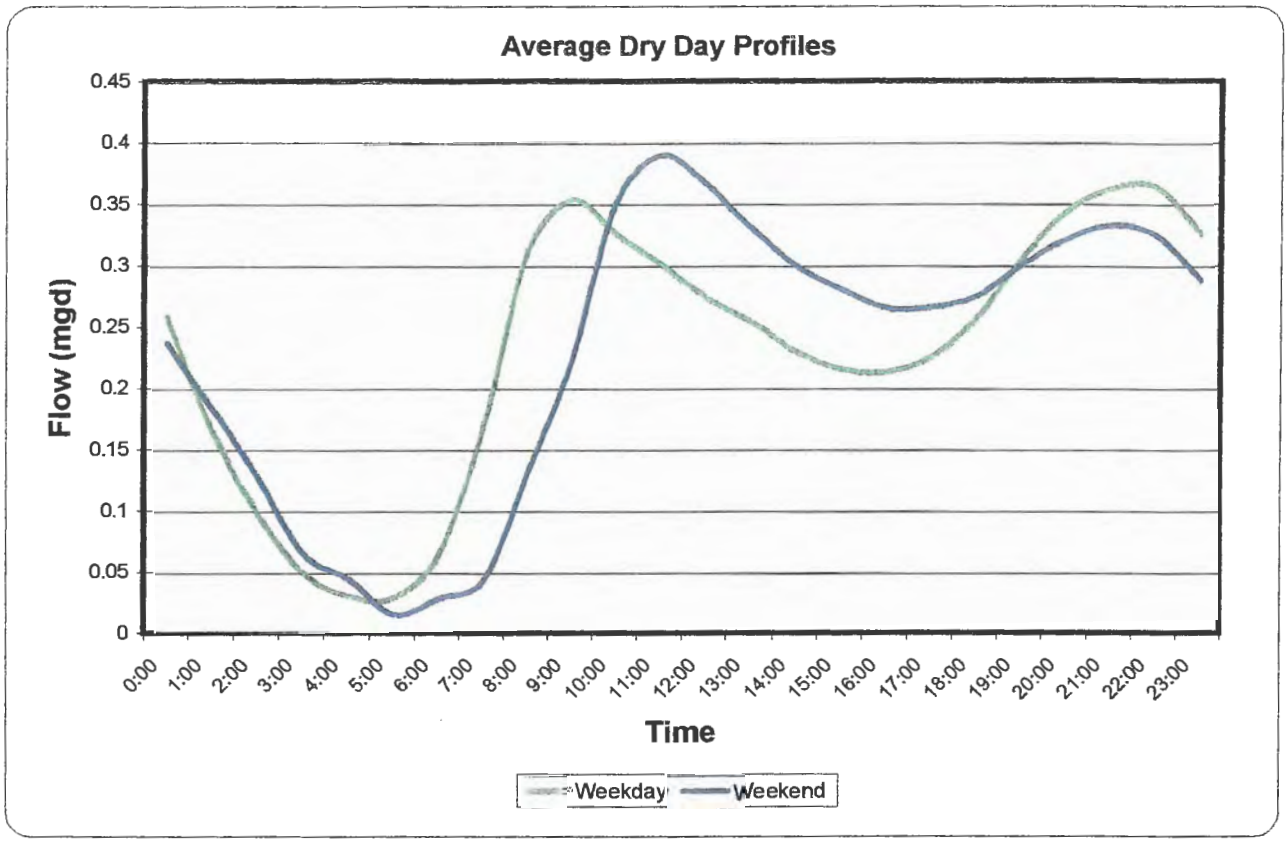
*Peak hour I/I plus peak dry weather flow





Regression Analyses			
	24-hr II Vol, Peak II		
Date Range:	***03/01/04*** to ***05/07/04***		
Monitor:	**MP5**	**Address:**	**222 Sullivan Dr**
Pipe Dia:	**14.75 in**		

MP6



Dry Day Profiles

Weekday and Weekend Periods

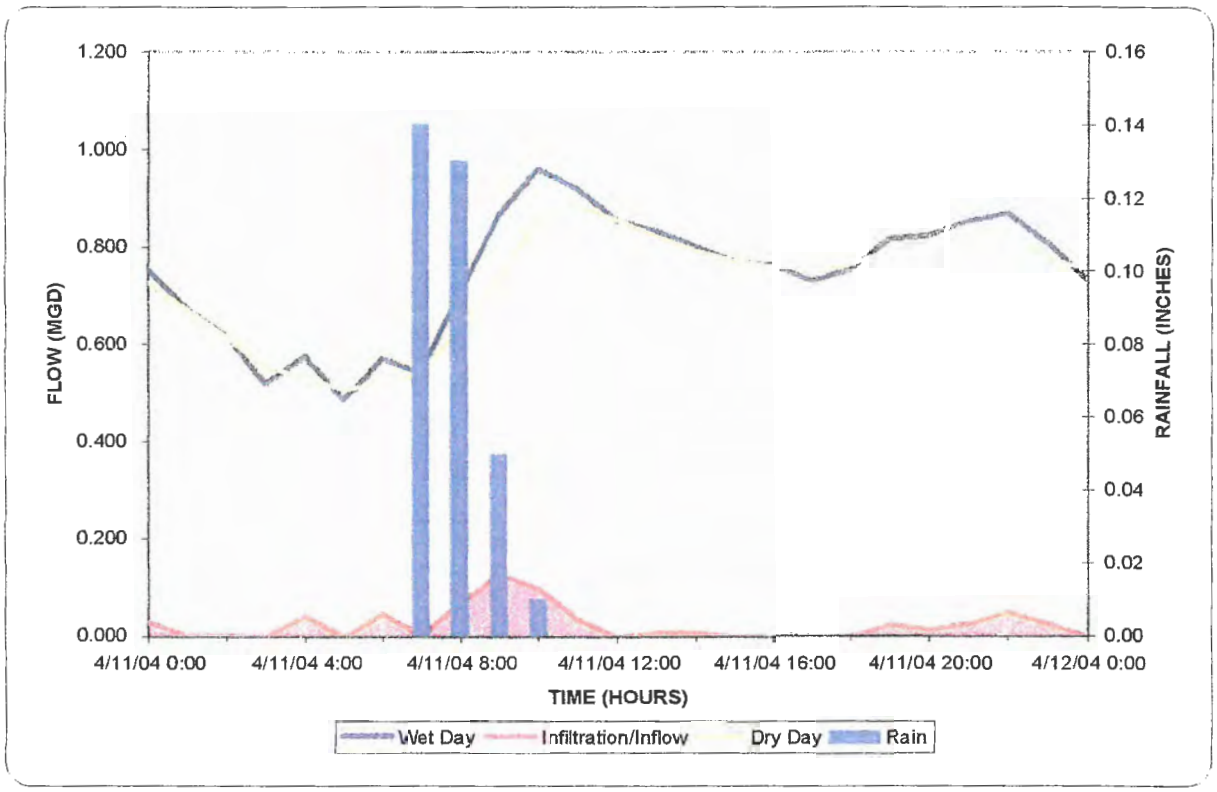
Date Range: ***03/01/04*** to ***05/07/04***

Monitor: **MP6** **Address:** **Frances Ave**

Pipe Dia: **19.63 in**

FLOW MONITOR ANALYSIS
STORM DATA

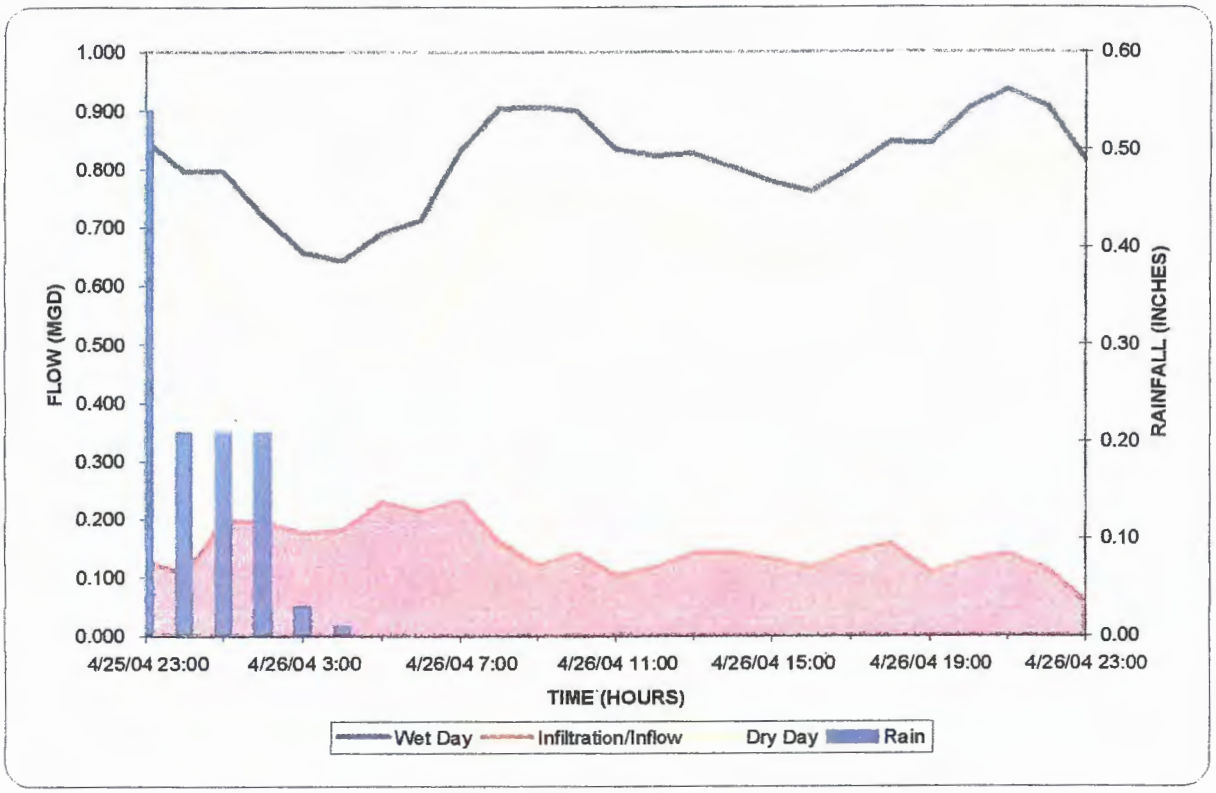
Monitor Name:	MP6	Day of Week:	Sunday
Storm date:	11-Apr-04	Total Rainfall:	0.33 Inches
Rain Start Hour:	11-Apr-04 07:00	Rainfall Duration (hr):	4



ADJUSTED AVERAGE BASE FLOW (mgd)	0.724
TOTAL FLOW (mg)	0.744
PEAK FLOW (mgd)	0.960
PEAK HOUR RAIN (in)	0.140
24 HR II VOLUME (MG)	0.032
PEAK II (MGD)	0.127

FLOW MONITOR ANALYSIS
STORM DATA

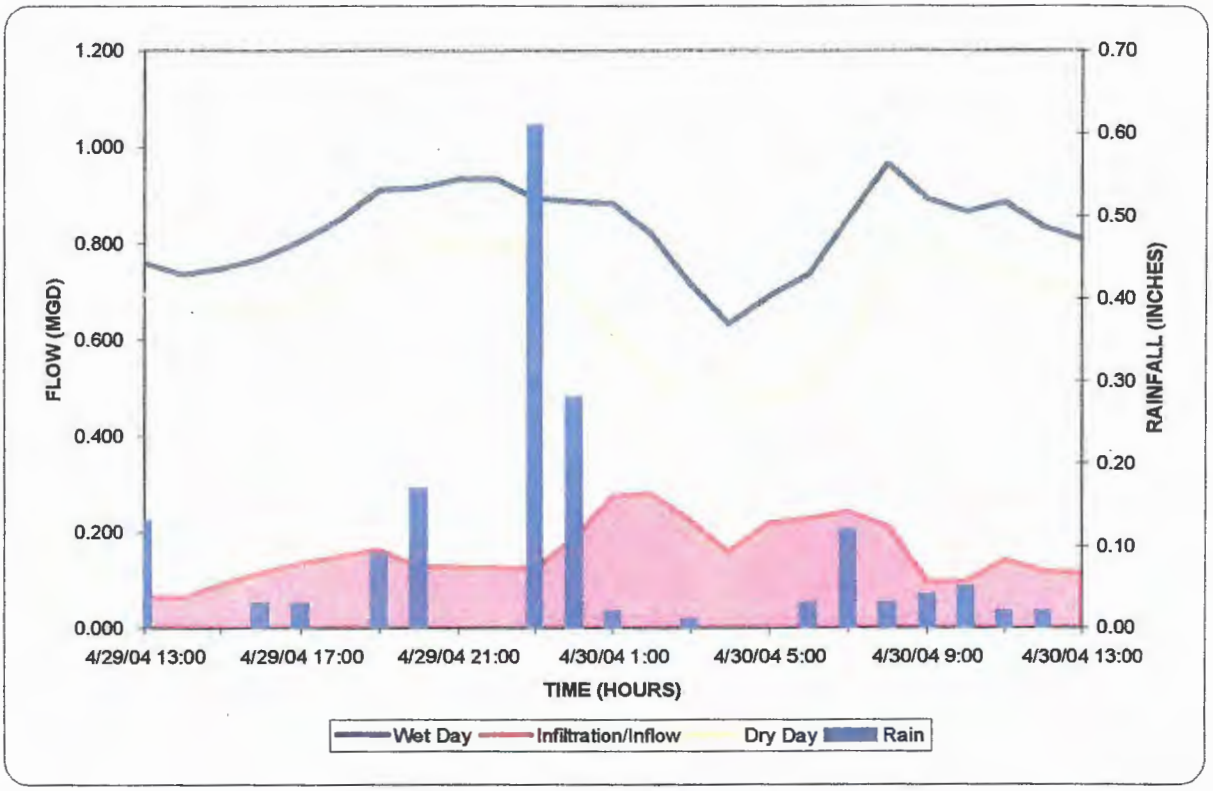
Monitor Name:	MP6	Day of Week:	Sunday
Storm date:	25-Apr-04	Total Rainfall:	1.25 Inches
Rain Start Hour:	25-Apr-04 22:00	Rainfall Duration (hr):	7



ADJUSTED AVERAGE BASE FLOW (mgd)	0.664
TOTAL FLOW (mg)	0.812
PEAK FLOW (mgd)	0.935
PEAK HOUR RAIN (in)	0.540
24 HR II VOLUME (MG)	0.148
PEAK II (MGD)	0.233

FLOW MONITOR ANALYSIS
STORM DATA

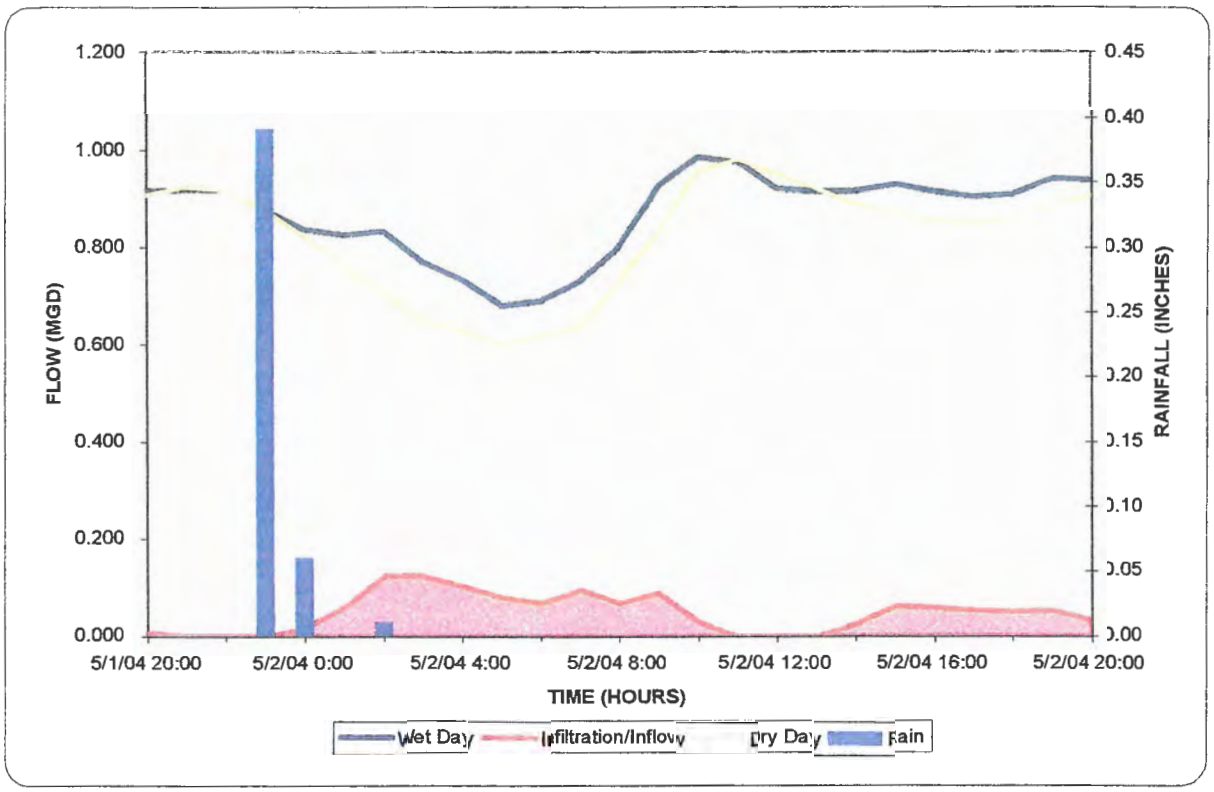
Monitor Name:	MP6	Day of Week:	Thursday
Storm date:	29-Apr-04	Total Rainfall:	1.70 Inches
Rain Start Hour:	29-Apr-04 12:00	Rainfall Duration (hr):	17



ADJUSTED AVERAGE BASE FLOW (mgd)	0.673
TOTAL FLOW (mg)	0.829
PEAK FLOW (mgd)	0.965
PEAK HOUR RAIN (in)	0.610
24 HR II VOLUME (MG)	0.155
PEAK II (MGD)	0.280

FLOW MONITOR ANALYSIS
STORM DATA

Monitor Name:	MP6	Day of Week:	Saturday
Storm date:	01-May-04	Total Rainfall:	0.46 Inches
Rain Start Hour:	01-May-04 23:00	Rainfall Duration (hr):	3



ADJUSTED AVERAGE BASE FLOW (mgd)	0.823
TOTAL FLOW (mg)	0.868
PEAK FLOW (mgd)	0.987
PEAK HOUR RAIN (in)	0.390
24 HR II VOLUME (MG)	0.063
PEAK II (MGD)	0.124

SARALAND FLOW MONITORING STUDY
FLOW MONITORING DATA SHEET

Monitor Name: MP6
Basin Name: SARALAND
Monitoring Period: 1-Mar-04 to 7-May-04

Date	Day of Week	Rainfall Start Date	Rainfall Start Time	24-hour Rainfall (inches)	24-hour Rainfall I/I (mgd)	Peak Hour Rainfall (inches)	Peak Hour Flow (mgd)	Peak I/I (mgd)
11-Apr-04	Sun	11-Apr	7:00	0.33	0.020	0.14	0.960	0.127
25-Apr-04	Sun	25-Apr	22:00	1.25	0.148	0.54	0.935	0.233
29-Apr-04	Thu	29-Apr	12:00	1.70	0.155	0.61	0.944	0.280
1-May-04	Sat	1-May	23:00	0.46	0.046	0.39	0.987	0.124

Average Dry Weather Flow (MGD):	0.735
Peak Dry Weather Flow (MGD):	0.899
Minimum Dry Weather Flow (MGD)	0.519

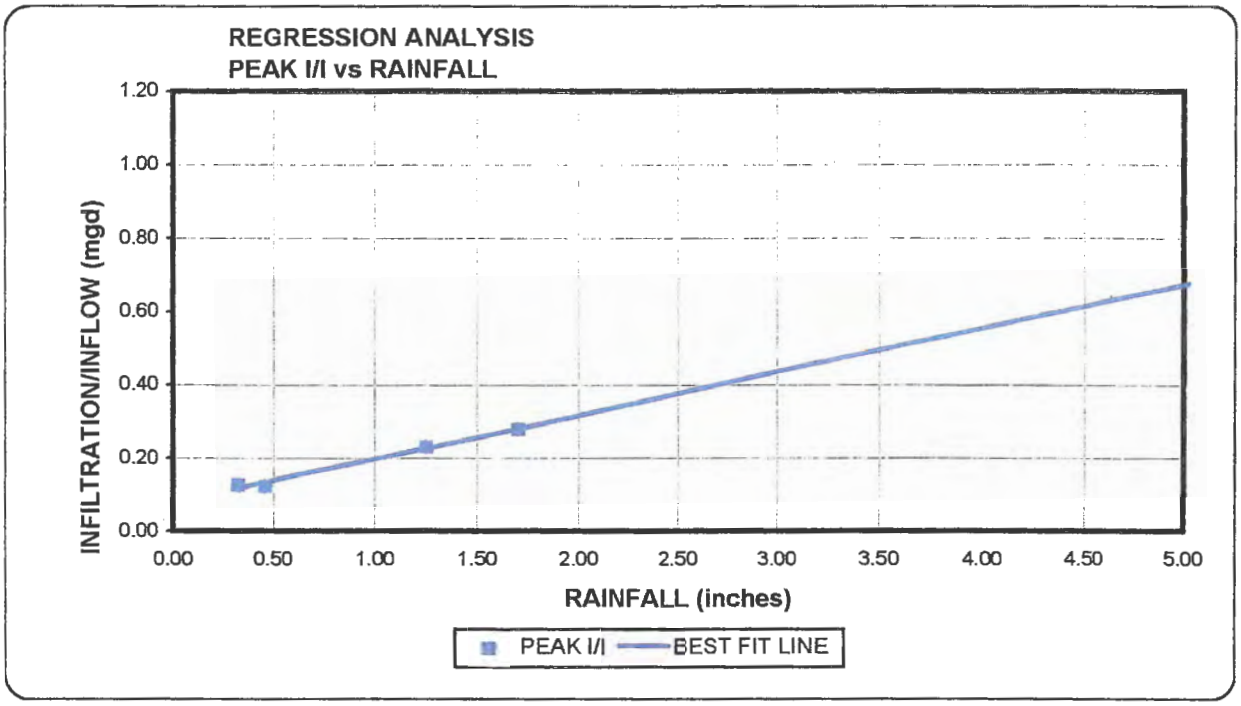
I. LINEAR REGRESSION ANALYSES

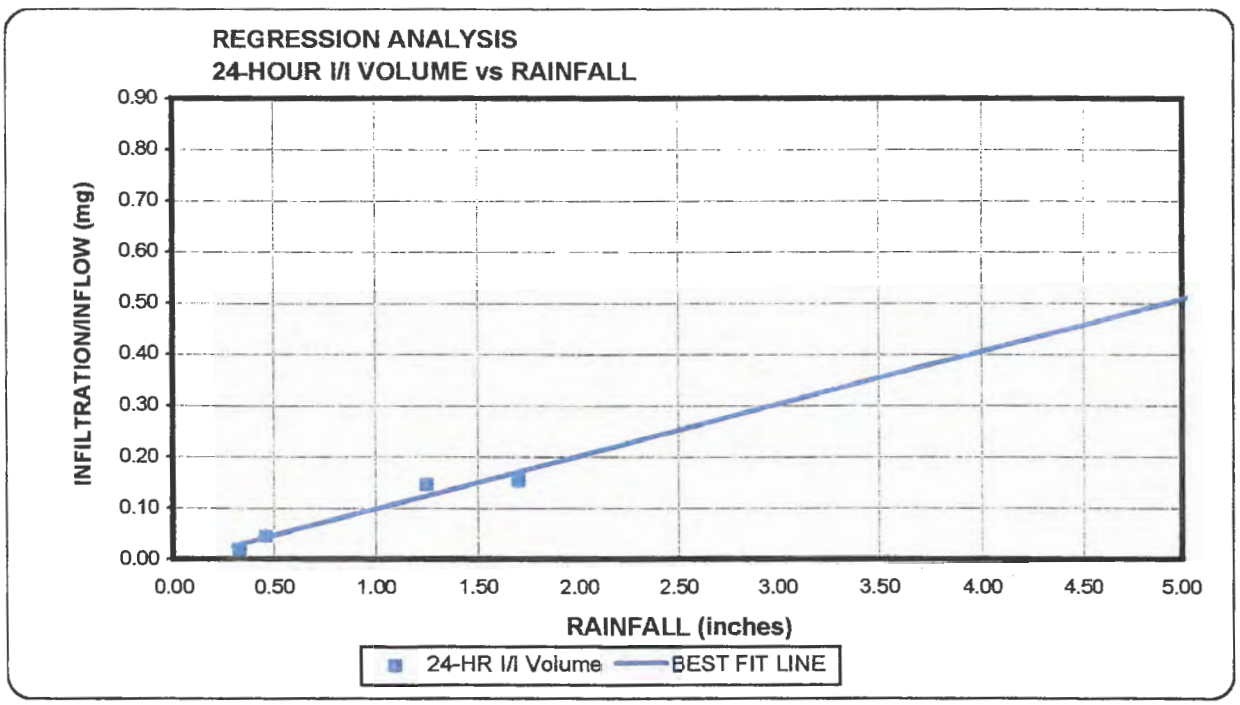
	Slope	y-intercept	r
A. 24-HR I/I VS. 24-HR RAINFALL	0.10	0.00	0.97
B. PEAK I/I VS. 24-HR RAINFALL	0.12	0.08	0.99

II. PROJECTED FLOWS (MGD)

	24-Hour Rain I/I	Peak Hour Rain I/I	Projected Peak Flow*
A. 1.00 in.	0.10	0.20	1.10
B. 2.00 in.	0.20	0.32	1.22
C. 3.00 in.	0.30	0.44	1.34

*Peak hour I/I plus peak dry weather flow





Regression Analyses			
	24-hr II Vol, Peak II		
Date Range:	***03/01/04*** to ***05/07/04***		
Monitor:	**MP6**	**Address:**	**Frances Ave**
Pipe Dia:	**19.63 in**		

INSPECTION AND EVALUATION OF LIFT STATIONS
CITY OF SARALAND
Project No. 111905.10

LIFT STATION NUMBER	LIFT STATION NAME	SURVEY DATE	INSPECTOR	LIFT STATION ADDRESS	LIFT STATION DATE BUILT	LIFT STATION TYPE	APPROX. SITE AREA	HOSE BIB	BACKFLOW PREVENTER	SITE DRAINAGE CONDITION	TYPE OF FENCE	LINEAR FOOTAGE OF FENCE	TYPE / CONDITION OF DRIVEWAY	LENGTH x WIDTH OF DRIVEWAY (FT)	LIFT STATION BLDG. ON SITE	TOP OF SLAB WIDTH (FT)	TOP OF SLAB LENGTH (FT)	BLDG. PLAN DIMENSION WIDTH(FT) x LENGTH(FT)	OVERALL BLDG CONDITION
1	**POLICE CLUB**	3/22/2004	J. Lamont	118 Park Drive	4/15/1993	SELF PRIME	75/140	NO	NO	see notes	no fence	n/a	dirt trail	n/a	FG /Encl.	8' 5"	12' 4"	6'6" x 6'6"	Good
2	**POPEYE'S or S. HWY 43**	7/21/2004	J. Lamont	1032 Hwy 43		Subm. Pump	12/140	NO	NO	fair	no fence	n/a	grass	n/a	NO	72" DIAM	72" DIAM	N/A	N/A
3	**PARK ST.**	7/23/2004	J. Lamont	118 Park Drive	4/29/1986	SELF PRIME	50 x 80	yes	yes	good	chain link	220	grass/gravel	12 x 55	cement/brick	N/A	N/A	22' 9" X 14' 8"	Good
4	**ZOOLAND OR EDGEFIELD**	9/30/2004	J. Lamont			GRINDER	12.5 X 12.5	NO	NO	POOR	WOOD	50	GRAVEL	12 X 133	NO	N/A	N/A	N/A	N/A
5	**FIRST AVE.**	8/13/2004	J. Lamont	530 First Ave.	4/29/1986	SELF PRIME	48 X 134	YES	NO	good	chain link	166'	GRAVEL/GRASS	96 X 12	FG / Encl	8'	12' 6"	6'6" X 6' 6"	Good
7	**SCOTT DR. or SHELTON BEACH EST.**	8/13/2004	J. Lamont	452 Scott Drive		Subm. Pump	76 X 45	YES	NO	FAIR	chain link	100'	GRAVEL	31 X 12	BRICK	N/A	N/A	18' x 13' 4"	Good
8	**JUBILEE DR.**	9/25/2004	JL	1297 Jubilee Drive	7/13/1998	Subm. Pump	26 X 26	YES	NO	FAIR	WOOD	104'	ASPHALT/FAIR	25 X 12	NO	N/A	N/A	N/A	N/A
9	**EXXON STATION or SERVICE RD.**	8/16/2004	J.LAMONT			Subm. Pump	50 X 25	NO	NO	GOOD	WOOD	100	ASPHALT/GOOD	30 X 11	NO	N/A	N/A	N/A	N/A
10	**LAREDO DR.**	9/8/2004	JL	2 Laredo Drive		Subm. Pump	52 X 104	YES	NO	FAIR	no fence	N/A	GRAVEL / POOR	80 X 11	FG / ENCL	8'	10.5'	6.5' X 6.5'	Good
11	**CHASE DR.**	8/11/2004	JL	1712 Chase Drive		SELF PRIME	70 X 90	YES	NO	GOOD	PRIVACY WOOD	132	grass/gravel	33 X 12	FG / ENCL	11' 7"	12' 11"	6'6" X 6'6"	GOOD
12	**SPANISH TRACE DR.**	8/9/2004	J. Lamont	1327 Spanish Trace		Subm. Pump	40 x 50	yes	no	good	chain link	180	grass/gravel	46 x 12	NO	21' 6"	12' 9"	N/A	N/A
13	**OAK RIDGE**	10/1/2004	J. Lamont			GRINDER	15 X 15	NO	NO	Good	no fence	n/a	none	n/a	NO	N/A	N/A	N/A	N/A
14	**LANDFILL or W. CELESTE RD.**	9/7/2004	JL			Subm Pump	24 X 22	NO	NO	good	WOOD	92	Asphalt / Good	32 X 12	NO	N/A	N/A	N/A	N/A
15	**DEER RUN DR.**	7/26/2004	J. Lamont	813 Deer Run Drive	5/20/1986	SELF PRIME	70 x 70	yes	yes	fair / holds water / adjacent to entry	chain link	280	grass/gravel	135 x 12	cement block	N/A	N/A	22.75 X 14.5	GOOD
16	**FORREST AVE.**	7/28/2004	J. Lamont	901 Forrest Ave	3/31/1978	SELF PRIME	50 x 60	yes	no	good	no fence	n/a	dirt / grass	n/a	brick	N/A	N/A	13' 4" X 18'	FAIR
17	**GRAHM ST.**	8/5/2004	J. Lamont	220 Gram St.		SELF PRIME	50 x 50	yes	no	good	no fence	n/a	asphalt / fair	9 x 20	brick	N/A	N/A	13' 5" X 18'	FAIR
18	**DELISA DR.**	8/24/2004	JL	124 A Delisa		SELF PRIME	25 x 18	yes	NO	FAIR	WOOD	13.5	none	n/a	FG / Encl	8'	12'	6.5' X 6.5'	FAIR
19	**CAMELOT DR.**	8/23/2004	JL	317 Camelot		SELF PRIME	30 X 25	yes	NO	FAIR	no fence	n/a	none	n/a	FG / Encl	8'	12'	6.5' X 6.5'	GOOD
20	**CELESTE RD or E. CELESTE RD.**	8/19/2004	J.L / P.K.	6 Celeste Rd		Subm Pump	272 X 35	NO	NO	POOR	chain link	120	DIRT/GRAVEL - POOR	242 X 12	NO	N/A	N/A	N/A	N/A
21	**SARALAND AVE.**	8/24/2004	J. Lamont/ DD	517 Saraland Ave		SELF PRIME	68 x 48	yes	NO	good	no fence	N/A	GRAVEL / GRASS/ OK	33 X 12	FG / Encl	8'	11'	6.5' X 6.5'	GOOD
22	**HWY. 43 N. or OLD TELEGRAPH**	7/22/2004	J.L. / R.H.			SELF PRIME	50 x 80	yes	yes	good	chain link	120	gravel road / good	12 x 335	cement block	N/A	N/A	14.5' X 22.75'	GOOD
23	**CEDAR ST.**	6/17/2004	J.L. / BP	408 Bayou Sara Ave		SELF PRIME	40 x 40	yes	no	good	chain link	160	gravel road / fair	100 x 12	FG / Encl	13' 0"	11' 8"	6'6" X 6' 6"	GOOD
24	**SMOKE AVE.**	5/27/2004	JL			Subm Pump	26 x 24	yes	no	FAIR	no fence	n/a	none	n/a	NO	N/A	N/A	N/A	N/A
25	**FERRY AVE.**	7/8/04 & 7/18/04	JL			Subm Pump	25 x 18	no	NO	FAIR	no fence	n/a	none	n/a	NO	6' 1"	13' 10"	N/A	N/A
26	**MIGNIONETTE AVE.**	4/15/2004	JL	199 Viola St.		SELF PRIME	40 x 40	yes	no	see notes	chain link	160	Fair / Asphalt	170 x 25	FG / Encl	8' 6"	12'	6.5' X 6.5'	GOOD
27	**FAIRFIELD**	5/20/2004	JL	S. Fairfield		Subm Pump	40 x 40	yes	no	good	chain link	160	Asphalt / Good	13 x 21	NO	8'	8'	N/A	N/A
28	**SHELTON BEACH EXT.**	9/27/2004	JL			Subm Pump	22 X 19	NO	NO	POOR	chain link	82	GRAVEL / GOOD	36 X 12	NO	N/A	N/A	N/A	N/A
29	**KALIFIELD**	9/13/2004	JL			Subm Pump	24 X 26	NO	NO	good	WOOD	100	GRAVEL	9 X 12	NO	N/A	N/A	N/A	N/A
30	**TWIN LAKES**	8/27/2004	JL			SUBM PUMP	14 X 15	NO	NO	POOR	BRICK	58'	none	n/a	NO	SEE NOTES	SEE NOTES	N/A	N/A
31	**WEARTHERBY**	8/25/2004	JL			SUBM PUMP		NO	NO	see notes	WOOD		DIRT / POOR	UNDEFINED SEE NOTES	NO	N/A	N/A	N/A	N/A
32	**SPANISH TRACE NEW**	9/1/2004	JL			SUBM PUMP	28 X 21	NO	NO	POOR	WOOD	96'	GRAVEL/GRASS/ FAIR	245 X 12	NO	6'	N/A	N/A	N/A
33	**WILLOW WALK**	9/2/2004	JL			Subm Pump	18.5 X 15	NO	NO	FAIR	BRICK	67'	none	n/a	NO	15'	18.5'	N/A	N/A

INSPECTION AND EVALUATION OF LIFT STATIONS
CITY OF SARALAND
Project No. 111905.10

LIFT STATION NUMBER	LIFT STATION NAME	VENTILATION EQUIPMENT	ROOF CONDITION	DRY WELL OR VALVE VAULT?	SHAPE OF WELL / VAULT	INSIDE DIMENSION LENGTH x WIDTH OR DIAMETER (FT)	DEPTH (FROM TOP OF SLAB - FT)	WALL MATERIAL	SUMP PUMP PRESENT	SUMP PUMP OPERATIONAL	WETWELL ACCESS TYPE	WETWELL SHAPE	INSIDE WETWELL DIMENSION LENGTH x WIDTH OR DIAM (FT)	INSIDE WETWELL DEPTH (FROM TOP OF SLAB- FT)	WETWELL MATERIAL	WETWELL CONDITION	WETWELL VENT SIZE	WETWELL INFILTRATION	AMOUNT OF GREASE PRESENT
1	POLICE CLUB	functional	good	NO	n/a	n/a	n/a	n/a	NO	n/a	MH	CIRC	6'	20' 0"	CONC	FAIR	4"	N/A	MODERATE
2	POPEYE'S or S. HWY 43	N/A	N/A	NO	n/a	n/a	n/a	n/a	NO	n/a	STEEL HATCH	CIRC	5'	10.5'	CONC	FAIR	2"	SEE NOTES	LIGHT
3	PARK ST.	YES	good	NO	n/a	n/a	n/a				MH	RECT	9.83' X 8'	18.55	CONC	GOOD	4"	None Visible	LIGHT
4	ZOOLAND OR EDGEFIELD	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	FG HATCH	CIRC	48"	7.1	FG	GOOD	N/A	SEE NOTES	NONE
5	FIRST AVE.	YES	good	NO	n/a	n/a	n/a	n/a	NO	n/a	MH	CIRC	6'	14'	CONC	GOOD	4"	None Visible	HEAVY
7	SCOTT DR. or SHELTON BEACH EST.	YES / NOT OPERATIVE	GOOD	NO	N/A	N/A	N/A	N/A	NO	N/A	MH	CIRC	6'	15'	CONC	GOOD	3"	NONE VISIBLE	NONE
8	JUBILEE DR.	N/A	N/A	VAULT	SQUARE	4 x 4	4'	CONC	NO	N/A	ALUM HATCH	CIRC	6'	18.4'	CONC	GOOD	4" PVC	None Visible	NONE
9	EXXON STATION or SERVICE RD.	N/A	N/A	VAULT	SQUARE	4 x 4	3'	CONC	NO	N/A	ALUM HATCH	CIRC	6'	13.25	CONC	GOOD	6"	NONE VISIBLE	NONE
10	LAREDO DR.	YES	GOOD	NO	N/A	N/A	N/A	N/A	NO	N/A	MH	CIRC	5'	17.7'	CONC	GOOD	3'	NONE VISIBLE	MODERATE
11	CHASE DR.	YES	GOOD	NO	N/A	N/A	N/A	N/A	NO	N/A	MH	CIRC	10'	20.1'	CONC	GOOD	3"	NONE VISIBLE	LIGHT
12	SPANISH TRACE DR.	N/A	N/A	VAULT	SQUARE	6' X 6'	4.5'	CONC	NO	N/A	ALUM HATCH	CIRC	9'	18.85'	CONC	FAIR	3"	NONE VISIBLE	VERY LIGHT
13	OAK RIDGE	N/A	N/A	NO	n/a	n/a	n/a	n/a	NO	N/A	FG MH LID	CIRC	36"	13.2'	FG/CONC	GOOD	N/A	None Visible	LIGHT
14	LANDFILL or W. CELESTE RD.	N/A	N/A	VAULT	SQUARE	4' X 4'	43"	CONC	NO	N/A	ALUM HATCH	CIRC	6'	18.25'	CONC	GOOD	6" 01	NONE VISIBLE	LIGHT
15	DEER RUN DR.	YES	GOOD	NO	N/A	N/A	N/A	N/A	NO	N/A	MH	RECT	9.83' X 8'	18.5	CONC	GOOD	4"	NONE VISIBLE	LIGHT
16	FORREST AVE.	YES	FAIR	NO	N/A	N/A	N/A	N/A	NO	N/A	MH	CIRC	6'	15'	CONC	GOOD	4"	NONE VISIBLE	MODERATE
17	GRAHM ST.	YES	GOOD	NO	N/A	N/A	N/A	N/A	NO	N/A	MH	CIRC	6'	12.28'	CONC	FAIR	4"	NONE VISIBLE	NONE
18	DELISA DR.	NO	POOR	NO	N/A	N/A	N/A	N/A	NO	N/A	MH	CIRC	6'	14.05'	CONC	GOOD	3"	NONE VISIBLE	LIGHT
19	CAMELOT DR.	NO	GOOD	NO	N/A	N/A	N/A	N/A	NO	N/A	MH	CIRC	6'	18.1'	CONC	SEE NOTES	3"	YES	LIGHT
20	CELESTE RD or E. CELESTE RD.	N/A	N/A	VAULT	SQUARE	5 X 4	4	CONC	NO	N/A	ALUM HATCH	CIRC	6'	12'	CONC	GOOD	4"	NONE VISIBLE	NONE
21	SARALAND AVE.	YES	GOOD	NO	N/A	N/A	N/A	N/A	NO	N/A	MH	CIRC	6'	19.1'	CONC	GOOD	3"	NONE VISIBLE	LIGHT
22	HWY. 43 N. or OLD TELEGRAPH	YES	GOOD	NO	N/A	N/A	N/A	N/A	NO	N/A	ALUM HATCH	RECT	9.83' X 8'	18.15'	CONC	GOOD	4"	None Visible	LIGHT
23	CEDAR ST.	BLOWER MOTOR	GOOD	NO	N/A	N/A	N/A	N/A	NO	N/A	MH	CIRC	9'	19.90'	CONC	GOOD	3" - Carbon Steel	None Visible	LIGHT
24	SMOKE AVE.	N/A	N/A	VAULT	SQUARE	5' X 5'	4'	CONC	NO	N/A	ALUM HATCH	CIRC	6'	18.25'	CONC	GOOD	6"	None Visible	HEAVY
25	FERRY AVE.	N/A	N/A	VAULT	SQUARE	4' X 5'	4' 6"	CONC	NO	N/A	ALUM HATCH	CIRC	5'	17.88'	CONC	GOOD	4" D.I	None Visible	MODERATE
26	MIGNIONETTE AVE.	NOT CONNECTED	GOOD	NO	N/A	N/A	N/A	N/A	NO	N/A	MH	CIRC	6'	19.5'	CONC	GOOD	No Vent	None Visible	LIGHT
27	FAIRFIELD	N/A	N/A	VAULT	SQUARE	4' 10" (SQ)	3' 4"	CONC	NO	N/A	ALUM HATCH	CIRC	6'	19.3'	CONC	GOOD	6" DI	None Visible	HEAVY
28	SHELTON BEACH EXT.	N/A	N/A	VAULT	SQUARE	4' X 4'	3'10"	CONC	NO	N/A	ALUM HATCH	CIRC	6'	14.1'	CONC	GOOD	4" PVC	None Visible	NONE
29	KALIFIELD	N/A	N/A	DRY WELL	CIRC	48"	3.5'	CONC	NO	N/A	ALUM HATCH	CIRC	6'	16.7'	CONC	GOOD	4" PVC	NONE VISIBLE	LIGHT
30	TWIN LAKES	N/A	N/A	DRY WELL	CIRC	48"	3'	CONC	NO	N/A	ALUM HATCH	CIRC	4'	15'	CONC	GOOD	No Vent	NONE VISIBLE	SEE NOTES
31	WEARTHERBY	N/A	N/A	VAULT	SQUARE	4' X 4'	7'-5"	CONC	NO	N/A	ALUM HATCH	CIRC	6'	15.1'	CONC	GOOD	6"-PVC	YES	NONE
32	SPANISH TRACE NEW	N/A	N/A	VAULT	SQUARE	5' X 5'	5'	CONC	NO	N/A	ALUM HATCH	CIRC	5'	17.5'	CONC	GOOD	4"-DI	NONE VISIBLE	NONE
33	WILLOW WALK	N/A	N/A	VAULT	SQUARE	4'X4'	3.5'	CONC	NO	N/A	ALUM HATCH	CIRC	5'	11.8'	CONC	GOOD	6" DI	NONE VISIBLE	NONE

INSPECTION AND EVALUATION OF LIFT STATIONS
CITY OF SARALAND
Project No. 111905.10

LIFT STATION NUMBER	LIFT STATION NAME	AMOUNT OF SILT PRESENT	AMOUNT OF DEBRIS PRESENT	NUMBER OF INFLUENT LINES	INFLUENT PIPE #1 POSITION, SIZE (IN), MATERIAL	INFLUENT PIPE #1 FORCE MAIN OR GRAVITY	INFLUENT PIPE #1 DEPTH (FROM TOP SLAB TO INVERT-FT)	INFLUENT PIPE #2 POSITION, SIZE (IN), MATERIAL	INFLUENT PIPE #2 FORCE MAIN OR GRAVITY	INFLUENT PIPE #2 DEPTH (FROM TOP SLAB TO INVERT-FT)	NUMBER OF PUMPS	DESIGN FLOW (gpm)	DESIGN HEAD (FT)	PUMP 1 TYPE	PUMP 1 MANUFACTURER	PUMP 1 MODEL #	PUMP 1 SERIAL NUMBER
1	**POLICE CLUB**	LIGHT	MODERATE	1	10" PVC	GRAVITY	14' 3"	N/A	N/A	N/A	2	200	40	SELF PRIME	GORMAN RUPP	T4A3-B	933061 AM
2	**POPEYE'S or S. HWY 43**	MODERATE +/- 0.2'	MODERATE	1	8" PVC (NW)	GRAVITY	6.5'	N/A	N/A	N/A	2	52	33	SUB PUM	FLYGHT	C-3067-267 IMP	
3	**PARK ST.**	LIGHT	LIGHT	1	18" DI	GRAVITY	12.67'	N/A	N/A	N/A	3	1206	50	SELF PRIME	GORMAN RUPP	T8A3-B	86-246-AX
4	**ZOOLAND OR EDGEFIELD**	NONE	LIGHT	1	8" DI (W)	GRAVITY	4.10'	N/A	N/A	N/A	2			SUB PUM GRINDER	ZOELLER	840 GRINDER	
5	**FIRST AVE.**	HEAVY	HEAVY	1	10" DI	GRAVITY	9.45	N/A	N/A	N/A	2	119	24	SELF PRIME	GORMAN RUP	T-3A3-B	86-2432-AM
7	**SCOTT DR. or SHELTON BEACH EST.**	NONE	NONE	1	8" DI	GRAVITY	11.70'	N/A	N/A	N/A	2	260	27	SELF PRIME	GORMAN RUP	T-4A3	663550-M-113-AX
8	**JUBILEE DR.**	NONE	LIGHT	1	8" DI	GRAVITY	11.70'	N/A	N/A	N/A	2	80	24	SUB PUM	FLYGT	CP-3085MT-436 IMP	
9	**EXXON STATION or SERVICE RD.**	NONE	LIGHT	1	DI	GRAVITY	11.10'	N/A	N/A	N/A	2	100	92	SUB PUM	FLYGT	CP-3127-481 IMP	
10	**LAREDO DR.**	LIGHT	MODERATE	2	8" DI	GRAVITY	13.9'	N/A	N/A	N/A	2	119	36	SUB PUM	GORMAN RUP	T-3A-B	86-2438-AM
11	**CHASE DR.**	MODERATE +/- 0.2'	MODERATE	2	12" DI	GRAVITY	12	8" DI	GRAVITY	12	2	756	35	SELF PRIME	GORMAN RUP	T-6A3-B	86-2437-AM
12	**SPANISH TRACE DR.**	NONE	VERY LIGHT	2	12" DI	GRAVITY	5.6	8" DI	GRAVITY	10.4	2	960	42	SUB PUM	FLYGT	C-3152-434 IMP	
13	**OAK RIDGE**	NONE	LIGHT	2	8" DI	GRAVITY	9.15	N/A	N/A	N/A	2	58 GPM @ 60 HZ OR 53 GPM @ 50 HZ	105' @ 60 HZ OR 81' @ 50 HZ	SUB PUM GRINDER	HRDROMATIC	HPGR200	
14	**LANDFILL or W. CELESTE RD.**	NONE	LIGHT	1	8" PVC	GRAVITY	12.65'	N/A	N/A	N/A	2	Org-125gpm-440 Imp / Pd-88.3gpm-438 Imp	11	SUB PUM	FLYGT	CP-3085-438 IMP	
15	**DEER RUN DR.**	LIGHT	LIGHT	1	16" DI	GRAVITY	12.97'	N/A	N/A	N/A	3	Pump 1,2,3 - 1215gpm / Stand-by - 1475gpm	40	SELF PRIME	GORMAN RUPP	T8A3-B	86-0250-AX
16	**FORREST AVE.**	NONE	LIGHT	1		GRAVITY	11.35'	N/A	N/A	N/A	2	200	30	SELF PRIME	GORMAN RUPP	T-4A3	M-116-AX
17	**GRAHM ST.**	NONE	NONE	1	12" DI (10" ?)	GRAVITY	8.10'	N/A	N/A	N/A	2	335	28.9	SELF PRIME	GORMAN RUPP	T4A3	M-115-AX
18	**DELISA DR.**	LIGHT	LIGHT	1	8" PVC (WEST)	GRAVITY	8	N/A	N/A	N/A	2	125	21	SELF PRIME	GORMAN RUPP	T4A3	M-1062-AM 663562
19	**CAMELOT DR.**	LIGHT	NONE	1	8" PVC (WEST)	GRAVITY	14.25	N/A	N/A	N/A	2	150	27	SELF PRIME	GORMAN RUPP	T4A4	M-1063-AM 663539
20	**CELESTE RD or E. CELESTE RD.**	NONE	NONE	2	8" DI (NNE)	GRAVITY	7.35	8" SS/PVC	GRAVITY	8.2	2			SUB PUMP	HOMA	DN-100	
21	**SARALAND AVE.**	LIGHT	LIGHT	2	8" DI (E)	GRAVITY	15.1	N/A	N/A	N/A	2	245	27	SELF PRIME	GORMAN RUPP	T4A3-B	86-2436-AM
22	**HWY. 43 N. or OLD TELEGRAPH**	MODERATE +/- 0.3'	LIGHT	2	16" - DI (NE)	GRAVITY	9.2'	8" - DI (SOUTHSIDE)	GRAVITY	10.5 '	(2) w/1-standby	1475 (standby-1616 gpm @ 39')	35	SELF PRIME	GORMAN RUPP	T8A3-B	86-249-AX
23	**CEDAR ST.**	NONE VISIBLE	MINIMAL	1	10" PVC	GRAVITY	15.4	N/A	N/A	N/A	2	725	41	SELF PRIME	GORMAN RUPP	T6A3-B	86-2439-AM
24	**SMOKE AVE.**	NONE VISIBLE	MODERATE	1	10" -PVC (W)	GRAVITY	15.04'	N/A	N/A	N/A	2	125	25	SUB PUMP	FLYGHT	CP-3067-265 IMP	
25	**FERRY AVE.**	NONE VISIBLE	LIGHT	1	8" -DI	GRAVITY	13.82'	N/A	N/A	N/A	2			SUB PUM	HOMA	DN-100	
26	**MIGNIONETTE AVE.**	NONE	LIGHT	1	12" - DI	GRAVITY	14.7	N/A	N/A	N/A	2	350	85	SELF PRIME	GORMANN RUPP	T4A3B	777961
27	**FAIRFIELD**	NONE	NONE	1	12 - DI	GRAVITY	16.0'	N/A	N/A	N/A	2	52	33	SUB PUM	FLYGHT	C-3067-267 IMP	
28	**SHELTON BEACH EXT.**	NONE	NONE	1	8" (W)	GRAVITY	7.25'	N/A	N/A	N/A	2			SUB PUM	DAVIS EMU'S	DAVIS EMU'S	
29	**KALIFIELD**	NONE VISIBLE	LIGHT	1	8"-DI	GRAVITY	10.6'	N/A	N/A	N/A	2			SUB PUM	DAVIS EMU'S	DAVIS EMU'S	
30	**TWIN LAKES**	NONE VISIBLE	LIGHT	1	8"-DI	GRAVITY	10.2'	N/A	N/A	N/A	2	50	132	SUB PUMP	FLYGHT	M-3127.17	
31	**WEARTHERBY**	NONE	NONE	1	10" PVC (N)	GRAVITY	13'	N/A	N/A	N/A	2	150	40	SUB PUMP	FLYGHT	CP-3127.18	
32	**SPANISH TRACE NEW**	NONE	NONE	1	8" - DI - NORTH	GRAVITY	13.6'	N/A	N/A	N/A	2	100	23	SUB PUMP	FLYGHT	NP-3085.182	
33	**WILLOW WALK**	LIGHT (SEE NOTES)	NONE	1	8" - DI - NORTH	GRAVITY	8.6'	N/A	N/A	N/A	2	400	50	SUB PUMP	PUMPEX	K100 F-CA3228	

INSPECTION AND EVALUATION OF LIFT STATIONS
CITY OF SARALAND
Project No. 111905.10

LIFT STATION NUMBER	LIFT STATION NAME	PUMP 1 FLOW RATE (GPM)	PUMP 1 RATED TDH (FT)	PUMP 1 IMPELLER (RPM)	PUMP 1 - IMPELLER MODEL / DIAM (IN)	PUMP 1 SUCTION PIPE SIZE (IN), MATERIAL	PUMP 1 DISCHARGE PIPE SIZE (IN), MATERIAL	PUMP 1 VIBRATION PRESENT	PUMP 1 NOISE PROBLEM	PUMP 1 AVE. DAILY RUN TIME	PUMP 1 DISCHARGE VALVE TYPE, SIZE (IN)	PUMP 1 DISCHARGE VALVE OPERATING OK?	PUMP 1 CHECK VALVE TYPE, SIZE (IN)	PUMP 1 CHECK VALVE OPERATING OK?	PUMP 1 PRESSURE GAUGE?	PUMP 1 PRESSURE GAUGE OPERATING?	PUMP 2 TYPE
1	POLICE CLUB	200	40	1180	9.75	4" DI	DI	NONE	NO	2.1	4"	YES	4"	YES	YES	NO	SELF PRIME
2	POPEYE'S or S. HWY 43	52	33	3430	3-1/2" (90mm)	N/A	2" PVC	NONE	NO	2.82	1.5"	YES	1.5"	YES	NO	N/A	SUB PUM
3	PARK ST.	1206	50	1047	14.75	8" DI	8" DI	NONE	NO	0.78	8" GATE	YES	8"	YES	NO	N/A	SELF PRIME
4	ZOOLAND OR EDGEFIELD			3450		N/A	1-1/2" PVC	NONE	NO	2.4	1-1/2" PVC/GALV	YES	1-1/2"		NO	NO	GRINDER SUB PUM
5	FIRST AVE.	119	24	1035	8.75	3" DI	4" DI	NONE	NO	3.1	4" - 3WAY	YES	4"	YES	NO	N/A	SELF PRIME
7	SCOTT DR. or SHELTON BEACH EST.	260	27	1010	9-3/4"	4" DI	6"	NONE	NO	10.1	4" - Gate	NO	4"	YES	NO	N/A	SELF PRIME
8	JUBILEE DR.	80	24	1725	5.78 (147mm)	N/A	4" DI	NONE	NO	0.28	4" - Gate	YES	4"	YES	NO	N/A	SUB PUMP
9	EXXON STATION or SERVICE RD.	100	92	1735	9.76 (248mm)	N/A	4" DI	NONE	NO	1.02	4" GATE	YES	4"	YES	NO	N/A	SUB PUMP
10	LAREDO DR.	119	36	1243	8.75	3" DI	4" DI	NONE	NO	1	4" - 3 WAY	YES	4"	YES	NO	N/A	SELF PRIME
11	CHASE DR.	756	35	1048	12-3/8"	6" DI	6" TO 8" DI	NONE	NO	0.86	3-WAY	YES	6"	YES	NO	N/A	SELF PRIME
12	SPANISH TRACE DR.	960	42	1750	10.35"	N/A	8" DI	NONE	NO	1.11	8" GATE	YES	YES	YES	NO	N/A	SUB PUM
13	OAK RIDGE	58 GPM @ 60 HZ OR 53 GPM @ 50 HZ	105' @ 60 HZ (OR) 81' @ 50 HZ	2900 @ 50 HZ / 3450 @ 60 HZ	5.38" - 60 HZ (OR) 5.38"/4.25" - 50HZ	N/A	1-1/4" PVC	NONE	NO		1-1/4" PVC BALL	YES	1-1/4" BRASS	YES	NO	N/A	SUB PUM
14	LANDFILL or W. CELESTE RD.	Org-125gpm-440 Imp / Pd-88.3gpm-438 Imp	11	1670	5.83"	N/A	4" DI	NONE	NO	0.33	4" GATE	YES	4"	YES	NO	N/A	SUB PUM
15	DEER RUN DR.	1215	40	Pump 1,2,3 - 949rpm / Stand-by - 1078rpm	14.75	8" DI	10" DI	NONE	NO	1.17	8" GATE	YES	8"	DOESN'T SEAT PROPERLY	NO	N/A	SELF PRIME
16	FORREST AVE.	200	30	1030	9-3/4"	4" DI	6" DI	NONE	NO	0.86	4" GATE	YES	4"	YES	NO	N/A	SELF PRIME
17	GRAHM ST.	335	28.9	1073	9-3/4"	4" DI	6" DI	NONE	NO	2.3	4" GATE	YES	4"	YES	YES	NO	SELF PRIME
18	DELISA DR.	125	21	841	9-3/4"	3" PVC	3" PVC	NONE	NO	0.96	3"-3 WAY	YES	3"	YES	NO	N/A	SELF PRIME
19	CAMELOT DR.	150	27	972	9-3/4"	3"DI	3" DI	NONE	NO	1.3	3"-3 WAY	YES	3"	YES	NO	N/A	SELF PRIME
20	CELESTE RD or E. CELESTE RD.			1450		N/A	4" DI	NONE	NO	0.02	4" GATE	YES	4"	DOESN'T SEAT PROPERLY	NO	N/A	SUB PUM
21	SARALAND AVE.	245	27	1044	9-3/4"	4" DI	4" X 6" DI	NONE	NO	0.62	4" 3 Way	YES	4"	YES	no	N/A	SELF PRIME
22	HWY. 43 N. or OLD TELEGRAPH	1475	35	952 (standby - 1022)	14-3/4"	8" DI	8" DI	NONE	NO	2.8	8" GATE	YES	8"	NO	NO	N/A	SELF PRIME
23	CEDAR ST.	725	41	1096	12-3/8"	6" DI	4" TO 6" TO 8" DI	NONE	NO	1.45	4" - 3 WAY PLUG	YES	4"	YES	NO	N/A	SELF PRIME
24	SMOKE AVE.	125	25	3395	4.0 (102mm)	N/A	2" STEEL INTO 4" DI	NONE	NO	1.08	4" GATE	YES	4" BALL CHECK	YES	NO	N/A	SUB PUM
25	FERRY AVE.			1450		N/A	4" -DI	NONE	NO	0.1	4" GATE	YES	4" BALL CHECK	YES	N/A	N/A	SUB PUM
26	MIGNIONETTE AVE.	350	85	1750	9-3/4"	6" TO 4" @ PUMP	6"	NONE	NO	2.2	4"	YES	4"	YES	NO	N/A	SELF PRIME
27	FAIRFIELD	52	33	3430	3-1/2"	N/A	3"	NONE	NO	0.89	3" GATE	YES	3" BALL CHECK	YES	NO	N/A	SUB PUM
28	SHELTON BEACH EXT.					N/A	6" DI	NONE	NO		6" GATE	YES	6"	YES	NO	N/A	SUB PUM
29	KALIFIELD					N/A	4" DI	NONE	NO	0.09	4" GATE	YES	4"	YES	NO	N/A	SUB PUM
30	TWIN LAKES	50	132	3430	6-1/4"	N/A	3" - PVC/DI	NONE	NO	0.29	3" GATE	YES	3"	YES	SEE NOTES	SEE NOTES	SUB PUMP
31	WEARTHERBY	150	40	1740	7-3/4"	N/A	4" DI	NONE	NO	0.09	4" GATE	YES	4"	YES	NO	N/A	SUB PUMP
32	SPANISH TRACE NEW	100	23	1710	5.35"	N/A	4" DI	NONE	NO	NOT IN SERVICE	4"	YES	4"	YES	SEE NOTES	SEE NOTES	SUB PUMP
33	WILLOW WALK	400	50	1760	8.97" (228 mm)	N/A	4" DI	NONE	NO	NOT IN SERVICE	4"-GATE	YES	4"	YES	NO	N/A	SUB PUMP

LIFT STATION NUMBER	LIFT STATION NAME	PUMP 2 MANUFACTURER	PUMP 2 MODEL #	PUMP 2 SERIAL NUMBER	PUMP 2 FLOW RATE (GPM)	PUMP 2 RATED TDH (FT)	PUMP 2 IMPELLER (RPM)	PUMP 2 IMPELLER MODEL / DIAM (IN)	PUMP 2 SUCTION PIPE SIZE (IN), MATERIAL	PUMP 2 DISCHARGE PIPE SIZE (IN), MATERIAL	PUMP 2 VIBRATION PRESENT	PUMP 2 NOISE PROBLEM	PUMP 2 AVE. DAILY RUN TIME	PUMP 2 SUCTION VALVE TYPE, SIZE (IN)	PUMP 2 SUCTION VALVE OPERATING OK?	PUMP 2 DISCHARGE VALVE TYPE, SIZE (IN)	PUMP 2 DISCHARGE VALVE OPERATING OK?
1	**POLICE CLUB**	GORMAN RUPP	T4A3-B	933861 AM	200	40	1180	9.75	4" DI	6" DI	NO	NO	0.72	4	YES	4"	YES
2	**POPEYE'S or S. HWY 43**	FLYGHT	C-3067-267 IMP		52	33	3430	3-1/2" (90mm)	N/A	2" PVC	NO	NO	2.9	NO	N/A	1.5" PVC	YES
3	**PARK ST.**	GORMAN RUPP	T8A3-B	52365	1206	50	1047	14.75	8" DI	8" DI	8" DI	NO	1	NO	N/A	8" GATE	YES
4	**ZOOLAND OR EDGEFIELD**	ZOELLER	840				3450		N/A	1-1/2" PVC/GALV	NO	NO	2.14	NO	N/A	1-1/2" PVC/GALV	HANDLE MISSING
5	**FIRST AVE.**	GORMAN RUPP	T3A3-B	86-2432-AM	119	24	1035	8.75		4" DI	NO	NO	2.9	NO	N/A	4" - 3 WAY	YES
7	**SCOTT DR. or SHELTON BEACH EST.**	GORMAN RUPP	T4A3	663550-M-113-AX	260	27	1010	9-3/4"	4" DI	6"	NO	NO	10.1	NO	N/A	4" - GATE	YES
8	**JUBILEE DR.**	FLYGT	C-3085MT-436 IMP		80	24	1725	5.78 (147mm)	N/A	4" DI	NO	NO	0.26	NO	N/A	4" - GATE	YES
9	**EXXON STATION or SERVICE RD.**	FLYGT	CP-3127-481 IMP		100	92	1735	9.76 (248mm)	N/A	4" DI	NO	NO	1.1	NO	N/A	4" GATE	YES
10	**LAREDO DR.**	GORMAN RUPP	T3A-B-4	86-2438-AM	119	36	1243	8.75	3" DI	4" DI	NO	NO	0.64	NO	N/A	4" - 3WAY	YES
11	**CHASE DR.**	GORMAN RUPP	T-6A3-B	86-2437-AM	756	35	1048	12-3/8"	6"	6" TO 8" DI	NO	NO	2.79	NO	N/A	6" - 3 WAY	YES
12	**SPANISH TRACE DR.**	FLYGT	C-3152-434 IMP		960	42	1750	10.35"	N/A	8" DI	NO	NO	3.76	NO	N/A	8" GATE	YES
13	**OAK RIDGE**	HYDROMATIC	HPGR200		58 GPM @ 60 HZ OR 53 GPM @ 50 HZ	HZ (OR) 81' @ 50 HZ	2900 @ 50 HZ / 3450 @ 60 HZ	5.38" - 60 HZ (OR) 5.38"/4.25" - 50HZ	N/A	1-1/4"PVC	NO	NO	1.28	NO	N/A	1-1/4"PVC BALL	YES
14	**LANDFILL or W. CELESTE RD.**	FLYGT	CP-3085-438 IMP		Org-125gpm-440 Imp / Pd-88.3gpm-438 Imp	11	1670	5.83"	N/A	4" DI	NO	NO	0.29	NO	N/A	4" GATE	YES
15	**DEER RUN DR.**	GORMAN RUPP	T8A3-B	857494	1215	40	949	14.75	8" DI	10" DI	NO	NO	0.89	NO	N/A	8" GATE	YES
16	**FORREST AVE.**	GORMAN RUPP	T-4A3	M-116-AX	200	30	1030	9-3/4"	4" DI	6" DI	NO	NO	5.6	NO	N/A	4" GATE	YES
17	**GRAHM ST.**	GORMAN RUPP	T-4A3	M-115-AX	335	28.9	1073	9-3/4"	4" DI	6" DI	NO	NO	2.45	NO	N/A	4" GATE	YES
18	**DELISA DR.**	GORMAN RUPP	T-4A4	M-1062-AM 663563	125	21	841	9-3/4"	3" PVC	3" PVC	NO	SEE NOTES	1.95	NO	N/A	3" - 3WAY	YES
19	**CAMELOT DR.**	GORMAN RUPP	T-4A5	M-1063-AM 663540	150	27	972	9-3/4"	3" DI	3" DI	SEE NOTES	SEE NOTES	6.6	NO	N/A	3" - 3WAY	YES
20	**CELESTE RD or E. CELESTE RD.**	HOMA	DN-100				1450		N/A	4" DI	NO	NO	0.03	NO	N/A	4" GATE	YES
21	**SARALAND AVE.**	GORMAN RUPP	T-4A3-B	86-2436-AM	245	27	1044	9-3/4"	4" DI	4" X 6" DI	YES	YES	0.83	NO	N/A	4" - 3 WAY	YES
22	**HWY. 43 N. or OLD TELEGRAPH**	GORMAN RUPP	T8A3-B	86-249-AX	1475	35	952	14-3/4"	8" DI	8" TO 10" DI	NO	NO	3.5			8" GATE	YES
23	**CEDAR ST.**	GORMAN RUPP	T6A3-B	86-2439-AM	725	41	1096	12-3/8"	6" DI	4" TO 6" TO 8" DI	NO	NO	1.08	3-WAY PLUG	YES	N/A	N/A
24	**SMOKE AVE.**	FLYGHT	CP-3067-265 IMP		125	25	3395	4.0 (102mm)	N/A	2" STEEL TO 4" DI	NO	NO	1.13	NO	N/A	N/A	N/A
25	**FERRY AVE.**	HOMA	DN-100				1450		N/A	4" -DI	NO	NO	0.11	NO	N/A	4" GATE	YES
26	**MIGNIONETTE AVE.**	GORMAN RUPP	T4A3B	S 1842-AM	350	85	1750	9-3/4"	6" TO 4" @ PUMP	6" DI	NO	NO	2.8	4"	YES	4" - 3 WAY PLUG	YES
27	**FAIRFIELD**	FLYGHT	C-3067-267 IMP		52	33	3430	3-1/2"	N/A	3" DI	NO	NO	0.45	NO	N/A	3" GATE	YES
28	**SHELTON BEACH EXT.**	DAVIS EMU'S	DAVIS EMU'S						N/A	6" DI	NO	NO		NO	N/A	6" GATE	YES
29	**KALIFIELD**	DAVIS EMU'S	DAVIS EMU'S						N/A	4"-DI	NO	NO	0.08	NO	N/A	4" GATE	YES
30	**TWIN LAKES**	FLYGHT	M-3127.17		50	132	3430	6-1/4"	N/A	3" -DI/PVC	NO	NO	0.3	NO	N/A	3" GATE	YES
31	**WEARTHERBY**	FLYGHT	CP-3127-434 IMP		150	40		7-3/4"	N/A	4" DI	NO	NO	0.08	NO	N/A	4" GATE	YES
32	**SPANISH TRACE NEW**	FLYGHT	NP-3085-463 IMP		100	23	1710	5.35"	N/A	4" DI	NO	NO	NOT IN SERVICE	NO	N/A	4"	YES
33	**WILLOW WALK**	PUMPEX	K100 F-CA3228		400	50	1760	8.97" (228 mm)	N/A	4" DI	NO	NO	NOT IN SERVICE	NO	N/A	4" GATE	YES

INSPECTION AND EVALUATION OF LIFT STATIONS
CITY OF SARALAND
Project No. 111905.10

LIFT STATION NUMBER	LIFT STATION NAME	PUMP 2 CHECK VALVE TYPE, SIZE (IN)	PUMP 2 CHECK VALVE OPERATING OK?	PUMP 2 PRESSURE GAUGE?	PUMP 2 PRESSURE GAUGE OPERATING?	NUMBER OF PUMP MOTORS	MOTOR 1 (HP)	MOTOR 1 SPEED (RPM)	MOTOR 1 DRIVE TYPE	MOTOR 1 ENCLOSURE	FULL LOAD MOTOR 1 AMPS	MOTOR 1 FREQUENCY	MOTOR 1 VOLTS	MOTOR 1 FRAME	MOTOR 1 MANUFACTURER	MOTOR 1 MODEL NUMBER	MOTOR 1 SERIAL NUMBER	MOTOR 1 DIRECT DRIVE	MOTOR 2 (HP)	MOTOR 2 SPEED (RPM)	MOTOR 2 DRIVE TYPE
1	**POLICE CLUB**	4"	YES	YES	NO	2	10	1745	BELT	ODP	26.8	60	230	215T	GORMAN RUPP	F	92Y 03 606		10	1745	BELT
2	**POPEYE'S or S. HWY 43**	1.5" PVC	YES	NO	N/A	2	2	3430		SUBMERSIBLE	Start-43amp / Rated-8amp	60	230		FLYGHT				2	3430	
3	**PARK ST.**	8"	YES	NO	N/A	3	30	1762	BELT	OPEN DRIP PROOF	40	60	460	286T	GORMAN RUPP	F	6300615		30	1762	BELT
4	**ZOOLAND OR EDGEFIELD**	1-1/2"		NO	N/A	2	2	3450		SUBMERSIBLE	15/20	60	208/240		ZOELLER	I			2	3450	
5	**FIRST AVE.**	4"	YES	NO	N/A	2	3	1740	BELT	OPEN DRIP PROOF	82	60	230	182T	GORMAN RUPP	K			3	1740	BELT
7	**SCOTT DR. or SHELTON BEACH EST.**	4"	NO	NO	N/A	2	5	1740	BELT	OPEN DRIP PROOF	13	60	230	184T	GORMAN RUPP	J	51-303-063		5	1740	BELT
8	**JUBILEE DR.**	4"	YES	NO	N/A	2	2.2 (3)	1670 (1700)		SUBMERSIBLE	8.7	60	460		FLYGT	CP-3085MT	3085.092 98101 65		2.2 (3)	1670 (1700)	
9	**EXXON STATION or SERVICE RD.**	4"	YES	NO	N/A	2	10	1735		SUBMERSIBLE	Start-64amp / Rated-13amp	60	230		FLYGT				10	1735	
10	**LAREDO DR.**	4"	YES	NO	N/A	2	5	1730	BELT	OPEN DRIP PROOF	13	60	230	184T	GORMAN RUP	J	60020234		5	1730	BELT
11	**CHASE DR.**	6"	YES	NO	N/A	2	15	1760	BELT	TEFC	39.4	60	230	254T	GORMAN RUP	G			15	1760	BELT
12	**SPANISH TRACE DR.**	8"	YES	NO	N/A	2	20	1750		SUBMERSIBLE	Start-142amp / Rated-26amp	60	460 VAC		FLYGT				20	1750	
13	**OAK RIDGE**	1-1/4" BRASS	YES	NO	N/A	2	2	2900 @ 50 HZ / 3450 @ 60 HZ		SUBMERSIBLE	12.5 / 15	60 / 50	230		HYDROMATIC				2	2900 @ 50 HZ / 3450 @ 60 HZ	
14	**LANDFILL or W. CELESTE RD.**	4"	YES	NO	N/A	2	2.2 (3)	1670 (1700)		SUBMERSIBLE	Start-14amp / Rated-3.4amp	60	460		FLYGT				2.2 (3)	1670 (1700)	
15	**DEER RUN DR.**	8"	YES	NO	N/A	3	25	1767	BELT	OPEN DRIP PROOF	33.9	60	240	284T	GORMAN RUPP	G			25	1767	BELT
16	**FORREST AVE.**	4"	YES	NO	N/A	2	7-1/2"	1755	BELT	OPEN DRIP PROOF	22.2	60	230	213T	ALLIS CHALMERS	H			7.5	1755	BELT
17	**GRAHM ST.**	4"	YES	YES	NO	2	7-1/2"	1755	BELT	OPEN DRIP PROOF	22.2	60	230	213T	ALLIS CHALMERS	H			7.5	1755	BELT
18	**DELISA DR.**	3"	YES	NO	N/A	2	5	1750	BELT	OPEN DRIP PROOF	25	60	230	213T	MARATHON	H	1466089		5	1750	BELT
19	**CAMELOT DR.**	3"	YES	NO	N/A	2	5	1750	BELT	OPEN DRIP PROOF	25	60	230	213T	MARATHON	H	1436107		5	1750	BELT
20	**CELESTE RD or E. CELESTE RD.**	4" BALL CHECK	DOESN'T SEAT PROPERLY	NO	N/A	2		1450							HOMA					1450	
21	**SARALAND AVE.**	4"	YES	NO	N/A	2	5	1724	BELT	OPEN DRIP PROOF	12.9	60	230	184T	GORMAN RUPP	J			5	1724	BELT
22	**HWY. 43 N. or OLD TELEGRAPH**	8"	YES	NO	N/A	2	25	1760	BELT	ODP	34	60	240	284T	GORMAN RUPP	G	92Y 03 606		25	1767	BELT
23	**CEDAR ST.**	6" WAFER CHECK	YES	NO	N/A	2	20	1751	BELT	ODP	51.2	60	230	256T	GORMAN RUPP	G			20	1751	BELT
24	**SMOKE AVE.**		YES	NO	N/A	2	2	3395		SUBMERSIBLE	Start-14amp / Rated-2.4amp	60	460		FLYGHT				2	3395	
25	**FERRY AVE.**	4" BALL CHECK	YES	NO	N/A	2		1450							HOMA					1450	
26	**MIGNIONETTE AVE.**	4"	YES	NO	N/A	2	20	1750	BELT	ODP	54 ?	60	230	256T	SIEMENS ALLIS	1LA3256 - YR 1960	B97T00 19	BELT	20	1750	BELT
27	**FAIRFIELD**	3" BALL CHECK	YES	NO	N/A	2	2	3430		SUBMERSIBLE	Start-43amp / Rated-8amp	60	230		FLYGHT				2	3430	
28	**SHELTON BEACH EXT.**	6"	YES	NO	N/A	2	7.5			SUBMERSIBLE	22 / 60	60	230		DAVIS EMU				7.5		
29	**KALIFIELD**	4"	YES	NO	N/A	2	10.8			SUBMERSIBLE	65	60	230		DAVIS EMU				10.8		
30	**TWIN LAKES**	3"	YES	SEE NOTES	SEE NOTES	2	10 (7KW)	3430		SUBMERSIBLE	Start-134amp / Rated-38amp	60	230		FLYGHT				10 (7KW)	3430	
31	**WEARTHERBY**	4"	YES	NO	N/A	2	7.5.	1740		SUBMERSIBLE	Start-52amp / Rated-9.6amp	60	460		FLYGHT				7.5	1740	
32	**SPANISH TRACE NEW**	4"	YES	SEE NOTES	SEE NOTES	2	3	1710		SUBMERSIBLE	Start-24amp / Rated-4.5amp	60	460		FLYGHT				3	1710	
33	**WILLOW WALK**	4"	YES	NO	N/A	2	4.7	1760		SUBMERSIBLE	26	60	230		PUMPEX	F			10	1760	

