



**STATE OF ALASKA  
ALASKA CLEAN/DRINKING WATER FUND  
GREEN PROJECT ASSESSMENT FORM**

As applicable under the EPA annual capitalization grants provided to the Alaska Clean Water Fund (ACWF) and Alaska Drinking Water Fund (ADWF) loan programs, a portion of funds appropriated shall be for projects to address green infrastructure, water or energy efficiency improvements or other environmentally innovative activities." To meet this condition under the federal grant for administering these funds, this assessment form is provided to document this eligibility or what is termed a "Categorical" or "Business Case" justification, which will be reviewed by DEC for provisional compliance. For more information on green infrastructure development, please review the following EPA web site:

[http://cfpub.epa.gov/npdes/home.cfm?program\\_id=298](http://cfpub.epa.gov/npdes/home.cfm?program_id=298)

For those projects requiring a "Business Case," Part 2 will require completion to qualify a "traditional project" as green; justification is broken down into two parts, technical and financial. The technical part should use information from a variety of sources such as maintenance or operation records, engineering studies, project plans or other applicable documentation to identify problems (including any data on water and/or energy inefficiencies) in the existing facility, and that clarifies the technical benefits from the project in water and/or energy efficiency terms. Financial justification needs to show estimated savings to a project based on the technical benefits, and demonstrate that the green component of the project provides a substantial savings and environmental benefit.

For more information and assistance in completing this assessment form, please contact the Municipal Matching Grants & Loans program in Anchorage at 907-269-7673, or in Juneau at 907-465-5300.

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**GENERAL INFORMATION**

Name of Community Petersburg Borough  
Address P.O. Box 329  
Petersburg, AK 99833  
Contact Name Chris Cotta Title Asst. Public Works Dir. Telephone (907) 772-4430

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**PROJECT INFORMATION**

Project Name Pump Station 1 Force Main Upgrade Location Petersburg, AK  
Project Type:  New Construction  Upgrades  
 Stormwater Infrastructure  Energy Efficiency Project  
 Water Efficiency Project  Innovative Environmental Project

Green Project Description: Replace aging ductile iron force main located under beach, with a new force main located under S. Nordic Drive. Pump Stations 1+2 will be upgraded to handle the changes in flow. Current pumps are worn out with parts no longer available. New, more efficient pumps will be installed, with VFD operation and controls optimized for energy efficiency.

## PART 1 – GREEN PROJECT CATEGORY & COSTS

Identify the most appropriate “Green” Clean Water or Drinking Water category project type. Note, any selection with (BC) at the end will require a Business Case demonstration.

**ENERGY EFFICIENCY** – the use of improved technologies and practices to reduce the energy consumption of water quality projects.

- Wastewater/water utility energy audits       Clean power for public owned facilities
- Leak detection equipment       Retrofits/upgrades to pumps & treatment processes (BC)
- Replace/rehabilitation of distribution (BC)       Other: \_\_\_\_\_ (BC)

**WATER EFFICIENCY** – the use of improved technologies and practices to deliver equal or better services with less water.

- Water meters       Fixture Retrofit       Landscape/Irrigation
- Graywater or other water recycling       Replace/rehabilitation of distribution (BC)
- Leak detection equipment       OTHER: \_\_\_\_\_ (BC)

**GREEN INFRASTRUCTURE** – Practices that manage and treat stormwater and that maintain and restore natural hydrology by infiltrating, evapotranspiring and capturing and using stormwater.

- Green Streets       Water harvesting and reuse
- Porous pavement, bioretention, trees, green roofs, water gardens, constructed wetlands
- Hydromodification for riparian buffers, floodplains, and wetlands
- Downspout disconnection to remove stormwater from combined sewers and storm sewers
- OTHER: \_\_\_\_\_ (BC)

**ENVIRONMENTALLY INNOVATIVE PROJECTS** – Demonstrate new/innovative approaches to managing water resources in a more sustainable way. This may include projects that achieve pollution prevention or pollutant removal with reduced costs and projects that foster adaptation of water protection programs and practices to climate change

- Wetland restoration       Decentralized wastewater treatment solutions
- Water reuse       Green stormwater infrastructure       Water balance approaches
- Adaptation to climate change       Integrated water resource management
- OTHER: \_\_\_\_\_ (BC)

**PROJECT & GREEN COMPONENT COSTS**

	<b><u>TOTAL PROJECT COSTS</u></b>	<b><u>TOTAL "GREEN" COMPONENT COSTS</u></b>
Administration	\$ <u>66,940</u>	\$ _____
Legal	\$ _____	\$ _____
Preliminary Studies/Reports	\$ _____	\$ _____
Engineering Design	\$ <u>209,625</u>	\$ _____
Inspection/Surveying/Construction	\$ _____	\$ _____
Management	\$ _____	\$ _____
Construction	\$ <u>1,397,500</u>	\$ <del>340,000</del> → \$ 270,000 <i>mw</i>
Equipment	\$ _____	\$ _____
Contingencies	\$ <u>419,250</u>	\$ _____
Other	\$ _____	\$ _____
Total Costs	\$ <u>2,093,315</u>	\$ <del>340,000</del> → \$ 270,000 <i>mw</i>

**PART 2 – PROJECT “BUSINESS CASE” TECHNICAL/FINANCIAL ASSESSMENT**

**TECHNICAL ANALYSIS OF BENEFITS\***

In addition to this form, a supporting technical and financial analysis is required to verify energy and water saving efficiencies for any green component of the project. For green infrastructure and innovative environmental type projects, the analysis should include any applicable efficiency and environmental benefits. For assisting MGL in evaluating “Business Case” assessments of water main, meter, and pump facility replacement type projects, the attached form titled “ADWF - Water/Energy Efficiency Determination - Water Main Replacement/Meter/Pump Facility” is required to be completed. Once the form is complete along with any supporting documentation, please submit documentation to the MGL program for review and concurrence. Note, only water/energy efficiencies that achieve a 20% or greater increase in efficiency will categorically qualify as a Green project.

**CERTIFICATION STATEMENT:**

I certify the above information is current and accurate.

