

MEMORANDUM



**J.L. Richards
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Page 1 of 6

To: Dave Markell
Ontario Clean Water Agency (OCWA)
5 Industrial Dr.
Chesterville, ON
K0C 1H0

Date: August 28, 2020

JLR No.: 28855-000.1

CC: Angela Rutley, Township of North Dundas
Khurram Tunio, Township of North Dundas
Mary-Lynn Plummer, Township of North Dundas
Mark Buchanan, P.Eng. J.L. Richards & Associates Limited

From: Annie Williams, P.Eng.

Re: **Township of North Dundas - Hydraulic Water Model**

Background

J.L. Richards & Associates Limited (JLR) has been retained by the Township of North Dundas (Township) to develop a hydraulic water model in support of the Municipal Environmental Assessment (Class EA) for the North Dundas Drinking Water Supply System Capacity Expansion works. Prior to completing this exercise, the Township had no hydraulic water model for their water distribution system.

Water Supply and Distribution System

The Township is comprised of two urban areas, Winchester and Chesterville, which are serviced by an interconnecting water distribution system involving multiple wells, storage reservoirs and pumping stations.

Until 2011, Winchester and Chesterville were serviced by two separate water distribution systems. Winchester was supplied by four wells (Winchester Well No. 1, Winchester Well No. 5, Winchester Well No. 6, and Winchester Well field No. 7, which consists of Wells No. 7A, 7B, and 7C) and had one elevated water tower. Chesterville was supplied by two well stations (Chesterville Well No. 5 and Chesterville Well No. 6) along with a standby well (Chesterville Well No. 1) and had one elevated water tower and a reservoir and pumping station located off of Brannen Drive.

In 2011, a reservoir and pumping station was constructed in Winchester on Gypsy Lane, east of St. Lawrence Street, and a transmission watermain was installed to connect the two systems. The valve arrangement at Chesterville Wells No. 5 and 6 allow water to be transferred in both directions, from Winchester to Chesterville or from Chesterville to Winchester.

Watermain Distribution Network

The Township's hydraulic water model was built within Bentley's WaterCAD® software platform. The scaled water distribution network was imported from GIS data consisting of pipes, junctions and hydrants. The GIS data included pipe diameters, materials and lengths. In accordance with the Ministry of the Environment, Conservation and Parks (MECP) design guidelines, the actual inside pipe diameters were modelled as follows:

Table 1: Pipe Diameters

Nominal Diameter (mm)	Inside Diameter (mm) (PVC, Ductile Iron)	Inside Diameter (mm) (AC)
100	108	101
150	155	152
200	204	203
250	250	254
300	297	305

Roughness coefficients or Hazen-Williams C-Factors were developed based on past experience and from the work done by Peter A. Lamont, entitled "Common pipe flow formulas compared with the theory of roughness" published in the American Water Works Association (AWWA) Journal in May 1981. Based on available information, consideration was given to pipe material and approximate pipe age. The modelled C-Factors are presented in the table below.

Table 2: C-Factors

Material	Installation Year	C-Factor for Nominal Diameter (mm)				
		100	150	200	250	300
Polyvinyl Chloride (PVC)	All	100	100	110	110	120
Asbestos-Cement (AC)	All	---	80	80	---	---
Ductile Iron (DI)	1990-1999	----	87	90	90	95

Junction and hydrant topographical elevations were obtained from the Ontario Provincial Digital Elevation Model (PDEM). Three (3) pressure zones were assigned in the model: Winchester, Chesterville, and Transmission that interconnects the Winchester and Chesterville systems.

System Operating Parameters: Wells and Pumping Stations

The well stations and pumping stations were modelled based on information shown on the following drawings:

- Water Supply Expansion – Contract No. 2, Wells 7A, 7B & 7C – Wellhead Works, Drawing No. 14946-02-M1, Rev. 2 dated October 30, 1997 prepared by JLR
- Chesterville Well No.6 Upgrade, Drawing No. E-2, Rev. 3 dated September 20, 2004 prepared by Stantec Consulting Ltd.
- Winchester Water Supply Upgrades- Phase 2, Part A, Reservoir and Pump Station, Drawing No. PR03, Rev. 2 dated April 14, 2014 prepared by Stantec Consulting Ltd.
- Village of Chesterville Waterworks Improvements, Drawings M1, M2, M3, Rev. 1 dated June 1990 prepared by Totten Sims Hubicki Associates

Pump curves and water tower levels were provided within several documents received from the Township (refer to Attachment 1 for Pump curves and water tower levels).

The following table summarizes the water tower operating levels input in the model.

Table 3: Winchester and Chesterville Water Tower Operating Levels

Description	Winchester Tower Elevation (m)	Chesterville Tower Elevation (m)
Base Elevation	104.50	103.77
Low Water Level	104.59	103.77
Normal Water Level	113.17	110.77
High Water Level	114.85	111.97
Overflow	115.50	112.67

Water Demands

The modelled water demands were based on monthly average day demand data provided by the Township. The total Township average and maximum day demands were obtained from the past five (5) years (2015 – 2019) of water production data provided by OCWA. The MECF peaking factors in accordance with Table 3-1 of their design guidelines were used to estimate the total peak hour demand. Based on the estimated population for 2019 (4,355 people), a peaking factor of 1.5 x maximum day demand was used for the peak hour demand.

Two (2) high water users were also accounted for in Winchester: Lactalis (formerly Parmalat) and the Winchester District Memorial Hospital. The Township provided monthly average day demand data for these two users. The average day demand for Lactalis was taken as the monthly average over the past three (3) years (2017 – 2019). Due to the overall increase in water usage in 2017 as compared to 2016, the past three (3) years were considered to provide the most representative data for Lactalis. The average day demand for the hospital was taken as the monthly average in 2018, which was the most recent year with complete data. The City of Ottawa peaking factors in accordance with Table 4.2 of their design guidelines were used to estimate the hospital's maximum day and peak hour demands. A peaking factor of 1.5 x average day demand and 1.8 x maximum day demand was used for maximum day demand and peak hour demand, respectively. The peaking factor of 1.5 x average day demand was used to estimate the maximum day demand for Lactalis, while its peak hour demand was assumed to be equal to its maximum day demand. MECF peaking factors were not used for the high water users because the Lactalis demand is expected to remain relatively consistent, and the resulting maximum day and peak hour demands obtained using MECF peaking factors were deemed too high. It is noted that the City of Ottawa peaking factors are still anticipated to provide a conservative assessment.

The table below summarizes the water demands for the high water users and the total for the Township.

Table 4: Water Demand Summary

Water User	Water Demand Scenario		
	Average Day (L/s)	Maximum Day (L/s)	Peak Hour (L/s)
Lactalis (formerly Parmalat)	14.68	22.02	22.02
Winchester District Memorial Hospital	0.70	1.05	1.89
Township of North Dundas (Winchester & Chesterville, including high water users)	27.90	54.90	66.08

The water demands for the high water users were deducted from the total Township demands and assigned to the nearest nodes. The remaining water demands were distributed amongst the representative junctions and hydrants, based on the parcel count assigned to each node. All parcels were equally weighted and any vacant parcels based on satellite imagery were not included. No rural properties situated along the transmission mains (watermain from Winchester Well No. 6 and Winchester Well Field No. 7, and watermain between Winchester and Chesterville) were considered to be connected to the water distribution system.

Model Scenarios

The newly constructed hydraulic water model was used to simulate the performance of the current system under existing flow conditions. The following operating conditions were assumed for these simulations:

- The existing average day scenario assumes that no pumps are operating, while the Winchester elevated storage tank level is at 113.17 m (tower start elevation provided from OCWA) and the Chesterville elevated storage tank level is at 110.77 m.
- The existing maximum day plus fire flow scenario assumes that several pumps (in Winchester: Well 1, Well 5, Well 6, Well 7B, Reservoir Duty Pump 1; and in Chesterville: Well 5, Well 6, Reservoir High Capacity Pump 3) are operating, while the Winchester elevated storage tank level is at 113.17 m and the Chesterville elevated storage tank level is at 110.77 m. In addition, the Winchester reservoir level is at 78.81 m and the Chesterville reservoir level is at 71.80 m.
- The existing peak hour scenario assumes that several pumps (in Winchester: Well 1, Well 5, Well 6, Well 7B, Reservoir Duty Pump 1; and in Chesterville: Well 5, Well 6, Reservoir Duty Pump 1) are operating, while the Winchester elevated storage tank level is at 113.17 m and the Chesterville elevated storage tank level is at 110.77 m. In addition, the Winchester reservoir level is at 78.81 m and the Chesterville reservoir level is at 71.80 m.

Note that under the average day, maximum day and peak hour scenarios, the following MECP Design Guidelines are applicable:

- The maximum pressure at any point in the distribution system in unoccupied areas shall not exceed 689 kPa (100 psi), and in occupied areas shall not exceed 552 kPa (80 psi).
- Maximum Day: Pressure is to be within the range of 345 kPa (50 psi) and 480 kPa (70 psi).
- Maximum Day + Fire Flow: Residual pressure at any point in the distribution system shall not be less than 140 kPa (20 psi).
- Peak Hour: Pressure is to be above 275 kPa (40 psi).

A summary of the results of these simulations is provided in Table 5.

Table 5: Hydraulic Water Model Results – Existing Conditions

Demand Scenario	General Results	Notes
Average Day	Good. Pressure Range: 248-418 kPa	These results are for the junctions and hydrants in the Winchester and Chesterville pressure zones only. All pumps are off in this simulation. Only two (2) hydrants experience pressures below 275 kPa and there are no customer connections in the vicinity of these hydrants.
Maximum Day + Fire Flow	Good. Fire Flow Availability: 26-314 L/s	These results are for the hydrants in the Winchester and Chesterville pressure zones only. Normal pumps are operating in this simulation, with the exception of the Chesterville reservoir where only one high capacity pump is operating. There are twenty-one (21) hydrants which are currently expected to have lower fire flow availability (less than 45 L/s). These hydrants are located along dead-end watermains or at the outer extents of the distribution system. All other nodes have expected fire flow availability in excess of 45 L/s.
Peak Hour	Good. Pressure Range: 276-548 kPa	These results are for the junctions and hydrants in the Winchester and Chesterville pressure zones only. Normal pumps are operating in this simulation. All nodes experience pressures above 275 kPa.

The following tables summarize the model results under existing conditions for the Winchester and Chesterville pressure zones based on the percentage of junctions in the model within each stated pressure range or available fire flow range. Model schematics for all scenarios are included in Attachment 2.

Average Day Demand

Table 6 presents the average day simulation results.

Table 6: Hydraulic Water Model Results - Average Day Demand

Pressure (kPa)		Existing
From	To	
	<=275	0.5%
>275	<=350	26.5%
>350	<=480	73.0%

>480	<=550	0.0%
>550	<=700	0.0%
>700		0.0%

Under average day demand, system pressures under existing conditions are found to be above the minimum recommended pressure of 275 kPa (40 psi), in accordance with the MECP Design Guidelines. Only two (2) hydrants do not achieve 275 kPa: hydrant H-194 along the transmission main from Well Field #7 (topographical high point), and hydrant H-174 near Well #6. No customers are connected to the water distribution system in the vicinity of these two hydrants.

Maximum Day Demand + Fire Flow

Table 7 presents the maximum day plus fire flow simulation results.

Table 7: Hydraulic Water Model Results – Maximum Day Demand + Fire Flow

Available Fire Flow (L/s)		Existing
From	To	
	<=30	2.3%
>30	<=45	7.3%
>45	<=75	41.7%
>75	<=100	22.0%
>100	<=150	20.2%
>150	<=250	6.0%
>250		0.5%

Under maximum day demand plus fire flow, available fire flows under existing conditions are generally found to be above 45 L/s, which is the minimum required fire flow per the Ontario Building Code (OBC) for a typical single family home. Hydrants which are expected to have less than 45 L/s of available fire flow are located along dead-end watermain or at the outer extents of the distribution system. All other hydrants have expected fire flow availability in excess of 45 L/s.

Peak Hour Demand

Table 8 presents the peak hour simulation results.

Table 8: Hydraulic Water Model Results – Peak Hour Demand

Pressure (kPa)		Existing
From	To	
	<=275	0.0%
>275	<=350	17.5%
>350	<=480	79.4%
>480	<=550	3.2%
>550	<=700	0.0%
>700		0.0%

Under peak hour demand, system pressures under existing conditions are found to be above the minimum recommended pressure of 275 kPa (40 psi), in accordance with the MECP Design Guidelines. One of the two hydrants which experienced low pressures in the average day demand simulation (H-194) is expected to experience pressures slightly above but close to 275 kPa, and no customers are connected to the water distribution system in the vicinity of this hydrant. The other of the two hydrants which experienced low pressures in the average day demand simulation (H-174) experiences an increase in pressure under the peak hour scenario because the nearby well pump is set to operate.

Recommendations and Conclusions

It is recommended that the Township update their water model periodically as new and better information becomes available over time regarding watermain rehabilitation or extensions and system operation. A pressure and flow monitoring field testing program in support of a model validation exercise would be beneficial in further refining the model's ability to accurately simulate real world conditions. Development of an extended period simulation (EPS) scenario within the model would also be beneficial in assessing water quality aspects of the distribution system.

Based on the model results, the existing water distribution system is operating in accordance with the pressure and flow recommendations of the current MECP Water Design Guidelines.

J.L. RICHARDS & ASSOCIATES LIMITED

Prepared by:



Annie Williams, P.Eng.
Civil Engineer

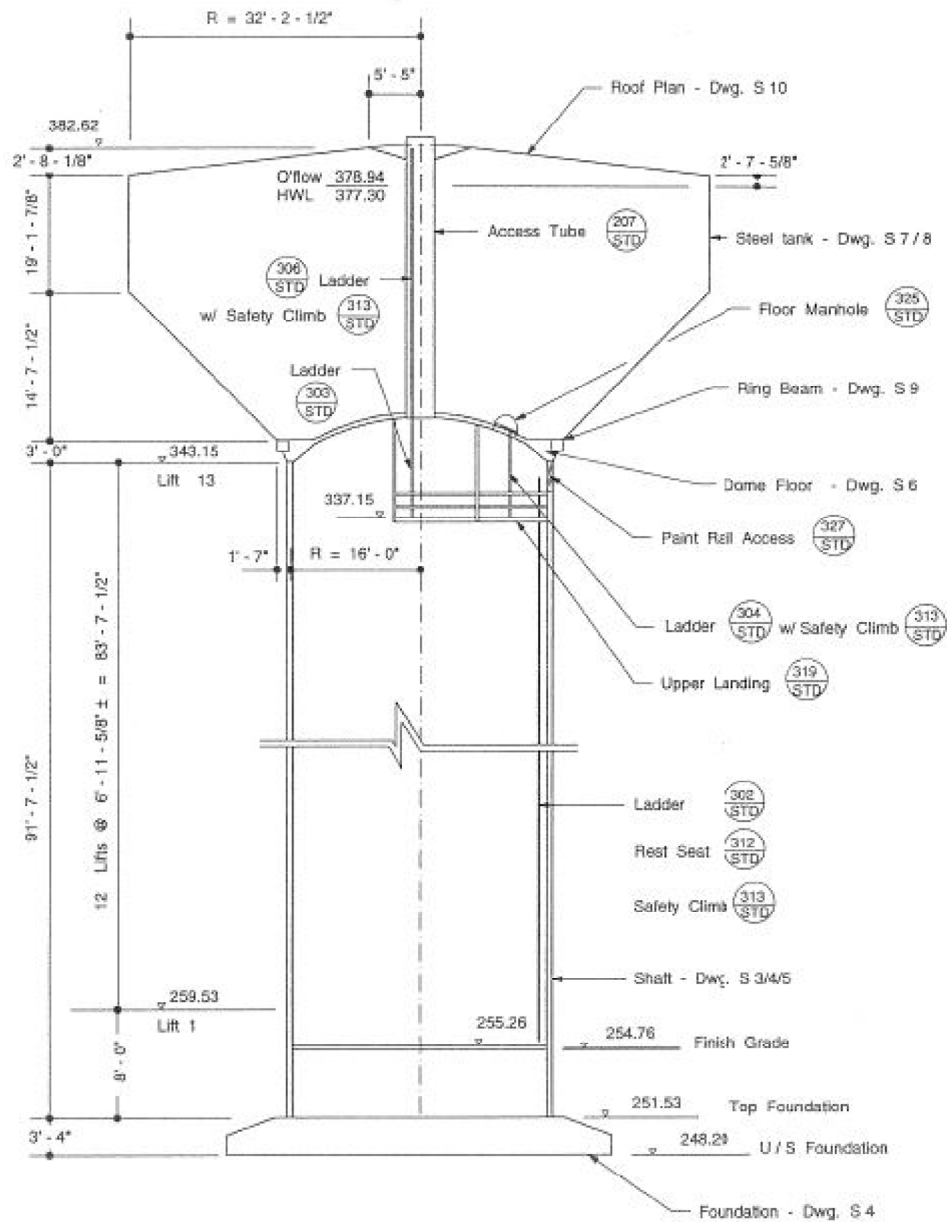
Reviewed by:



Mark Buchanan, P.Eng.
Senior Civil Engineer

AW/MB:aw

ATTACHMENT 1



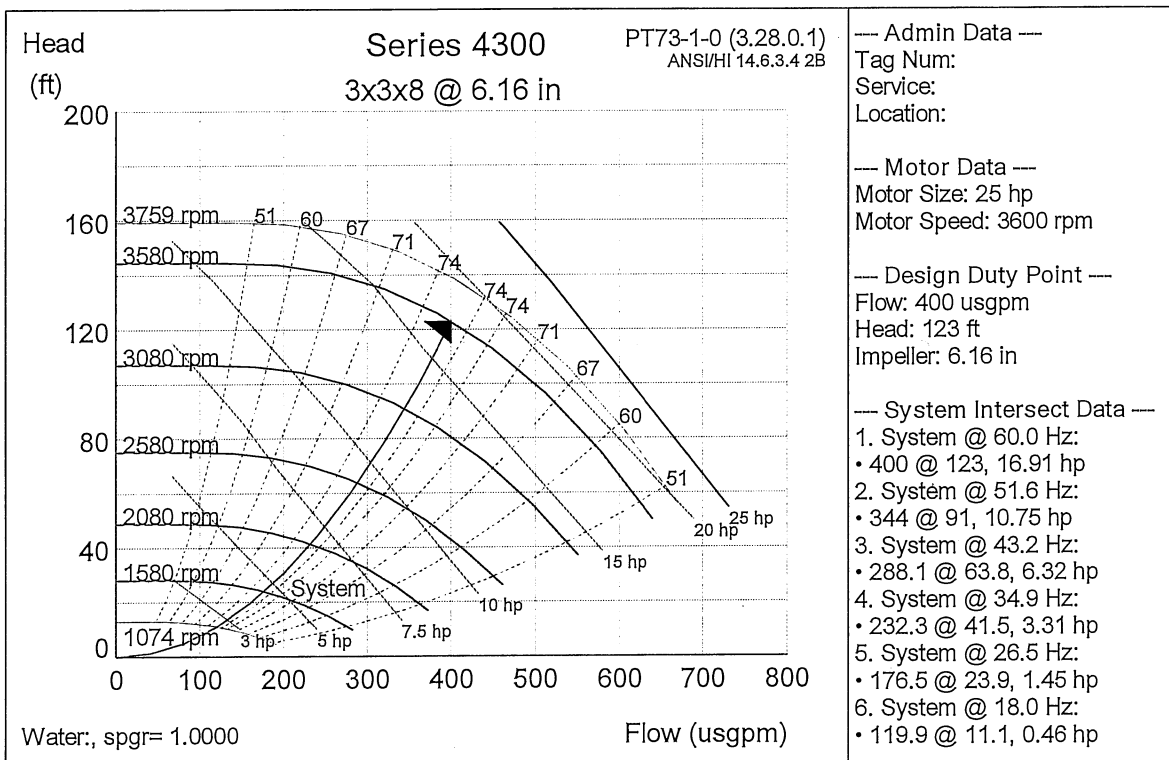
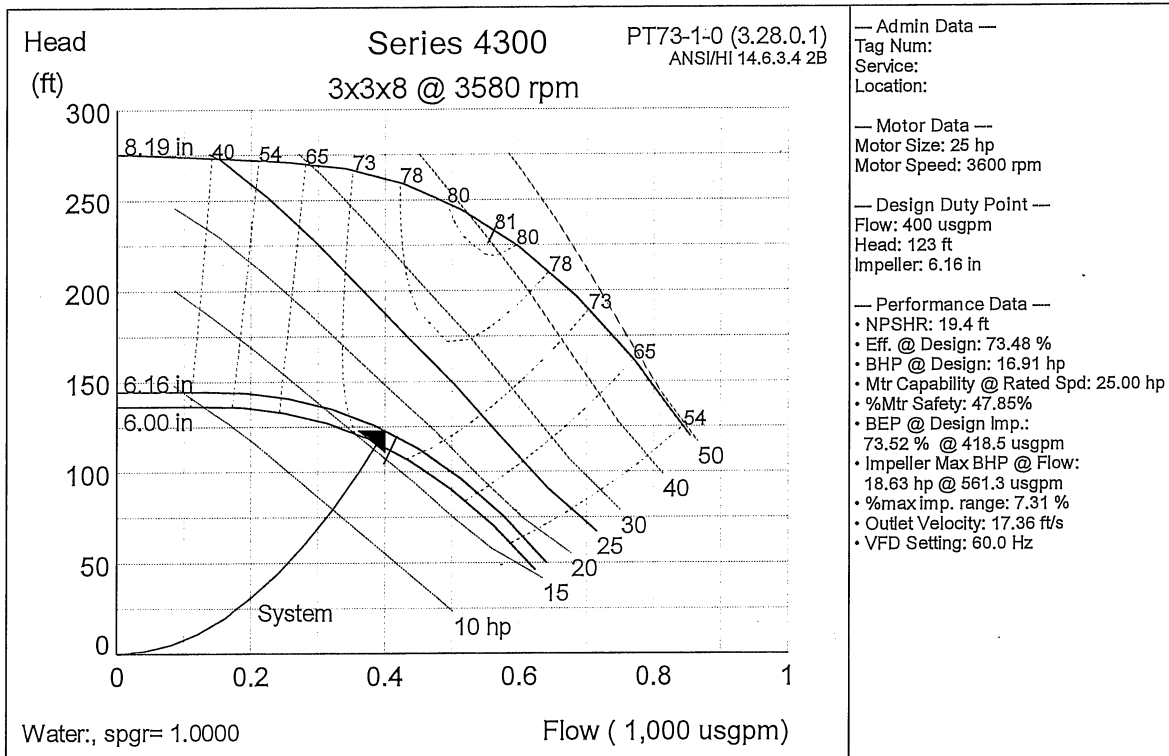
WINCHESTER ELEVATED TANK