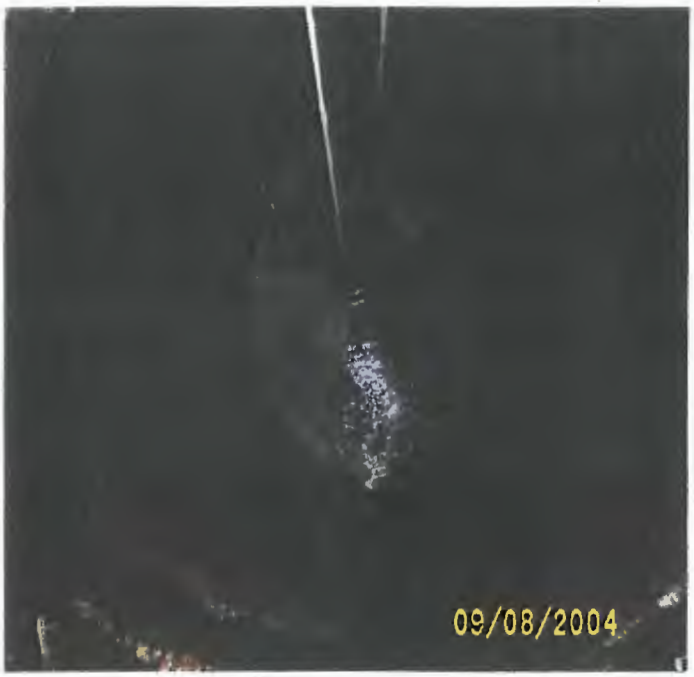
INSPECTION AND EVALUATION OF LIFT STATIONS
CITY OF SARALAND
Project No. 111905.10

LIFT STATION NUMBER	LIFT STATION NAME	MOTOR 2 ENCLOSURE	MOTOR 2 AMPS	MOTOR 2 FREQUENCY	MOTOR 2 VOLTS	MOTOR 2 FRAME	MOTOR 2 MANUFACTURER	MOTOR 2 MODEL NUMBER	MOTOR 2 SERIAL NUMBER	MOTOR 2 DIRECT DRIVE	TYPE OF CONTROLS	GREASE ON FLOATS	HIGH LEVEL ALARM (FROM BOTTOM OF WETWELL - FT)	PUMP 1 ON (FT)	PUMP 2 ON (FT)	ALL PUMPS OFF (FT)	CONTROL PANEL ENCLOSURE TYPE	CONTROL PANEL HEIGHT (TOP OF SLAB TO PANEL BOTTOM- FT)	ELAPSED TIME METERS PRESENT / OPERATING?	ALARM LIGHT PRESENT / OPERATING?
1	**POLICE CLUB**	ODP	26.8	60	230	215T	GORMAN RUPP	F	92Y 03 606		EPS / T-?	NO	6	3	4	1.5 / 2.0	3R	1' 2"	YES	YES
2	**POPEYE'S or S. HWY 43**	SUBMERSIBLE	Start-43amp / Rated-8amp	60	230		FLYGT				FLOATS	YES					NEMA 4X	2' 10"	YES	YES
3	**PARK ST.**	OPEN DRIP PROOF	40	60	460	286T	GORMAN RUPP	F	6300616		EPS	NO	5.5'	1.3	4.5	2.2	NEMA TYPE I	12"	YES	YES / ?
4	**ZOOLAND OR EDGEFIELD**	SUBMERSIBLE	15/20	60	208/240		ZOELLER	I			FLOATS	NO					NEMA 4X	41"	YES	YES
5	**FIRST AVE.**	OPEN DRIP PROOF	82	60	230	182T	GORMAN RUPP	K			EPS	NO	5.1	3.5	5.5	5	TYPE 4	14"	YES	YES
7	**SCOTT DR. or SHELTON BEACH EST.**	OPEN DRIP PROOF	13	60	230	184T	GORMAN RUPP	J	51-303-063		EPS	NO					TYPE 4	23"	YES	NO
8	**JUBILEE DR.**	SUBMERSIBLE	8.7	60	460		FLYGT	CP-3085MT	3085.092 98101 65		FLOATS	NO					NEMA 4X	14"	YES	YES
9	**EXXON STATION or SERVICE RD.**	SUBMERSIBLE	Start-64amp / Rated-13amp	60	230		FLYGT				FLOATS	NO					NEMA 4X	32"	YES	YES
10	**LAREDO DR.**	OPEN DRIP PROOF	13	60	230	184T	GORMAN RUPP	J	60020234		EPS	NO	6.2	4.1	5.4	2.8	NEMA- B	15"	YES	YES
11	**CHASE DR.**	TEFC	39.4	60	230	254T	GORMAN RUPP	G			EPS		6.1	2.4	3				YES	YES
12	**SPANISH TRACE DR.**	SUBMERSIBLE	Start-142amp / Rated-26amp	60	460 VAC		FLYGT				FLOATS	NO					NEMA TYPE 4	42"	YES	YES
13	**OAK RIDGE**	SUBMERSIBLE	12.5 / 15	60 / 50	230		HYDROMATIC				FLOATS	NO					NEMA 4X	33"	YES	YES
14	**LANDFILL or W. CELESTE RD.**	SUBMERSIBLE	Start-14amp / Rated-3.4amp	60	460		FLYGT				FLOATS	YES					NEMA 4X	29"	YES	NO
15	**DEER RUN DR.**	OPEN DRIP PROOF	33.9	60	240	284T	GORMAN RUPP	G			EPS	NO	8'	3	4	1.9	3R	12"	YES	YES / ?
16	**FORREST AVE.**	OPEN DRIP PROOF	22.2	60	230	213T	ALLIS CHALMERS	H					6'	3.2'	4.3'	3.1'	3R	47"	YES	NO
17	**GRAHM ST.**	OPEN DRIP PROOF	22.2	60	230	213T	ALLIS CHALMERS	H			D-152		5 / 5.5	2.5 /	3 /	1 / 1.25	3R	22"	YES	NO
18	**DELISA DR.**	OPEN DRIP PROOF	25	60	230	213T	MARATHON	H	1165225		CANDY CANE T-DICES	NO						14"	YES	NO
19	**CAMELOT DR.**	OPEN DRIP PROOF	25	60	230	213T	MARATHON	H	1165224		EPS	NO						14"	YES	NO
20	**CELESTE RD or E. CELESTE RD.**	SUBMERSIBLE					HOMA				FLOATS	NO						60"	YES	YES
21	**SARALAND AVE.**	ODP	12.9	60	230	184T	GORMAN RUPP	J			EPS	NO	6.1				NEMA- B	14"	YES	YES
22	**HWY. 43 N. or OLD TELEGRAPH**	ODP	33.9	60	240	284T	GORMAN RUPP	G	92Y 03 606		AIR BELL	NO	6.9	3.5	5	1.9	NEMA TYPE I	13"	YES	NO
23	**CEDAR ST.**	ODP	51.2	60	230	256T	GORMAN RUPP	G					6	3.6	4.5	1.8	3R	9"	YES	YES
24	**SMOKE AVE.**	SUBMERSIBLE	Start-14amp / Rated-2.4amp	60	460		FLYGHT				FLOATS	YES					NEMA 4X		YES	YES
25	**FERRY AVE.**	SUBMERSIBLE					HOMA				FLOATS	NO					3R	5"	YES	YES
26	**MIGNIONETTE AVE.**	ODP		60	230	256T	GORMAN RUPP	G		BELT	EPS ? / T-?	NO	5.8	3.2	3.9	2.8	NEMA 4X	2' 2"	YES	YES / ?
27	**FAIRFIELD**	SUBMERSIBLE	Start-43amp / Rated-8amp	60	230		FLYGHT				FLOATS	YES					NEMA 4X	37"	YES	YES
28	**SHELTON BEACH EXT.**	SUBMERSIBLE	22 / 60	60	230		DAVIS EMU				FLOATS	NO					NEMA 4X	40"	YES	YES
29	**KALIFIELD**	SUBMERSIBLE	65	60	230		DAVIS EMU				FLOATS	NO	6.2	3.3	4.8	2.6	NEMA 4X	36"	YES	YES
30	**TWIN LAKES**	SUBMERSIBLE	Start-134amp / Rated-38amp	60	230		FLYGHT				D-152	YES	3.75	2.5	3.5	1	NEMA 4X	18"	YES	YES
31	**WEARTHERBY**	SUBMERSIBLE	Start-52amp / Rated-9.6amp	60	460		FLYGHT				D-152	NO	3	2	2.75	0.7	NEMA 4X	28"	YES	YES
32	**SPANISH TRACE NEW**	SUBMERSIBLE	Start-24amp / Rated-4.5amp	60	460		FLYGHT				D-152	NO					NEMA 4X	39"	YES	YES
33	**WILLOW WALK**	SUBMERSIBLE	26	60	230		PUMPEX	F			FLOATS	NO	7.5		3.1		NEMA 4X	32"	YES	YES

INSPECTION AND EVALUATION OF LIFT STATIONS
CITY OF SARALAND
Project No. 111905.10

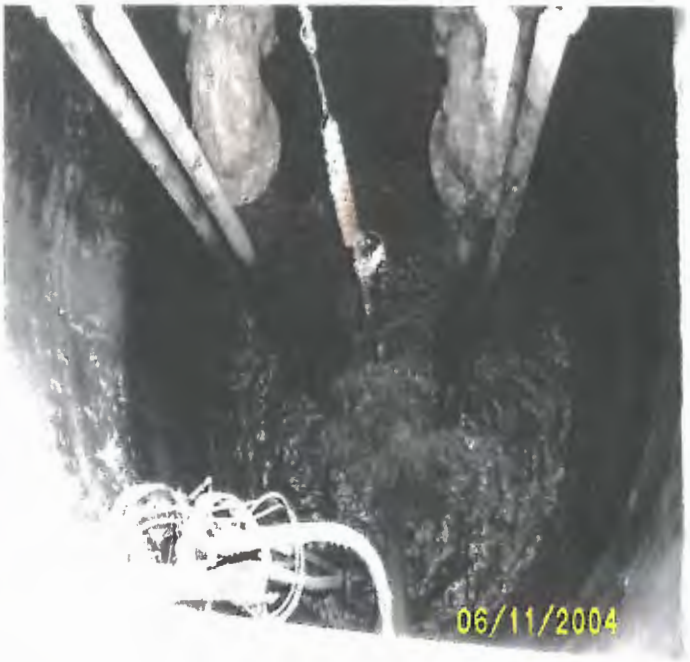
LIFT STATION NUMBER	LIFT STATION NAME	CONTROL PANEL HEATER	EVIDENCE OF SHORTS AND SPARKS?	CONTROL PANEL LOCK PRESENT?	ELECTRICAL POWER SOURCE	SERVICE VOLTS	PHASE	UTILITY SERVICE CONNECTION	METER LOCATION	SITE LIGHT PRESENT	INTERIOR BUILDING LIGHTING?	DRYWELL INTERIOR LIGHTING?	AIR RELEASE VALVE OPERATING?	FORCE MAIN SIZE (IN)	FORCE MAIN MATERIAL	FORCE MAIN APPROX. LENGTH (FT)	FORCE MAIN DISCHARGE TYPE	FORCE MAIN DISCHARGE LOCATION
1	**POLICE CLUB**	NO	NO	OVER ENCLOSURE	YES	230	3	POLE	POLE	NO	NO		N/A	6"	DI		N/A	MH @ WWTP
2	**POPEYE'S or S. HWY 43**	NO	NO	YES	YES	230	1	POLE	POLE	NO	N/A	N/A	NO	2"	PVC	+/- 879'	N/A	MH @ TRAX TIRE
3	**PARK ST.**	NO	NO	NO	YES	460	3	POLE	(SE) CORNER OF BLDG		YES			10"	PVC	4160'	N/A	MH @ 2ND AVENUE
4	**ZOOLAND OR EDGEFIELD**	?	NO	NO	YES	120	1	UNDER GROUND	ON RACK	NO	N/A	N/A	N/A	1-1/2"	PVC		N/A	
5	**FIRST AVE.**	NO	NO	NO	YES	230	3	POLE / OH	POLE	NO	NO	NO	NO	4"			N/A	
7	**SCOTT DR. or SHELTON BEACH EST.**	NO	NO	NO	YES	230	3	POLE / OH	(SE) CORNER OF BLDG.	NO	YES	NO	NO	6"			N/A	
8	**JUBILEE DR.**		NO	NO	YES	460	3	POLE / OH	POLE	NO	N/A	N/A	N/A	4"	PVC		N/A	
9	**EXXON STATION or SERVICE RD.**	NO	NO	NO	YES	230	3	POLE / OH	POLE	YES	N/A	N/A	N/A	4"			N/A	
10	**LAREDO DR.**					230	3	POLE / OH	POLE	NO	NO	N/A	N/A	4"	PVC		N/A	
11	**CHASE DR.**	NO	NO	NO	YES	230	3	UNDER GROUND	POST	NO	NO	N/A	N/A	8"			N/A	
12	**SPANISH TRACE DR.**	NO	YES	NO	YES	460 VAC	3	POLE	POLE	NO		N/A		8"			N/A	
13	**OAK RIDGE**		NO	NO	YES	230	1	OH/POLE	ON POLE	YES - STREET LIGHT	N/A	N/A	N/A	1-1/2" OR 2"	PVC		N/A	
14	**LANDFILL or W. CELESTE RD.**	NO	NO	NO	YES	460	3	OH/POLE	ON POLE	NO	N/A	N/A	N/A	4"	PVC			
15	**DEER RUN DR.**	NO	NO	NO	YES	240	3	POLE TO BLDG	ON BLDG			N/A		10"	PVC	+/- 2125	N/A	MH @ WHIGHAM ST
16	**FORREST AVE.**	NO	NO	NO	YES	230	3	POLE TO BLDG	ON BLDG	NO	YES	N/A		6"			N/A	
17	**GRAHM ST.**	NO	NO	NO	YES	230	3	POLE TO BLDG	ON BLDG	NO	YES	N/A		6"				
18	**DELISA DR.**		NO	NO	YES	230	1	UNDER GROUND	POLE	NO	NO	N/A	NO	3"	PVC		N/A	
19	**CAMELOT DR.**		NO	NO	YES	230	1	UNDER GROUND	THE POLE ACROSS ST OF LS	NO	NO	N/A	NO	3"	PVC		N/A	
20	**CELESTE RD or E. CELESTE RD.**		NO	NO	YES			POLE / OH	POLE	NO				4"				
21	**SARALAND AVE.**		NO	NO	YES	230	3	POLE / OH	POLE	NO	NO			6"			N/A	
22	**HWY. 43 N. or OLD TELEGRAPH**	NO	NO	NO	YES	240	3	POLE	(NE) SIDE OF BLDG	MOUNTED OUTSIDE BLDG.	YES	N/A	N/A	10"	PVC	1500	N/A	MH @ NORTON AVE
23	**CEDAR ST.**	NO	NO	NO	YES	230	3	POLE	POLE	NO	NO	N/A	N/A	8"	PVC	3022		MH @ BAYOU SARA
24	**SMOKE AVE.**	NO	NO	YES	YES	230	3	POLE	POLE	YES	N/A	N/A	N/A	4"	DI	692	N/A	MH @ SMOKE AVE
25	**FERRY AVE.**	NO	NO	YES	YES			POLE	POLE	NO	N/A	N/A	N/A	4"	PVC	1220		MH @ FERRY JUNIPER
26	**MIGNIONETTE AVE.**	NO	NO	NO	YES	230	3	POLE	POLE	NO	NO	N/A	N/A	6"	DI	+/- 2700	N/A	MH @ WWTF
27	**FAIRFIELD**	NO	NO	YES	YES		1	POLE	POLE	N/A	N/A	N/A	N/A	3"	DI	1556	N/A	SMOKE AVE L.S.
28	**SHELTON BEACH EXT.**	YES	NO	NO	YES	230	3	POLE / OH	POLE	NO	N/A	N/A	N/A	6"			N/A	
29	**KALIFIELD**	YES	NO	NO	YES	230	SINGLE W/ ADD-A-PHASE	U/GROUND	CONTROL RACK	NO	N/A	N/A	N/A				N/A	
30	**TWIN LAKES**		NO	NO	YES		SINGLE W/ ADD-A-PHASE	U/GROUND	BRICK WALL/ SOUTH SIDE	NO	N/A	N/A	N/A	3"	PVC		N/A	CELESTE RD. FORCE MAIN
31	**WEARTHERBY**		NO	NO	YES		3	U/GROUND / POLE	POLE	NO	N/A	N/A	N/A	4"			N/A	
32	**SPANISH TRACE NEW**		NO	NO	YES		SINGLE W/ ADD-A-PHASE	U/GROUND	RACK MOUNT	NO	N/A	NO	N/A	4"				
33	**WILLOW WALK**		NO	NO	YES	230	3	U/GROUND	RACK MOUNT	NO	N/A	NO	N/A	4"			N/A	

LIFT STATION NO. 10 – LAREDO DRIVE



LIFT STATION NO. 11 – CHASE DRIVE

LIFT STATION NO. 12 – SPANISH TRACE DRIVE



LIFT STATION NO. 1 – POLICE CLUB

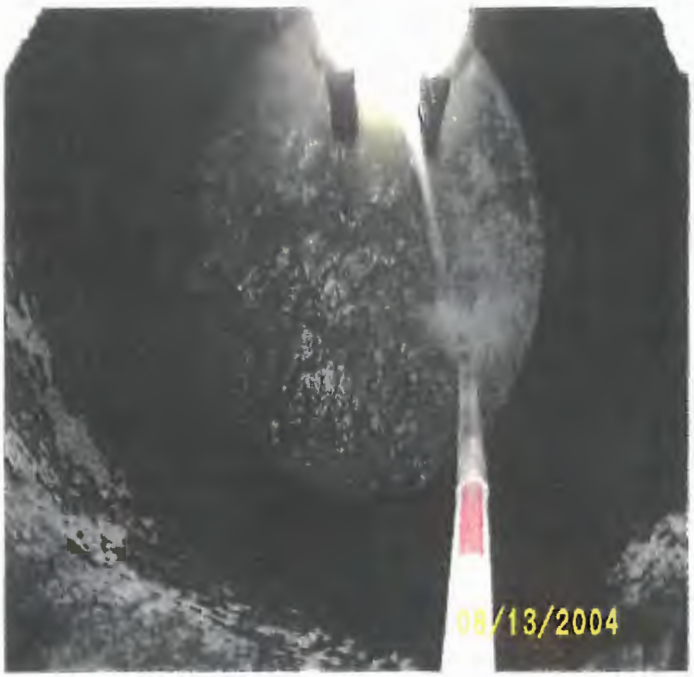
LIFT STATION NO. 2 – POPEYES / HWY43

LIFT STATION NO. 3 – PARK STREET

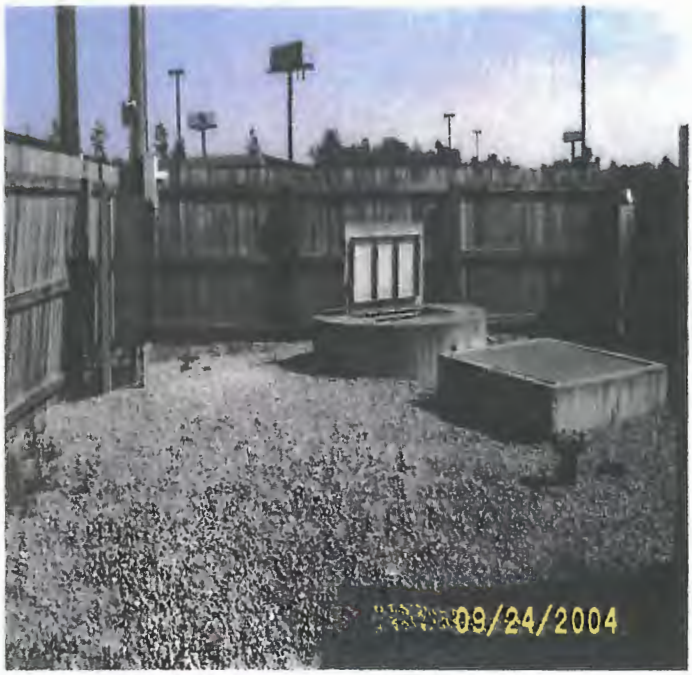
LIFT STATION NO. 4 – ZOOLAND / EDGEFIELD

LIFT STATION NO. 5 – FIRST AVENUE

LIFT STATION NO. 7 – SCOTT DRIVE / SHELTON BEACH EST.



LIFT STATION NO. 8 – JUBILEE DRIVE



LIFT STATION NO. 9 – EXXON STATION / SERVICE RD.

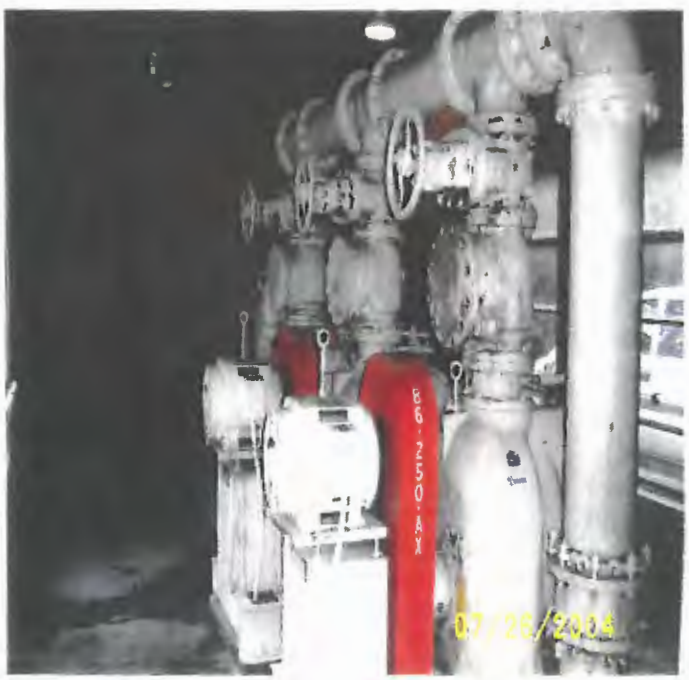
LIFT STATION NO. 33 – WILLOW WALK

LIFT STATION NO. 13 – OAK RIDGE

LIFT STATION NO. 14 – LANDFILL / CELESTE RD.

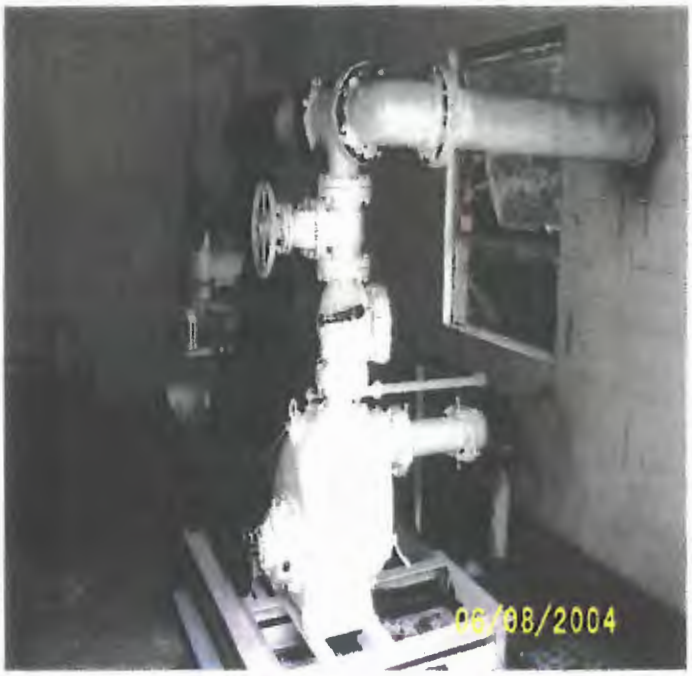
NO PICTURES AVAILABLE

LIFT STATION NO. 15 – DEER RUN DRIVE

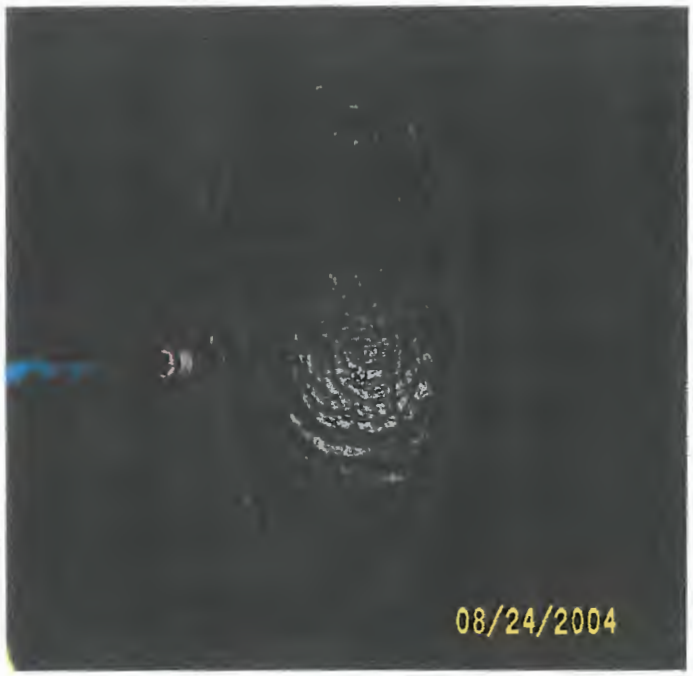


LIFT STATION NO. 16 – FORREST AVENUE

LIFT STATION NO. 17 – GRAHM STREET



LIFT STATION NO. 18 – DELISA DRIVE

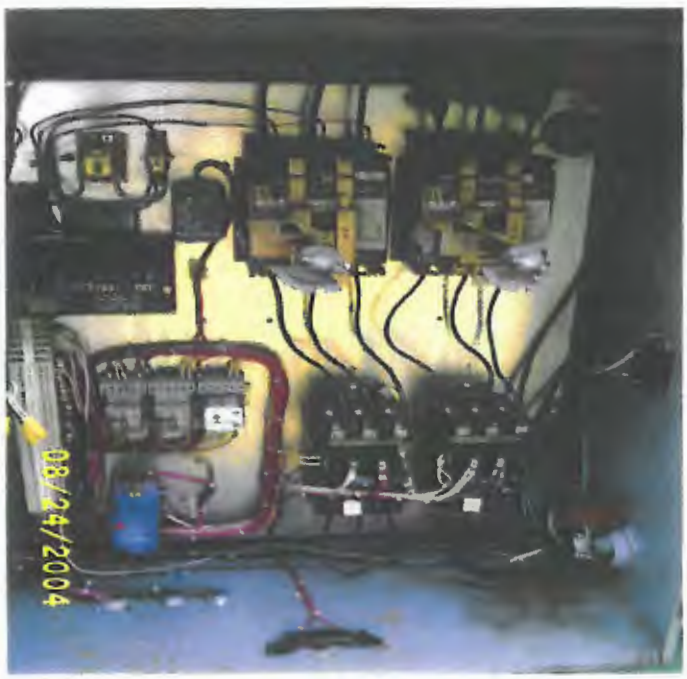


LIFT STATION NO. 19 – CAMELOT DRIVE

NO PICTURES AVAILABLE

LIFT STATION NO. 20 – CELESTE RD. / EAST CELESTE RD.

LIFT STATION NO. 21 – SARALAND AVENUE



LIFT STATION NO. 22 – OLD TELEGRAPH / HWY 43

LIFT STATION NO. 23 – CEDAR STREET

LIFT STATION NO. 24 – SMOKE AVENUE

LIFT STATION NO. 25 – FERRY AVENUE

LIFT STATION NO. 26 – MIGNIONETTE AVENUE

LIFT STATION NO. 27 – FAIRFIELD

LIFT STATION NO. 28 – SHELTON BEACH EXT.

LIFT STATION NO. 29 – KALIFIELD

LIFT STATION NO. 30 – TWIN LAKES

LIFT STATION NO. 31 – WEATHERBY

LIFT STATION NO. 32 – SPANISH TRACE NEW

"Quality Pumps Since 1939"

Product information presented here reflects conditions at time of publication. Consult factory regarding discrepancies or inconsistencies.

Zoeller Pump Co.

MAIL TO: P.O. BOX 16347 • Louisville, KY 40256-0347
SHIP TO: 3649 Cane Run Road • Louisville, KY 40211-1961
(502) 778-2731 • 1 (800) 928-PUMP • FAX (502) 774-3624

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SECTION: 2.50.040
FM1232
0603
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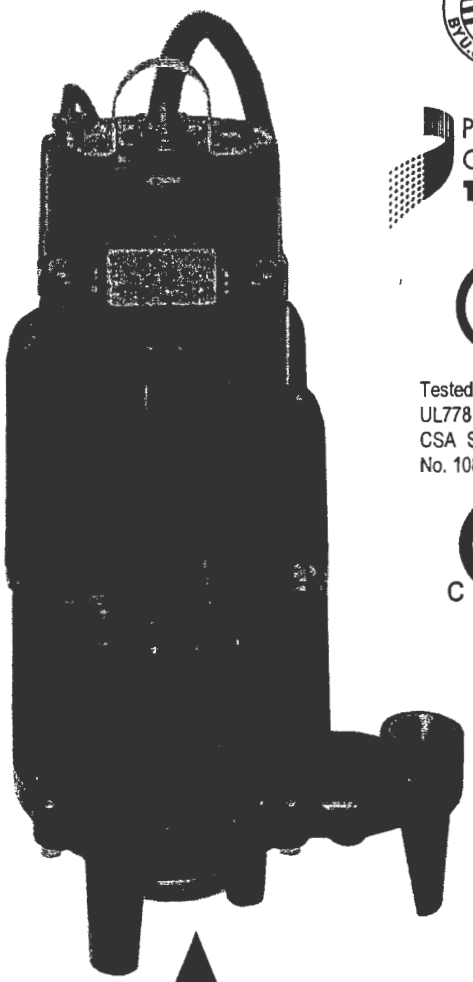
THE SHARK Series® 840 GRINDER PUMP

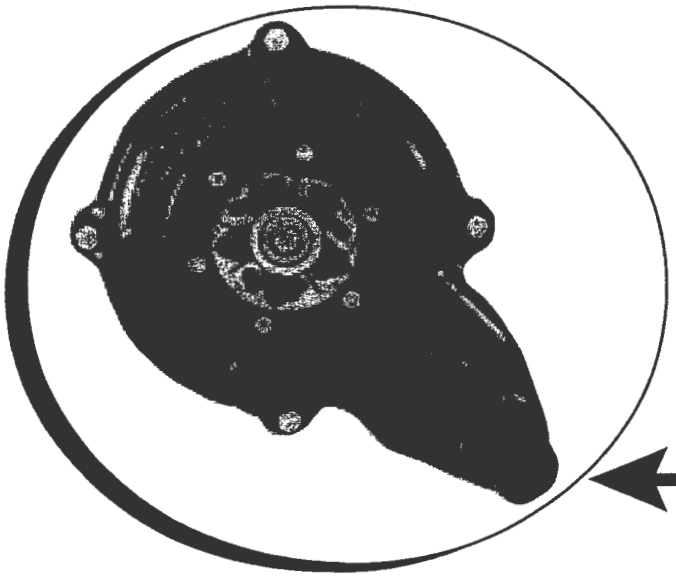
PUMP SYSTEMS AND REVERSING CONTROLS

840 SERIES



FEATURES:

- Durable Heavy Duty Finned Cast Iron Construction.
- 2 HP, 60 Hz, 3450 RPM.
- Oil-Filled - Hermetically Sealed Motor with Class F Windings.
- Hardened Stainless Steel Cutter Rotor and Disc.
- Cutters Protected from Abrasive Solids.
- Cutters can automatically alternate direction to enhance blade life and free hang-ups. (automatic or manually)
- Stainless Steel Screws, Bolts, and Lifting Bail.
- Easily adapts to many existing competitors' rail systems.
- Tandem seals with leak detection.
- Automatic Thermal Overload Protection (Single Phase)
- Thermal Sensor Protection (Standard on 3 Phase)
- Legs provide for free standing installation.
- Preassembled Systems Available.
- Corrosion resistant powder coated epoxy finish.



Quality Made by U.S. Craftsmen

POWDER COATED TOUGH™

Tested to UL Standard UL778 and Certified to CSA Standard C22.2 No. 108

Submersible Wastewater Pump Association SWPA MEMBER

Product may not be exactly as pictured.

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Submersible Wastewater Pump Association SWPA MEMBER

Model 840 Grinder Pump
ENGINEERING SPECIFICATIONS SHEET

QUALITY MADE America's Pump Co. BY U.S. CRAFTSMEN

APPLICATIONS

• Pumping Stations • Housing Developments • Pressure Sewers

SPECIFICATIONS

PUMP:

- Discharge Size - 1¼" NPT Vertical.
- Seals - dual mechanical carbon/rotary, ceramic/stationary, with Buna-N elastomers.
- Construction - Cast Iron ASTM A-48, Class 30, 30,000# tensile strength.
- Corrosion resistant powder coated epoxy finish.
- Bi-directional Stainless Steel cutter and plate hardened to Rockwell C 55-60.
- Attaching Hardware and Lifting Bracket - 304 stainless steel.
- "O" Ring Seals - Buna-N.
- Impeller - bi-directional - bronze impeller with top pump out vanes.
- Moisture probes and leads.

OPTIONAL:

☐ Additional cord length _____ ft. ☐ Rail systems
☐ Pre-packaged Systems

MOTOR:

- 2 HP, 3450 RPM.
- 1 Phase - 200/230 Volt with integral Thermal Overload.
- 3 Phase - 200/230/460/575 Volt with Thermal Sensor and leads.
- Stainless Steel Motor shaft.
- Stator - Class F insulation and lead wires. Nema B design.
- Housing - Cast Iron, oil-filled, protected by cooling fins.
- Ball Bearings - Dual high carbon chromium steel.
- Power Cable Length - 20'.

DIMENSIONS:

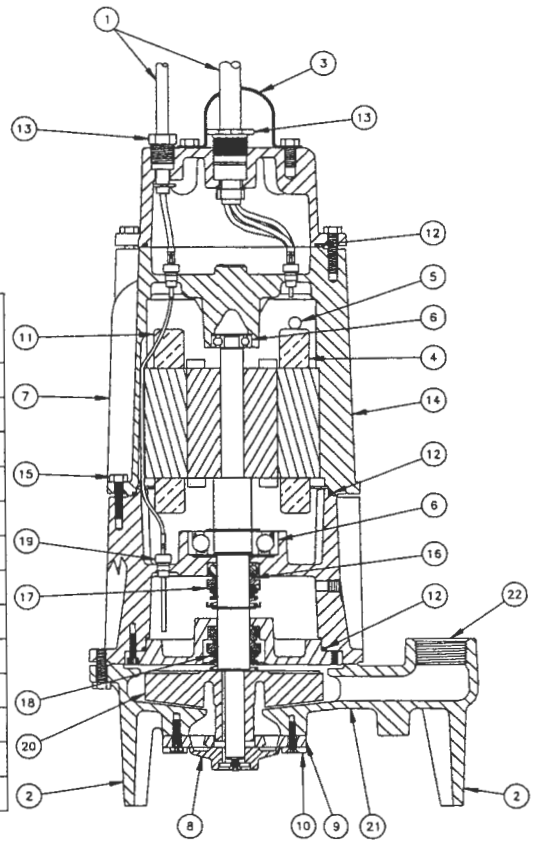
Height: 21 3/8"
Major Width: 14 5/8"
Weight: 135 lbs.

Tested to UL Standard UL778 & Certified to CSA Standard CSA C22.2 No.108.

TOTAL DYNAMIC HEAD/CAPACITY PER MINUTE SEWAGE

MODEL		840	
Feet	Meters	Gallons	Liters
5	1.5	45	170
10	3.1	45	170
20	6.1	45	170
30	9.1	44	167
40	12.2	42	159
50	15.2	36	136
60	18.3	30	114
70	21.3	23	87
80	24.4	16	61
90	27.4	10	38
100	30.5	3	11
Shut-off Head		104ft. (31.7m)	

009960A



ZEPA0374

FEATURES

EASY INSTALLATION: Motor is normally supplied with twenty foot of multi-conductor, power cable and control cable (1) as standard. Alternate cable lengths are available. Small overall motor dimensions, through use of NEMA-T frame electrics, reduce space requirements. Units have 3 legs (#2 on drawing) as an integral part of pump housing for free standing requirements. Pump and motor assembly can be easily lowered into position, without disturbing the piping, by use of a rail system. Pump is furnished with a stainless steel lifting bracket (3).

Long lasting internal components - Special Class F insulation system (4) rated for continuous duty in 130°F (54°C) liquids at 1.15 service factor. Thermal protection (5) standard on all motors. Conservatively rated locked antifriction ball bearings (6) for thrust loads. Finned motor housing (7) for greater heat dissipation, and cooler running motors.

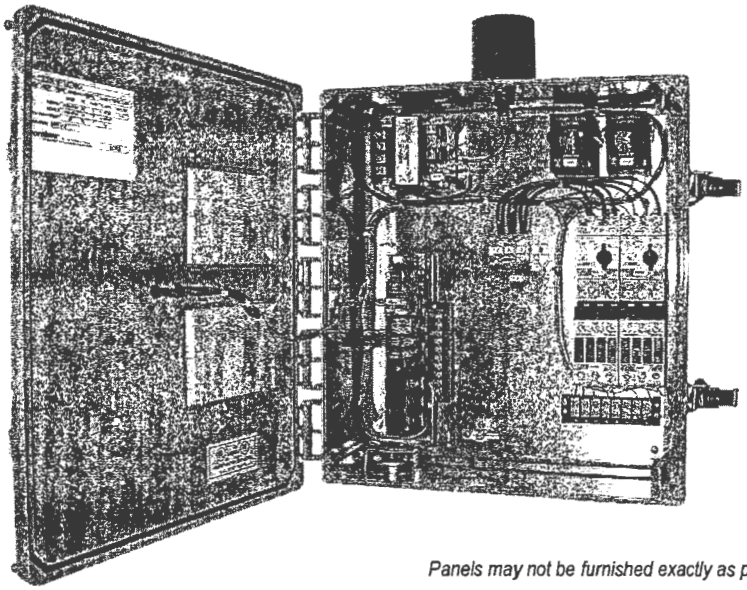
Reversing Cutter Action - (8) doubles cutter life vs. conventional grinders by allowing both sides of the cutter to work. Reversibility also allows the pump to clear troublesome jams and hangups thus reducing maintenance costs. Cutter and plate (9) can be resharpened to extend pump life. Both are made of high quality stainless steel and hardened to a value of 55-60 on a Rockwell C scale. Protective cutter ring (10) helps to extend cutter life. Capacitor Start/Capacitor Run motor (11) provides extra start and run torque for cutting.

Complete environmental protection - Buna-N O-rings (12) and heavy duty cord connectors (13) keep liquid from entering the motor assembly. Pump castings are constructed of Class 30 cast iron (14). Hardware (15) is stainless steel. Seal faces (16) are carbon and ceramic for corrosion resistance. Inner (17) and outer seals (18) provide complete protection for motor internals. Both have stainless steel and Buna-N components. Silicon carbide seal faces are available for those extra abrasive applications. Two moisture sensing probes (19) warn of impending seal failure. Vent hole helps prevent air locking. Balanced bi-directional bronze vortex impeller (20) with top pump out vanes for seal protection is keyed and bolted to the shaft. Concentric case (21) with center discharge reduces radial loading for longer bearing and seal life. All pumps come with 1¼" NPT female vertical discharge (22). Pump is designed to provide same performance in both a clockwise and counter-clockwise rotation of impeller/cutter assembly.

Model 840 Control Panels
ENGINEERING SPECIFICATIONS SHEET

Standard Features:

NEMA-4X Thermoplastic Enclosure
UL Labeled
Automatic Reversing Circuitry
Simplex or Duplex Configuration
Control Side Fuses
Control On/Off Switch
Lockable Hasp
HOA Switch(es)
I.E.C. Rated Motor Contactor(s)
120 Volt Control Circuit
Pump Circuit Breaker(s) or Motor Overload
Protection w/ Disconnect (3 Phase)
External High Water Alarm Light
Seal Fail Indication Light
Green Pump Run Light(s)
Capacitors and Start Relay (1 Phase)
Alternating Circuit Board (Duplex)
Float Status Indicator Lights



Panels may not be furnished exactly as pictured

Standard Options:

☐Audible Alarm w/ Test Switch
☐Flasher for High Water Alarm Light
☐Manual High Water Alarm Reset
☐Seal Fail Relay w/ Indication
☐Dry Auxilliary Contacts
☐Elapsed Time Meter(s)
☐Anti-Condensation Heater
☐Redundant Off
☐Event Counter(s)
☐Dead Front Enclosure
☐Lightning Arrestor
☐Intrinsically Safe Relays

For other options, consult factory.

CONTROL PANEL:

The control panel is housed in a NEMA 4X enclosure and is of a ☐ simplex design which controls a single pump from a 3-float system or a ☐ duplex design which controls two pumps in an alternating lead/lag cycle sequence from a ☐ 3 or ☐ 4-float system. The panel contains the required starting, control, & alarm circuits. Rated motor starters and circuit breakers are furnished for each pump. The 115 volt control circuit has short circuit protection. The panel features pump run pilot light(s) and pump selector switches. The panel is equipped with circuit(s) which automatically reverses the direction of the cutter blades after each pumping cycle. A seal leak indicator light is furnished as well as a thermal cut-out connection for 3 phase systems. A padlock hasp is provided. High water conditions shall be indicated by a visible light with polycarbonate cover. Numbered terminal strips are furnished to speed the connection of each pump. A wiring schematic and trouble shooting guide are included with each panel. The panel is UL listed and labeled as such.

For additional information on Zoeller Grinder pumps, refer to catalog on Performance information, FM1235; Prepackaged systems, FM1232; Guide specifications, FM1240; Replacement parts list, FM1308; and Installation and Service instructions, FM1239.

					SIMPLEX CONTROL PANEL			DUPLEX CONTROL PANEL		
MODEL	VOLTS	PH	AMP	PANEL AMP RANGE	P/N	WGT.	DIMENSIONS	P/N	WGT.	DIMENSIONS
E840	230	1	17.2	20 Max.	10-0393	15	14" x 12" x 6"	10-0397	21	18" x 16" x 9"
I840	200/208	1	20.0	20 Max.	10-0393	15	14" x 12" x 6"	10-0397	21	16" x 14" x 6"
F840	230	3	10.8	9.0-12.5	10-0394	18	12" x 10" x 6"	10-0398	21	14" x 12" x 6"
J840	200/208	3	12.3	9.0-12.5	10-0394	18	12" x 10" x 6"	10-0398	21	14" x 12" x 6"
G840	460	3	5.5	4.5-6.3	10-0395	18	12" x 10" x 6"	10-0399	21	16" x 14" x 6"
BA840	575	3	4.5	4.5-6.3	10-0396	18	12" x 10" x 6"	10-0400	21	16" x 14" x 6"

http://www.zoeller.com

ZOELLER PUMP CO.

MAIL TO: P.O. BOX 16347
Louisville, KY 40256-0347
SHIP TO: 3649 Cane Run Road
Louisville, KY 40211-1961
(502) 778-2731 • 1 (800) 928-PUMP
FAX (502) 774-3624

Manufacturers of . .
"Quality Pumps Since 1939"

GRINDER SYSTEMS

(A) GRINDER MODEL - 840 2 HP, 1¼" N.P.T. VERTICAL DISCHARGE - 20 FT. CORDS

P/N	WGT.	MODEL	VOLTS	PH	AMP
☐ 840-0004	137	E840	230	1¤	17.2
☐ 840-0005	137	I840	200/208	1¤	20.0
☐ 840-0006	132	F840	230	3	10.8
☐ 840-0007	132	J840	200/208	3	12.3
☐ 840-0008	132	G840	460	3	5.5
☐ 840-0009	132	BA840	575	3	4.5

¤ Single phase units require a set of capacitors and relay starting components.

STANDARD FEATURES:

- Reversible Cutter Action Manual/Auto**
- 1¼" NPT Vertical Discharge
- Carbon/Ceramic Tandem Seals
- Thermal Sensors** (O.L. on 1PH)
- Moisture Probes**
- Balanced Bronze Impellers
- Stainless Steel Cutter and Plate (R-C 55-60)
- Stainless Steel Shaft
- Stainless Steel Lifting Bracket
- Corrosion resistant powder coated epoxy paint
- 20 ft. Power Cord - 20 ft. Sensor Cord
- UL Listed

OPTIONS:

☐ Extended Cord Lengths
☐ Anti-Siphon Device

**Requires Circuit in Control Panel to Function

(B) CONTROL PANELS

	SIMPLEX NEMA 4X		DUPLEX NEMA 4X	
MODEL	P/N	WGT.	P/N	WGT.
E or I 840	☐ 10-0393	15	☐ 10-0397	21
E or I 840	☐ 10-0420*	17	☐ 10-0512*	23
F or J 840	☐ 10-0394	18	☐ 10-0398	21
G840	☐ 10-0395	18	☐ 10-0399	21
BA840	☐ 10-0396	18	☐ 10-0400	21

*With Audible and Visible High Water Alarm

(B) CONTROL PANEL

STANDARD FEATURES:

- Nema 4X Outdoor Rating
- Starting, Control, and Alarm Circuits
- Circuit Breaker and Rated Motor Contactor (single phase)
- Capacitors and Motor Starting Relay on Single Phase
- Motor Protective Switch (circuit breaker/adj overloads) and Rated Motor Contactor (three phase)
- Alternating Circuit (Duplex)
- Automatic Reversing Circuit
- High Water Alarm Light
- Internal Seal Leak Light
- HOA Switches and Pilot Light(s)
- Terminal Strips
- Thermal Cut-Out Circuit (three phase only)
- Padlock Hasp
- Capacitors/Start Relay (single phase)
- UL Listed

OPTIONS:

☐ Audible High Water Alarm
☐ Flasher for High Water Alarm Light
☐ Manual Reset of High Water Alarm
☐ Intrinsically Safe Relays
☐ Manual Reversing Switch
☐ Elapsed Time Meters
☐ Dry Auxiliary Contact
☐ For other options, consult factory

Maximum Temperature for Sewage 130° F (54° C)

(C) VARIABLE LEVEL FLOAT SWITCHES

INDOOR SYSTEM

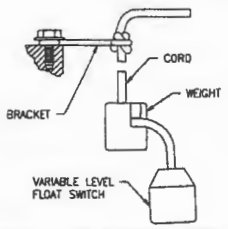
3 Switches and Weights without Brackets
☐ P/N 10-0347 WGT. 9.5

4 Switches and Weights without Brackets
☐ P/N 10-0348 WGT. 13.0

OUTDOOR SYSTEM

3 Switches with Weights and Brackets
☐ P/N 10-0329 WGT. 10.0

4 Switches with Weights and Brackets
☐ P/N 10-0330 WGT. 14.0



SK1328

SIMPLEX REVERSING CONTROL BOXES*

	AUTOMATIC		MANUAL	
MODEL	P/N	WGT.	P/N	WGT.
E840	☐ 10-0352	8	☐ 10-0360	7
I840	☐ 10-0352	8	☐ 10-0360	7
F840	☐ 10-0353	6	☐ 10-0361	5
J840	☐ 10-0353	6	☐ 10-0361	5
G840	☐ 10-0354	12	☐ 10-0362	5
BA840	☐ 10-0355	12	☐ 10-0362	5

*These control boxes consist of the reversing mechanisms and capacitors (1PH units) only. They will not control pumps. Refer to Section B for complete system controls. For duplex applications use two simplex reversing control boxes. (For pump prefix identification see News & Views 0052)

FOR GRINDER PUMP ONLY
Single Phase Pump Requires Two Capacitors and a Motor Starting Relay Factory Mounted in a Nema 4X starter pack.

☐ P/N 10-0379 WGT. 7

Two Capacitors and Motor Starting Relay shipped loose to be mounted in existing panel.

☐ P/N 10-0380 WGT. 2

THE MODEL 840 GRINDER WILL FIT ON MYER'S RAIL
P/N RWG125 (1 Required) & RWGD125 (2 required) by using Zoeller's Adapter.

☐ P/N 10-0381 WGT. 3

Hydro-O-Matic's Hydr-O-Rail® bolts directly to Model 840 by using base adapter.

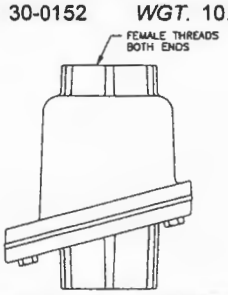
Specify when ordering.

(D) CHECK VALVES

1¼" Cast Iron NPT Female
☐ *P/N* 30-0163 *WGT.* 7.5

1½" Cast Iron NPT Female
☐ *P/N* 30-0164 *WGT.* 7.5

2" Cast Iron NPT Female
☐ *P/N* 30-0152 *WGT.* 10.0



SK1330

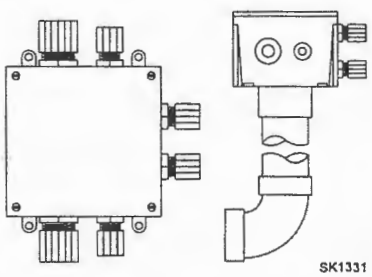
(E) JUNCTION BOXES - TYPE 4X

SIMPLEX

5 Holes with Seals for (1) Power Cord, (1) Sensor Cord, (3) Float Switch Cords.
☐ *P/N* 10-0331 *WGT.* 2.5 3 Float System

DUPLEX

8 Holes with Seals for (2) Power Cords, (2) Sensor Cords, (3 or 4) Float Switch Cords.
☐ *P/N* 10-0332 *WGT.* 2.5 3 Float System
☐ *P/N* 10-0421 *WGT.* 2.5 4 Float System


SK1331

(F) INDOOR BASIN, COVER, AND HARDWARE - PREPACKAGED STANDARD EQUIPMENT

- Fiberglass Basin
- Rust Resistant Steel Cover(s) (epoxy coated only)
- Inspection Plate
- Individual Pump Covers
- 3" Adaptaflex Vent Seal
- 1¼" Adaptaflex Discharge Pipe Seal(s)
- Cord Seal(s)
- 1-4" C.I. Hub with Insert for 4" I.P.S. Inlet Pipe
- Pump Support Hardware
- 1¼" Check Valve(s)
- Ball Valve(s)

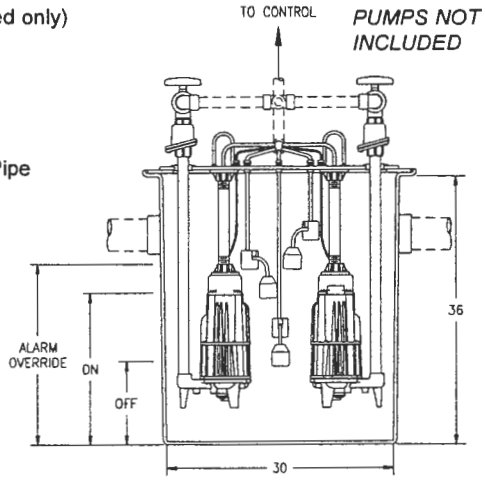
SIMPLEX

☐ 24" x 36" *P/N* 32-0005 *WGT.* 107

DUPLEX

☐ 30" x 36" *P/N* 32-0006 *WGT.* 154
3-Float System

☐ 30" x 36" *P/N* 32-0007 *WGT.* 154
4-Float System



SK1326

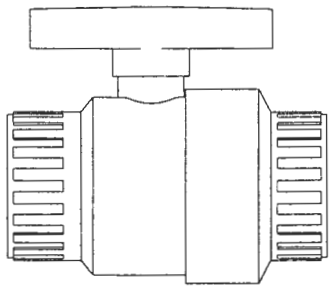
PUMPS ROTATED 90° TO SHOW FEATURES

(I) BALL VALVE

1¼" IPS
☐ *P/N* 30-0165 WGT. 2.0

1½" IPS
☐ *P/N* 30-0166 WGT. 2.0

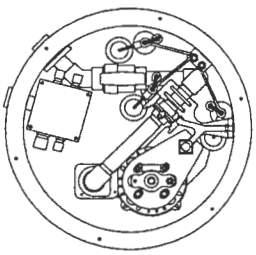
2" IPS
☐ *P/N* 30-0167 WGT. 2.5

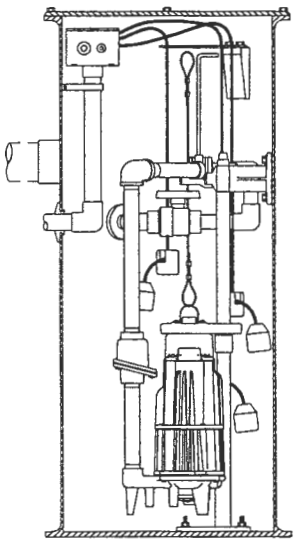


SK1333

(G) OUTDOOR BASIN, COVER, AND RAIL SYSTEM ASSEMBLIES - STANDARD EQUIPMENT

- Fiberglass Basin with Anti-flotation Ring
- 1¼" Galvanized pump discharge piping to disconnect
- 1¼" PVC Discharge Pipe from Disconnect
- 1¼" Adaptaflex Discharge Pipe Seal
- Stainless Steel Square Guide Rail
- 1' Pull Rod
- 8' SS Lifting Cable for basin depths to 84" (12' SS Lifting Cable for basin depths of 96")
- 1¼" PVC Ball Valve(s)
- 1¼" C.I. Check Valve(s)
- 1-4" C.I. Hub - Field Installed
- Fiberglass Cover





PUMP NOT INCLUDED

SIMPLEX

☐ 24" x 48"	*P/N* 33-0022	*WGT.* 204
☐ 24" x 60"	*P/N* 33-0023	*WGT.* 217
☐ 24" x 72"	*P/N* 33-0024	*WGT.* 231
☐ 24" x 84"	*P/N* 33-0057	*WGT.* 262
☐ 24" x 96"	*P/N* 33-0025	*WGT.* 275

DUPLEX

☐ 36" x 48"	*P/N* 33-0034	*WGT.* 364
☐ 36" x 60"	*P/N* 33-0035	*WGT.* 386
☐ 36" x 72"	*P/N* 33-0036	*WGT.* 469
☐ 36" x 84"	*P/N* 33-0059	*WGT.* 496
☐ 36" x 96"	*P/N* 33-0037	*WGT.* 522

OPTIONS: • All SS Fitted (Rail Supports)
• Larger Diameter or Deeper Basins (Allow for Overhead Clearance)

SK1607

(J) PULL RODS FOR SQUARE GUIDE RAIL SYSTEMS ONLY (Field Installed Systems)

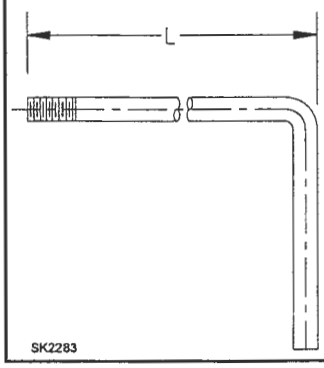
1 Ft. "L"
☐ *P/N* 39-0069 *WGT.* 0.5

2½ Ft. "L"
☐ *P/N* 39-0006 *WGT.* 1.0

3½ Ft. "L"
☐ *P/N* 39-0007 *WGT.* 1.5

4½ Ft. "L"
☐ *P/N* 39-0008 *WGT.* 1.5

5½ Ft. "L"
☐ *P/N* 39-0009 *WGT.* 2.0



SK2283

(H) RAIL SYSTEMS - (FIELD INSTALLED)

E-Z out Rail System for 1¼" pump discharges (Rail System discharge is 2" NPT male thread)

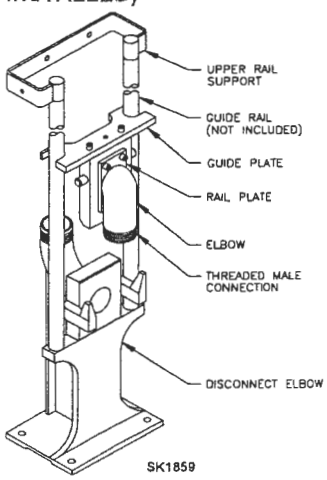
Galvanized Fitted
☐ *P/N* 39-0087 *WGT.* 43

Stainless Steel Fitted
☐ *P/N* 39-0088 *WGT.* 43

Intermediate Stabilizer Bracket for every 12' of depth.

Galvanized
☐ *P/N* 39-0089 *WGT.* 6.0

Stainless Steel
☐ *P/N* 39-0090 *WGT.* 6.0



SK1859

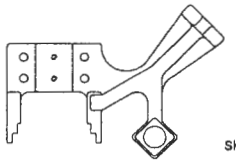
Square Guide Rail System for systems less than 96" deep)

BASIN DEPTH

☐ 48"	*P/N* 39-0054	*WGT.* 90.5
☐ 60"	*P/N* 39-0055	*WGT.* 94.5
☐ 72"	*P/N* 39-0056	*WGT.* 98.5

Fits both round and square basins
Includes Square Guide Rail

Basins over 72" deep require one additional angle arm bracket.
☐ *P/N* 39-0070 *WGT.* 11



SK1826

(K) SS LIFTING CABLE (Field Installed Systems)

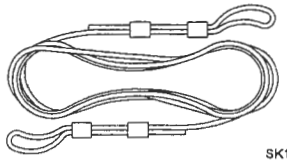
8 Ft.
☐ *P/N* 39-0031 *WGT.* 1.0

12 Ft.
☐ *P/N* 39-0032 *WGT.* 1.0

16 Ft.
☐ *P/N* 39-0033 *WGT.* 1.0

20 Ft.
☐ *P/N* 39-0034 *WGT.* 1.0

24 Ft.
☐ *P/N* 39-0035 *WGT.* 1.0



SK1335

PREPACKAGED AND JOB READY SYSTEMS

INDOOR

SIMPLEX		DUPLEX	
REQ.		**REQ.**	
1 Grinder	P/N _____ (A)	2 Grinders	P/N _____ (A)
1 Simplex Control Panel	P/N _____ (B)	1 Duplex Control Panel	P/N _____ (B)
1 Variable Level Fl. Sw. Assm.	P/N _____ (C)	1 Variable Level Fl. Sw. Assm.	P/N _____ (C)
1 Basin, Cover and Hardware	P/N _____ (F)	1 Basin, Cover and Hardware	P/N _____ (F)

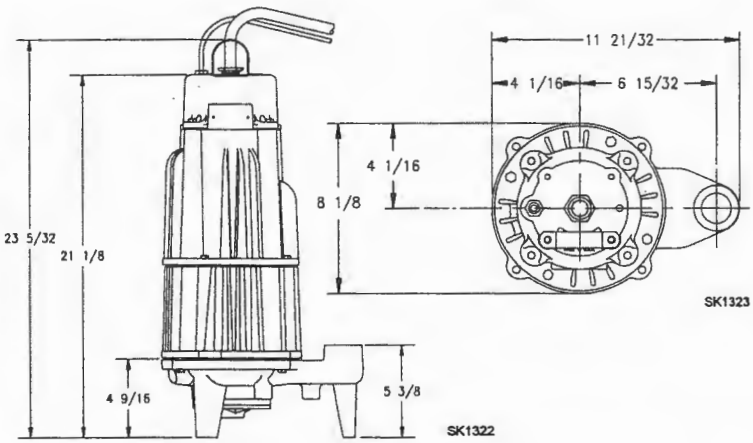
OUTDOOR

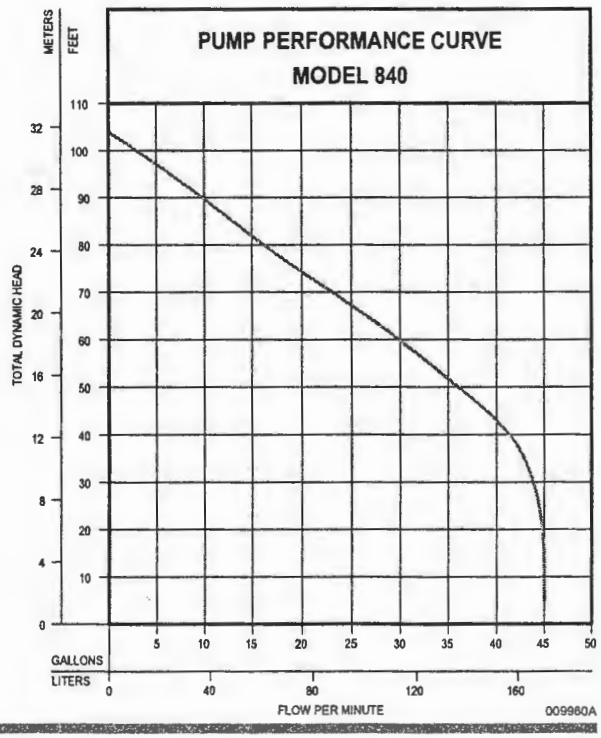
SIMPLEX		DUPLEX	
REQ.		**REQ.**	
1 Grinder	P/N _____ (A)	2 Grinders	P/N _____ (A)
1 Simplex Control Panel	P/N _____ (B)	1 Duplex Control Panel	P/N _____ (B)
1 Variable Level Fl. Sw. Assm.	P/N _____ (C)	1 Variable Level Fl. Sw. Assm.	P/N _____ (C)
1 J-Box	P/N _____ (E)	1 J-Box	P/N _____ (E)
1 Basin, Cover and Rail System	P/N _____ (G)	1 Basin, Cover and Rail System	P/N _____ (G)

FIELD MOUNT SYSTEMS

SIMPLEX	
REQ.	
1 Grinder	P/N _____ (A)
1 Simplex Control Panel	P/N _____ (B)
1 Variable Level Fl. Sw. Assm.	P/N _____ (C)
1 Junction Box	P/N _____ (E)
1 Rail System	P/N _____ (H)
1 Angle Arm/Intermediate Bracket*	P/N _____ (H)
1 Pull Rod**	P/N _____ (J)
1 S.S. Lifting Cable	P/N _____ (K)

DUPLEX	
REQ.	
2 Grinders	P/N _____ (A)
1 Duplex Control Panel	P/N _____ (B)
1 Variable Level Fl. Sw. Assm.	P/N _____ (C)
1 Junction Box	P/N _____ (E)
2 Rail Systems	P/N _____ (H)
2 Angle Arm/Intermediate Bracket*	P/N _____ (H)
2 Pull Rods**	P/N _____ (J)
2 S.S. Lifting Cables	P/N _____ (K)





** Required for basin depths over 72" (Square Guide Rail) and over 12' (E-Z Out Rail). Allow for overhead clearances.*

*** For Square Guide Rail only.*

Access Doors Available on Field Mount Systems - Consult Factory

Special Basin Configurations - Consult Factory

Junction Box Mounting & Assembly - Consult Factory

Manufacturers of . . .

"Quality Pumps Since 1939"

PUMPS THE PROS USE Zoeller Pump Co. Zoeller On Line

THE SHARK Series GRINDER PUMP

840 Automatic Reversing Grinder Pump Systems

Pump Systems and Reversing Controls

Standard Features:

- 2 HP, 60 cycle, 1 & 3 PH, 3450 RPM.
- 1-1/4" NPT Vertical discharge.
- Reversible Cutter Action Manual/Auto (requires circuit in control panel to function)
- Carbon/Ceramic Tantem Seals.
- Thermal Sensors on 3 PH requires circuit in control panel to function. 1 PH units have integral overload protection.
- Moisture Probes (requires circuit in control panel to function)
- Balanced Bronze Impellers.
- Stainless Steel Cutter Plate/Cutter.
- Stainless Steel Shaft.
- Stainless Steel Hardware.
- Brass test plugs.
- Enamel Paint
- 20' Power Cord and Sensor Cord.
- UL Listed.
    - **Options:**
    - Epoxy Paint
    - Silicon Carbide/Carbon Seal (s)
    - Long Cords (2 required).
    - Trimmed Impeller.
    - Stainless Steel Lifting Eye Bolt

Prepackaged and Job Ready Systems

Outdoor Requirements (Simplex):

For Simplex Field Mount Systems add to Simplex Outdoor Requirements:

- (1) Grinder See Model 840 Grinder.
- (1) Simplex Control Panel
- (1) Variable Level Float Switch Assembly
- (1) Junction Box
- (1) Basin, Cover and Rail System
- (1) Pull Rod
- (1) Stainless Steel Lifting Cable

For Duplex Outdoor Systems add to Simplex System:

- (1) Additional Grinder
- (1) Duplex Control Panel
- (1) Additional Pull Rod
- (1) Additional Stainless Steel Lifting Cable

Indoor Requirements (Simplex):

- (1) Grinder See Model 840 Grinder.
- (1) Simplex Control Panel
- (1) Variable Level Float Switch Assembly
- (1) Basin, Cover and Hardware

- (1) Rail System
- (1) Angle arm Bracket (required for basins over 72" deep)
- (1) Ball Valve

Field Mount System does not come with Basin and Cover.

For Duplex Field Mount Systems add to Duplex Outdoor Requirements:

- (2) Rail Systems
- (2) Angle arm Brackets (required for basins over 72" deep)
- (2) Ball Valves

Field Mount System does not come with Basin and Cover.

For Duplex Indoor Systems add to Simplex System:

- (1) Additional Grinder
- (1) Duplex Control Panel

View the Catalog Sheet for the 840 Simplex Grinder System,
or the Catalog Sheet for the 840 Outdoor Prepackage Rail System.
View the Installation Instructions or the Owners Manual for the 840 Series Pumps.
View the Guide Specifications for the 840 Series Pumps.
View the Product Features for the 840 Series Pumps.
View the Grinder Sizing and Selection worksheet for the 840 Series Pumps.
View the Parts List for Model 840. (Requires **Adobe Acrobat Reader 3.0 or Higher.**)

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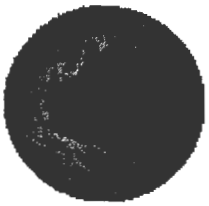
AutoCAD DWGS Click here to download available AutoCad sketches for these products.

"QUALITY PUMPS SINCE 1939"

Engineering & Tech Data

PUMPS THE PROS USE — ZOELLER PUMP CO. On Line



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Product Index | Utility/Dewatering & Effluent Pumps | Sewage/Waste Pumps | Grinder Pumps | Agricultural Pumps | Hi-Temp Pumps | Pedestal Pumps | Package Systems & Basins | Hazardous Environment Pumps | Home Improvement Products | Specialty Products | Water Conditioning Products | Backup Systems | Controls & Accessories | On-Site Septic | Literature Info

THE SHARK Series GRINDER PUMP

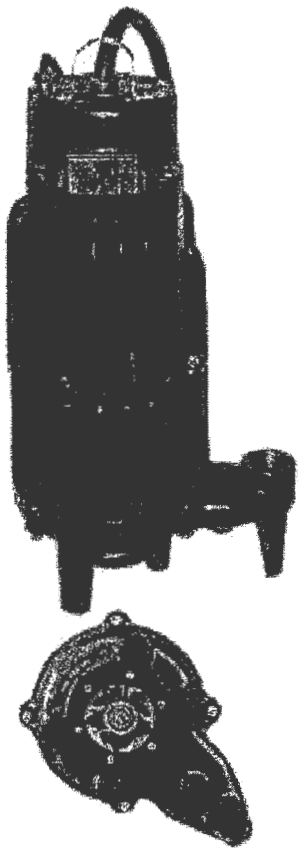
SWPA MEMBER

QUALITY MADE BY U.S. CRAFTSMEN

POWDER COATED TOUGH™

840 Reversing Grinder

Submersible Pump



- Durable Heavy Duty Finned Cast Iron Construction.
- Corrosion resistant powder coated epoxy coating.
- Legs provide for free standing installation.
- 2 HP, 60 Cycle, 1 and 3 PH, 3450 RPM.
- 1-1/4" NPT Vertical Discharge.
- Oil-Filled - Hermetically Sealed Motor with Class F Windings.
- Hardened Stainless Steel Cutter Rotor and Disc.
- Cutters Protected from Abrasive Solids.
- Cutters can automatically alternate direction to enhance blade life and free hang-ups. (automatic or manually)
- Stainless Steel Screws, Bolts and Lifting Bail.
- Brass test plugs.
- Easily adapts to Rail Systems.
- Tandem seals with leak detection.
- Automatic Thermal Overload Protection (single phase).
- Thermal Sensor Protection (standard on 3 phase).
- Preassembled systems available. See 840 Systems.

AVAILABLE MODELS

- **840** - 1 Phase, 200/208 or 230 Volt.
- **840** - 3 Phase, 200/208, 230, 460 or 575 Volt.

C SP US Tested to UL778 and CSA C22.2 108 Standards

"Quality Pumps Since 1939"

Product information presented here reflects conditions at time of publication. Consult factory regarding discrepancies or inconsistencies.

ZOELLER PUMP CO.

MAIL TO: P.O. BOX 16347 • Louisville, KY 40256-0347
SHIP TO: 3649 Cane Run Road • Louisville, KY 40211-1961
(502) 778-2731 • 1 (800) 928-PUMP • FAX (502) 774-3624

visit our web site:
http://www.zoeller.com

SECTION: 5.10.030
FM1326
0603
Supersedes
0901

GRINDER PUMP SIZING AND SELECTION WORKSHEET

See back side for sizing and selection worksheet. Fill out front side and return to representative or Zoeller Pump Company for system sizing and selection assistance. Complete shaded boxes if sizing of pumps is required. Complete unshaded boxes for system selection.

CONTROLS (840 ONLY)

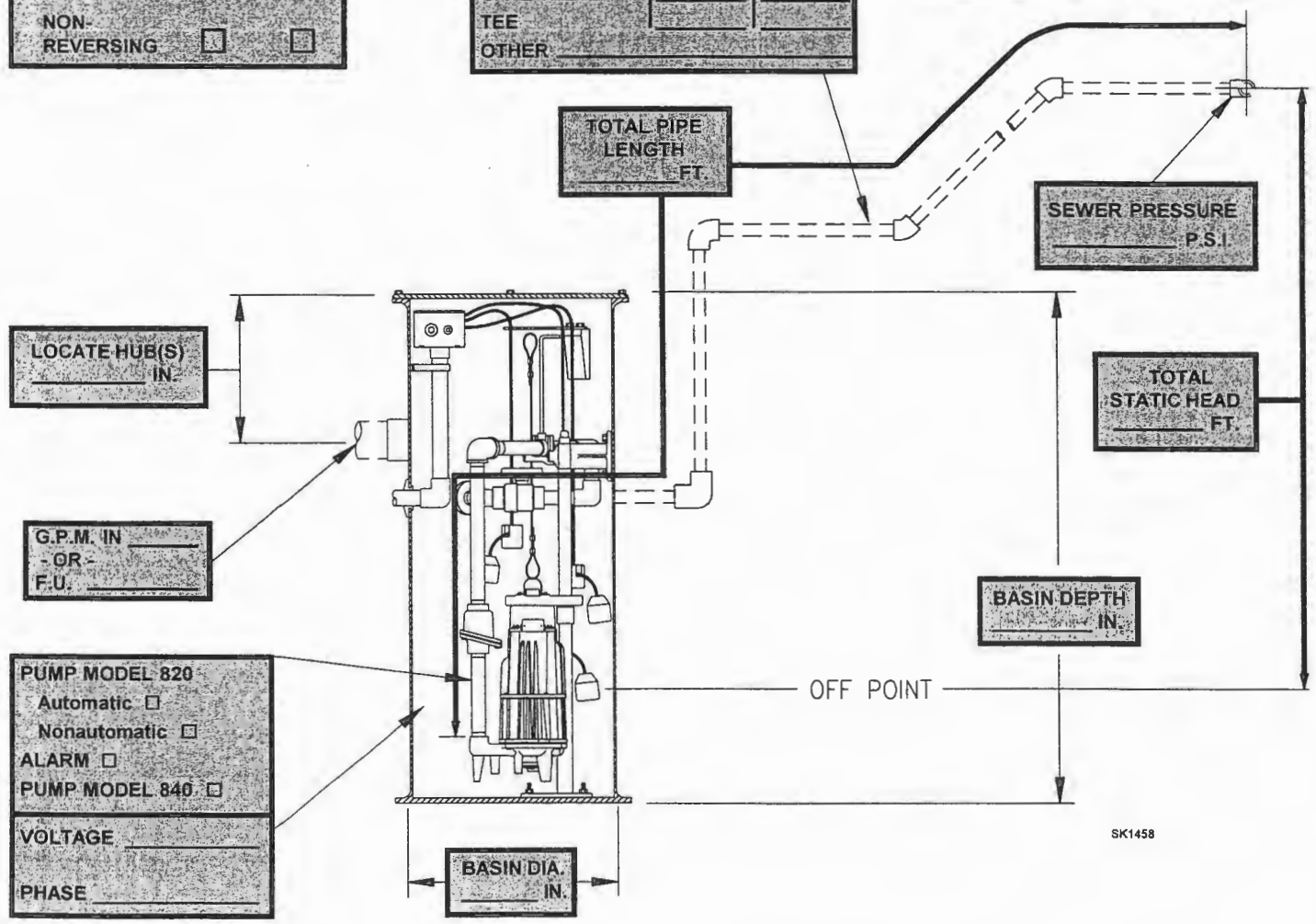
	SIMPLEX	DUPLEX
AUTO REVERSING	☐	☐
MANUAL REVERSING	☐	☐
NON-REVERSING	☐	☐

PIPE MAT'L _____ SIZE _____

FITTINGS	QTY.	SIZE
CHECK VALVE		
90° ELBOW		
45° ELBOW		
GATE VALVE		
TEE		
OTHER		

ASSEMBLY TYPE

	INDOOR	OUTDOOR
PRE-PACKAGED	☐	☐
FIELD ASSEMBLED	☐	☐



CUSTOMER _____
ADDRESS _____
JOB _____
JOB# _____ REP. _____
G.P.M. _____ AT T.D.H. OF _____

GRINDER PUMP SIZING AND SELECTION WORKSHEET

To begin, fill in the shaded areas on the front side. A calculator and additional sheet of paper may be required.