Chris Cotta  
Name

Asst. Public Works Dir.  
Title

Chris Cotta  
Signature

9/2/14  
Date

Submit Completed Form to:

Alaska Department of Environmental Conservation  
Municipal Matching Grants & Loans  
555 Cordova Street  
Anchorage, AK 99501-2617

## Green Project Business Case

### Petersburg Borough – Pump Station 1 Force Main Upgrade

#### Business Case Summary

The Pump Station 1 Force Main Upgrade project is a key piece of Petersburg's overall wastewater capital project plan. Among the primary goals of the project are pollution prevention and energy efficiency. One major goal is to relocate the aging ductile iron force main that runs under the beach between Pump Stations 1 & 2. Although both pump stations are located upland, most of the force main is located below grade along the beach line, with exposed portions in two locations. The force main has leaked in the past and is heavily corroded, raising concerns that a future failure will cause sewage to be released into Petersburg's harbors and nearby marine waters (Wrangell Narrows and Frederick Sound). Petersburg Borough plans to relocate the force main into the South Nordic Drive ROW as part of DOT's upcoming South Nordic Drive Rehabilitation project. This will greatly reduce the chance of a pollution event due to force main failure.

A second major goal of the project is to increase energy efficiency of the pumping systems at Pump Stations 1 and 2. These pump stations are both nearly 40 years old and the pumping systems are well past their useful lives. Pumps at both stations use "across the line" starters, with no control over pump speed once the pump is energized. Efficiencies of the worn out pumps are only 29% at Pump Station 1 and 27% at Pump Station 2. Planned pump station upgrades include complete replacement of the pumping systems at both pump stations, with the new systems featuring high efficiency pumps and variable frequency drives.

Existing pumps at Pump Station 1 are 10 hp Allis Chalmers 400 series. These will be replaced with 7.5 hp Flygt 3127 pumps with model 439 impellers. Pump Station 2 has Crane Deming 7370 pumps rated at 5 hp. These will be replaced with 5 hp Flygt 3102 pumps with model 422 impellers. Pump curves for the new pumps are attached for reference.

#### Technical and Financial Analysis

At both pump stations 1 and 2, the pumping systems are so worn that the original pump curves are of little use in calculating flow rates and pump efficiencies. Public Works has calculated pump efficiencies using observed flow data (gathered through draw down testing) and the electrical cost to operate the pumps. Summaries of electrical costs for the two pump stations are attached. Following are the efficiency numbers for existing pumps:

##### Pump Station 1

Operating Cost = \$110.08/month (calendar year 2013)

Flow = 100,000 gals per day

Total Dynamic Head = 32.55 ft

System Horsepower Requirements =  $(32.55 \text{ ft of TDH} \times 310 \text{ gpm}) / 3960 = 2.55 \text{ hp}$

Existing HP usage =  $(33.06 \text{ kw/day}) / (5.1 \text{ hours/day runtime}) / (.746 \text{ kw/hp}) = 8.7 \text{ hp}$

Existing Efficiency =  $2.55 \text{ hp required} / 8.7 \text{ hp used} = 29\%$

## Pump Station 2

Operating Cost = \$35.34/month (calendar year 2013)

Flow = 30,000 gals per day

Total Dynamic Head = 10 ft

System HP Requirements =  $(10 \text{ ft of TDH} \times 425 \text{ gpm}) / 3960 = 1.1 \text{ hp}$

Existing HP Usage =  $(10.61 \text{ kw/day}) / (3.5 \text{ hours/day runtime}) / (.746 \text{ kw/hp}) = 4.06 \text{ hp}$

Existing Efficiency =  $1.1 \text{ hp required} / 4.06 \text{ hp used} = 27\%$

Upgrades to the pump stations should result in much higher pump efficiencies. Power usage for the new pumping systems is estimated as follows:

### Pump Station 1 (same flow as before project)

New Total Dynamic Head = 31.8 ft

New HP Requirement =  $(31.8 \text{ ft} \times 500 \text{ gpm}) / 3960 = 4.0 \text{ hp}$

New HP Usage =  $4.0 \text{ hp required} / 70\% \text{ efficiency for new pumps} = 5.7 \text{ hp}$

New KW =  $5.7 \text{ hp} \times .746 \text{ kw/hp} = 4.3 \text{ kw}$

New Electric Usage =  $(100,000 \text{ gpd} / 500 \text{ gpm}) / 60 \text{ min/hr} = 3.3 \text{ hrs/day runtime}$

New Operating Cost =  $4.3 \text{ kw} \times 3.3 \text{ hr/day} \times 30 \text{ day/month} \times .111 \text{ per kwh} = \$47.25/\text{month}$

### Pump Station 2 (new sewer main alignment results in a flow increase as noted)

New Flow = 130,000 gals per day

New TDH = 16 ft

New HP Requirement  $(16 \text{ ft} \times 750 \text{ gpm}) / 3960 = 3.0 \text{ hp}$

New HP Usage =  $3.0 \text{ hp required} / 63\% \text{ efficiency for new pumps} = 4.8 \text{ hp}$

New KW =  $4.8 \text{ hp} \times .746 \text{ kw/hp} = 3.6 \text{ kw}$

New Electric Usage =  $(130,000 \text{ gpd} / 750 \text{ gpm}) / 60 \text{ min/hr} = 2.9 \text{ hrs runtime}$

New Operating Cost =  $3.6 \text{ kw} \times 2.9 \text{ hr/day} \times 30 \text{ days/mo} \times \$0.111 \text{ per kwh} = \$34.77/\text{month}$

To summarize the above calculations:

### Pump Station 1

Present electrical cost \$110.08/month

Anticipated post-construction electric cost \$47.25/month

Difference: Decrease of \$62.83/month

### Pump Station 2

Present electrical cost \$35.34/month

Anticipated post-construction electric cost \$34.77/month

Difference: Decrease of \$0.57/month

**Combined Pump Stations 1 & 2**

**Present electric cost \$145.42**

**Anticipated post-construction electric cost \$82.02**

**Difference: Decrease of \$63.40 or 44% overall**

As the preceding analysis illustrates, the Borough expects overall power usage to decrease sharply as a result of the pumping system upgrades at Pump Stations 1 & 2. This decrease comes primarily from significant efficiency gains at Pump Station 1. The decrease in power cost for Pump Station 2 is anticipated to be minor, however it should be noted that flow through Pump Station 2 is expected to quadruple due to the new sewage main alignment. This flow increase will be offset by the large increase in pump efficiency of the new pumping system at Pump Station 2.