6/6/96

DESIGN DATA

	2,300	c.m
Volume	506,000	Imp. gals
HWL (High Water Level)	377.30	ft
LWL (Low Water Level)	347.30	ft
Range	30.00	ft
HWL to Overflow	1.64	ft.
GL (Finished Grade Level)	254.76	ft
Service Load Soil Bearing Capacity	7,310	psf
Underside of Footing	248.20	ft
Footing Thickness	3.33	ft
Snow Load	33.4	psf
Wind	100	mph
Earthquake Zone	2	

Performance curve



**TOWNSHIP OF NORTH DUNDAS
APPLICATION FOR AN AMENDMENT TO CERTIFICATE OF APPROVAL (WATER)**

**Appendix B
Winchester Booster Pump Technical Info**

Customer Price Sheet

Project name / location : WINCHESTER BPS	Tag Number : 1634_00948_VIS_100201
Consulting engineer : Stantec Consulting, Jean Hebert	Service :
Customer :	Pump size : 50707 VL
Customer ref. / PO :	Quantity of pumps : 2
Quote number : 100204-087	Quoted By (Sales Office) : Grundfos Canada Inc.
Date last saved : 02/04/2010 13:27 PM	Quoted By (Sales Engineer) : Grant Stanley, VSC

Construction

Construction Code: 16N6 - 50707 - 14010X - XXXX	Flow: 54.50 l/s	Head: 70.00 psi.g	Impeller diameter: 6.83 in
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Totals

Grand Total	\$ 21,086.00	Lead Time Total	N/A
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Pump

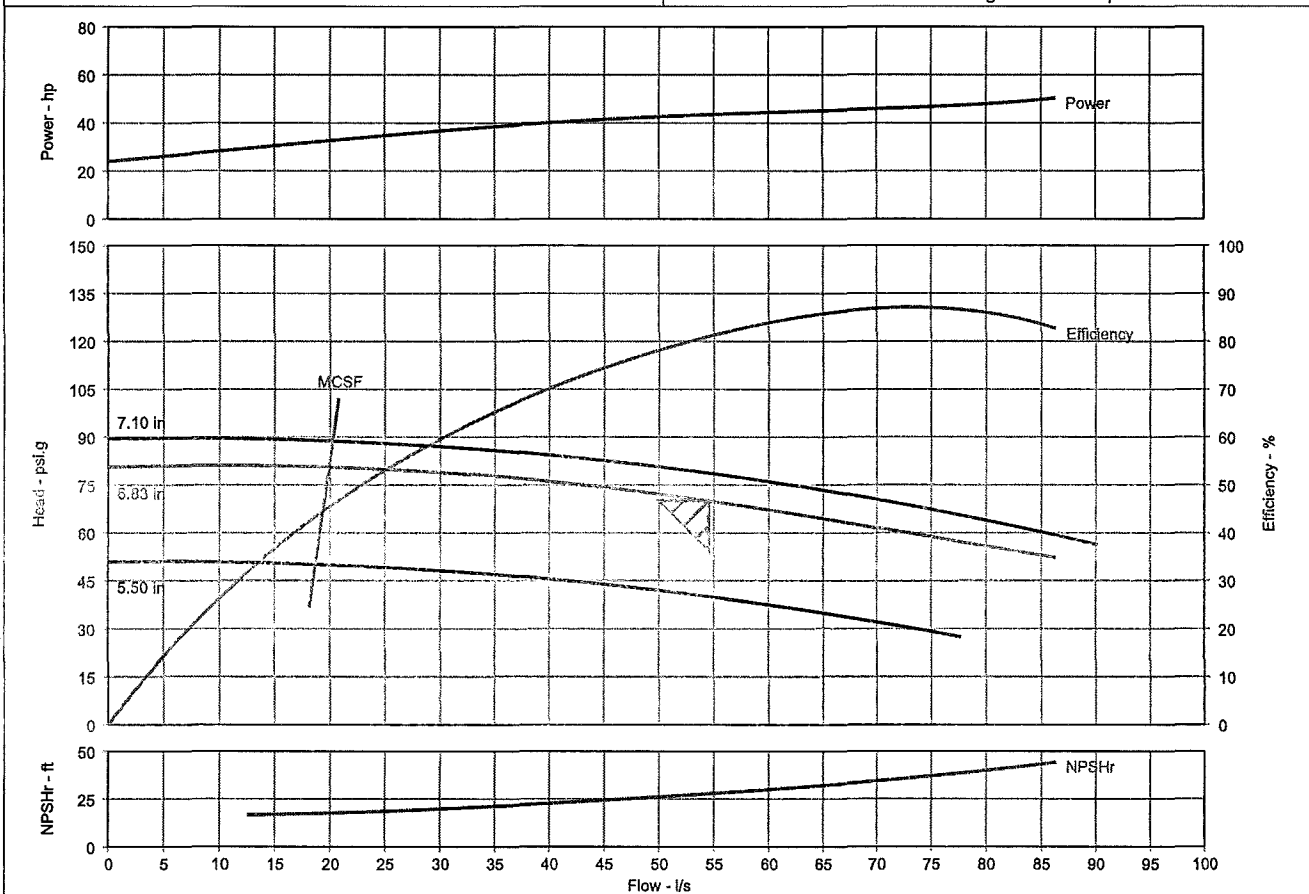
Qty	Description	Average Unit Price	Extended Price
2	5070-7 VL Scope of Supply: Complete Unit (Pump and Motor) Pump Rotation: Clockwise Pump Case material: Cast Iron, ASTM A48 - Class 30 Nozzle Configuration: 125# ANSI flange Impeller Material: Silicon Bronze, ASTM B584 C87600 Impeller Cap Screw and Washer: Stainless Steel, AISI-303 Impeller Key: Steel, Cold Drawn C1018 Hardware Material: Steel, Grade 5 Wear Ring Material: Ni-Aluminum -Bronze, ASTM-B148, C95400 Wear Ring Configuration: Single (Case) Wear Ring Shaft material: Steel, AISI-1040 Shaft sleeve material: Bronze, III932, C89835 Bearing Types: Rolling Element Bearing (Upper & Lower) Bearing Lubrication: Regreasable O Rings: Buna N Insert: Provided Seal Material (Elastomer/Rotating Element/Stationary Seat): Single Seal, Type 21S Buna/Carbon/Ceramic/SS-Spring&Hardware Recirculation Lines: Nylon Tubing with Brass Fittings Base: None Motor size: NA 60 HP, 575/3/60hz, 3600 RPM, TEFC, Premium, Baldor -Weight not included in GA Motor Manufacturer: Baldor Motor Enclosure: TEFC Motor efficiency: NEMA Premium Motor phase: Three Phase Motor Application: Suitable for Variable Speed Drive Motor bracket: Motor bracket provided Motor Bracket Material: Cast Iron, ASTM-A48, CL 30 Test level: No test CAD drawing: Leadtime: Custom leadtime/Contact factory for leadtime Estimated Weights: 210Lbs Coating: Standard Manufacturers Paint Certifications: NSF-61 Certified (drinking water)	\$ 10,543.00	\$ 21,086.00

Pump Performance Datasheet

Project name / location	: WINCHESTER BPS	Tag Number	: 1634_00948_VIS_100201
Consulting engineer	: Stantec Consulting, Jean Hebert	Service	:
Customer	:	Pump size	: 50707 VL
Customer ref. / PO	:	Quantity of pumps	: 2
Quote number	: 100204-087	Quoted By (Sales Office)	: Grundfos Canada Inc.
Date last saved	: 02/04/2010 10:27 AM	Quoted By (Sales Engineer)	: Grant Stanley, VSC

Operating Conditions		Liquid	
Flow, rated	: 54.50 l/s	Liquid type	: Water
Head, rated (requested)	: 70.00 psi.g	Additional liquid description	:
Head, rated (actual)	: 69.93 psi.g	Solids diameter, max	: 0.00 in
Suction pressure, rated / max	: 0.00 / 0.00 psi.g	Temperature, max	: 68.00 deg F
NPSH available, rated	: Ample	Fluid density, rated / max	: 0.998 / 0.998 SG
Frequency	: 60 Hz	Viscosity, rated	: 1.00 cP

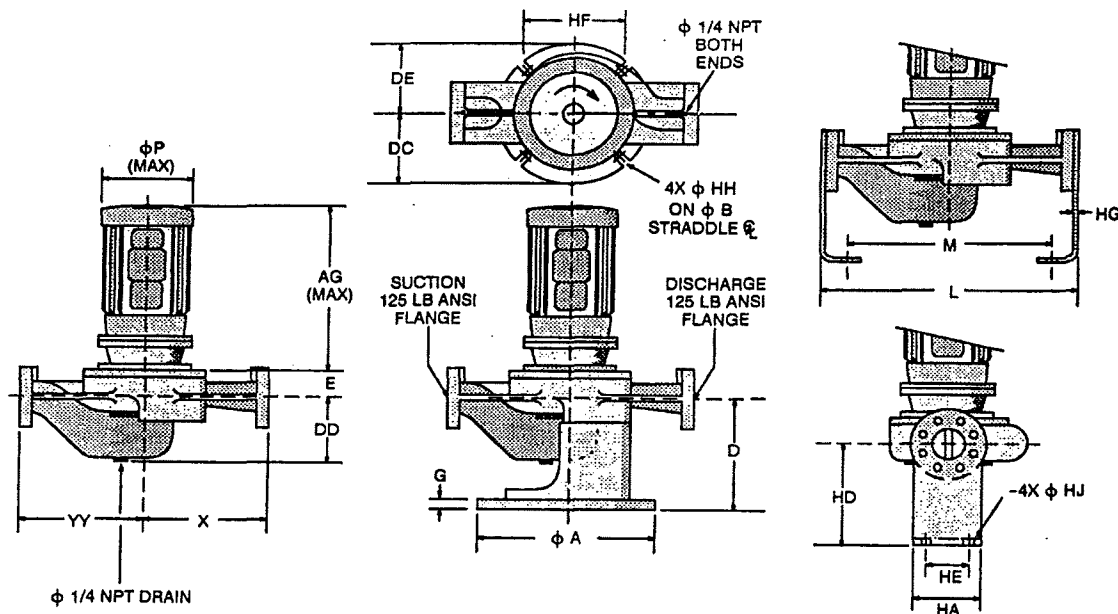
Performance		Material	
Pump speed, rated	: 3,500 rpm	Material requested	: Auto
Impeller diameter, rated	: 6.83 in	Material selected	: Cast iron
Impeller diameter, maximum	: 7.10 in	Pressure Data	
Impeller diameter, minimum	: 5.50 in	Maximum working pressure	: 81.08 psi.g
Efficiency	: 81.03 %	Maximum allowable working pressure	: 175.0 psi.g
NPSH required / margin required	: 27.82 / 0.00 ft	Maximum allowable suction pressure	: 175.0 psi.g
nq (imp. eye flow) / S (imp. eye flow)	: 53 / 155 Metric units	Hydrostatic test pressure	: 263.0 psi.g
MCSF	: 19.96 l/s	Driver & Power Data	
Head, maximum, rated diameter	: 81.08 psi.g	Driver sizing specification	: Rated power
Head rise to shutoff	: 15.22 %	Margin over specification	: 0.00 %
Flow, best eff. point (BEP)	: 72.94 l/s	Service factor	: 1.15
Flow ratio (rated / BEP)	: 74.72 %	Power, hydraulic	: 35.22 hp
Diameter ratio (rated / max)	: 96.20 %	Power, rated	: 43.47 hp
Head ratio (rated dia / max dia)	: 88.93 %	Power, maximum, rated diameter	: 50.32 hp
Cq/Ch/Ce [ANSI/HI 9.6.7-2004]	: 1.00 / 1.00 / 1.00	Minimum recommended motor rating	: 60.00 hp / 44.74 kW
Selection status	: Acceptable		



Construction Datasheet

Project name / location : WINCHESTER BPS				Tag Number : 1634_00948_VIS_100201	
Consulting engineer : Stantec Consulting, Jean Hebert				Service : -	
Customer :				Model : 50707 VL	
Customer ref. / PO :				Quantity : 2	
Quote number : 100204-087				Quoted By (Sales Office) : Grundfos Canada Inc.	
Date last saved : 02/04/2010 10:27 AM				Quoted By (Sales Engineer) : Grant Stanley, VSC	
Construction				Motor Information	
Nozzle	Size (In.)	Nozzle Configuration	Pos'n	Manufacturer	: Baldor
Suction	5	125# ANSI	Side	Frame Size	: 326JM
Discharge	5	125# ANSI	Side	Power	: 60.00 hp
Orientation / Configuration : Vertical				RPM	: 3600
Rotation : Clockwise				Enclosure	: TEFC
Wear Ring Configuration : Single - Case				Operating Power Supply	: 575/3/60hz
Discharge Elbow Size : -				Efficiency	: Premium
Subplate : -				Service factor	: -
Sump Depth (feet) : -				Motor Application	: Suitable for Variable Speed Drive
Bearing Frame : -				Motor Options/Accessories	: -
Bearing Frame Foot : -				Cord Length (feet)	: -
Bearing Type (Radial/Thrust) : In motor				Materials	
Bearing Lubrication : Regreasable				Case	: Cast Iron, ASTM A48 - Class 30
Thrust Bearing : -				Motor Bracket	: Cast Iron, ASTM-A48, CL 30
Intermediate Bearing : -				Impeller	: Silicon Bronze, ASTM B584 C87600
Lower Bearing : -				Impeller Cap Screw and Washer	: Stainless Steel, AISI-303
Bearing Housing Accessories : -				Impeller Key	: Steel, Cold Drawn C1018
Construction code : 16N6 - 50707 - 14010X - XXXX				Case wear ring	: Ni-Aluminum -Bronze, ASTM-B148, C95400
Baseplate, Coupling and Guard				Impeller wear ring	: -
Baseplate : Not Applicable				Pump Shaft	: Steel, AISI-1040
Drip Pan : -				Sleeve	: Bronze, III932, C89835
Coupling : -				Line Shaft	: -
Guard : OSHA Approved				Column	: -
Seal & Packing Construction				Discharge Pipe	: -
Sealing Method : Single Seal, Type 21S				Discharge Elbow	: -
Seal Material : Buna/Carb/Cer./SS-Spring&Hardw.				Suction Elbow	: -
Packing Gland : -				Subplate	: -
Lantern Ring : -				Hardware	: Steel, Grade 5
Recirculation Lines : Nylon Tubing with Brass Fittings				O Rings	: Buna N
Weights (Approx.)				Pump Coatings	: Standard Manufacturers Paint
Pump : 210					
Baseplate : -					
Driver : 0					
Estimated Shipping gross weight : 210					

IN-LINE WITH SUPPORT STAND & WITH FLANGE SUPPORTS — MODELS 4070-7 THRU 5095-9



PUMP DIMENSIONS

Pump Model	Suct. Disch.	A	B	D	E	G	L	M	DC (1)	DD (1)	DE (1)
4070-7	4	12	11	8-11/16	2	3/4	21	16	5-1/8	6-11/16	7-3/8
4095-7	4	16	13-1/2	8-3/4	2-1/8		25-1/2	20-1/2	6-5/8	6-3/4	8-7/8
4012-1, -7	4	16	13-1/2	8-3/4	2		27	20	7-3/4	6-3/4	9-3/4
5070-7	5	12	11	10-1/8	2-1/8		24	19	6-1/8	7-3/4	8-5/8
5095-7, -9	5	16	13-1/2	9-3/4	2-1/4		27	22	7-1/8	7-1/8	9-1/2

(cont.)

Pump Model	HA	HD	HE	HF	HG	HH (2)	HJ	X	YY
4070-7	6	8	4	7-13/16	1/2	3/4	3/4	10	10
4095-5	6	8	4	9-9/16	1/2		3/4	12	12-1/2
4012-1, -7	6	8	4	9-9/16	1/2		3/4	13	13
5070-7	7	10	5	7-13/16	1/2		7/8	11-1/2	11-1/2
5095-7, -9	7	10	5	9-9/16	1/2		7/8	13	13

MOTOR DIMENSIONS

	X3 CONST.				X4/XA CONST.				X5 CONST.	
	143TC/ 145JM	182TC/ 184JM	213TC/ 215JM	254 TC/JM	213TC/ 215JM	254TC/ 256JM	284TC/ 286JM	324TC/ 326JM	364TC/ JM	326TC 365TC
P(max)	8	10	12	14	12	14	15	17	19	19
AG(max) (3)	18	20	22	24	22	24	26	30	31	30

SINGLE PHASE MOTORS

	X3 CONST.				
	143JM	145JM	182JM	184JM	213JM
P(max)	8	8	10	10	12
AG(max)	15	15	17	17	22

(1) Dimensions of cast surfaces vary $\pm 1/4$.

(2) 'HH' Dimension is slot, except 6095, 6012, & 8012 are holes.

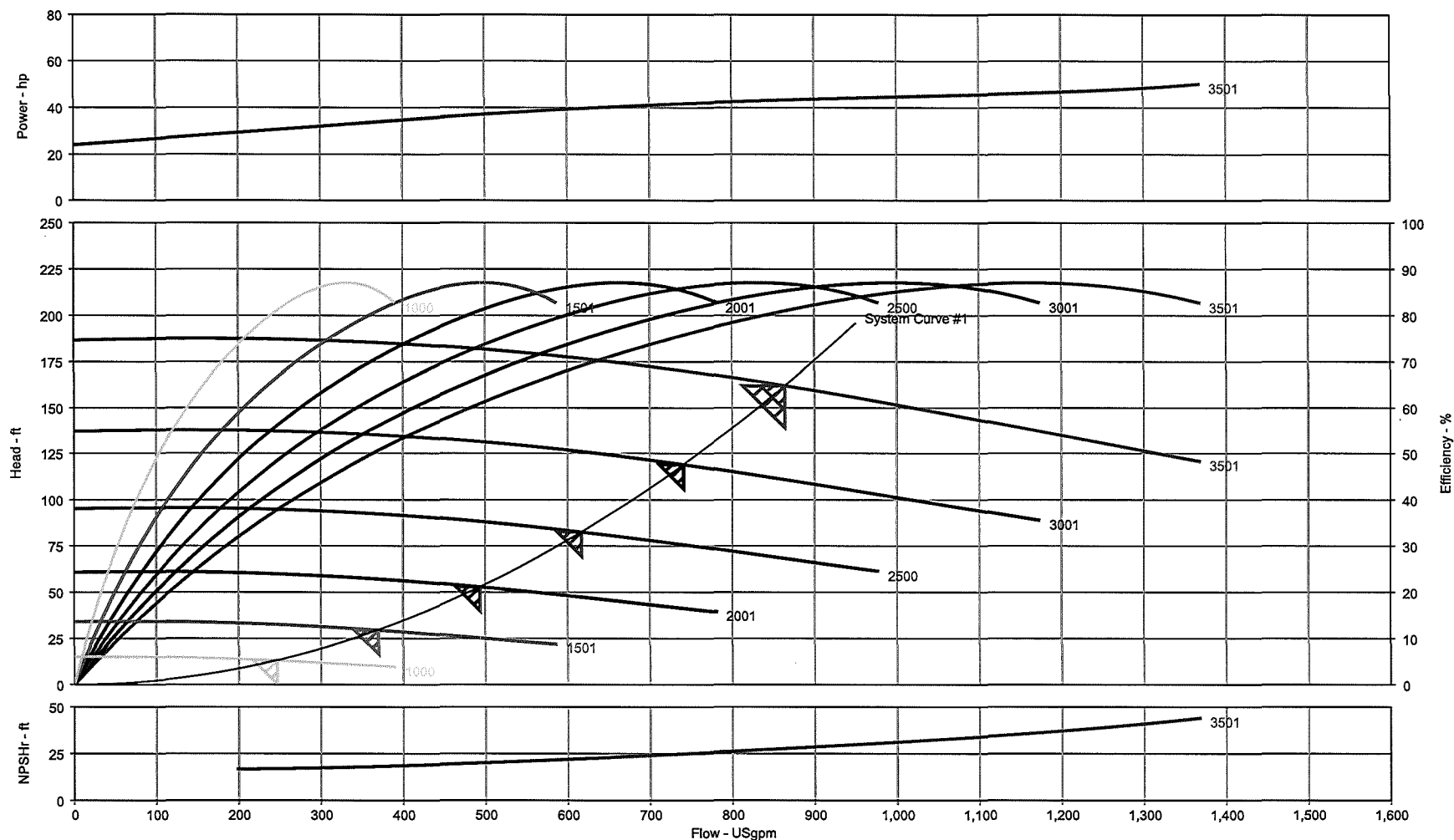
(3) If head space requirement is critical, contact Factory.