STEP #1 Determine the type and quantity of each plumbing fixture. Multiply each by its fixture unit values in figure "A". Sum these values _____ Determine GPM from figure "B". _____GPM (1)

STEP #2 Refer to Figure "C". Based on the System's discharge piping size, Determine the minimum GPM Listed for that size. _____GPM (2)

STEP #3 Select the greater of the two GPM values in #1 & #2. This is your **Design GPM**. If greater than maximum GPM listed in figure, "B", contact factory. _____GPM (3)

STEP #4 Multiply each pipe fitting by its equivalent length value shown in figure "D" and sum. _____Ft. (4)

STEP #5 Total pipe length from front side _____Ft. (5)

STEP #6 Add #4 & #5. [(4) + (5) = (6)] _____Ft. (6)

STEP #7 Divide #6 by 100 and multiply it by the associated friction value from Figure "E". This is the total Friction Head. _____Ft. (7)

STEP #8 Determine static head in Ft., as shown on front side, from minimum water level to the discharge point. _____Ft. (8)

STEP #9 Sewer Pressure, if any, expressed in feet (PSI x 2.31). _____Ft. (9)

STEP #10 Add #7, #8, & #9. [(7) + (8) + (9) = (10)]. This is the system's **Total Dynamic Head.** (TDH) _____Ft. (10)

STEP #11 Select the Grinder Pump: Select grinder pump from FM1478 (820) or FM1232 (840). Base selection on design values, #3 & #10. _____(Part No.) Required voltage source _____(Volt/Phase)

STEP #12 Select type of control, basin size, and type of assembly from FM1232.

Final Notes:

1) Consult Factory in any application where TDH is less than 5' #10.
2) Consult Factory in those applications where the performance requirement exceeds the capability of the Model 840 Grinder.
2) Pump must be capable of providing the minimum required GPM for pipe size, Figure "C", at the calculated TDH #10 .
3) Pump's lock valve must be greater than system's highest point.

FIGURE A

PLUMBING FIXTURE UNIT VALUES*

Fixture Description	Fixture Unit Value	Fixture Description	Fixture Unit Value
Bathtub, 1-1/2" trap	2	Sink, service type	3
Bathtub, 2" trap	3	Sink, scullery	4
Bidet, 1-1/2" trap	3	Sink, surgeons	3
Dental unit or cuspidor	1	Swimming pool (per 100 gallons)	1
Drinking fountain	1	Urinal	4**
Dishwasher, domestic	2	Washing machine	2
Kitchen sink	2	Water closet	3**
Kitchen sink with disposal	3	Water softener	4
Lavatory, 1-1/2" trap	1	Unlisted fixture, 1-1/4" trap	2
Lavatory, barber/beautician	2	Unlisted fixture, 1-1/2" trap	3
laundry tray	2	Unlisted fixture, 2" trap	4
Shower	2	Unlisted fixture, 2-1/2" trap	5
Shower, group (per head)	3	Unlisted fixture, 3" trap	6
Bathroom group consisting of lavatory, bathtub or shower, and water closet			6**

*Graph data is taken form ASPE Handbook, Uniform Plumbing Code, Cameron Hydraulic Data and Plastic Pipe Institute.
** Add 4 fixture units for each flush valve fixture

FIGURE B

PUMP CAPACITY based on total Fixture Units*

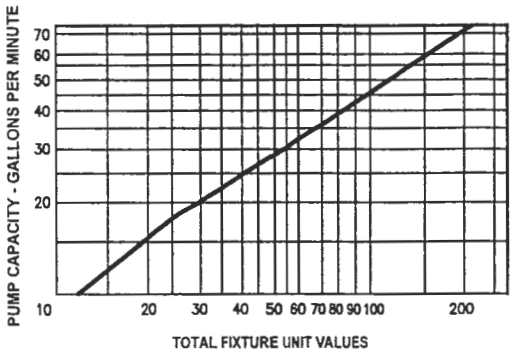


FIGURE C*

Pipe Size	Minimum GPM
1¼"	10
1½"	13
2"	21

FIGURE D*

FRICTION FACTORS FOR PIPE FITTINGS IN TERMS OF EQUIVALENT FEET OF STRAIGHT PIPE

Nominal Pipe Size	90 Elbow	45 Elbow	Tee Branch flow	Swing Check Valve	Gate Valve
1¼"	3.5	1.8	6.9	11.5	0.9
1½"	4.0	2.2	2.7	13.4	1.1
2"	5.2	2.8	10.3	17.2	1.4

FIGURE E*

FRICTION HEAD IN FEET PER 100' OF SCHEDULE 40 PLASTIC PIPE

GPM	1¼" Plastic	1½" Plastic	2" Plastic
10	1.45	0.68	0.20
12	2.03	0.96	0.28
15	3.06	1.45	0.43
18	4.29	2.03	0.60
21	5.75	2.71	0.80
25	7.89	3.73	1.10
30	11.1	5.22	1.55
35	14.7	6.95	2.06
40	---	8.90	2.64
45	---	11.1	3.28
50	---	13.45	3.99
60	---	---	5.59
70	---	---	7.44

ENGINEERING ORDER

GORMAN-RUPP WASTE WATER EQUIPMENT
MANSFIELD, OHIO 44902

Date 4/29/86
Revisions

Serial 86-2432- AM #5

PUMP AND MOTOR DATA

FIRST AVENUE

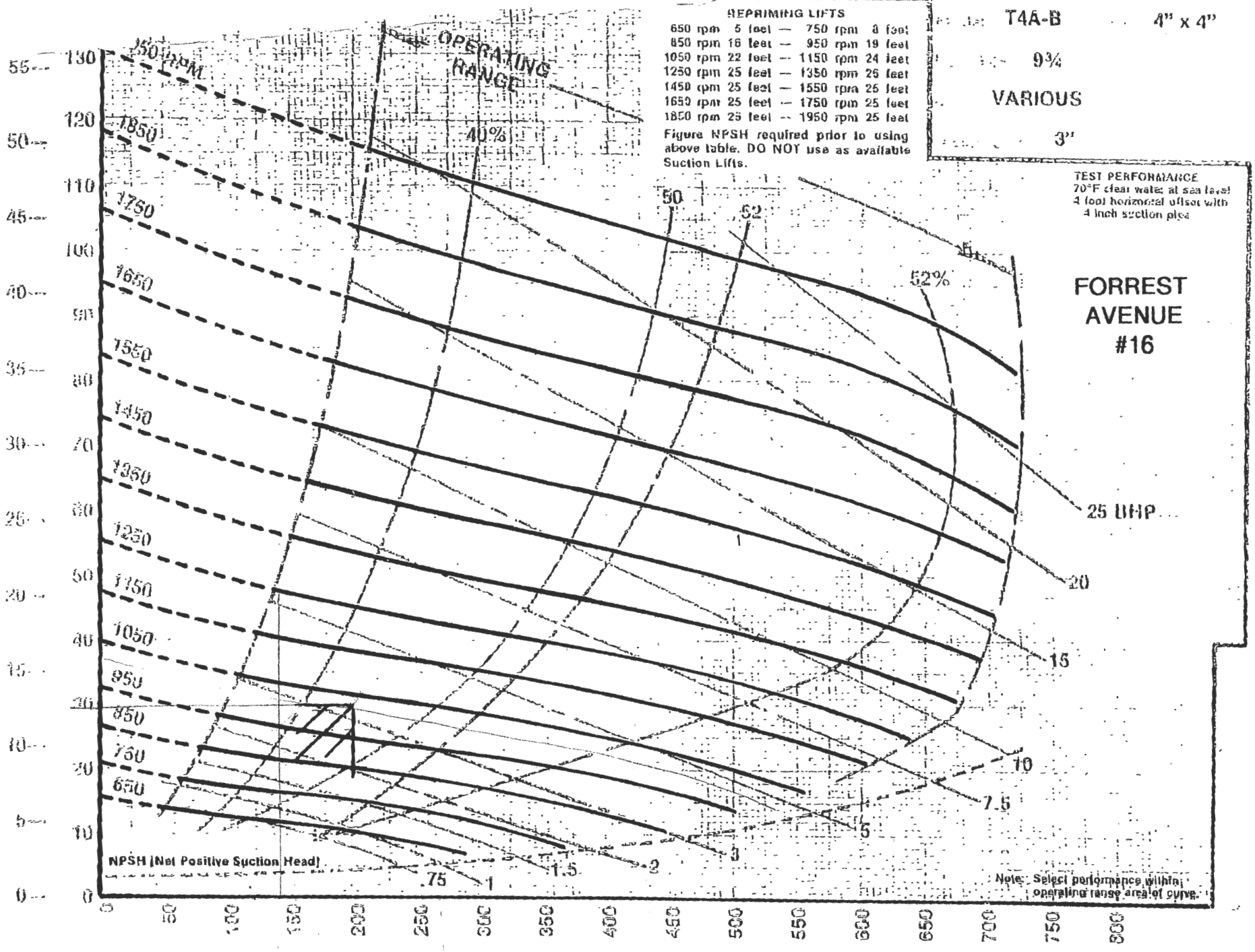
PUMP DATA	Pump No. 1	Pump No. 2	Pump No. 3	Pump No. 4
Design characteristics (GPM @ TDH)	119 @ 24'	119 @ 24'		
Priming lift	10.5	10.5'		
Total dynamic suction lift	15.8'	15.8'		
NPSH required	4'	4'		
NPSH available EXCESS WUTG 3' S.F. DEDUCT	8.8	8.8		
Pump Model	T3A3-B	T3A3-B		
Pump Serial No.				
Impeller diameter	8-3/4	8-3/4		
G-R Mech. seal, tungsten-titanium carbide	YES	YES		
Base, V-Belt	YES	YES		
Pump speed	1035	1035		
Horizontal Electrical MOTOR DATA	**Pump No. 1**	**Pump No. 2**	**Pump No. 3**	**Pump No. 4**
Horsepower	3	3		
RPM FULL LOAD	1740	1740		
Electrical characteristics: Phase/Hertz/Volts	3/60/230	3/60/230		
Electrical design: (standard NEMA unless otherwise indicated)	B	B		
Enclosure, open drip-proof W/1.15 S.F.	YES	YES		
Manufacturer GORMAN RUPP				
Code letter	K	K		
Frame size	182T	182T		
Full load amps.	8.2	8.2		
V-BELT DRIVE DATA	**Pump No. 1**	**Pump No. 2**	**Pump No. 3**	**Pump No. 4**
Center Distance	19.0	19.0		
Sheave on Pump DODGE BUSHING # 1610 BORE 1-1/2" KEY 3/8" — Section	3V	3V		
O.D.	4.75	4.75		
Grooves	2	2		
Sheave on Motor DODGE BUSHING # LL)* BORE 1-1/8" KEY 1/4" — Section	3V	3V		
O.D.	2.80	2.80		
Grooves	2	2		
V-Belt Size (2) BELTS PER PUMP	3VX500	3VX500		

RELATED MODIFICATION/DATA/COMMENTS, ETC.

CERTIFIED PERFORMANCE TEST REQUIRED ON BOTH PUMPS

CERTIFIED REPRIME TEST REQUIRED ON BOTH PUMPS

NOTE: Standard motor rated voltages will not agree with rated system voltages. For example, new NEMA motor voltages for 3 phase current will be 230 VAC/460 VAC. Related system voltage would be 240 VAC or 480 VAC. Standard motors are guaranteed to operate satisfactorily within plus or minus 10% of standard nameplate voltage ratings. It is rarely necessary to apply motors specially wound for odd voltages (at additional cost). When special voltage motors are required, it should be so noted.



SEP. 3. 2004 10:31AM JIM HOUSE AND ASSOCIATES NO. 5986 P. 17/17
NO. T4A-4 5-7-75 1154

4/16

Date 3/30/78

Revisions

ENGINEERING ORDER

GORMAN-RUPP WASTE WATER EQUIPMENT
MANSFIELD, OHIO 44902

Serial M-115-AX #17

AUXILIARY ENGINE DRIVE PUMP UNIT
WITH DIGITAL LOGIC CONTROL

Location STATION "C" SARALAND, ALABAMA

GRAHAM STREET

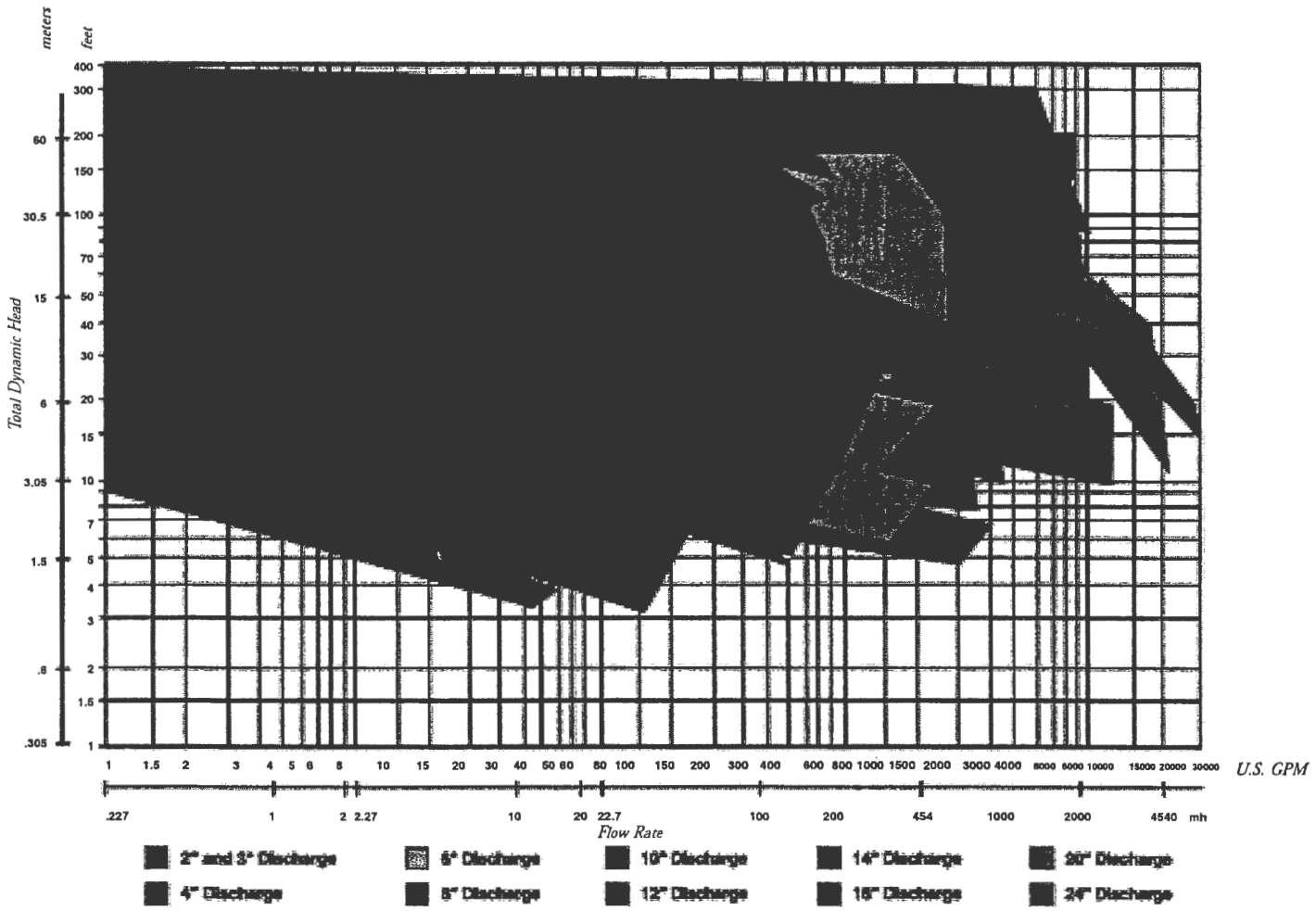
Configuration:
Pump No. 1 BOTH PUMPS ON ONE COMMON BASE - PUMP #1 EQUIPPED
Pump No. 2 WITH AN AUXILIARY ENGINE
~~Pump No. 3~~
~~Pump No. 4~~

PUMP DATA	Pump No. 1	Pump No. 2	Pump No. 3	Pump No. 4
Design Characteristics (GPM @ TDH)	335 @ 28.9	335 @ 28.9		
Priming Lift	10.5'	10.5'		
Total Dynamic Suction Lift	15.5'	15.5'		
NPSH Required BY PUMP	7.0'	7.0'		
NPSH Available	8.0'	8.0'		
Pump Model	T4A3-B	T4A3-B		
Pump Serial No.				
Impeller Dia.	9-3/4"	9-3/4"		
G-R Mech. seal, tungsten-titanium carbide	YES	YES		
Base, V-Belt PER OUTLINE DRWG. NO.	46126-057	Same		
Pump Speed	1073	1073		
G-R Air Release Valve Model No.	GRP33-07	GRP33-07		

MOTOR DATA	Pump No. 1	Pump No. 2	Pump No. 3	Pump No. 4
Horsepower	7-1/2	7-1/2		
RPM (FULL LOAD)	1755	1755		
Electrical characteristics: Phase/Hertz/Volts * WIRED	3/60/230	3/60/230		
Electrical design: (standard NEMA unless otherwise indicated)	B	B		
Full Load Amps	22.2	22.2		
Enclosure-Open Drip-Proof	YES	YES		
Manufacturer ALLIS CHALMERS	YES	YES		
Code Letter	H	H		
Service Factor	1.15	1.15		
Frame Size	213T	213T		
Shaft	DOUBLE	SINGLE		
Serial No.				

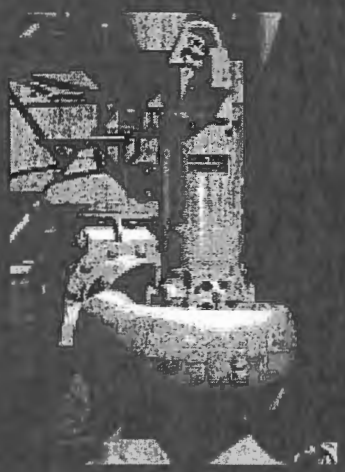
ENGINE DATA	Pump No. 1	Pump No. 2	Pump No. 3	Pump No. 4
Horsepower MAX. DERATED 25%	16.8			
No. of Cylinders	4			
Design RPM	1800			
Fuel	NAT. GAS			
Coolant	AIR			
Manufacturer	WISCONSIN			
Model No.	VH4D			
Serial No.				

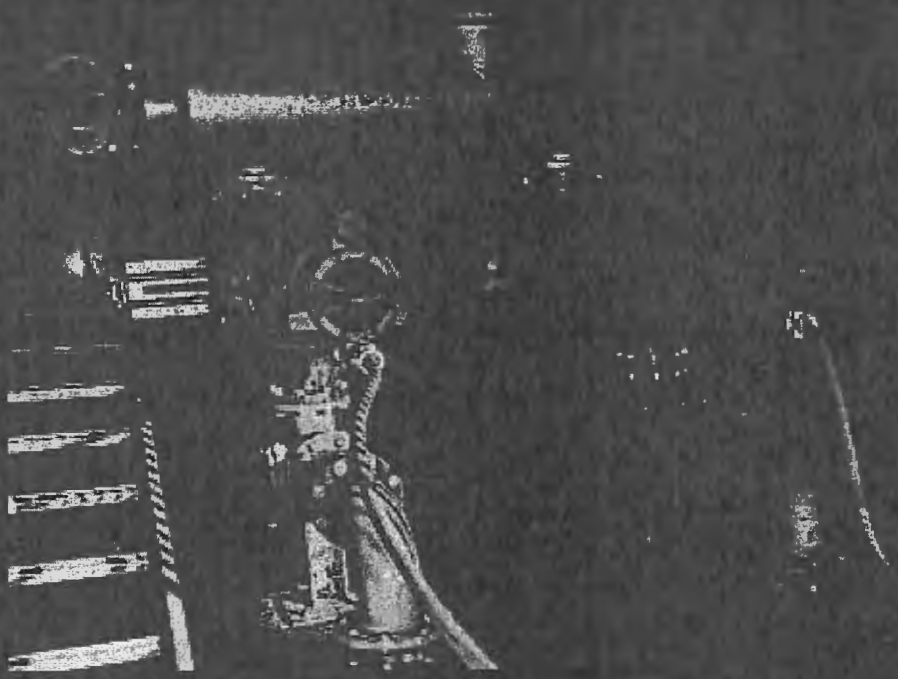
* NOTE: Standard motor rated voltages will not agree with rated system voltages. For example, new NEMA motor voltages for 3 phase current will be 230 VAC/460 VAC. Related system voltage would be 240 VAC or 480 VAC. Standard motors are guaranteed to operate satisfactorily within plus or minus 10% of standard nameplate voltage ratings. It is rarely necessary to apply motors specially wound for odd voltages (at additional cost). When special voltage motors are required, it should be so noted.



CURRENT PUMPING CAPABILITIES

This diagram reflects the current pumping capabilities offered by Davis Product's EMU Pumps. However, please keep in mind that new models may have been introduced since the publication of this brochure; please contact your local representative for the most current information on new models. Pump selection software is available, contact your local representative for your copy.





Whether submerged or stationed in the baking sun- advanced EMU technology meets the dry pit pump endurance challenge, easily.

Look to USFilter's Davis Products' EMU Pumps for the optimum in design, performance and reliability in Dry Pit, Dry Pit Retrofit and Wet Pit Pumps for your specific applications.

To find out more about how to put USFilter to work for you, contact us at

USFilter

Davis Products
1828 Metcalf Avenue
Thomasville, GA 31792
800.841.1550 *phone*
912.226.5733 *phone*
912.227.1661 *fax*

For more information, visit our web site at

www.usfilter.com

www.davcoproducts.com

EMU PP BR 0800

FLYGT

PERFORMANCE CURVE

TWIN LAKES #1 (#30)

PRODUCT	TYPE
M3127.170	HT

DATE	PROJECT
1/1/01	

CURVE NO	ISSUE
61-266-00-1260	3

	1/1-LOAD	3/4-LOAD	1/2-LOAD
POWER FACTOR	0.99	0.99	0.97
EFFICIENCY	79.5 %	80.5 %	78.5 %
MOTOR DATA	—	—	—

COMMENTS: 50 GPM @ 132' TDH

INLET/OUTLET: - / 50 mm

IMP. THROUGHLET: —

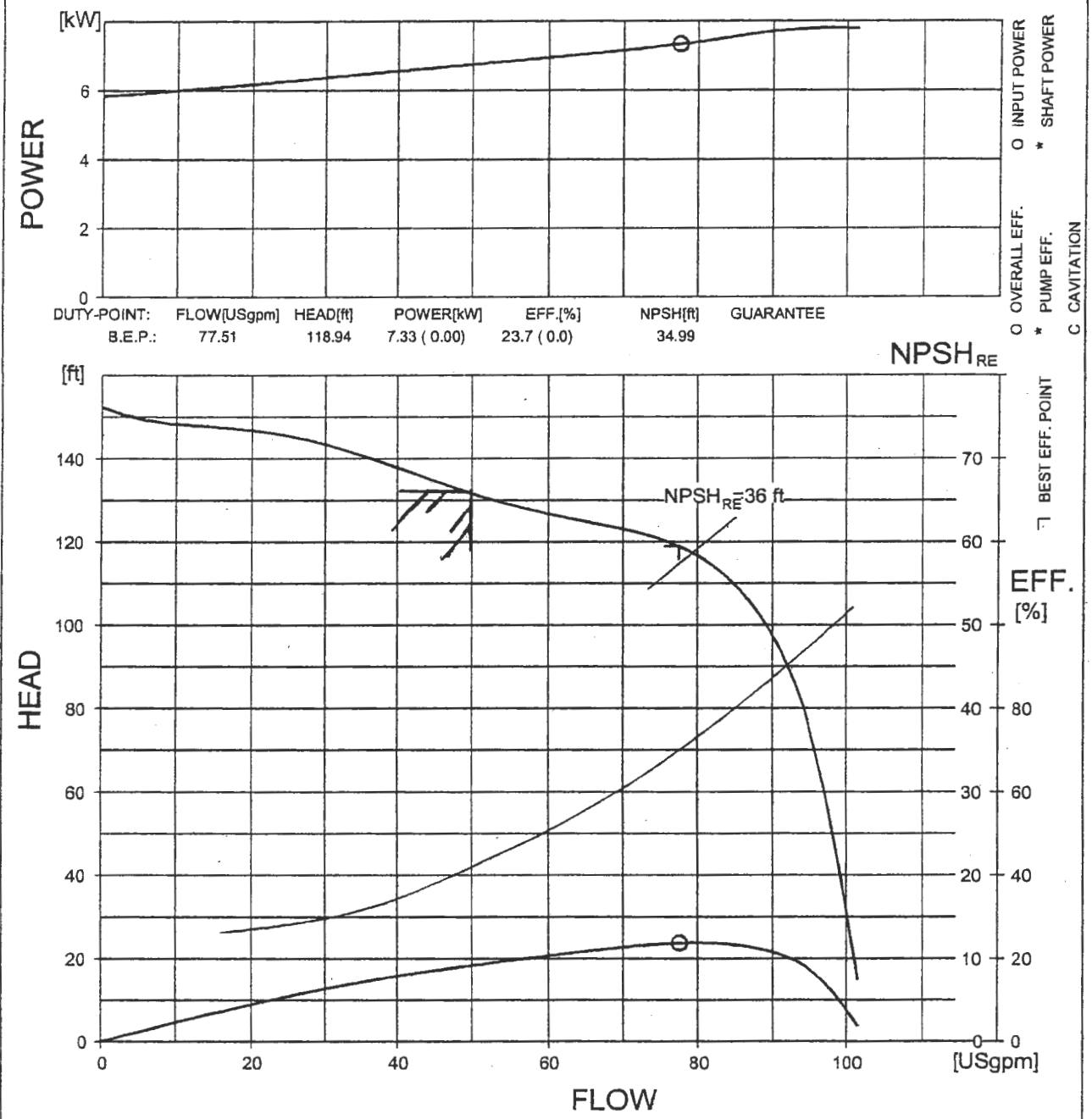
RATED POWER	7.0	kW
STARTING CURRENT ...	134	A
RATED CURRENT ...	38	A
RATED SPEED	3430	rpm
TOT.MOM.OF INERTIA ...	0.054	kgm2
NO. OF BLADES	6	

IMPELLER DIAMETER: 159 mm

MOTOR #	STATOR	REV
21-11-2GZ	72-	10

FREQ.	PHASES	VOLTAGE	POLES
60 Hz	1	230 V	2

GEARTYPE	RATIO
—	—



FLYPS 2.0 (1118)

Performance with clear water and ambient temp 40 °C

FLYGT CURVE

FLYGT

PERFORMANCE CURVE

PRODUCT	TYPE
CP3127.180	MT

DATE 2002-09-20 | PRC

WEATHERBY SUBDIVISION P.S.

CURVE NO	ISSUE
63-434-00-2240	3

	1/1-LOAD	3/4-LOAD	1/2-LOAD
POWER FACTOR	0.88	0.85	0.77
EFFICIENCY	83.5 %	84.5 %	83.5 %
MOTOR DATA	—	—	—

RATED POWER	7.5	hp
STARTING CURRENT ...	52	A
RATED CURRENT ...	9.6	A
RATED SPEED	1740	rpm
TOT.MOM.OF INERTIA ...	---	
NO. OF BLADES	1	

IMPELLER DIAMETER: 197 mm

MOTOR #	STATOR	REV
21-10-4AL	12YSER	10

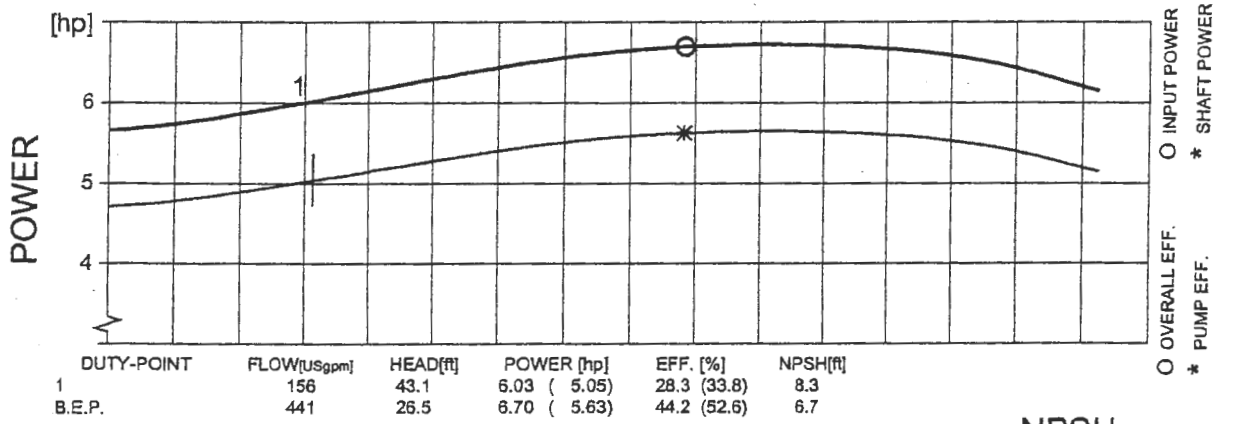
FREQ.	PHASES	VOLTAGE	POLES
60 Hz	3	460 V	4

GEARTYPE	RATIO
---	---

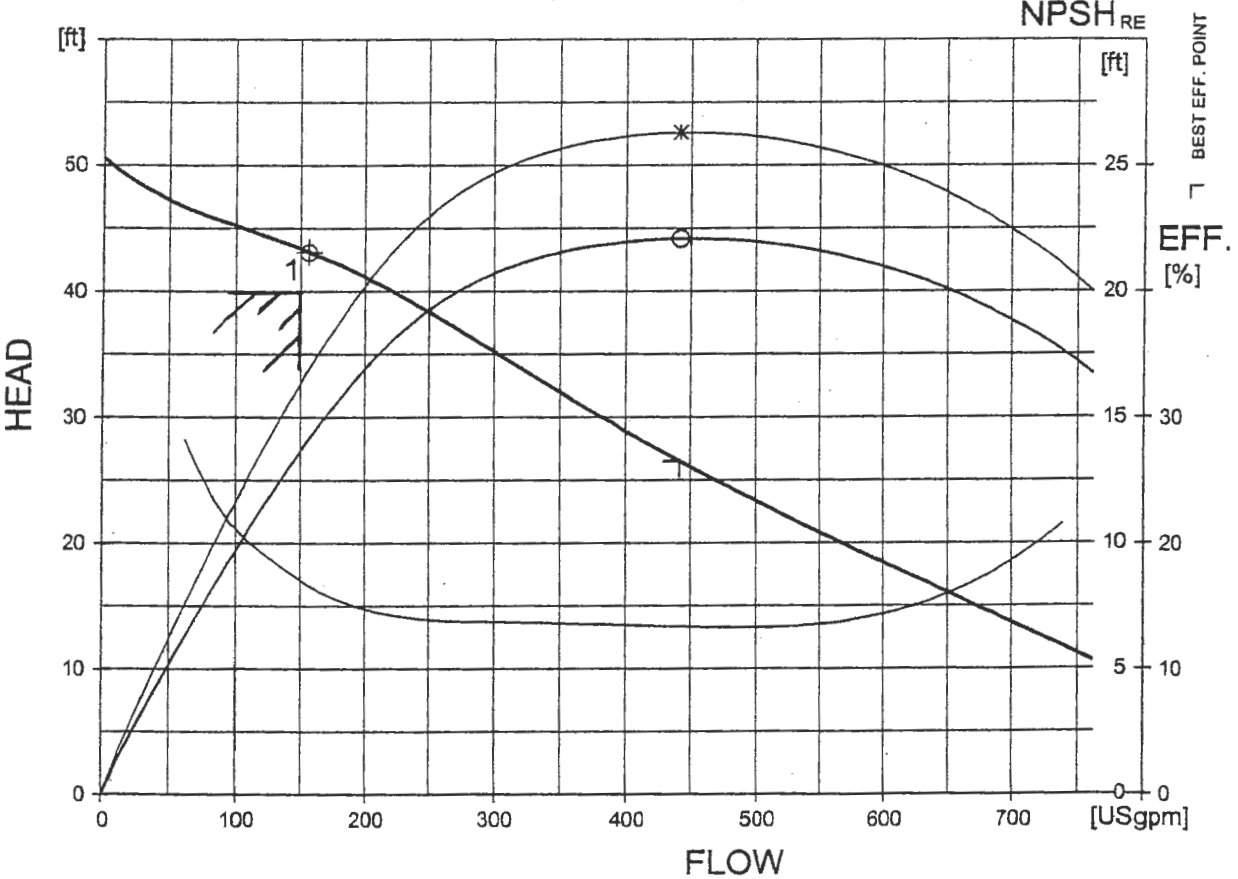
COMMENTS: 150 GPM @ 40' TDH

INLET/OUTLET: - /100 mm

IMP. THROUGHLET: 80 mm



DUTY-POINT	FLOW[USgpm]	HEAD[ft]	POWER [hp]	EFF. [%]	NPSH[ft]
1	156	43.1	6.03 (5.05)	28.3 (33.8)	8.3
B.E.P.	441	26.5	6.70 (5.63)	44.2 (52.6)	6.7



FLYPS2.11 (20010918)

Performance with clear water and ambient temp 40 °C

FLYGT CURVE

FLYGT

PERFORMANCE CURVE

PRODUCT	TYPE
NP3085.182	MT

DATE 2003-01-13 | PRO.

SPANISH TRACE – SARALAND

CURVE NO	ISSUE
63-463-00-3860	1

#32

	1/1-LOAD	3/4-LOAD	1/2-LOAD
POWER FACTOR	0.80	0.74	0.62
EFFICIENCY	77.5 %	77.5 %	75.0 %
MOTOR DATA		—	—

RATED POWER	3	hp
STARTING CURRENT ...	24	A
RATED CURRENT ...	4.5	A
RATED SPEED	1710	rpm
TOT.MOM.OF INERTIA ...	0.018	kgm2
NO. OF BLADES	2	

IMPELLER DIAMETER: 136 mm

MOTOR #	STATOR	REV
15-10-4AL	38D	10

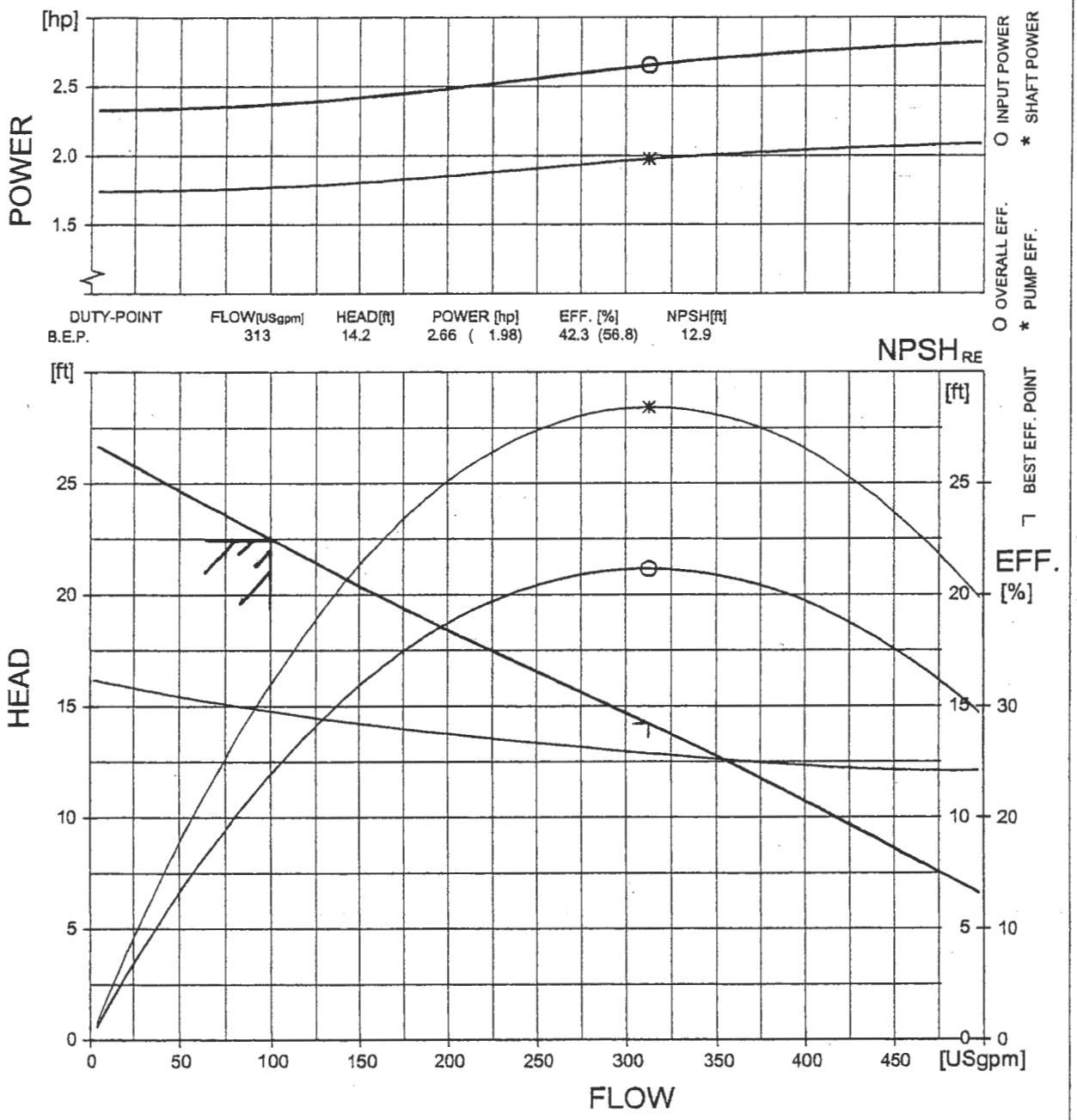
FREQ.	PHASES	VOLTAGE	POLES
60 Hz	3	460 V	4

GEARTYPE	RATIO
---	---

COMMENTS: 100 GPM @ 23' TDH

INLET/OUTLET: - / 80 mm

IMP. THROUGHLET: ---



DUTY-POINT	FLOW[USgpm]	HEAD[ft]	POWER [hp]	EFF. [%]	NPSH[ft]
B.E.P.	313	14.2	2.66 (1.98)	42.3 (56.8)	12.9

FLYPS2.11 (20010918)

Performance with clear water and ambient temp 40 °C

FLYGT CURVE

PUMPEX K 100

#33 – WILLOW WALK

Technical Specification

Pumpex K 100 is an electric submersible wastewater pump designed to pump raw sewage, industrial wastewater and other contaminated liquids.
The electric motor and the pump unit are built together into a compact and durable unit.
The pump is designed for intermittent or continuous operation in wet or dry sump installations.

Pump types

(F = GUIDE RAIL, P = PORTABLE, T/H = DRY PIT)

Pump type (impeller type) K 100 (F, P, T, H)	Motor	
	Power	Poles rating
Single phase:		
CB3180, 3190	5.4 Hp	4
VA3160, 3182	5.4 Hp	4
Three phase:		
CA3210	7.5 Hp	4
CA3220, 3228	10 Hp	4
CB3180, 3190	5 Hp	4
CB3205, 3215	7.5 Hp	4
VA3160, 3182	5 Hp	4
VA3202	7.5 Hp	4
VA3230, 3250	10 Hp	4

Motor data

Squirrel cage, 1 or 3-phase, 60 Hz.
Insulation class F (155°C, 310°F).
The stator incorporates thermal switches connected in series.
The thermal switches opens at 140°C, 284°F.
Built-in moisture sensor. FM Explosion Proof - Class 1. Div. 1. Gr. C&D (standard).
Maximum submergence: 20 m, 65 feet.

NOTE! For single phase pumps a start box will be needed. In the start box are two run capacitors (1x40 µF, 1x50 µF), two start capacitors (2x160-200 µF), two contactors (2x40 A) and a time relay(1.5-30 s) included.

Power rating Hp / rpm	Motor efficiency	Power factor
Single phase:		
5.4 / 1755	0.77	0.98
Three phase:		
5 / 1710	0.81	0.77
7.5 / 1700	0.84	0.80
10 / 1700	0.83	0.85

Power rating Hp / rpm	Running amps 230 Volt	Starting amps 230 V	Nema code
Single phase:			
5.4 / 1755	23	68	F
	230 (460) Volt	**230 (460) Volt**	
Three phase:			
5 / 1710	14.8 (7.4)	84.4 (42.2)	H
7.5 / 1700	20.8 (10.4)	131 (65.5)	H
10 / 1700	26 (13)	132.6 (66.3)	F

Impeller

CA = Single channel impeller. Free passage 3".
CB = Single channel impeller. Free passage 3".
VA = Vortex impeller. Free passage 3".

Shaft seals

Double mechanical seal in oil bath.
Primary seal: Silicon carbide – Silicon carbide **See note 1
Secondary seal: Carbon – Stainless steel ** See note 1

Bearings

Upper bearing: Single-row deep groove ball bearing
Lower bearing: Double angular contact ball bearing

Materials

		ASTM
Motor housing, oil - housing, volute:	Cast iron	A48 Class 35 B
Shaft:	Stainless Steel	AISI 420
Impeller, adapter:	S. G. iron	A395 Grade 60-45-15
Handle, nuts and bolts:	Stainless Steel	AISI 304
O-rings:	Nitrile rubber	

Cable

45 ft. submersible cable type AWG-S00W

Motor type	D.O.L.-start 230 V
Single phase: 5.4 Hp-4	AWG 8/4 + 16/3
	D.O.L.-start 460 V
Three phase:	
5 Hp-4	AWG 12/7
7.5 Hp-4	AWG 10/7
10 Hp-4	AWG 8/4 + 16/3

Weights

All weights in lb.

Pump type, K 100	F-4"	F-6"	T/H	P
Single phase:				
K 100 - 5.4 Hp	280	289	313	317
Three phase:				
K 100 - 5 Hp	280	289	313	317
K 100 - 7.5 Hp	295	304	331	335
K 100 - 10 Hp	306	315	342	346
Base elbow 4"	80	–	–	–
Base elbow 6"	–	143	–	–

Note 1

Seals both upper and lower are to be tungsten carbide on tungsten carbide, per Volkert letter.

0203

PUMPEX WASTEWATER PUMP K 100
60Hz

Pump	Motor Power rating	Poles	Discharge-connection	Suction-inlet
Single phase:				
K 100 CB3190	5,36 Hp	4	Ansi 4"	Ansi 4"
K 100 CB3180	5,36 Hp	4	Ansi 4"	Ansi 4"
K 100 VA3182	5,36 Hp	4	Ansi 4"	Ansi 4"
K 100 VA3160	5,36 Hp	4	Ansi 4"	Ansi 4"
3-phase:				
K 100 CA3228	10 Hp	4	Ansi 4"	Ansi 4"
K 100 CA3220	10 Hp	4	Ansi 4"	Ansi 4"
K 100 CA3216	7.5 Hp	4	Ansi 4"	Ansi 4"
K 100 CB3215	7.5 Hp	4	Ansi 4"	Ansi 4"
K 100 CB3205	7.5 Hp	4	Ansi 4"	Ansi 4"
K 100 CB3190	5 Hp	4	Ansi 4"	Ansi 4"
K 100 CB3180	5 Hp	4	Ansi 4"	Ansi 4"
K 100 VA3250	10 Hp	4	Ansi 4"	Ansi 4"
K 100 VA3230	10 Hp	4	Ansi 4"	Ansi 4"
K 100 VA3202	7.5 Hp	4	Ansi 4"	Ansi 4"
K 100 VA3182	5 Hp	4	Ansi 4"	Ansi 4"
K 100 VA3160	5 Hp	4	Ansi 4"	Ansi 4"

Motordata : Insulation Class F (310° F). Built-in thermal contacts.
Built-in moisture sensor.
FM Explosion Proof - Class 1, Div.1, Gr. C&D (optional).

Power rating	Motor-efficiency	Power factor	Speed (rpm)	Nom.current 230V (Amps)	Nom.current 460V (Amps)	Start current Ist/In
Single phase:						
5,36 Hp	0.77	0.98	1755	23		
3-phase:						
5 Hp	0.81	0.77	1710	14.8	7.4	5.7
7.5 Hp	0.84	0.80	1700	20.8	10.4	6.3
10 Hp	0.83	0.85	1700	26	13	5.1

Impellers : CA : 1-channel impeller. Free passage 3".
CB : 1-channel impeller. Free passage 3".
VA : Vortex impeller. Free passage 3".

Cables :	Motor	D.O.L.-start
Single phase:		
	5,36 Hp	10x1.5 sq.mm.
3-phase:		
	5 Hp	10x1.5 sq.mm.
	7.5 Hp	10x1.5 sq.mm.
	10 Hp	10x1.5 sq.mm.

Shaft seal : Double mechanical seal in oil bath.
Primary seal : silicon carbide on silicon carbide.

Secondary seal : carbon on stainless steel.

Bearings : Upper : single-row deep groove ball bearing.
Lower : double angular contact ball bearing.

Oil, cooling liquid : Without cooling system : 4.6 pints nontoxic oil.
With cooling system : 0.95 pint nontoxic oil, and 6.8 pints cooling liquid (water with 30% propylenglycol Dowcal R 20).

Materials : Motor-, oil-housing, volute : Grey cast iron ASTM A48 Class 30 B.
Impeller, adapter : S.G. iron ASTM A395 Grade 60-45-15.
Rotor shaft : Stainless steel ASTM AISI 420.
Nuts and bolts : Stainless steel ASTM AISI 304.
O-rings : Nitrile rubber.

Weights : Pump	K 100 F100	K 100 F150	K 100 T	K 100 P
Single phase:				
K 100 5,36 Hp	280 lbs	289 lbs	313 lbs	317 lbs
3-phase:				
K 100 5 Hp	280 lbs	289 lbs	313 lbs	317 lbs
K 100 7.5 Hp	295 lbs	304 lbs	331 lbs	335 lbs
→ K 100 10 Hp	306 lbs	315 lbs	342 lbs	346 lbs
Discharge bracket				
→ 4"	80 lbs	-	-	-
6"	-	143 lbs	-	-

Wet sump installation :
Min. hatch size simplex installation 24" x 36".
Min. hatch size duplex installation 36" x 48".

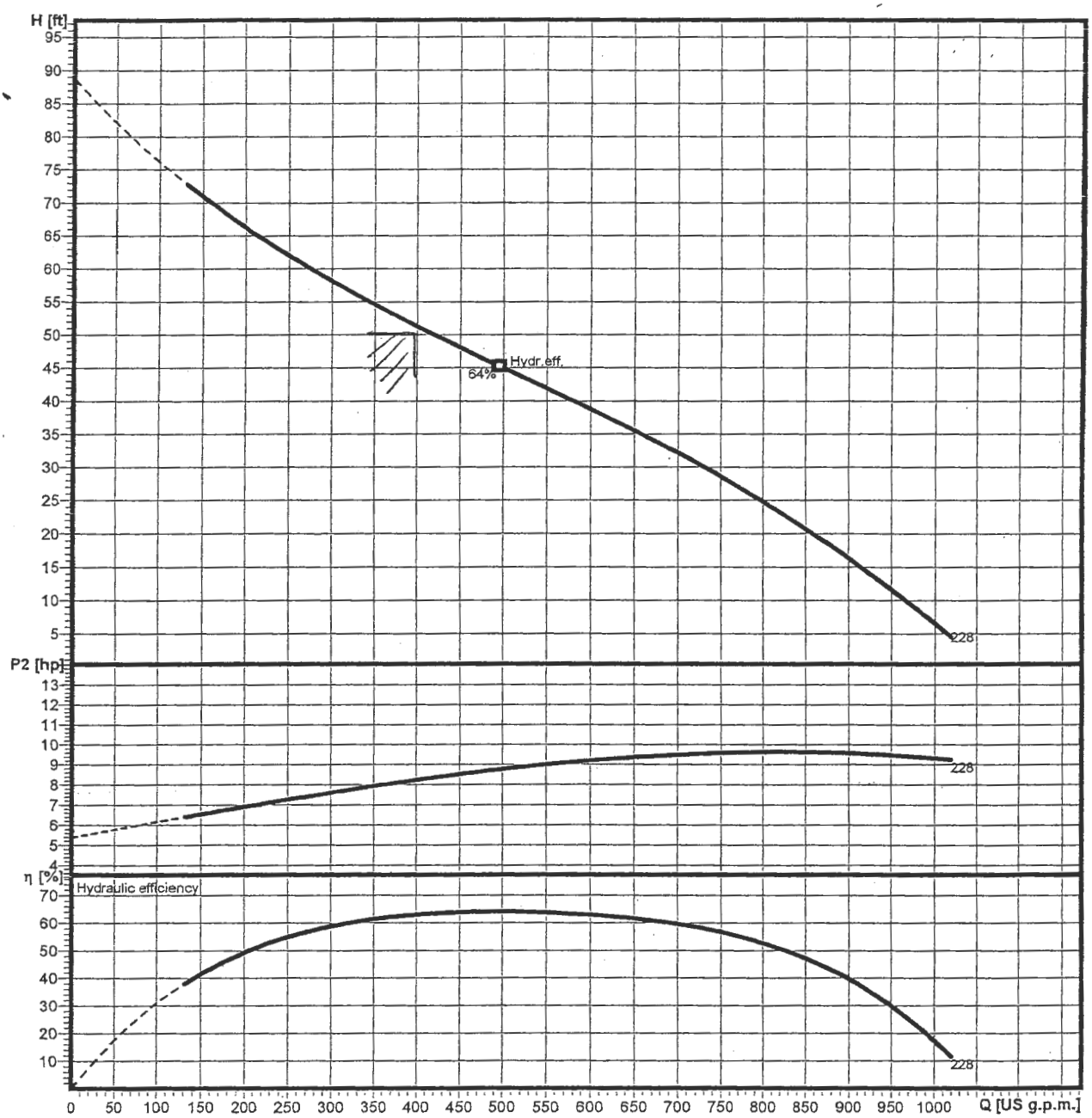
Duplex installation : Min. 20" between pumps centerlines.

Wastewater pumps

K 100 F-CA3228

60 Hz

Density	Viscosity	Testnorm	Nominal speed	Sel. speed	Date
62.4 lb/ft³	0.0000108 ft²/s	H.I.	1700 rpm	1700 rpm	May 13, 2003
Impeller Channel		Impeller size 228 mm			



K 100-CA3-AG 60Hz

LIFT STATION REPAIR RECOMMENDATIONS

L.S. #1 – Police Club:

Observations:

The pumps are having difficulty priming. Both pumps are primed manually. The pump run-time data shows that the lead pump (P1) runs twice as long as the lag pump (P2). The pump-down test results show that P1 pumps approx. 54% of design capacity and P2 pumps 120% of design. There are (2) pot holes in the driveway and one (1) hole with stagnate rainwater located along the wood line behind the lift station which is currently being used to prime the existing pumps.

Recommendations:

1. Replace the impeller and the wear plate in P1.
2. Fill the holes in the driveway.
3. Install a hose bib when water becomes available and fill the hole.

L.S. #2 – Popeye's or Hwy 43:

Observations:

There are indications of I/I in the wet well due to the thinning, delaminated steel access hatch which has severe corrosion and a missing wet well vent.

Recommendations:

1. Replace the access hatch per the city's standard specifications.
2. Install a 2" PVC 180° elbow fitting for the wet well vent.

L.S. #3 – Park Street:

Observations:

A window pane is broken on the east window. The floor drain is badly corroded and possibly clogged.

Recommendations:

1. Replace the broken window pane
2. Clean and repair the floor drain.

L.S. #4 – Zooland / Edgefield:

Observations:

The discharge valve handle is missing on P2. There are indications of flooding within the site area. The wet well lid is lower than the surrounding grades allowing rainwater to flow into the access hatch. The access hatch has no gasket and is not fastened. The junction box is in poor condition.

Recommendations:

1. Replace the 1-1/2" PVC discharge valve on P2.
2. Correct the grading around the lift station site area. Consider installing a berm around the lift station area to redirect the side drainage away from the wet well.
3. Raise the wet well lid 16" to 18" above grade. Install a new gasket material and fasteners to the access hatch.

4. Repair the existing junction box in the wet well to its proper condition and replace the missing lid.
5. Verify that the existing (new) control box is high enough to avoid future flooding.
6. Remove the old control box that is no longer in use.

L.S. #5 – First Avenue:

Observations:

There is heavy grease build-up in the wet well.

Recommendations:

1. Schedule periodic grease cleaning.

L.S. #7 – Scott Dr. / Shelton Beach Est.:

Observations:

P1 could not lower the wetwell by itself during the pump-down test. The pump-down test showed that P2 is operating at approx. 53% of its design capacity. The pump run-time data shows that P1 and P2 are not alternating and both pumps have matching extended run-time hours. It appears that both pumps are either on or off simultaneously. The P1 discharge gate valve is operating poorly. The P2 discharge check valve is operating poorly. P1 has an improper motor alignment. The natural gas driven Wisconsin back up motor is not functional. There are indications of flooding in the building and within the existing control panel. The facia and soffits need repairing.

Recommendations:

1. Build a new pump station above the flood level.

L.S. # 8 – Jubilee Drive:

Observations:

Several fasteners inside the wet well are not stainless steel and are corroding. The entrance gates and fencing in the south west corner are in need of repairs. The east fence line is leaning towards the control panel. The gate operates poorly.

Recommendations:

1. Watch for continued corrosion of the fasteners and replace as needed with stainless steel fasteners.
2. Repair the fence and the entrance gates.

L.S. # 9 – Exxon Station or Service Rd.

Observations:

Several fasteners inside the wet well are not stainless steel and are corroding. The counterweights were purposely taken off the swing arms of the check valves in order for the valves to operate. The fencing entrance gates are partially open.

Recommendations:
1. Watch for continued corrosion of fasteners and replace as needed with stainless steel fasteners.
2. Repair the fence entrance gates.

L.S. # 10 – Laredo Drive:

Observations:
P2 is operating at 37 % of its design capacity. Currently, there are no pump run-time issues. Therefore it appears that the reduced pump capacity is not currently creating a capacity problem.

Recommendations:
1. Replace impeller and wear plates in P2.

L.S. # 11 – Chase Drive:

Observations:
The pump-down test results show that P2 pumps approx. 55% of design capacity while P1 pumps approx. 81% of design capacity. The run-time data reveals that P2 is running longer than P1. The Gorman Rupp level indicator readout is not functioning properly when the buttons are pressed. The high-level alarm light has a cracked housing. The wood fence is damaged and is missing several pickets. The entrance gates do not swing open completely.

Recommendations:
1. Consider P2 for either an impeller replacement or check valve replacement.
2. Inspect the controls for pump alternation malfunctions and repair as needed.
3. Replace existing level indicator with Candy Cane type level indicator.
4. Replace the light housing.
5. Repair the fencing and the gates. Replace the missing pickets.

L.S. # 12 – Spanish Trace:

Observations:
Water hammering was observed while the check valve on P2 was seating/closing. The HOA Switch on P2 is difficult to engage in "Hand" mode. The control panel has heavy corrosion possibly due to corrosive gases from the wetwell flowing through an abandoned conduit to the inside of the control panel. There is evidence of ground water leaks within the valve vault at the valve vault joints. The valve pit drainpipe appears to be clogged and draining slowly.

Recommendations:
1. Further investigate the cause of the water hammer. Consider installing the oil cushion check valves on the pump discharge.
2. Seal the abandoned conduit pipe in the wetwell.
3. Rehabilitate the valve vault.
4. Replace the HOA Switch.
5. Repair the control panel.

6. Clean the valve pit drain.

L.S. # 13 – Oak Ridge:

Observations:

The pump down test results show that P1 and P2 pump approx. 30% of the design capacity. There are no HOA switches; pumps are operated directly from the breakers. There is some degree of difficulty in the removal of the wet well lid due to the excessive weight of the lid. An existing fiberglass insert is attached to the inside wall of the wet well. Floats and levels have been removed.

Recommendations:

1. Replace the impeller and wear plates in P1 and P2.
2. Install the HOA switches.
3. Replace the wet well lid with a standard lighter weight lid.
4. Remove fiberglass insert from the wet well and install the pumps and piping into the concrete manhole.
5. Add the floats and the levels and retest with a pump down to confirm pump design data.

L.S. # 14 – Landfill or E. Celeste Rd:

Observations:

The front gates to the station are not swinging freely.

Recommendation:

Repair the gates.

L.S. # 15 – Deer Run:

Observations:

The pump-down test results show that P2 pumps approx. 45% of the design capacity while P1 and P3 pumps approx. 80% of the design capacity. The pump run-time data reveals that P2 is running fewer hours than P1 and P3. There is a broken window pain on the east side of the building. The floor drains appear to be clogged.

Recommendations:

1. Replace the impeller and wear plate in P2.
2. Repair the windowpane on the east side of the building.
3. Clean the floor drains.

L.S. # 16 – Forrest Avenue:

Observations:

The run-time data reveals that P2 is running longer than P1 and not alternating correctly. The Wisconsin back-up engine is not operating. There is visible damage to the Soffit & Facia on the southeast corner of the building roof. The ceiling light fixtures are detached from the junction box. There is no high-level alarm light. The bulbs for the "Pump On" lights are not operating.

Recommendations:

1. Investigate the control malfunction in relations to the pumps not alternating correctly.
2. In lieu of repairing the stand by engine, a skid mounted emergency generator could be purchased for use by the Sewer Department during lift station failures.
3. Repair and paint the damaged Soffit & Facia.
4. Affix the light fixture to the ceiling.
5. Install an Alarm Failure Light.
6. Replace the "Pump On" bulbs.

L.S. # 17 – Grahm Street:

Observations:

P1 "Pump On" indicator light is burned out. The pump run-time data shows some excessive run-time hours on P1 and P2. The pump flow capacity appears to be approaching its limit especially during rainfall events. The Wisconsin back-up pump motor is not functional; battery is missing. The aggregate is exposed on the wet well walls. The window is broken on the south side of building. The light fixtures are not properly attached to the junction box. The soffit & facia is in need of minor repairs & re-painting. The front door thresh hold is not attached to the slab.

Recommendations:

1. Replace the P1 indicator light bulb.
2. Consider replacing the pumps with a higher capacity pump.
3. Consider changing impeller size to increase the flow.
4. In lieu of repairing the stand by engine, a skid mounted emergency generator could be purchased for use by the Sewer Department during lift station failures.
5. Rehab the wetwell walls.
6. Replace the broken windowpane.
7. Affix the light fixture to the junction box.
8. Repair and paint the damaged soffit & facia.
9. Repair the front doors.

L.S. # 18 – Delisa Drive:

Observations:

P2 would not prime. The discharge check valve on P1 is not operating properly. The run-time data reveals that P2 is running longer than P1. The roof is damaged on the north side of the building.

Recommendations:

1. Replace the impeller and wear plate in P2.
2. Replace the discharge check valve on P1.
3. Repair the roof on north side.

LIFT STATION REPAIR RECOMMENDATIONS

L.S. # 19 – Camelot Drive:

Observations:

The belt guard on P2 is creating a noise. A considerable amount of corrosion was found inside the control panel. The junction box is mounted inside the wet well, which makes it susceptible to a corrosive environment. A root intrusion is located on the east side of wet well 6 feet from the top.

Recommendations:

1. Rehab the wet well.
2. Refurbish the control panel.
3. Relocate the junction box outside of the wet well.
4. Inspect the belt guard on P2 and repair or replace as needed.

L.S. # 20 – E. Celeste Rd:

Observations:

Corrosion was found inside the control panel. The pump base anchor bolts and brackets are corroded. The junction box is mounted inside the wet well, which makes it susceptible to a corrosive environment.

Recommendations:

1. Refurbish the control panel.
2. Monitor the corrosion of the anchor bolts and the brackets, replace as needed with stainless steel.
3. Relocate the junction box outside of the wet well.

L.S. # 21 – Saraland Avenue:

Observations:

P2 has difficulty priming and pumping. The alternating relay is not functioning; the pumps are manually rotated periodically.

Recommendations:

1. None. A & B Electrical fixed the alternating relay.
2. Replace the wear plate and the impeller in P2.

L.S. # 22 – Old Telegraph Rd:

Observations:

Pump-down test shows that both P1 and P2 are operating at approx. 25% of their design capacity. The discharge check valve on P1 is not completely engaged (seated). Light bulbs over the north pump and inside the wet well are burned out. Ten percent (+/- 10%) of the existing bituminous coating is peeling off the wet well wall in various places. The floor drains are blocked and deteriorated.

Recommendations:

1. Rebuild and refurbish P1 and P2.
2. Replace the light bulbs over the north pump and the wet well.
3. Rehabilitate the wet well walls.

4. Repair and clean the floor drains.

L.S. # 23 – Cedar Street:

Observations:
The pump-down test shows that P1 is operating at approx. 41% of its design capacity and P2 is operating at approx. 50% of its design capacity. Review of the run times show that currently the reduced flow rates are not limiting the capacity.

Recommendations:
Replace the impellers and wear plates in P1 and P2.

L.S. # 24 – Smoke Avenue:

Observations:
Heavy grease build-up was found within the wet well. Visual signs of reinforcement corrosion through the bituminous epoxy lining was found on the south wet well wall.

Recommendations:
1. Schedule grease removal.
2. Rehabilitate the wet well walls.

L.S. # 25 – Ferry Avenue:

Observations:
Corrosion was present on carbon steel components and fasteners inside the wet well. The bituminous coating is wearing inside the wet well.

Recommendations:
1. Monitor corrosion of carbon steel components and replace as needed with stainless steel.
2. Rehabilitate the wet well walls.

L.S. # 26 – Mignionette Avenue:

Observations:
The site drainage accumulates standing water during rain events. The double leaf gate is not suitable for existing grade. The wet well vent is missing. The wet well level controllers are not functioning properly; recorded levels are not matching actual water level measurements. The run-time data reveals that P2 is running longer than P1.

Recommendations:
1. Repair the site drainage.
2. Replace the existing fence gates.
3. Replace the wet well vent.
4. Inspect level controllers and repair or replace as needed. Re-evaluate the daily run times to determine if the impellers and wear plates should be considered for replacement to regain additional pumping capacity.

LIFT STATION REPAIR RECOMMENDATIONS

L.S. # 27 – Fairfield:

Observations:
The wet well vent is rusting. The epoxy lining is delaminating from the inside wet well wall surface on the south sidewall. The valve vault box is not draining properly.

Recommendations:
1. Paint the wet well vent.
2. Rehabilitate the wet well walls.
3. Modify the valve vault to slope to drain pipe.

L.S. # 28 – Shelton Beach Ext:

Observations:
Overall site is in good condition.

Recommendations:
None.

L.S. # 29 – Kaliefield:

Observations:
Various equipment and stored materials was found in the lift station site area.

Recommendations:
The equipment and the stored materials should be kept clear of the slabs and the controls to prevent tripping and safety hazards.

L.S. # 30 – Twin Lakes:

Observations:
There was no gate installed on the brick wall to the lift station site to prevent public access. There are no locks on the control panel or the wet well hatch. The access to the valve pit is by a manhole lid, which limits the workspace during maintenance. The concrete slab is not graded to drain water towards the entry away from the wet well, the valve pit and the control panel / add-a-phase. There is no vent on the wet well.

Recommendations:
1. The Twin Lakes Lift Station is within the vicinity of residential homes, and there are safety concerns associated with children and other pedestrians gaining potential access to the lift station site; therefore, the following items should be installed:
    a. A new gate for the brick wall entrance with a pad lock.
    b. Pad locks on the control panel and the wet well.
2. Install the required vent on the wet well.
3. Install a drainage trench to drain the rainwater from the station.
4. Install a square valve pit access lid.

LIFT STATION REPAIR RECOMMENDATIONS

L.S. # 31 – Weatherby:

Observations:

There is no hose bib on site. There are no locks on the control panel, wet well, or valve vault. There are potential drainage issues due to the adjacent detention pond. There is no defined driveway from the detention pond gate to the lift station. There is evidence of ground water leaks within the wet well and valve vault at the discharge pipes, the wet well joints, and the valve vault joints. The control panel and the junction box are mounted low to the ground.

Recommendations:

1. Install a hose bib.
2. Install pad locks on the control panel, the wet well, and the valve vault.
3. Consider adding a driveway to the station.
4. Rehabilitate the wet well and valve vault. (Check to see if this is a warranty issue).
5. Mount the control panel and the junction box higher to avoid potential flooding.
6. Monitor the drainage concerns and address as needed.

L.S. # 32 – Spanish Trace New:

Observations:

The high-level audible alarm has some external damage and was found disconnected inside the control panel. Erosion was found below the fence line on the north west side of the site area. Phone and cable pedestals were placed in the middle of the access driveway to the lift station site.

Recommendations:

1. Repair or replace the damaged high-level audible alarm and reconnect inside the panel.
2. Build-up the ground below the fence line.
3. Make a request to the phone and cable companies to relocate their existing pedestals or consider moving the existing access drive to avoid interference.

L.S. # 33 – Willow Walk:

Observations:

The pump down test shows that both P1 and P2 are pumping below 5% of their design capacity. P1 and P2 did not engage when the high-level alarm was on. P1 will not engage in "AUTO", but will work in "HAND" mode. The discharge gate and check valves are in the wrong location. The discharge gate valve should be downstream of the check valve. The wet well vent is incomplete. The 90^{o} discharge elbows are not serviceable; the downstream flanges are embedded in the wall. Access to the lift station site is very poor; there is no existing driveway. Utility vehicles must ride over the cul-de-sac curb to get to the site. There are no stairs leading up to the elevated lift station slab; slope is too steep. Re-grading the site area will reduce operator difficulty during mobilization of tools and equipment for future maintenance of lift station. A valve is located within the station, which appears to be for an emergency bypass connection, although a connection point

was not found. The manhole outside the lift station site area is partially buried. The chimney joints inside the manhole at the cul-de-sac adjacent to the lift station were not sealed with concrete.

Recommendations:
A final inspection needs to be conducted with the contractor. The following recommendations should be warranty items that need to be addressed to the contractor before the expiration date:

1. Replace the pumps.
2. Relocate the discharge gate valves downstream of the check valves.
3. Install a complete wet well vent with screen cover.
4. Install a driveway apron at the cul-de-sac curb to access the lift station.
5. Re-grade the site area to reduce the slope leading up to the lift station slab.
6. Install a bypass connection to the existing bypass valve.
7. Raise the manhole lid to the grade.
8. Seal the manhole joints with concrete.

GORMAN-RUPP
SPARE PARTS PRICING, PUMP MODEL T3A3-B
ROTATING ASSEMBLY

DESCRIPTION	PRICE EACH
IMPELLER	298.96
SEAL ASSEMBLY	250.56
WEAR PLATE ASSEMBLY	106.39
INBOARD BALL BEARING	24.68
OUTBOARD BALL BEARING	21.98
FLAP VALVE	113.17
SEAL PLATE GASKET	1.89
IMPELLER SHIM SET	1.84
ROTATING ASSEMBLY SHIM SET	.97
ROTATING ASSY O-RING	2.45
BACK COVER O-RING	2.45
SUCTION FLANGE GASKET	3.26
BELTS AND SHEAVES	275.00
CHECK VALVE (LH & RH)	947.94
4" GATE/PLUG VALVE	2,181.78
COMPLETE ROTATING ASSEMBLY	1536.00

GORMAN-RUPP
SPARE PARTS PRICING, PUMP MODEL T4A3-B
ROTATING ASSEMBLY

DESCRIPTION	PRICE EACH
IMPELLER	355.93
SEAL ASSEMBLY	250.56
WEAR PLATE ASSEMBLY	106.34
INBOARD BALL BEARING	34.73
OUTBOARD BALL BEARING	92.62
FLAP VALVE	124.34
SEAL PLATE GASKET	1.89
IMPELLER SHIM SET	1.84
ROTATING ASSEMBLY SHIM SET	.97
ROTATING ASSY O-RING	3.06
BACK COVER O-RING	3.06
SUCTION FLANGE GASKET	8.11
BELTS AND SHEAVES	275.00
CHECK VALVE (LH & RH)	947.94
4" GATE/PLUG VALVE	2,181.78
COMPLETE ROTATING ASSEMBLY	1,765.00

GORMAN-RUPP
SPARE PARTS PRICING, PUMP MODEL T6A3-B
ROTATING ASSEMBLY

DESCRIPTION	PRICE EACH
IMPELLER	397.49
SEAL ASSEMBLY	250.56
WEAR PLATE ASSEMBLY	142.49
INBOARD BALL BEARING	34.73
OUTBOARD BALL BEARING	92.62
FLAP VALVE	137.70
SEAL PLATE GASKET	1.89
IMPELLER SHIM SET	1.84
ROTATING ASSEMBLY SHIM SET	1.43
ROTATING ASSY O-RING	6.58
BACK COVER O-RING	6.58
SUCTION FLANGE GASKET	11.53
BELTS AND SHEAVES	325.00
LH CHECK VALVE	1,132.00
RH CHECK VALVE	1,127.97
6" GATE/PLUG VALVE	3,343.15
COMPLETE ROTATING ASSEMBLY	1,886.00

GORMAN-RUPP
SPARE PARTS PRICING, PUMP MODEL T8A3-B
S/N 348220 - 740692
ROTATING ASSEMBLY

DESCRIPTION	PRICE EACH
IMPELLER	613.53
SEAL ASSEMBLY	468.23
WEAR PLATE ASSEMBLY	302.38
INBOARD BALL BEARING	145.71
OUTBOARD BALL BEARING	48.55
FLAP VALVE	187.37
SEAL PLATE GASKET	1.79
IMPELLER SHIM SET	13.52
WEAR PLATE SHIM SET	1.02
SEAL PLATE O-RING	4.95
BACK COVER O-RING	5.71
SUCTION FLANGE GASKET	20.35
BELTS AND SHEAVES	350.00
COMPLETE ROTATING ASSEMBLY	3,111.00

GORMAN-RUPP
SPARE PARTS PRICING, PUMP MODEL T8A3-B
S/N 740692 - 905545
ROTATING ASSEMBLY

DESCRIPTION	PRICE EACH
IMPELLER	613.53
SEAL ASSEMBLY	468.23
WEAR PLATE ASSEMBLY	302.38
INBOARD BALL BEARING	145.71
OUTBOARD BALL BEARING	48.55
FLAP VALVE	187.37
SEAL PLATE GASKET	1.79
IMPELLER SHIM SET	13.52
WEAR PLATE SHIM SET	1.02
ROTATING ASSY O-RING	3.06
BACK COVER O-RING	5.71
SUCTION FLANGE GASKET	20.35
BELTS AND SHEAVES	350.00
COMPLETE ROTATING ASSEMBLY	3,111.00

GORMAN-RUPP
SPARE PARTS PRICING, PUMP MODEL T8A3-B
S/N 905546 & UP
ROTATING ASSEMBLY

DESCRIPTION	PRICE EACH
IMPELLER	613.53
SEAL ASSEMBLY	468.23
WEAR PLATE ASSEMBLY	302.38
INBOARD BALL BEARING	168.30
OUTBOARD BALL BEARING	191.66
FLAP VALVE	187.37
SEAL PLATE GASKET	1.79
IMPELLER SHIM SET	13.52
ROTATING ASSEMBLY SHIM SET	2.65
BACK COVER O-RING	5.71
SUCTION FLANGE GASKET	20.35
BELTS AND SHEAVES	350.00
COMPLETE ROTATING ASSEMBLY	3,143.00

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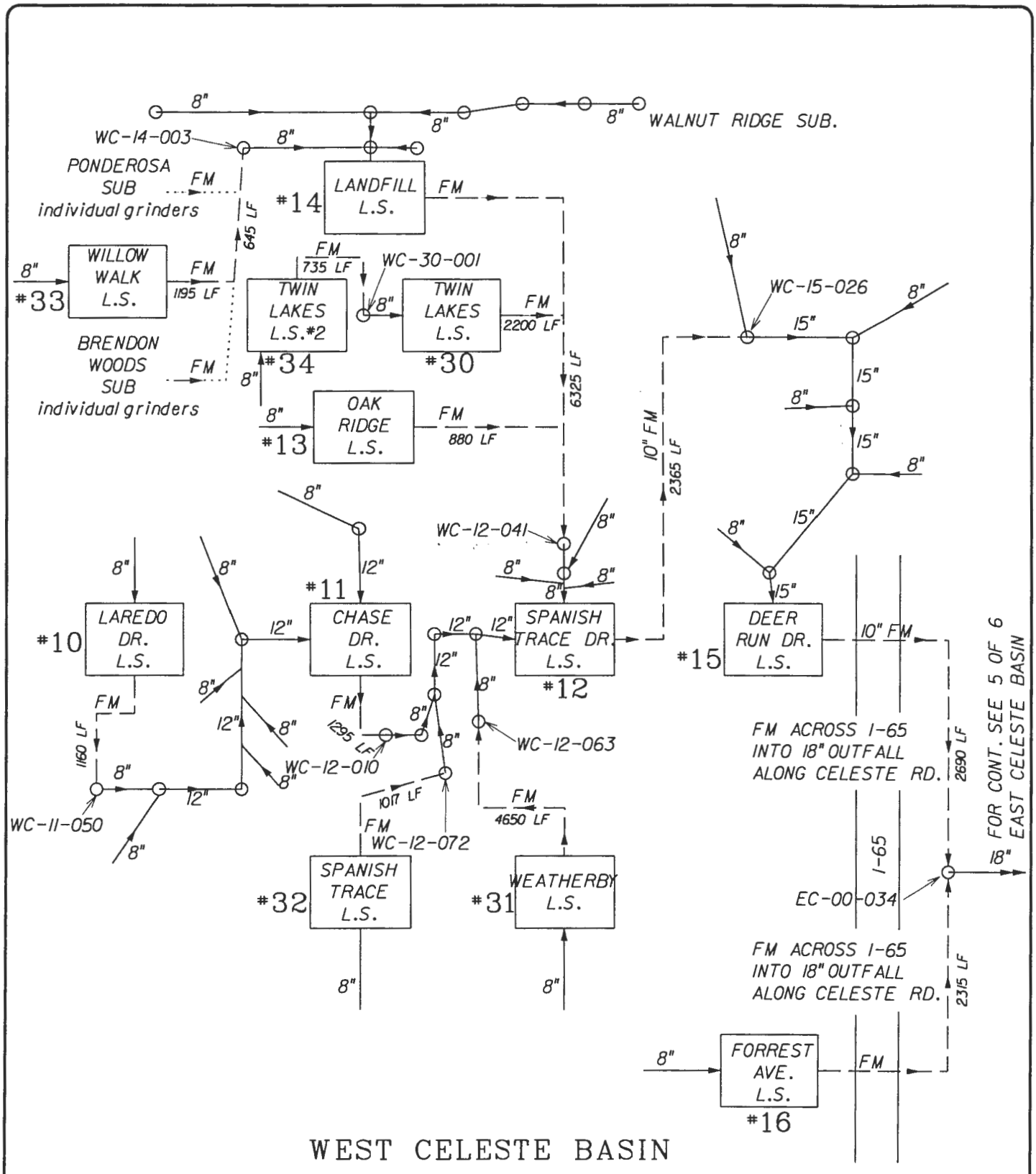

WEST CELESTE BASIN
(CELESTE RD AREA WEST OF I-65)

PROJECT NO.: 111905.10
DRAWING NO.:

NO.	DATE	DESCRIPTION	BY
		REVISIONS	

PROJECT NAME: SARALAND SEWER MAPPING

SHEET NAME: WEST CELESTE BASIN SEWER SCHEMATIC

VOLKERT & ASSOCIATES, INC.