**Attachments: Power usage history for Pump Stations 1 & 2 (2 pages total)**  
**Pump Station 1 pump curve data (4 pages)**  
**Pump Station 2 pump curve data (6 pages)**

# Usage History

## PETERSBURG BOROUGH

Account 37158

910 S NORDIC DRIVE *Pump Station 1*

ELEC

	<u>Metered Usage</u>	<u>Billed Usage</u>	<u>Charge</u>
Jul-12	0.00	0.00	0.00
Aug-12	980.00	980.00	108.78
Sep-12	1,370.00	1,370.00	152.07
Oct-12	1,280.00	1,280.00	142.08
Nov-12	1,200.00	1,200.00	133.20
Dec-12	750.00	750.00	83.25
Jan-13	1,060.00	1,060.00	117.66
Feb-13	1,140.00	1,140.00	126.54
Mar-13	850.00	850.00	94.35
Apr-13	670.00	670.00	74.37
May-13	990.00	990.00	109.89
Jun-13	680.00	680.00	75.48
Jul-13	760.00	760.00	84.36
Aug-13	730.00	730.00	81.03
Sep-13	950.00	950.00	105.45
Oct-13	1,290.00	1,290.00	143.19
Nov-13	1,390.00	1,390.00	154.29
Dec-13	1,390.00	1,390.00	154.29
Jan-14	1,320.00	1,320.00	146.52
Feb-14	780.00	780.00	86.58
Mar-14	930.00	930.00	103.23
Apr-14	1,180.00	1,180.00	130.98
May-14	970.00	970.00	107.67
Jun-14	970.00	970.00	107.67
Maximum:	1,390	1,390	\$ 154.29
Minimum:	0	0	\$ 0.00
Monthly Average:	985	985	109.29
Avg Cost/Usage:			0.1110

*2013 total electric cost \$1320.90*

*Monthly Avg \$110.08*

*2013 total electric use 11,900 kwh*

*Cost per kwh \$.111*

# Usage History

## PETERSBURG BOROUGH

Account 37158

27 S SINGLEE ALLEY

*Pump Station 2*

ELEC

	<u>Metered Usage</u>	<u>Billed Usage</u>	<u>Charge</u>
Jul-12	0.00	0.00	0.00
Aug-12	310.00	310.00	34.41
Sep-12	400.00	400.00	44.40
Oct-12	350.00	350.00	38.85
Nov-12	610.00	610.00	67.71
Dec-12	430.00	430.00	47.73
Jan-13	530.00	530.00	58.83
Feb-13	460.00	460.00	51.06
Mar-13	380.00	380.00	42.18
Apr-13	400.00	400.00	44.40
May-13	390.00	390.00	43.29
Jun-13	230.00	230.00	25.53
Jul-13	130.00	130.00	14.43
Aug-13	100.00	100.00	11.10
Sep-13	130.00	130.00	14.43
Oct-13	310.00	310.00	34.41
Nov-13	290.00	290.00	32.19
Dec-13	470.00	470.00	52.17
Jan-14	440.00	440.00	48.84
Feb-14	300.00	300.00	33.30
Mar-14	370.00	370.00	41.07
Apr-14	360.00	360.00	39.96
May-14	170.00	170.00	18.87
Jun-14	180.00	180.00	19.98
Maximum:	610	610	\$ 67.71
Minimum:	0	0	\$ 0.00
Monthly Average:	323	323	35.80
Avg Cost/Usage:			0.1110