In the interest of Product Improvement, dimensions are subject to change without notice.

ALL DIMENSIONS ARE IN INCHES.

Customer _____	P.O. No. _____	Job No. _____
Project _____	Item No. _____	Certified By _____ Date _____
HP _____, RPM _____, HZ _____, V _____, ENCL _____, FR _____, Total Wgt. _____		

Multi-Speed Performance Curve



Project name / location : Winchester BPS/Eastern Ontario	Tag Number :	Pump speed, rated : 3,500 rpm
Consulting engineer :	Service :	Flow, rated : 864.0 USgpm
Customer :	Pump size : 50707 VL	Head, rated : 162.0 ft
Customer ref. / PO :	Quantity of pumps : 2	Fluid density, rated / max : 0.998 / 0.998 SG
Quote number : 100204-087A	Quoted By (Sales Office) : Grundfos Canada Inc.	Viscosity : 1.00 cP
Date last saved : 03/19/2010	Quoted By (Sales Engineer) :	Cq/Ch/Ce [ANSI/HI 9.6.7-2004] : 1.00 / 1.00 / 1.00
:	Stages : 1	Based on curve number : RC2547 Rev 0

**TOWNSHIP OF NORTH DUNDAS
APPLICATION FOR AN AMENDMENT TO CERTIFICATE OF APPROVAL (WATER)**

**Appendix C
Winchester Well #1 Pump Curve**

Performance Curves

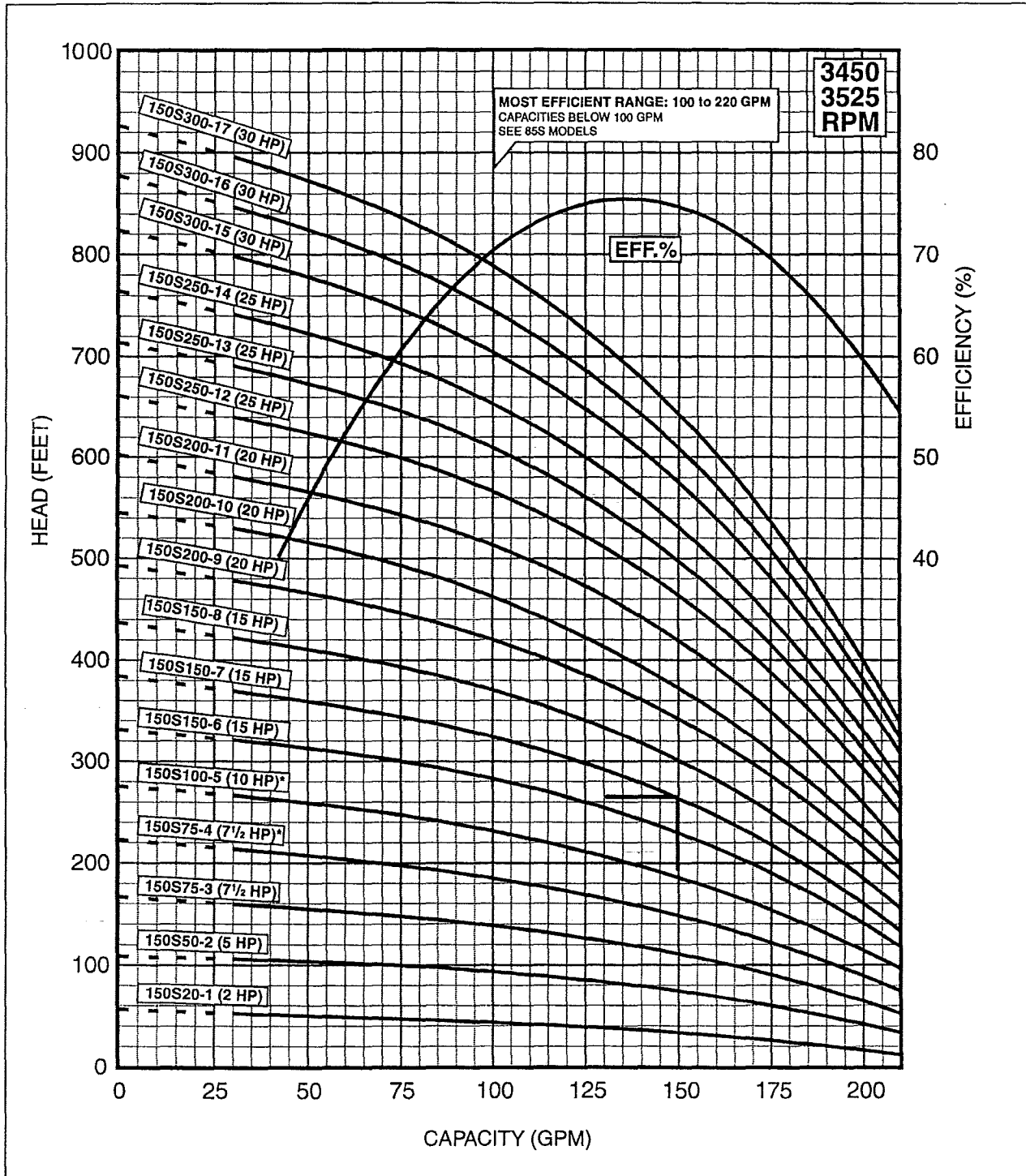
150 GPM

Model 150S

FLOW RANGE: 30 -220 GPM

OUTLET SIZE: 3" NPT

NOMINAL DIA. 6"



SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE.

4" MOTOR STANDARD, 2-10 HP/3450 RPM

6" MOTOR STANDARD, 7.5-60 HP/3450 RPM.

8" MOTOR STANDARD, 75 HP/3525 RPM.

* Alternate motor sizes available.

Performance conforms to ISO 9906 Annex A
@ 5 ft. min. submergence.

**TOWNSHIP OF NORTH DUNDAS
APPLICATION FOR AN AMENDMENT TO CERTIFICATE OF APPROVAL (WATER)**

**Appendix D
Chesterville Well #6 Pump Curve**

Lump #6

PERFORMANCE CURVES

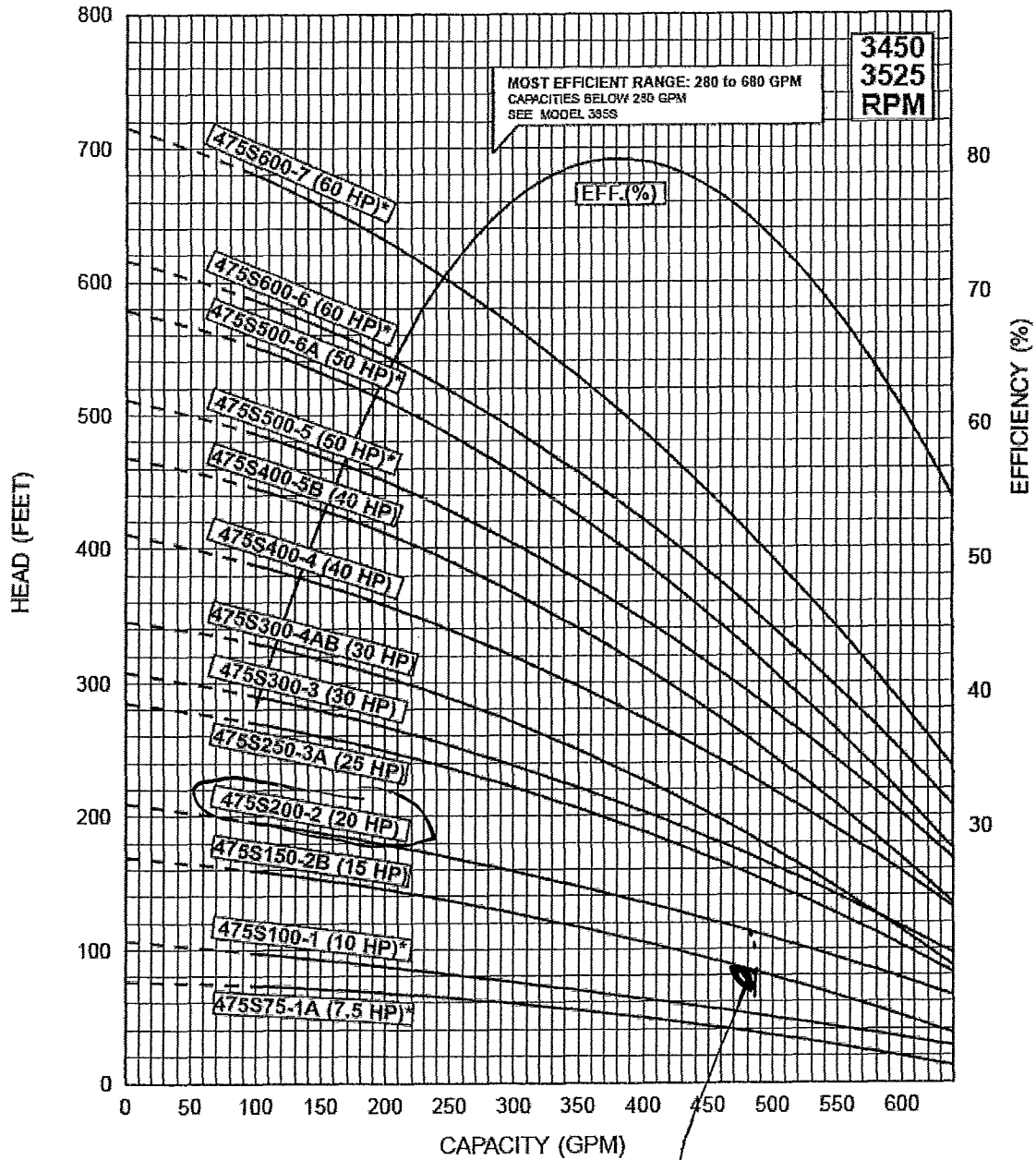
475 GPM

MODEL 475S

FLOW RANGE: 95 - 680 GPM

OUTLET SIZE: 6" NPT

NOMINAL DIA. 8"



SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE.
6" MOTOR STANDARD, 10-60 HP/3450 RPM.
8" MOTOR STANDARD, 75-125 HP/3525 RPM.
* Alternate motor sizes available.

Performance conforms to ISO 9906 Annex A
@ 8 ft. min. submergence.

Actual Operating
Point (VFD)

PERFORMANCE CURVES

385 GPM

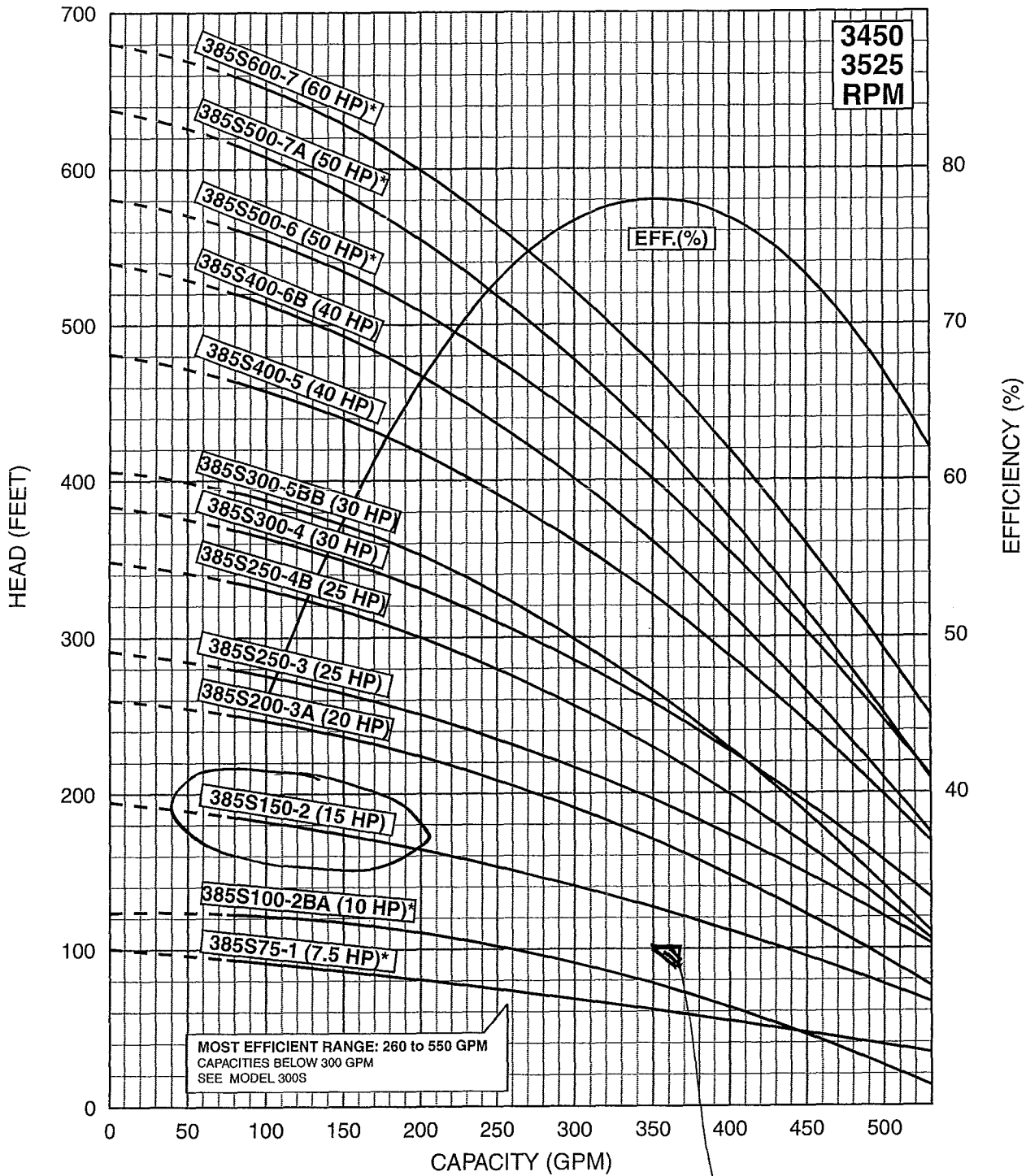
Pump #5

MODEL 385S

FLOW RANGE: 75 - 550 GPM

OUTLET SIZE: 4" NPT

NOMINAL DIA. 8"



SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE.

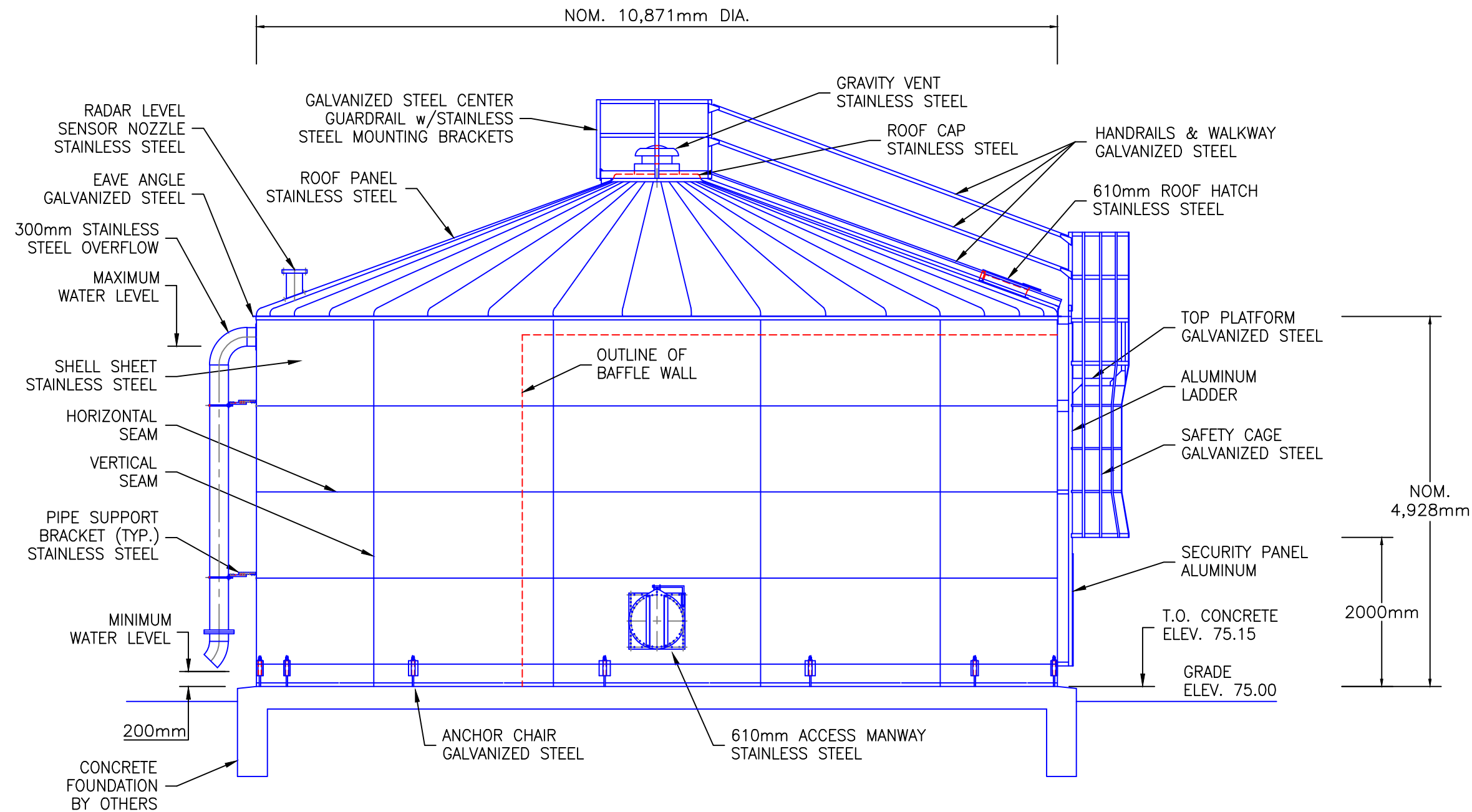
6" MOTOR STANDARD, 7.5-60 HP/3450 RPM.

8" MOTOR STANDARD, 75-100 HP/3525 RPM.

* Alternate motor sizes available.

Performance conforms to ISO 9906 Annex A
@ 8 ft. min. submergence.

*Actual operating
Point (VFD to
reduce speed)*



ELEVATION

1	21-OCT-13	AS-BUILT
ISSUE	DATE	REMARK



Alstor International Inc.

13516 Byers Road
Chesterville, ON.
Canada, K0C 1H0
Ph: (613) 448-2277

ALSTOR MODEL 3616
BOLTED STAINLESS STEEL
POTABLE WATER STORAGE TANK

PROJECT NAME	
TOWNSHIP OF NORTH DUNDAS WINCHESTER ONTARIO, CANADA	
DATE	OCTOBER 7, 2010
DRAWN BY	J.C.S.
SCALE	N.T.S.
CHECKED	APP'D.
PROJECT	10010
DWG No.	10010-01

INTERNATIONAL WATER SUPPLY LTD.

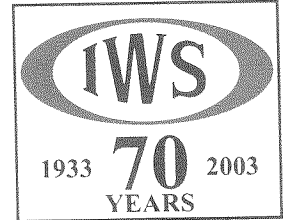
Ground Water Development - Drilling Services
Pumps - Water Treatment - Service & Maintenance
BARRIE ST. URSULE, PQ SASKATOON
342 Bavview Dr., Post Office Box 310
Barrie, Ontario, Canada L4M 4T5

Tel. 705-733-0111 • 800-461-9636 • Fax 705-721-0138
email iws@iws.ca

October 6, 2003

Ontario Clean Water Agency
Chesterville Hub
5 Industrial Drive
Chesterville, Ontario
K0C 1H0

CC: A. Harris



Attention: Dave Markell

Reference: **Township of North Dundas**
Winchester Water Well No. 1

Enclosed we submit our Invoices No. 030930 for supply and installation of new Grundfos 150S150-6 pump, complete with 15 hp Franklin Electric motor, power cable and drop pipe, and No. 030931 for supply of Franklin Subtrol-Plus and replacement Start Control.

Also, enclosed for your records is Pump and Motor Installation, Operation and Maintenance manual complete with copy of our Installer's Report.

If you have any questions, please do not hesitate to call.

Regards,

A handwritten signature in dark ink, appearing to read "John A. Harris".