CERTIFICATION:
DATE:

DESIGNED: DATE: OCTOBER, 2004
CHECKED: PROJECT NO.: 111905.10
DRAWN: DRAWING NO.:
CHECKED: Sheet 1 Of 6

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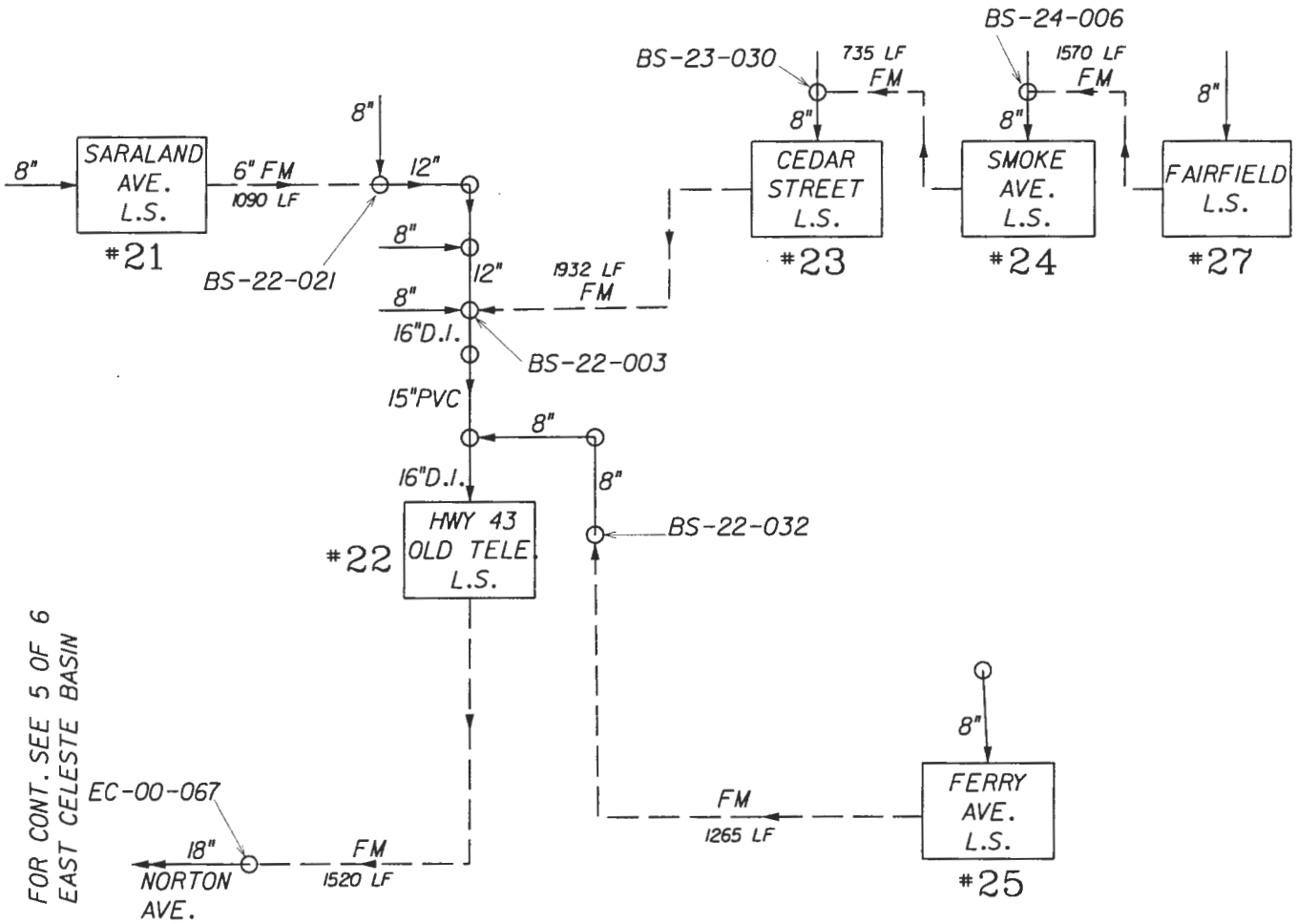


BAYOU SARA BASIN

PROJECT NO.: 111905.10
DRAWING NO.:

NO.	DATE	DESCRIPTION	BY
		REVISIONS	

PROJECT NAME: SARALAND SEWER MAPPING

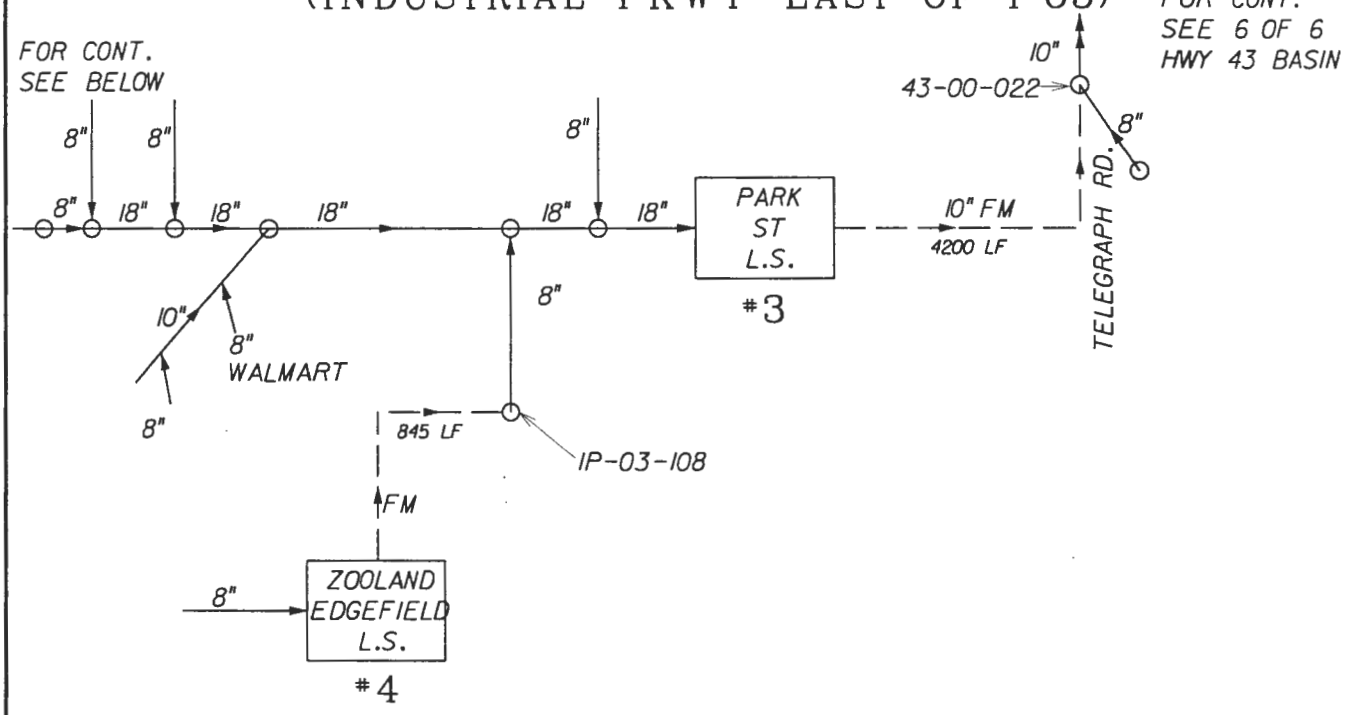
SHEET NAME: BAYOU SARA BASIN SEWER SCHEMATIC

VOLKERT & ASSOCIATES, INC.

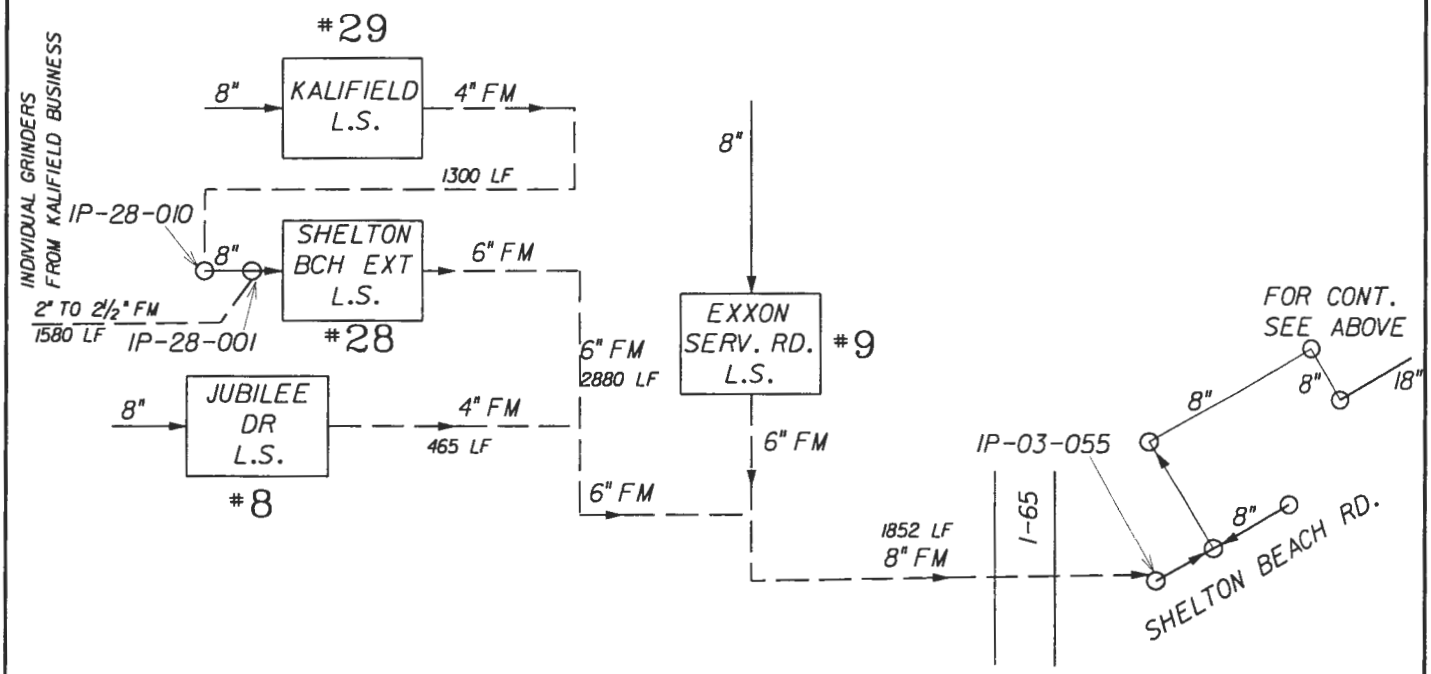
CERTIFICATION:
DATE:

DESIGNED:	DATE: OCTOBER, 2004
CHECKED:	PROJECT NO.: 111905.10
DRAWN:	DRAWING NO.:
CHECKED:	Sheet 2 Of 6

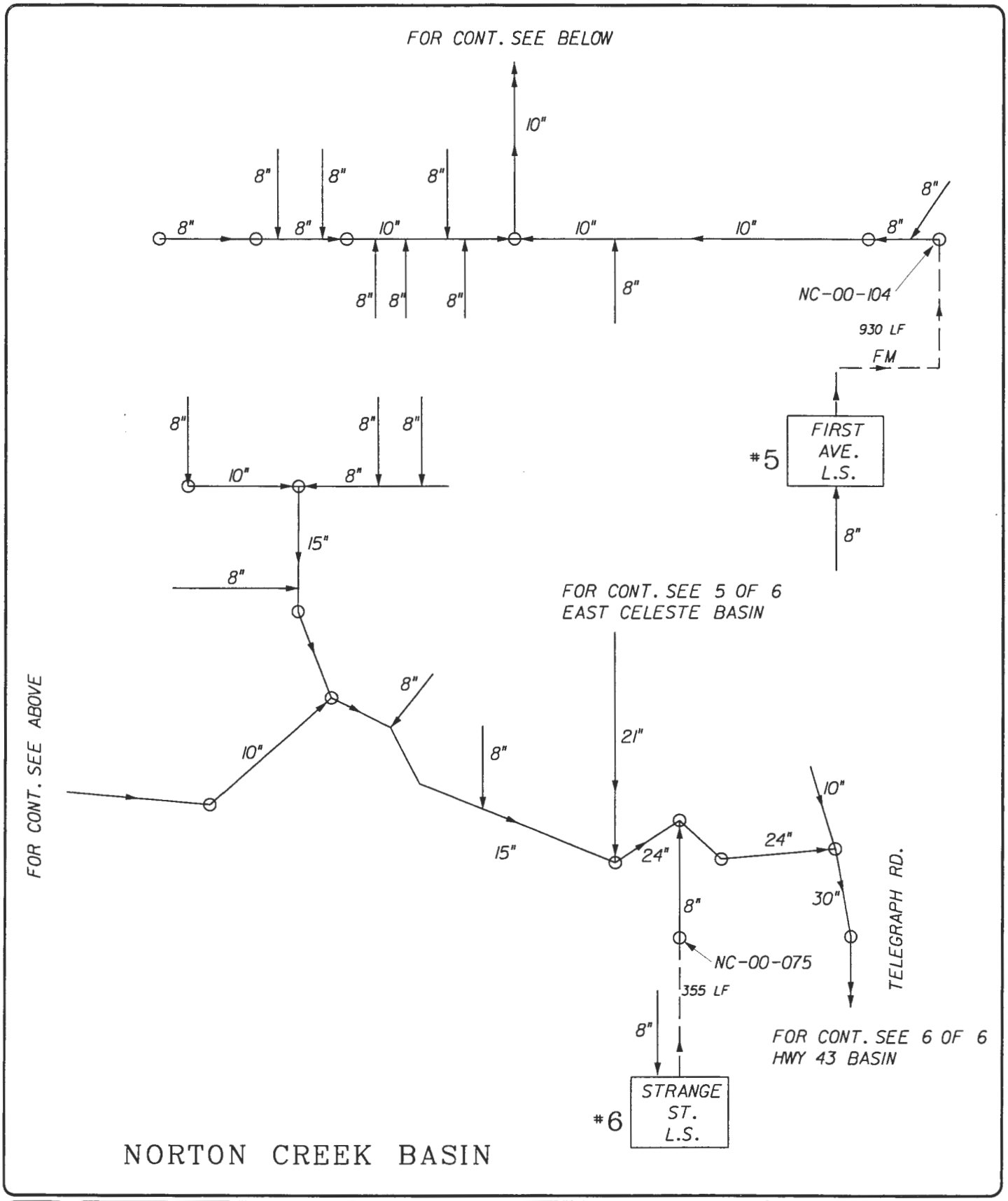
INDUSTRIAL PARKWAY BASIN
(INDUSTRIAL PKWY EAST OF I-65)



INDUSTRIAL PARKWAY BASIN
(INDUSTRIAL PKWY WEST OF I-65)



PROJECT NO.: 111905.10	NO.	DATE	DESCRIPTION	BY	PROJECT NAME: SARALAND SEWER MAPPING	CERTIFICATION:	DESIGNED: DATE: OCTOBER, 2004
DRAWING NO.:			REVISIONS		SHEET NAME: INDUSTRIAL PARKWAY BASIN SEWER SCHEMATIC	DATE:	CHECKED: PROJECT NO.: 111905.10
					VOLKERT ASSOCIATES, INC.		DRAWN: DRAWING NO.:
							CHECKED: Sheet 3 of 6



NORTON CREEK BASIN

PROJECT NO.: 111905.10
DRAWING NO.:

NO.	DATE	DESCRIPTION	BY

REVISIONS

PROJECT NAME: SARALAND SEWER MAPPING

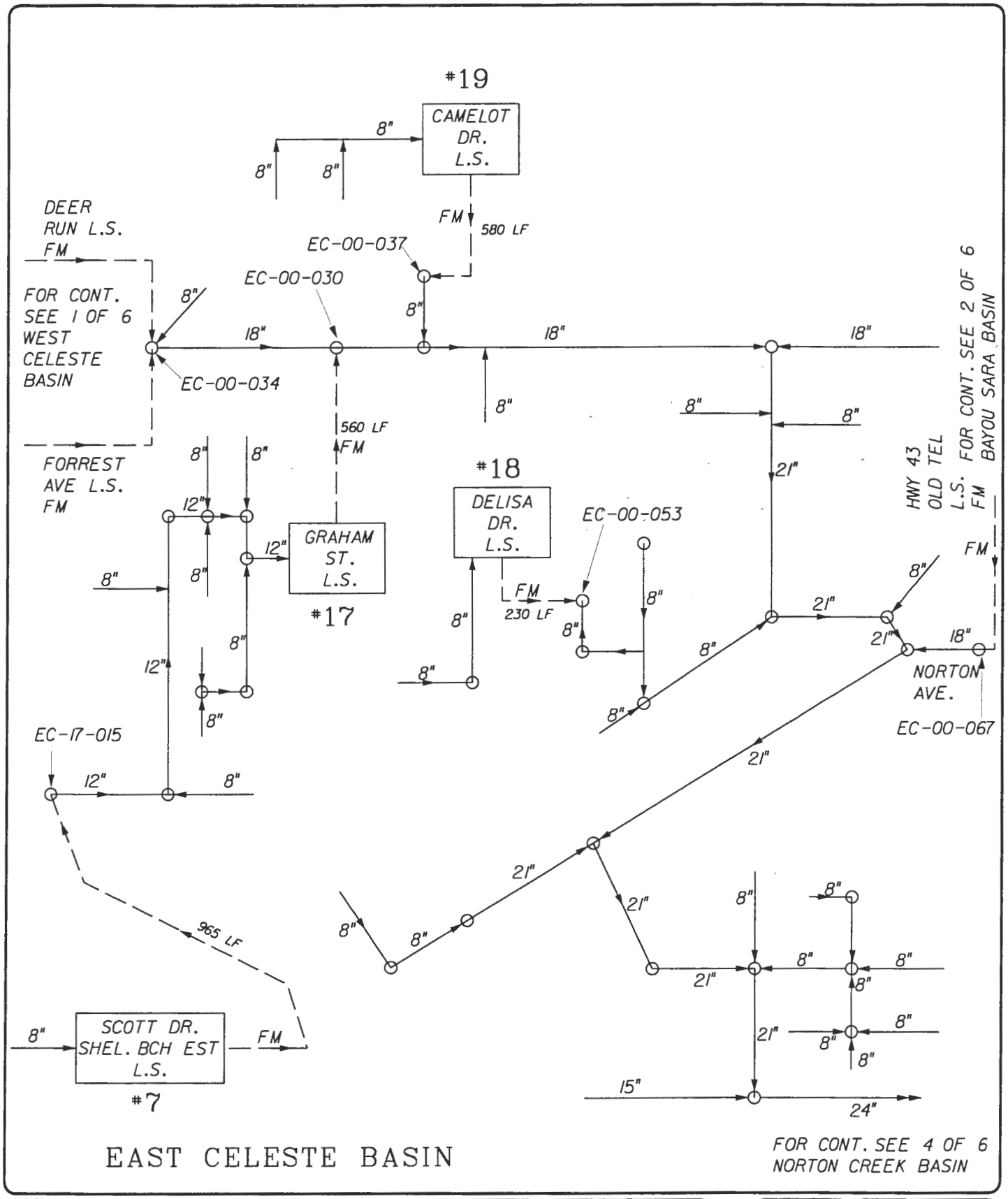
SHEET NAME: NORTON CREEK BASIN SEWER SCHEMATIC

VOLKERT & ASSOCIATES, INC.

CERTIFICATION:

DATE:

DESIGNED:	DATE: OCTOBER, 2004
CHECKED:	PROJECT NO.: 111905.10
DRAWN:	DRAWING NO.:
CHECKED:	Sheet 4 Of 6



EAST CELESTE BASIN

FOR CONT. SEE 4 OF 6
NORTON CREEK BASIN

PROJECT NO.: 0505.10	PROJECT NAME: SARALAND SEWER MAPPING	CERTIFICATION:	DESIGNED: DATE: OCTOBER, 2004
DRAWING NO.:	SHEET NAME: EAST CELESTE BASIN SEWER SCHEMATIC	DATE:	CHECKED: PROJECT NO.: 111905.10
NO. DATE DESCRIPTION BY REVISIONS	VOLKERT & ASSOCIATES, INC.		DRAWN: DRAWING NO.:
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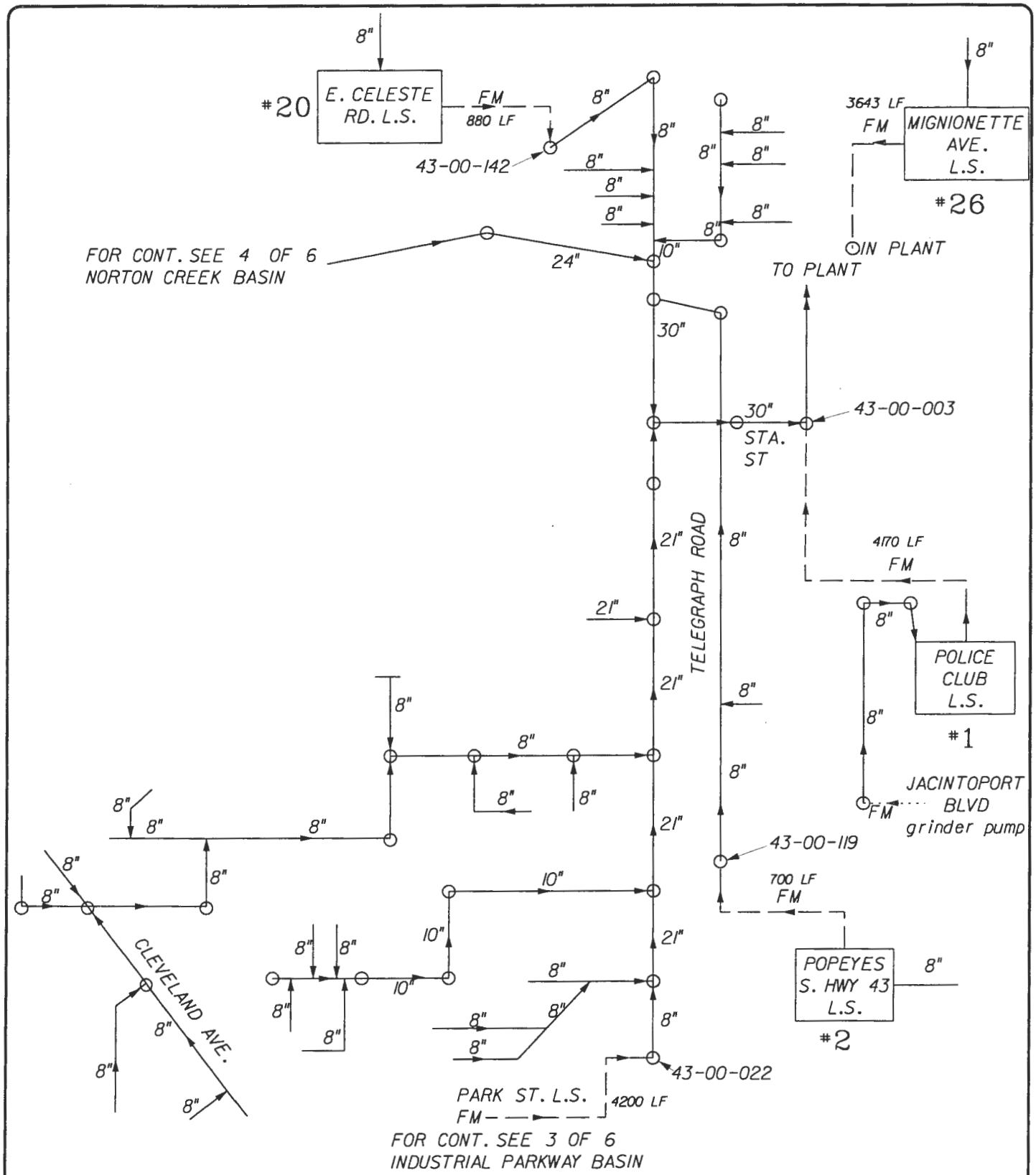
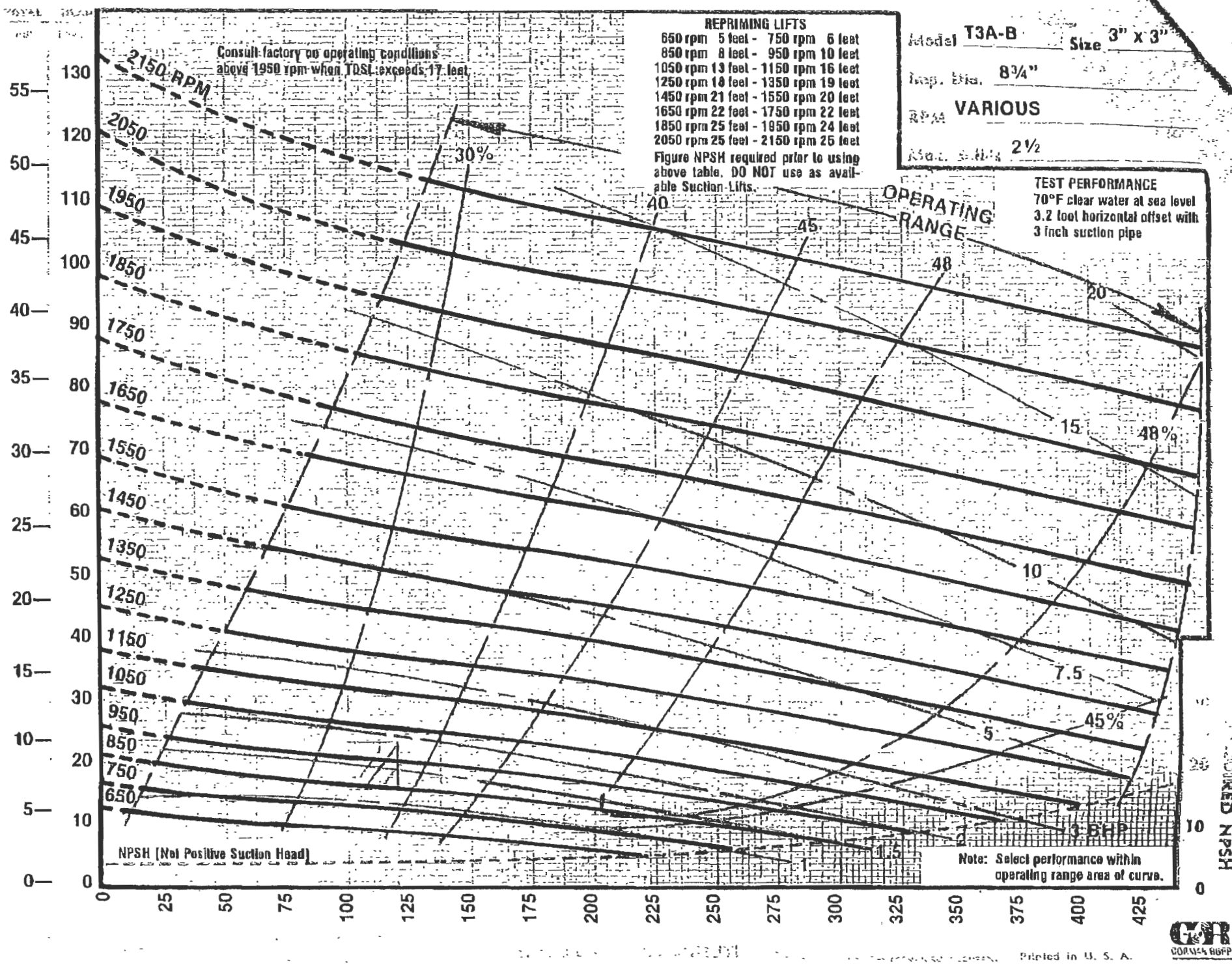


HWY 43 BASIN

PROJECT NO.: 2905.10	PROJECT NAME: SARALAND SEWER MAPPING	CERTIFICATION:	DESIGNED: DATE: OCTOBER, 2004
DRAWING NO.:	SHEET NAME: HWY 43 BASIN SEWER SCHEMATIC	DATE:	CHECKED: PROJECT NO.: 111905.10
NO. DATE DESCRIPTION BY REVISIONS			DRAWN: DRAWING NO.:
			CHECKED: Sheet 6 Of 6

VOLKERT & ASSOCIATES, INC.

FIRST AVENUE #5



PERFORMANCE CHART NO. T3A-4 2-21-79

#5

#7 SCOTT DRIVE

ENGINEERING ORDER

GR GORMAN-RUPP WASTE WATER EQUIPMENT
MANSFIELD, OHIO 44902

a 3/30/78
Revisions 6/6/78
7/24/78
8/8/78
M-113-AX

AUXILIARY ENGINE DRIVE PUMP UNIT WITH DIGITAL LOGIC CONTROL

Location STATION "J", SARALAND, ALABAMA /SHELTON BEACH EST.

Configuration: Pump No. 1 BOTH PUMPS ON COMMON BASE -RIGHT HAND AUXILIARY ENGINE
Pump No. 2
Pump No. 3
Pump No. 4

PUMP DATA	Pump No. 1	Pump No. 2	Pump No. 3	Pump No. 4
Design Characteristics (GPM @ TDH)	260 @ 27'	260 @ 27'		
Priming Lift	13.7'	13.7'		
Total Dynamic Suction Lift	17.4'	17.4'		
NPSH Required				
NPSH Available				
Pump Model	T4A3-B	T4A3-B		
Pump Serial No.	663550	663551		
Impeller Dia.	9-3/4"	9-3/4"		
G-R Mech. seal, tungsten-titanium carbide	YES	YES		
Base, V-Belt PER DRAWING NO.	46126-057	SAME		
Pump Speed	1010	1010		
G-R Air Release Valve Model No.	GRP33-07	GRP33-07		

MOTOR DATA	Pump No. 1	Pump No. 2	Pump No. 3	Pump No. 4
Horsepower	5	5		
RPM RATING & (FULL LOAD)	1740	1740		
Electrical characteristics: Phase/Hertz/Volts * WIRED	3/60/230	3/60/230		
Electrical design: (standard NEMA unless otherwise indicated)	B	B		
Full Load Amps	13.0	13.0		
Enclosure-Open Drip-Proof	YES	YES		
Manufacturer ALLIS CHALMERS	YES	YES		
Code Letter	J	J		
Service Factor	1.15	1.15		
Frame Size	184T	184T		
Shaft	DOUBLE	SINGLE		
Serial No.	51-303-063	51-303-063		

ENGINE DATA	Pump No. 1	Pump No. 2	Pump No. 3	Pump No. 4
Horsepower AFTER DERATED 25%	16.8			
No. of Cylinders	4			
Design RPM	1800			
Fuel	NAT. GAS			
Coolant	AIR			
Manufacturer	WISCONSIN			
Model No.	VH40			
Serial No.	5727575			

* NOTE: Standard motor rated voltages will not agree with rated system voltages. For example, new NEMA motor voltages for 3 phase current will be 230 VAC/460 VAC. Related system voltage would be 240 VAC or 480 VAC. Standard motors are guaranteed to operate satisfactorily within plus or minus 10% of standard nameplate voltage ratings. It is rarely necessary to apply motors specially wound for odd voltages (at additional cost). When special voltage motors are required, it should be so noted.

ENGINEERING ORDER

GORMAN-RUPP WASTE WATER EQUIPMENT
MANSFIELD, OHIO 44902

Date 3/30/78
Revisions ~~6/6/78~~ 7/24/78 8/8/78
Serial M-113-AX

AUXILIARY ENGINE DRIVE PUMP UNIT
Location STATION "J" SARALAND, ALABAMA

DRIVE DATA			Pump No. 1	Pump No. 2	Pump No. 3	Pump No. 4
MOTOR DRIVE	Sheave on Pump DODGE # 2517 BUSHING	Section	3V	3V		
		Grooves	2	2		
		O.D.	8.0	8.0		
		Bore	1-1/2"	1-1/2"		
		Key	3/8"	3/8"		
	Sheave on Motor DODGE BUSHING #1610	Section	3V	3V		
		Grooves	2	2		
		O.D.	4.75	4.75		
		Bore	1-1/8"	1-1/8"		
		Key	1/4"	1/4"		
	Center Distance		34.1	23.1		
	V-Belt Size	2 BELTS PER PUMP	3V900	3V670		
ENGINE DRIVE	Sheave on Engine DODGE BUSHING #2517	Section	3V			
		Grooves	4			
		O.D.	6.5			
		Bore	1-7/16"			
		Key	3/8"			
	Sheave on Jackshaft DODGE BUSHING #2517	Section	3V			
		Grooves	4			
		O.D.	6.5			
		Bore	1-1/2"			
		Key	3/8"			
	Center Distance		19.8"			
	V-Belt Size		3V600			
	Centrifugal Clutch	Mfr.	FORMSPRAG			
		Model No.	10AD-1M			

MODIFICATIONS/COMMENTS

EACH PUMP TO BE FITTED W/ A DRAIN KIT.
SHIP WITH PUMP UNIT:
ONE (1) ADDITIONAL V-BELT DRIVE ASSY. TO INCLUDE THE FOLLOWING:
2 - "A" SEC. 9.0 3GR 1-1/2" BORE 3/8" KEY
2 - "A" SEC. 5.2 3GR 1-1/8" BORE 1/4" KEY

3 - A90 BELTS
3 - A65 BELTS

1 - TB WOODS BUSHING "SK"
1 - TB WOODS BUSHING "SD"

M-113-AX

TOTAL HEAD IN FEET
0 5 10 15 20 25
0 10 20 30 40 50 60
CAPACITY IN U.S. GALLONS PER MINUTE
0 50 100 150 200 250 300 350 400 450 500 550 600 650 700 750 800
0 10 20 30
NPSH REQUIRED IN FEET
REPRIMING LIFTS
650 rpm 5 feet — 750 rpm 8 feet
850 rpm 16 feet — 950 rpm 19 feet
1050 rpm 22 feet — 1150 rpm 24 feet
1250 rpm 25 feet — 1350 rpm 25 feet
1450 rpm 25 feet — 1550 rpm 25 feet
1650 rpm 25 feet — 1750 rpm 25 feet
1850 rpm 25 feet — 1950 rpm 25 feet
Figure NPSH required prior to using above table. DO NOT use as available Suction Lift.
TEST PERFORMANCE
70°F clear water at sea level
4 foot horizontal offset with
6 inch suction pipe
OPERATING RANGE
40%
52%
T4A-B
4" x 4"
VARIOUS
9¾
3"
6-7-78
SECTION 60 PAGE 1154
REQUIRED NPSH

FLYGT

PERFORMANCE CURVE

PRODUCT	TYPE
CP3085.182	MT

DATE	PROJECT	CURVE NO	ISSUE
2004-09-07	#8 – JUBILEE DRIVE	63-436-00-3830	3

	1/1-LOAD	3/4-LOAD	1/2-LOAD
POWER FACTOR	0.85	0.79	0.69
EFFICIENCY	72.5 %	74.5 %	73.5 %
MOTOR DATA	---	---	---

RATED POWER	2.2	hp
STARTING CURRENT ...	14	A
RATED CURRENT ...	3.4	A
RATED SPEED	1670	rpm
TOT.MOM.OF INERTIA ...	0.030	kgm2
NO. OF BLADES	1	

IMPELLER DIAMETER: 147 mm

MOTOR #	STATOR	REV
15-07-4AL	12YSER	10

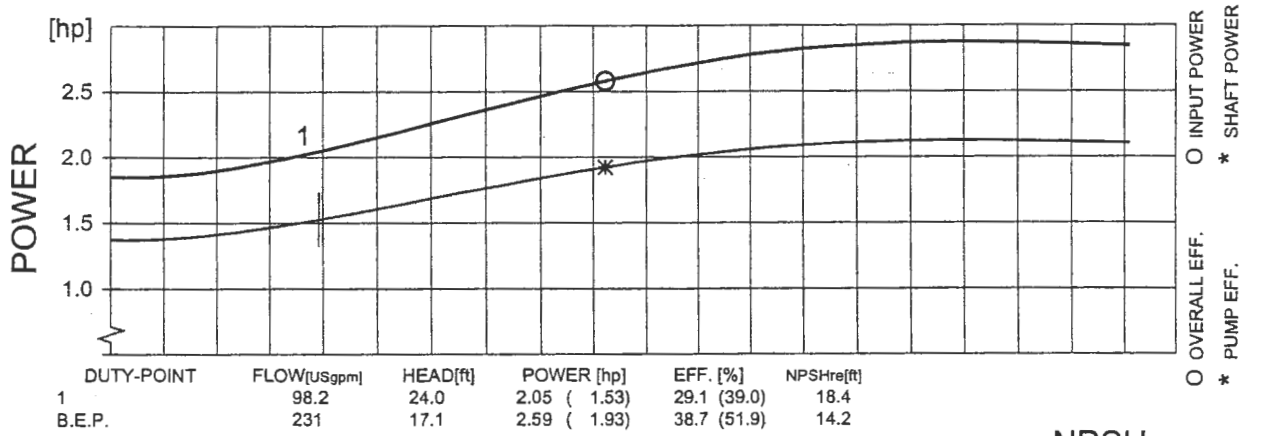
FREQ.	PHASES	VOLTAGE	POLES
60 Hz	3	460 V	4

GEARTYPE	RATIO
---	---

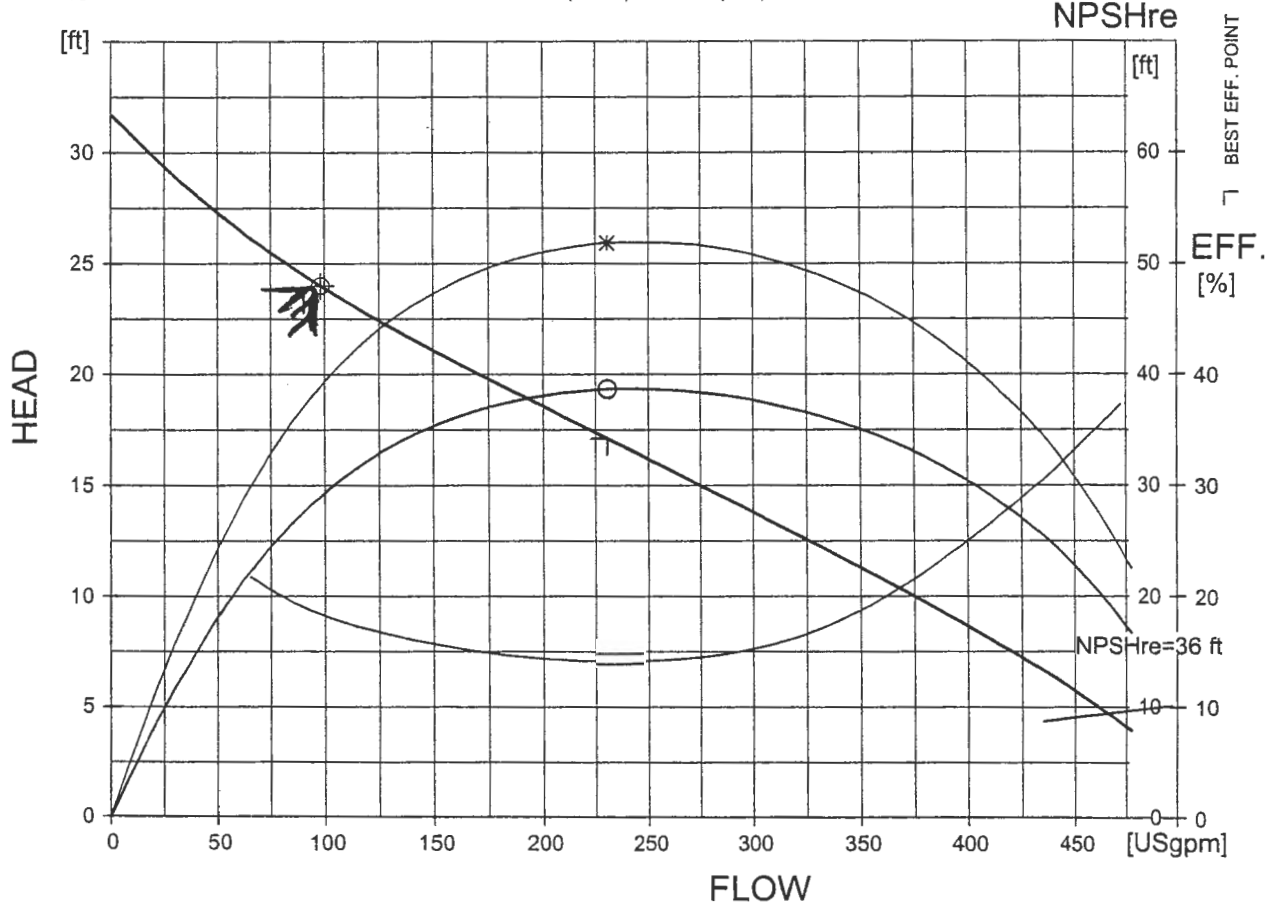
COMMENTS: **80 GPM @ 24' TDH**

INLET/OUTLET: - / 80 mm

IMP. THROUGHLET: 76 mm



DUTY-POINT	FLOW[USgpm]	HEAD[ft]	POWER [hp]	EFF. [%]	NPSHre[ft]
1	98.2	24.0	2.05 (1.53)	29.1 (39.0)	18.4
B.E.P.	231	17.1	2.59 (1.93)	38.7 (51.9)	14.2



FLYPS2.19 (20021016)

NPSHre = NPSH3% + min. operational margin

Performance with clear water and ambient temp 40 °C

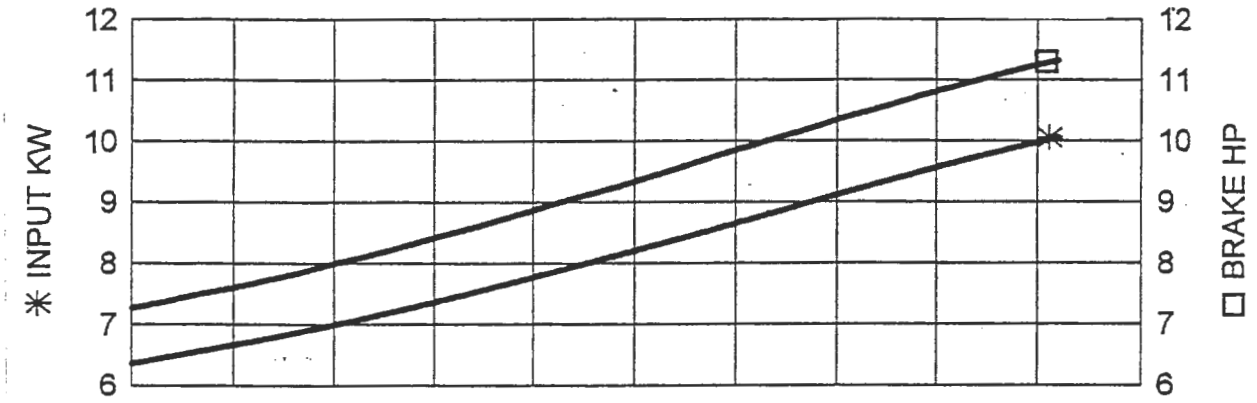
FLYGT CURVE

26	3
ISSUED	SUPERSEDES
3/94	2/88

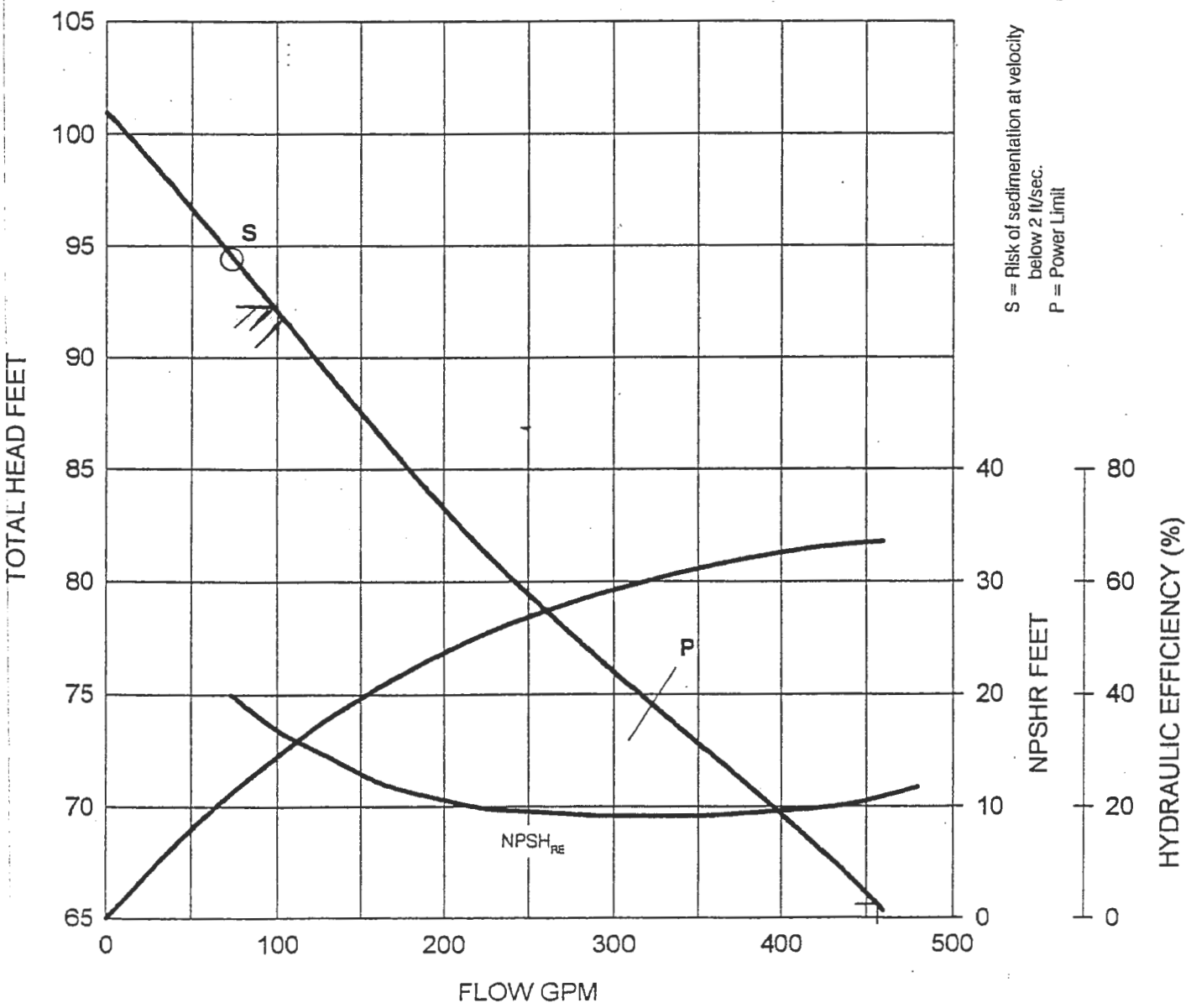
C-3127
481 Impeller

CP	
VANES	PHASE
1	3

EXXON STATION OR SERVICE ROAD #9



100 GPM @ 92' TDH



EXPLOSION PROOF

The pump system including the pump, motor and power cable shall be approved for use in areas classified as hazardous locations in accordance with the NEC Class 1, Division 1, Group C and D service as determined and approved by a U.S. nationally recognized testing agency (U.L., FM) at the time of bidding of the project. As required by Factory Mutual (FM) the motor shall be capable of operating in pumped media up to 104 degrees F. The motor thermal switch shall allow safe motor operation up to 260 degrees F (125 degrees C). In addition an internal Float Switch shall be available in the motor chamber. Service of explosion proof submersible units shall be performed by qualified FM experienced personnel.

PUMP CAPABILITIES	
Flygt Pump Model	CP-3127
Impeller	481
Horsepower	10
Voltage	230
Phase	3
Frequency	60
Discharge Size	4"
Upper Guide Bar Brackets	Stainless Steel
Lifting Cable/Chain	Cable
Length of Cable/Chain	30'
Type of Cable/Chain	Stainless Steel
Electric Cable Length	40'
Electric Cable Size	#10/3-2-1
Pump Capacity	100 GPM @ 92' TDH

L.S. #1
EXXON STATION
OR SERVICE ROAD

#9

ENGINEERING ORDER

GORMAN-RUPP WASTE WATER EQUIPMENT
MANSFIELD, OHIO 44902

Date 5/19/86
Revisions
Serial -86-2438-AM

PUMP AND MOTOR DATA

LAREDO (#10)

PUMP DATA	Pump No. 1	Pump No. 2	Pump No. 3	Pump No. 4
Design characteristics (GPM @ TDH)	119 @ 36'	119 @ 36'		
Priming lift	16'	16'		
Total dynamic suction lift	20'	20'		
NPSH required	4'	4'		
NPSH available EXCESS W/3' S.F. DEDUCT	6.9'	6.9'		
Pump Model	T3A3-B	T3A3-B		
Pump Serial No.	853819	853820		
Impeller diameter	8-3/4	8-3/4		
G-R Mech. seal, tungsten-titanium carbide	YES	YES		
Base, V-Belt	YES	YES		
Pump speed	1243	1243		

Horizontal Electrical MOTOR DATA	Pump No. 1	Pump No. 2	Pump No. 3	Pump No. 4
Horsepower	5	5		
RPM @ DESIGN CONDITION	1730	1730		
Electrical characteristics: Phase/Hertz/Volts	3/60/230	3/60/230		
Electrical design: (standard NEMA unless otherwise indicated)	B	B		
Enclosure, open drip-proof W/1.15 S.F.	YES	YES		
Manufacturer GORMAN-RUPP	60020234	60020226		
Code letter	J	J		
Frame size	184T	184T		
Full load amps.	13.0	13.0		

V-BELT DRIVE DATA		Pump No. 1	Pump No. 2	Pump No. 3	Pump No. 4
Center Distance		18.6	18.6		
Sheave on Pump	Section	3V	3V		
BUSHING # 1610	O.D.	4.75	4.75		
BORE 1-1/2" KEY 3/8"	Grooves	3	3		
Sheave on Motor	Section	3V	3V		
BUSHING # 1610	O.D.	3.35	3.35		
BORE 1-1/8 KEY 1/4	Grooves	3	3		
V-Belt Size (3) BELTS PER PUMP		3VX500	3VX500		

RELATED MODIFICATION/DATA/COMMENTS, ETC.

CERTIFIED PERFORMANCE TEST REQUIRED ON BOTH PUMPS

CERTIFIED REPRIME TEST REQUIRED ON BOTH PUMPS

NOTE: Standard motor rated voltages will not agree with rated system voltages. For example, new NEMA motor voltages for 3 phase current will be 230 VAC/460 VAC. Related system voltage would be 240 VAC or 480 VAC. Standard motors are guaranteed to operate satisfactorily within plus or minus 10% of standard nameplate voltage ratings. It is rarely necessary to apply motors specially wound for odd voltages (at additional cost). When special voltage motors are required, it should be so noted.

MASTER FILE COPY
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CDSW

119 GPM @ 36' TDH (LAREDO #10)

PERFORMANCE CURVE

VOLUTE 11405B CURVE T3A-B-4

IMPELLER 11406 MODEL T3A-B

SIZE 3"X3" IMP.DIA. 8.75"

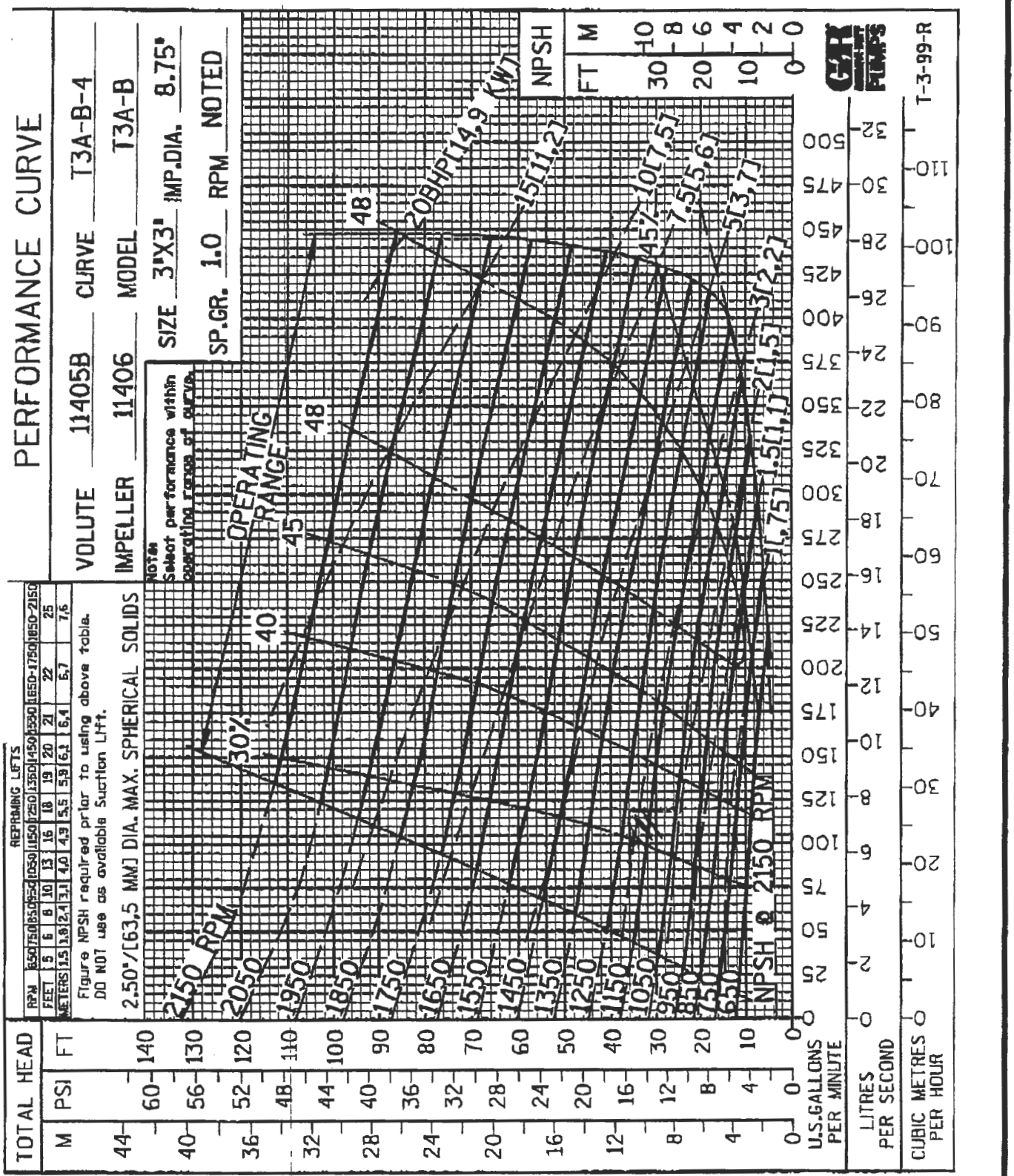
SP.GR. 1.0 RPM NOTED

Note: Select performance within operating range of curve.

2.50"/[63,5 MM] DIA. MAX. SPHERICAL SOLIDS

REPRIMING LIFTS																
RPM	650	750	850	950	1050	1150	1250	1350	1450	1550	1650-1750	1850-2150
FEET	5	6	8	10	13	16	18	19	20	21	22	25
METERS	1,5	1,8	2,4	3,1	4,0	4,9	5,5	5,9	6,1	6,4	6,7	7,6

Figure NPSH required prior to using above table. DO NOT use as available Suction Lift.



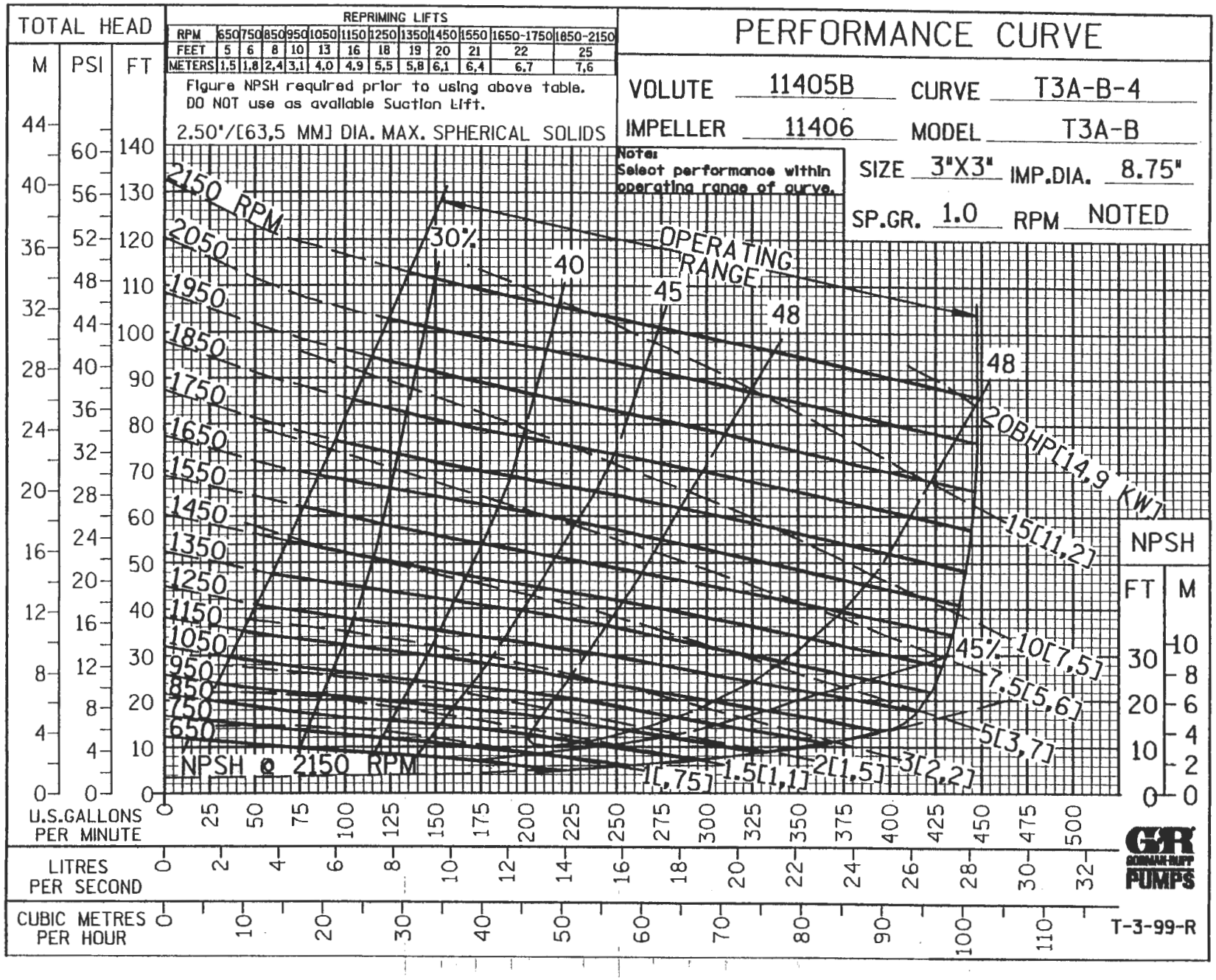
THE GORMAN-RUPP COMPANY • MANSFIELD, OHIO

GORMAN-RUPP OF CANADA LIMITED • ST. THOMAS, ONTARIO, CANADA

Specifications Subject to Change Without Notice

Printed in U.S.A.

LAREDO DRIVE #10



GORMAN-RUPP PUMPS

THE GORMAN-RUPP COMPANY • MANSFIELD, OHIO

GORMAN-RUPP OF CANADA LIMITED • ST. THOMAS, ONTARIO, CANADA

Specifications Subject to Change Without Notice

Printed in U.S.A.

ENGINEERING ORDER

GORMAN-RUPP WASTE WATER EQUIPMENT
MANSFIELD, OHIO 44902

Date 5/19/86
Revisions

Serial 86-2437 AM #11

PUMP AND MOTOR DATA

CHASE DRIVE

PUMP DATA	Pump No. 1	Pump No. 2	Pump No. 3	Pump No. 4
Design characteristics (GPM @ TDH)	756 @ 35'	756 @ 35'		
Priming lift	17'	17'		
Total dynamic suction lift	23.2	23.2		
NPSH required	7'	7'		
NPSH available EXCESS W/3' S.F. DEDUCT	.7'	.7'		
Pump Model	T6A3-B	T6A3-B		
Pump Serial No.				
Impeller diameter	12-3/8	12-3/8		
G-R Mech. seal, tungsten-titanium carbide	YES	YES		
Base, V-Belt	YES	YES		
Pump speed	1048	1048		

Horizontal Electrical MOTOR DATA	Pump No. 1	Pump No. 2	Pump No. 3	Pump No. 4
Horsepower	15	15		
RPM FULL LOAD	1760	1760		
Electrical characteristics: Phase/Hertz/Volts	3/60/230	3/60/230		
Electrical design: (standard NEMA unless otherwise indicated)	B	B		
Enclosure/~~open/drip-proof~~ W/1.15 S.F. TEFC	YES	YES		
Manufacturer GORMAN RUPP				
Code letter	G	G		
Frame size	254T	254T		
Full load amps.	39.4	39.4		

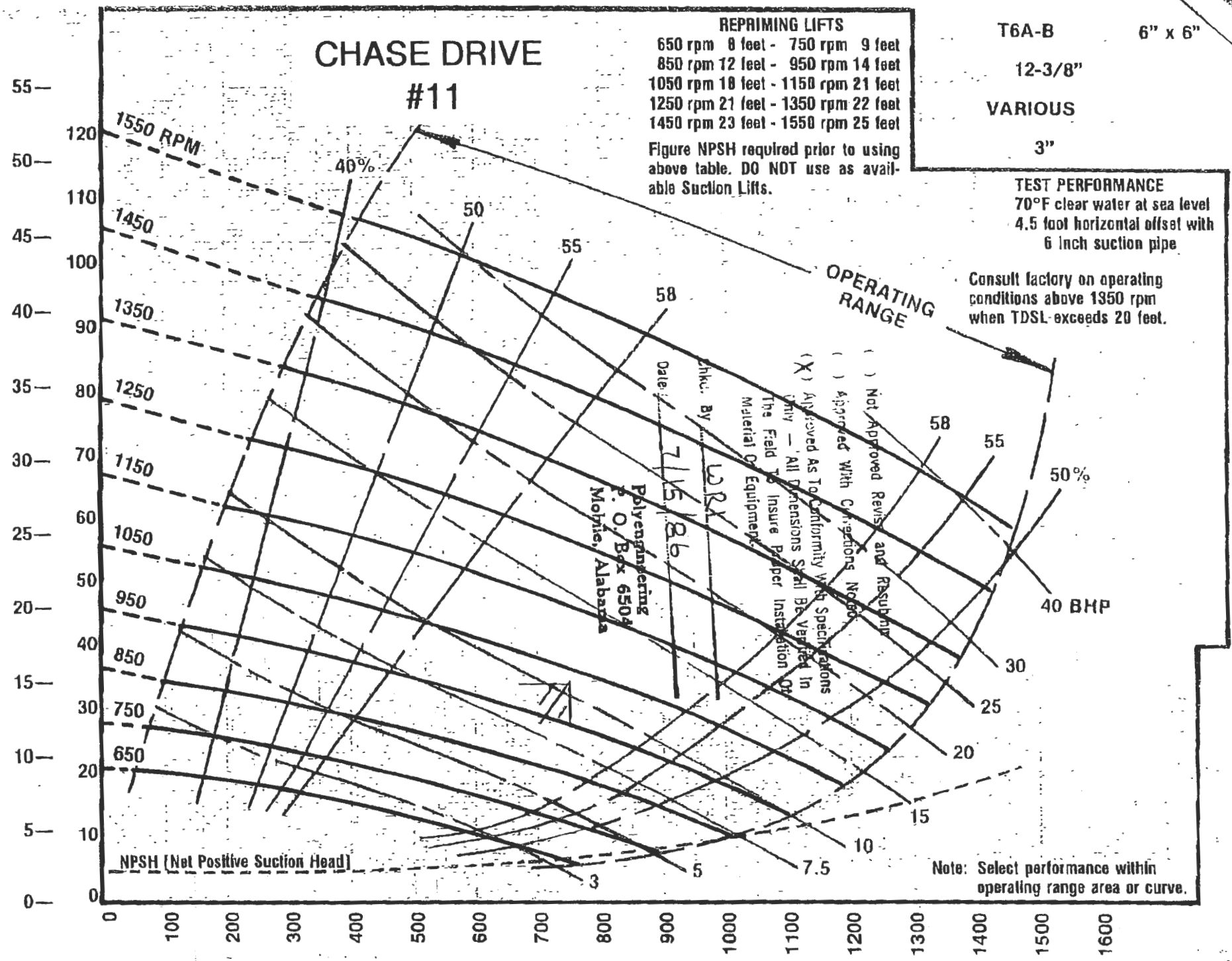
V-BELT DRIVE DATA		Pump No. 1	Pump No. 2	Pump No. 3	Pump No. 4
Center Distance		17.9	17.9		
Sheave on Pump DODGE BUSHING # 2517 BORE 1-1/2" KEY 3/8"	Section	3V	3V		
	O.D.	8.0	8.0		
	Grooves	4	4		
Sheave on Motor DODGE BUSHING # 1610 BORE 1-5/8" KEY 3/8"	Section	3V	3V		
	O.D.	4.75	4.75		
	Grooves	4	4		
V-Belt Size (4)	BELTS PER PUMP	3VX560	3VX560		

RELATED MODIFICATION/DATA/COMMENTS, ETC.

CERTIFIED PERFORMANCE TEST REQUIRED ON BOTH PUMPS

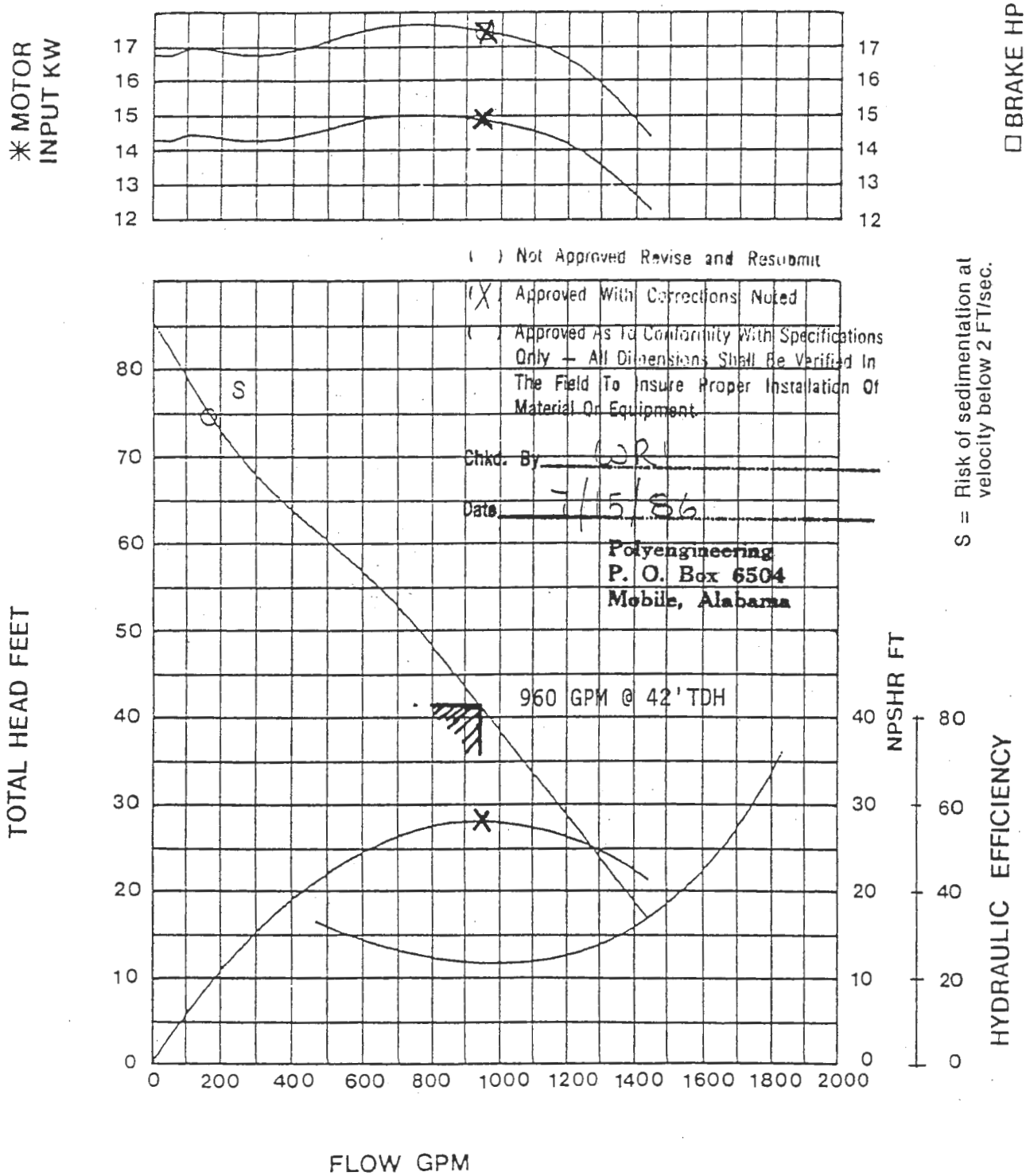
CERTIFIED REPRIME TEST REQUIRED ON BOTH PUMPS.

NOTE: Standard motor rated voltages will not agree with rated system voltages. For example, new NEMA motor voltages for 3 phase current will be 230 VAC/460 VAC. Related system voltage would be 240 VAC or 480 VAC. Standard motors are guaranteed to operate satisfactorily within plus or minus 10% of standard nameplate voltage ratings. It is rarely necessary to apply motors specially wound for odd voltages (at additional cost). When special voltage motors are required, it should be so noted.