*2013 total electric cost \$424.02*

*Monthly avg \$ 35.34*

*2013 total electric use 3820 kwh*

*Cost per kwh \$.111*



## NP 3127 MT 3~ SmartRun 439



### Performance curve

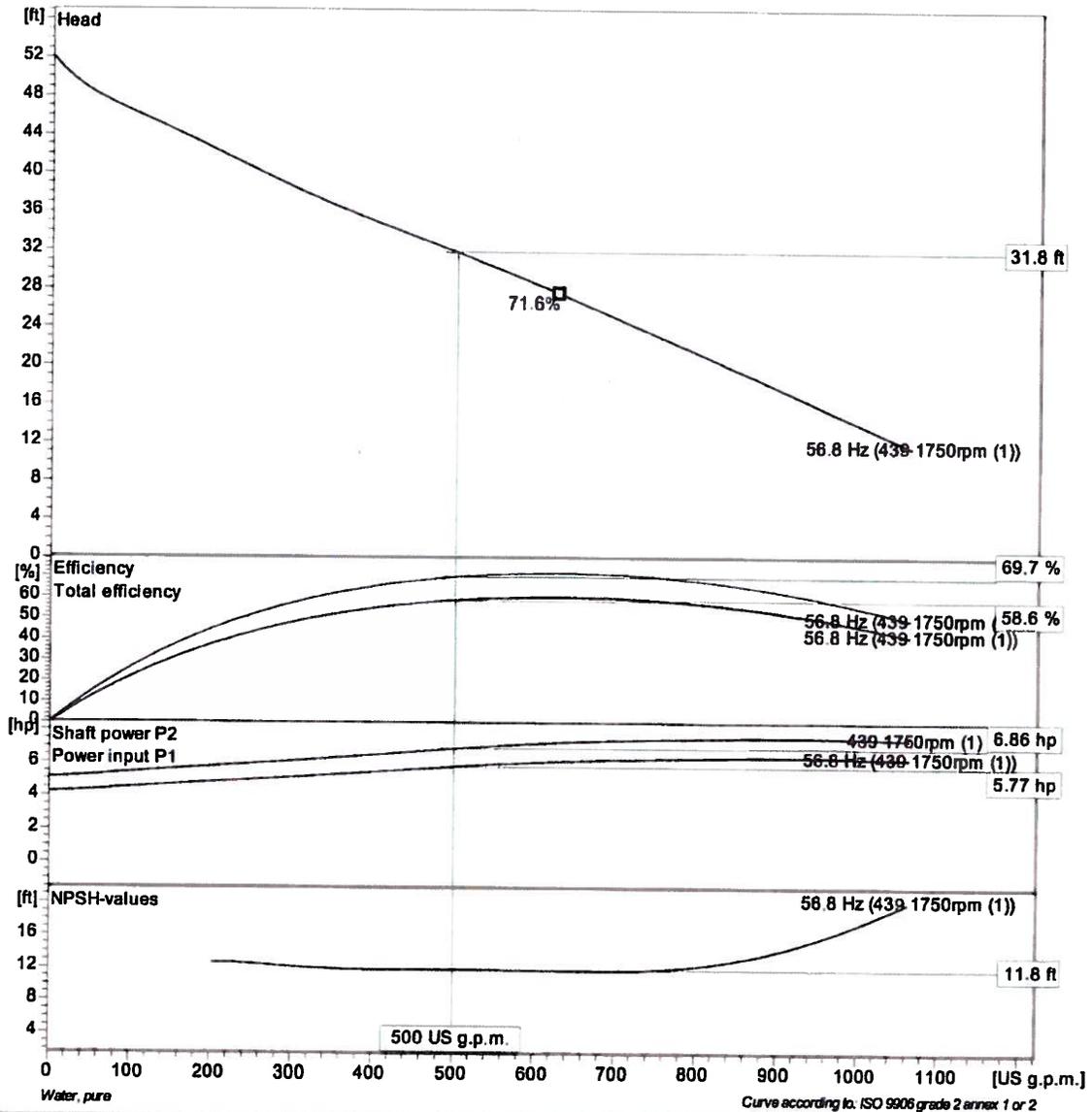
#### Pump

Discharge Flange Diameter 3 15/16 inch  
Suction Flange Diameter 100 mm  
Impeller diameter 7 7/8"  
Number of blades 2

#### Motor

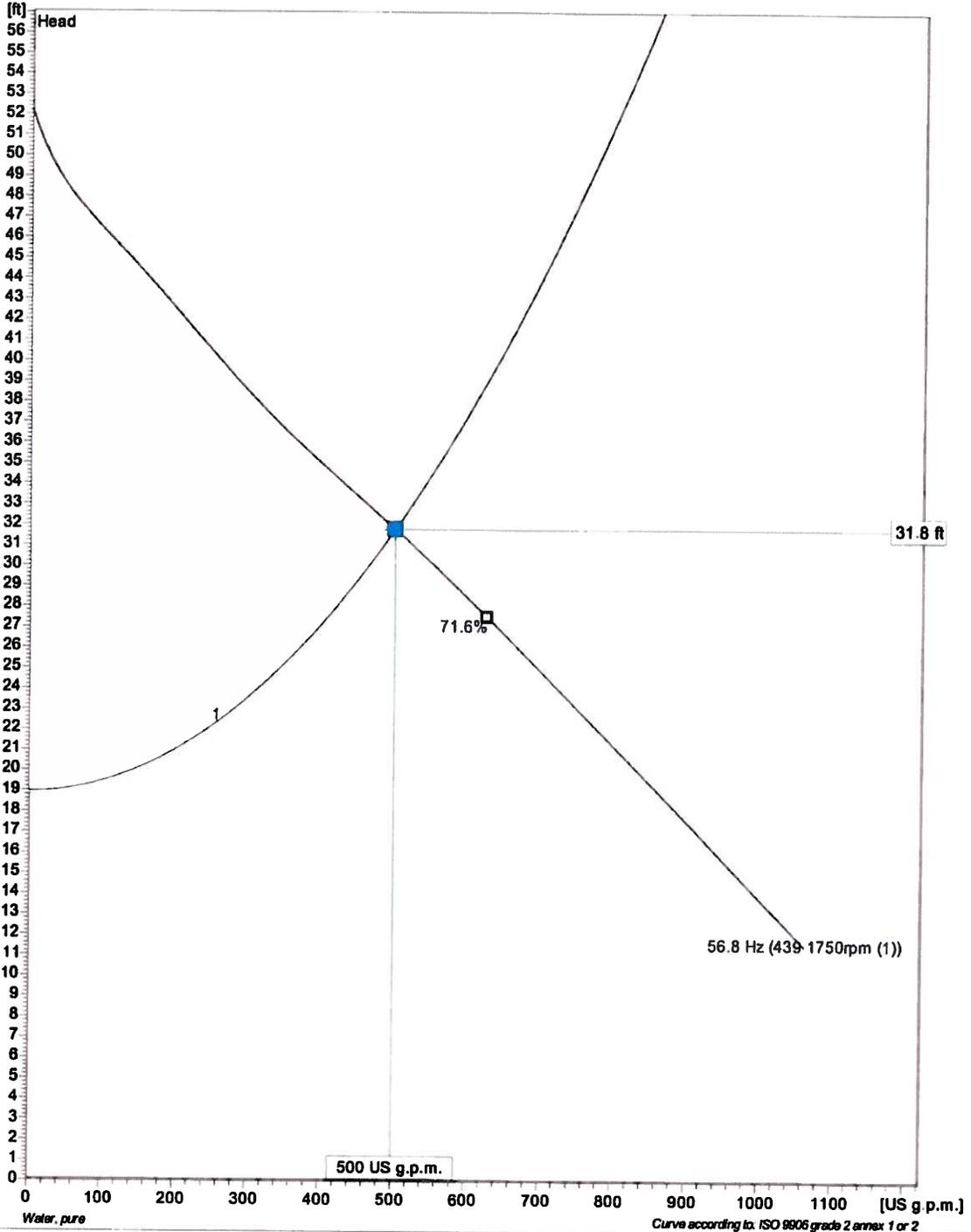
Motor # N3127.160 21-10-4AL-W 7.5hp  
Stator variant 34  
Frequency 60 Hz  
Rated voltage 460 V  
Number of poles 4  
Phases 3~  
Rated power 7.5 hp  
Rated current 9.8 A  
Starting current 60 A  
Rated speed 1750 rpm

Power factor  
1/1 Load 0.85  
3/4 Load 0.81  
1/2 Load 0.72  
Efficiency  
1/1 Load 84.0 %  
3/4 Load 84.0 %  
1/2 Load 82.0 %