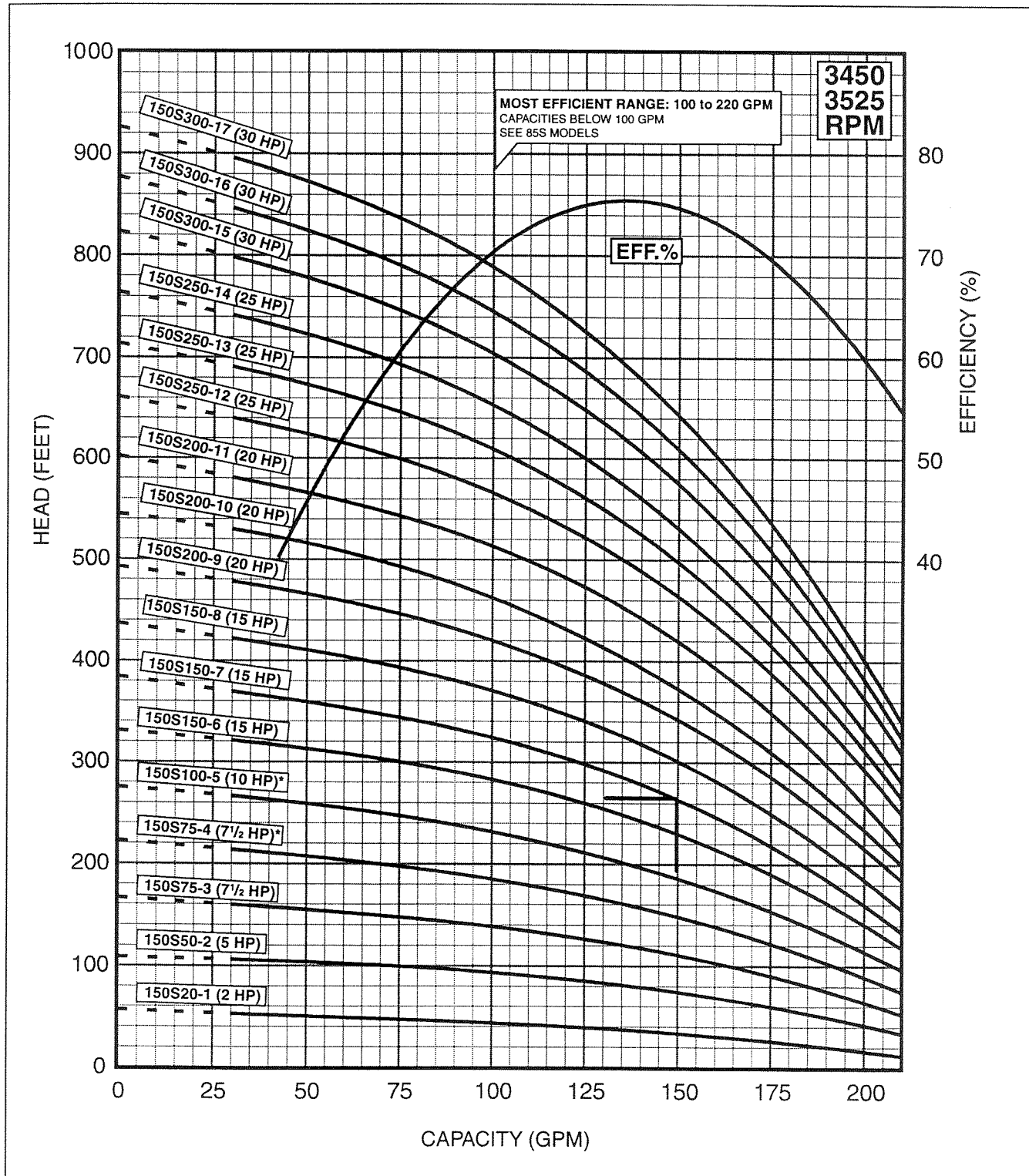
John A. Harris, P. Eng.
JAH/lw

Performance Curves**150 GPM****Model 150S**

FLOW RANGE: 30 -220 GPM

OUTLET SIZE: 3" NPT

NOMINAL DIA. 6"



SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE.

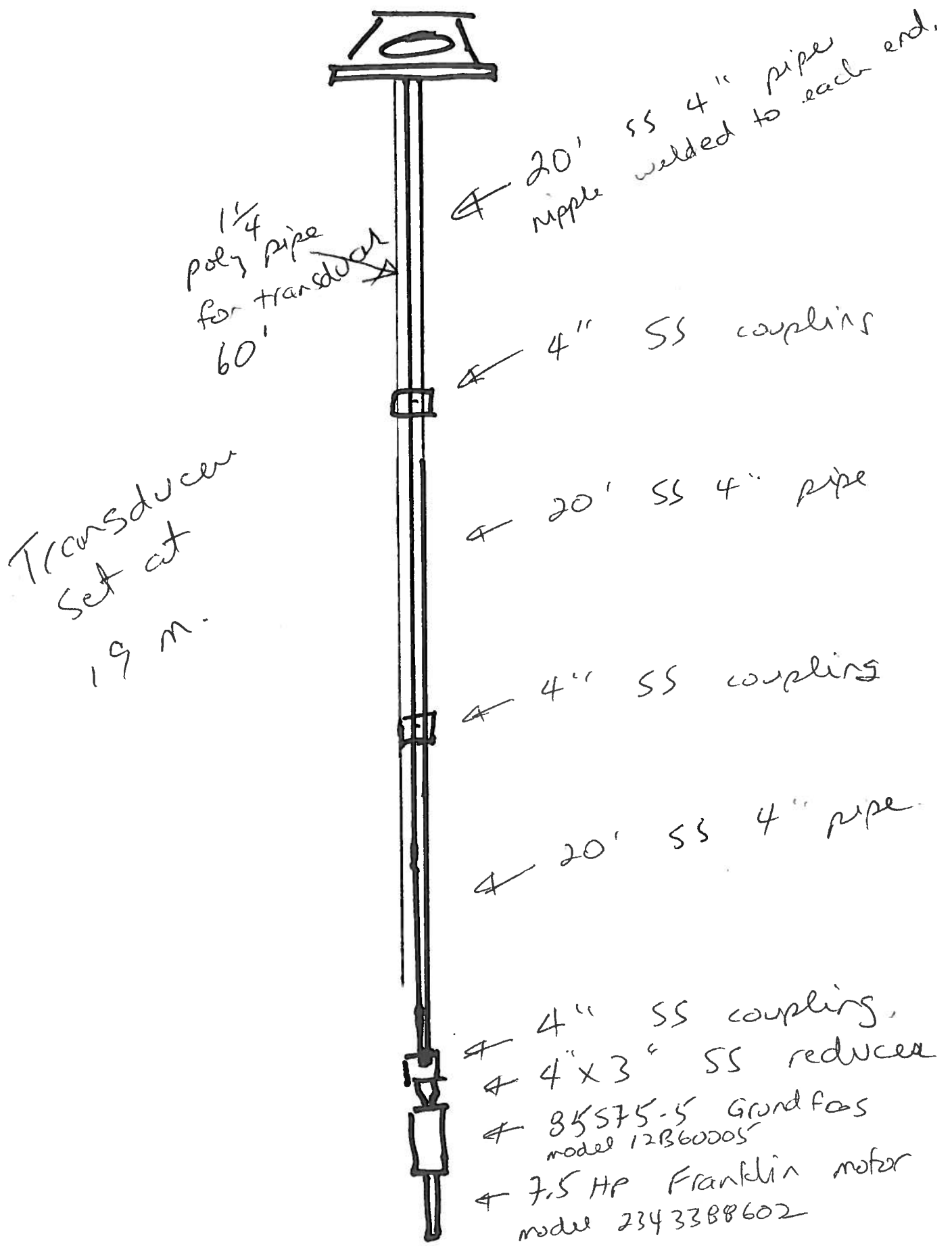
4" MOTOR STANDARD, 2-10 HP/3450 RPM

6" MOTOR STANDARD, 7.5-60 HP/3450 RPM.

8" MOTOR STANDARD, 75 HP/3525 RPM.

* Alternate motor sizes available.

Performance conforms to ISO 9906 Annex A
@ 5 ft. min. submergence.



old pump base



Approx 12"



4" internal thread

SS coupling

this had to be removed
transducer can still be changed



PERFORMANCE CURVES

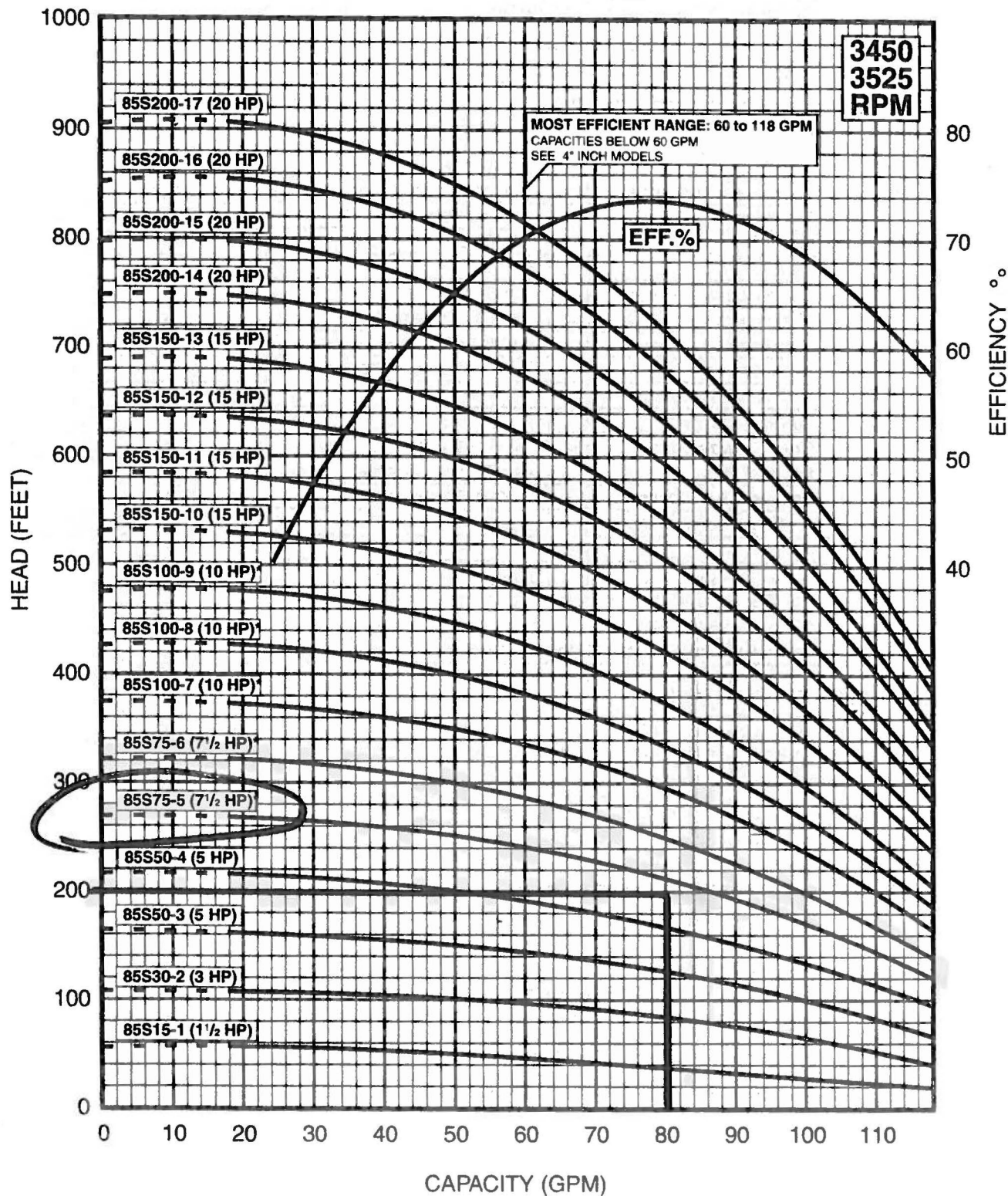
85 GPM

MODEL 85S

FLOW RANGE: 18 -118 GPM

OUTLET SIZE: 3" NPT

NOMINAL DIA. 6"



SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE.

4" MOTOR STANDARD, 1.5-5 HP/3450 RPM

6" MOTOR STANDARD, 7.5-50 HP/3450 RPM.

* Alternate motor sizes available.

Performance conforms to ISO 9906 Annex A
@ 5 ft. min. submergence.

DIMENSIONS AND WEIGHTS

MODEL NO.	FIG.	HP	MOTOR SIZE	DISCH. SIZE	DIMENSIONS IN INCHES					APPROX. SHIP WT.
					A	B	C	D	E	
85S15-1	A	1 1/2	4"	3" NPT	25.9	13.6	12.3	3.75	5.2	37
85S30-2	A	3	4"	3" NPT	35.3	20.6	14.7	3.75	5.2	61
85S50-3	A	5	4"	3" NPT	40.7	23.6	17.1	3.75	5.2	75
85S75-4	A	7 1/2	4"	3" NPT	43.1	23.6	18.8	3.75	5.2	77
85S75-5	A	7 1/2	4"	3" NPT	51.5	29.6	21.9	3.75	5.2	95
85S75-6	A	7 1/2	4"	3" NPT	52.9	29.6	24.8	3.75	5.2	97
85S100-7	A	10	4"	3" NPT	70.5	43.9	26.6	3.75	5.2	151
85S100-8	A	10	4"	3" NPT	72.9	43.9	29.0	3.75	5.2	154
85S100-9	A	10	4"	3" NPT	75.2	43.9	31.4	3.75	5.2	156
85S150-10	A	15	6"	3" NPT	62.4	28.0	34.4	5.38	5.6	170
85S150-11	A	15	6"	3" NPT	64.8	28.0	36.8	5.38	5.6	174
85S150-12	A	15	6"	3" NPT	67.2	28.0	39.2	5.38	5.6	176
85S150-13	A	15	6"	3" NPT	69.6	28.0	41.6	5.38	5.6	178
85S200-14	A	20	6"	3" NPT	74.5	30.6	43.9	5.38	5.6	193
85S200-15	A	20	6"	3" NPT	76.9	30.6	46.3	5.38	5.6	198
85S200-16	A	20	6"	3" NPT	79.3	30.6	48.7	5.38	5.6	200
85S200-17	A	20	6"	3" NPT	81.7	30.6	51.1	5.38	5.6	202
85S200-18	A	20	6"	3" NPT	84.1	30.6	53.5	5.38	5.6	204
85S250-19	A	25	6"	3" NPT	88.9	33.1	55.8	5.38	5.6	240
85S250-20	A	25	6"	3" NPT	91.9	33.1	58.8	5.38	5.6	244
85S250-21	A	25	6"	3" NPT	94.3	33.1	61.2	5.38	5.6	246
85S250-22	A	25	6"	3" NPT	96.7	33.1	63.6	5.38	5.6	249
85S300-23	A	30	6"	3" NPT	101.9	35.7	66.2	5.38	5.6	264
85S300-24	A	30	6"	3" NPT	104.1	35.7	68.4	5.38	5.6	266
85S300-25	A	30	6"	3" NPT	106.4	35.7	70.7	5.38	5.6	271
85S300-26	A	30	6"	3" NPT	108.8	35.7	73.1	5.38	5.6	273
85S300-27	A	30	6"	3" NPT	116.3	40.8	75.5	5.38	5.6	278
85S400-28	A	40	6"	3" NPT	118.7	40.8	77.9	5.38	5.6	281
85S400-29	A	40	6"	3" NPT	121.1	40.8	80.3	5.38	5.6	283
85S400-30	A	40	6"	3" NPT	123.4	40.8	82.6	5.38	5.6	287
85S400-33*	B	40	6"	3" NPT	139.7	40.8	98.9	5.38	6.9	343
85S400-36*	B	40	6"	3" NPT	146.9	40.8	106.1	5.38	6.9	354
85S500-39*	B	50	6"	3" NPT	171.0	57.8	113.2	5.38	6.9	448
85S400-33*	B	40	8"	3" NPT	134.7	35.8	98.9	7.5	6.9	377
85S400-36*	B	40	8"	3" NPT	141.9	35.8	106.1	7.5	6.9	390
85S500-39*	B	50	8"	3" NPT	152.0	38.8	113.2	7.5	6.9	498

NOTES: All models suitable for use in 6" wells, unless otherwise noted.

Weights include pump end with motor in lbs.

* Built into sleeve 3" NPT discharge, 8" min. well dia.



Fig. A

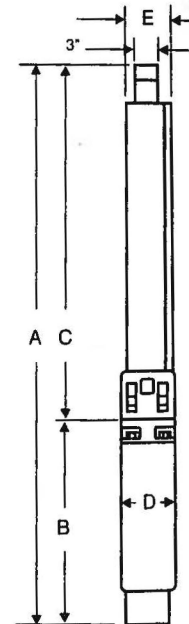


Fig. B

$\pm$ 200' total head.

Pump 35575-5 7.5 hp.

4" motor

3" NPT

51' ~~41'~~ overall length

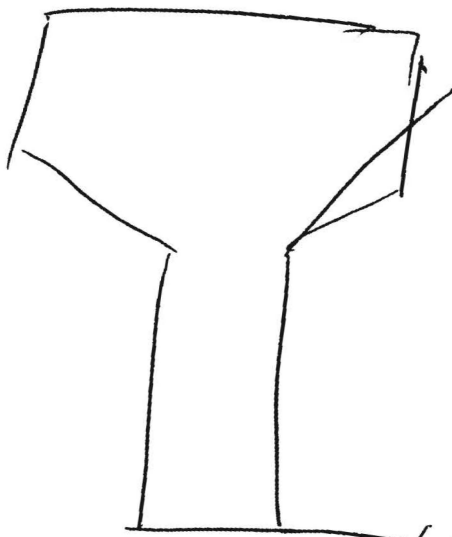
75' cable

600 V.

Check valve

Rideau Pipe 267-5880

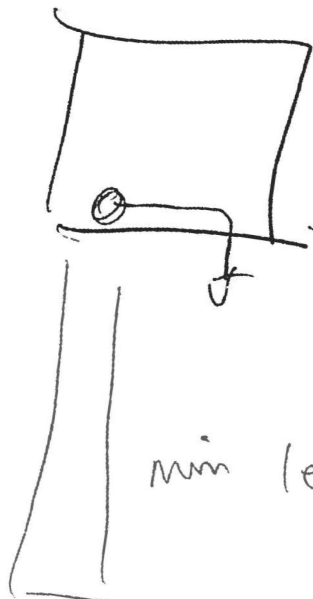
w/w #5



overflow 378.9

Grade 254.76

186 ft head
(+) line loss
(30' of 4") + (15' of 3")



243 Top of well casing.

min level 20% of 20m = 16m4 - 50'

$$PTTW = 6.4 \text{ L/sec.}$$

136' total Lift

$$80' \text{ of } 4'' = 1 \text{ ft.}$$

@ $5 \frac{1}{2}$ /sec

$$20' \text{ of } 3'' = 2 \text{ ft.}$$

@ $5 \frac{1}{2}$ /sec.

overall

190 ft head.

$$5 \frac{1}{2} \text{ /sec} = 80 \text{ gpm (as)}$$

Nominal Pipe Size: 3"

- Inside Diameter: 0.078 m (3.1 inches)

Flow			Velocity		Pressure Drop			
(m ³ /s)	(liter/s)	(US gpm)	(m/s)	(ft/s)	(Pa/100m)	(mmH ₂ O/100m)	(psi/100ft)	(ftH ₂ O/100ft)
0.0012	1.2	19.0	0.25	0.82	1170	119	0.052	0.119
0.0013	1.3	21	0.27	0.89	1326	135	0.059	0.135
0.0014	1.4	22	0.29	0.96	1538	157	0.068	0.157
0.0015	1.5	24	0.31	1.03	1766	180	0.078	0.18
0.0016	1.6	25	0.33	1.1	1937	198	0.086	0.198
0.0017	1.7	27	0.36	1.17	2187	223	0.097	0.22
0.0018	1.8	29	0.38	1.24	2452	250	0.108	0.25
0.0019	1.9	30	0.4	1.3	2631	268	0.116	0.27
0.0020	2.0	32	0.42	1.37	2915	297	0.129	0.3
0.0030	3.0	48	0.63	2.1	6054	617	0.27	0.62
0.0040	4.0	63	0.84	2.7	10314	1052	0.46	1.05
0.0050	5.0	79	1.05	3.4	16116	1643	0.71	1.64
0.0060	6.0	95	1.26	4.1	22197	2263	0.98	2.3
0.0070	7.0	111	1.46	4.8	30213	3081	1.34	3.1
0.0080	8.0	127	1.67	5.5	39462	4024	1.74	4.0
0.0090	9.0	143	1.88	6.2	47674	4861	2.1	4.9
0.01	10.0	159	2.1	6.9	58857	6002	2.6	6.0
0.011	11.0	174	2.3	7.6	71217	7262	3.1	7.3

Nominal Pipe Size: 4"

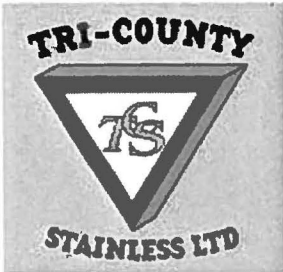
- Inside Diameter: 0.102 m (4.0 inches)

Flow			Velocity		Pressure Drop			
(m ³ /s)	(liter/s)	(US gpm)	(m/s)	(ft/s)	(Pa/100m)	(mmH ₂ O/100m)	(psi/100ft)	(ftH ₂ O/100ft)
0.0030	3.0	48	0.37	1.2	1649	168	0.073	0.168
0.0040	4.0	63	0.49	1.61	2814	287	0.124	0.29
0.0050	5.0	79	0.61	2.0	4214	430	0.186	0.43
0.0060	6.0	95	0.73	2.4	5805	592	0.26	0.59
0.0070	7.0	111	0.86	2.8	7901	806	0.35	0.81
0.0080	8.0	127	0.98	3.2	10319	1052	0.46	1.05
0.0090	9.0	143	1.1	3.6	12467	1271	0.55	1.27
0.01	10.0	159	1.22	4.0	15391	1569	0.68	1.57
0.011	11.0	174	1.35	4.4	18623	1899	0.82	1.9
0.012	12.0	190	1.47	4.8	22163	2260	0.98	2.3
0.013	13.0	206	1.59	5.2	24772	2526	1.09	2.5
0.014	14.0	222	1.71	5.6	28730	2930	1.27	2.9
0.015	15.0	238	1.84	6.0	32981	3363	1.46	3.4
0.016	16.0	254	1.96	6.4	37525	3826	1.66	3.8
0.017	17.0	269	2.1	6.8	42362	4320	1.87	4.3
0.018	18.0	285	2.2	7.2	47493	4843	2.1	4.8
0.019	19.0	301	2.3	7.6	52916	5396	2.3	5.4
0.02	20	317	2.4	8.0	58633	5979	2.6	6.0
0.03	30	476	3.7	12.0	125328	12780	5.5	12.8

Dave Markell

Well #5

From: Eric Dubuc [eric@tricountystainless.ca]
Sent: Wednesday, December 03, 2014 10:08 AM
To: Dave Markell
Subject: RE: OCWA Drop Pipe Quote



Éric Dubuc
eric@tricountystainless.ca
Tel : (613) 537-8515
Cell : (450) 802-1496
2 railway street ingleside ont k0c1m0

De : Dave Markell [mailto:DMarkell@ocwa.com]
Envoyé : Wednesday, December 03, 2014 9:45 AM
À : eric@tricountystainless.ca
Objet : OCWA Drop Pipe Quote

Could you provide a price for the following;

3 pcs 4" sched 40 SS pipe with threaded ends (cut or welded on) 1950.00\$
5 pcs 4" SS couplings 260.00\$
1 pc (4" X 3") SS reducer male threads 160.00\$
1 pc 3" SS nipple 25.00\$

Dave Markell
1-613-448-3098
1-613-223-1571

Drop Pipe
\$ 2395.00



THE RIDEAU GROUP INC.
RIDEAU PIPE & DRILLING SUPPLIES LTD.