20 HP - 1750 RPM 3φ: ~~230~~, 230/~~460~~, ~~575~~V	STD. C-3152 Warm Liquid—Impeller 434	SECTION 3152	PAGE 8J
		SUPERSEDES —	ISSUED 6/81

460 VAC REQ'D #12 – SPANISH TRACE DRIVE



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

FLYGT

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

#13 – OAK RIDGE

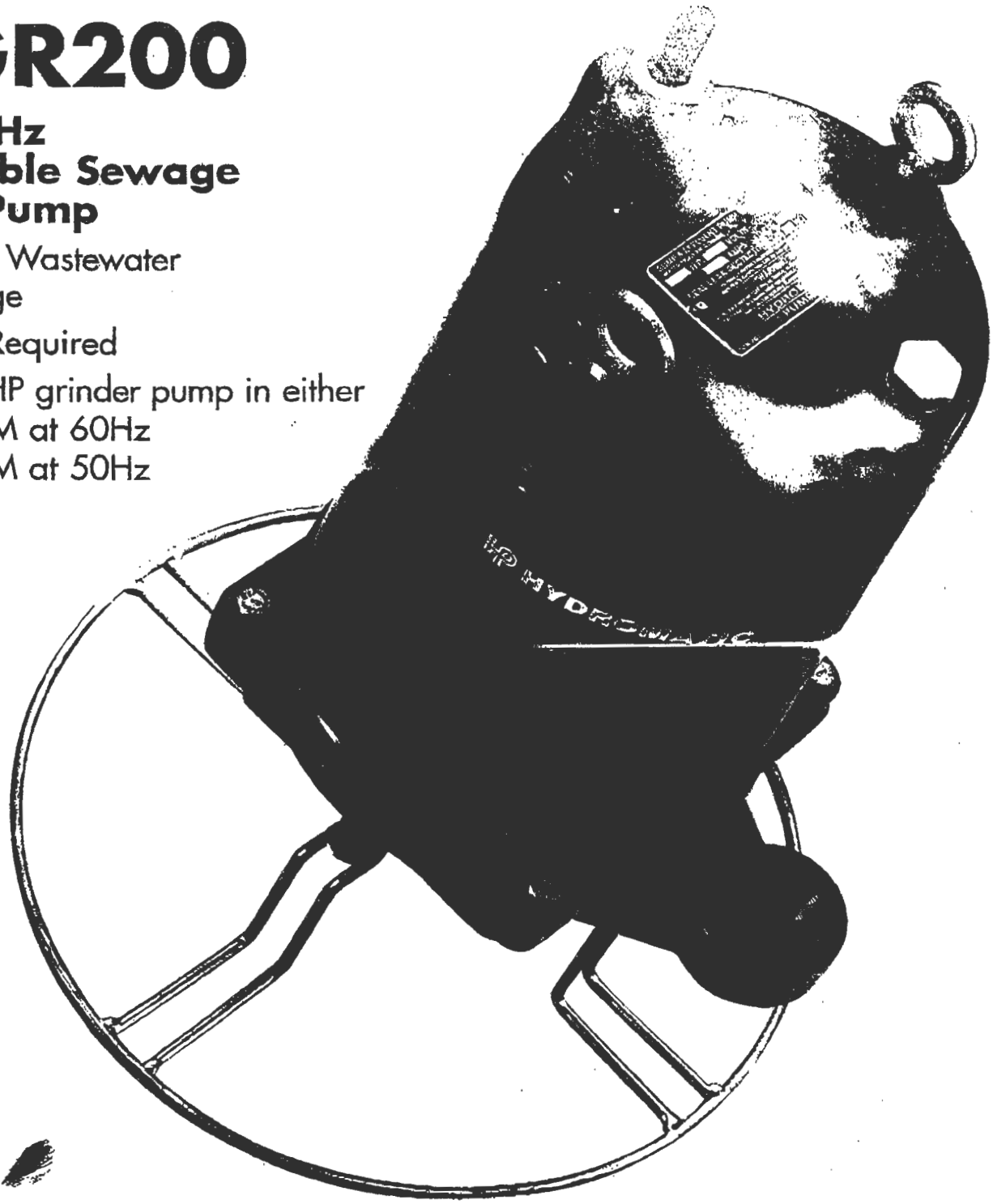
HYDROMATIC®

HPGR200

60Hz/50Hz Submersible Sewage Grinder Pump

- Residential Wastewater and Sewage
- No Panel Required
- Durable 2HP grinder pump in either
  - 3450 RPM at 60Hz
  - 2900 RPM at 50Hz

(60 Hz only)



HYDROMATIC®
Pentair Pump Group

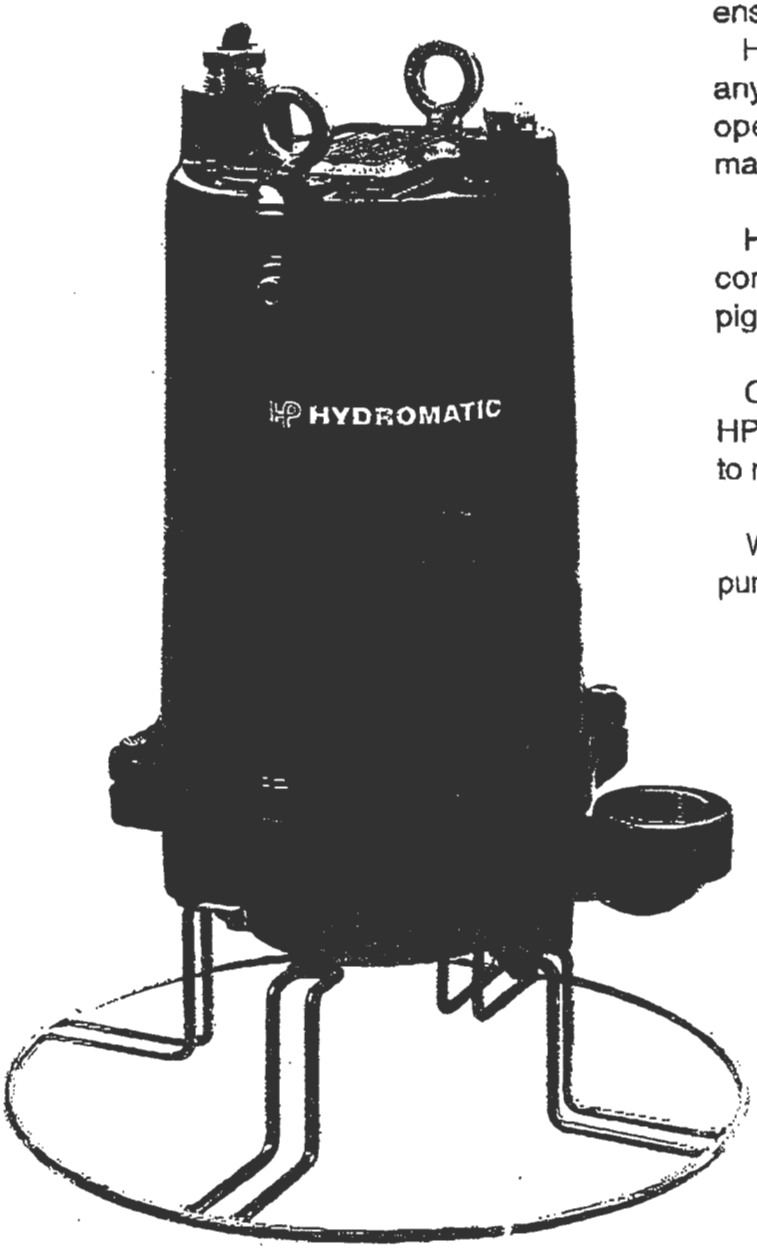
HPGR200 - Submersible Sewage Grinder Pump

Features

The Hydromatic HPGR200 submersible sewage grinder pump is specifically designed to meet the demands of residential wastewater, sewage applications, and the quality standard of the professional plumbing contractor.

The HPGR200 is ideal for "high head" applications involving single-family residences and cottages. The 1-1/4 inch NPT discharge pump is available with a vertical discharge and can handle capacities up to 58 gallons per minute and heads up to 105 feet in 60 Hz model, up to 53 gallons per minute and heads up to 81 feet in 50 Hz models.

The HPGR200 has a powerful 2 HP oil-filled motor, available in single phase, to provide superior cooling and lubrication, allowing the motor to provide years of trouble-free service. The heavy duty ball bearings upper (radial) and lower (thrust) are continuously lubricated by oil to ensure a long service life.



Hydromatic's HPGR200 does not require any control panels or liquid level controls to operate the HPGR200 grinder pump in manual mode.

Hydromatic's HPGR200A2 grinder comes complete with 2 HP listed wide angle piggyback float switch for automatic operations.

Complete "packaged systems" featuring the HPGR200 are also available from Hydromatic to make installation quick and simple.

When it comes to submersible sewage grinder pumps, trust the leader....Hydromatic.

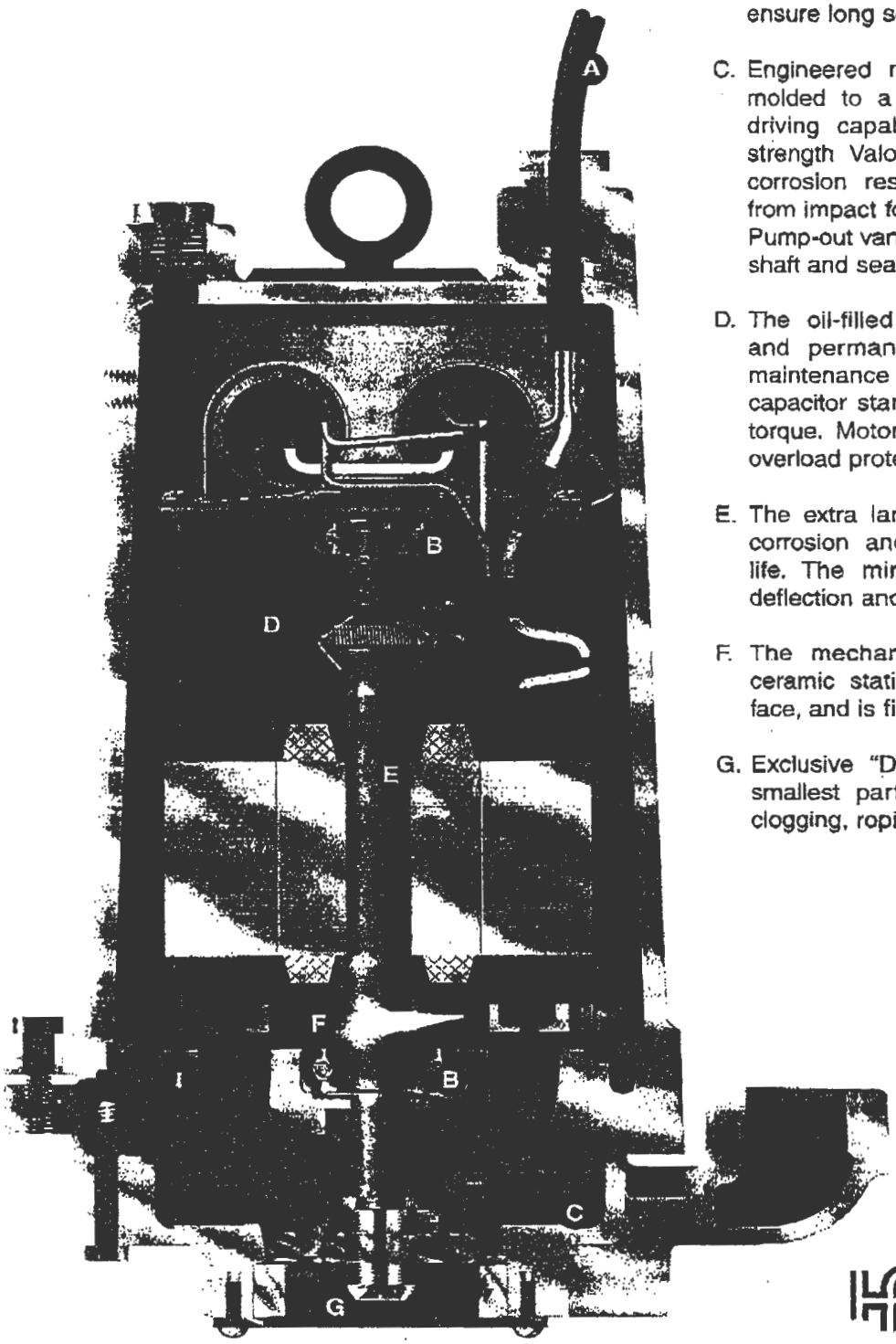
NO PANEL REQUIRED

HYDROMATIC®
Pentair Pump Group

HPGR200 - Submersible Sewage Grinder Pump

Benefits

The HPGR200 is a completely submersible sewage grinder pump for residential applications. Complete *packaged systems* also available.



A. The water resistant power cord with molded plug is available in 20 or 50 foot lengths.

B. The heavy duty ball bearings, upper (radial) and lower (thrust), are continuously lubricated by oil to ensure long service life.

C. Engineered non-metallic semi-open impeller is molded to a bronze insert for greatest torque driving capabilities. Impeller is made of high strength Valox which provides highest level of corrosion resistance and maximum toughness from impact for a wide variety of slurry pumpage. Pump-out vanes preclude material buildup around shaft and seal.

D. The oil-filled motor provides superior cooling and permanent lubrication of bearings, low maintenance and extended service life. 2-HP capacitor start motors provide maximum starting torque. Motor windings contain automatic thermal overload protection.

E. The extra large stainless steel shaft eliminates corrosion and fatigue to provide longer pump life. The minimum shaft overhang decreases deflection and increases bearing and seal life.

F. The mechanical seal is constructed with a ceramic stationary face and a carbon rotating face, and is field-proven for long service life.

G. Exclusive "Dual Cutter" design cuts solids to smallest particle size thereby greatly reducing clogging, roping, or binding.

HYDROMATIC
Pentair Pump Group

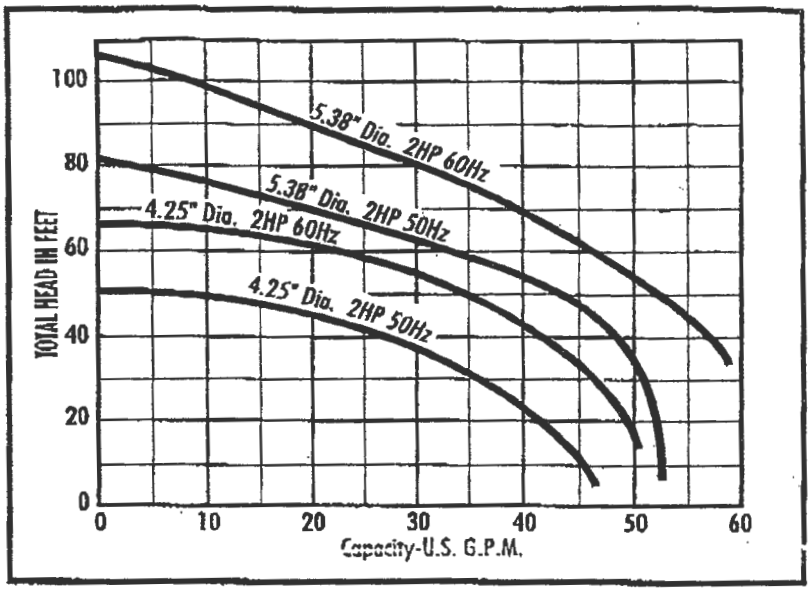
HPGR200 - Submersible Sewage Grinder Pump

Details

Pump Characteristics

Pump/Motor Unit	Submersible-Grinder
Hertz	60 Hz / 50 Hz
Phase	1 Ø
Voltage	230
Horsepower	2 HP
Full Load Amps	12.5 / 15
Motor Type	Oil Cooled Induction
	Capacitor Start
R.P.M.	2900 / 3450
Temp.	140° F Ambient
Operation	Intermittent
Thermal Overload	Bi-Metallic
Temperature	Max. Water 140° F
NEMA Design	Type A
Insulation	Class F
Discharge Size	1 1/4" NPT
Unit Weight	95 lbs.
Power Cord	Type SJOW/SJOW-A
	Water Resistant
	600 V, 60° C
	CSA/UL Approved
	20' Ft. Std.

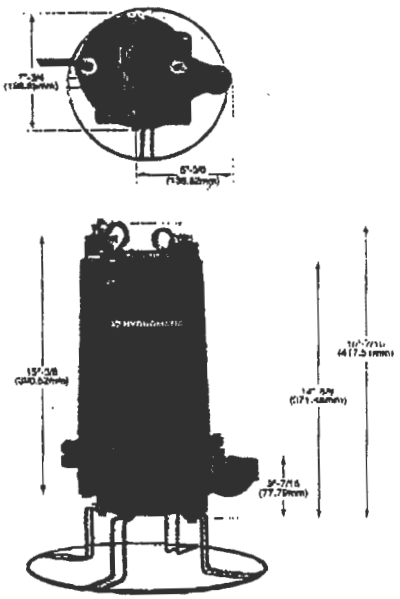
Performance Data



Materials of Construction

Motor Housing	Cast Iron ASTM-48
Pump Casing	Cast Iron ASTM-48
Coolant/Lubricant	Dielectric Oil
Shaft	Stainless Steel
Mechanical	Seal Faces: Carbon/Ceramic Shaft Seal
	Seal Body: Stainless Steel
	Spring: Stainless Steel
	Bellows: Buna-N
Impeller	High Strength Valox 420SEO with Bronze Insert
Cutters	440C Hardened 55-60 Rockwell C
Upper Bearing	Single Ball Bearing
Lower Bearing	Single Ball Bearing
Fasteners	Stainless Steel

Dimensional Data



All dimensions in inches. Metric for international use. Component dimensions may vary ± 1/8 inch. Dimensional data not for construction purpose unless certified. Dimensions and weights are approximate. On/Off level adjustable. We reserve the right to make revisions to our product and their specifications without notice.

HYDROMATIC®
Pentair Pump Group

– Your Authorized Local Distributor –

USA
1840 Baney Road Ashland, Ohio 44805
Tel: 419-289-3042 Fax: 419-281-4087

www.hydromatic.com
ISO 9001 Registered Quality System

CANADA
269 Trillium Drive Kitchener, Ontario, Canada N2C 4W5
Tel: 519-896-2163 Fax: 519-896-6337

Item# W-02-6710 SM 9/01

FLYGT

PERFORMANCE CURVE #14

PRODUCT	TYPE
CP3085.182	MT

DATE	PROJECT	CURVE NO	ISSUE
2002-02-04	LANDFILL/W. CELESTE RD. –	63-438-00-3830	1

	1/1-LOAD	3/4-LOAD	1/2-LOAD
MOTOR COS PHI	0.85	0.79	0.69
MOTOR EFFICIENCY	72.5 %	74.5 %	73.5 %
GEAR EFFICIENCY	—	—	—

MOTOR SHAFT POWER	2.2	hp
STARTING CURRENT ...	14	A
RATED CURRENT ...	3.4	A
RATED SPEED	1670	rpm
TOT.MOM.OF INERTIA ...	0.021	kgm2
NO. OF BLADES	1	

IMPELLER DIAMETER: 148 mm

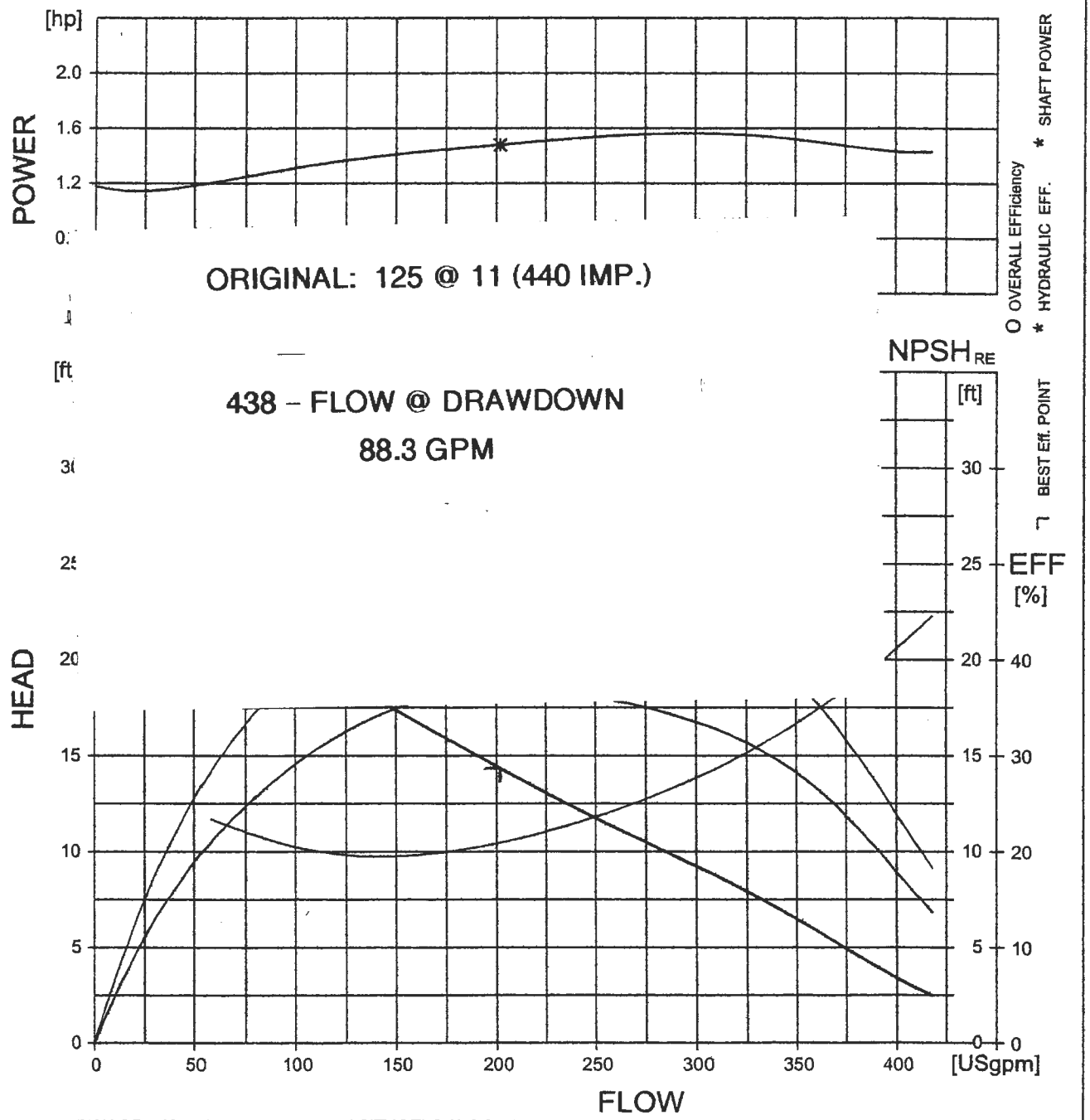
MOTORTYPE	STATOR	REV
15-07-4AL	12YSER	10

FREQ.	PHASES	VOLTAGE	POLES
60 Hz	3	460 V	4

GEARTYPE	RATIO
---	---

COMMENTS

INLET/OUTLET	IMP. THROUGHLET
- / 80 mm	64 mm



S: RISK OF SEDIMENTATION AT VELOCITY BELOW 0.6 m/s
(Point (S) show risk in a 80 mm pipe)

CURVES SHOW PERFORMANCE WITH CLEAR COLD WATER

FLYGT CURVE

Date 5/20/86
Revisions

ENGINEERING ORDER D

AUXILIARY ENGINE DRIVE PUMP UNIT

GORMAN RUPP WASTE WATER EQUIPMENT
MANSFIELD, OHIO 44902

Serial 86-0250-AX #15

Location DEER RUN #15

Configuration:
Pump No. 1 T8A3-B w/25 HP MOTOR AND V465DG STANDBY ENGINE
Pump No. 2 T8A3-B w/25 HP MOTOR (NORMAL POWER ONLY)
Pump No. 3 T8A3-B w/25 HP MOTOR (NORMAL POWER ONLY)
Pump No. 4

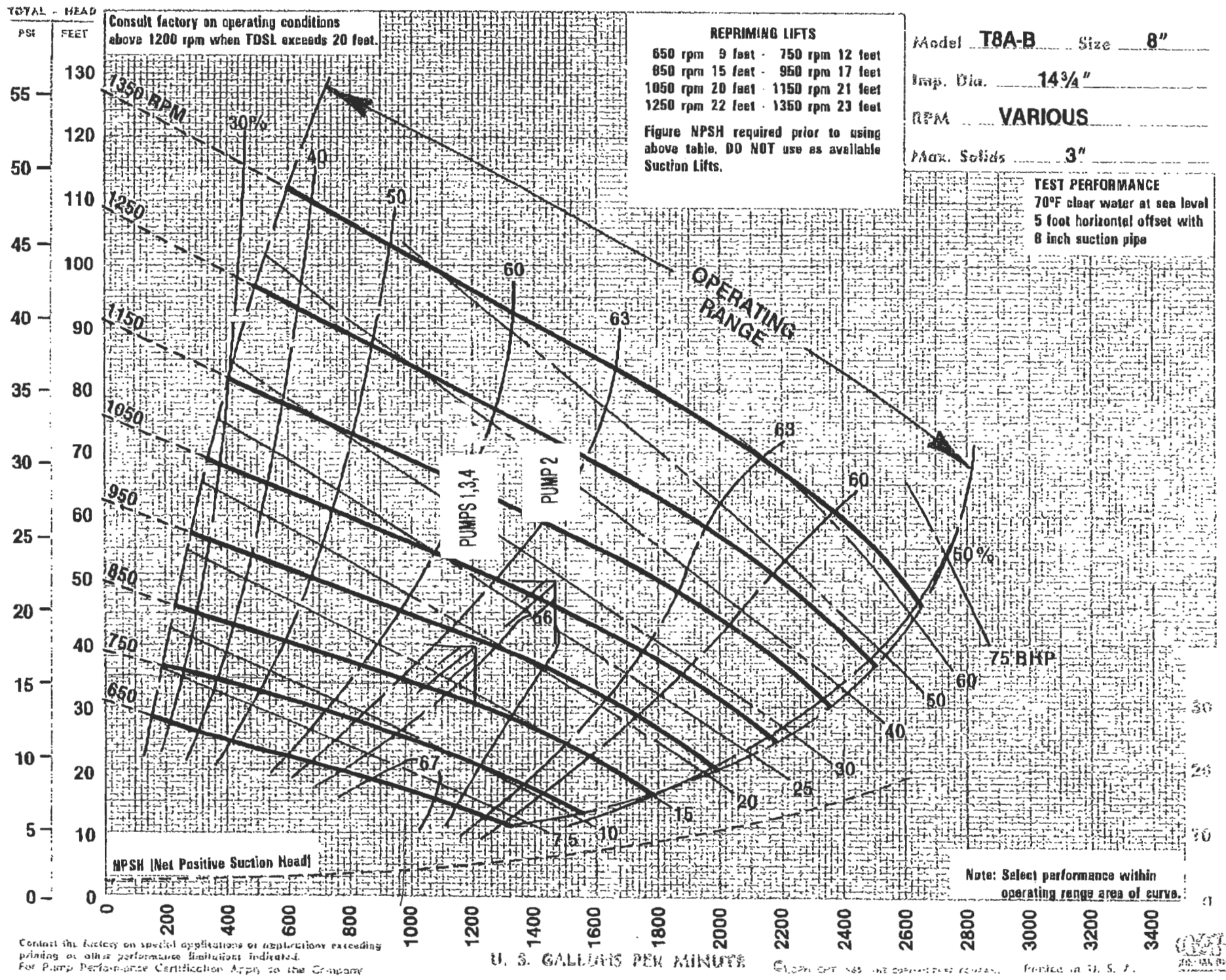
PUMP DATA	Pump No. 1	w/Standby Eng Pump No. 1	Pump No. 2	Pump No. 3
Design Characteristics (GPM @ TDH)	1215 @ 40'	1475 @ 50'	1215 @ 40'	1215 @ 40'
Priming Lift	17'	17'	17'	17'
Total Dynamic Suction Lift	22.9'	24.0'	22.9'	22.9'
NPSH Required	5.0'	6.5'	5.0'	5.0'
NPSH Available EXCESS W/3' S.F. DEDUCT	3.0'	4'	3.0'	3.0'
Pump Model	T8A3-B		T8A3-B	T8A3-B
Pump Serial No.				
Impeller Dia.	14-3/4		14-3/4	14-3/4
G-R Mech. seal, tungsten-titanium carbide	YES		YES	YES
Base, V-Belt	YES		YES	YES
Pump Speed	949	1078	949	949
G-R Air Release Valve Model No.	~~GRP33-07~~		~~GRP33-07~~	~~GRP33-07~~
		NOT REQUIRED		

MOTOR DATA	Pump No. 1		Pump No. 2	Pump No. 3
Horsepower	25		25	25
RPM (FULL LOAD)	1767		1767	1767
Electrical characteristics: Phase/Hertz/Volts * WIRED	~~3/60/460~~		~~3/60/460~~	~~3/60/460~~ 3/60/240
Electrical design: (standard NEMA unless otherwise indicated)	B		B	B
Full Load Amps	33.9		33.9	33.9
Enclosure-Open Drip-Proof	YES		YES	YES
Manufacturer GORMAN-RUPP	YES		YES	YES
Code Letter	G		G	G
Service Factor	1.15		1.15	1.15
Frame Size	284T		284T	284T
Shaft	DOUBLE		STANDARD	STANDARD
Serial No.				

ENGINE DATA	Pump No. 1
Horsepower MAX. DERATED 25%	35.6
No. of Cylinders	4
Design RPM	1800
Fuel	NAT. GAS
Coolant	AIR
Manufacturer	WISCONSIN
Model No.	V465DG
Serial No.	

* NOTE: Standard motor rated voltages will not agree with rated system voltages. For example, new NEMA motor voltages for 3 phase current will be 230 VAC/460 VAC. Related system voltage would be 240 VAC or 480 VAC. Standard motors are guaranteed to operate satisfactorily within plus or minus 10% of standard nameplate voltage ratings. It is rarely necessary to apply motors specially wound for odd voltages (at additional cost). When special voltage motors are required, it should be so noted.

DEER RUN #15



Contact the factory on special applications or applications exceeding pumping or other performance limitations indicated.
For Pump Performance Certification Apply to the Company

FORREST AVENUE

Date 3/31/78
Revisions

ENGINEERING ORDER #16

GORMAN RUPP WASTE WATER EQUIPMENT
MANSFIELD, OHIO 44902

Serial M-116-AX #16

AUXILIARY ENGINE DRIVE PUMP UNIT
WITH DIGITAL LOGIC CONTROL

Location STATION "F", SARALAND, ALABAMA

Configuration: Pump No. 1 BOTH PUMPS INSTALLED ON ONE COMMON BASE WITH THE
Pump No. 2 AUXILIARY ENGINE INSTALLED ON PUMP #1
Pump No. 3
Pump No. 4

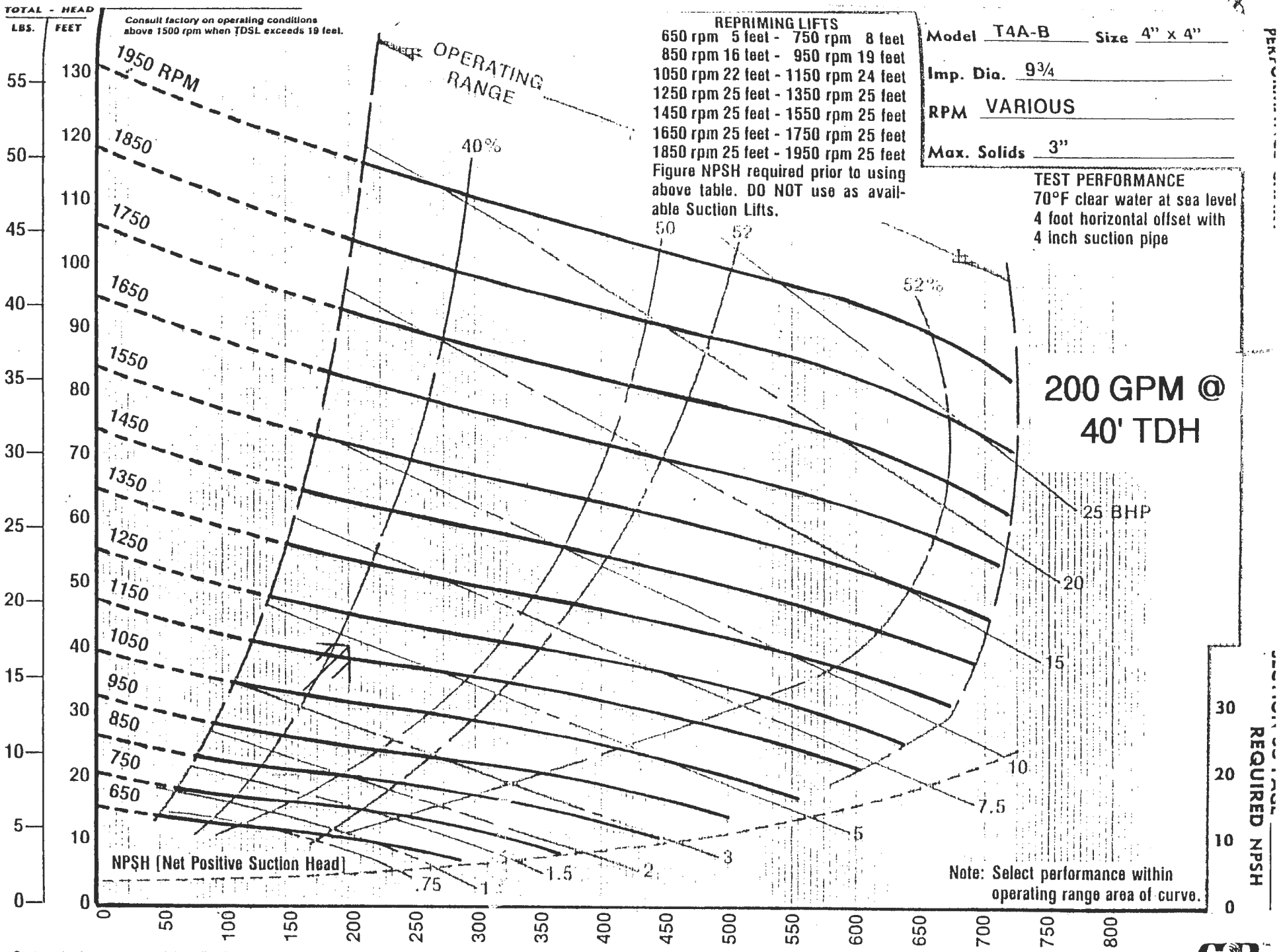
PUMP DATA	Pump No. 1	Pump No. 2	Pump No. 3	Pump No. 4
Design Characteristics (GPM @ TDH)	200 @ 30'	200 @ 30'		
Priming Lift	15.7'	15.7'		
Total Dynamic Suction Lift	17.85'	17.85'		
NPSH Required BY PUMP	4.5'	4.5'		
NPSH Available	8.0'	8.0'		
Pump Model	T4A3-B	T4A3-B		
Pump Serial No.				
Impeller Dia.	9-3/4"	9-3/4"		
G-R Mech. seal, tungsten-titanium carbide	YES	YES		
Base, V-Belt PER OUTLINE DRWG #	46126-057	Same		
Pump Speed	1030	1030		
G-R Air Release Valve Model No.	GRP33-07	GRP33-07		

MOTOR DATA	Pump No. 1	Pump No. 2	Pump No. 3	Pump No. 4
Horsepower	7-1/2	7-1/2		
RPM (FULL LOAD)	1755	1755		
Electrical characteristics: Phase/Hertz/Volts * WIRED	3/60/230	3/60/230		
Electrical design: (standard NEMA unless otherwise indicated)	B	B		
Full Load Amps	22.2	22.2		
Enclosure-Open Drip-Proof	YES	YES		
Manufacturer ALLIS CHALMERS	YES	YES		
Code Letter	H	H		
Service Factor	1.15	1.15		
Frame Size	213T	213T		
Shaft	DOUBLE	SINGLE		
Serial No.				

ENGINE DATA	Pump No. 1	Pump No. 2	Pump No. 3	Pump No. 4
Horsepower MAX. DERATED 25%	16.8			
No. of Cylinders	4			
Design RPM	1800			
Fuel	NAT. GAS			
Coolant	AIR			
Manufacturer	WISCONSIN			
Model No.	VH4D			
Serial No.				

* NOTE: Standard motor rated voltages will not agree with rated system voltages. For example, new NEMA motor voltages for 3 phase current will be 230 VAC/460 VAC. Related system voltage would be 240 VAC or 480 VAC. Standard motors are guaranteed to operate satisfactorily within plus or minus 10% of standard nameplate voltage ratings. It is rarely necessary to apply motors specially wound for odd voltages (at additional cost). When special voltage motors are required, it should be so noted.

#1 – LL&E (POLICE CLUB)



REPRIMING LIFTS

650 rpm 5 feet - 750 rpm 8 feet
850 rpm 16 feet - 950 rpm 19 feet
1050 rpm 22 feet - 1150 rpm 24 feet
1250 rpm 25 feet - 1350 rpm 25 feet
1450 rpm 25 feet - 1550 rpm 25 feet
1650 rpm 25 feet - 1750 rpm 25 feet
1850 rpm 25 feet - 1950 rpm 25 feet
Figure NPSH required prior to using above table. DO NOT use as available Suction Lifts.

Model T4A-B Size 4" x 4"

Imp. Dia. 9¾

RPM VARIOUS

Max. Solids 3"

TEST PERFORMANCE
70°F clear water at sea level
4 foot horizontal offset with
4 inch suction pipe

200 GPM @ 40' TDH

Note: Select performance within operating range area of curve.

Contact the factory on special applications or applications exceeding priming or other performance limitations indicated.
For Pump Performance Certification Apply to the Company.

 Printed in U.S.A.

GORMAN RUPP

ENGINEERING ORDER

Date:
Revisions: _____
_____
Serial No.

PUMP DATA

PUMP PERFORMANCE APPLIES TO EACH PUMP EXCEPT WHERE NOTED:

Design Characteristics (G.P.M. @ T.D.H.):	200 @ 40'
Priming Lift:	17.5'
Total Dynamic Suction Lift:	22.0'
N.P.S.H. Required:	5.0'
Excess N.P.S.H. Available: With 3 ft. S.F.	3.9
Pump Model No.:	T4A3–B
Impeller Diameter:	9–3/4"
Impeller Speed (R.P.M.):	1180

#1
LL&E
(POLICE CLUB)

RELATED MODIFICATIONS / DATA / COMMENTS, ETC.

_____

_____

_____

MOTOR NAME PLATE DATA:

PUMP MOTOR DATA APPLIES TO EACH PUMP MOTOR EXCEPT WHERE NOTED.

H.P.	10
Motor Wired: Phase/Hertz/Volts:	3/60/230
Service Factor:	1.15
Locked Rotor Code:	H
Frame Size:	215T
Enclosure Type:	ODP
Insulation Class:	F
Manufacturer:	Gorman–Rupp
Amb. Rating:	40°C

Note: A supplement sheet will be provided in the O&M Manual with the following data:

- Pump S/N'S
- Motor S/N'S
- Motor Full Load R.P.M.
- Motor Full Load Amps
- Motor Overload Heater Elements
- Engine S/N (When Applicable)

RELATED MODIFICATIONS / DATA / COMMENTS, ETC.

_____

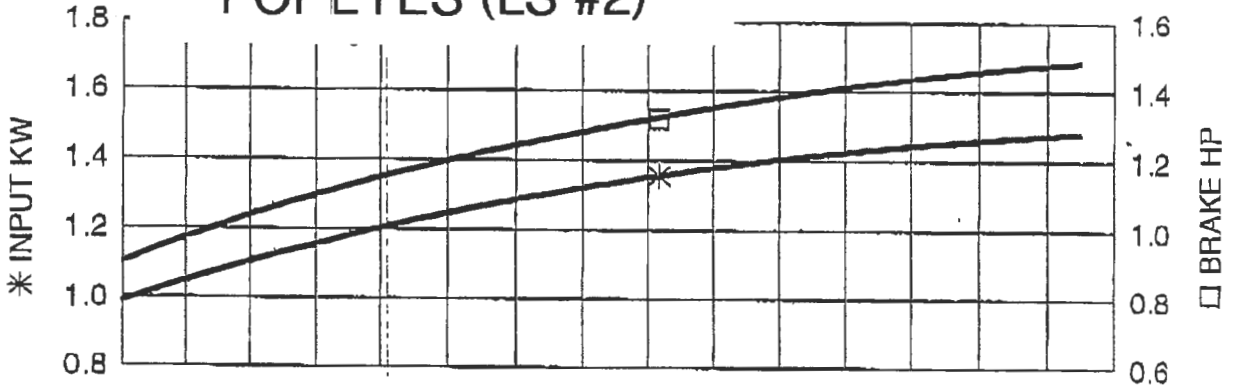
_____

_____

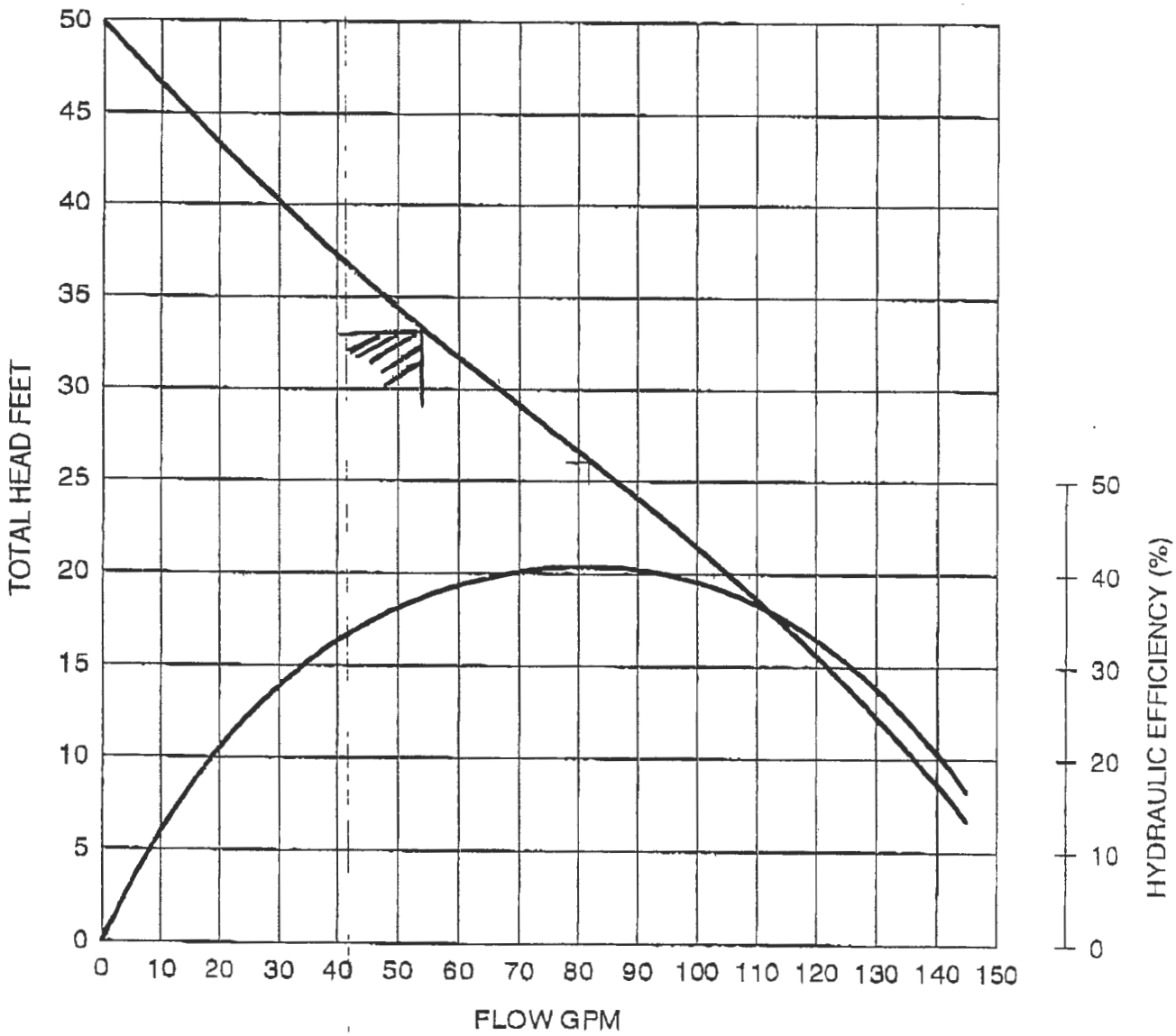
_____

CP/CF		C-3067	SECTION	PAGE
PHASE	VANES	267 Impeller	3	5
1	1		SUPERSEDES	ISSUED
			6/94	2/96

POPEYES (LS #2)



52 GPM @ 33' TDH



FLYGT

ENGINEERING ORDER

G&R GORMAN RUPP WASTE WATER EQUIPMENT
MANSFIELD, OHIO 44902

Date 4/24/86
Revisions

AUXILIARY ENGINE DRIVE PUMP UNIT

Serial 86-246-AX #3

WITH ELECTRONIC PRESSURE SWITCH CONTROL

Location PARK STREET

Configuration:
Pump No. 1 T8A3-B WITH 30HP MOTOR (NORMAL POWER ONLY)
Pump No. 2 T8A3-B WITH 30HP MOTOR (NORMAL POWER ONLY)
Pump No. 3 T8A3-B WITH 30HP MOTOR & V465 DG STANDBY ENGINE
Pump No. 4

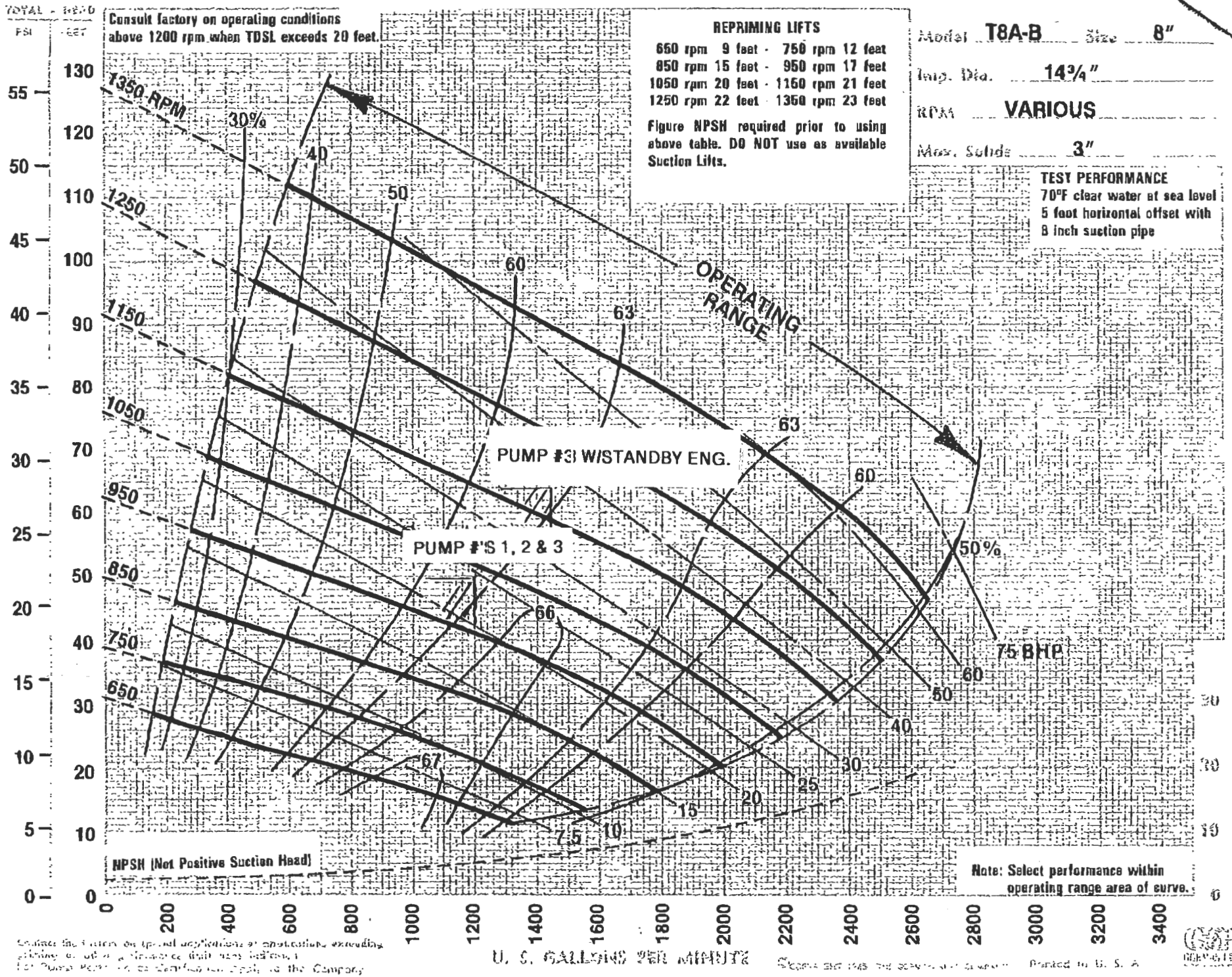
PUMP DATA	Pump No. 1	Pump No. 2	Pump No. 3	W/STANDBY ENG. Pump No. 3
Design Characteristics (GPM @ TDH)	1206 @ 50'	1206 @ 50'	1206 @ 50'	1456 @ 64'
Priming Lift	16.3	16.3	16.3	16.3
Total Dynamic Suction Lift	22.7	22.7	22.7	23.8
NPSH Required	6'	6'	6'	7'
NPSH Available EXCESS WITH 3' S.F. DEDUCT	2.2	2.2	2.2	1'
Pump Model.	T8A3-B	T8A3-B	T8A3-B	
Pump Serial No.				
Impeller Dia.	14-3/4	14-3/4	14-3/4	
G-R Mech. seal, tungsten-titanium carbide	YES	YES	YES	
Base, V-Belt	YES	YES	YES	
Pump Speed	1047	1047	1047	1192
G-R Air Release Valve Model No.	~~GRP 3307~~	~~GRP3307~~	~~GRP3307~~	
	NOT REQUIRED			

MOTOR DATA	Pump No. 1	Pump No. 2	Pump No. 3	
Horsepower	30	30	30	
RPM (FULL LOAD)	1762	1762	1762	
Electrical characteristics: Phase/Hertz/Volts * WIRED	3/60/460	3/60/460	3/60/460	
Electrical design: (standard NEMA unless otherwise indicated)	B	B	B	
Full Load Amps	40	40	40	
Enclosure-Open Drip-Proof	YES	YES	YES	
Manufacturer GORMAN RUPP				
Code Letter	F	F	F	
Service Factor	1.15	1.15	1.15	
Frame Size	286T	286T	286T	
Shaft	STANDARD	STANDARD	DOUBLE	
Serial No.				

ENGINE DATA	Pump No. 1	Pump No. 2	Pump No. 3	
Horsepower MAX. DERATED 25%	N/R	N/R	35.6	
No. of Cylinders			4	
Design RPM			1800	
Fuel			NAT GAS	
Coolant			AIR	
Manufacturer			WISCONSIN	
Model No.			V465-DG	
Serial No.				

* NOTE: Standard motor rated voltages will not agree with rated system voltages. For example, new NEMA motor voltages for 3 phase current will be 230 VAC-460 VAC. Related system voltage would be 240 VAC or 480 VAC. Standard motors are guaranteed to operate satisfactorily within plus or minus 10% of standard nameplate voltage ratings. It is rarely necessary to apply motors specially wound for odd voltages (at additional cost). When special voltage motors are required, it should be so noted.

PARK STREET



PERFORMANCE CURVE NO. T8A-3 7-6-81

SECTION 55 PAGE 1353

SEP. 3. 2004 10:26AM JIM HOUSE AND ASSOCIATES NO. 5986 P. 3/12 #3

PUMP STATION DRAWDOWN TESTS

CITY OF SARALAND

Project No. 111905.10

LIFT STATION NUMBER	LIFT STATION NAME	PUMP3										PUMP 1 & 2 & 3									
		(1) DRAWDOWN DEPTH (IN)	(2) DRAWDOWN VOLUME (GAL)	(3) DRAWDOWN TIME (MIN)	(4) DRAWDOWN RATE (2/3)	(5) RECOVERY TIME (MIN)	(6) RECOVERY RATE (2/5)	(7) PUMP CAPACITY (4+6)	(8) DISCHARGE PRESSURE (PSI)	DATE	TIME	(1) DRAWDOWN DEPTH (IN)	(2) DRAWDOWN VOLUME (GAL)	(3) DRAWDOWN TIME (MIN)	(4) DRAWDOWN RATE (2/3)	(5) RECOVERY TIME (MIN)	(6) RECOVERY RATE (2/5)	(7) PUMP CAPACITY (4+6)	(8) DISCHARGE PRESSURE (PSI)	DATE	TIME
1	POLICE CLUB																				
2	POPEYES or S. HWY 43	12	147	2.42	60.7	9.68	15.2	75.9	N/A	7/21/04	10:42	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
3	PARK ST.	12	588	0.77	764	5.35	110	874	10 PSI @ 18.8'	7/23/04	9:20	12	588	0.63	933	5.17	114	1047	18 & 15 PSI @ 18.8'	7/23/04	9:45
4	ZOOLAND OR EDGEFIELD																				
5	FIRST AVE.																				
7	SCOTT DR. or SHELTON BEACH EST.																				
8	JUBILEE DR.																				
9	EXXON STATION or SERVICE RD.																				
10	LAREDO DR.																				
11	CHASE DR.																				
12	SPANISH TRACE DR.																				
13	OAK RIDGE																				
14	LANDFILL or W. CELESTE RD.																				
15	DEER RUN DR.	12	588	0.7	840	4.65	126.5	966.5	9 @ 18.25	7/27/04	15:45	12	588	36 SEC (0.6)	980	5.76	102.1	1082	2 & 12 PSI @ 18.25'	7/27/04	16:55
16	FORREST AVE.																				
17	GRAHM ST.																				
18	DELISA DR.																				
19	CAMELOT DR.																				
20	CELESTE RD or E. CELESTE RD.																				
21	SARALAND AVE.																				
22	HWY. 43 N. or OLD TELEGRAPH																				
23	CEDAR ST.																				
24	SMOKE AVE.																				
25	FERRY AVE.																				
26	MIGNIONETTE AVE.																				
27	FAIRFIELD																				
28	SHELTON BEACH EXT.																				
29	KALIFIELD																				
30	TWIN LAKES																				
31	WEARTHERBY																				
32	SPANISH TRACE NEW																				
33	WILLOW WALK																				

CITY OF SARALAND

Project No. 111905.10

LIFT STATION NUMBER	LIFT STATION NAME	PUMP 2										PUMP 1 & 2									
		(1) DRAWDOWN DEPTH (IN)	(2) DRAWDOWN VOLUME (GAL)	(3) DRAWDOWN TIME (MIN)	(4) DRAWDOWN RATE (2/3)	(5) RECOVERY TIME (MIN)	(6) RECOVERY RATE (2/5)	(7) PUMP CAPACITY (4+6)	(8) DISCHARGE PRESSURE (PSI)	DATE	TIME	(1) DRAWDOWN DEPTH (IN)	(2) DRAWDOWN VOLUME (GAL)	(3) DRAWDOWN TIME (MIN)	(4) DRAWDOWN RATE (2/3)	(5) RECOVERY TIME (MIN)	(6) RECOVERY RATE (2/5)	(7) PUMP CAPACITY (4+6)	(8) DISCHARGE PRESSURE (PSI)	DATE	TIME
1	POLICE CLUB	12	211	1.01 / 1.02	207	6.37	33	240	9 PSI	3/21/04	11:30	12	211	1.13	187	9.17	23	210	#1-4 PSI @ 11.3' #2-7 PSI @ 11.3'		
2	POPEYES or S. HWY 43	12	147	2.42	60.7	9.68	15.2	75.9	N/A	7/21/04	10:42	12	147	1.2	122.5	5.78	25.4	147.9	N/A	7/21/04	11:00
3	PARK ST.	12	588	0.96	613	5.27	112	725	NO READING	7/23/04	9:00	12	588	0.68	865	5.25	112	977	N/A	7/23/04	9:35
4	ZOOLAND OR EDGEFIELD	6	47	2.4	19.58	2.17	21.66	41.24		9/30/04	9:54	6	47	1.33	35.34	1.83	25.68	102.26		9/30/04	10:00
5	FIRST AVE.	6	106	1.25	85	9.1	12	97	5 PSI @ 11.3'	8/23/04	11:15	6	106	1.2	88	11.2	10	98	#1-3 PSI @ 11.3' #2-6 PSI @ 11.3'	8/23/04	10:00
7	SCOTT DR. or SHELTON BEACH EST.	6	106	2.33	44.53	1.13	93.8	138.33	1.5PSI @ 17.6'	8/13/04	2:48	6	106	2.4	44.17	1.08	90.14	142.31	3 PSI @ 17.6'	8/13/04	3:00
8	JUBILEE DR.	6	106	2.47	42.91	8.87	11.95	54.86	12 PSI @ 11.6'	9/27/04	8:56	6	106	1.65	64.24	6.55	16.18	80.42	#1-11 PSI @ 11.4' #2-13 PSI @ 11.6'	9/27/04	9:17
9	EXXON STATION or SERVICE RD.	6	106	1.32	80	11.67	9.08	89	RUN +/- 11.4' NO TAP	3/17/04	1:30	6	106	0.83	128	11.7	9.06	137	TOP OF WETWELL NO TAP	8/17/04	1:53
10	LAREDO DR.	6	74	2.2	33.6	6.6	11.2	45	7 PSI @ 16.9'	9/8/04	3:15	6	74	1.1	67.3	7.4	10	77	P#1- 10 psi @ 17.5' P#2- 8 psi @ 17.5'	9/8/04	6:00
11	CHASE DR.	6	294	0.8	367.5	5.6	52.5	420	7 PSI @ 17.62'	8/11/04	12:55	6	294	0.4	735	5.17	56.9	791.9	P#1- 8 psi @ 17.62' P#2- 7psi @ 17.62'	8/11/04	1:09
12	SPANISH TRACE DR.	12	476	0.58	8.21	5.97	78	899	? PSI @ 15.15'	8/9/04	11:17	12	476	0.38	1253	5.57	85	1337	? PSI @ 15.15'	8/9/04	11:35
13	OAK RIDGE	6	26	1.95	13.33	3.75	6.93	20.26		10/1/04	11:17	6	26	1.3	20	6.28	4.14	24.14		10/1/04	11:45
14	LANDFILL or W. CELESTE RD.	6	106	0.55	193	26.56	4	197		9/7/04	3:10	6	106	0.48	221	26.56	4	225		9/7/04	3:14
15	DEER RUN DR.	12	588	1.33	442.1	5.25	112	554.1	5 PSI @ 18.25'	7/27/04	15:15	12	588	1:05	560	5.08	115.7	675.7	2 & 10 PSI @ 18.25'	7/27/04	16:45
16	FORREST AVE.	6	106	1.05	101	4.05	26	127	2 PSI @ 14.45'	7/29/04	14:42	6	106	0.63	168	4.42	24	192	2 & 7 PSI @ 14.45'	7/29/04	14:52
17	GRAHM ST.	6	106	0.58	183	1.5	71	254	7 PSI @ 11'	8/6/04	1:00	6	106	0.42	252	1.62	65	317	#1 - 9 PSI @ 11' #2 - 8 PSI @ 11'	8/6/04	1:10
18	DELISA DR.	6	106	3.45	30.72	5.02	21.12	51.84	1 PSI @ 12.4	8/24/2004-10/6/04	11:43	6	106	1.32	80.3	6.55	16.18	96.48	#1-1.5 PSI @ 12.4' #2-1 PSI @ 12.4'	8/24/04-10/6/04	11:58
19	CAMELOT DR.	6	106	1.15	92.2	6.02	17.6	109.8	5 PSI @ 17.8'	8/23/04 RT-10/6/04	1:50-10:55	6	106	0.93	113.98	4.92	25.23	139.21	#1 - 7 PSI @ 17' #2 -3 PSI @ 17'	10/6/04	9:56
20	CELESTE RD or E. CELESTE RD.	6	106	0.8	133	0	0	133		8/19/04	3:05	6	106	0.68	156	0	0	156		8/19/04	3:10
21	SARALAND AVE.	6	106	0.7	151.43	8.32	12.74	164.17	1.5 PSI @ 18.8'	RT-10/6/2004	2:08	6	106	0.58	192.72	8.08	13.12	205.84	#1 - 3 psi @ 18.8' #2 - 4 PSI @ 18.8'	RT-10/6/04	2:33
22	HWY. 43 N. or OLD TELEGRAPH	12	588	1.7	345.88	12.77	46	391.88	3 PSI @ 17.78'	7/22/04-RT-10/28/04	11:00	6	294	0.72	408.3	5.18	57	465	6 PSI @ 17.78'	RT-10/28/04	11:30
23	CEDAR ST.	12	476	1.46	326	13.56	35.1	362	7 PSI @ 18.7	6/18/04	1:30	12	476	1.1	433	12.56	37.9	471	#1 - 6 psi @ 18.7' #2 - 8 PSI @ 18.7'	6/18/04	2:00
24	SMOKE AVE.	12	211.5	1.78	118.8	19.8	10.7	129.5	5 PSI @ 12.96'	5/27/04	14:16	12	211.5	1.2	176.3	19.8	10.7	187	6 PSI @ 12.66'	5/27/04	14:50
25	FERRY AVE.	12	147	1.17	126	N/A	N/A	126	N/A	7/16/04	14:14	12	147	1.1	134	N/A	N/A	134	N/A	7/16/04	14:18
26	MIGNIONETTE AVE.	12	211.5	0.83	254.8	5.82	36.3	291.1	25	4/15/04	9:10	12	211.5	0.78	271.2	7.17	29.5	300.7		4/15/04	
27	FAIRFIELD	12	211.5	3.53	60.43		4	64.43	4 PSI @ 14.83'	5/24/04		12	211.51	2.2	96.14		4	100.14	14 PSI @ 15.5	5/24/04	18:07
28	SHELTON BEACH EXT.	6	106	1.82	58.24	3.72	28.49	86.73	15 PSI @ 8.6'	9/27/04	3:34	6	106	0.77	137.67	3.03	34.98	172.65	#1-17 PSI @ 8.6' #2-15 PSI @ 8.6'	9/27/04	3:42
29	KALIFIELD	6	106	0.7	151	0	0	151		9/13/04	1:30	6	106	0.62	171	0	0	171		9/13/04	1:35
30	TWIN LAKES	6	47	0.48	98	9.75 (Est. recovery based on low flows)	5	103	3/8" taps for gauge installed improperly - unable to get accurate reading	8/31/04	11:50	6	47	0.28	168	9.75	5	173	3/8" taps for gauge installed improperly - unable to get accurate reading	8/31/04	12:55
31	WEARTHERBY	6	106	0.47	156 - (Pump drawdn conducted w/ H20 levels from 12.9' to 11.7' from the top of wetwell)			156	? PSI @ 11.7' - No taps on disch. Line for gauges	8/25/04	12:25	6	106	0.47	226 - (Pump drawdn conducted w/ H20 levels from 12.9' to 11.7' from the top of wetwell)			226	P1 & P2 - ? PSI @ 12.9' (No taps on disch. Line for gauges)	8/25/04	1:07
32	SPANISH TRACE NEW	6	74	0.68	109			109		9/1/04	12:42	6	74	0.55	135			135		9/1/04	12:55
33	WILLOW WALK	6			10.6 - (Pump drawdn conducted w/ H20 level 9.3' from the top of wetwell)			10.6		9/2/04	10:30	6	74	7.45	9.9			9.9		9/2/04	1:38

CITY OF SARALAND
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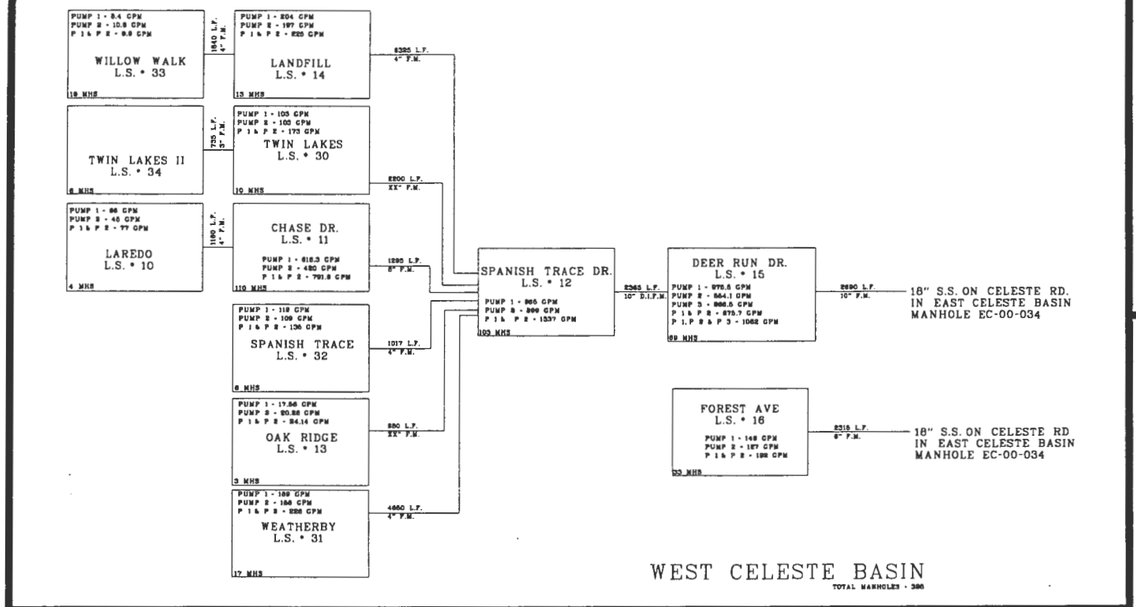
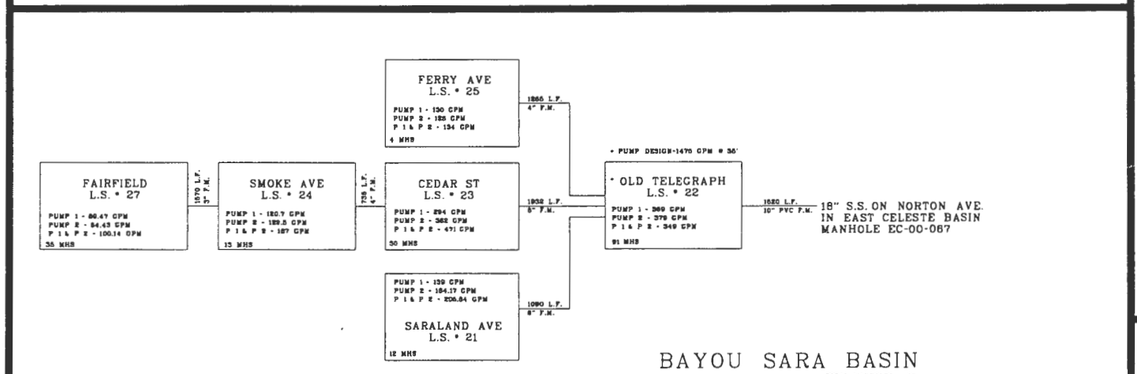
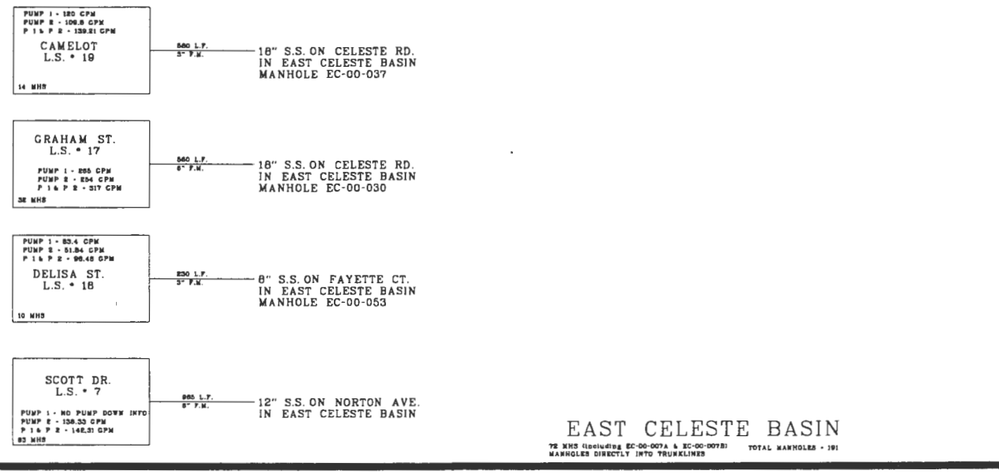
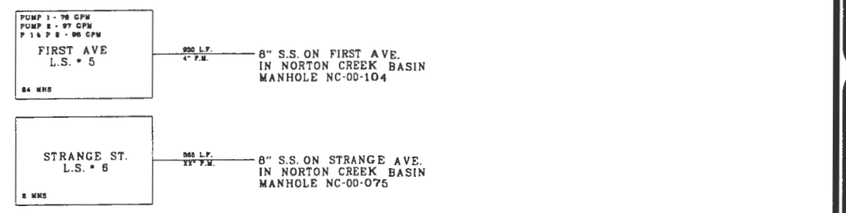
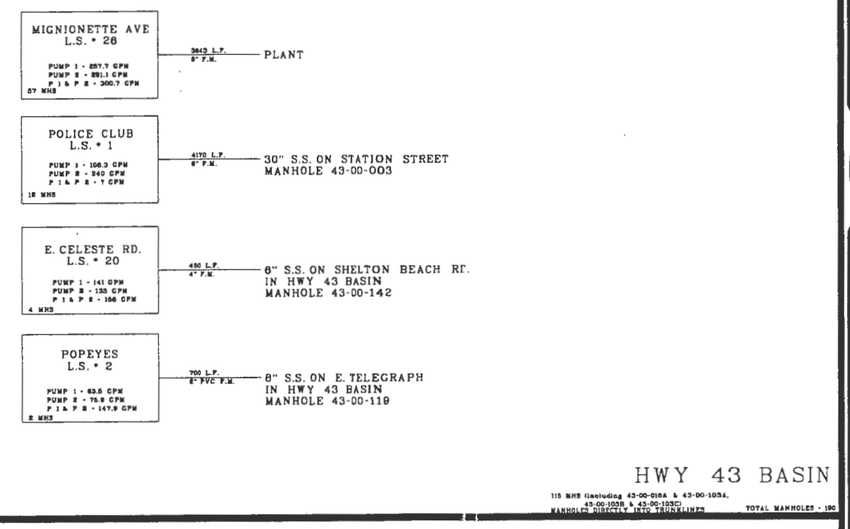
LIFT STATION NUMBER	LIFT STATION NAME	PUMP STATION TYPE	WET-WELL DIAM (FT)	NUMBER OF PUMPS	PUMP MODEL	PUMP CAPACITY DESIGN CAPACITY (GPM)	PUMP CAPACITY TDH (FT)	PUMP 1 % OF DESIGN CAPACITY USED	PUMP 2 % OF DESIGN CAPACITY USED	PUMP 3 % OF DESIGN CAPACITY USED	Pump Run Time Concerns (Y or N)	MOTOR (HP)	FORCE MAIN DIAM (IN)	DEPTH TO WET-WELL LOW WATER LEVEL	PUMP 1 (1) DRAWDOWN DEPTH (IN)	(2) DRAWDOWN VOLUME (GAL)	(3) DRAWDOWN TIME (MIN)	(4) DRAWDOWN RATE (2/3)	(5) RECOVERY TIME (MIN)	(6) RECOVERY RATE (2/5)	(7) PUMP CAPACITY (4+6)	(8) DISCHARGE PRESSURE (PSI)	DATE	TIME
1	POLICE CLUB	SELF PRIMER	[illegible]	2	GOR RUP [illegible]	300?	[illegible]	54.[illegible]	100.[illegible]	[illegible]	Y	[illegible]	[illegible]	20.0' - [illegible] = 18.50'	12	21[illegible]	2.[illegible]	[illegible]	[illegible]	[illegible]	105.2	[illegible] PSI	[illegible]	[illegible]
2	POPEYES or S. HWY 43	SUBMERSIBLE	6	2	FLYGHT CP-3067-267	52	33	122.1%	148.0%	140.0%	N	[illegible]	[illegible]	10.6' - ? =	12	147	7.2	46	3.38?	11.5	63.5	N/A	5/27/04	10:15
3	PARK ST.	SELF PRIMER	16	3	GOR RUP T-[illegible]	1208	[illegible]	73.5%	80.1%	[illegible]	N	[illegible]	10	18.65' - 2.2' = 16.45	12	[illegible]	1.7?	[illegible]	50	1?6	255	[illegible] PSI @ [illegible]	[illegible]	8:40
4	ZOOLAND OR EDGEFIELD	SUBMERSIBLE	4	2	ZOELLER 840 GRINDER					N/A	N	4?	1.5	7.1' - ? =	6	47	2.8	16.68?	2.07	22.71	40.79		6/30/04	3:45
5	FIRST AVE.	SELF PRIME	6		GOR [illegible]	110	[illegible]	63.5%	[illegible]	N/A	N	3	4	[illegible] - 5.0' = [illegible]	6	106	1.68	[illegible]	[illegible]	[illegible]	75	[illegible] PSI @ [illegible]	6/29/04	10:00
7	SCOTT DR. or SHELTON BEACH EST.	SELF PRIME	6	2	GOR RUP T-4	260	27	0.0%	53.9%	N/A	Y		6	15.0' - ? =		PUMP #1 COULD NOT LOWER WET WELL LEVEL BY ITSELF								
8	JUBILEE DR.	SUBMERSIBLE	[illegible]	2	FLYGHT C-3085 MT-488?	[illegible]	24	[illegible]	[illegible]	N/A	N	[illegible]	[illegible]	[illegible]	6	[illegible]	.62	[illegible]	[illegible]	11.7	[illegible]	[illegible] PSI @ 17.8'	[illegible]	3:40
9	EXXON STATION or SERVICE RD.	SUBMERSIBLE	6	2	FLYGHT CP 3127-481	100	52	54.0%	69.0%	N/A	N	10	4	13.25' - ? =	6	106	1.[illegible]	86	12.93	8.2	94	DRAW DOWNS NO TAPS	8/19/04	12:50
10	LAREDO DR.	SELF PRIME	[illegible]	2	GOR T[illegible]	119	[illegible]	55.5%	37.5%	N/A	N	[illegible]	4	17.7' - 2.8' = 14.9'	[illegible]	[illegible]	1.[illegible]	[illegible]	[illegible]	18	65	[illegible] PSI @ 16.5'	9/8/04	3:00
11	CHASE DR.	SELF PRIME	10	2	GOR RUP T6	756	36	61.8%	55.6%	N/A	Y	15	8	20.1' - ? =	12	880	1.51	570.6	12.77	45.8	616.3	7 PSI @ 17.62'	8/11/04	12:34
12	SPANISH TRACE DR	SUBMERSIBLE		2	FLYGHT CP-3152-434	[illegible]	42	[illegible]	[illegible]	N/A	N	20?	[illegible]	[illegible]	[illegible]	75	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	7 PSI @ [illegible]	8/9/04	[illegible]
13	OAK RIDGE	SUBMERSIBLE	[illegible]	2	HYDROMATIC HGR200	58	108	[illegible]	84.8%	N/A	Y	2	1-1/4"	15.2' - 7 =	[illegible]	25	2.07	12.1?	5.2	5	17.50		10/1/04	11:00
14	LANDFILL or W. CELESTE RD.	SUBMERSIBLE	[illegible]	2	FLYGHT CP-3085-[illegible]	125	[illegible]	[illegible]	167.0%?	N/A	N	[illegible]	4	[illegible]	6	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	204		[illegible]	[illegible]
15	DEER RUN DR.	SELF PRIMER	5.83 x 8	3	GOR RUP T-6A3-B	1215	40	80.3%	45.8%	[illegible]	Y	25	10" PVC	18.5 - 1.9 = 16.60	12	[illegible]	.72	816.6	8.7	158.8	975.5	7 PSI @ 16.25'	7/27/04	15:06
16	FORREST AVE.	SELF PRIMER	6	2	GOR RUP T-[illegible]	200	[illegible]	[illegible]	[illegible]	N/A	Y	7.5	6	[illegible] = 11.80?	6	106	0.93?	[illegible]	[illegible]	31	[illegible]	[illegible] PSI @ 14.45'	7/23/04	[illegible]
17	GRAHM ST.	SELF PRIMER	6	2	GOR RUP T4	335	39	79.1%	76.8%	N/A	Y	7.5	6	12.28 - 1.25' = 11.03'	[illegible]	106	0.53	200	1.68	65	265?	7 PSI @ 11'	8/8/04	12:00
18	DELISA DR.	SELF PRIMER	6	2	GOR RUP T-4	125	21	[illegible]	[illegible]	N/A	Y	[illegible]	[illegible]	14.5' - ? =	6	106	1.6	[illegible]	[illegible]	[illegible]	[illegible]	[illegible] PSI @ 12.4'	[illegible] RT 9/6/04	11:48- 12:[illegible]
19	CAMELOT DR.	SELF PRIMER	6	2	GOR RUP T4	150	27	40.2%	73.2%	N/A	N	5	3	16.1' - ? =	5	106	1.06	100	5.23	20.26	120.26	4 PSI @ 17.6'	8/23/04 RT-10/8/04	2:42
20	CELESTE RD or E. CELESTE RD.	SUBMERSIBLE	6		HOMA [illegible]					N/A	N			12.0' - ? =	6	105	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		6/18/04	[illegible]
21	SARALAND AVE.	SELF PRIMER	6	2	GOR RUP T4	345	27	66.7%	67.0%	N/A	Y	[illegible]	6	13.1' - ? =	[illegible]	109	0.85	125	7.32	14	139	3 PSI @ 18.1'	8/24/04	[illegible]
22	HWY. 43 N. or OLD TELEGRAPH	SELF PRIMER / WET WELL	9.83 x 8	[illegible]	GOR RUP T 6A3-B	1475	[illegible]	[illegible]	[illegible]	N/A	N	[illegible]	10" PVC	16.6	6	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	4 PSI @ 17.7'	[illegible] 10/18/[illegible]	[illegible]
23	CEDAR ST.	SELF PRIMER / PACKAGE	9'	2	GOR RUP T6	725	41	40.8%	49.9%	N/A	N	20	6	19.90' - 1.8' = 18.1'	12	475	1.97?	254.6?	12.06	[illegible]	294?	4 PSI @ 18.1'	5/18/04	13:00
24	SMOKE AVE.	SUBMERSIBLE	6	[illegible]	FLYGHT C-3067-[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	N/A	N	[illegible]	4	[illegible]	[illegible]	[illegible]	[illegible]	110	[illegible]	10.7	[illegible]	2.5 PSI @ [illegible]	5/27/04	14:05
25	FERRY AVE.	SUBMERSIBLE	5	2	HOMA [illegible]					N/A	N		4	17.68' - ? =	12	147	1.13	[illegible]	N/A	N/A	130	N/A	7/8/04	13:00
26	MIGNONETTE AVE.	SELF PRIMER	6	[illegible]	GOR RUP T4	[illegible]	[illegible]	[illegible]	[illegible]	N/A	Y	[illegible]	6	19.5' - 2.8' = 16.7'	[illegible]	[illegible]	0.96	[illegible]	[illegible]	35?	[illegible]	[illegible]	[illegible]	[illegible]
27	FAIRFIELD	SUBMERSIBLE	6	2	FLYGHT C-3067-267	52	33	133.6%	123.5%	N/A	N	3	3	19.3' - 1.72' = 17.58'	12	211.5	3.25?	65.06?	48.12	4.39	69.47	4 PSI @ 14.75'	5/20/04	15:10
28	SHELTON BEACH EXT.	SUBMERSIBLE	6	[illegible]	DAVIS EMU					N/A	N	[illegible]	12	14.1' - ? =	6	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	67.0	10 PSI @ [illegible]	5/27/04	[illegible]
29	KALIFIELD	SUBMERSIBLE	6	2	DAVIS EMU					N/A	N	10.0?		16.7' - 2.6' = 14.10'	6	106	0.57?	192	0	0	156?		9/15/04	1:17
30	TWIN LAKES	SUBMERSIBLE	[illegible]	[illegible]	"GH" GRINDER [illegible]	50	132	[illegible]	[illegible]	N/A	N	10	[illegible]	16.0' - ? = 14.0'	[illegible]	47	[illegible]	96	3.75	[illegible]	103	[illegible]	[illegible]	[illegible]
31	WEARTHERBY	SUBMERSIBLE	6	2	FLYGHT C-3127-434	150	40	126.0%	104.0%	N/A	N	7.5	4	15.1' - 0.7' = 14.4'	6	106	0.66	[illegible] (Pump [illegible] levels from 12.9' to 11.7' from the top of [illegible])			189	7 PSI @ 12.2' - No [illegible]	8/25/04	10:15
32	SPANISH TRACE NEW	SUBMERSIBLE	[illegible]	[illegible]	FLYGHT NP [illegible]	100	[illegible]	119.0%	[illegible]	N/A	N		4	17.5' - [illegible]	[illegible]	74	[illegible]	[illegible]			115		[illegible]	[illegible]
33	WILLOW WALK	SUBMERSIBLE	5	2	PUMPEX # 100 F CA3238	400	50	2.1%	2.7%	N/A	N	[illegible]	4	11.8 - ? =	[illegible]	74	[illegible]	8.4 - (Pump drawdn conducted w/ H20 level 9.3' from the top of [illegible])			8.4		6/2/04	[illegible]

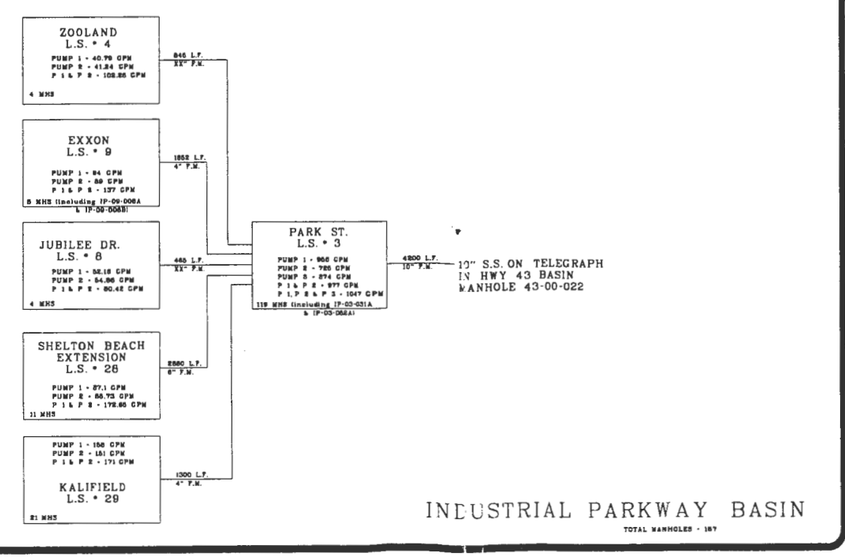












PROJECT NO.: 111905.10

DRAWING NO.:

NO.	DATE	DESCRIPTION	BY
		REVISIONS	

PROJECT NAME: SARALAND SEWER MAPPING

SHEET NAME: LIFT STATIONS SCHEMATICS

VOLKERT & ASSOCIATES, INC.