Project	Project ID	Created by	Created on	Last update
			2014-09-11	

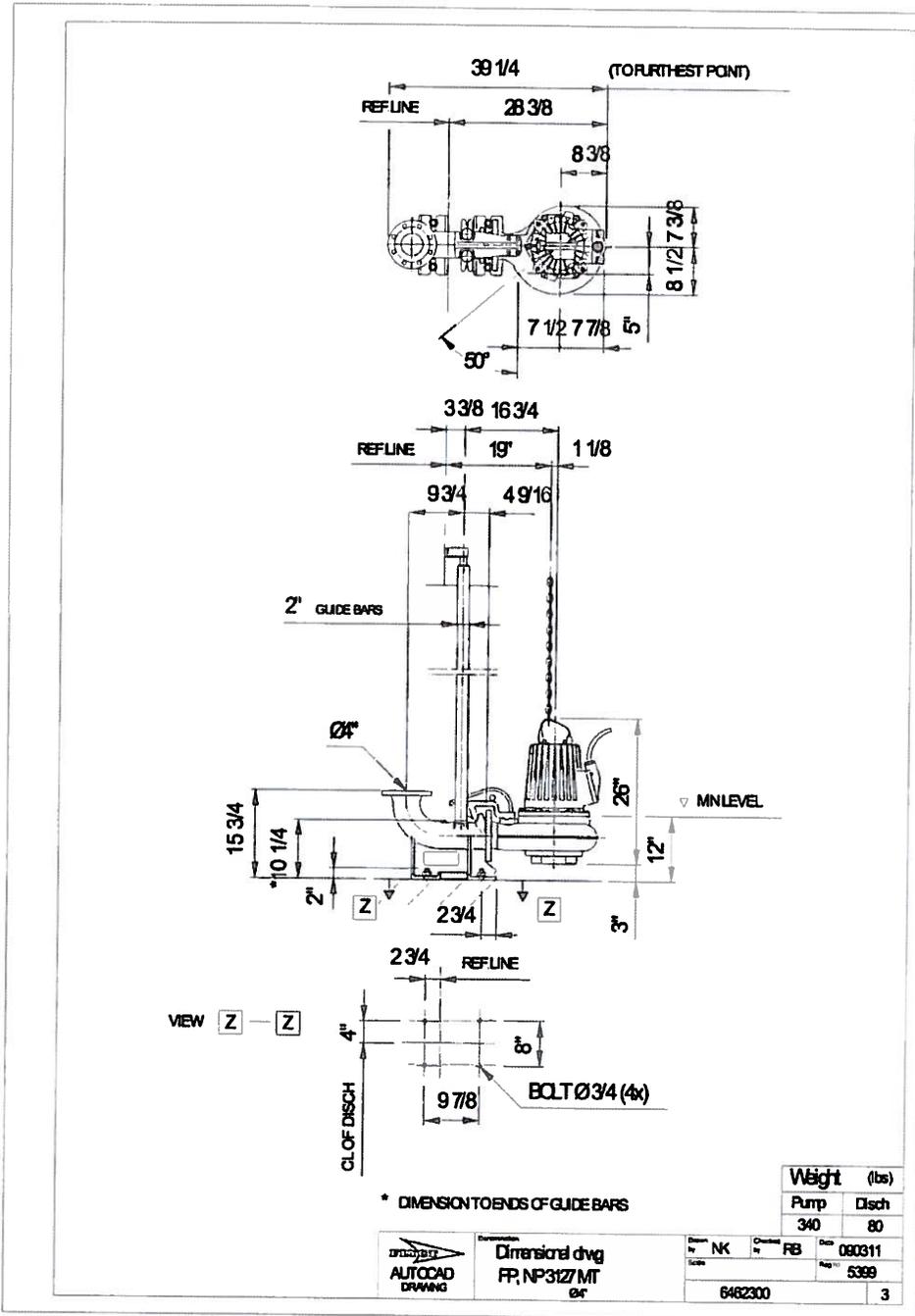
**NP 3127 MT 3~ SmartRun 439**  
Duty Analysis



Pumps running /System	Individual pump			Total					
	Flow	Head	Shaft power	Flow	Head	Shaft power	Hyd. eff.	Specific energy	NPSH <sub>re</sub>
1	500 US g.p.m.	31.8 ft	5.77 hp	500 US g.p.m.	31.8 ft	5.77 hp	69.7%	170 kWh/US MG	11.8 ft