Head Office
P.O. Box 354
Perth, ON
K7H 3E4
Phone:
(800)268-7156

Amherst Office
P.O. Box 844
Amherst, NS
B4H 4B9
Phone:
(800)565-1575

Barrie Office
18 Napier Court
Utopia, ON
L0M 1T0
Phone:
(855)728-4144

**ACCU PUMPS
DISTRIBUTING**
78 Wright Blvd.
Stratford, ON
N4Z 1H3
Phone:
(800)463-7648



QUOTE

00112868

Date: 02-Dec/2014
Page #: 1

Our GST/HST No: 104529599

QUOTE FOR	SHIP TO
ONTARIO CLEAN WATER AGENCY 5 INDUSTRIAL DRIVE CHESTERVILLE, Ontario K0C 1H0	ONTARIO CLEAN WATER AGENCY 5 INDUSTRIAL DRIVE CHESTERVILLE, Ontario K0C 1H0
REFERENCE	CONTACT TEL 613-448-3098 FAX 613-448-1616

CUSTOMER NO.	SHIP TO	SALES PERSON	FOLLOW UP DATE	EXPIRY	ENTERED BY
ONTCHE	ONTCHE	Daryl Mawhinney		01-Jan/2015	ANDREWR2

TERMS Net 30 Days	F.O.B. Prepaid & Charge	SHIP VIA	P.S.T.
-----------------------------	-----------------------------------	-----------------	---------------

PRODUCT DESCRIPTION	DELIVERY	UOM	QUANTITY	PRICE	AMOUNT
12B60005 85S75-5 PUMP END ONLY 6" 7-1/2HP 85GPM - FITS 4"		EA	1	\$2,714.00	\$2,714.00
2343388602 MOTOR - FRANKLIN 7-1/2HP 575V 4" 3PH		EA	1	\$1,226.40	\$1,226.40
TWU1447FT SUB WIRE 4C14(7) SOLD /FT TWU14-4		FT	200	\$0.71	\$142.00

pump end stock in Oakville

motor stock in Bolton

pump end does not come with a check valve

you will need to confirm what size of check valve you need me to quote

SUBTOTAL		MISCELLANEOUS	FREIGHT	HST	SALES TAX	TOTAL
\$4,082.40		\$0.00	\$0.00	\$530.71	\$0.00	\$4,613.11

Dave Markell

From: Dave Markell
Sent: Wednesday, December 03, 2014 9:45 AM
To: 'eric@tricountystainless.ca'
Subject: OCWA Drop Pipe Quote

Could you provide a price for the following;

3 pcs 4" sched 40 SS pipe with threaded ends (cut or welded on)
5 pcs 4" SS couplings
1 pc (4" X 3") SS reducer male threads
1 pc 3" SS nipple

Dave Markell
1-613-448-3098
1-613-223-1571

3 Test Well 3 Well #5

Driller's log of formations:

0 to 8 feet	sand and gravel
8 to 14 feet	hardpan
14 to 92 feet	grey dolomite and limestone

Diameter of hole: 8 inches

Casing diameter and position: 8 inches, 0 to 15 feet

Water-bearing zones: 46 to 52 feet
64 to 75 feet
80 to 92 feet

Static level: 0 feet

Depth: 92 feet

Grouting: cement 0 to 10 feet

History:

May 1/72 - drilling commenced
May 15/72 - well at a depth of 86 feet

May 24/72 - 2-hour step test at 30, 70, 110 and 142 gpm
May 24, 25
& 26/72 - 54-hour test at 100 gpm

4 X 20'

Winchester

Well #5

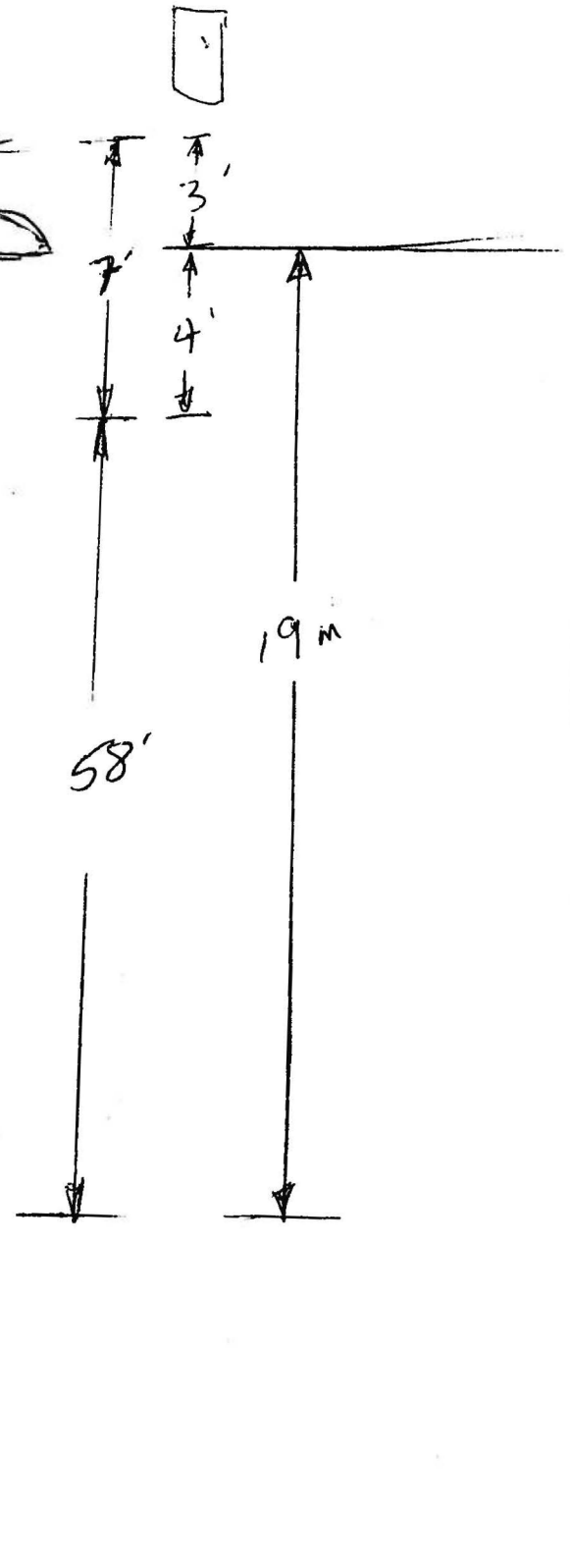
Transducer
Well #5 Winchester
Transducer & Cable 20m

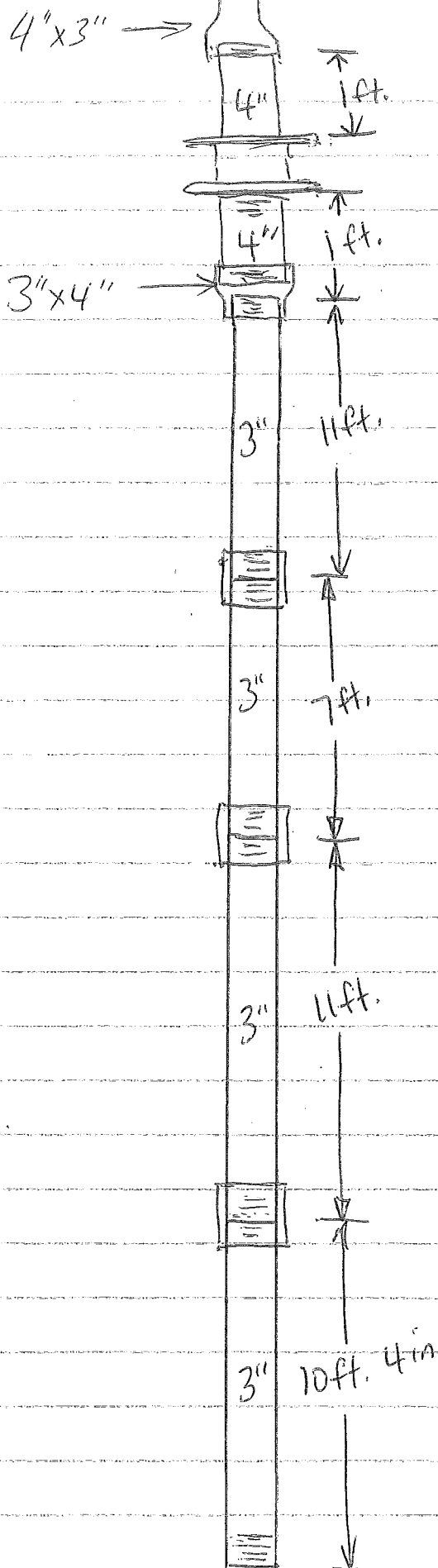
Conduit starts
Pump must be
lifted to change
transducer.

1" conduit
pump column

well casing

pump





Material required

2 - $3" \times 4"$ Couplings

2 - $4" \times 1 \text{ ft.}$ PIPE

2 - $3" \times 11 \text{ ft.}$ PIPE

1 - $3" \times 10 \text{ ft. } 4 \text{ in}$ PIPE

1 - $3" \times 7 \text{ ft.}$ PIPE

4 - $3"$ couplings

All pipe ends threaded.

PERFORMANCE CURVES

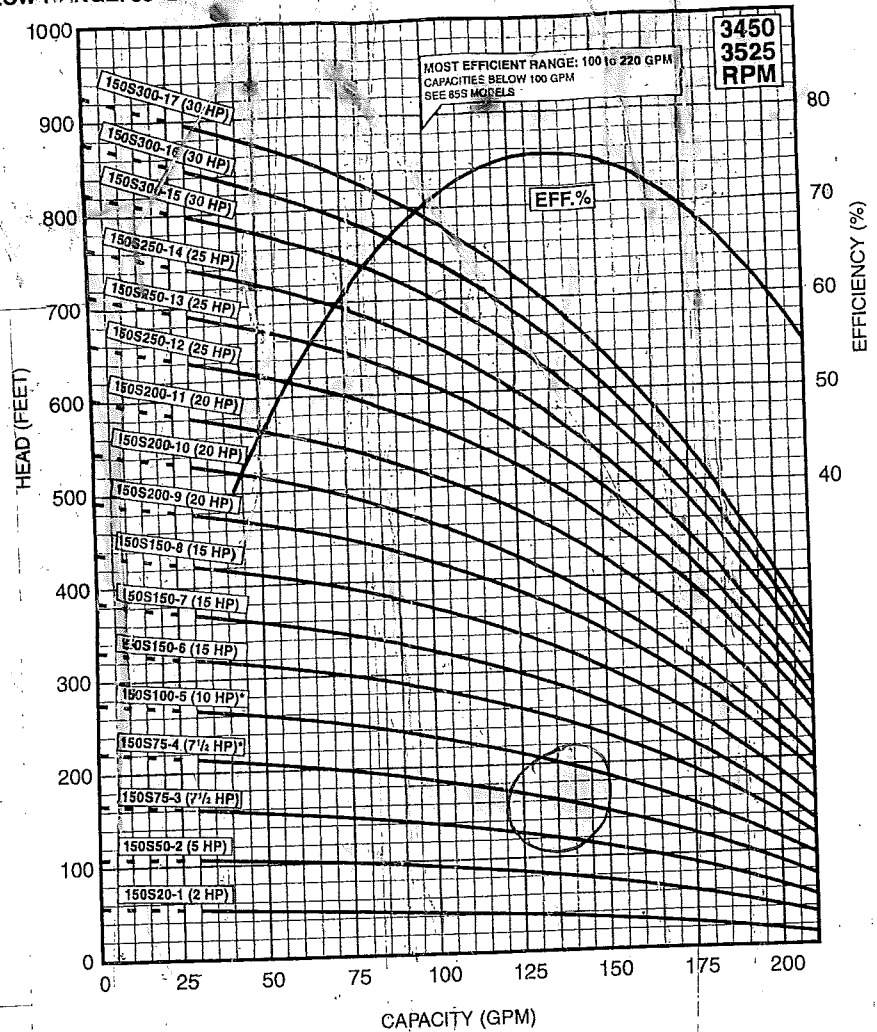
150 GPM

MODEL 150S

FLOW RANGE: 30 - 220 GPM

OUTLET SIZE: 3" NPT

NOMINAL DIA. 6"

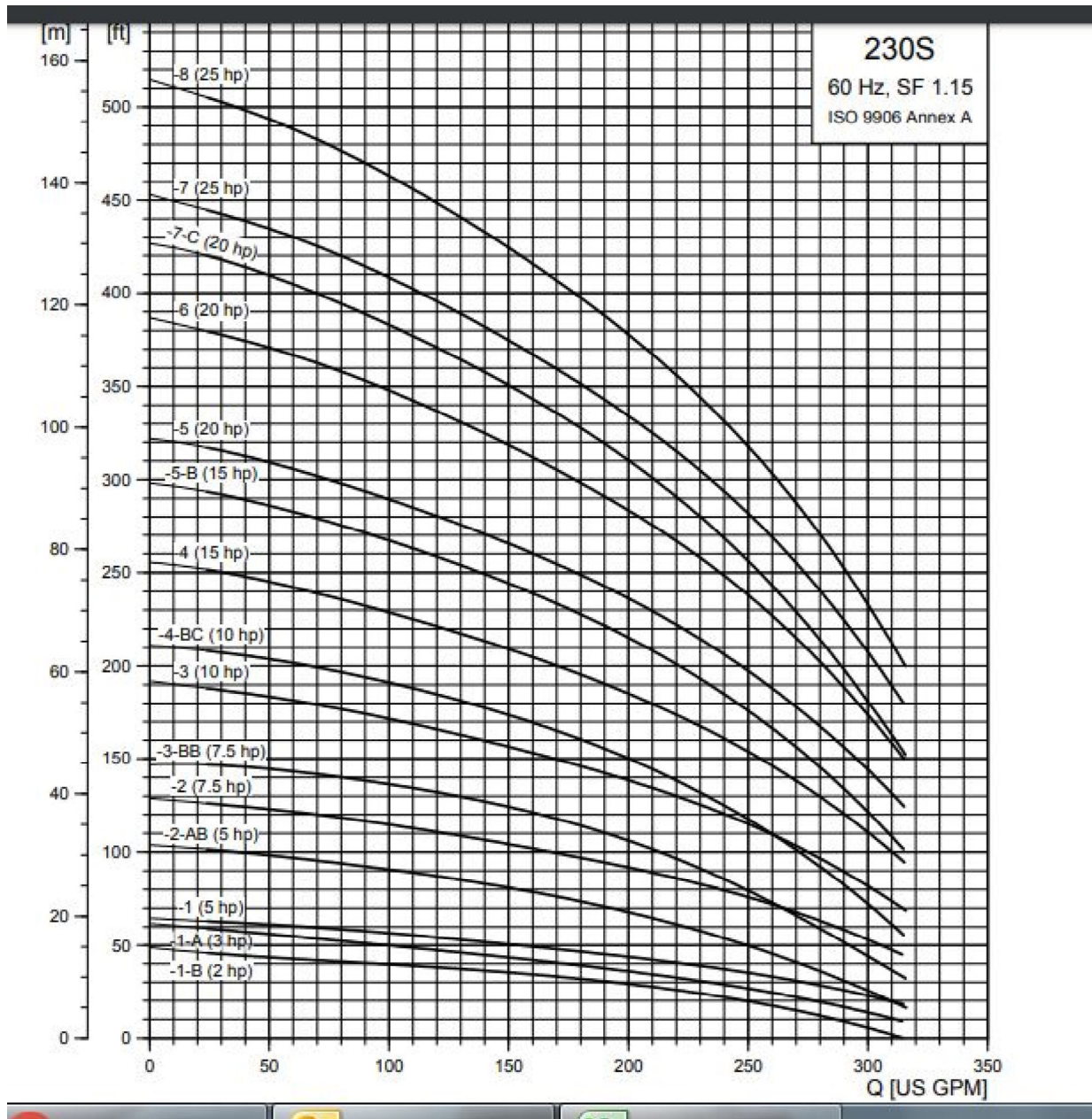


SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE.
 4" MOTOR STANDARD, 2-10 HP/3450 RPM
 6" MOTOR STANDARD, 7.5-60 HP/3450 RPM.
 8" MOTOR STANDARD, 75 HP/3525 RPM.
 * Alternate motor sizes available.

Performance conforms to ISO 9906 Annex A
 @ 5 ft. min. submergence.

#6 ground elevation 79 m
Tower overflow 115.8 m
= 36.8 m + Well Depth 12 m
= 48.8 m or 160' total lift.

This pump should be very close
to 135 gpm or 10 l/sec.



NORTH-EAST SIDE OF TANK

SCALE: 3/32" = 1'-0"

Chesterville Tower

PRINT ON S. W. SIDE OF TANK
LETTER HEIGHT 3'-0"
LETTER SPACING 3'-0"
LETTER THICKNESS - 6"

PAINT ONTARIO WATER RESOURCES
COMMISSION SEAL 4'-6" DIA.
(DETAILS WILL BE SUPPLIED TO
TANK PAINTER BY ENGINEER).

CONTROL
CABINET.

CHESTERVILLE

32'-0"

BALCONY

TOP OF TANK CAPACITY

6'-3"

15'-0"

6'-3"

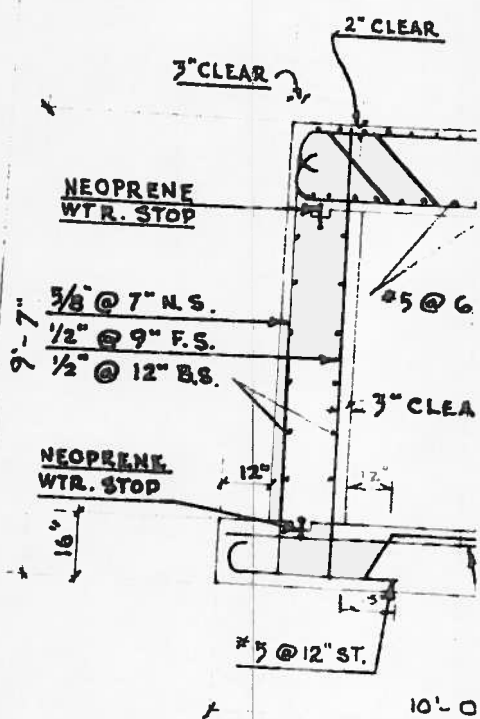
BOTTOM OF TANK CAPACITY

CONNECTION
OF ALTITUDE VALUE

CONTROL
CABINET.