CERTIFICATION:

DATE:

DESIGNED:	CHECKED:
DRAWN:	CHECKED:

DATE: OCTOBER, 2004

PROJECT NO.: 111905.10

PLAN SHEET DRAWING NO.:

Sheet _____ Of _____

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Plot Scale: NONE
Pen Table File

User: Bl. Malone
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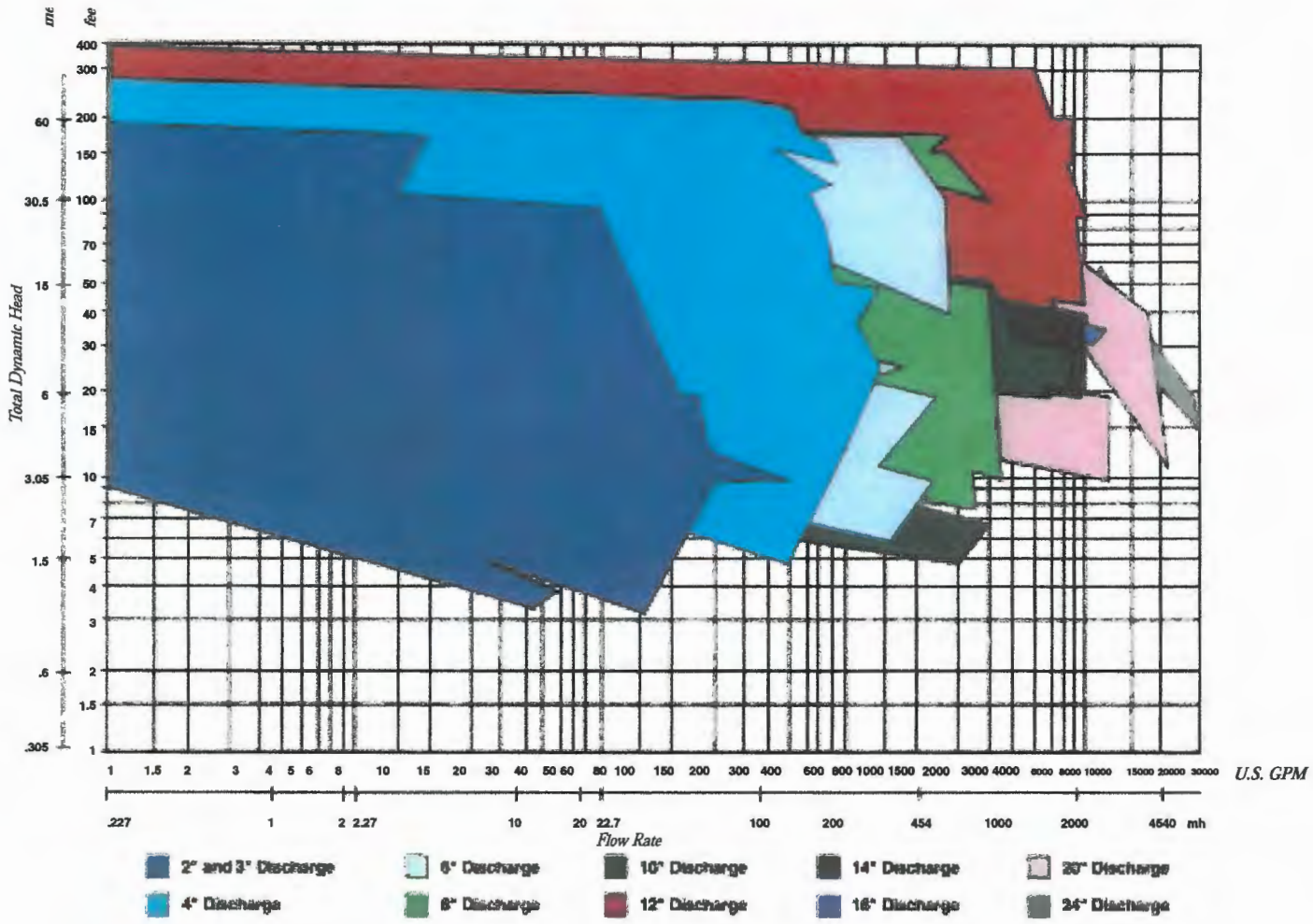
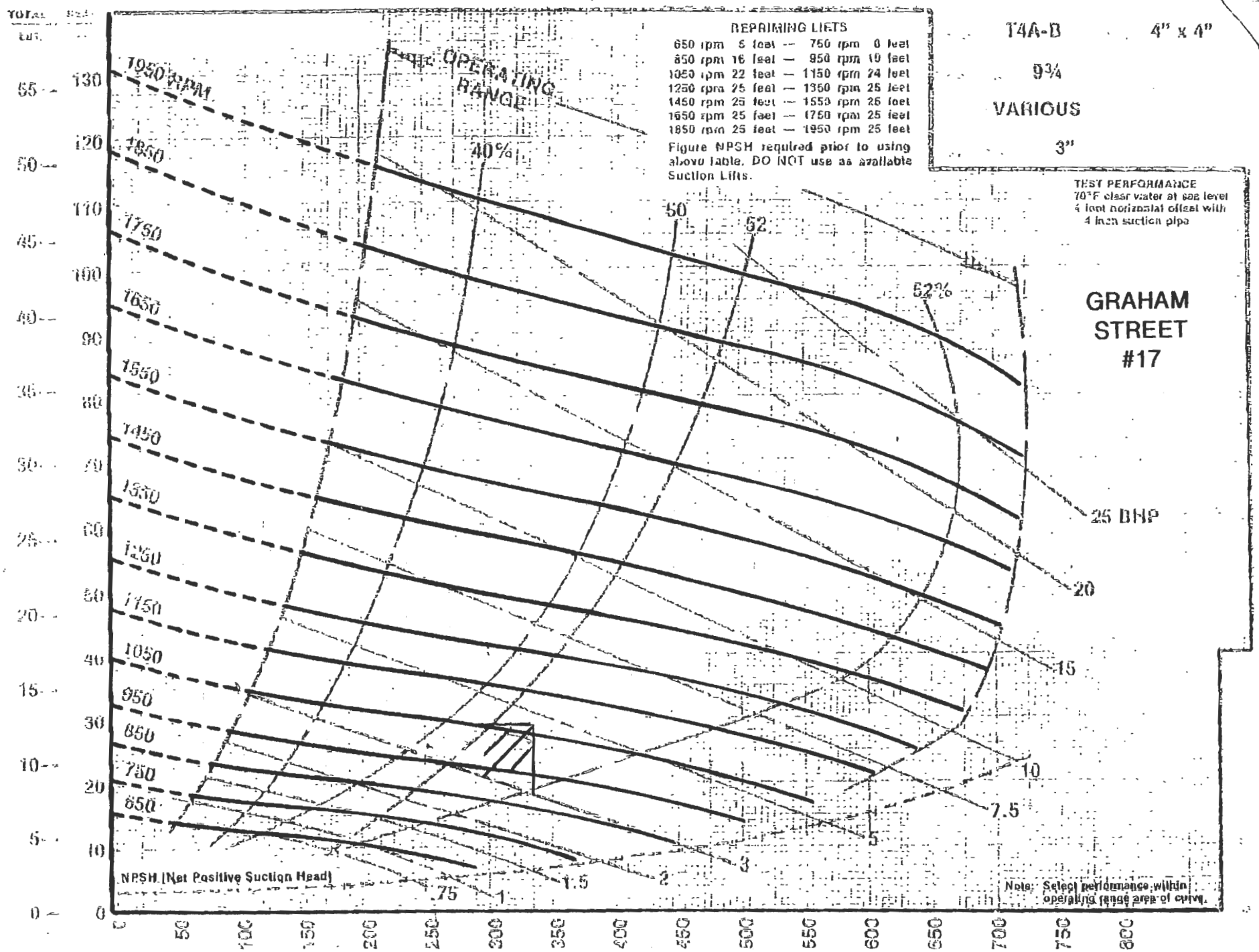

Total Dynamic Head
meters
feet
60
30.5
15
6
3.05
1.5
.6
.305
400
300
200
150
100
70
50
40
30
20
15
10
7
5
4
3
2
1.5
1
1 1.5 2 3 4 5 6 8 10 15 20 30 40 50 60 80 100 150 200 300 400 600 800 1000 1500 2000 3000 4000 6000 8000 10000 15000 20000 30000
U.S. GPM
.227 1 2 2.27 10 20 22.7 100 200 454 1000 2000 4540 mh
Flow Rate
2" and 3" Discharge
4" Discharge
6" Discharge
8" Discharge
10" Discharge
12" Discharge
14" Discharge
16" Discharge
20" Discharge
24" Discharge



ENGINEERING ORDER

GORMAN-RUPP WASTE WATER EQUIPMENT
MANSFIELD, OHIO 44902

Date 4/3/78
Revisions 7/26/78
7/31/78
Serial M-1062-AM

PUMP AND MOTOR DATA

DELISA DRIVE #18

PUMP DATA	Pump No. 1	Pump No. 2	Pump No. 3	Pump No. 4
Design characteristics (GPM @ TDH)	125 @ 21'	125 @ 21'		
Priming lift	8'	8'		
Total dynamic suction lift	10.9	10.9		
NPSH required BY PUMP	4.0'	4.0'		
NPSH available AT SEA LEVEL	16.0'	16.0'		
Pump Model	T4A3-B	T4A3-B		
Pump Serial No.	663562	663563		
Impeller diameter	9.75	9.75		
G-R Mech. seal, tungsten-titanium carbide	YES	YES		
Base, V-Belt	YES	YES		
Pump speed	841	841		

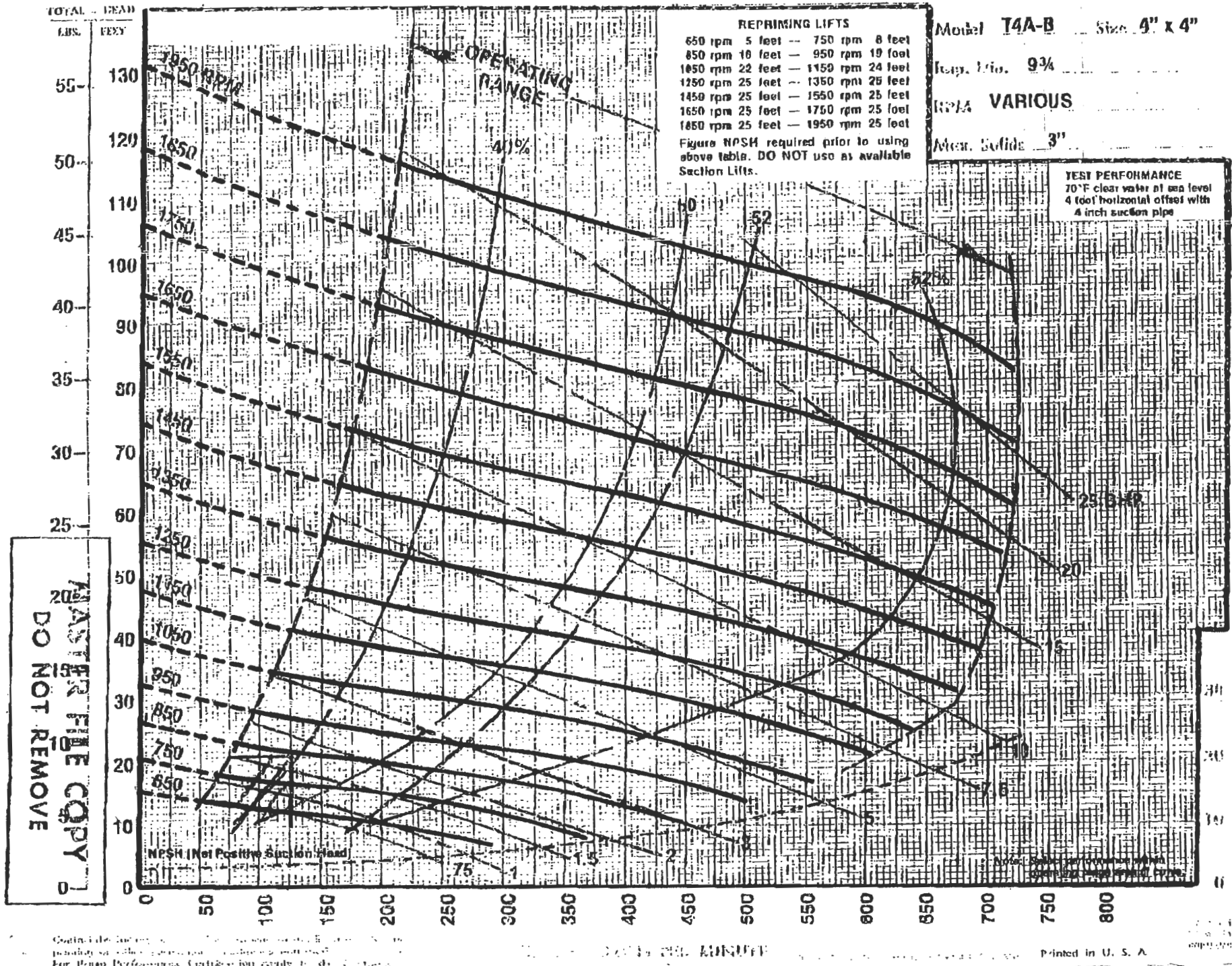
Horizontal Electrical MOTOR DATA	Pump No. 1	Pump No. 2	Pump No. 3	Pump No. 4
Horsepower	5	5		
RPM FULL LOAD	1750	1750		
Electrical characteristics: Phase/Hertz/Volts	1/60/230	1/60/230		
Electrical design: (standard NEMA unless otherwise indicated)	L	L		
Enclosure, open drip-proof w/1.15 S.F.	YES	YES		
Manufacturer MARATHON	1466089	1165225		
Code letter	H	H		
Frame size	213T	213T		
Full load amps.	25.0	25.0		

V-BELT DRIVE DATA		Pump No. 1	Pump No. 2	Pump No. 3	Pump No. 4
Center Distance		18.4	18.4		
Sheave on Pump	Section	3V	3V		
BUSHING # 2517	O.D.	6.9	6.9		
BORE 1-1/2" KEY 3/8"	Grooves	3	3		
Sheave on Motor	Section	3V	3V		
BUSHING # 1610	O.D.	3.35	3.35		
BORE 1-3/8 KEY 5/16	Grooves	3	3		
V-Belt Size 3 BELTS PER PUMP		3V530	3V530		

RELATED MODIFICATION/DATA/COMMENTS, ETC.

NOTE: Standard motor rated voltages will not agree with rated system voltages. For example, new NEMA motor voltages for 3 phase current will be 230 VAC/460 VAC. Related system voltage would be 240 VAC or 480 VAC. Standard motors are guaranteed to operate satisfactorily within plus or minus 10% of standard nameplate voltage ratings. It is rarely necessary to apply motors specially wound for odd voltages (at additional cost). When special voltage motors are required, it should be so noted.

DELISA DRIVE #18 125 GPM @ 21' TDH



ENGINEERING ORDER

GORMAN-RUPP WASTE WATER EQUIPMENT
MANSFIELD, OHIO 44902

Date 4/4/78
Revisions
Serial M-1063-AM

PUMP AND MOTOR DATA — CAMELOT DRIVE #19

PUMP DATA	Pump No. 1	Pump No. 2	Pump No. 3	Pump No. 4
Design characteristics (GPM @ TDH)	150 @ 27'	150 @ 27'		
Priming lift	13'	13'		
Total dynamic suction lift	16.55	16.55		
NPSH required BY PUMP	4.5	4.5		
NPSH available	9.85	9.85		
Pump Model	T4A3-B	T4A3-B		
Pump Serial No.	663539	663540		
Impeller diameter	9.75	9.75		
G-R Mech. seal, tungsten-titanium carbide	YES	YES		
Base, V-Belt	YES	YES		
Pump speed	972	972		
Horizontal Electrical MOTOR DATA	**Pump No. 1**	**Pump No. 2**	**Pump No. 3**	**Pump No. 4**
Horsepower	5	5		
RPM FULL LOAD	1750	1750		
Electrical characteristics: Phase/Hertz/Volts	1/60/230	1/60/230		
Electrical design: (standard NEMA unless otherwise indicated)	L	L		
Enclosure, open drip-proof w/1.15 S.F.	YES	YES		
Manufacturer MARATHON ELEC.	1436107	1165224		
Code letter	H	H		
Frame size	213T	213T		
Full load amps.	25	25		
V-BELT DRIVE DATA	**Pump No. 1**	**Pump No. 2**	**Pump No. 3**	**Pump No. 4**
Center Distance	19.1	19.1		
Sheave on Pump — Section	3V	3V		
BUSHING # 2517 — O.D.	6.0	6.0		
BORE 1-1/2" KEY 3/8" — Grooves	3	3		
Sheave on Motor — Section	3V	3V		
BUSHING # 1615 — O.D.	3.35	3.35		
BORE 1-3/8" KEY 5/16" — Grooves	3	3		
V-Belt Size BELTS PER PUMP 3	3V530	3V530		

RELATED MODIFICATION/DATA/COMMENTS, ETC.

NOTE: Standard motor rated voltages will not agree with rated system voltages. For example, new NEMA motor voltages for 3 phase current will be 230 VAC/460 VAC. Related system voltage would be 240 VAC or 480 VAC. Standard motors are guaranteed to operate satisfactorily within plus or minus 10% of standard nameplate voltage ratings. It is rarely necessary to apply motors specially wound for odd voltages (at additional cost). When special voltage motors are required, it should be so noted.

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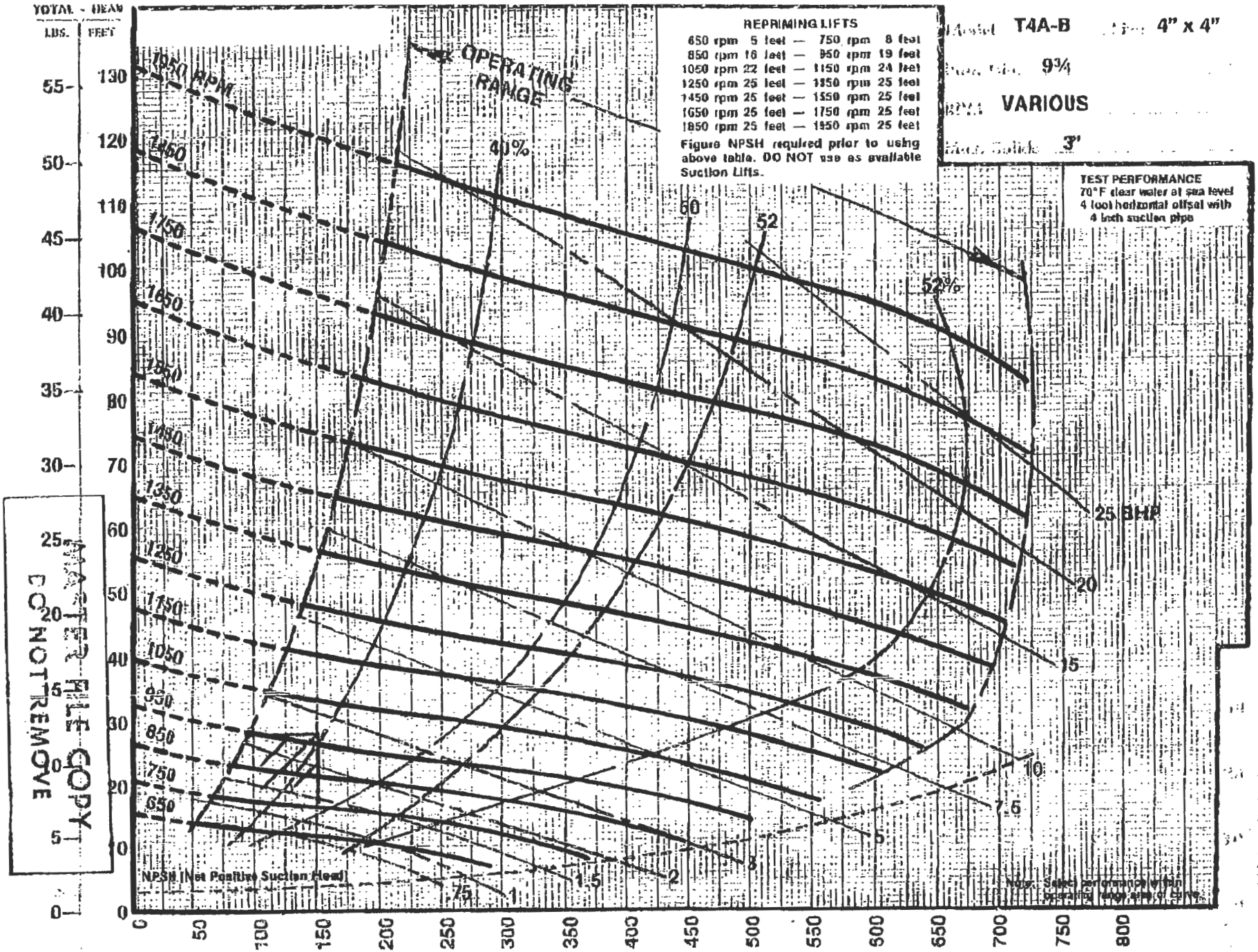
DO NOT REMOVE

CAMELOT DRIVE #19 150 GPM @ 27' TDH



T-150 P.12/12 Job-703

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NO. T4A-4 8-7-76

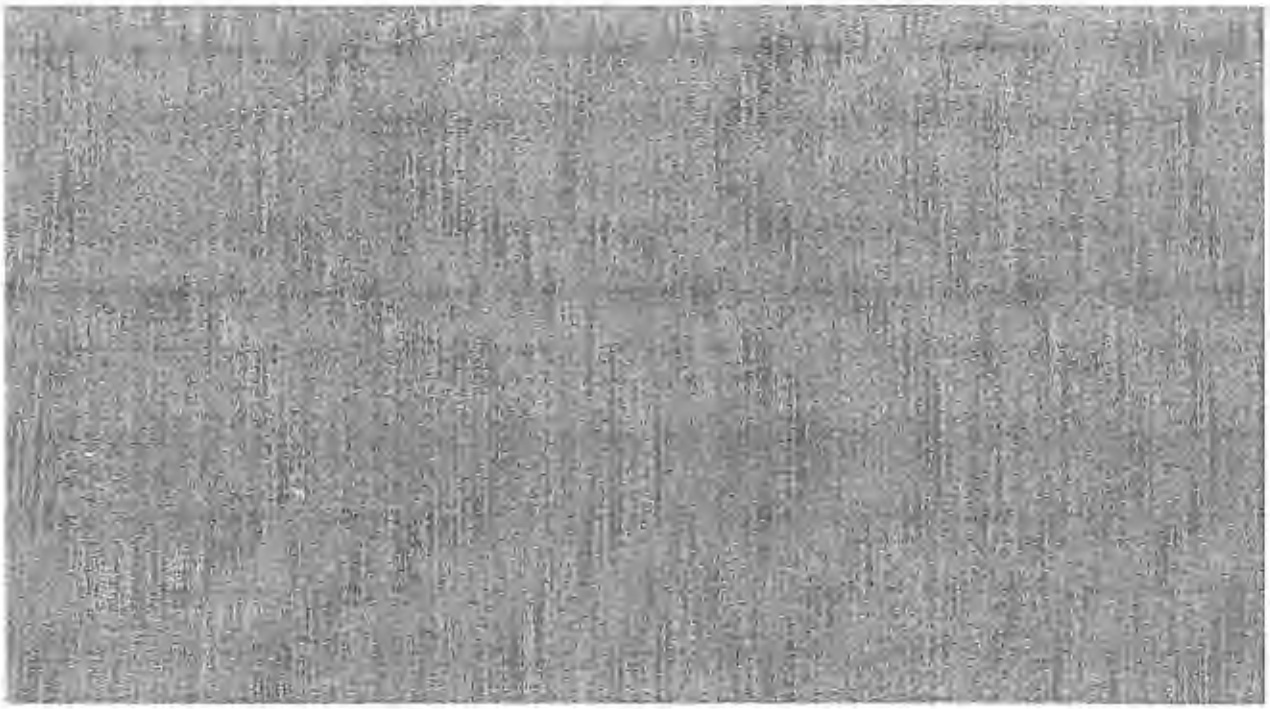
1154

L.S. #20 – CELESTE ROAD

L.S. #25 – FERRY AVENUE

HOMA
PUMP TECHNOLOGY

Electric Submersible Sewage Pumps.
Series A.
Discharge Size DN 100 – DN 150.



- **Channel and Vortex impellers**
- **Spherical clearance 77 mm – 100 mm**
- **Standard and explosion proof motors**
- **Wet and dry installation**

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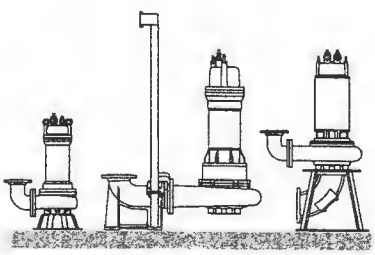
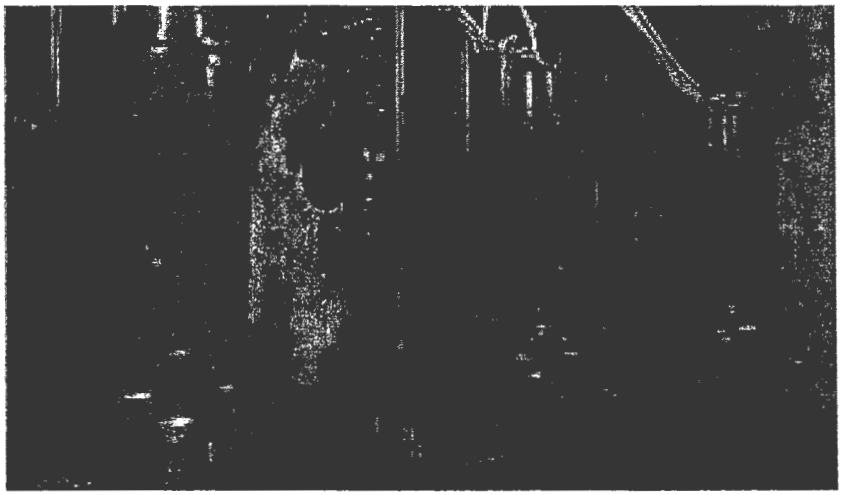
ISO 9001
CERTIFIED



Economic Sewage and Waste Water Disposal with HOMA Submersible Waste Water Pumps.



High performance level through decades of experience.
Many years of experience in the design and construction of submersible pumps plus uncompromising attention to quality in every technical detail and strict monitoring of production quality ensure the utmost reliability and long service life of all HOMA pumps.

System components for problem-free, low-cost installation.
HOMA supplies complete pumping stations encompassing everything from the pump, accessories, such as valves, piping, ready-made concrete or plastic sumps, through to electronic control and monitoring systems. Both the wet well type of installation with auto-coupling system, which requires the minimum of space, and all other types of installation are designed to keep installation costs as low as possible.

The reliability of fully automatic operation.
HOMA pumping stations feature fully automatic control and monitoring. Reliable liquid level control systems of various types to suit every operational situation (e.g. float switch, pneumatic, ultrasound or electronic system) control the pump operation and ensure minimum possible energy consumption. All possible fault factors (power supply, temperature, state of the seals) are automatically monitored and any malfunctions maybe signalled.

Applications

HOMA series A submersible pumps are suitable for pumping sewage, sludge, effluents and surface water, even those containing a large proportion of solid or fibrous matter. They are installed in a great variety of domestic, industrial and agricultural heavy duty pumping applications.

Applications range from waste removal for residential buildings and small industrial buildings through to operation in large municipal and industrial pumping stations and sewage treatment plants.

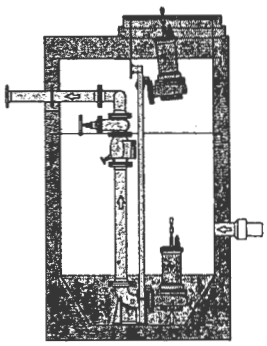
Operation: The motors are designed for continuous operating duty (S 1) at maximum 15 starts per hour with a fully submerged motor housing in wet well installation. A jacket cooled motor-variant is available for S 1 operating with a non submerged motor for dry pit installation.

Pumps with enclosed single-vane impellers are designed for intermittent operation, normally in automatic level-controlled wet well sump installations. They are also suitable for limited continuous operation, as in storm water retention tanks.

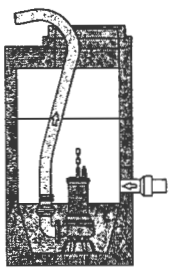
Vortex or enclosed multi-vane impeller pumps are also designed for unlimited continuous operation, such as industrial water supply. In this case a low motor speed should be chosen (4- or 6-pole).

Installation

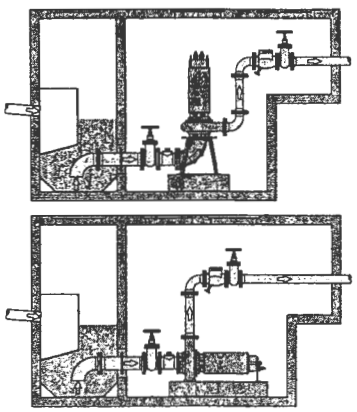
Permanent wet well installation: Submerged autocoupling guide tube system for automatic connection and disconnection of the pump from the pipework from outside the sump. All maintenance or repair work can be done outside the sump. Back in operating position, the weight of the pump ensures leak-proof discharge connection.



Tansportable wet well installation: Submerged pump mounted on a ring basestand for temporary, service or emergency operation. Discharge connection with pipe or hose.



Permanent dry well installation, vertical or horizontal: Flood-proof installation for pump stations with separate collection sump. Fixed flanged connection of suction and discharge pipe.



Construction – Proven quality in detail

HOMA sewage pumps are fully submersible, compact integrated motor-pump-units with reliable, robust design and all important components generously dimensioned.

Pump section
Volutes with discharge sizes DN 100 and DN 150, DIN flange PN 10. Enclosed single and multi-channel impellers, dynamically balanced, with replaceable wear ring, or vortex impellers. Spherical clearances 77 mm and 100 mm.

Shaft seals
Two rotating mechanical seals with silicon-carbide and carbon-graphite/chrome steel faces, in tandem arrangement, operate independent of each other in an oil bath, with a separate large oil chamber as lubricating and cooling medium and extra buffer between the pump volute and the motor. A seal condition monitoring probe is available upon request.

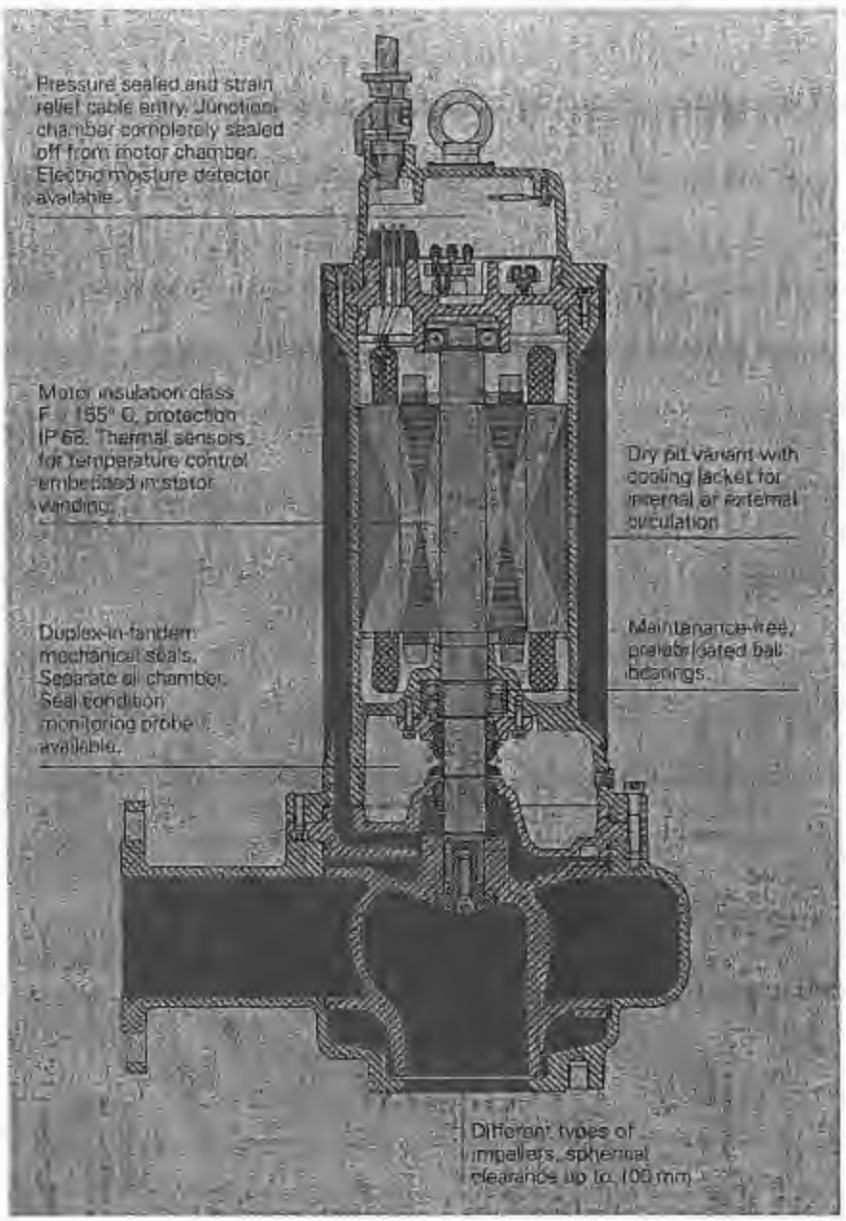
Shaft bearing
A large diameter stainless steel shaft rotates in pre-lubricated heavy-duty ball bearings.

Motor
Three-phase electric motors, with 2-, 4-, or 6-pole motor speed, 8-pole upon request. Motors are protected to IP 68 and Class F (155°C) insulation standards. Thermal sensors embedded in the stator winding protect the motor from overheating.

Explosion protection
All pumps are available with explosion proof motors according to E Ex d (e) IIB standard.

Motor cooling
Models for wet pit installation/submerged operating, are cooled directly by the water surrounding the motor casing. For dry pit installation/non-submerged operating, motors have a built-in cooling system with a cooling jacket around the motor casing. Cooling is achieved by an internal circulation of cleaned water from the pump volute. For special demands the cooling jacket can be sealed off from the volute and connected to an external cooling system (on request).

Materials
Standard models with casing, volute, impeller from GG-25 cast iron. Volute and impeller from bronze or stainless steel upon request. Shaft, bolts and nuts from stainless steel.



Choice of motor

Speeds: The motors are designed for the following speeds, depending on hydraulic requirements:

2900 rpm /2pole
1450 rpm /4pole
960 rpm /6pole

Voltages: All power specifications relate to an operating voltage of 400 V/3 Ph, 50 Hz. Other voltages are available on request.

Type of starting: The motors are supplied as standard:
☐ with direct starting up to 3,5 kW (P_2)
☐ with star-delta starting above 3,5 kW (P_2).
Other versions are available on request.

Explosion protection: In addition to the standard version all motors can be supplied explosion proof according to E Ex d(e) II B standard.

Dry pit variant: Besides the standard model for submerged operating all motors are also available for dry pit installation. Motor cooling is provided by a cooling jacket, using either the pumped liquid or external coolant circulation.

Choice of hydraulic system

Suction and discharge flange:
☐ DN 100
☐ DN 150

Reducing adapters for other coupling system and valve dimensions are available.

Impellers: A range of impeller designs are available to give optimum performance with various liquids and under different operating conditions:

M

Enclosed single-vane impeller. For liquids containing impurities and sludge with solid particles or long fibres.

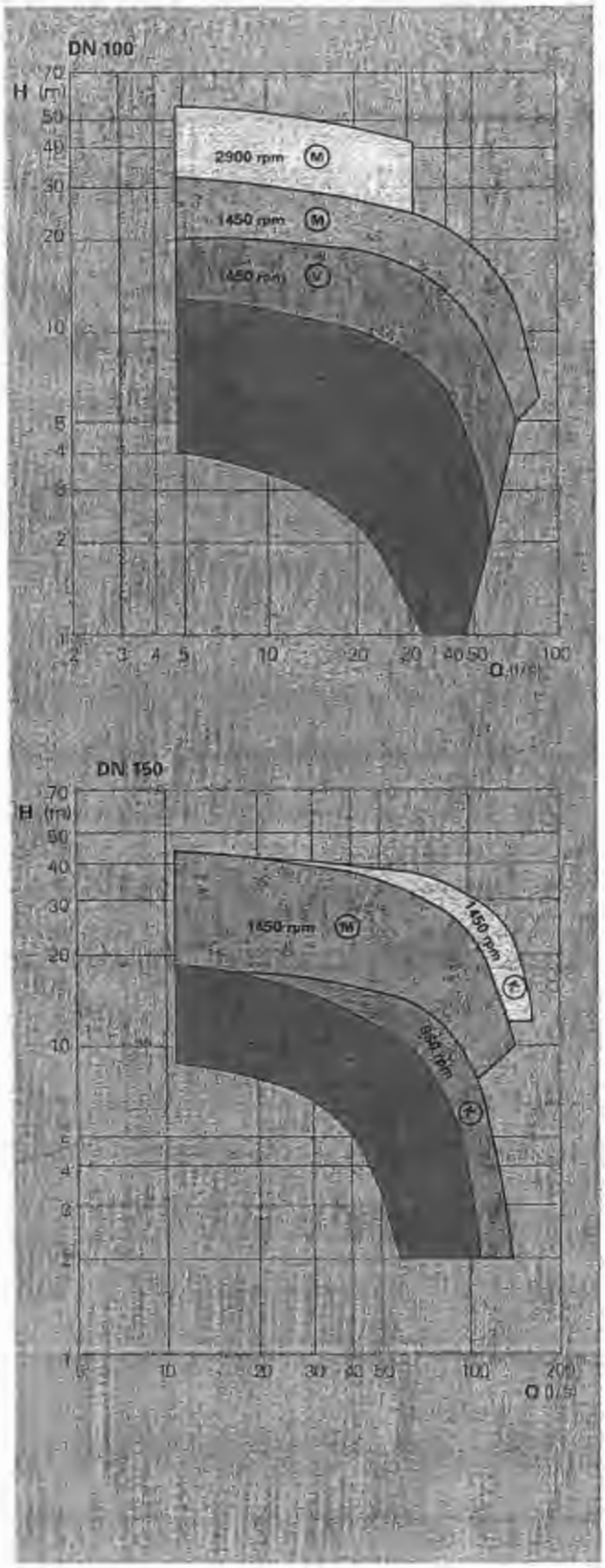
K

Enclosed multi-vane impeller. For liquids containing impurities and sludge with solid particles.

V

Vortex impeller. For liquids containing a high level of impurities or fibrous matter and containing gas.

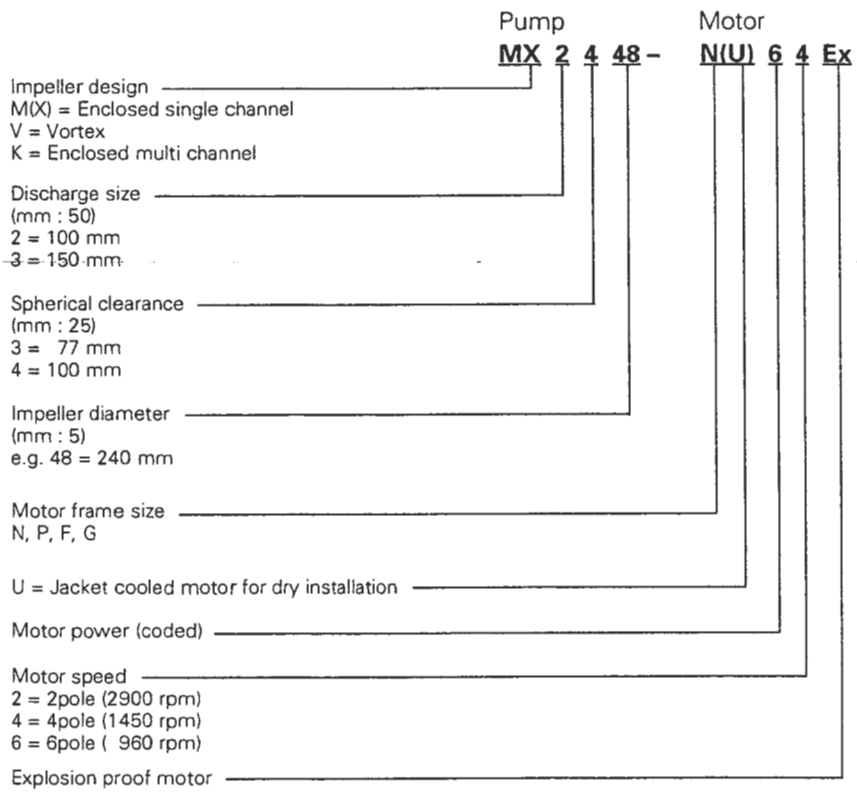
Impeller spherical clearance. The pumps are available with impeller spherical clearances from 77 mm to 100 mm according pump size.



Pump Selection Guide

Impeller	Discharge Size	Spherical clearance	Speed	Pump Type		Page
M 	DN 100	77 mm	2900 rpm	M23...	-2 pole	6
			1450 rpm	M23...	-4 pole	8
MX 	DN 100	100 mm	1450 rpm	MX24...	-4 pole	10
			960 rpm	MX24...	-6 pole	12
V 	DN 100	100 mm	1450 rpm	V24...	-4 pole	14
MX 	DN 150	100 mm	1450 rpm	MX34...	-4 pole	16
			960 rpm	MX34...	-6 pole	18
K 	DN 150	77 mm	1450 rpm	K33...	-4 pole	20
			960 rpm	K33...	-6 pole	22
Accessories						24

Pump type code



M23...-2pole

2900 rpm	M
DN 100 discharge	
77 mm Ø spherical clearance	

Standard model

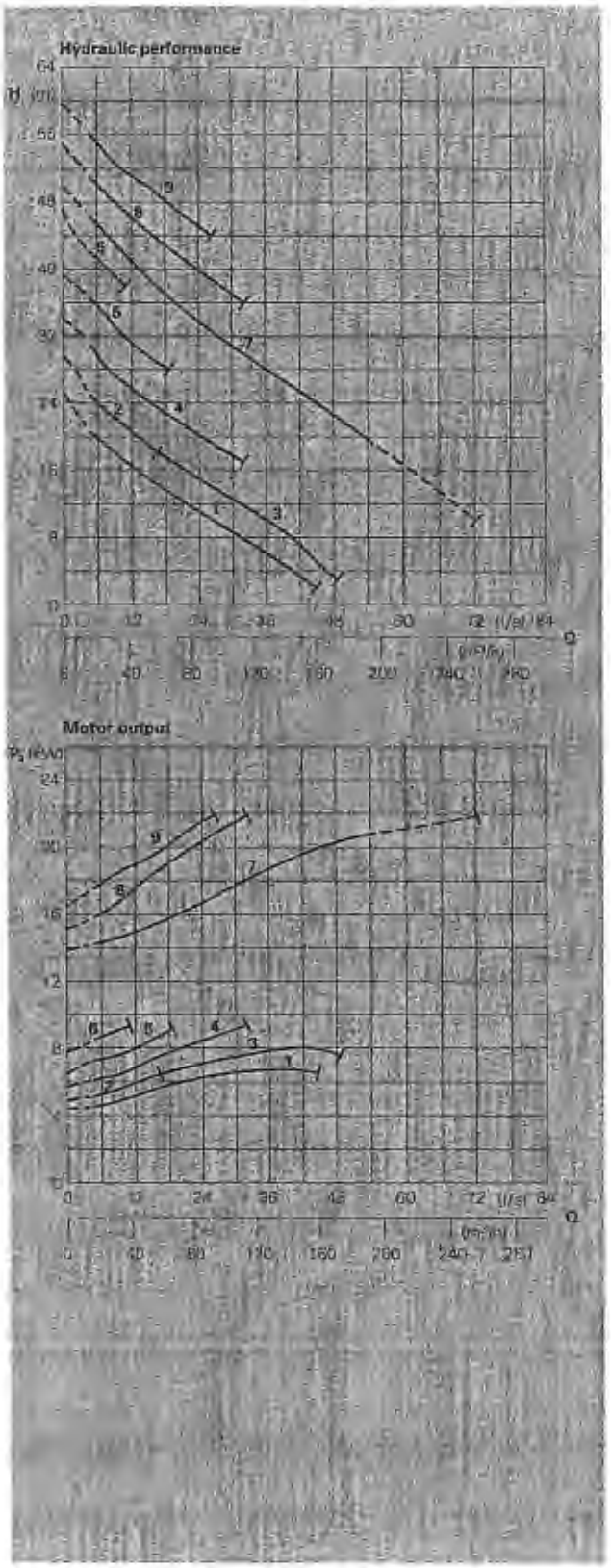
Curve No.	Pump type Wet well installation	Dry well installation	Motor output P_2 (kW)	Rated curr. I_N (A)	Weight (kg) Wet w. inst.	Dry w. inst.
1	M2328-N62	...-NU62	6,5	13,4	91	94
2	M2330-N62	...-NU62	6,5	13,4	91	94
3	M2330-N72	...-NU72	9,2	19,1	103	108
4	M2332-N72	...-NU72	9,2	19,1	103	108
5	M2334-N72	...-NU72	9,2	19,1	103	108
6*	M2336-N72	...-NU72	9,2	19,1	103	108
7	M2338-P122	...-PU122	21,8	42,5	197	209
8	M2340-P122	...-PU122	21,8	42,5	197	209
9	M2342-P122	...-PU122	21,8	42,5	197	209

Explosion-proof model

Curve No.	Pump type Wet well installation	Dry well installation	Motor output P_2 (kW)	Rated curr. I_N (A)	Weight (kg) Wet w. inst.	Dry w. inst.
1	M2328-N62 Ex	...-NU62 Ex	6,5	13,4	100	103
2	M2330-N62 Ex	...-NU62 Ex	6,5	13,4	100	103
3	M2330-N72 Ex	...-NU72 Ex	9,2	19,1	112	116
4	M2332-N72 Ex	...-NU72 Ex	9,2	19,1	112	116
5	M2334-N72 Ex	...-NU72 Ex	9,2	19,1	112	116
6*	M2336-N72 Ex	...-NU72 Ex	9,2	19,1	112	116
7	M2338-P122 Ex	...-PU122 Ex	21,8	42,5	209	221
8	M2340-P122 Ex	...-PU122 Ex	21,8	42,5	209	221
9	M2342-P122 Ex	...-PU122 Ex	21,8	42,5	209	221

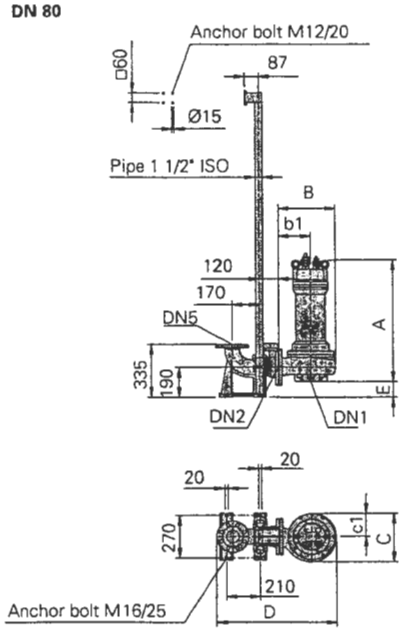
* For wet well installation with an auto-coupling system these pump types must be fitted with a DN 80 coupling foot to prevent a lifting of the pump during operation.

Performance curves

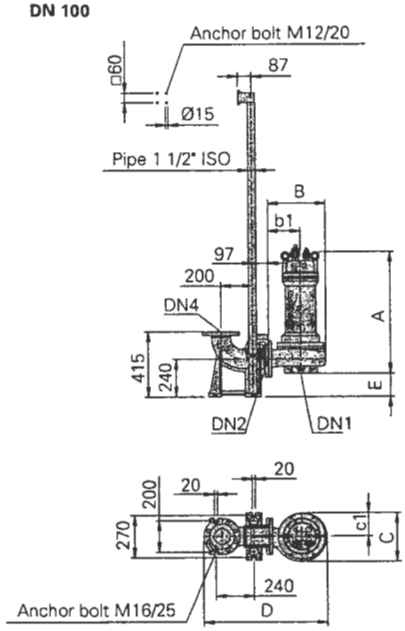


Installations and dimensions for M23...-2 pole

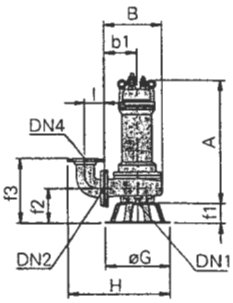
Wet well installation with auto-coupling system
DN 80



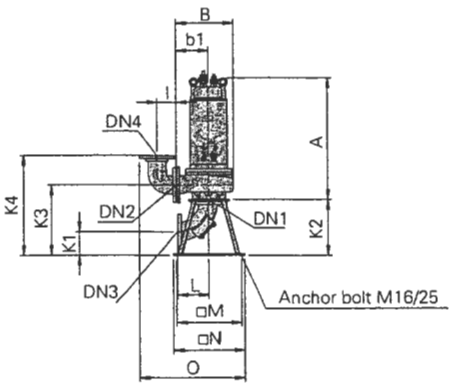
DN 100



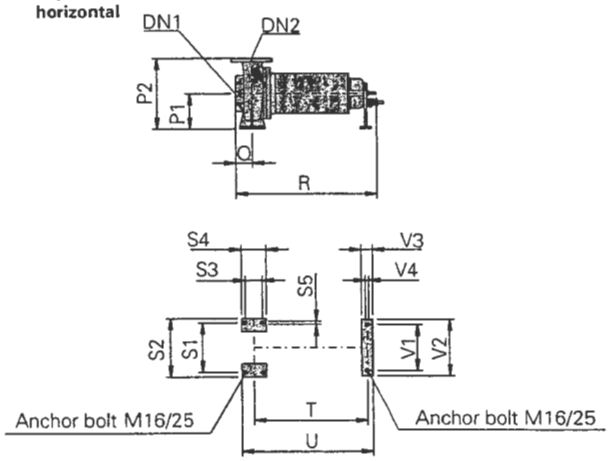
Wet well installation with ring base stand



Dry well installation
vertical



Dry well installation
horizontal



Pump type	$A_{max.}$	B	b_1	C	c_1	D	E	f_1	f_2	f_3	øG	H	l	K_1	K_2	K_3	K_4	L	□M	□N	O
M2328-N... up to M2336-N...	775	355	200	307	146	767	147	125	218	406	395	628	120	150	355	448	636	195	400	440	650
*M2328-N... up to M2336-N...	775	355	200	307	146	745	97	125	218	406	395	628	120	150	355	448	636	195	400	440	650
M2338-P... up to M2342-P...	1051	459	280	363	165	871	122	125	244	432	395	708	120	150	355	474	662	195	400	440	730

Pump type	P_1	P_2	Q	$R_{max.}$	S_1	S_2	S_3	S_4	S_5	$T_{max.}$	$U_{max.}$	V_1	V_2	V_3	V_4	DN_1	DN_2	DN_3	DN_4	DN_5
M2328-N... up to M2336-N...	200	400	93	787	280	330	95	140	18	635	745	260	320	60	ø18	100	100	100	100	-
*M2328-N... up to M2336-N...	200	400	93	787	280	330	95	140	18	635	745	260	320	60	ø18	100	100	100	-	80
M2338-P... up to M2342-P...	200	480	119	1063	280	330	95	140	18	886	986	310	370	60	ø18	100	100	100	100	-

all dimensions in mm *only wet well installation with auto-coupling system DN80

M23...-4 pole

1450 rpm	M
DN 100 discharge	
77 mm Ø spherical clearance	

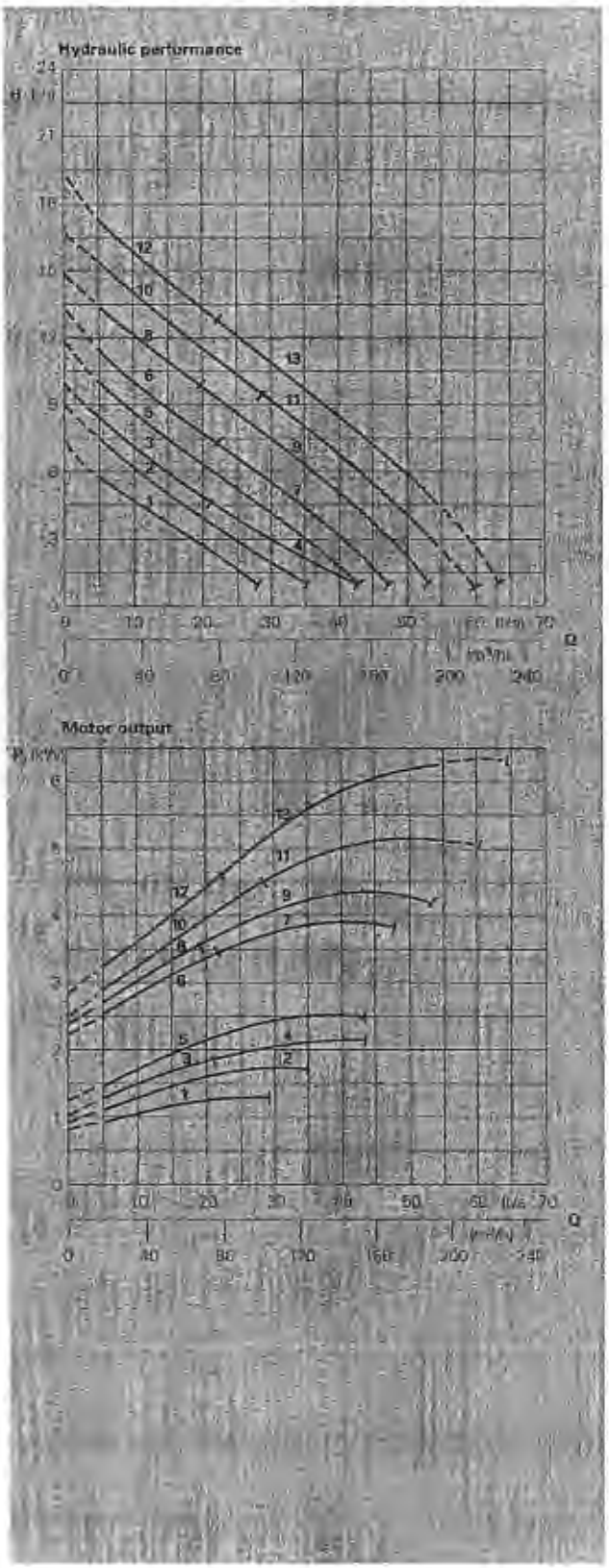
Standard model

Curve No.	Pump type: Wet well installation	Pump type: Dry well installation	Motor output P_2 (kW)	Rated curr. I_N (A)	Weight (kg): Wet w. inst.	Weight (kg): Dry w. inst.
1	M2330-N24	...-NU24	1,8	3,7	83	86
2	M2332-N24	...-NU24	1,8	3,7	83	86
3	M2334-N24	...-NU24	1,8	3,7	83	86
4	M2334-N34	...-NU34	2,6	5,5	87	90
5	M2336-N34	...-NU34	2,6	5,5	87	90
6	M2340-N44	...-NU44	3,5	7,4	88	91
7	M2340-N54	...-NU54	4,6	10,5	112	116
8	M2342-N44	...-NU44	3,5	7,4	88	91
9	M2342-N54	...-NU54	4,6	10,5	112	116
10	M2344-N54	...-NU54	4,6	10,5	112	116
11	M2344-N64	...-NU64	6,5	13,6	114	118
12	M2346-N54	...-NU54	4,6	10,5	112	116
13	M2346-N64	...-NU64	6,5	13,6	114	118

Explosion-proof model

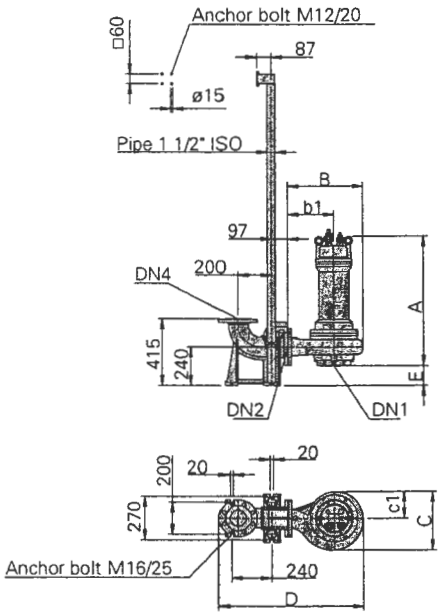
Curve No.	Pump type: Wet well installation	Pump type: Dry well installation	Motor output P_2 (kW)	Rated curr. I_N (A)	Weight (kg): Wet w. inst.	Weight (kg): Dry w. inst.
1	M2330-N24 Ex	...-NU24 Ex	1,8	3,7	95	98
2	M2332-N24 Ex	...-NU24 Ex	1,8	3,7	95	98
3	M2334-N24 Ex	...-NU24 Ex	1,8	3,7	95	98
4	M2334-N34 Ex	...-NU34 Ex	2,6	5,5	99	102
5	M2336-N34 Ex	...-NU34 Ex	2,6	5,5	99	102
6	M2340-N44 Ex	...-NU44 Ex	3,5	7,4	100	103
7	M2340-N54 Ex	...-NU54 Ex	4,6	10,5	124	128
8	M2342-N44 Ex	...-NU44 Ex	3,5	7,4	100	103
9	M2342-N54 Ex	...-NU54 Ex	4,6	10,5	124	128
10	M2344-N54 Ex	...-NU54 Ex	4,6	10,5	124	128
11	M2344-N64 Ex	...-NU64 Ex	6,5	13,6	126	130
12	M2346-N54 Ex	...-NU54 Ex	4,6	10,5	124	128
13	M2346-N64 Ex	...-NU64 Ex	6,5	13,6	126	130

Performance curves

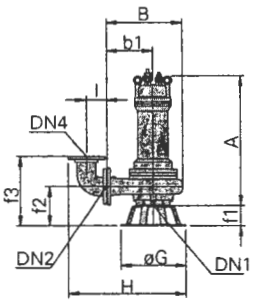


Installations and dimensions for M23...-4 pole

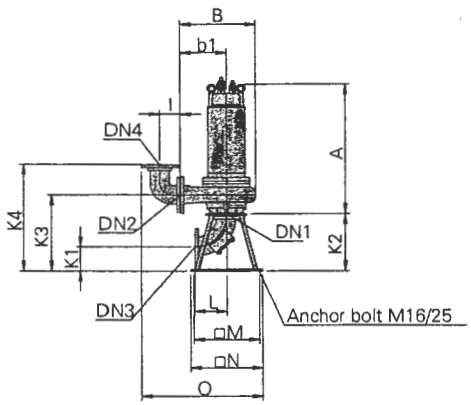
Wet well installation with auto-coupling system



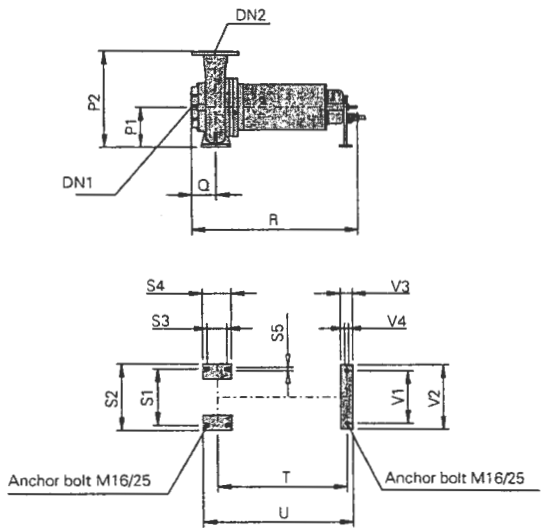
Wet well installation with ring base stand



Dry well installation vertical



Dry well installation horizontal



Pump type	$A_{max.}$	B	b_1	C	c_1	D	E	f_1	f_2	f_3	øG	H	I	K_1	K_2	K_3	K_4	L	□M	□N	O
M2330-N... up to M2336-N...	705	355	200	307	146	767	147	125	218	406	395	628	120	150	355	448	636	195	400	440	650
M2340-N...up to M2346-N...	805	459	280	363	165	871	122	125	244	432	395	708	120	150	355	474	662	195	400	440	730

Pump type	P_1	P_2	Q	$R_{max.}$	S_1	S_2	S_3	S_4	S_5	$T_{max.}$	$U_{max.}$	V_1	V_2	V_3	V_4	DN_1	DN_2	DN_3	DN_4
M2330-N... up to M2336-N...	200	400	93	717	280	330	95	140	18	565	665	260	320	60	ø18	100	100	100	100
M2340-N...up to M2346-N...	200	480	119	817	280	330	95	140	18	640	740	260	320	60	ø18	100	100	100	100

all dimensions in mm

MX24...-4 pole

1450 rpm	M
DN 100 discharge	
100 mm Ø spherical clearance	

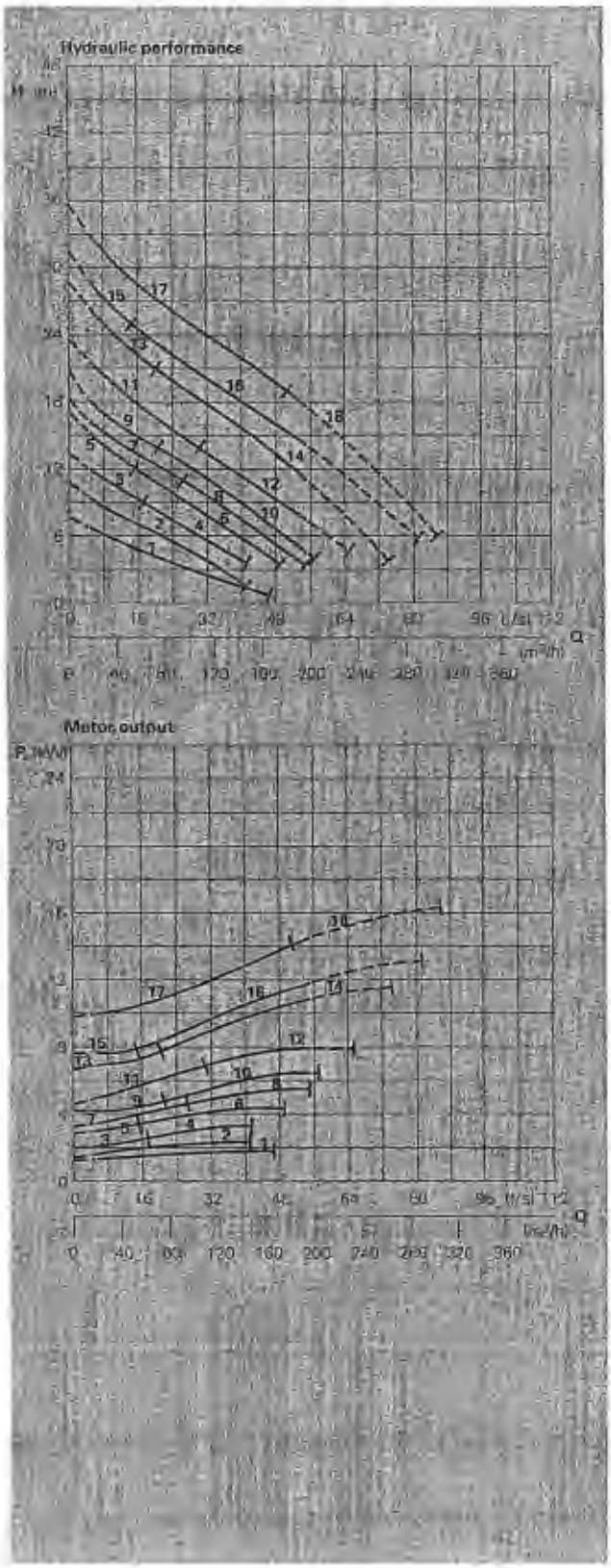
Standard model

Curve No.	Pump type Wet well installation	Dry well installation	Motor output P_2 (kW)	Rated curr. I_N (A)	Weight (kg) Wet w. inst.	Dry w. inst.
1	M 2432-N24	...-NU24	1,8	3,7	102	105
2	MX2436-N34	...-NU34	2,6	5,5	104	107
3	MX2438-N34	...-NU34	2,6	5,5	104	107
4	MX2438-N44	...-NU44	3,5	7,4	108	111
5	MX2444-N44	...-NU44	3,5	7,4	109	112
6	MX2444-N54	...-NU54	4,6	10,5	111	115
7	MX2446-N54	...-NU54	4,6	10,5	111	115
8	MX2446-N64	...-NU64	6,5	13,6	114	118
9	MX2448-N54	...-NU54	4,6	10,5	111	115
10	MX2448-N64	...-NU64	6,5	13,6	114	118
11	MX2452-N64	...-NU64	6,5	13,6	136	140
12	MX2452-P74	...-PU74	7,8	17,5	184	191
13	MX2456-P74	...-PU74	7,8	17,5	186	193
14	MX2456-P94	...-PU94	13,4	30,0	211	219
15	MX2460-P74	...-PU74	7,8	17,5	187	194
16	MX2460-P94	...-PU94	13,4	30,0	212	220
17	MX2462-P94	...-PU94	13,4	30,0	213	221
18	MX2462-P104	...-PU104	18,7	40,0	231	241