Project	Project ID	Created by	Created on	Last update
			2014-09-11	

**NP 3127 MT 3~ SmartRun 439**  
Dimensional drawing







## NP 3102 LT 3~ Adaptive 422

### Performance curve

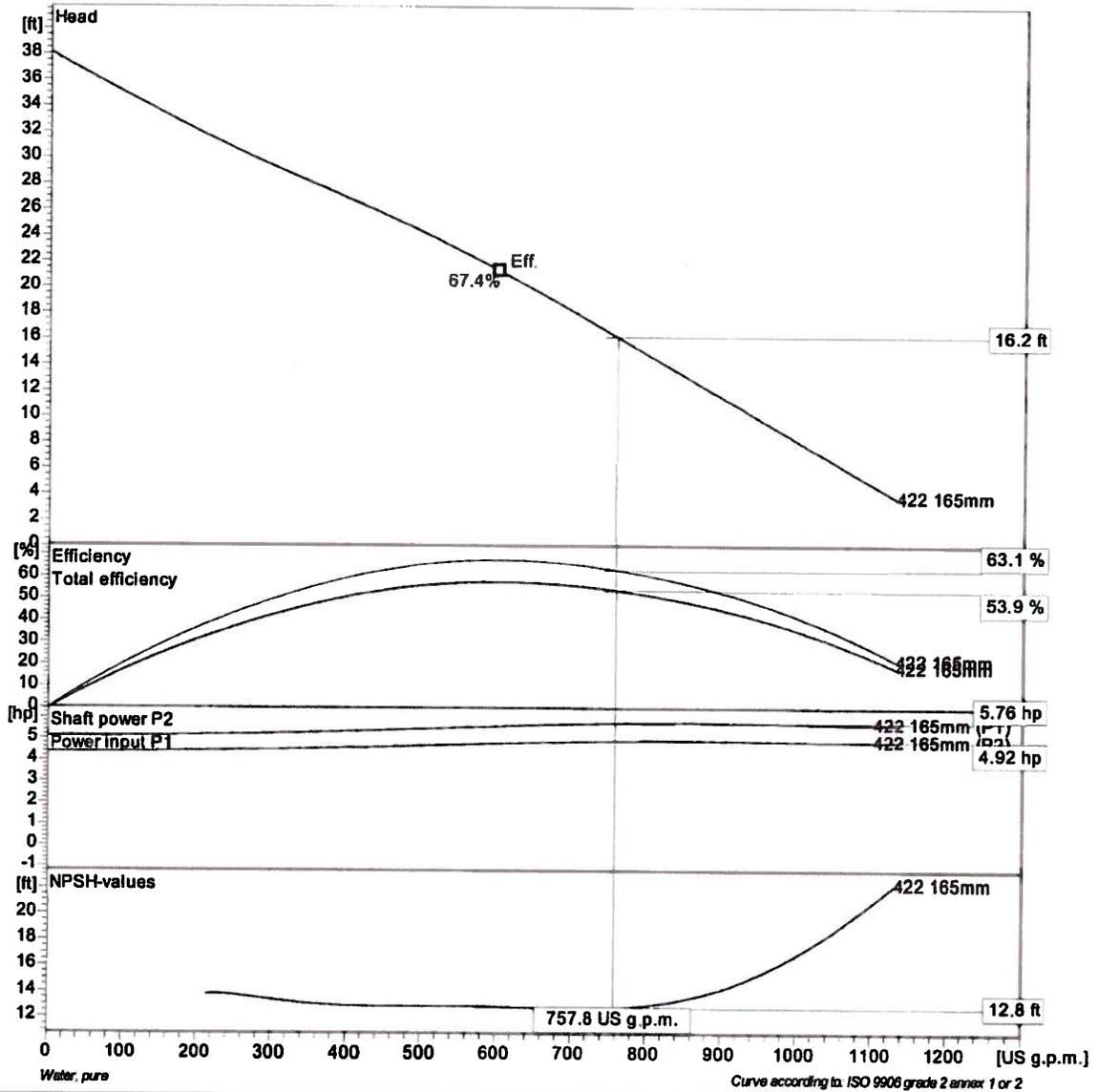
#### Pump

Discharge Flange Diameter 150 mm  
Suction Flange Diameter 150 mm  
Impeller diameter 165 mm  
Number of blades 2

#### Motor

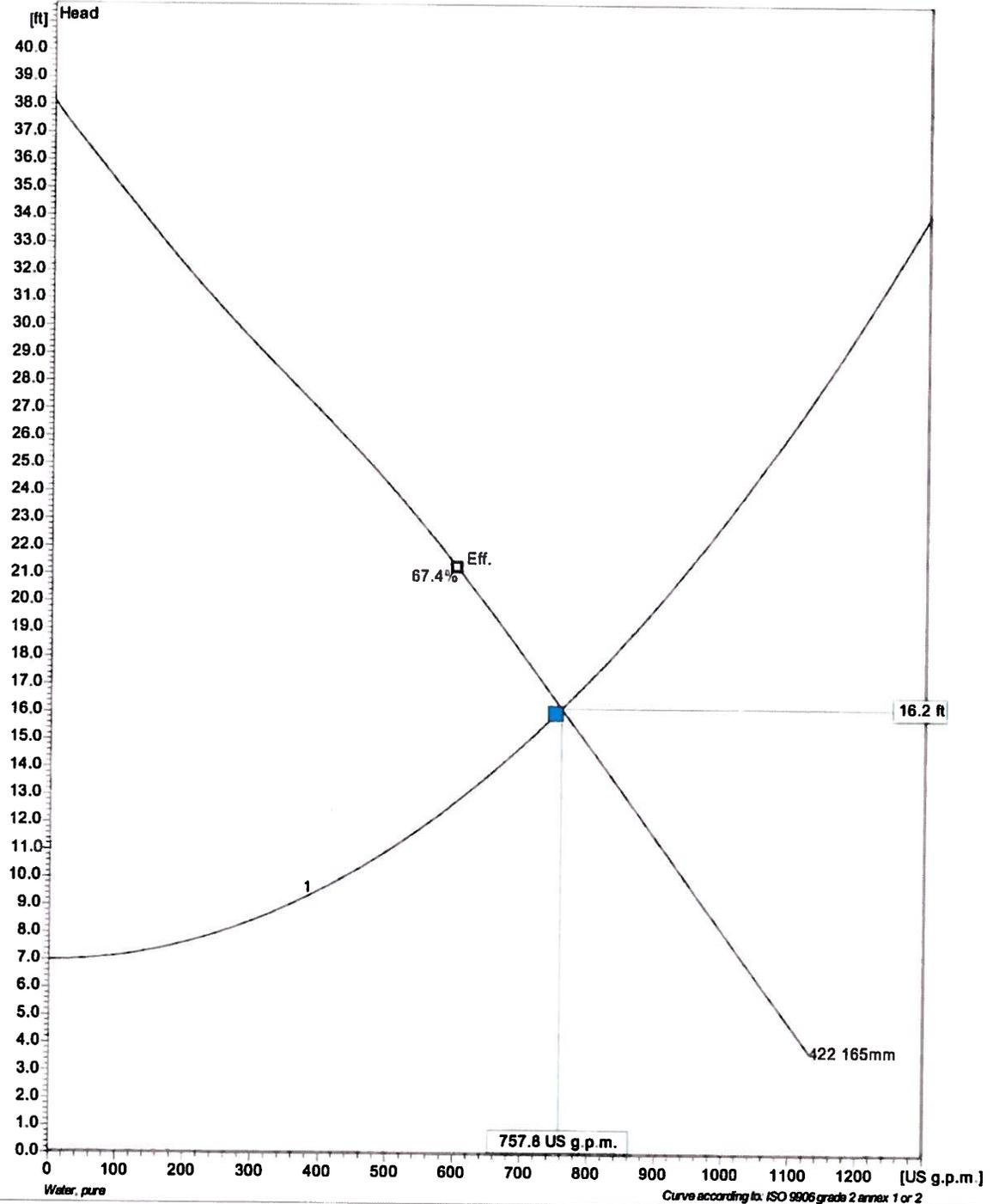
Motor # N3102.160 18-11-4AL-W 5hp  
Stator variant 61  
Frequency 60 Hz  
Rated voltage 460 V  
Number of poles 4  
Phases 3~  
Rated power 5 hp  
Rated current 6.7 A  
Starting current 41 A  
Rated speed 1745 1/min