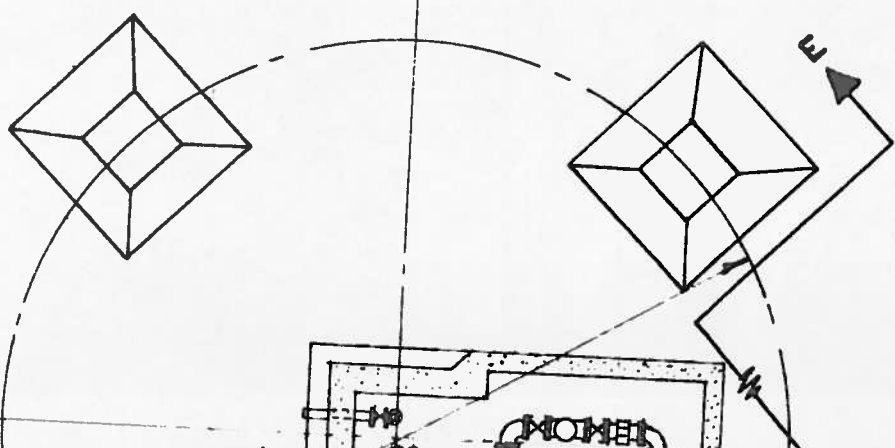
117'-6"

90'-0"



ELEVATION (SECTION E-E)

SCALE: 3/32" = 1'-0"



SOIL PROFILE

Notes:

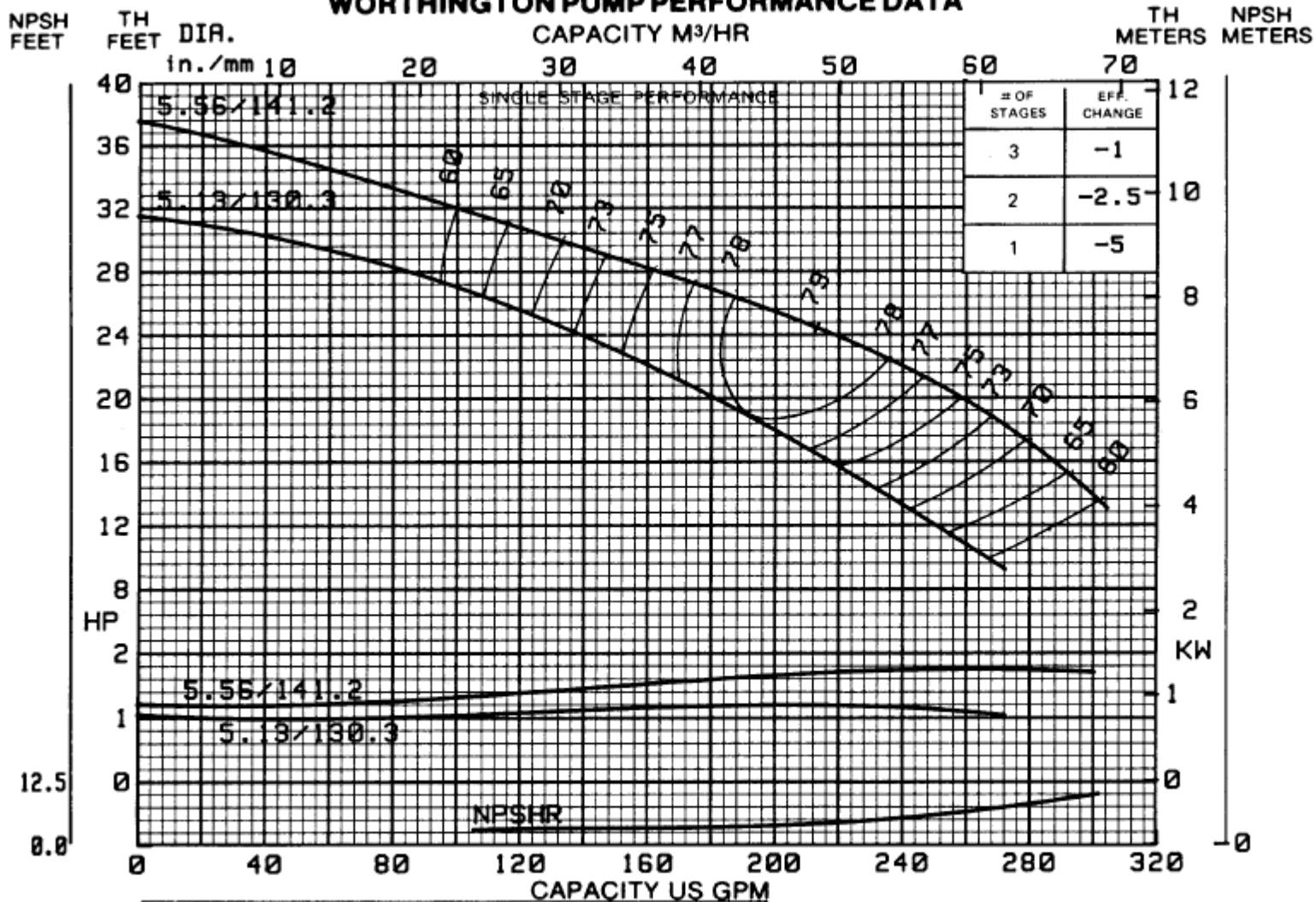
1. DESIGN SOIL

Customer _____
Project _____
Cust. Proposal/Order No. _____
Customer Item No. _____
Date _____
Worthington S.O. _____
Proposal/Order No. _____
Certified By _____
Date _____

Liquid/Service _____ Sp. Gr. _____ Visc. _____ SSU
Capacity _____ Head _____ Temp. _____ °F/°C Consistency _____ %

ChesRes Duty8M23

WORTHINGTON PUMP PERFORMANCE DATA

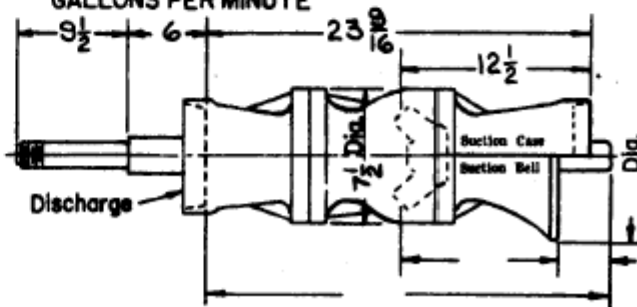
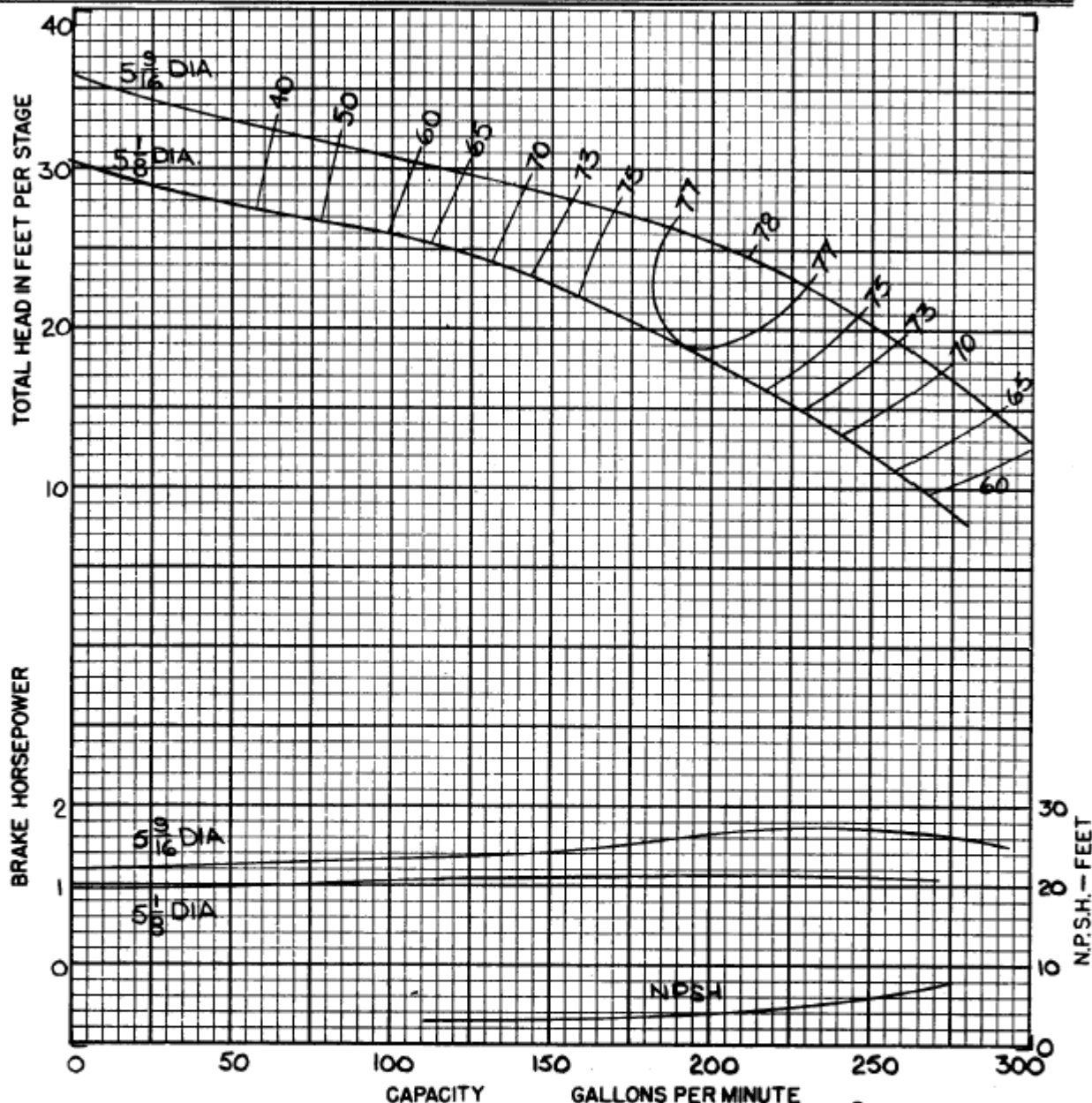


CURVE NO.	SIZE	RPM
A-24062	8M23	1760

RATING CURVES (60 CYCLE)

ChesRes Duty8M23

8M-23
1760 RPM

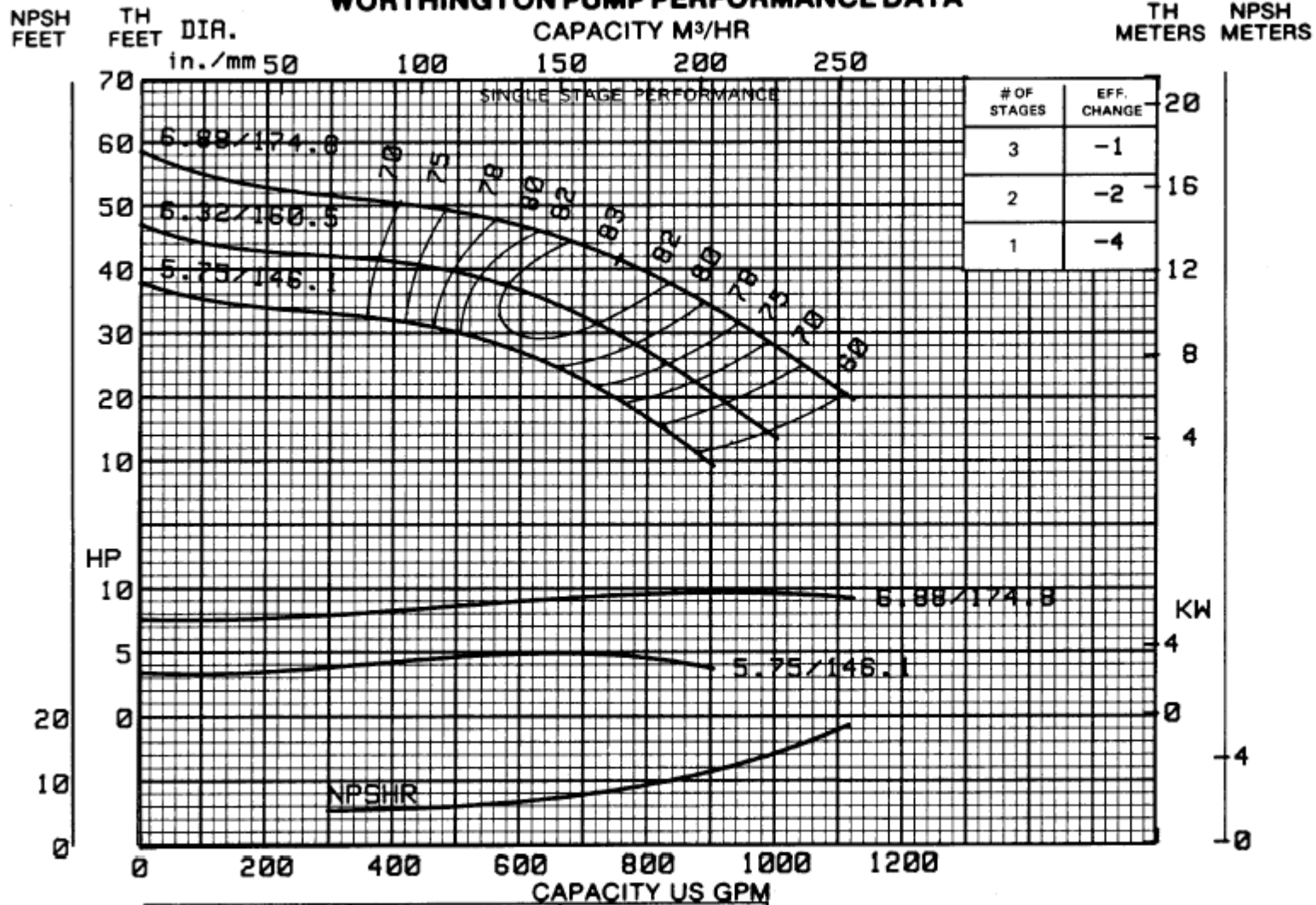


For additional stages add $6\frac{1}{8}$ per stage.

Efficiency shown is for 6 stages or more, with standard materials. For fewer stages or other materials change efficiency as shown.				
No. of stages	Eff. change	MATERIAL	Standard materials	
6	—	Impeller—bronze	Impeller—bronze	
3	-0.5	Impeller—c.i.	Bowl—cast iron/enamelled	
4	-1	Impeller—c.i.enm.	Thrust factor	4.3
3	-1.5	Bowl—c.i.enm.	Rotor wt. per stage (lbs.)	7
2	-2.5	Bowl—cast iron	Bowl wt. 1st stage (lbs.)	85
1	-4	Bowl—bronze	Bowl wt. odd stage (lbs.)	30
			Max. bowl horsepower	80
			Impeller eye area (sq.in.)	7.7

Impeller shaft diameter	1.25	Column pipe	5
Minimum impeller shaft end play	.438	Suction pipe	5

WORTHINGTON PUMP PERFORMANCE DATA



CURVE NO.	SIZE	RPM
A-24124	10H75	1760

# OF STAGES	EFF. CHANGE
3	-1
2	-2
1	-4

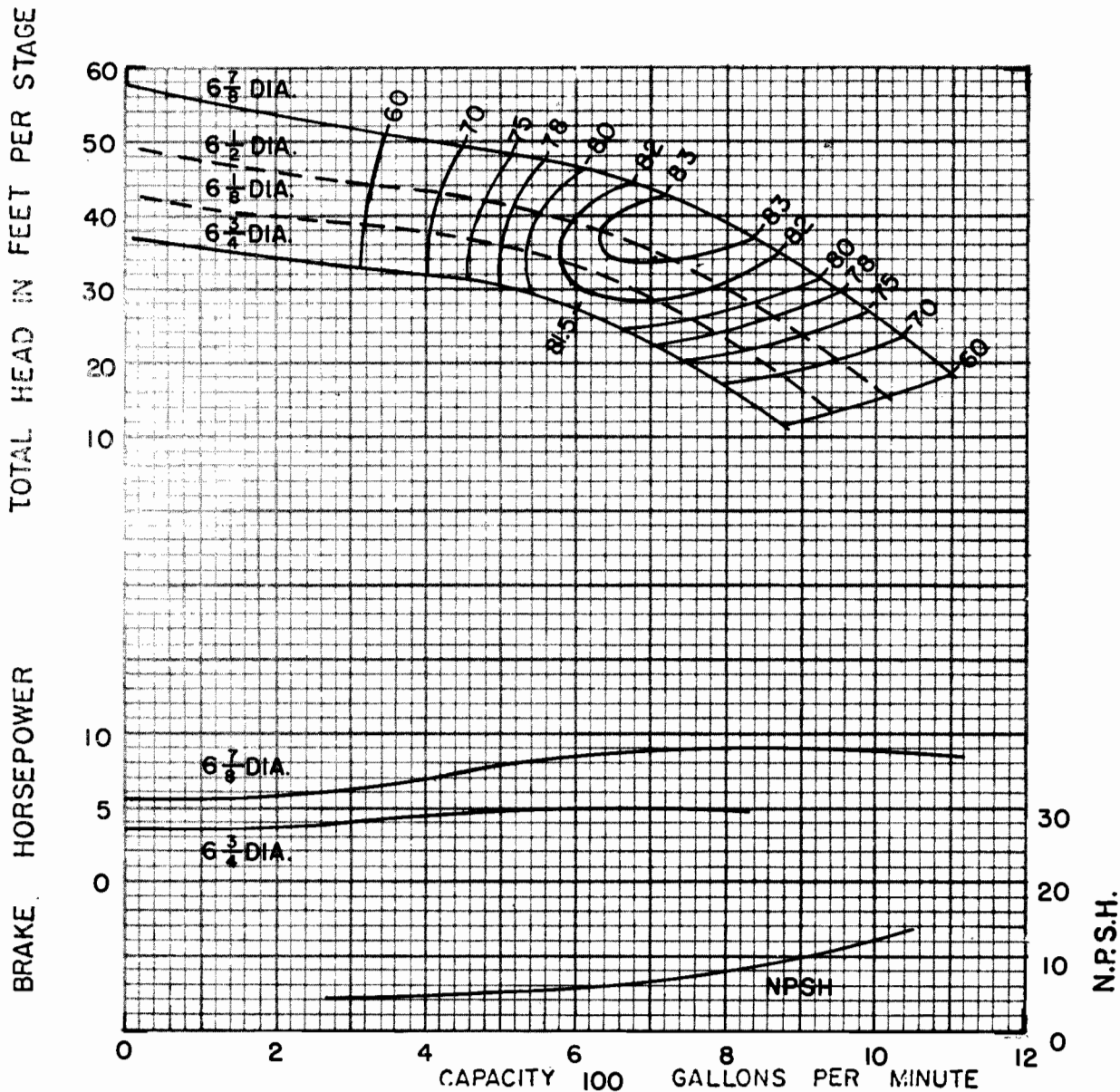
Customer _____
 Project _____
 Cust. Proposal/Order No. _____
 Customer Item No. _____
 Date _____
 Liquid/Service _____
 Capacity _____ Head _____ Sp. Gr. _____
 Temp. _____ °F/°C Visc. _____
 SSU _____

10H - 75
1760 RPM

RATING CURVES
60 CYCLE

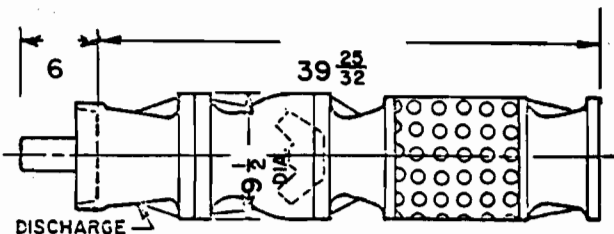
ChesRes Fire10H75

10 - 15 INCH - 1760 RPM



Efficiency shown is for 4 stages or more, with standard materials. For fewer stages or other materials change efficiency as shown.