Explosion-proof model

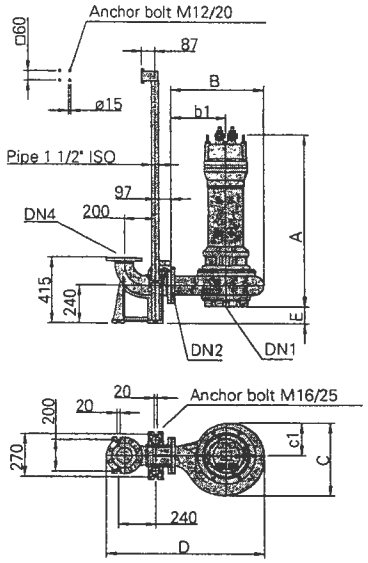
Curve No.	Pump type Wet well installation	Dry well installation	Motor output P_2 (kW)	Rated curr. I_N (A)	Weight (kg) Wet w. inst.	Dry w. inst.
1	M 2432-N24 Ex	...-NU24 Ex	1,8	3,7	114	117
2	MX2436-N34 Ex	...-NU34 Ex	2,6	5,5	116	119
3	MX2438-N34 Ex	...-NU34 Ex	2,6	5,5	116	119
4	MX2438-N44 Ex	...-NU44 Ex	3,5	7,4	120	123
5	MX2444-N44 Ex	...-NU44 Ex	3,5	7,4	121	124
6	MX2444-N54 Ex	...-NU54 Ex	4,6	10,5	123	127
7	MX2446-N54 Ex	...-NU54 Ex	4,6	10,5	123	127
8	MX2446-N64 Ex	...-NU64 Ex	6,5	13,6	126	130
9	MX2448-N54 Ex	...-NU54 Ex	4,6	10,5	123	127
10	MX2448-N64 Ex	...-NU64 Ex	6,5	13,6	126	130
11	MX2452-N64 Ex	...-NU64 Ex	6,5	13,6	148	162
12	MX2452-P74 Ex	...-PU74 Ex	7,8	17,5	196	203
13	MX2456-P74 Ex	...-PU74 Ex	7,8	17,5	198	205
14	MX2456-P94 Ex	...-PU94 Ex	13,4	30,0	223	231
15	MX2460-P74 Ex	...-PU74 Ex	7,8	17,5	199	206
16	MX2460-P94 Ex	...-PU94 Ex	13,4	30,0	224	232
17	MX2462-P94 Ex	...-PU94 Ex	13,4	30,0	225	233
18	MX2462-P104 Ex	...-PU104 Ex	18,7	40,0	243	253

Performance curves

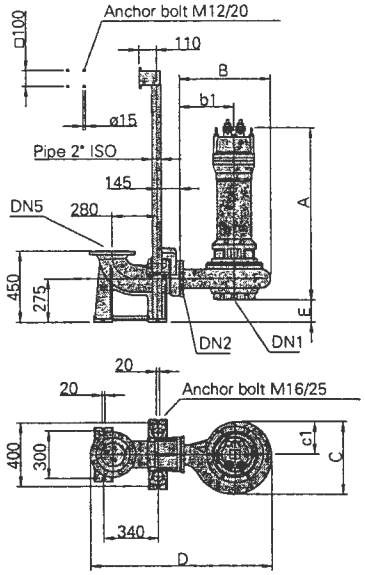


Installations and dimensions for MX24...-4 pole

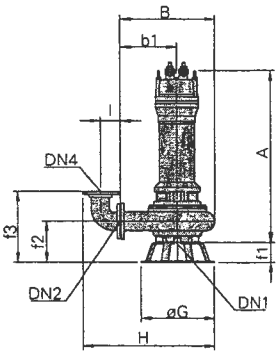
Wet well installation with auto-coupling system
DN 100



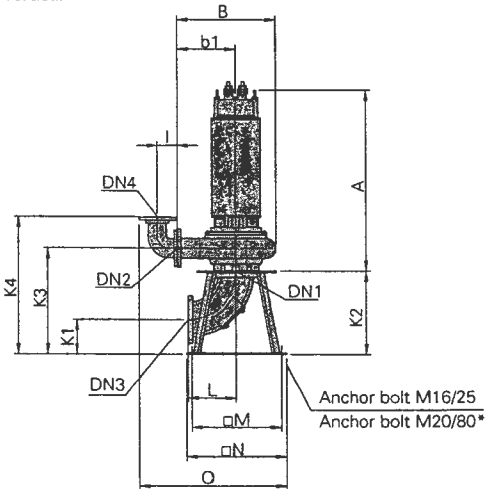
DN 150



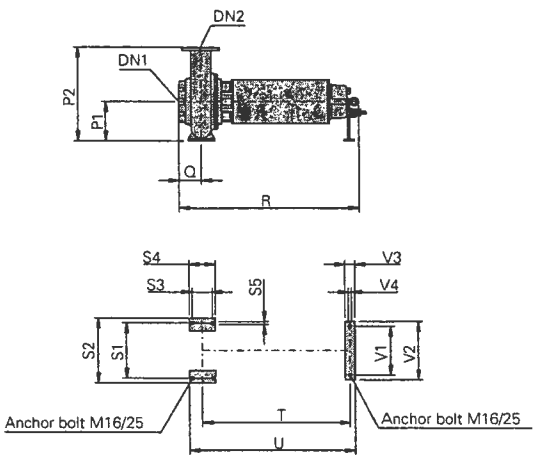
Wet well installation with ring base stand



Dry well installation
vertical



Dry well installation
horizontal



Pump type	$A_{max.}$	B	b_1	C	c_1	D	E	f_1	f_2	f_3	øG	H	I	K_1	K_2	K_3	K_4	L	oM	oN	O
M 2432-N... up to MX2438-N...	762	422	265	323	147	834	117	125	248	436	395	693	120	150	355	478	666	195	400	440	715
MX2444-N... up to MX2448-N...	828	459	280	363	165	871	110	125	255	443	395	708	120	150	355	485	673	195	400	440	730
MX2452-N...	844	576	345	457	207	988	105	125	260	448	450	806	120	207	500	635	823	283	520	580	865
MX2452-P... up to MX2462-P...	1084	576	345	457	207	988	105	125	260	448	450	806	120	207	500	635	823	283	520	580	865
**MX2452-P... up to MX2462-P...	1084	576	345	457	207	1143	140	125	260	448	450	806	120	207	500	635	823	283	520	580	865

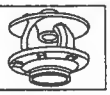
Pump type	P_1	P_2	Q	$R_{max.}$	S_1	S_2	S_3	S_4	S_5	$T_{max.}$	$U_{max.}$	V_1	V_2	V_3	V_4	DN_1	DN_2	DN_3	DN_4	DN_5
M 2432-N... up to MX2438-N...	200	465	123	774	280	330	95	140	18	592	692	260	320	60	ø18	100	100	100	100	–
MX2444-N... up to MX2448-N...	200	480	130	840	280	330	95	140	18	651	751	260	320	60	ø18	100	100	100	100	–
MX2452-N...	250	595	135	856	350	410	120	160	18	662	772	260	320	60	ø18	150	100	150	100	–
MX2452-P... up to MX2462-P...	250	595	135	1096	350	410	120	160	18	902	1012	310	370	60	ø18	150	100	150	100	–
**MX2452-P... up to MX2462-P...	250	595	135	1096	350	410	120	160	18	902	1012	310	370	60	ø18	150	100	150	–	150

all dimensions in mm *Pump stand DN 150 **wet well installation with auto-coupling system DN150

MX24...-6pole

960 rpm
DN 100 discharge
100 mm Ø spherical clearance

M



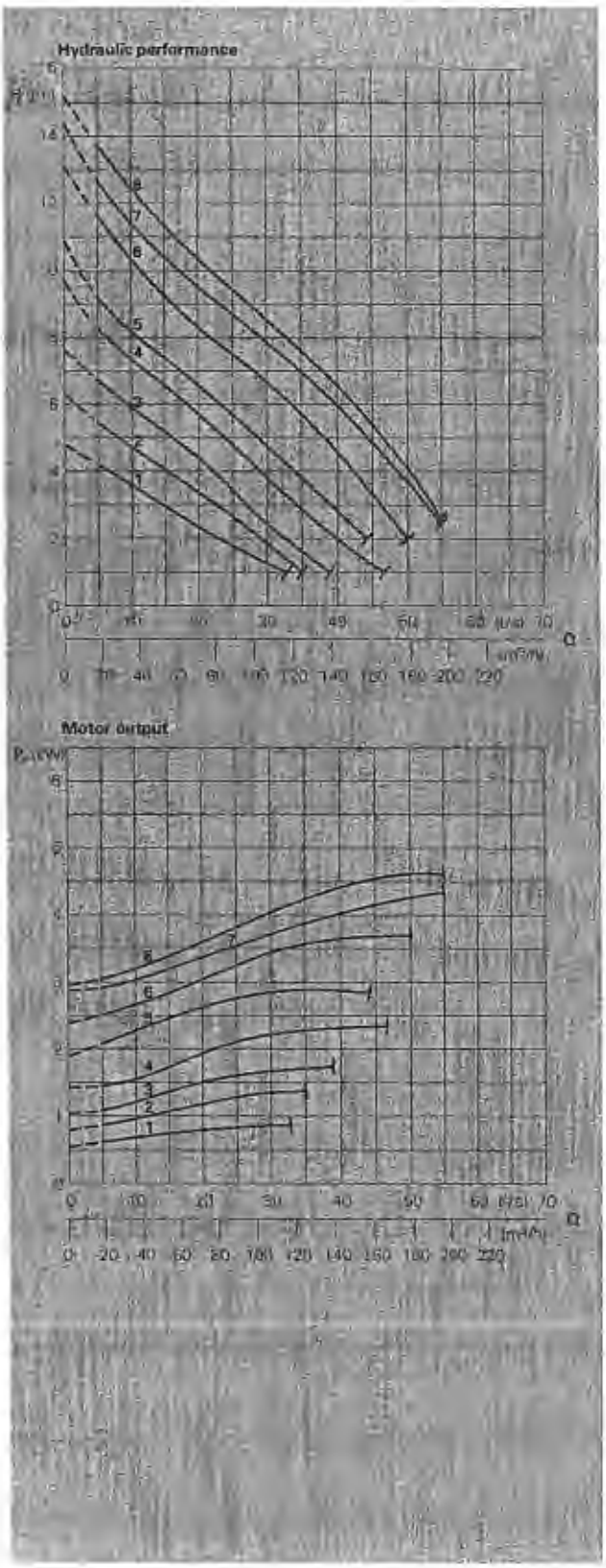
Standard model

Curve No.	Pump type: Wet well installation	Pump type: Dry well installation	Motor output P_2 (kW)	Rated curr. I_N (A)	Weight (kg): Wet w. inst.	Weight (kg): Dry w. inst.
1	MX2436-N26	...-NU26	2,0	4,5	104	107
2	MX2438-N26	...-NU26	2,0	4,5	104	107
3	MX2446-N26	...-NU26	2,0	4,5	109	112
4	MX2448-N36	...-NU36	2,6	5,9	109	112
5	MX2452-N46	...-NU46	3,4	8,0	148	154
6	MX2456-N56	...-NU56	4,7	12,0	154	160
7	MX2460-N56	...-NU56	4,7	12,0	155	161
8	MX2462-N56	...-NU56	4,7	12,0	156	162

Explosion-proof model

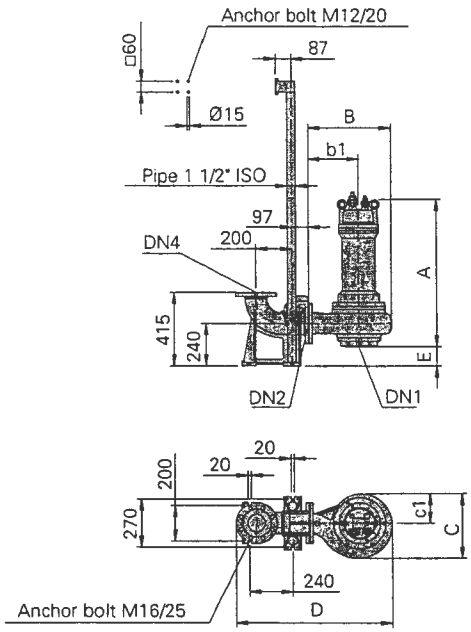
Curve No.	Pump type: Wet well installation	Pump type: Dry well installation	Motor output P_2 (kW)	Rated curr. I_N (A)	Weight (kg): Wet w. inst.	Weight (kg): Dry w. inst.
1	MX2436-N26 Ex	...-NU26 Ex	2,0	4,5	116	119
2	MX2438-N26 Ex	...-NU26 Ex	2,0	4,5	116	119
3	MX2446-N26 Ex	...-NU26 Ex	2,0	4,5	121	124
4	MX2448-N36 Ex	...-NU36 Ex	2,6	5,9	121	124
5	MX2452-N46 Ex	...-NU46 Ex	3,4	8,0	159	165
6	MX2456-N56 Ex	...-NU56 Ex	4,7	12,0	165	171
7	MX2460-N56 Ex	...-NU56 Ex	4,7	12,0	166	172
8	MX2462-N56 Ex	...-NU56 Ex	4,7	12,0	167	173

Performance curves

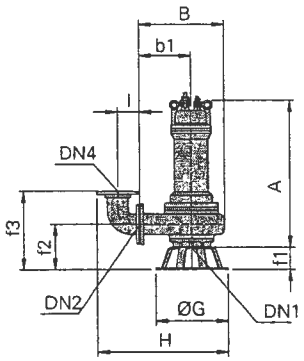


Installations and dimensions for MX24...-6 pole

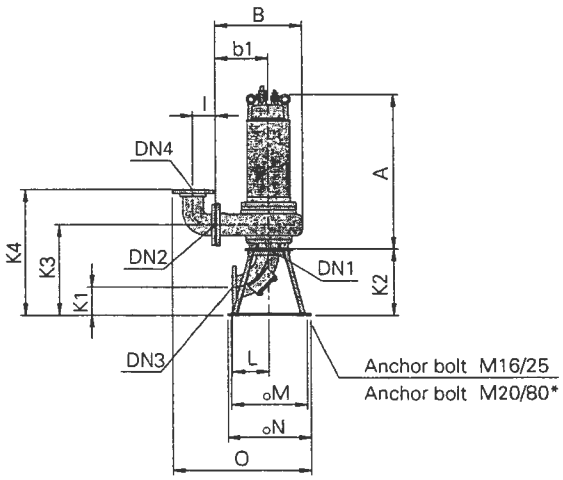
Wet well installation with auto-coupling system



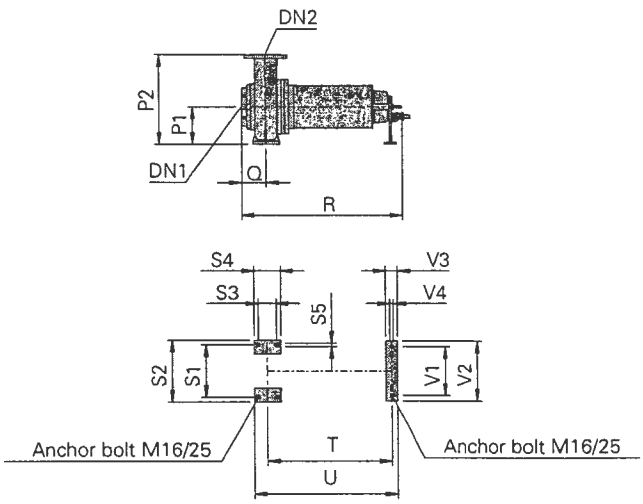
Wet well installation with ring base stand



Dry well installation vertical



Dry well installation horizontal



Pump type	$A_{max.}$	B	b_1	C	c_1	D	E	f_1	f_2	f_3	øG	H	I	K_1	K_2	K_3	K_4	L	oM	oN	O
MX2436-N...up to MX2438-N...	762	422	265	323	147	834	117	125	248	436	395	693	120	150	355	478	666	195	400	440	715
MX2446-N... up to MX2448-N...	758	459	280	363	165	871	110	125	255	443	395	708	120	150	355	485	673	195	400	440	730
MX2452-N... up to MX2462-N...	844	576	345	457	207	988	105	125	260	448	450	806	120	207	500	635	823	283	520	580	865

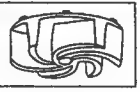
Pump type	P_1	P_2	Q	$R_{max.}$	S_1	S_2	S_3	S_4	S_5	$T_{max.}$	$U_{max.}$	V_1	V_2	V_3	V_4	DN_1	DN_2	DN_3	DN_4
MX2436-N...up to MX2438-N...	200	465	123	774	280	330	95	140	18	592	692	260	320	60	ø18	100	100	100	100
MX2446-N... up to MX2448-N...	200	480	130	840	280	330	95	140	18	651	751	260	320	60	ø18	100	100	100	100
MX2452-N... up to MX2462-N...	250	595	135	856	350	410	120	160	18	662	772	260	320	60	ø18	150	100	150	100

all dimensions in mm *Pump stand DN 150

V24...-4pole

1450 rpm
DN 100 discharge
100 mm Ø spherical clearance

V



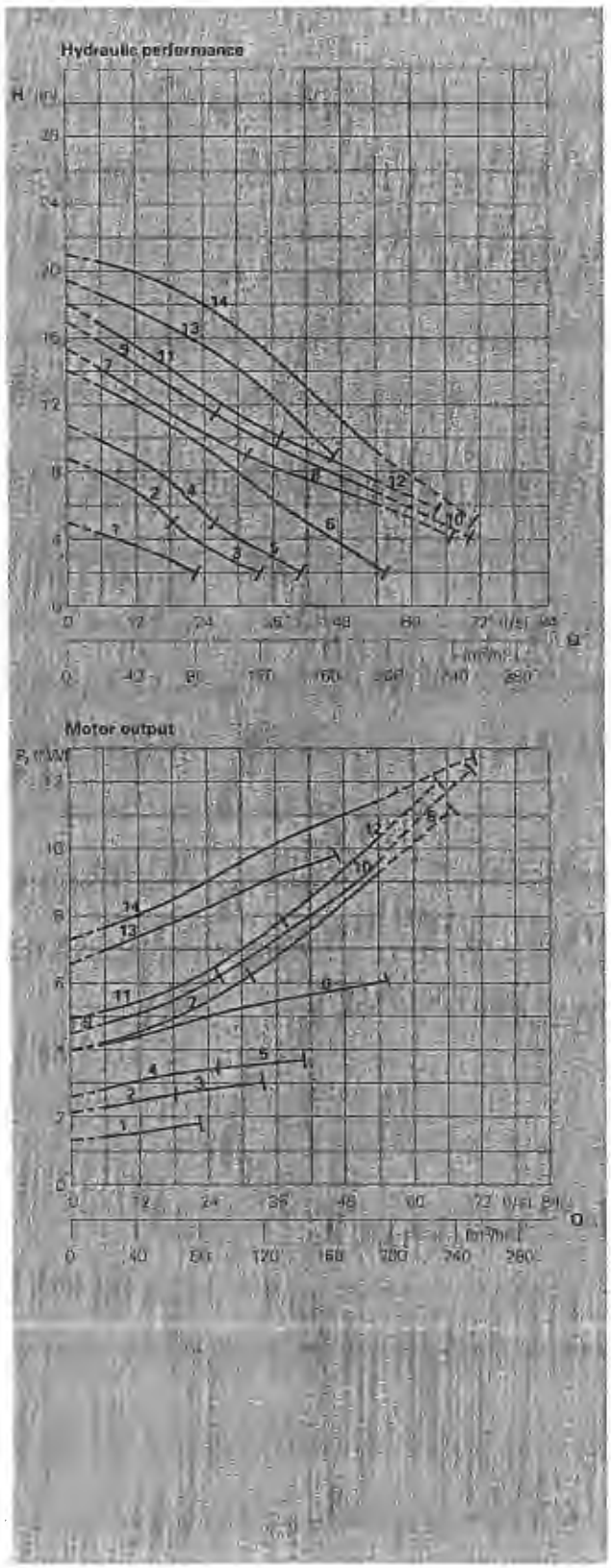
Standard model

Curve No.	Pump type: Wet well installation	Pump type: Dry well installation	Motor output P_2 (kW)	Rated curr. I_N (A)	Weight (kg): Wet w. inst.	Weight (kg): Dry w. inst.
1	V2436-N24	...-NU24	1,8	3,7	102	105
2	V2437-N34	...-NU34	2,6	5,5	104	107
3	V2437-N44	...-NU44	3,5	7,4	109	112
4	V2441-N44	...-NU44	3,5	7,4	109	112
5	V2441-N54	...-NU54	4,6	10,5	111	115
6	V2445-N64	...-NU64	6,5	13,6	114	118
7	V2442-N64	...-NU64	6,5	13,6	114	118
8	V2442-P94	...-PU94	13,4	30,0	169	179
9	V2444-N64	...-NU64	6,5	13,6	114	118
10	V2444-P94	...-PU94	13,4	30,0	169	179
11	V2446-P74	...-PU74	7,8	17,5	156	165
12	V2446-P94	...-PU94	13,4	30,0	169	179
13	V2452-P94	...-PU94	13,4	30,0	197	207
14	V2456-P94	...-PU94	13,4	30,0	197	207

Explosion-proof model

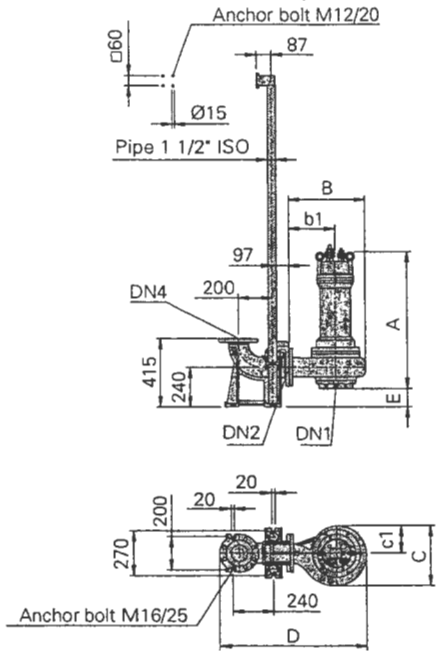
Curve No.	Pump type: Wet well installation	Pump type: Dry well installation	Motor output P_2 (kW)	Rated curr. I_N (A)	Weight (kg): Wet w. inst.	Weight (kg): Dry w. inst.
1	V2436-N24 Ex	...-NU24 Ex	1,8	3,7	114	117
2	V2437-N34 Ex	...-NU34 Ex	2,6	5,5	116	119
3	V2437-N44 Ex	...-NU44 Ex	3,5	7,4	121	124
4	V2441-N44 Ex	...-NU44 Ex	3,5	7,4	121	124
5	V2441-N54 Ex	...-NU54 Ex	4,6	10,5	123	127
6	V2445-N64 Ex	...-NU64 Ex	6,5	13,6	126	130
7	V2442-N64 Ex	...-NU64 Ex	6,5	13,6	126	130
8	V2442-P94 Ex	...-PU94 Ex	13,4	30,0	181	191
9	V2444-N64 Ex	...-NU64 Ex	6,5	13,6	126	130
10	V2444-P94 Ex	...-PU94 Ex	13,4	30,0	181	191
11	V2446-P74 Ex	...-PU74 Ex	7,8	17,5	168	177
12	V2446-P94 Ex	...-PU94 Ex	13,4	30,0	181	191
13	V2452-P94 Ex	...-PU94 Ex	13,4	30,0	209	219
14	V2456-P94 Ex	...-PU94 Ex	13,4	30,0	209	219

Performance curves

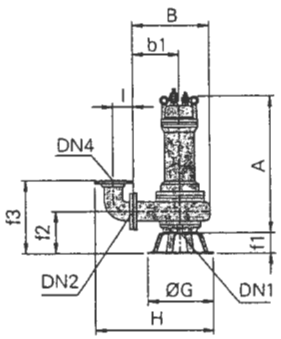


Installations and dimensions for V24...-4 pole

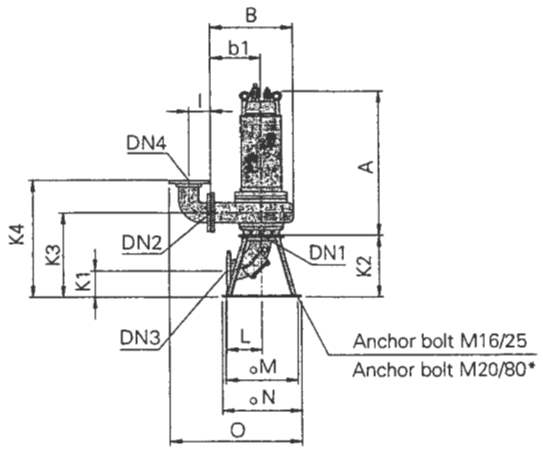
Wet well installation with auto-coupling system



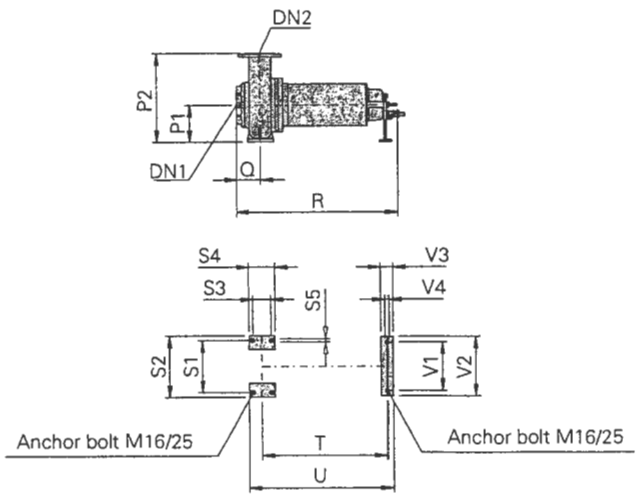
Wet well installation with ring base stand



Dry well installation vertical



Dry well installationhorizontal horizontal



Pump type	$A_{max.}$	B	b_1	C	c_1	D	E	f_1	f_2	f_3	øG	H	I	K_1	K_2	K_3	K_4	L	oM	oN	O
V2436-N24(Ex)	762	422	265	323	147	834	117	125	248	436	395	693	120	150	355	448	636	195	400	440	715
V2437-N... up to V2444-N...	828	459	280	363	165	871	110	125	255	443	395	708	120	150	355	448	636	195	400	440	730
V2442-P... up to V2446-P...	984	459	280	363	165	871	110	125	255	443	395	708	120	150	355	448	636	195	400	440	730
V2448-P... up to V2456-P...	994	576	345	457	207	988	105	125	260	448	450	806	120	207	500	635	823	283	520	580	865

Pump type	P_1	P_2	Q	$R_{max.}$	S_1	S_2	S_3	S_4	S_5	$T_{max.}$	$U_{max.}$	V_1	V_2	V_3	V_4	DN_1	DN_2	DN_3	DN_4
V2436-N24(Ex)	200	465	123	774	280	330	95	140	18	592	692	260	320	60	ø18	100	100	100	100
V2437-N... up to V2444-N...	200	480	130	840	280	330	95	140	18	651	751	260	320	60	ø18	100	100	100	100
V2442-P... up to V2446-P...	200	480	130	996	280	330	95	140	18	807	907	310	370	60	ø18	100	100	100	100
V2448-P... up to V2456-P...	250	595	135	856	350	410	120	160	18	662	772	310	370	60	ø18	150	100	150	100

all dimensions in mm *Pump stand DN 150

MX34...-4 pole

1450 rpm	M
DN 150 discharge	
100 mm Ø spherical clearance	

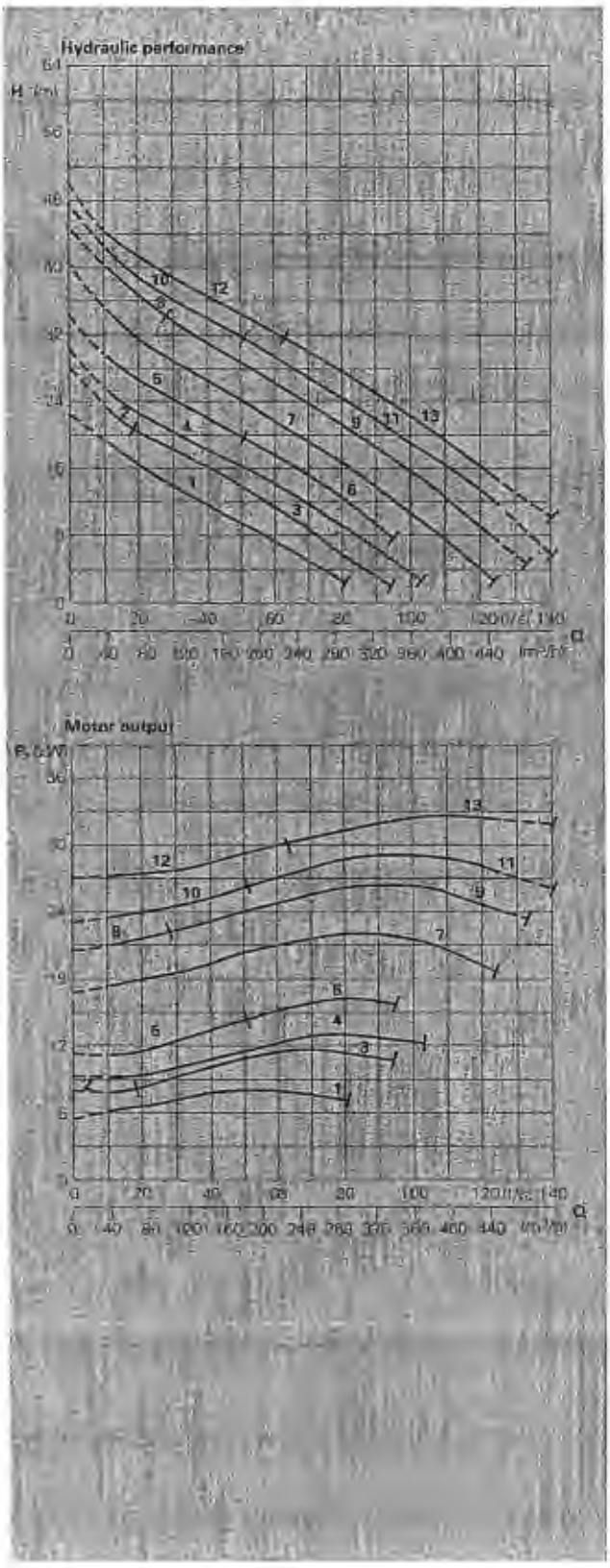
Standard model

Curve No.	Pump type: Wet well installation	Pump type: Dry well installation	Motor output P_2 (kW)	Rated curr. I_N (A)	Weight (kg): Wet w. inst.	Weight (kg): Dry w. inst.
1	MX3452-P74	...-PU74	7,8	17,5	189	196
2	MX3456-P74	...-PU74	7,8	17,5	191	198
3	MX3456-P94	...-PU94	13,4	30,0	216	224
4	MX3460-P94	...-PU94	13,4	30,0	217	225
5	MX3462-P94	...-PU94	13,4	30,0	218	226
6	MX3462-P104	...-PU104	18,7	40,0	236	246
7	MX3468-F114	...-FU114	22,0	44,0	388	451
8	MX3470-F114	...-FU114	22,0	44,0	388	451
9	MX3470-F124	...-FU124	26,0	52,0	410	488
10	MX3472-F124	...-FU124	26,0	52,0	410	488
11	MX3472-F134	...-FU134	30,0	59,0	420	498
12	MX3474-F134	...-FU134	30,0	59,0	420	498
13	MX3474-F144	...-FU144	33,0	65,0	430	508

Explosion-proof model

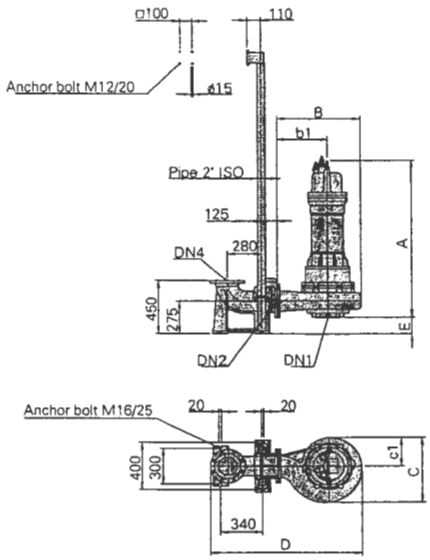
Curve No.	Pump type: Wet well installation	Pump type: Dry well installation	Motor output P_2 (kW)	Rated curr. I_N (A)	Weight (kg): Wet w. inst.	Weight (kg): Dry w. inst.
1	MX3452-P74 Ex	...-PU74 Ex	7,8	17,5	201	208
2	MX3456-P74 Ex	...-PU74 Ex	7,8	17,5	203	210
3	MX3456-P94 Ex	...-PU94 Ex	13,4	30,0	228	236
4	MX3460-P94 Ex	...-PU94 Ex	13,4	30,0	229	237
5	MX3462-P94 Ex	...-PU94 Ex	13,4	30,0	230	238
6	MX3462-P104 Ex	...-PU104 Ex	18,7	40,0	248	258
7	MX3468-F114 Ex	...-FU114 Ex	22,0	44,0	388	451
8	MX3470-F114 Ex	...-FU114 Ex	22,0	44,0	388	451
9	MX3470-F124 Ex	...-FU124 Ex	26,0	52,0	410	488
10	MX3472-F124 Ex	...-FU124 Ex	26,0	52,0	410	488
11	MX3472-F134 Ex	...-FU134 Ex	30,0	59,0	420	498
12	MX3474-F134 Ex	...-FU134 Ex	30,0	59,0	420	498
13	MX3474-F144 Ex	...-FU144 Ex	33,0	65,0	430	508

Performance curves

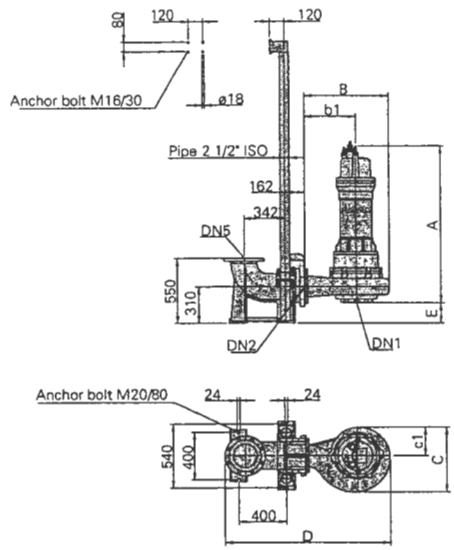


Installations and dimensions for MX34...-4 pole

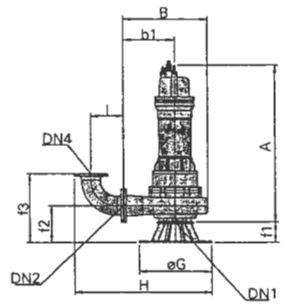
Wet well installation with auto-coupling system DN 150



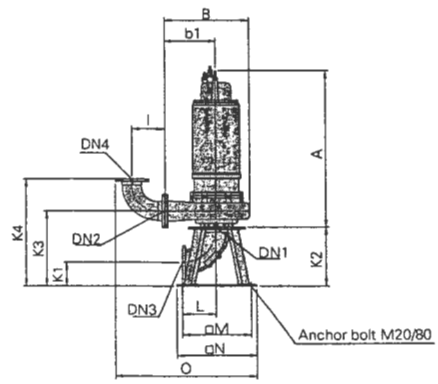
DN 200



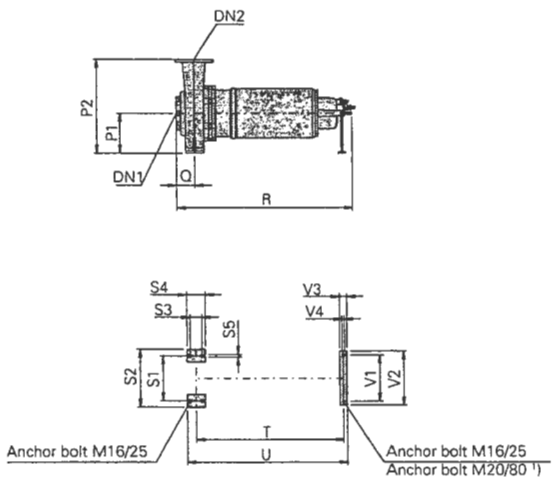
Wet well installation with ring base stand



Dry well installation vertical



Dry well installation horizontal



Pump type	$A_{max.}$	B	b_1	C	c_1	D	E	f_1	f_2	f_3	øG	H	l	K_1	K_2	K_3	K_4	L	øM	øN	O
MX3452-P... up to MX 3462-P...	1084	608	370	468	209	1156	140	125	260	531	450	1021	271	207	500	635	906	283	520	580	1074
MX3452-P... up to MX 3462-P...	1084	608	370	468	209	1282**	175**	125	260	531	450	1021	271	207	500	635	906	283	520	580	1074
1) MX3468-F... up to MX 3474-F...	1326	690	420	241	548	1237	137	174	312	583	600	1134	271	202	500	638	909	283	560	650	1159
1) MX3468-F... up to MX 3474-F...	1326	690	420	241	548	1364**	172**	174	312	583	600	1134	271	202	500	638	909	283	560	650	1159

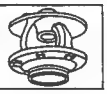
Pump type	P_1	P_2	Q	$R_{max.}$	S_1	S_2	S_3	S_4	S_5	$T_{max.}$	$U_{max.}$	V_1	V_2	V_3	V_4	DN_1	DN_2	DN_3	DN_4	DN_5
MX3452-P... up to MX 3462-P...	250	620	135	1096	350	410	120	160	18	902	1012	310	370	60	ø18	150	150	150	150	–
MX3452-P... up to MX 3462-P...	250	620	135	1096	350	410	120	160	18	902	1012	310	370	60	ø18	150	150	200*	–	200**
1) MX3468-F... up to MX 3474-F...	310	730	138	1341	350	450	90	140	20	1125	1225	360	420	60	ø23	150	150	150	150	–
1) MX3468-F... up to MX 3474-F...	310	730	138	1341	350	450	90	140	20	1125	1225	360	420	60	ø23	150	150	200*	–	200**

all dimensions in mm *only vertical dry well installation with flanged 90° elbow DN150-DN200 **only wet well installation with auto-coupling system DN200

MX34...-6pole

960 rpm
DN 150 discharge
100 mm Ø spherical clearance

M



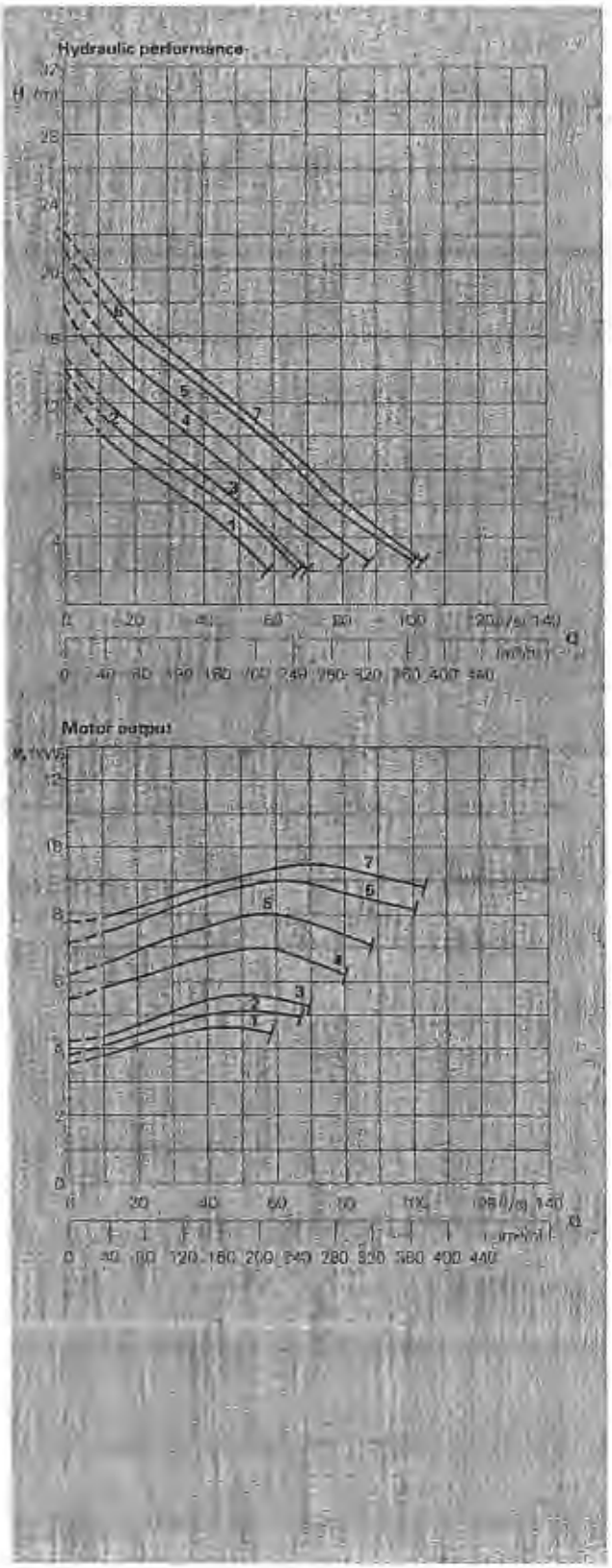
Standard model

Curve No.	Pump type: Wet well installation	Pump type: Dry well installation	Motor output P_2 (kW)	Rated curr. I_N (A)	Weight (kg): Wet w. inst.	Weight (kg): Dry w. inst.
1	MX3456-N56	...-NU56	4,7	12,0	158	164
2	MX3460-N56	...-NU56	4,7	12,0	159	165
3	MX3462-N56	...-NU56	4,7	12,0	160	166
4	MX3468-P76	...-PU76	7,3	16,3	260	267
5	MX3470-P76	...-PU76	7,3	16,3	260	267
6	MX3472-P86	...-PU86	10,0	22,4	285	292
7	MX3474-P86	...-PU86	10,0	22,4	285	292

Explosion-proof model

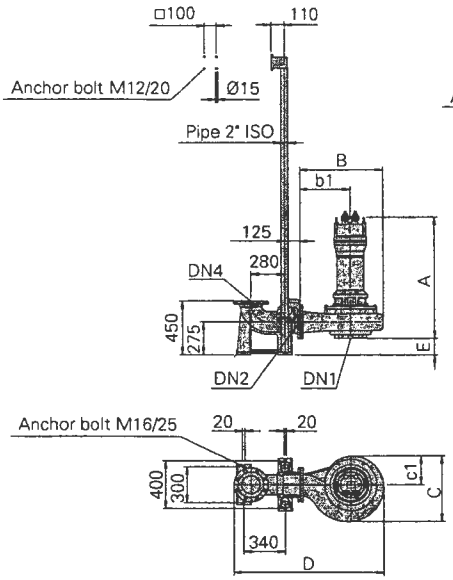
Curve No.	Pump type: Wet well installation	Pump type: Dry well installation	Motor output P_2 (kW)	Rated curr.I $_N$(A)	Weight (kg): Wet w. inst.	Weight (kg): Dry w. inst.
1	MX3456-N56 Ex	...-NU56 Ex	4,7	12,0	169	175
2	MX3460-N56 Ex	...-NU56 Ex	4,7	12,0	170	176
3	MX3462-N56 Ex	...-NU56 Ex	4,7	12,0	171	177
4	MX3468-P76 Ex	...-PU76 Ex	7,3	16,3	272	279
5	MX3470-P76 Ex	...-PU76 Ex	7,3	16,3	272	279
6	MX3472-P86 Ex	...-PU86 Ex	10,0	22,4	297	304
7	MX3474-P86 Ex	...-PU86 Ex	10,0	22,4	297	304

Performance curves

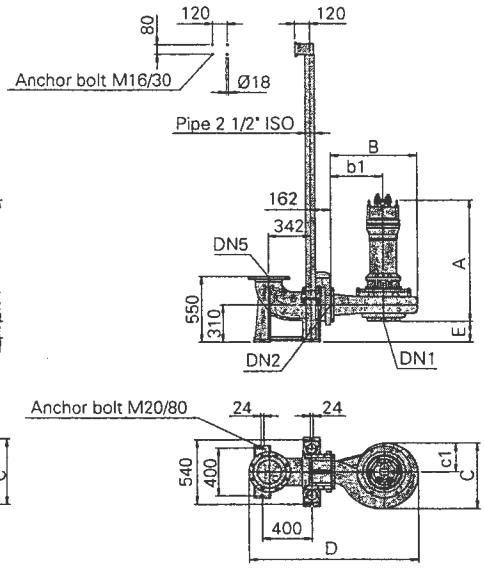


Installations and dimensions for MX34...-6 pole

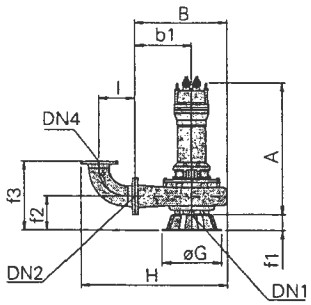
Wet well installation with auto-coupling system
DN 150



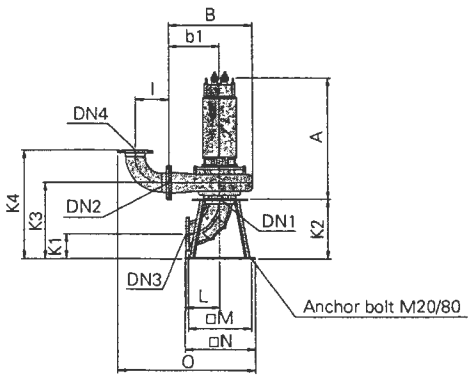
DN 200



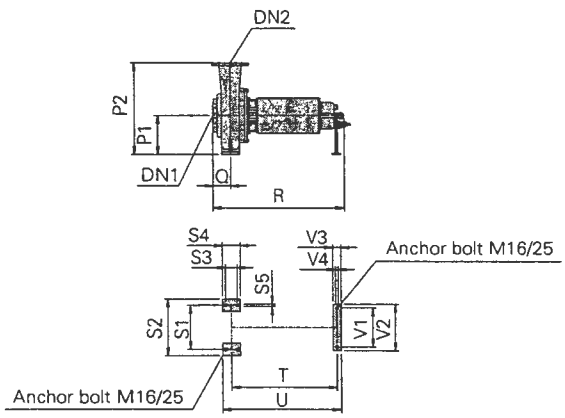
Wet well installation with ring base stand



Dry well installation
vertical



Dry well installation
vertical



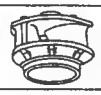
Pump type	$A_{max.}$	B	b_1	C	c_1	D	E	f_1	f_2	f_3	øG	H	I	K_1	K_2	K_3	K_4	L	oM	oN	O
MX3456-N... up to M3462-N...	844	608	370	468	209	1156	140	125	260	531	450	1022	271	207	500	635	906	283	520	580	1074
MX3456-N... up to M3462-N...	844	608	370	468	209	1282**	175**	125	260	531	450	1022	271	207	500	635	906	283	520	580	1074
MX3468-P... up to M3474-P..	1016	690	420	548	241	1237	137	125	263	534	450	1103	271	207	500	638	909	283	520	580	1124
MX3468-P... up to M3474-P..	1016	690	420	548	241	1364**	172**	125	263	534	450	1103	271	207	500	638	909	283	520	580	1124

Pump type	P_1	P_2	Q	$R_{max.}$	S_1	S_2	S_3	S_4	S_5	$T_{max.}$	$U_{max.}$	V_1	V_2	V_3	V_4	DN_1	DN_2	DN_3	DN_4	DN_5
MX3456-N... up to M3462-N.	250	620	135	856	350	410	120	160	18	662	772	260	320	60	ø18	150	150	150	150	–
MX3456-N... up to M3462-N...																		200*	–	200**
MX3468-P... up to M3474-P.	310	730	138	1028	350	450	90	140	20	831	931	310	370	60	ø18	150	150	150	150	–
MX3468-P... up to M3474-P.	310	730	138	1028	350	450	90	140	20	831	931	310	370	60	ø18	150	150	200*	–	200**

all dimensions in mm *only vertical dry well installation with flanged 90° elbow DN150-DN200 **only wet well installation with auto-coupling system DN200

K33...-4pole

1450 rpm	K
DN 150 discharge	
77 mm Ø spherical clearance	



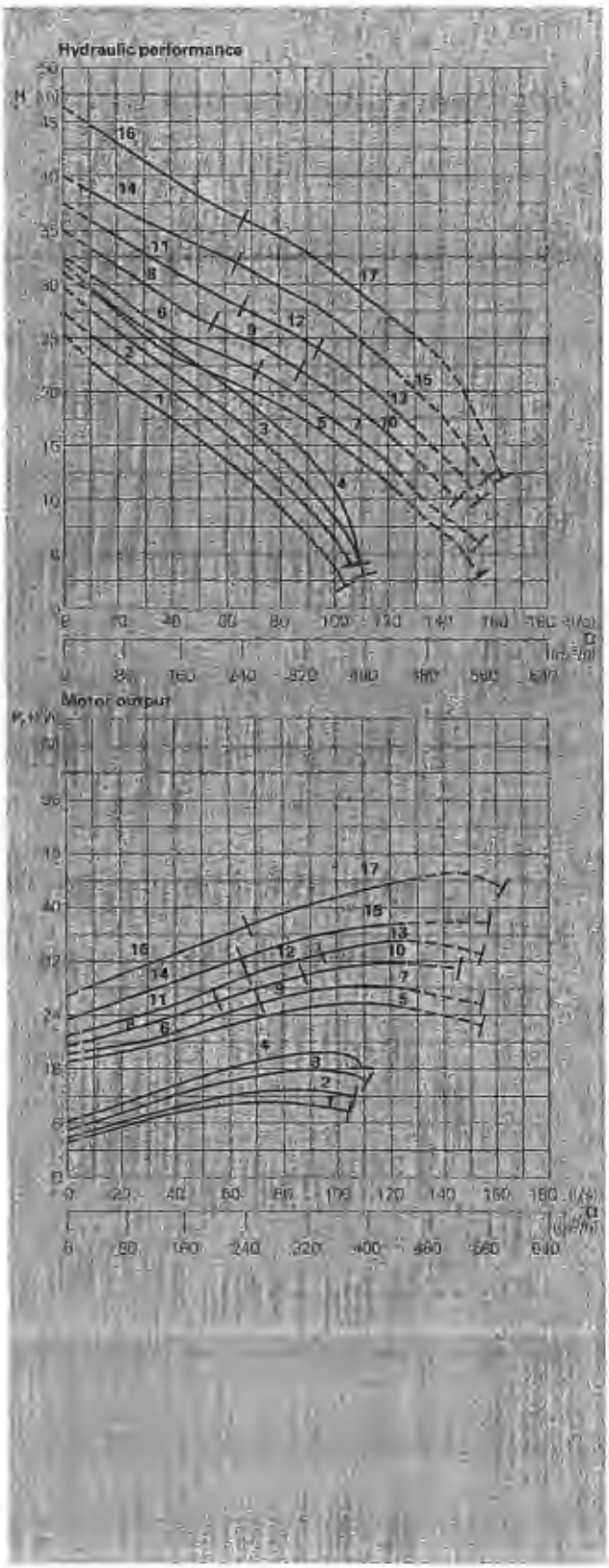
Standard model

Curve No.	Pump type Wet well installation	Dry well installation	Motor output P_2 (kW)	Rated curr. I_N (A)	Weight (kg) Wet w. inst.	Dry w. inst.
1	K3352-P94	...-PU94	13,4	30,0	216	224
2	K3354-P94	...-PU94	13,4	30,0	216	224
3	K3356-P104	...-PU104	18,7	40,0	234	244
4	K3358-P104	...-PU104	18,7	40,0	234	244
5	K3360-F124	...-FU124	26,0	52,0	418	493
6	K3362-F124	...-FU124	26,0	52,0	418	493
7	K3362-F134	...-FU134	30,0	59,0	428	503
8	K3364-F124	...-FU124	26,0	52,0	428	493
9	K3364-F134	...-FU134	30,0	59,0	428	503
10	K3364-F144	...-FU144	33,0	65,0	449	524
11	K3366-F134	...-FU134	30,0	59,0	428	503
12	K3366-F144	...-FU144	33,0	65,0	449	524
13	K3366-G154	...-GU154	37,0	71,0	486	555
14	K3368-F144	...-FU144	33,0	65,0	449	524
15	K3368-G154	...-GU154	37,0	71,0	486	555
16	K3370-G154	...-GU154	37,0	71,0	486	555
17	K3370-G174	...-GU174	45,0	94,0	528	610

Explosion-proof model

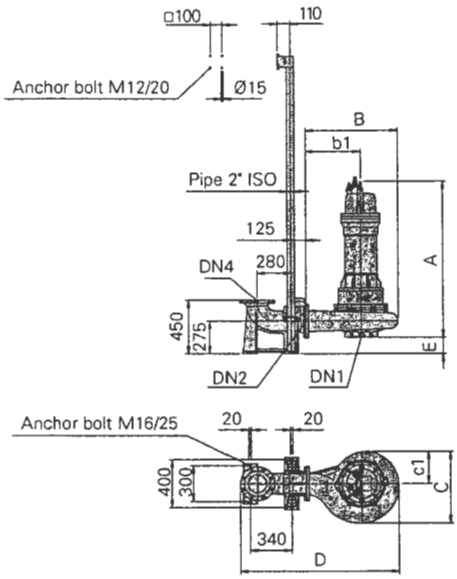
Curve No.	Pump type Wet well installation	Dry well installation	Motor output P_2 (kW)	Rated curr. I_N (A)	Weight (kg) Wet w. inst.	Dry w. inst.
1	K3352-P94 Ex	...-PU94 Ex	13,4	30,0	228	236
2	K3354-P94 Ex	...-PU94 Ex	13,4	30,0	228	236
3	K3356-P104 Ex	...-PU104 Ex	18,7	40,0	246	256
4	K3358-P104 Ex	...-PU104 Ex	18,7	40,0	246	256
5	K3360-F124 Ex	...-FU124 Ex	26,0	52,0	418	493
6	K3362-F124 Ex	...-FU124 Ex	26,0	52,0	418	493
7	K3362-F134 Ex	...-FU134 Ex	30,0	59,0	428	503
8	K3364-F124 Ex	...-FU124 Ex	26,0	52,0	428	493
9	K3364-F134 Ex	...-FU134 Ex	30,0	59,0	428	503
10	K3364-F144 Ex	...-FU144 Ex	33,0	65,0	449	524
11	K3366-F134 Ex	...-FU134 Ex	30,0	59,0	428	503
12	K3366-F144 Ex	...-FU144 Ex	33,0	65,0	449	524
13	K3366-G154 Ex	...-GU154 Ex	37,0	71,0	486	555
14	K3368-F144 Ex	...-FU144 Ex	33,0	65,0	449	524
15	K3368-G154 Ex	...-GU154 Ex	37,0	71,0	486	555
16	K3370-G154 Ex	...-GU154 Ex	37,0	71,0	486	555
17	K3370-G174 Ex	...-GU174 Ex	45,0	94,0	528	610

Performance curves

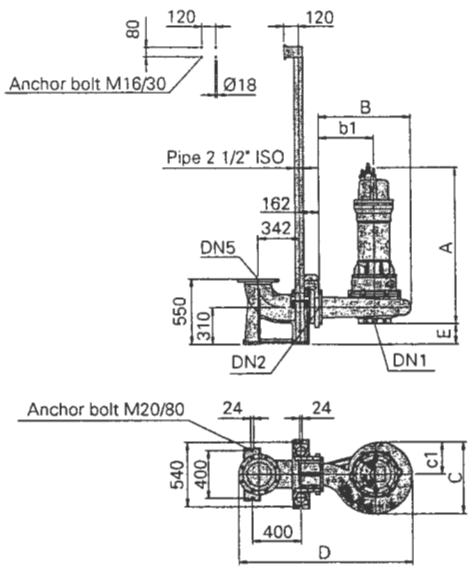


Installations and dimensions for K33...-4 pole

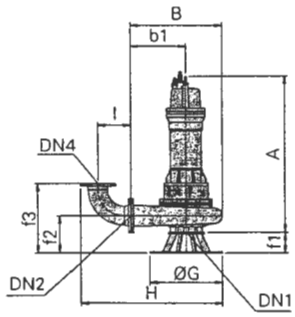
Wet well installation with auto-coupling system
DN 150



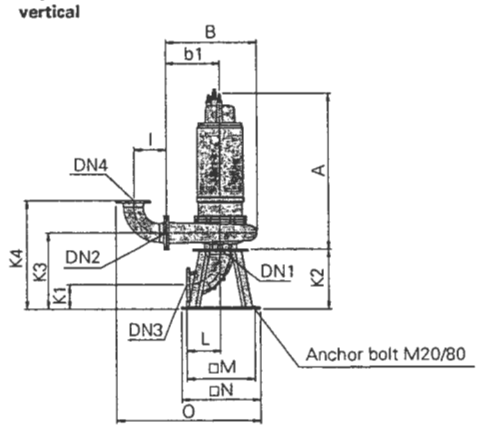
DN 200



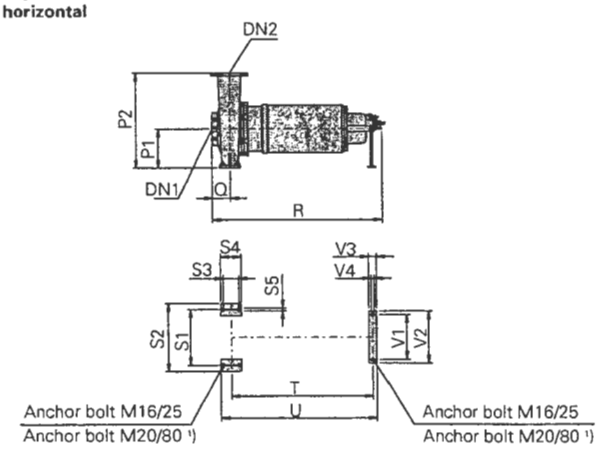
Wet well installation with ring base stand



Dry well installation
vertical



Dry well installation
horizontal



Pump type	$A_{max.}$	B	b_1	C	c_1	D	E	f_1	f_2	f_3	øG	H	I	K_1	K_2	K_3	K_4	L	□M	□N	O
K3352-P... up to K3358-P...	1084	608	370	468	209	1156	140	125	260	531	450	1022	271	207	500	635	906	283	520	580	1074
K3352-P... up to K3358-P...	1084	608	370	468	209	1283**	175**	125	260	531	450	1022	271	207	500	635	906	283	520	580	1074
1) K3360-F... up to K3368-F...	1308	752	450	600	269	1300	136	174	313	584	600	1166	271	202	500	639	910	283	560	650	1189
1) K3360-F... up to K3368-F...	1308	752	450	600	269	1427**	171**	174	313	584	600	1166	271	202	500	639	910	283	560	650	1189
1) K3366-G... up to K3370-G...	1364	752	450	600	269	1300	136	174	313	584	600	1166	271	202	500	639	910	283	560	650	1189
1) K3366-G... up to K3370-G...	1364	752	450	600	269	1427**	171**	174	313	584	600	1166	271	202	500	639	910	283	560	650	1189

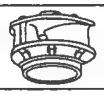
Pump type	P_1	P_2	Q	$R_{max.}$	S_1	S_2	S_3	S_4	S_5	$T_{max.}$	$U_{max.}$	V_1	V_2	V_3	V_4	DN_1	DN_2	DN_3	DN_4	DN_5
K3352-P... up to K3358-P...	250	620	135	1096	350	410	120	160	ø18	902	1012	310	370	60	ø18	150	150	150	150	–
K3352-P... up to K3358-P...	250	620	135	1096	350	410	120	160	ø18	902	1012	310	370	60	ø18	150	150	200*	–	200**
1) K3360-F... up to K3368-F...	315	765	139	1320	450	550	120	160	ø23	1104	1214	360	420	60	ø23	150	150	150	150	–
1) K3360-F... up to K3368-F...	315	765	139	1320	450	550	120	160	ø23	1104	1214	360	420	60	ø23	150	150	200*	–	200**
1) K3366-G... up to K3370-G...	315	765	139	1382	450	550	120	160	ø23	1144	1254	410	470	60	ø23	150	150	150	150	–
1) K3366-G... up to K3370-G...	315	765	139	1382	450	550	120	160	ø23	1144	1254	360	470	60	ø23	150	150	200*	–	200**

all dimensions in mm *only vertical dry well installation with flanged 90° elbow DN150-DN200 **only wet well installation with auto-coupling system DN200

K33...-6pole

960 rpm
DN 150 discharge
77 mm Ø spherical clearance

K



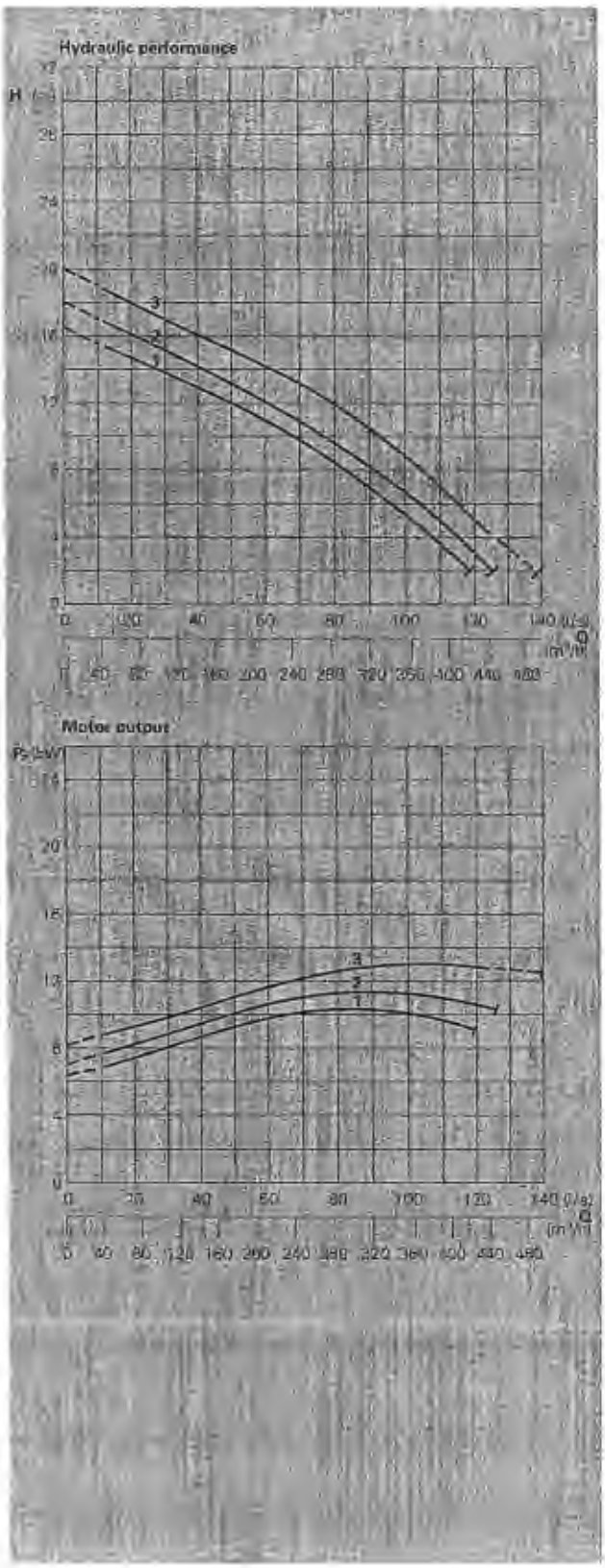
Standard model

Curve No.	Pump type Wet well installation	Dry well installation	Motor output P_2 (kW)	Rated curr. I_N (A)	Weight (kg) Wet w. inst.	Dry w. inst.
1	K3366-P96	...-PU 96	13,6	29,4	280	305
2	K3368-P96	...-PU 96	13,6	29,4	280	305
3	K3370-P96	...-PU 96	13,6	29,4	280	305

Explosion-proof model

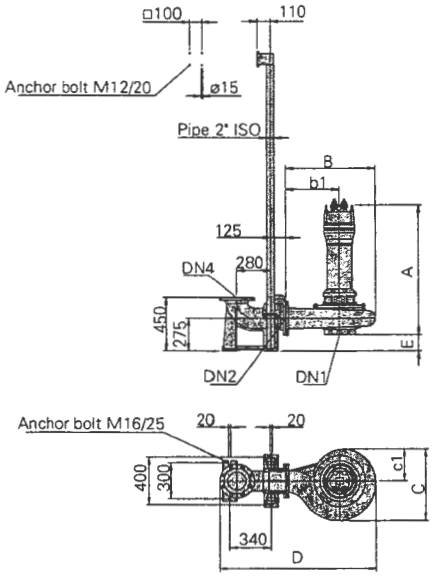
Curve No.	Pump type Wet well installation	Dry well installation	Motor output P_2 (kW)	Rated curr. I_N (A)	Weight (kg) Wet w. inst.	Dry w. inst.
1	K3366-P96 Ex	...-PU 96 Ex	13,6	29,4	280	305
2	K3368-P96 Ex	...-PU 96 Ex	13,6	29,4	280	305
3	K3370-P96 Ex	...-PU 96 Ex	13,6	29,4	280	305

Performance curves

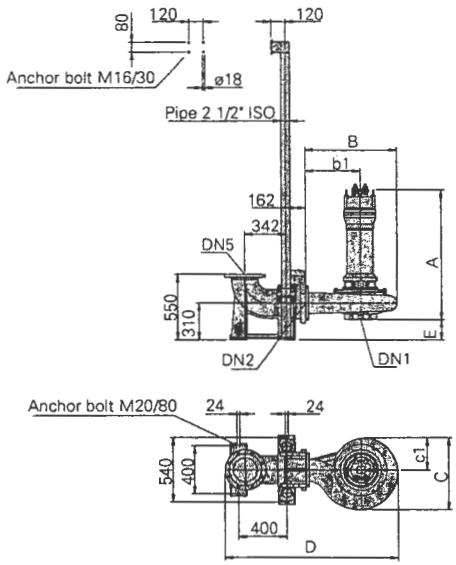


Installations and dimensions for K33...-6 pole

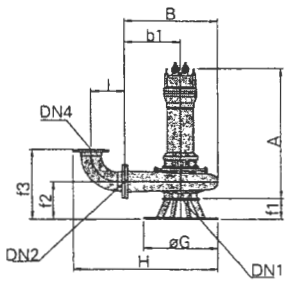
Wet well installation with auto-coupling system
DN 150



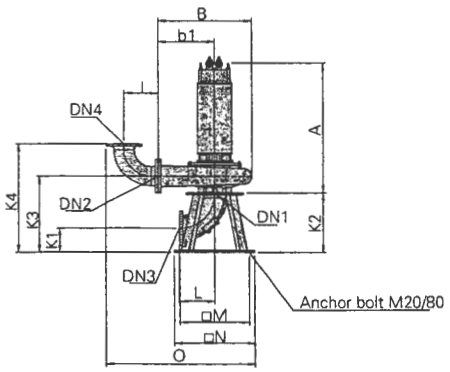
DN 200



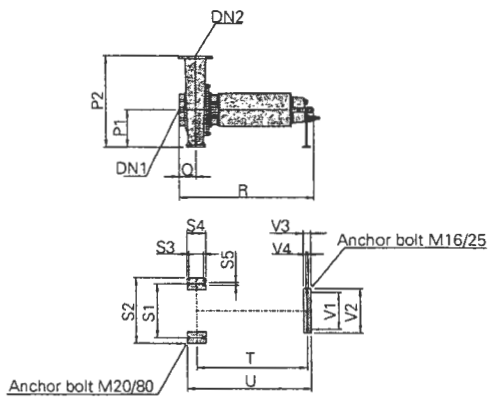
Wet well installation with ring base stand



Dry well installation
vertical



Dry well installation
horizontal



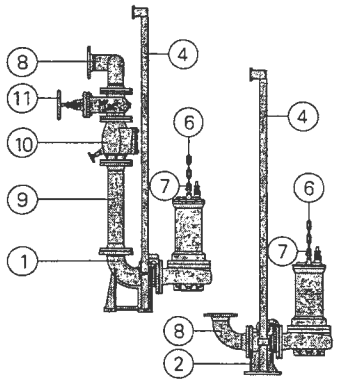
Pump type	$A_{max.}$	B	b_1	C	c_1	D	E	f_1	f_2	f_3	øG	H	l	K_1	K_2	K_3	K_4	L	₀M	₀N	O
K3366-P... up to K3370-P...	1088	752	450	600	269	1300	136	125	264	535	450	1166	271	207	500	639	910	283	520	580	1166
K3366-P... up to K3370-P...	1088	752	450	600	269	1427	**171**	125	264	535	450	1166	271	207	500	639	910	283	520	580	1166

Pump type	P_1	P_2	Q	$R_{max.}$	S_1	S_2	S_3	S_4	S_5	$T_{max.}$	$U_{max.}$	V_1	V_2	V_3	V_4	DN_1	DN_2	DN_3	DN_4	DN_5
K3366-P... up to K3370-P...	315	765	139	1100	450	550	120	160	23	902	1012	310	370	60	ø18	150	150	150	150	–
K3366-P... up to K3370-P...	315	765	139	1100	450	550	120	160	23	902	1012	310	370	60	ø18	150	150	200*	–	200**

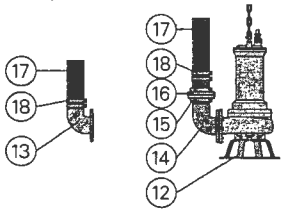
all dimensions in mm *only vertical dry well installation with flanged 90° elbow DN150-DN200 **only wet well installation with auto-coupling system DN200

Accessories

Permanent wet well installation with elbow discharge connection

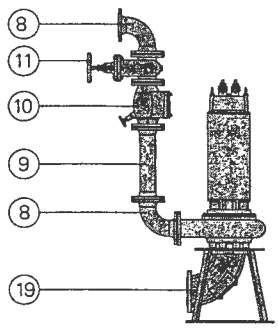


Transportable wet well installation

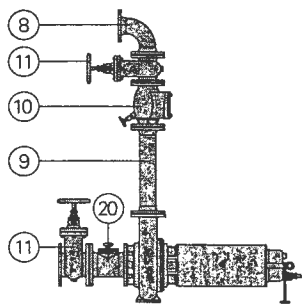


Permanent dry well installation

vertical



horizontal



Part Description	Type	Dim.	Part No.
① Auto-coupling system consisting of auto-coupling with flanged elbow, flanged pumpcoupling and upper slide rail bracket	KK 100/100	DN 100	8604055
	KK 80/100	DN 80/ DN 100	8604030
	KK 150/150	DN 150	8604070
	KK 150/100	DN 150/ DN 100	8603632
	KK 200/150	DN 200/ DN 150	8604105
② Auto-coupling system consisting of auto-coupling, with horizontal discharge flange, flanged pump coupling and upper slide railbracket	KS 100/100	DN 100	8604065
	KS 80/100	DN 80/ DN 100	8604045
	KS 150/150	DN 150	8604075
	KS 200/150	DN 200/ DN 150	8604083
④ Guide rails, pair, per m			
- Steel galvanized		1 1/2" for DN 80, DN 100	2190155
		2" for DN 150	2190205
- Stainless steel		1 1/2" for DN 80, DN 100	2190254
		2" for DN 150	2190256
Upper slide rail-bracket, stainless steel			on request
⑥ Steel galvanized lifting chain, per m		8 mm Ø	2800380
		10 mm Ø	2800410
⑦ Steel galvanized shackle		1	2801380
		2	2801410
⑧ 90° flanged elbow		DN 80	2153302
		DN 100	2153303
		DN 150	2153353
		DN 200	2153363
or flanged y-piece for twin pump arrange-ment, horizontal discharge (optional with vertical discharge) available with different dimensions according to sump dimension	DN 80/80/80		on request
	DN 80/80/100		
	DN 100/100/100		
	DN 100/100/125		
	DN 100/100/150		
	DN 150/150/150		
	DN 200/200/200		
⑨ Flanged discharge pipe with gasket and fixing bolts		DN 80	2152081
		DN 100	2152201
		DN 125	2152221
		DN 150	2152251
		DN 200	2152271
Discharge pipe, per additonal m		DN 80	2150080
		DN 100	2150100
		DN 125	2150125
		DN 150	2150150
		DN 200	2150200
Flanged reducer			on request
⑩ Flanged swing check valve with gasket and fixing bolts		DN 80	2212807
		DN 100	2212809
		DN 125	2212810
		DN 150	2212811
		DN 200	2212816
⑪ Flanged gate valve with gasket and fixing bolts		DN 80	2216080
		DN 100	2216100
		DN 125	2216125
		DN 150	2216150
		DN 200	2216200

Part Description	Type	Dim.	Part No.
⑫ Ring base stand	NB 100 A	DN 100	7321215
up to 16,9 kW (P_2)	NB 150 A	DN 150	7321285
above 17,0 kW (P_2)	NB 150	DN 150	7321275
⑬ Flanged spigot elbow with gasket and fixing bolts		DN 100 x 4"	6001141
⑭ Flanged to thread elbow with gasket and fixing bolts		DN 100 x R4 "	6001121
		DN 150 x R6 "	6001205
⑮ STORZ-fixed coupling		A-R4 "	2010701
		F-R6 "	2010961
⑯ STORZ-hose coupling with spigot		B-75 mm	2013502
		A-110 mm	2013801
		F-150 mm	2013901
STORZ-reducer		A – B	2015612
		F – A	2015622
⑰ Reinforced hose, per m (inner dia.)		75 mm	2632075
		110 mm	2632110
		150 mm	2632150
Rubber hose, per m (inner dia.)		75 mm	2642075
		110 mm	2642110
Hose with pre-attached couplings			on request
⑱ Hose bands		S 85/20	2308520
		S 100/20	2310020
		S 115/20	2311520
		S 118/20	2311820
		S 172/20	2317520
⑲ Pump stand with suction elbow, clean-ing hole, gasket and fixing bolts			
up to 17,0 kW (P_2)	TVS 100 R	DN 100	8604220
	TVS 150 RA	DN 150	8604225
above 17,0 kW (P_2)	TVS 150 R	DN 150	8604230
	TVS 150/ 200 R	DN 150/ DN 200	8604235
⑳ Flanged pipe with cleaning hole, gasket and fixing bolts		DN 100	2159810
		DN 150	2159815

Couplings systems, elbows, pipes, fittings (valves, flaps etc.) of **stainless steel** on request.