Power factor  
1/1 Load 0.81  
3/4 Load 0.75  
1/2 Load 0.64  
  
Efficiency  
1/1 Load 85.0 %  
3/4 Load 85.5 %  
1/2 Load 84.0 %



Project	Project ID	Created by	Created on	Last update
			2014-08-22	

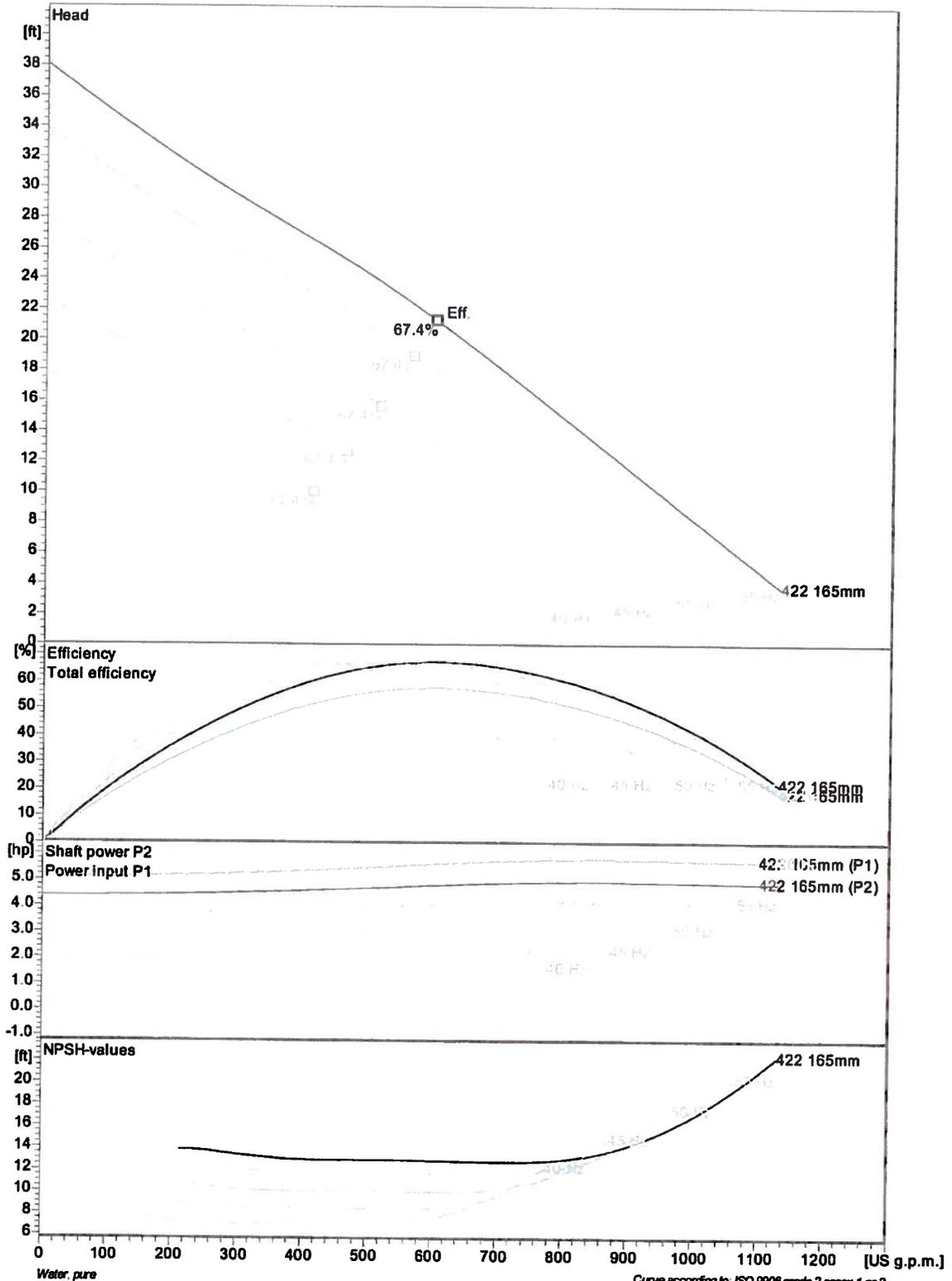
**NP 3102 LT 3~ Adaptive 422**  
Duty Analysis



Pumps running /System	Individual pump			Total					
	Flow	Head	Shaft power	Flow	Head	Shaft power	Hyd. eff.	Specific energy	NPSH <sub>re</sub>
1	758 US g.p.m.	16.2 ft	4.92 hp	758 US g.p.m.	16.2 ft	4.92 hp	63.1 %	94.5 kWh/US MG	12.8 ft

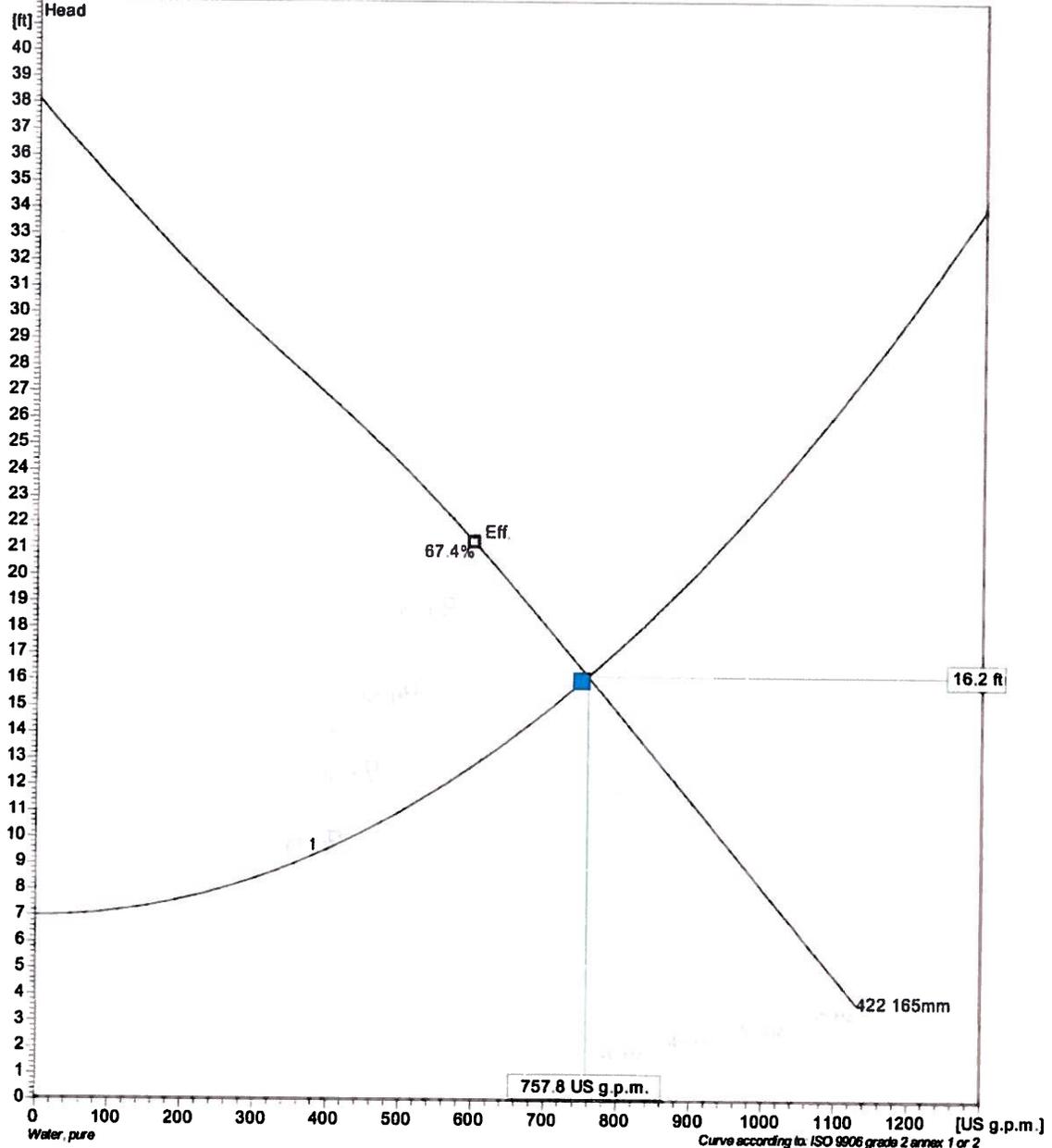
Project	Project ID	Created by	Created on 2014-08-22	Last update
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**NP 3102 LT 3~ Adaptive 422**  
VFD Curve