No. of stages	Eff. change	MATERIAL	Standard materials	Eff. chg.
6	-	Imp.-bronze	Impeller-bronze or c.i.	
5	-	Imp.-cast iron	Bowl-cast iron/enm.	
4	-	Imp.-c.i. enm.	Thrust factor	7.8
3	-	Bowl-c.i. enm.	Rotor wt. per stage	16
2	-	Bowl-cast iron	Bowl wt. 1st stage	16.5
1	-	Bowl-bronze	Bowl wt. add'l stage	5.8
			Max. bowl hp.	140
			Impeller eye area/sq.in.	142



For additional stages add	8 5/8	per stage
Column pipe	5 1/8	Shaft end play
		438
Impeller shaft dia.	1.5	

**TOWNSHIP OF NORTH DUNDAS
APPLICATION FOR AN AMENDMENT TO CERTIFICATE OF APPROVAL (WATER)**

**Appendix B
Winchester Booster Pump Technical Info**

Customer Price Sheet

Project name / location : WINCHESTER BPS	Tag Number : 1634_00948_VIS_100201
Consulting engineer : Stantec Consulting, Jean Hebert	Service :
Customer :	Pump size : 50707 VL
Customer ref. / PO :	Quantity of pumps : 2
Quote number : 100204-087	Quoted By (Sales Office) : Grundfos Canada Inc.
Date last saved : 02/04/2010 13:27 PM	Quoted By (Sales Engineer) : Grant Stanley, VSC

Construction

Construction Code: 16N6 - 50707 - 14010X - XXXX	Flow: 54.50 l/s	Head: 70.00 psi.g	Impeller diameter: 6.83 in
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Totals

Grand Total	\$ 21,086.00	Lead Time Total	N/A
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Pump

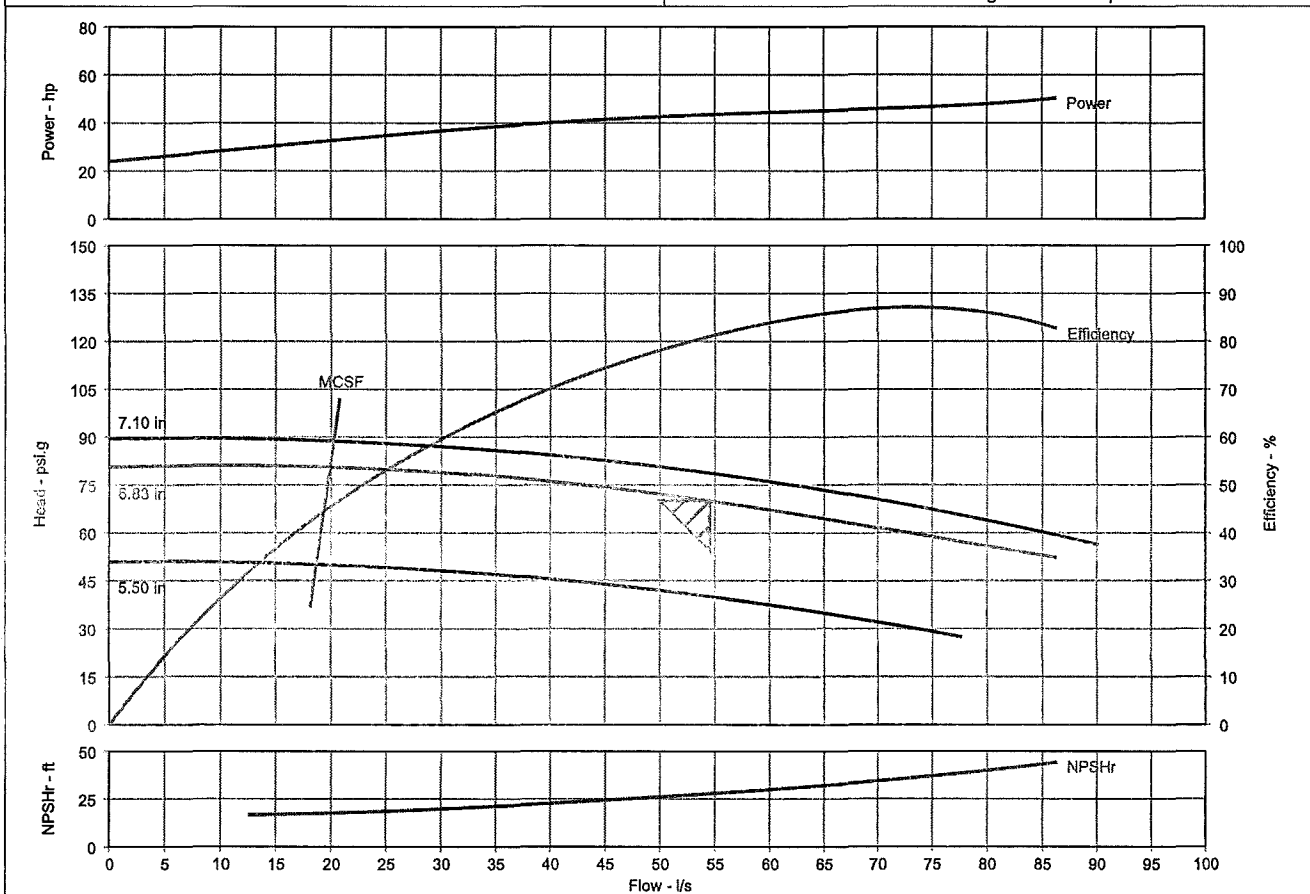
Qty	Description	Average Unit Price	Extended Price
2	5070-7 VL Scope of Supply: Complete Unit (Pump and Motor) Pump Rotation: Clockwise Pump Case material: Cast Iron, ASTM A48 - Class 30 Nozzle Configuration: 125# ANSI flange Impeller Material: Silicon Bronze, ASTM B584 C87600 Impeller Cap Screw and Washer: Stainless Steel, AISI-303 Impeller Key: Steel, Cold Drawn C1018 Hardware Material: Steel, Grade 5 Wear Ring Material: Ni-Aluminum -Bronze, ASTM-B148, C95400 Wear Ring Configuration: Single (Case) Wear Ring Shaft material: Steel, AISI-1040 Shaft sleeve material: Bronze, III932, C89835 Bearing Types: Rolling Element Bearing (Upper & Lower) Bearing Lubrication: Regreasable O Rings: Buna N Insert: Provided Seal Material (Elastomer/Rotating Element/Stationary Seat): Single Seal, Type 21S Buna/Carbon/Ceramic/SS-Spring&Hardware Recirculation Lines: Nylon Tubing with Brass Fittings Base: None Motor size: NA 60 HP, 575/3/60hz, 3600 RPM, TEFC, Premium, Baldor -Weight not included in GA Motor Manufacturer: Baldor Motor Enclosure: TEFC Motor efficiency: NEMA Premium Motor phase: Three Phase Motor Application: Suitable for Variable Speed Drive Motor bracket: Motor bracket provided Motor Bracket Material: Cast Iron, ASTM-A48, CL 30 Test level: No test CAD drawing: Leadtime: Custom leadtime/Contact factory for leadtime Estimated Weights: 210Lbs Coating: Standard Manufacturers Paint Certifications: NSF-61 Certified (drinking water)	\$ 10,543.00	\$ 21,086.00

Pump Performance Datasheet

Project name / location	: WINCHESTER BPS	Tag Number	: 1634_00948_VIS_100201
Consulting engineer	: Stantec Consulting, Jean Hebert	Service	:
Customer	:	Pump size	: 50707 VL
Customer ref. / PO	:	Quantity of pumps	: 2
Quote number	: 100204-087	Quoted By (Sales Office)	: Grundfos Canada Inc.
Date last saved	: 02/04/2010 10:27 AM	Quoted By (Sales Engineer)	: Grant Stanley, VSC

Operating Conditions		Liquid	
Flow, rated	: 54.50 l/s	Liquid type	: Water
Head, rated (requested)	: 70.00 psi.g	Additional liquid description	:
Head, rated (actual)	: 69.93 psi.g	Solids diameter, max	: 0.00 in
Suction pressure, rated / max	: 0.00 / 0.00 psi.g	Temperature, max	: 68.00 deg F
NPSH available, rated	: Ample	Fluid density, rated / max	: 0.998 / 0.998 SG
Frequency	: 60 Hz	Viscosity, rated	: 1.00 cP

Performance		Material	
Pump speed, rated	: 3,500 rpm	Material requested	: Auto
Impeller diameter, rated	: 6.83 in	Material selected	: Cast iron
Impeller diameter, maximum	: 7.10 in	Pressure Data	
Impeller diameter, minimum	: 5.50 in	Maximum working pressure	: 81.08 psi.g
Efficiency	: 81.03 %	Maximum allowable working pressure	: 175.0 psi.g
NPSH required / margin required	: 27.82 / 0.00 ft	Maximum allowable suction pressure	: 175.0 psi.g
nq (imp. eye flow) / S (imp. eye flow)	: 53 / 155 Metric units	Hydrostatic test pressure	: 263.0 psi.g
MCSF	: 19.96 l/s	Driver & Power Data	
Head, maximum, rated diameter	: 81.08 psi.g	Driver sizing specification	: Rated power
Head rise to shutoff	: 15.22 %	Margin over specification	: 0.00 %
Flow, best eff. point (BEP)	: 72.94 l/s	Service factor	: 1.15
Flow ratio (rated / BEP)	: 74.72 %	Power, hydraulic	: 35.22 hp
Diameter ratio (rated / max)	: 96.20 %	Power, rated	: 43.47 hp
Head ratio (rated dia / max dia)	: 88.93 %	Power, maximum, rated diameter	: 50.32 hp
Cq/Ch/Ce [ANSI/HI 9.6.7-2004]	: 1.00 / 1.00 / 1.00	Minimum recommended motor rating	: 60.00 hp / 44.74 kW
Selection status	: Acceptable		

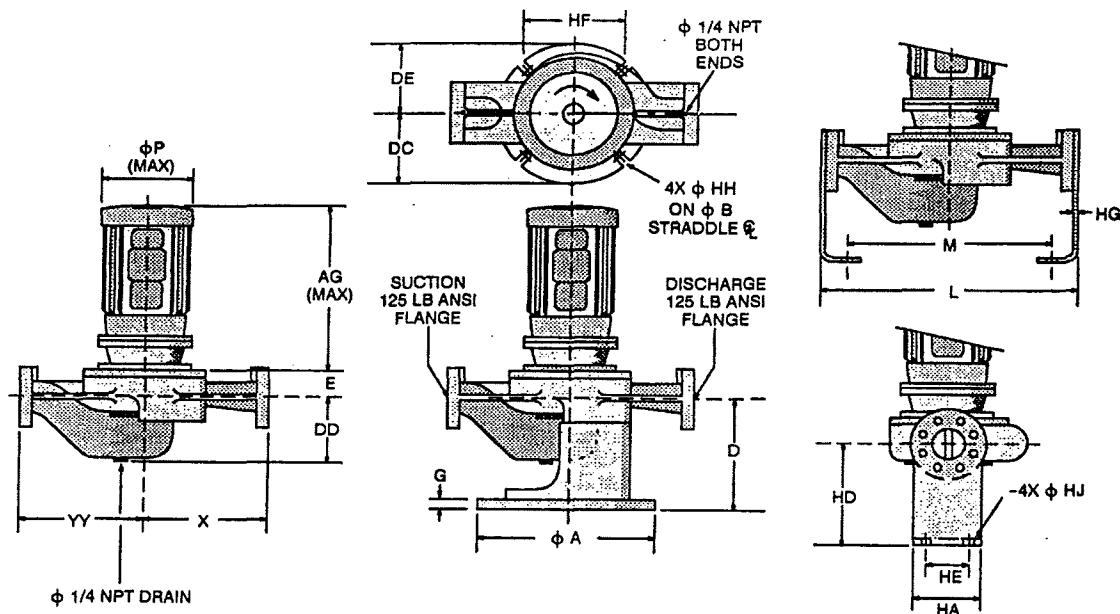


Construction Datasheet

Project name / location : WINCHESTER BPS		Tag Number : 1634_00948_VIS_100201	
Consulting engineer : Stantec Consulting, Jean Hebert		Service : -	
Customer :		Model : 50707 VL	
Customer ref. / PO :		Quantity : 2	
Quote number : 100204-087		Quoted By (Sales Office) : Grundfos Canada Inc.	
Date last saved : 02/04/2010 10:27 AM		Quoted By (Sales Engineer) : Grant Stanley, VSC	

Construction				Motor Information	
Nozzle	Size (In.)	Nozzle Configuration	Pos'n	Manufacturer	: Baldor
Suction	5	125# ANSI	Side	Frame Size	: 326JM
Discharge	5	125# ANSI	Side	Power	: 60.00 hp
Orientation / Configuration : Vertical				RPM	: 3600
Rotation : Clockwise				Enclosure	: TEFC
Wear Ring Configuration : Single - Case				Operating Power Supply	: 575/3/60hz
Discharge Elbow Size : -				Efficiency	: Premium
Subplate : -				Service factor	: -
Sump Depth (feet) : -				Motor Application	: Suitable for Variable Speed Drive
Bearing Frame : -				Motor Options/Accessories	: -
Bearing Frame Foot : -				Cord Length (feet)	: -
Bearing Type (Radial/Thrust) : In motor				Materials	
Bearing Lubrication : Regreasable				Case	: Cast Iron, ASTM A48 - Class 30
Thrust Bearing : -				Motor Bracket	: Cast Iron, ASTM-A48, CL 30
Intermediate Bearing : -				Impeller	: Silicon Bronze, ASTM B584 C87600
Lower Bearing : -				Impeller Cap Screw and Washer	: Stainless Steel, AISI-303
Bearing Housing Accessories : -				Impeller Key	: Steel, Cold Drawn C1018
Construction code : 16N6 - 50707 - 14010X - XXXX				Case wear ring	: Ni-Aluminum -Bronze, ASTM-B148, C95400
Baseplate, Coupling and Guard				Impeller wear ring	: -
Baseplate : Not Applicable				Pump Shaft	: Steel, AISI-1040
Drip Pan : -				Sleeve	: Bronze, III932, C89835
Coupling : -				Line Shaft	: -
Guard : OSHA Approved				Column	: -
Seal & Packing Construction				Discharge Pipe	: -
Sealing Method : Single Seal, Type 21S				Discharge Elbow	: -
Seal Material : Buna/Carb/Cer./SS-Spring&Hardw.				Suction Elbow	: -
Packing Gland : -				Subplate	: -
Lantern Ring : -				Hardware	: Steel, Grade 5
Recirculation Lines : Nylon Tubing with Brass Fittings				O Rings	: Buna N
Weights (Approx.)				Pump Coatings	: Standard Manufacturers Paint
Pump : 210					
Baseplate : -					
Driver : 0					
Estimated Shipping gross weight : 210					

IN-LINE WITH SUPPORT STAND & WITH FLANGE SUPPORTS — MODELS 4070-7 THRU 5095-9



PUMP DIMENSIONS

Pump Model	Suct. Disch.	A	B	D	E	G	L	M	DC (1)	DD (1)	DE (1)
4070-7	4	12	11	8-11/16	2	3/4	21	16	5-1/8	6-11/16	7-3/8
4095-7	4	16	13-1/2	8-3/4	2-1/8		25-1/2	20-1/2	6-5/8	6-3/4	8-7/8
4012-1, -7	4	16	13-1/2	8-3/4	2		27	20	7-3/4	6-3/4	9-3/4
5070-7	5	12	11	10-1/8	2-1/8		24	19	6-1/8	7-3/4	8-5/8
5095-7, -9	5	16	13-1/2	9-3/4	2-1/4		27	22	7-1/8	7-1/8	9-1/2

(cont.)

Pump Model	HA	HD	HE	HF	HG	HH (2)	HJ	X	YY
4070-7	6	8	4	7-13/16	1/2	3/4	3/4	10	10
4095-5	6	8	4	9-9/16	1/2		3/4	12	12-1/2
4012-1, -7	6	8	4	9-9/16	1/2		3/4	13	13
5070-7	7	10	5	7-13/16	1/2		7/8	11-1/2	11-1/2
5095-7, -9	7	10	5	9-9/16	1/2		7/8	13	13

MOTOR DIMENSIONS

	X3 CONST.				X4/XA CONST.				X5 CONST.	
	143TC/ 145JM	182TC/ 184JM	213TC/ 215JM	254 TC/JM	213TC/ 215JM	254TC/ 256JM	284TC/ 286JM	324TC/ 326JM	364TC/ JM	326TC 365TC
P(max)	8	10	12	14	12	14	15	17	19	19
AG(max) (3)	18	20	22	24	22	24	26	30	31	30

SINGLE PHASE MOTORS

	X3 CONST.				
	143JM	145JM	182JM	184JM	213JM
P(max)	8	8	10	10	12
AG(max)	15	15	17	17	22

(1) Dimensions of cast surfaces vary $\pm 1/4$.

(2) 'HH' Dimension is slot, except 6095, 6012, & 8012 are holes.

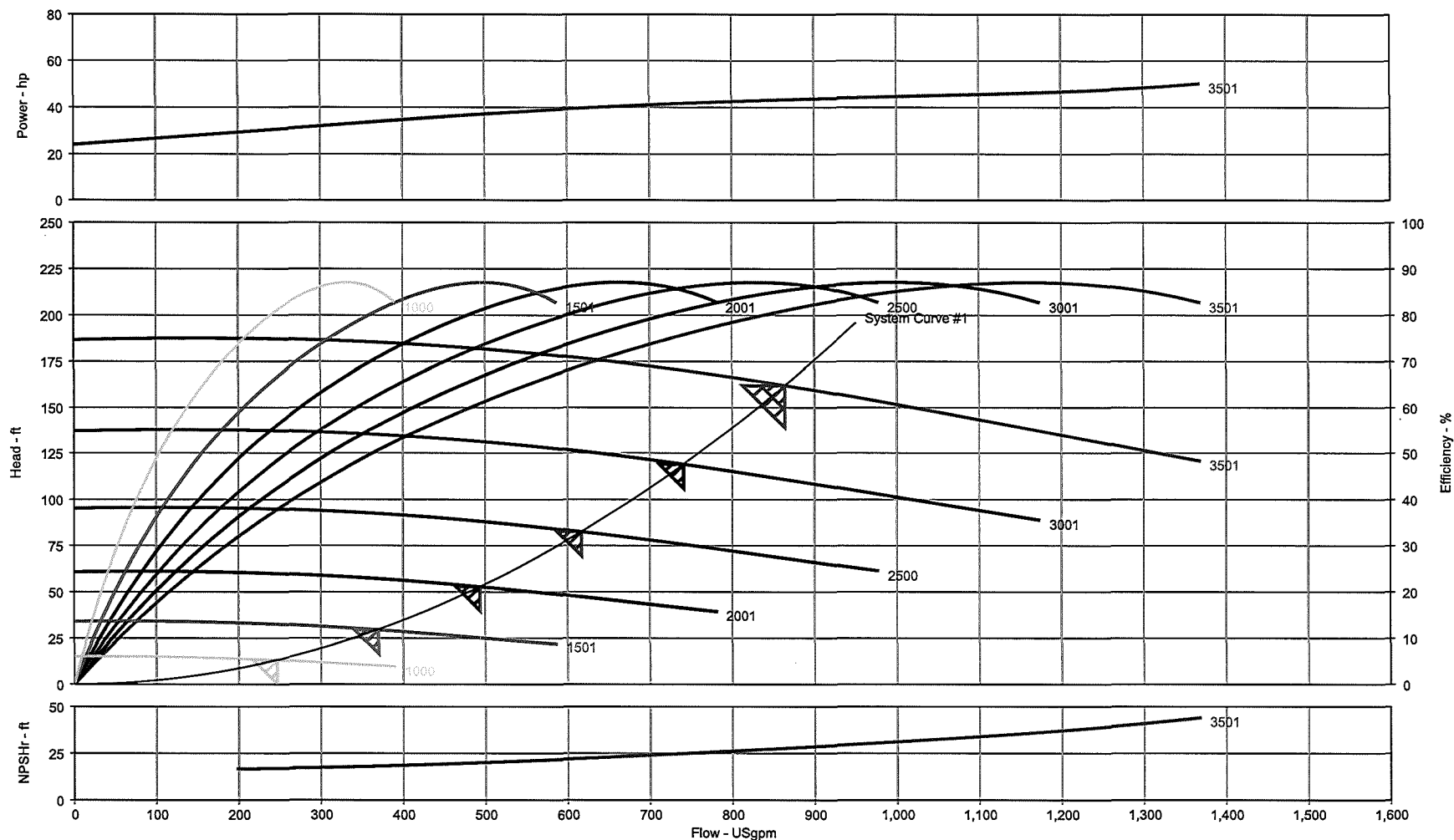
(3) If head space requirement is critical, contact Factory.

In the interest of Product Improvement, dimensions are subject to change without notice.

ALL DIMENSIONS ARE IN INCHES.