Electrical and electronic **control panels** for pumps and pump stations with accessories on request.

Sumps of concrete or synthetic material for complete pump stations please see special leaflet.

HOMA PUMP TECHNOLOGY

HOMA Pumpenfabrik GmbH
P.O.Box 22 63 , D-53814 Neunk.-Seelscheid
Tel. (0 22 47) 702-0, Fax (0 22 47) 702 -44
e-mail: info@homa-pumpen.de

ENGINEERING ORDER

GORMAN-RUPP WASTE WATER EQUIPMENT
MANSFIELD, OHIO 44902

Date 5/15/86
Revisions
Serial 86-2436-AM

#21

PUMP AND MOTOR DATA

SARALAND AVENUE #21

PUMP DATA	Pump No. 1	Pump No. 2	Pump No. 3	Pump No. 4
Design characteristics (GPM @ TDH)	245 @ 27'	245 @ 27'		
Priming lift	16.2'	16.2'		
Total dynamic suction lift	22.4'	22.4'		
NPSH required	5.5'	5.5'		
NPSH available EXCESS W/3' S.F. DEDUCT	3'	3'		
Pump Model	T4A3-B	T4A3-B		
Pump Serial No.				
Impeller diameter	9-3/4	9-3/4		
G-R Mech. seal, tungsten-titanium carbide	YES	YES		
Base, V-Belt	YES	YES		
Pump speed	1044	1044		
Horizontal Electrical MOTOR DATA	**Pump No. 1**	**Pump No. 2**	**Pump No. 3**	**Pump No. 4**
Horsepower	5	5		
RPM @ DESIGN CONDITION	1724	1724		
Electrical characteristics: Phase/Hertz/Volts	3/60/230	3/60/230		
Electrical design: (standard NEMA unless otherwise indicated)	B	B		
Enclosure, open drip-proof W/1.15 S.F.	YES	YES		
Manufacturer GORMAN RUPP				
Code letter	J	J		
Frame size	184T	184T		
Full load amps.	12.9	12.9		
V-BELT DRIVE DATA	**Pump No. 1**	**Pump No. 2**	**Pump No. 3**	**Pump No. 4**
Center Distance	17.9	17.9		
Sheave on Pump DODGE BUSHING # 2517 BORE 1-1/2" KEY 3/8" — Section	3V	3V		
Sheave on Pump — O.D.	8.0	8.0		
Sheave on Pump — Grooves	2	2		
Sheave on Motor DODGE BUSHING # 1610 BORE 1-1/8 KEY 1/4 — Section	3V	3V		
Sheave on Motor — O.D.	4.75	4.75		
Sheave on Motor — Grooves	2	2		
V-Belt Size (2) BELTS PER PUMP	3VX560	3VX560		

RELATED MODIFICATION/DATA/COMMENTS, ETC.

BOTH PUMPS WILL HAVE CERTIFIED PERFORMANCE TESTS.

BOTH PUMPS WILL HAVE CERTIFIED REPRIME TESTS.

NOTE: Standard motor rated voltages will not agree with rated system voltages. For example, new NEMA motor voltages for 3 phase current will be 230 VAC/460 VAC. Related system voltage would be 240 VAC or 480 VAC. Standard motors are guaranteed to operate satisfactorily within plus or minus 10% of standard nameplate voltage ratings. It is rarely necessary to apply motors specially wound for odd voltages (at additional cost). When special voltage motors are required, it should be so noted.

REPRIMING LIFTS
650 rpm 5 feet - 750 rpm 8 feet
850 rpm 16 feet - 950 rpm 19 feet
1050 rpm 22 feet - 1150 rpm 24 feet
1250 rpm 25 feet - 1350 rpm 25 feet
1450 rpm 25 feet - 1550 rpm 25 feet
1650 rpm 25 feet - 1750 rpm 25 feet
1850 rpm 25 feet - 1950 rpm 25 feet
Figure NPSH required prior to using above table. DO NOT use as available Suction Lifts.
T4A-B
4" x 4"
9¾
VARIOUS
3"
TEST PERFORMANCE
70°F clear water at sea level
4 foot horizontal offset with
4 inch suction pipe
SARALAND AVENUE #21
OPERATING RANGE
1950 RPM
1850
1750
1650
1550
1450
1350
1250
1150
1050
950
850
750
650
40%
50
52
52%
25 BHP
20
15
10
7.5
5
3
2
1.5
1
.75
NPSH [Net Positive Suction Head]
Note: Select performance within operating range area of curve.
( ) Not Approved
Revise and Resubmit
( ) Approved With Corrections Noted
(X) Approved As To Conformity With Specifications Only — All Dimensions Shall Be Verified In The Field To Insure Proper Installation Of Material Or Equipment.
Date
Chkd. By
Polyengineering
P. O. Box 6564
Mobile, Alabama
NO. T4A-4 2-21-79
NO. 5987 P. 7
1154
SEP. 3. 2004 10:35AM JIM HOUSE AND ASSOCIATES

Date 5/21/86
Revisions

ENGINEERING ORDER

AUXILIARY ENGINE DRIVE PUMP UNIT

GORMAN RUPP WASTE WATER EQUIPMENT
MANSFIELD, OHIO 44902

Serial 86-249-AX #22

Location HIGHWAY 43/OLD TELEGRAPH

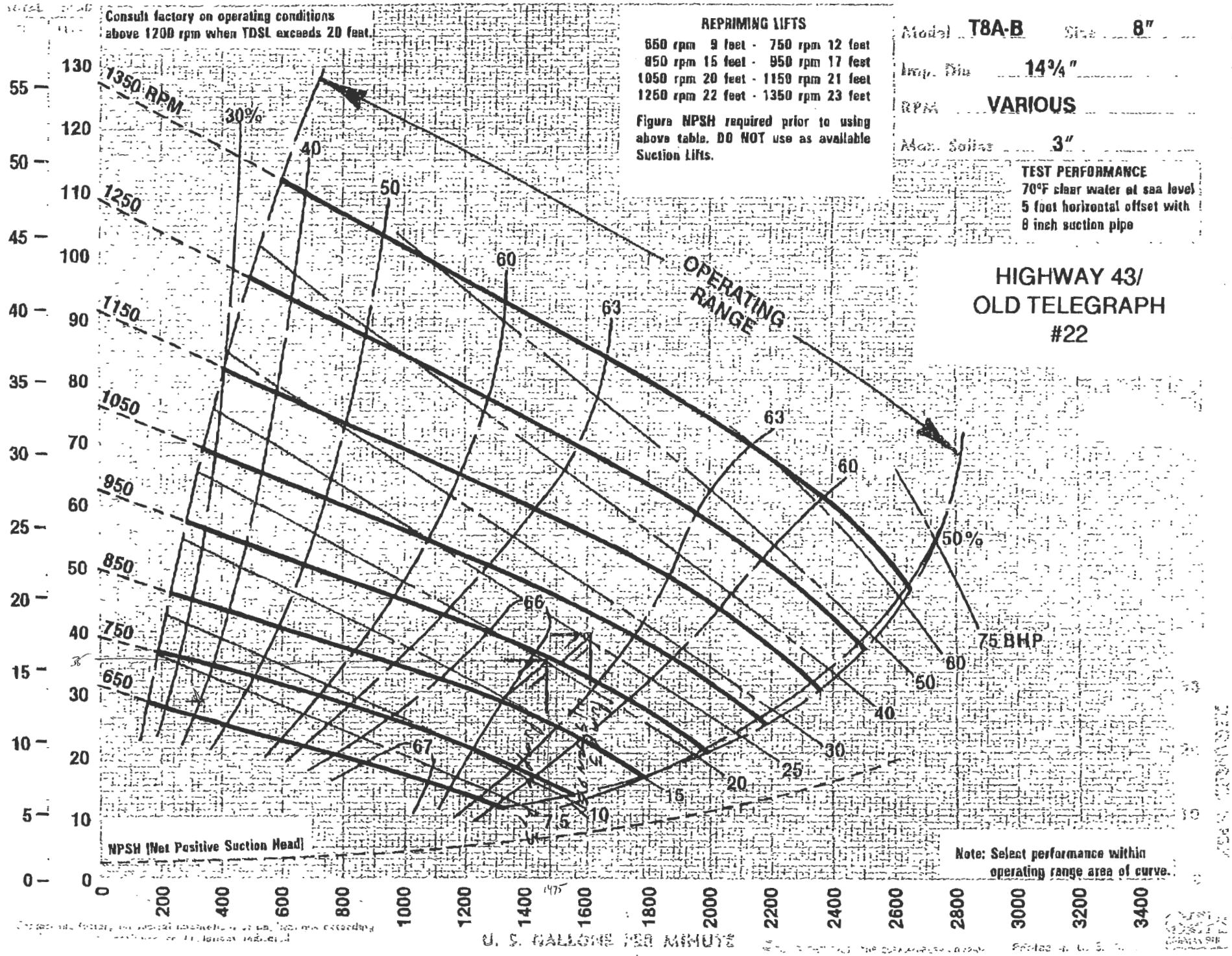
Configuration:
Pump No. 1 FUTURE T8A3-B w/25 HP MOTOR (NORMAL POWER ONLY)
Pump No. 2 T8A3-B w/25 HP MOTOR (NORMAL POWER ONLY)
Pump No. 3 T8A3-B w/25 HP MOTOR & V465DG STANDBY ENGINE
Pump No. 4

PUMP DATA	FUTURE Pump No. 1	Pump No. 2	Pump No. 3	w/STANDBY ENG. Pump No. 3
Design Characteristics (GPM @ TDH)		1475 @ 35'	1475 @ 35'	1616 @39'
Priming Lift		14.8'	14.8'	14.8'
Total Dynamic Suction Lift		22.4'	22.4'	23.0'
NPSH Required		6.5'	6.5'	7.5'
NPSH Available EXCESS w/3' S.F. DEDUCT		2.0'	2.0'	.4'
Pump Model		T8A3-B	T8A3-B	
Pump Serial No.				
Impeller Dia.		14-3/4	14-3/4	
G-R Mech. seal, tungsten-titanium carbide		YES	YES	
Base, V-Belt		YES	YES	
Pump Speed		952	952	1022
G-R Air Release Valve Model No.		~~GRP33-07~~	~~GRP33-07~~	
		NOT REQUIRED		

MOTOR DATA	Pump No. 1	Pump No. 2	Pump No. 3	Pump No. 4
Horsepower		25	25	
RPM (FULL LOAD)		1767	1767	
Electrical characteristics: Phase/Hertz/Volts * WIRED		~~3/60/460~~	~~3/60/460~~	3/60/240
Electrical design: (standard NEMA unless otherwise indicated)		B	B	
Full Load Amps		33.9	33.9	
Enclosure-Open Drip-Proof		YES	YES	
Manufacturer GORMAN-RUPP				
Code Letter		G	G	
Service Factor		1.15	1.15	
Frame Size		284T	284T	
Shaft		STD.	DOUBLE	
Serial No.				

ENGINE DATA	Pump No. 1	Pump No. 2	Pump No. 3	Pump No. 4
Horsepower MAX. DERATED 25%			35.6	
No. of Cylinders			4	
Design RPM			1800	
Fuel			NAT. GAS	
Coolant			AIR	
Manufacturer	NR		WISCONSIN	
Model No.			V465DG	
Serial No.				

* NOTE: Standard motor rated voltages will not agree with rated system voltages. For example, new NEMA motor voltages for 3 phase current will be 230 VAC/460 VAC. Related system voltage would be 240 VAC or 480 VAC. Standard motors are guaranteed to operate satisfactorily within plus or minus 10% of standard nameplate voltage ratings. It is rarely necessary to apply motors specially wound for odd voltages (at additional cost). When special voltage motors are required, it should be so noted.



SEP. 3. 2004 10:35AM JIM HOUSE AND ASSOCIATES NO. 5987 P. 9

NO. T8A-3 7-6-81 1353

ENGINEERING ORDER

GORMAN-RUPP WASTE WATER EQUIPMENT
MANSFIELD, OHIO 44902

Date 5/19/86
Revisions
Serial 86-2439-AM #23

PUMP AND MOTOR DATA

CEDAR STREET

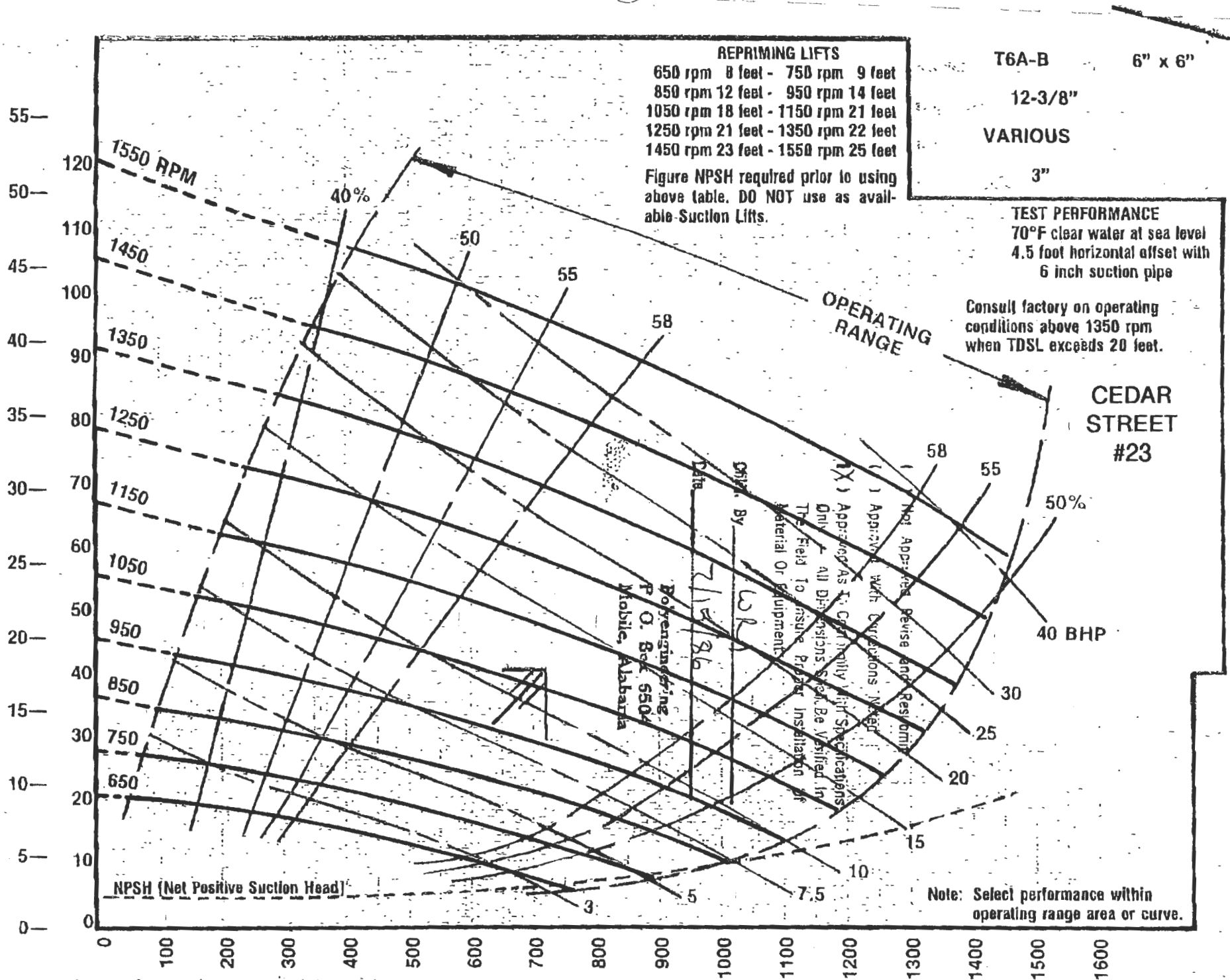
PUMP DATA	Pump No. 1	Pump No. 2	Pump No. 3	Pump No. 4
Design characteristics (GPM @ TDH)	725 @ 41'	725 @ 41'		
Priming lift	16.5'	16.5'		
Total dynamic suction lift	22.5'	22.5'		
NPSH required	6'	6'		
NPSH available EXCESS W/3' S.F. DEDUCT	2.4'	2.4'		
Pump Model	T6A3-B	T6A3-B		
Pump Serial No.				
Impeller diameter	12-3/8	12-3/8		
G-R Mech. seal, tungsten-titanium carbide	YES	YES		
Base, V-Belt	YES	YES		
Pump speed	1096	1096		
Horizontal Electrical MOTOR DATA	**Pump No. 1**	**Pump No. 2**	**Pump No. 3**	**Pump No. 4**
Horsepower	20	20		
RPM @ DESIGN CONDITION	1751	1751		
Electrical characteristics: Phase/Hertz/Volts	3/60/230	3/60/230		
Electrical design: (standard NEMA unless otherwise indicated)	B	B		
Enclosure, open drip-proof W/1.15 S.F.	YES	YES		
Manufacturer GORMAN-RUPP				
Code letter	G	G		
Frame size	256T	256T		
Full load amps.	51.2	51.2		
V-BELT DRIVE DATA	**Pump No. 1**	**Pump No. 2**	**Pump No. 3**	**Pump No. 4**
Center Distance	17.7	17.7		
Sheave on Pump DODGE BUSHING # 2517 BORE 1-1/2" KEY 3/8" — Section	3V	3V		
O.D.	8.0	8.0		
Grooves	4	4		
Sheave on Motor DODGE BUSHING # 1610 BORE 1-5/8 KEY 3/8 — Section	3V	3V		
O.D.	5.0	5.0		
Grooves	4	4		
V-Belt Size (4) BELTS PER PUMP	3VX560	3VX560		

RELATED MODIFICATION/DATA/COMMENTS, ETC.

CERTIFIED PERFORMANCE TEST REQUIRED ON BOTH PUMPS.

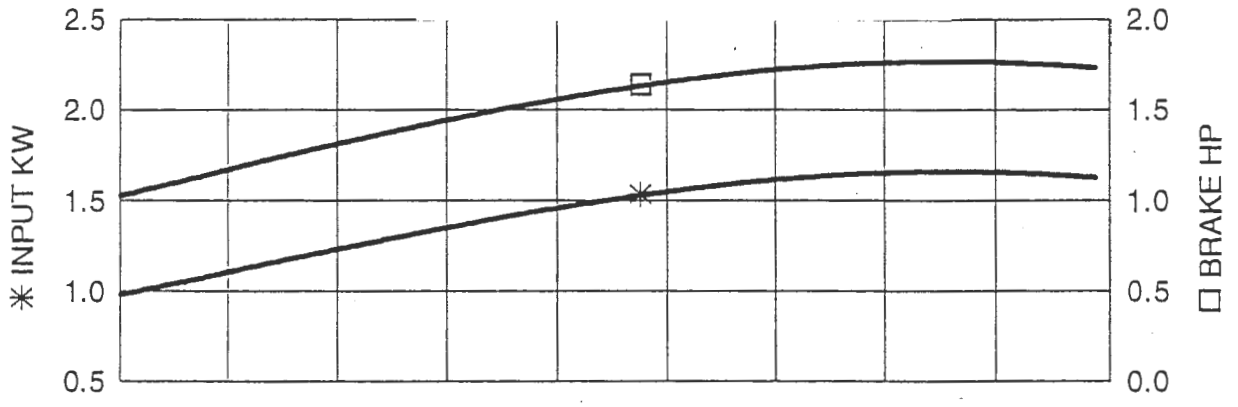
CERTIFIED REPRIME TEST REQUIRED ON BOTH PUMPS.

NOTE: Standard motor rated voltages will not agree with rated system voltages. For example, new NEMA motor voltages for 3 phase current will be 230 VAC/460 VAC. Related system voltage would be 240 VAC or 480 VAC. Standard motors are guaranteed to operate satisfactorily within plus or minus 10% of standard nameplate voltage ratings. It is rarely necessary to apply motors specially wound for odd voltages (at additional cost). When special voltage motors are required, it should be so noted.

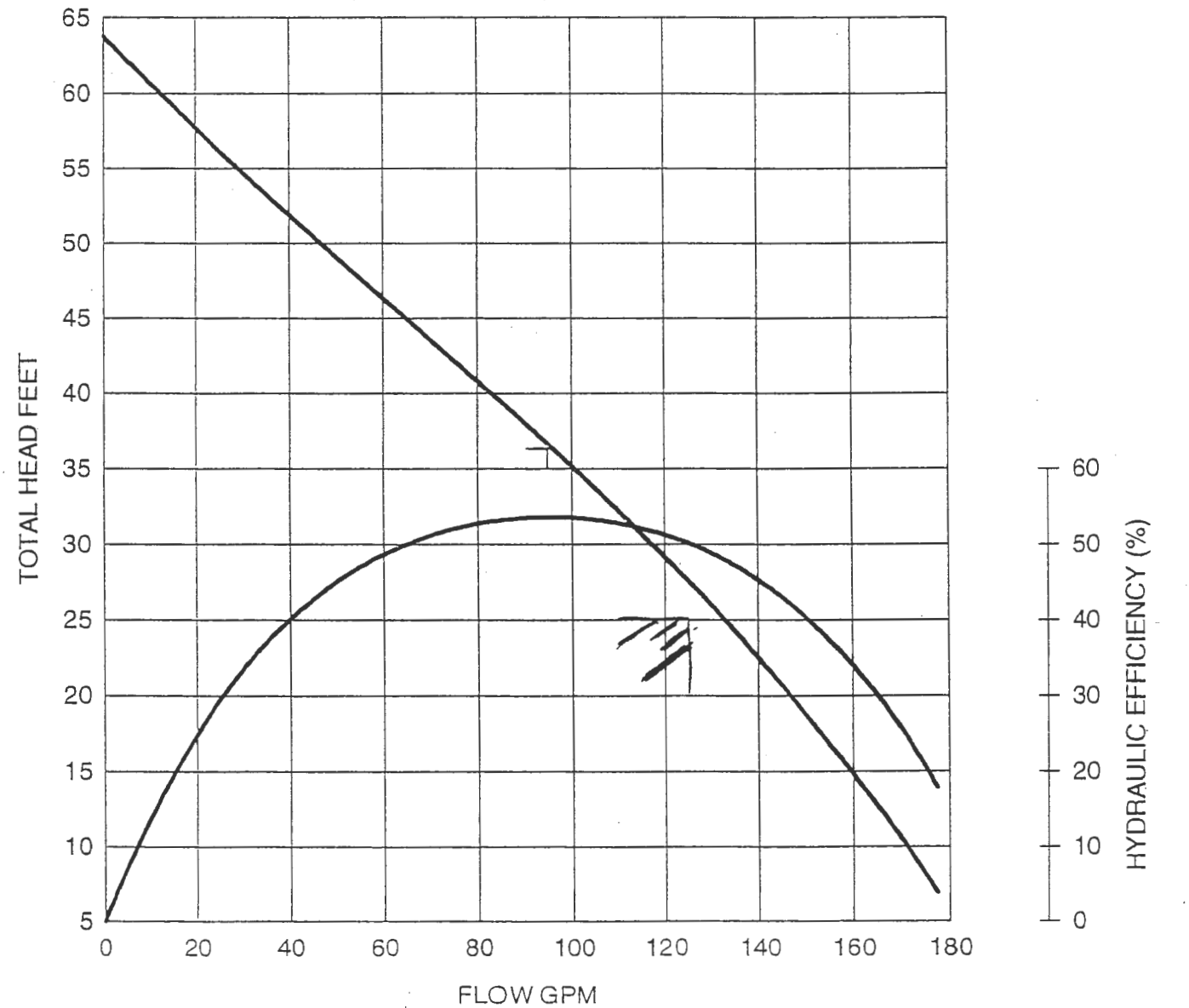


PAGE	SECTION		CONFIG.	
4	3	**C-3067**	CP/CF	
ISSUED	SUPERSEDES	**265 Impeller**	VANES	PHASE
2/96	6/94		1	3

SMOKE AVENUE #24



125 GPM @ 25' TDH



ENGINEERING ORDER

GORMAN-RUPP WASTE WATER EQUIPMENT
MANSFIELD, OHIO 44902

Date
Revisions
Serial S 1842- AM #26

PUMP AND MOTOR DATA

MIGNIONETTE AVENUE #26

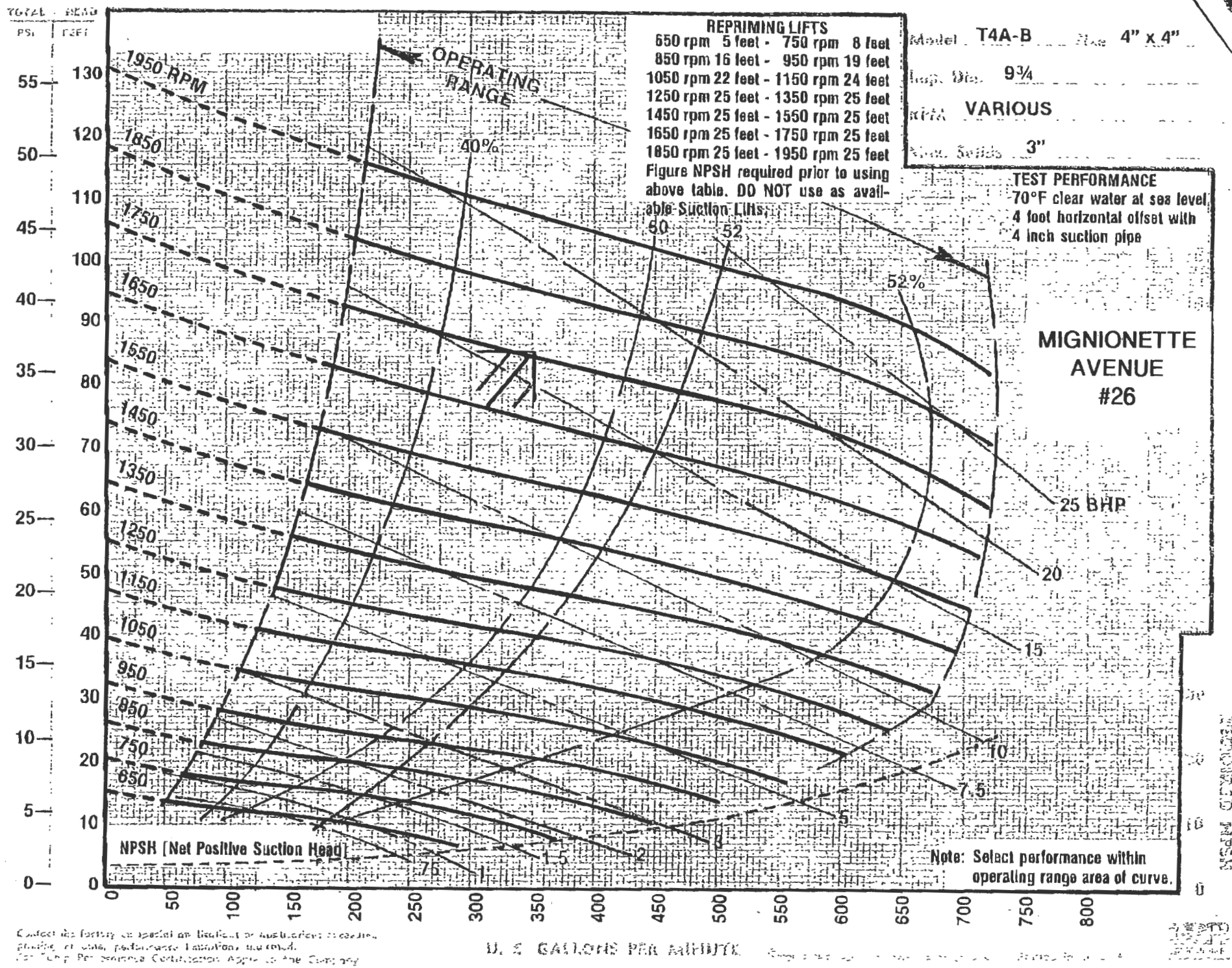
PUMP DATA	Pump No. 1	Pump No. 2	Pump No. 3	Pump No. 4
Design characteristics (GPM @ TDH)	350 @ 85'	350 @ 85'		
Priming lift	16'	16'		
Total dynamic suction lift	22'	22'		
NPSH required	7'	7'		
NPSH available AFTER 3' S.F. DEDUCT	1'	1'		
Pump Model	T4A3-B	T4A3-B		
Pump Serial No.				
Impeller diameter	9-3/4"	9-3/4"		
G-R Mech. seal, tungsten-titanium carbice	YES	YES		
Base, V-Belt	YES	YES		
Pump speed	1750	1750		

Horizontal Electrical MOTOR DATA	Pump No. 1	Pump No. 2	Pump No. 3	Pump No. 4
Horsepower	20	20		
RPM FULL LOAD	1750	1750		
Electrical characteristics: Phase/Hertz/Volts	3/60/230	3/60/230		
Electrical design: (standard NEMA unless otherwise indicated)	B	B		
Enclosure, open drip-proof W/1.15 S.F.	YES	YES		
Manufacturer SIEMENS ALLIS				
Code letter	G	G		
Frame size	256T	256T		
Full load amps.				

V-BELT DRIVE DATA		Pump No. 1	Pump No. 2	Pump No. 3	Pump No. 4
Center Distance		20.9	20.9		
Sheave on Pump DODGE BUSHING # 2517 BORE 1-1/2" KEY 3/8"	Section	3V	3V		
	O.D.	8.0	8.0		
	Grooves	3	3		
Sheave on Motor DODGE BUSHING #2517 BORE 1-5/8 KEY 3/8	Section	3V	3V		
	O.D.	8.0	8.0		
	Grooves	3	3		
V-Belt Size (3) BELTS PER PUMP		3V670	3V670		

RELATED MODIFICATION/DATA/COMMENTS, ETC.

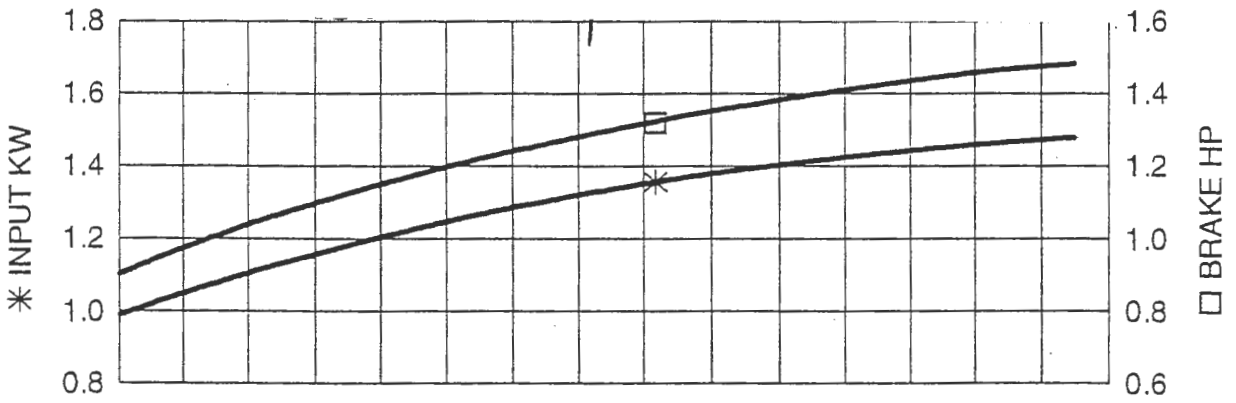
NOTE: Standard motor rated voltages will not agree with rated system voltages. For example, new NEMA motor voltages for 3 phase current will be 230 VAC/460 VAC. Related system voltage would de 240 VAC or 480 VAC. Standard motors are guaranteed to operate satisfactorily within plus or minus 10% of standard nameplate voltage ratings. It is rarely necessary to apply motors specially wound for odd voltages (at additional cost). When special voltage motors are required, it should be so noted.



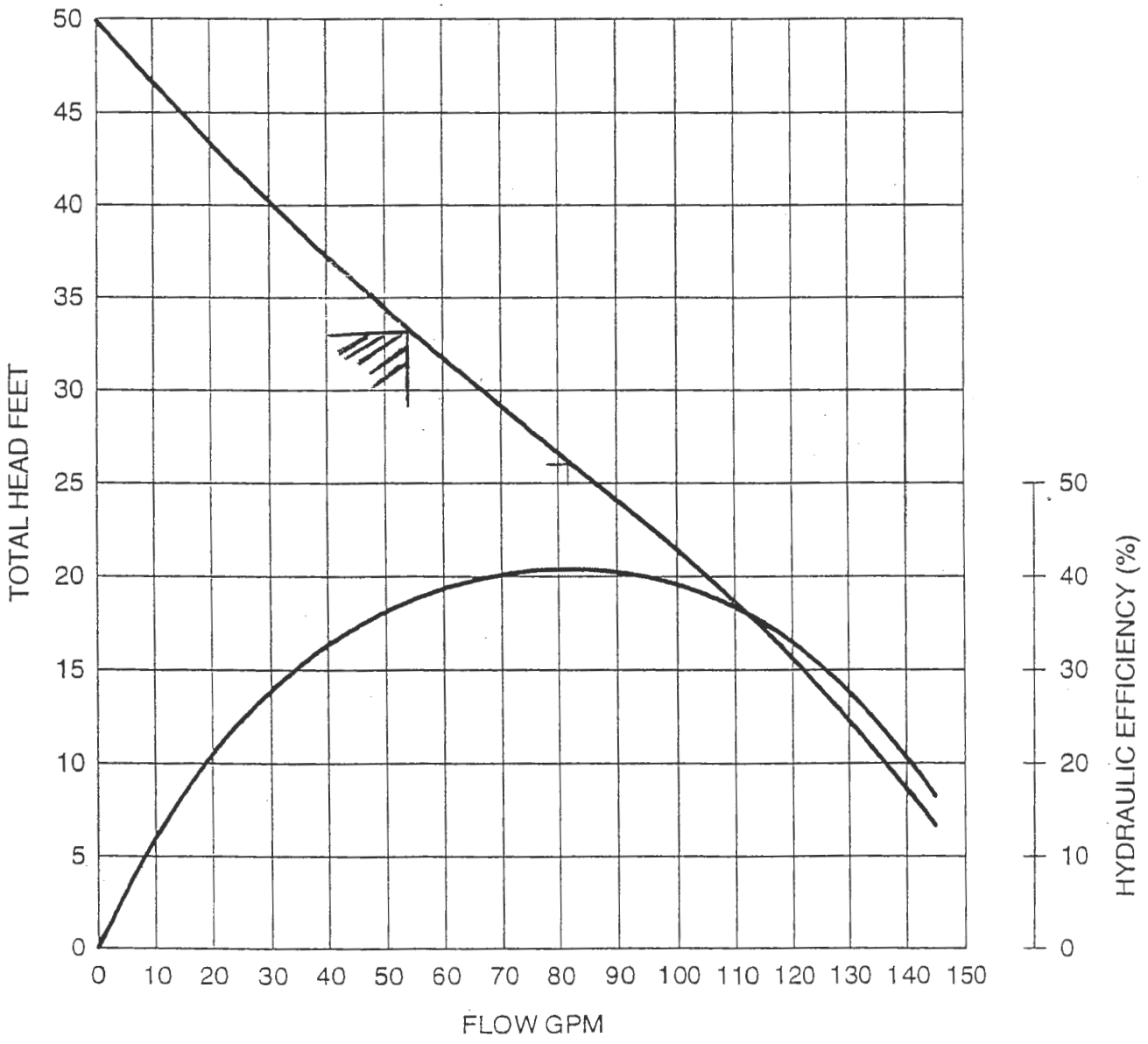
CONFIG.		SECTION	PAGE
CP/CF		3	5
PHASE	VANES	SUPERSEDES	ISSUED
1	1	6/94	2/96

C-3067
267 Impeller

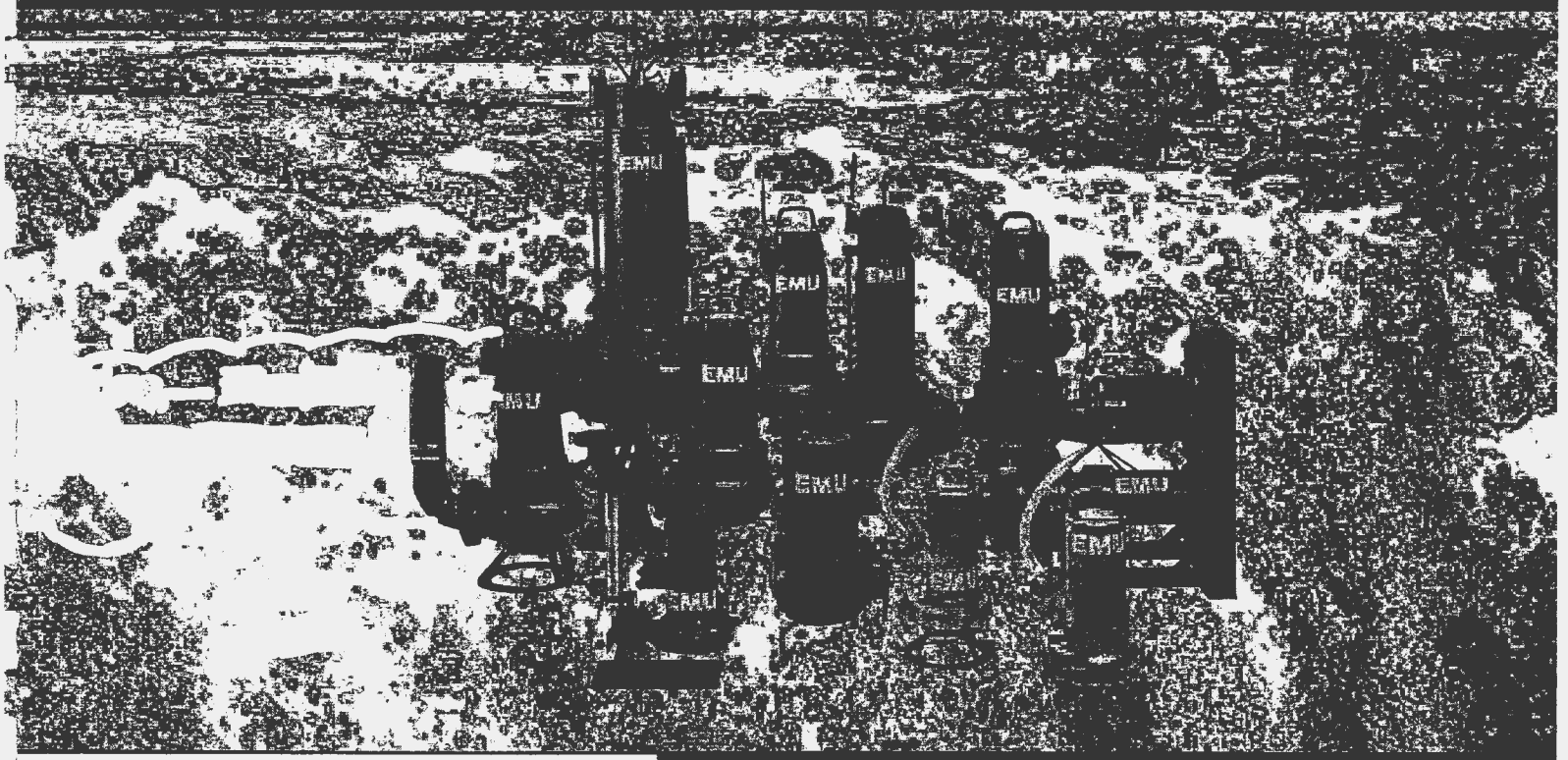
#27 FAIRFIELD (ROBERT KING DR.)



52 GPM @ 33' TDH



FLYGT



L.S. #28 – SHELTON BEACH

L.S. #29 – KALIFIELD

USFilter

PUMPS FOR:

DRY PIT

DRY PIT RETROFIT &

WET PIT APPLICATIONS

Submersible solids handling and stormwater pumps from USFilter's Davis Products' EMU Pumps represent the optimum in design, performance and reliability. The ISO 9001 certified quality and craftsmanship of these products have grown out of 75 years of specialized manufacturing experience and innovation. EMU Pumps-

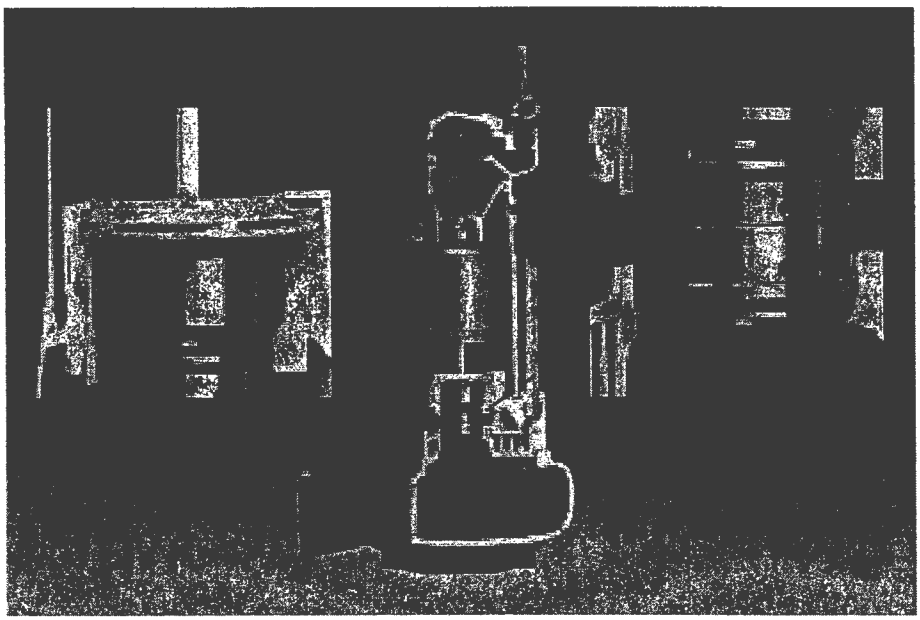
marketed in Germany since 1948- came to the United States in 1970. Since then, more than 100,000 units have been installed. Although these pumps are totally submersible, they are often used in dry installations or for portable dewatering.

ALL MOUNTING POSITIONS POSSIBLE

USFilter's Davis Products' EMU pumps are manufactured in both oil-cooled and high-efficiency, air-filled configurations using well-proven, proprietary designs. Each type has unique design features, which are optimized for specific applications. All mounting positions are possible with EMU pumps, including horizontal, with either the oil-cooled or air-filled models. While most applications are best suited to a specific design, either type can be installed in any desired location, given proper configuration. This provides total application flexibility.

OIL-FILLED PUMP MOTORS

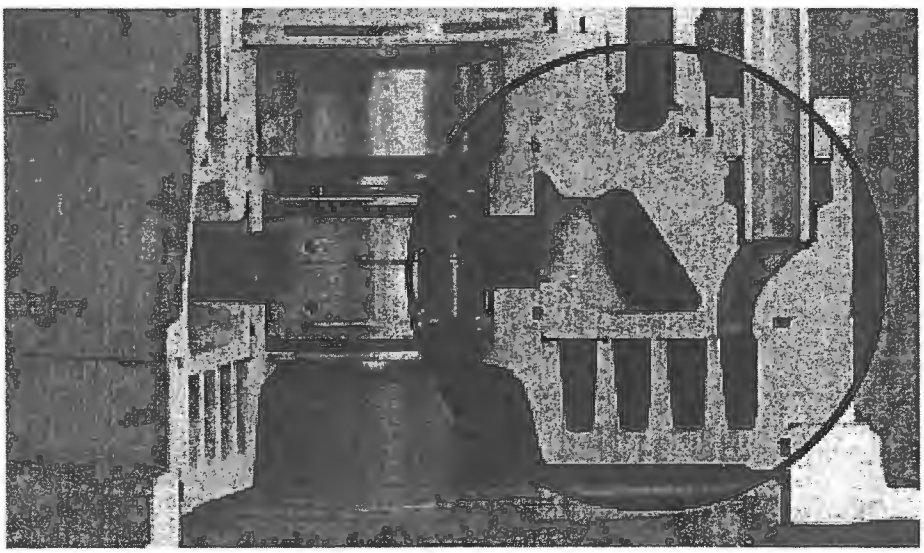
Oil-filled motors have been the foundation to EMU's loyal and dedicated customer base since the 70's. Today, our engineers continue to refine and perfect these models on a continuous basis- responding to information gathered from tens of thousands of installations. Design improvements include expanded application of the proprietary Enclosed Block Seal (EBS) to larger motor frame sizes and air-filled models. (This type of seal has proven itself since the first pumps were installed with it in the 60's.)



View of shaft mounted oil circulation impeller, lower bearing and Enclosed Block Seal.

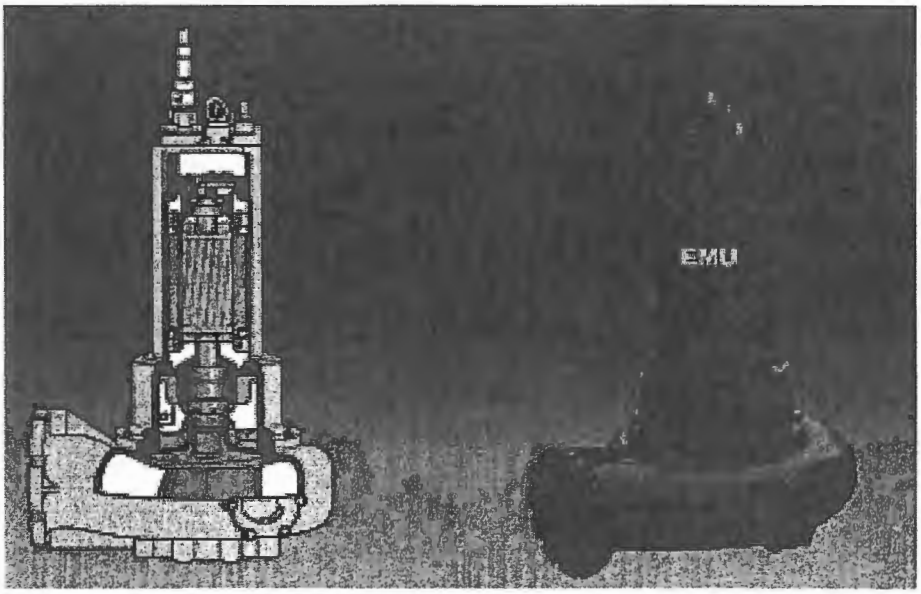
However, the short shaft overhang design of USFilter's Davis Products' EMU pump motors remains central to the design of all new EMU pump motors. This is because the short, large-diameter shaft is better suited to resist deflections- such as off-balance forces developed during solids pumping- than conventional motor shaft designs common to the industry.

Cooling of a pump motor takes on critical importance when it is totally sealed against moisture intrusion. That's why EMU oil-cooled, submersible pump motors are provided with a sealed oil lubrication and cooling system so effective that it allows applications in completely dry conditions, without de-rating the power output of the motor. The cooling oil in an EMU pump motor is circulated through the windings, around the rotor, and through the bearings before it passes through a heat exchanger located just above the impeller. The close proximity to the impeller allows the heat to pass from the oil into the pumped fluid so that by the time the oil leaves the heat exchanger it has been completely cooled. (The temperature increase of pumped fluids is increased only slightly as the flow through the pump normally exceeds 100 times the flow through the cooling systems. Pumped fluids remain essentially at a constant temperature, even after cooling the oil.)



View of Heat Exchanger and Impeller Clearance. The Cooled Oil Return is located on the right side of the picture.

View of Air-Filled Motor illustrating the short shaft overhang, Enclosed Block Seal and heavy-duty duplex lower bearing arrangement.



It should be noted that de-rated motors use more energy and operate at a lower level of efficiency. For example: a 10 hp air-filled motor in a submerged installation can only be rated for 7.5 hp in a dry location because of loss of external cooling provided through submerging. Though some manufacturers may argue against this, a review of their starting codes and physical weights will quickly show that this is occurring.

AIR-FILLED PUMP MOTORS

Submersible pump motors for solids handling duty must, of course, be designed for the application. A non-submersible pump motor design "adapted" to submersible duty simply can not give the life and reliability that EMU "purpose-designed" pump motors have been proven to deliver year-after-year.

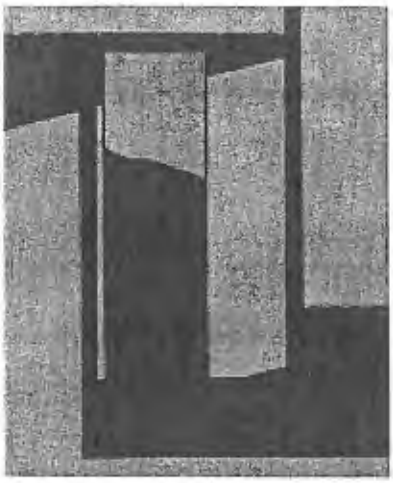
The EMU line of air-filled pump motors- designed for solids-handling pump applications- meet all of the rigid design criteria made famous by EMU oil-cooled designs. The same shaft material and shaft dimensions are used in the critical areas of "diameter" and "shaft overhang." The mechanical seals are identical and interchangeable, and the castings are of the highest quality. EMU air-filled pump motors are available in a variety of configurations, each designed for specific uses. Non-Jacketed pump motors are specifically designed for wet sump installation in which the pumped liquid covers the motor at least once during each pumping cycle. These designs have the ability to operate with the motor exposed, while pumping under full load for a minimum of one hour.

Comparison of conventionally tandem mechanical seal arrangement with EBS. Note the length of shafting taken up by the seal faces and external springs is much longer than on the Enclosed Block design of equal shaft size.

Statements written into specifications that claim continuous operation in air often fail to mention that the impeller connected to the motor must also be spinning in air, which results in no load being placed on the motor. Of course, it stays cool under these circumstances. Any manufacturer's motor can perform this trick, however, it proves very little relative to the durability or cooling capacity of the motor unless "under full load condition" is part of the statement.

SILICON CARBIDE SEALS

Only EMU pumps from USFilter's Davis Products offer solid sintered Silicon Carbide seals in both the upper and lower mechanical seal positions. These solid components have pre-formed o-ring seal grooves. These grooves reduce the number of components in each mechanical seal assembly. Both upper and lower sets of mechanical seals are conveniently located inside a proprietary EBS housing constructed of type 316 stainless steel. The EBS housing allows for easy service because each set of seals are "factory set" with correct spring pressure and do not allow field modification. This arrangement does not require any special spring force tools or other highly technical field assembly procedures in order to guarantee correct positioning and location in the pump. The EBS further prevents the handling of individual sealing faces during field service. The number one cause of submersible pump failure is the failure of the mechanical seal in keeping out water. It is almost impossible to field-assemble and install a conventional



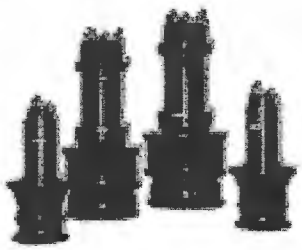
An example of a propeller type pump installation.

mechanical seal without contamination of the seal faces. The simple act of wiping off the seal faces with a clean cloth leaves behind particles and grit that is unseen and can cause early seal failure.

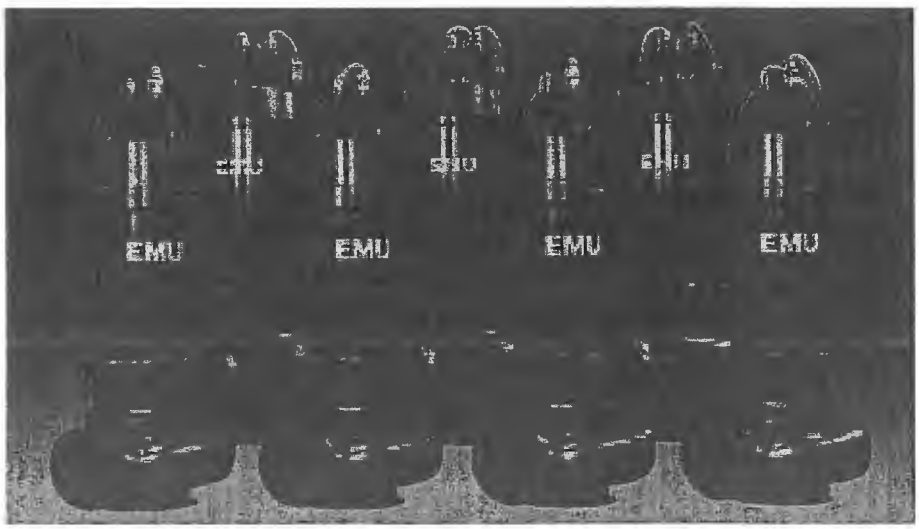
Most manufacturers of high quality submersible pumps assemble their seals in near Clean Room environments. It is unlikely that service personnel at a wet-pit lift station would be equipped to duplicate the factory environment when repairing a critical pump that has just failed in the middle of the night, in the pouring rain.

Replacing the EBS in the field is simple and can be done without sending a pump to a service center. The EBS slides onto the shaft (after swabbing the internal Viton sleeve with rubbing alcohol and the upper external o-ring with Loctite o-ring lubricant then sliding the EBS into the fit in the bearing chamber. The lower external o-ring is lubricated and the seal chamber casting is installed and the bolts tightened. Installing the EBS is that simple. Another feature of the EBS is that the seal faces can be easily relapped to new condition due to the thickness of the solid faces. This is unlike conventional seal faces that have very thin slices of seal face material that are difficult and nearly impossible to relap. (The slender size of conventional seal faces also makes them susceptible to heat damage as the thin material has nothing to transmit heat to in the event that the pump runs dry due to faulty level controls.) The spring system used in the EBS is totally isolated from the sewage with all springs located in the sealing chamber oil bath. The springs are all 316 Stainless Steel and consist of a series of individual coils spaced equally

EMU PUMPS ARE EASIER TO SERVICE



USFilter's Davis Products offers a complete line of EMU propeller type pumps for high flowrates and low discharge pressures. The pumps feature the air-filled line of submersible pump motors.



The EMU line of air-filled pump motors- designed for solids-handling pump applications- meet all of the rigid design criteria made famous by EMU oil-cooled designs.

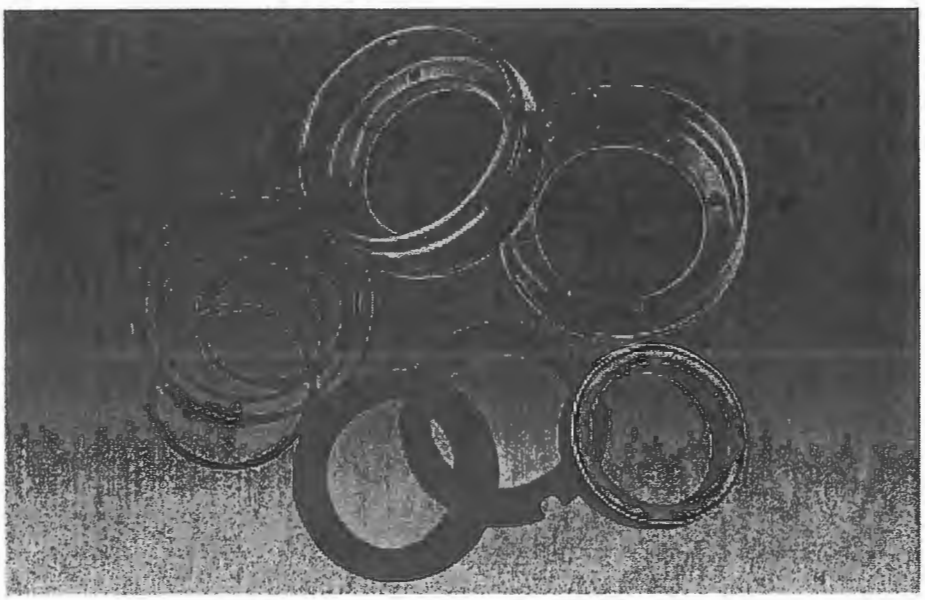
around the shaft; each tensioned by the assembly of the two halves of the type 316 Stainless Steel housing. There is no unbalanced spring force as is the case with a single coil spring that wraps around the shaft as in conventional mechanical designs.

The EBS is designed to be compact and require a minimum of shaft length between the lower thrust bearing and the hub of the impeller. The shorter the distance from bearing to impeller the less the deflection of the shaft.

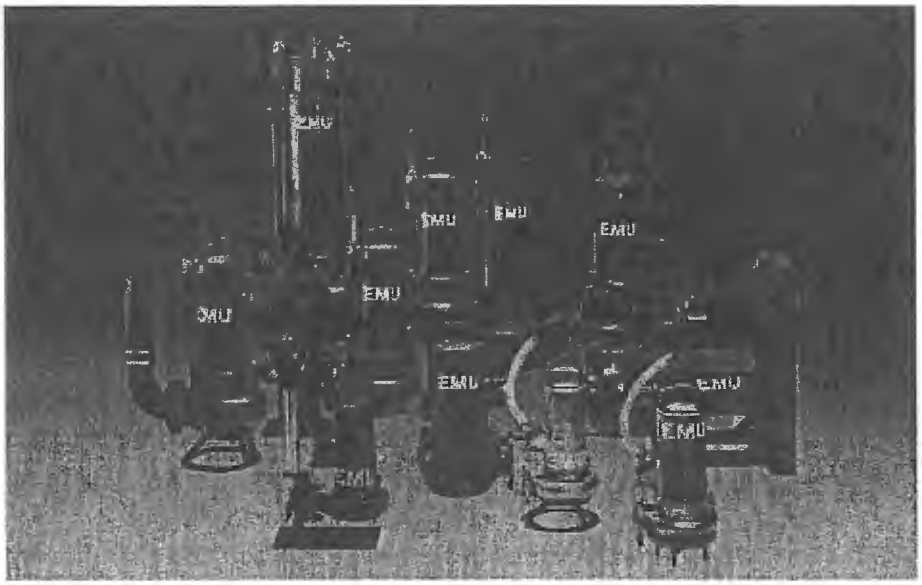
Solid shafting- composed of type 420 Stainless Steel- is used on all standard EMU Pumps/Motors. The critical diameter of the shaft exists between both the upper and lower bearings and particularly where it enters the hub of the impeller. EMU has a set standard of construction requiring that the length of the pump shaft between the lower bearing and the hub of the impeller shall not be more than 2.5 times the diameter on all standard pump motors. By comparison, there are pumps and motors on the market with this ratio as high as 7 or more. A shaft subjected to a given load that has a ratio of 7 times shaft diameter will deflect dramatically (causing seal faces to open and allow grit and other contaminates in between the faces). This ratio is typically referred to as the "overhang ratio," and it is critical to long mechanical seal and bearing life. The bearings are affected because any shaft deflection causes the bearings to absorb internal displacements on the rollers, which lessens life and can cause vibration of the shaft- this is a bearing's most damaging condition.

SOLID SHAFTING

View of air-filled pump in tough industrial application.

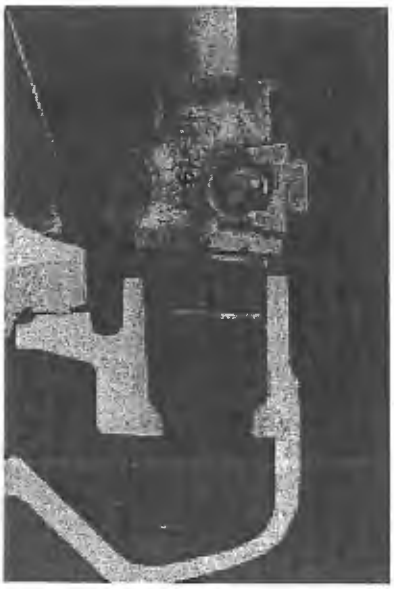


Mechanical seals are protected inside of a proprietary Enclosed Block Seal (EBS) housing which allows for easy servicing- as internal components are "factory set."



Assortment of EMU Pumps provided by USFilter's Davis Products. Shown are small to large sizes of sewage pumps along with all-stainless steel models (shown as silver).

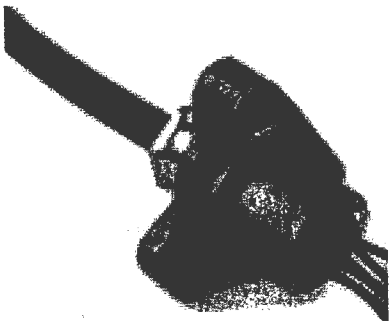
CABLE ENTRY INTO MOTOR



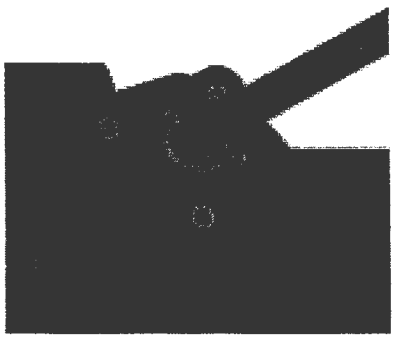
In oil-filled motors, the galvanized steel strain relief clamp is completely independent of the sealing grommet located below the fitting.

USFilter's Davis Products' EMU pumps utilize two types of cable entry into the motors, based upon motor type. Oil-filled motors are provided with a galvanized steel strain relief fitting screwed in the top of the motor. The strain relief consists of a galvanized clamp that compresses the outer jacket of the power or sensor cord, completely independent of the sealing grommet located below the fitting inside the motor housing. The strain relief clamp also incorporates a fitting lock that keeps the complete cable fitting from unscrewing from the top of the motor without first removing this clamp. The cable is sealed by a compressed grommet, which is pressed into the top of the motor by the base of the galvanized cable entry fitting. The grommet is protected on top and bottom by a series of stainless steel washers that distribute the load evenly onto the grommet. This washer and grommet combination is the first line of defense against liquid entry into the motor. The second line of defense consists of an isolated terminal board with individually o-ringed pins that transmit the power to the stator windings. These pins are solid brass and are sealed into the terminal board by the pin's o-ring. Liquid in the top of the cable entry chamber cannot gain access to the stator chamber because of this second line of defense. Even the heat sensor leads pass through isolated pins before entering the stator chamber. This design has been one of EMU's best features since the first pumps were installed 30 years ago. The design is still utilized today, consisting of the most modern materials of construction for the terminal boards, pins, and o-rings.

AIR-FILLED MOTOR CABLE ENTRY



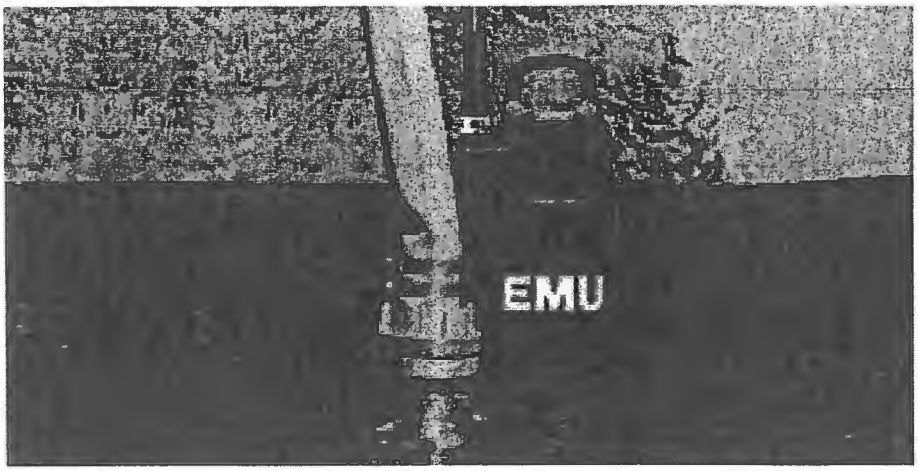
In air-filled motors, two barriers to water intrusion are provided. This is the method of choice in current R.C.E.P. standards.



Cable change is possible by removing the three hold-down screws and installing an additional cable with the entry barriers completely factory sealed.

Similar to the cable entry used on the oil-filled pump motors, the air-filled pump motors are provided with two barriers to water intrusion into the stator chamber of the motors. The design chosen for the air-filled pump motors also happens to be the method of choice for the current Factory Mutual Research Corporation Explosion Proof® standards for cable entries. The cable enters the fitting through a type 316 Stainless Steel fitting with a bell mouth shape, to prevent chafing the jacket of the cord. The fitting screws down into a cast-iron housing that is then bolted and sealed to the motor chamber with an o-ring. The cast-iron housing with cable attached can be quickly removed by three type 304 stainless steel cap screws. The cable entry housing contains the compressed grommet and a heat activated compound used to isolate the individual conductors of each strand of wire as it enters the motor. Each wire is stripped of insulation and a solid silver solder block is added to a short portion of the exposed conductors forming a solid metal barrier to prevent wicking through the individual strands as they enter the motor. This system is so secure that the cable can be totally cut, then submerged and still no moisture will gain access to the inside of the stator chamber. Cable change is possible by removing the three hold-down screws and installing an additional cable with the entry barriers completely factory sealed. The old entry can be returned to the factory for complete rebuilding and returned as a spare.

Beside the mechanical seal, the cable and cable entry is the second leading cause of failure in submersible pumps. It is critical to get this assembly correct and to provide ease of service in the field. Cable change-outs in the field consists of the three screws, the o-ring, and the splicing of the stator leads from the bottom of the entry fitting.



Portable base designs, which can be customized for each application are also available.

NON-CLOG IMPELLERS

Exploded view of Non-Clog impeller type showing separate wear rings (Stainless steel, std.), suction port (bottom plate), Impeller, and pump volute.

We offer a selection of impeller types, designed using the latest computer aided technology- including rapid prototyping and guaranteed hydraulic efficiency. Each impeller type undergoes a continuous improvement process that assures interchangeability with the highest possible efficiency balanced against longest life requirements.

Non-Clog impellers can have one or more vanes depending upon the pump size and required pumping efficiency. All are provided with wear rings of type 316 Stainless Steel drive fitted to the suction throat of the impeller and volute. The wear rings are replaceable in the field and are provided to renew pumping efficiency to "like new" specifications, even after many years of service. Unlike other pumps on the market- which have no wear rings or wear rings only on the pump casting, often made of brass, rubber, or other soft material- EMU offers only stainless steel as a standard, fitted to both the impeller, and the suction eye of the pump volute.

Since EMU pumps have a short shaft overhang and large diameter shaft, stainless steel is used against stainless steel without galling and friction welding problems. This is because there is no contact between EMU wear rings that could cause galling. Stainless steel wear rings should last 5 to 10 times longer than brass or rubber under most conditions.

VORTEX-INDUCING IMPELLERS

View of Vortex impeller wet end showing Impeller, suction port and casing.

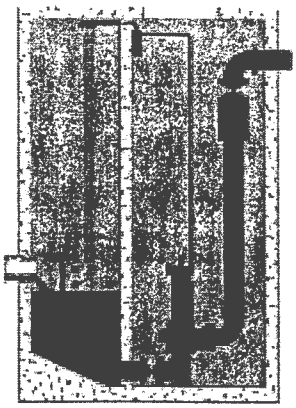
SCREW CENTRIFUGAL IMPELLERS

View of Screw-Channel impeller. These impellers are ideal for use with higher solids concentrations.

USFilter's Davis Products offers the EMU vortex-inducing impellers in 3, 4, and 6-inch discharge sizes for pumping stringy fibrous materials. In vortex impeller equipped pumps for solids handling duty, the design intention is for most of the liquid to bypass the impeller. The impeller is recessed out of the direct flow path, and by fluid friction the solids are pulled through the pump as the impeller spins just above. Vortex impellers are also well suited to applications where the pumps will be operated against the occasional shut discharge valve. This is because vortex-inducing impeller shapes transmit less force to the shaft than would be the case with a single or multi-bladed impeller in which the flow through the pump passes around each vane. Vane shapes and curvature is optimized based upon discharge size and solid sphere passage requirements.

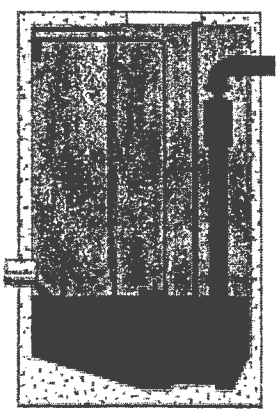
The EMU screw-channel, centrifugal impellers are unmatched for pumping sludge and sewage containing high concentrations of short fibrous water based liquids. These impellers are shaped similar to an inclined screw channel that is wrapped around the central pump shaft. In addition to the inclined screw, the impeller is also tapered from a point that broadens out to an outward-curving channel. This progression from the center to the outside edge of the impeller gives the liquid the gently increasing velocity to move out the discharge with high velocity and pressure. At the same time, solids that tend to wrap around the leading edge of the impeller are unwrapped from the edge as the material moves through the pump. These impellers can pump higher concentrations of solids than will flow into the pump by gravity. Screw-centrifugal impeller pumps should be selected for all sludge applications, and other applications where low liquid-shear is critical for the liquid being pumped. Care should always be used when selecting screw centrifugal impeller pumps to insure that the liquid moves into the suction of the pump. Remember it is easier to push the sludge through the pipe than it is to pull the sludge through the pipe. Screw-centrifugal impeller pumps should be located inside, or as close to the suction supply as possible to assure good operation. As a centrifugal pump, suction lift capabilities are reduced by the amount of solids present in the pumpage.

DRY PIT INSTALLATIONS



View of typical dry pit installation. Note the elastic expansion compensator on the discharge side of the pump just after the 90 degree elbow. These should be installed on all dry pit installations to isolate the piping from the pump and reduce pump vibration.

WET PIT INSTALLATIONS



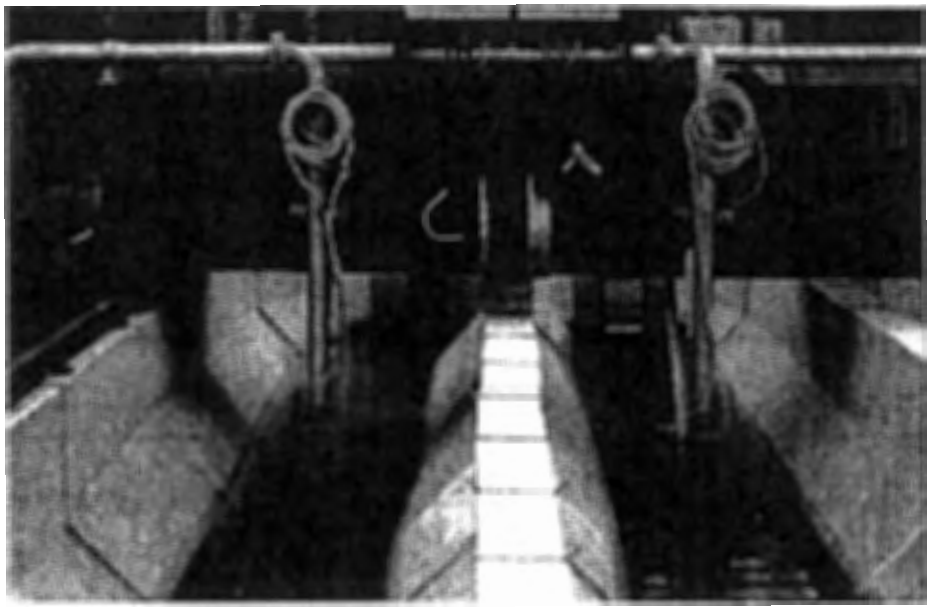
View of typical wet pit installation. Note the level switches and the influent baffle located just below the line dumping in from the left. The use of baffles helps reduce entrained air into the wet well.

In the dry pit environments that are normally encountered, the pump is bolted vertically to the suction elbow. In most cases, this provides enough support without the need for additional braces or stands. In the case of large dry pit pumps, additional feet on the volute are provided as well as mounting plates which add stability and anchor the vertical concrete piers at the top where the pump sits. Custom fabrication capabilities are available from USFilter's Davis Products, and unique mounting requirements can be met precisely.

Davis Products offers a wide selection of EMU wet pit mounting systems for almost every discharge size. There are single pipe systems for smaller pump models, dual pipe systems, which are interchangeable with competitors' models in the market, and the proprietary T-Bar type slide-rail system for 3, 4, and 6-inch discharge sizes. Portable base designs, which can be customized for each application, are also available. Since EMU units use the pump discharge flange to attach the sliding coupling, the number of volutes that must be inventoried is limited. EMU pumps do not need specific wet pit volutes or specific dry pit volutes, as is common among other manufacturers. This is beneficial for installations using EMU pumps, because it allows spare pumps to be used in any application- stocking of duplicate stock of the same pump volute becomes unnecessary.

As an option, Davis Products can provide a Factory Mutual Certified Non-Sparking slide-rail system for use in locations where conditions dictate this level of safety.

As with all of EMU wet pit systems, the user is never required to enter the wet well- under any conditions- to install or remove the pump from the discharge base. EMU pumps feature a Buna-N seal at the discharge connection that is flexible and provides guaranteed sealing against full shutoff pressure of the pump, without leakage.



Each impeller type undergoes a continuous improvement process that assures interchangeability with the highest possible efficiency balanced against longest life requirements.

USFilter's Davis Products warrants each EMU submersible pump for a period of five years without restriction on the total or operating point run time hours. Our warranty is 100% for the first year and 50% years two through five. This warranty applies to standard municipal pump applications. See actual warranty for complete wording and details. Our industrial warranty period is two years with 100% coverage for the first year and 50% coverage for the second year.

Davis Products provides regional service capabilities all across the United States consisting of factory trained service shops, and factory business center locations in the area. Please contact your local USFilter Davis Product's representative for the location nearest you.

Due to the simplicity of the EMU submersible and dry pit pumps- and the designed-in "ease of maintenance"- users are encouraged to complete the short training course (at the USFilter's EMU factory) and become qualified to service their own pumps. The design of EMU pumps, which incorporates similar interchangeable parts from one model to another, makes pump servicing easy. The modular method of EMU pump construction also makes it possible for technicians to make the transition from smaller models to larger models with the only change being the size of the individual parts.

VOLKERT

VOLKERT, INC.
1110 MONTLIMAR DR., SUITE 1050
MOBILE, ALABAMA 36609
PH (251) 342-1070