Project	Project ID	Created by	Created on 2014-08-22	Last update
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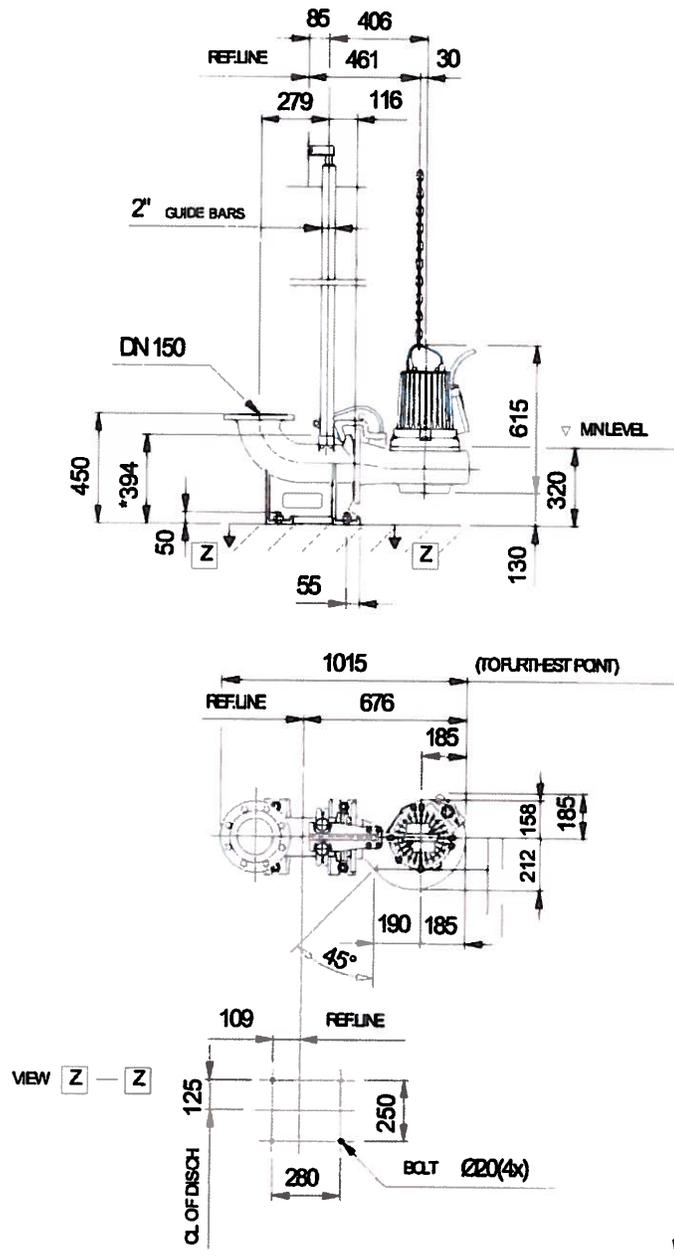
**NP 3102 LT 3~ Adaptive 422**  
**VFD Analysis**



Pumps running /System	Individual pump				Total					
	Frequency	Flow	Head	Shaft power	Flow	Head	Shaft power	Hyd. eff.	Specific energy	NPSH <sub>req</sub>
1	60 Hz	758 US g.p.m.	16.2 ft	4.92 hp	758 US g.p.m.	16.2 ft	4.92 hp	63.1 %	94.5 kWh/US MG	12.8 ft
1	55 Hz	701 US g.p.m.	14.9 ft	4.13 hp	701 US g.p.m.	14.9 ft	4.13 hp	63.8 %	101 kWh/US MG	11.6 ft
1	50 Hz	612 US g.p.m.	13 ft	3.09 hp	612 US g.p.m.	13 ft	3.09 hp	65.1 %	114 kWh/US MG	9.53 ft
1	45 Hz	519 US g.p.m.	11.3 ft	2.24 hp	519 US g.p.m.	11.3 ft	2.24 hp	66.4 %	132 kWh/US MG	8.41 ft
1	40 Hz	421 US g.p.m.	9.83 ft	1.56 hp	421 US g.p.m.	9.83 ft	1.56 hp	67.4 %	159 kWh/US MG	7.01 ft

Project	Project ID	Created by	Created on 2014-08-22	Last update
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**NP 3102 LT 3~ Adaptive 422**  
Dimensional drawing



\* DIMENSION TO ENDS OF GUIDE BARS

Weight

Dimensional dvg  
NP3102LT

Project	Project ID	Created by	Created on 2014-08-22	Last update
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