Customer _____	P.O. No. _____	Job No. _____
Project _____	Item No. _____	Certified By _____ Date _____
HP _____, RPM _____, HZ _____, V _____, ENCL _____, FR _____, Total Wgt. _____		

Multi-Speed Performance Curve



Project name / location : Winchester BPS/Eastern Ontario
Consulting engineer :
Customer :
Customer ref. / PO :
Quote number : 100204-087A
Date last saved : 03/19/2010

Tag Number :
Service :
Pump size : 50707 VL
Quantity of pumps : 2
Quoted By (Sales Office) : Grundfos Canada Inc.
Quoted By (Sales Engineer) :
Stages : 1

Pump speed, rated : 3,500 rpm
Flow, rated : 864.0 USgpm
Head, rated : 162.0 ft
Fluid density, rated / max : 0.998 / 0.998 SG
Viscosity : 1.00 cP
Cq/Ch/Ce [ANSI/HI 9.6.7-2004] : 1.00 / 1.00 / 1.00
Based on curve number : RC2547 Rev 0

**TOWNSHIP OF NORTH DUNDAS
APPLICATION FOR AN AMENDMENT TO CERTIFICATE OF APPROVAL (WATER)**

**Appendix C
Winchester Well #1 Pump Curve**

Performance Curves

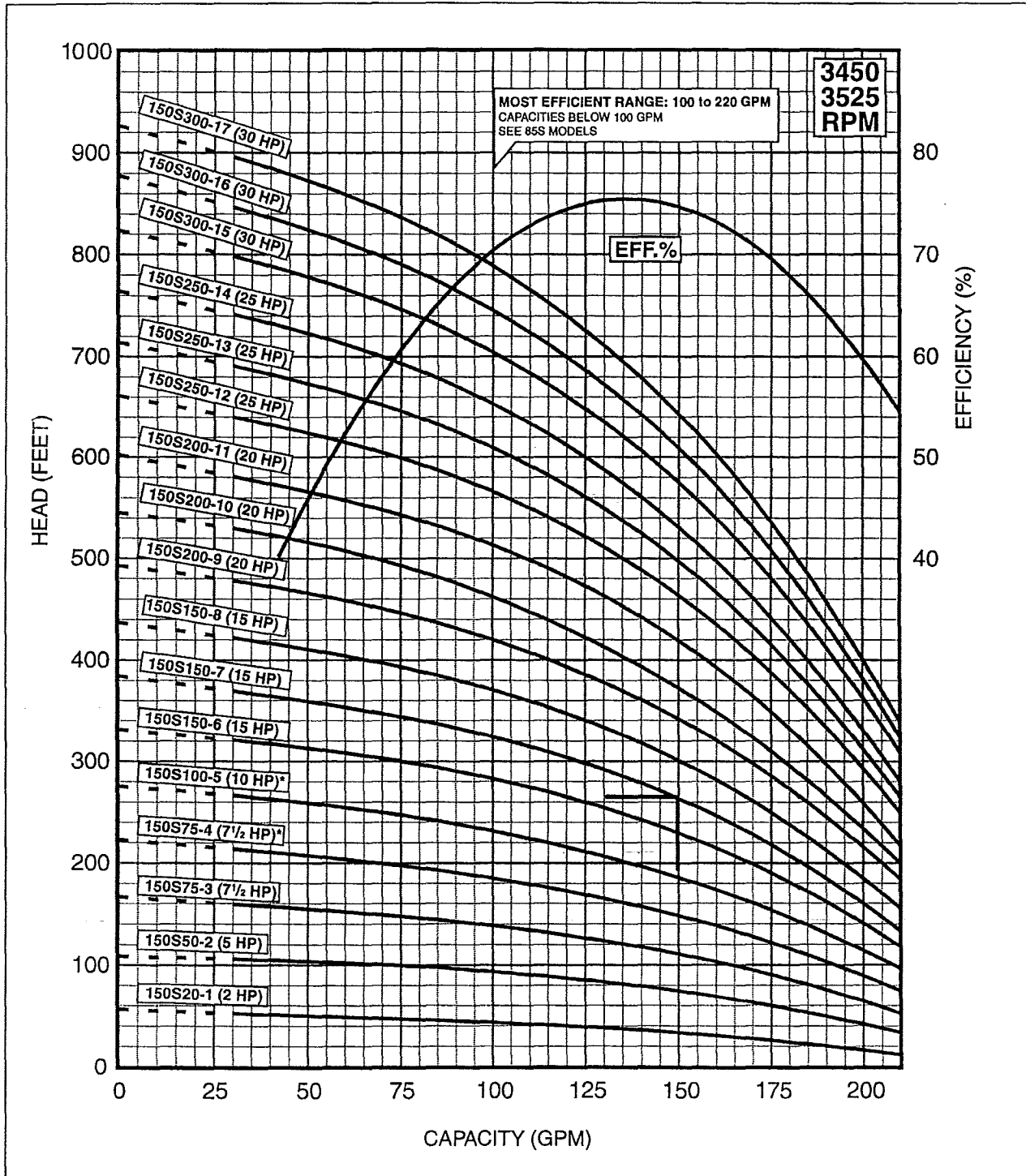
150 GPM

Model 150S

FLOW RANGE: 30 -220 GPM

OUTLET SIZE: 3" NPT

NOMINAL DIA. 6"



SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE.

4" MOTOR STANDARD, 2-10 HP/3450 RPM

6" MOTOR STANDARD, 7.5-60 HP/3450 RPM.

8" MOTOR STANDARD, 75 HP/3525 RPM.

* Alternate motor sizes available.

Performance conforms to ISO 9906 Annex A
@ 5 ft. min. submergence.

**TOWNSHIP OF NORTH DUNDAS
APPLICATION FOR AN AMENDMENT TO CERTIFICATE OF APPROVAL (WATER)**

**Appendix D
Chesterville Well #6 Pump Curve**

Lump #6

PERFORMANCE CURVES

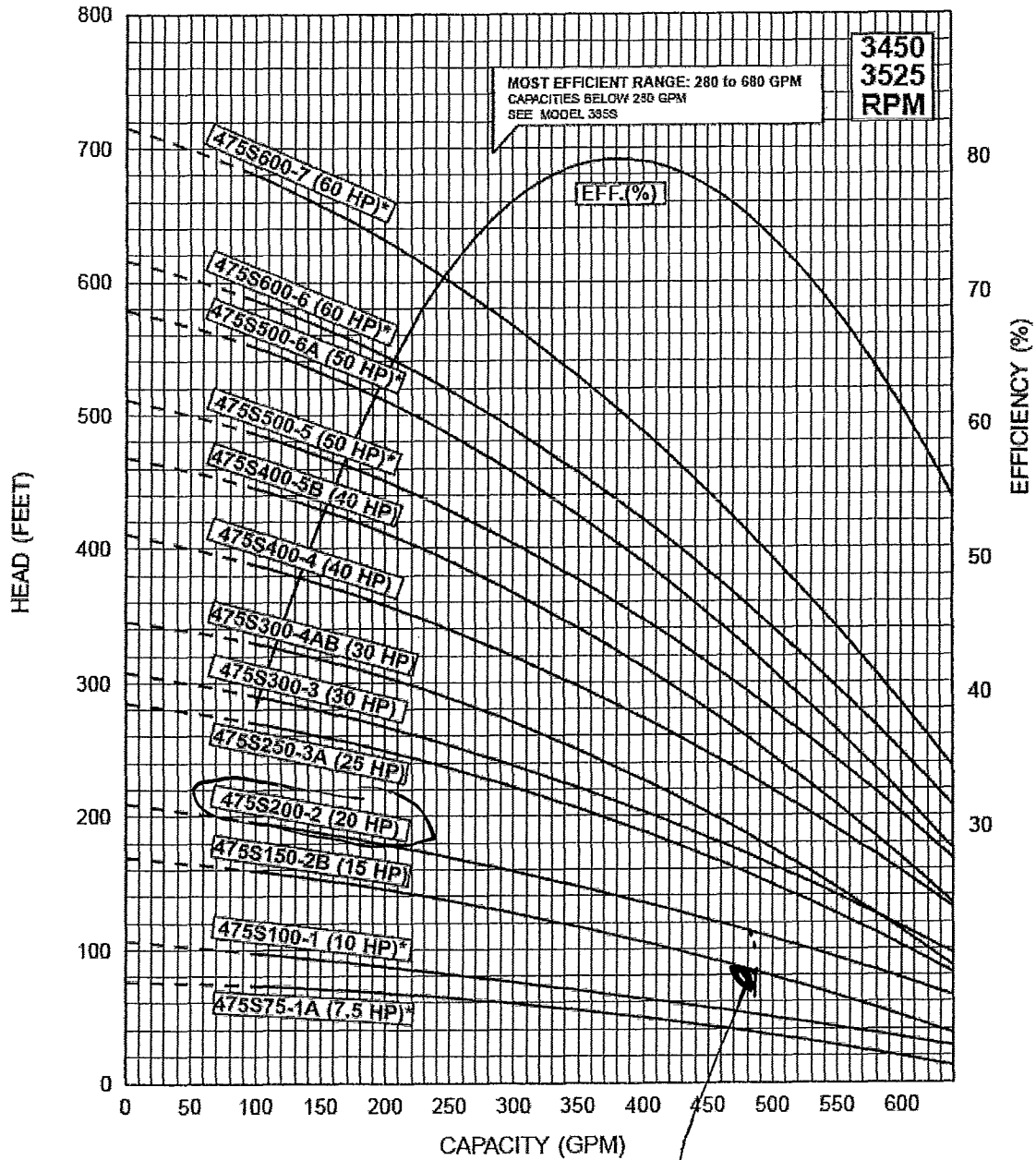
475 GPM

MODEL 475S

FLOW RANGE: 95 - 680 GPM

OUTLET SIZE: 6" NPT

NOMINAL DIA. 8"



SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE.
6" MOTOR STANDARD, 10-60 HP/3450 RPM.
8" MOTOR STANDARD, 75-125 HP/3525 RPM.
* Alternate motor sizes available.

Performance conforms to ISO 9906 Annex A
@ 8 ft. min. submergence.

Actual Operating
Point (VFD)

PERFORMANCE CURVES

385 GPM

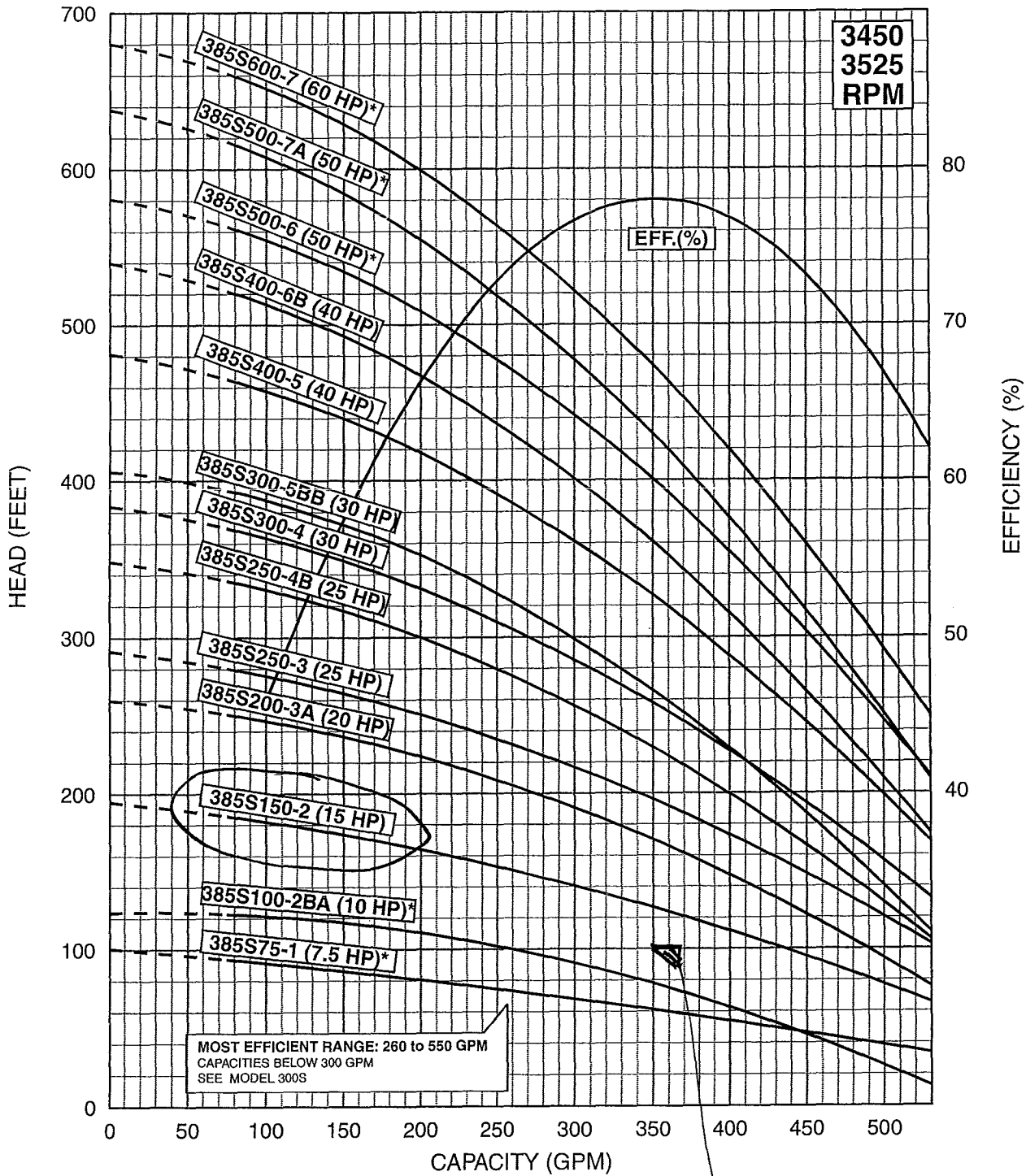
Pump #5

MODEL 385S

FLOW RANGE: 75 - 550 GPM

OUTLET SIZE: 4" NPT

NOMINAL DIA. 8"



SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE.

6" MOTOR STANDARD, 7.5-60 HP/3450 RPM.

8" MOTOR STANDARD, 75-100 HP/3525 RPM.

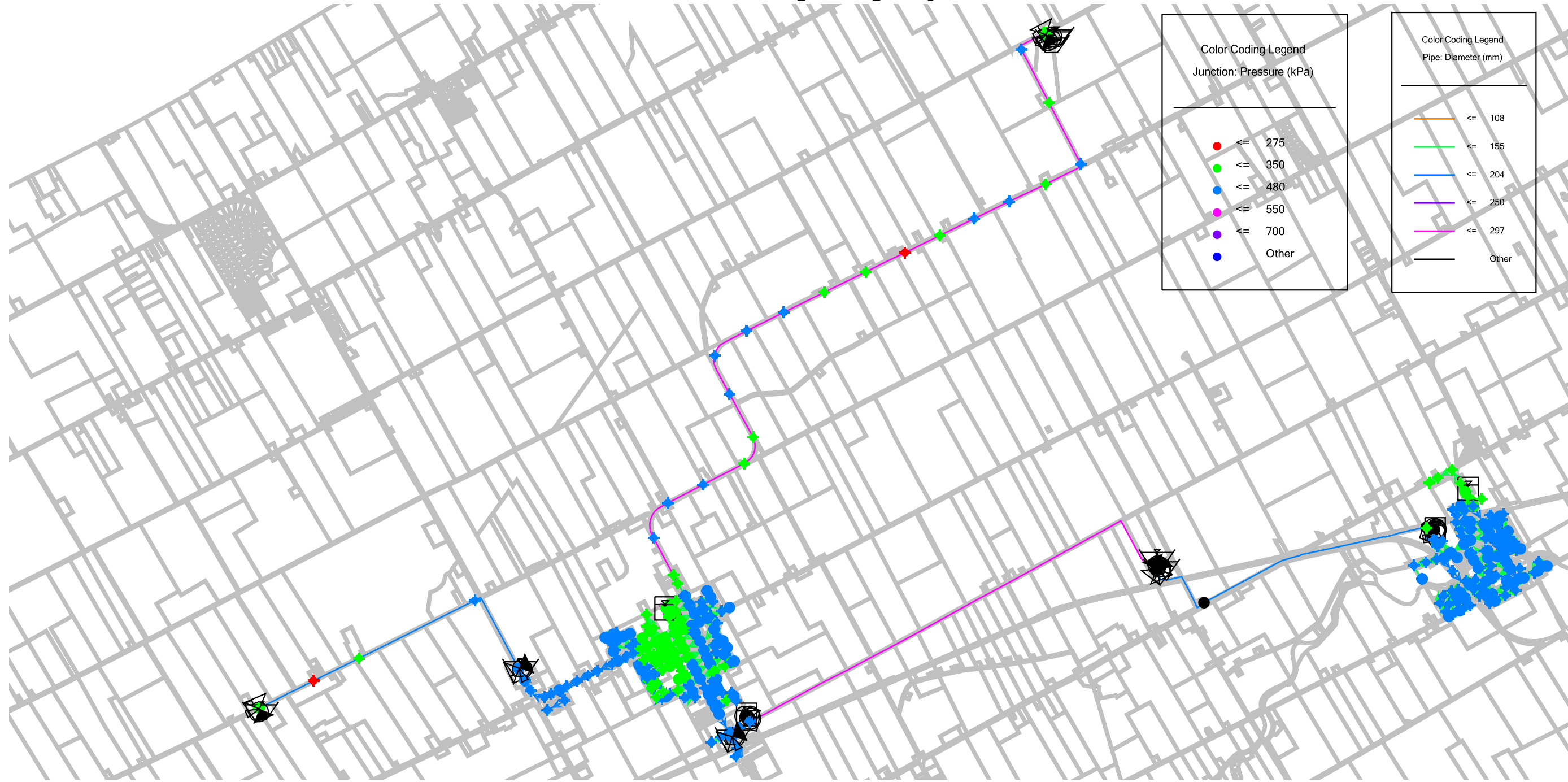
* Alternate motor sizes available.

Performance conforms to ISO 9906 Annex A
@ 8 ft. min. submergence.

*Actual operating
Point (VFD to
reduce speed)*

ATTACHMENT 2

North Dundas Hydraulic Water Model
Existing Average Day Demand



Color Coding Legend
Junction: Pressure (kPa)

●	≤	275
●	≤	350
●	≤	480
●	≤	550
●	≤	700
●		Other

Color Coding Legend
Pipe: Diameter (mm)

—	≤	108
—	≤	155
—	≤	204
—	≤	250
—	≤	297
—		Other

North Dundas Hydraulic Water Model
Existing Average Day Demand - Winchester



North Dundas Hydraulic Water Model
Existing Average Day Demand - Chesterville



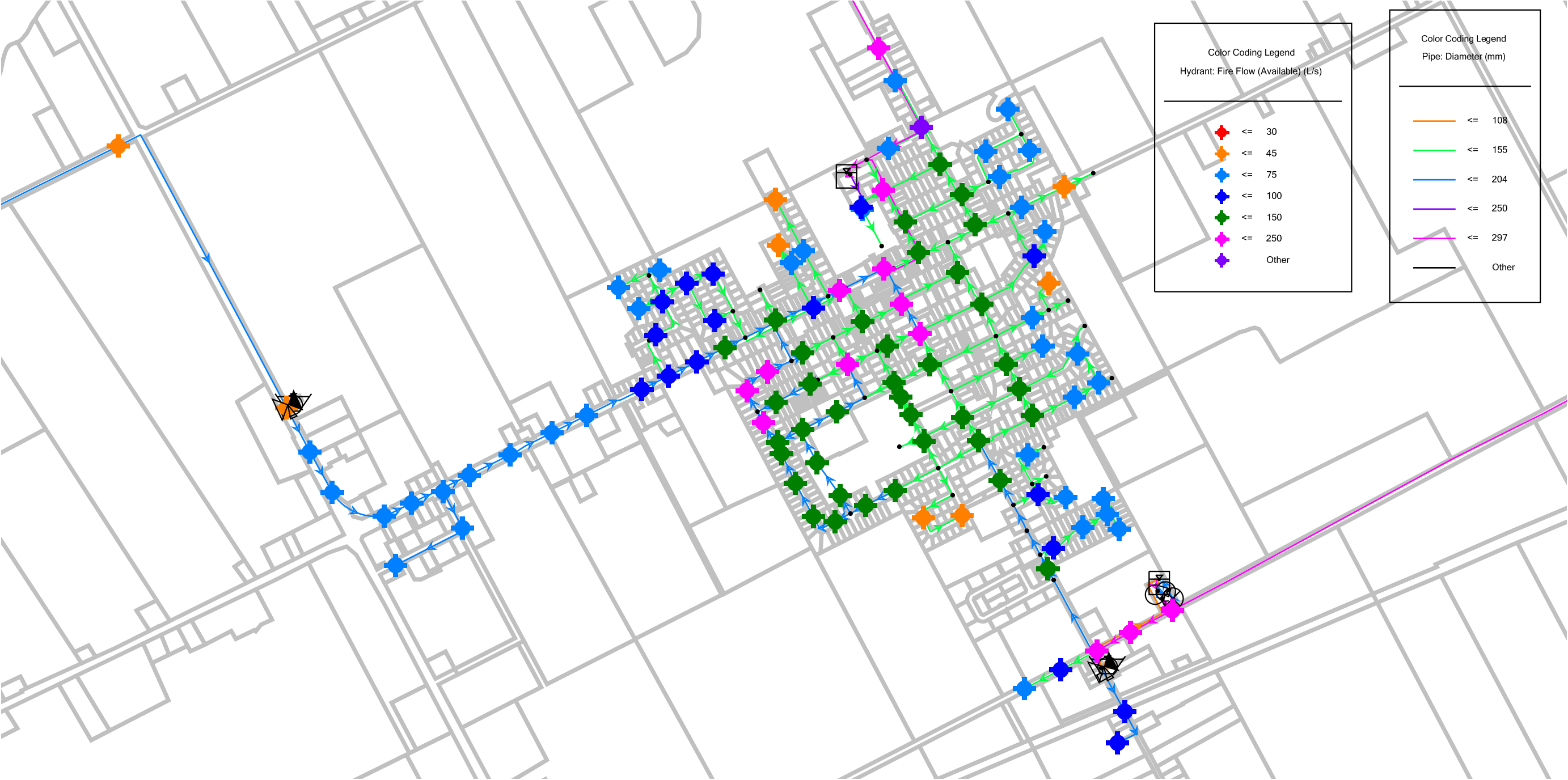
Color Coding Legend	
Junction: Pressure (kPa)	
●	<= 275
●	<= 350
●	<= 480
●	<= 550
●	<= 700
●	Other

Color Coding Legend	
Pipe: Diameter (mm)	
—	<= 108
—	<= 155
—	<= 204
—	<= 250
—	<= 297
—	Other

North Dundas Hydraulic Water Model
Existing Maximum Day Demand + Fire Flow



North Dundas Hydraulic Water Model
Existing Maximum Day Demand + Fire Flow - Winchester



North Dundas Hydraulic Water Model
Existing Maximum Day Demand + Fire Flow - Chesterville



North Dundas Hydraulic Water Model

Existing Peak Hour Demand



North Dundas Hydraulic Water Model
Existing Peak Hour Demand - Winchester



North Dundas Hydraulic Water Model
Existing Peak Hour Demand - Chesterville

