

**Amphenol Corporation
40-60 Delaware Avenue
Village of Sidney
Delaware County, New York**

**West Well Improvement Project
Basis of Design Report**

June 2017

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Village of Sidney
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June 2017

Prepared For:

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P.O. Box 359
Bridgeport, New York 13030

Prepared by:

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443 Electronics Parkway
Liverpool, New York 13088



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1.0 Introduction

Amphenol Corporation has completed several investigations and preliminary design work which have contributed to the final design of Amphenol's West Well Improvement Project. This Basis of Design (BOD) report shall serve as a summary of the design calculations and technical assumptions that have been incorporated into the final design.

2.0 Background

In January 2017, JTM Associates (JTM), on behalf of Amphenol, submitted a technical memorandum to NYSDEC entitled “Supplemental TRE Investigations and West Well/ Parking Lot Site Remediation Review” which requested approval to reduce the West Well remediation pumping rate to match what is needed for the facility’s process water needs. This flow was estimated to be 90-160 gallons per minute (gpm). Barton & Loguidice, DPC (B&L) was notified by JTM and Amphenol that NYSDEC granted Amphenol approval of the reduced flow rate which shall serve as the basis for Amphenol’s modifications to the West Well process water delivery system. As a result of multiple design coordination meetings and site visits to the West Well, and coordination between JTM, B&L, Evans Mechanical, and Amphenol, this Final Design Report details the West Well improvements necessary for the on-demand process water delivery system that meets both Amphenol’s process water needs and the revised pumping rate approved by NYSDEC. The process water delivery system improvements will primarily supply Amphenol’s plating facility with remediated well water, and with provisions to have the Village water feed as a backup water supply.

3.0 Basis of Design Summary

Amphenol West Well on-demand plating facility process water delivery system improvements are described below. As part of the improvement project, nearly all of the existing piping and equipment in the West Well pump house will be removed prior to or during construction, including:

- One Vertical turbine well pump;
- Two vertical turbine process water delivery pumps; and
- Miscellaneous piping, valves, and instruments that will no longer be utilized and/or have reached the end of their effective service life.

The vertical turbine well pump will be replaced with a new Christensen 6CHC 10 hp, 240V submersible well pump to be provided and installed by Layne Christensen (Layne), a Subcontractor to Evans Mechanical (Evans). Layne will also provide and install a new 4-inch ductile iron drop pipe, power cable, still tubes and other equipment and materials necessary for a complete well discharge head. Well water will then flow, as it does now, to the existing clear well. A pressure transducer and a backup high water float will be installed (by ACI Controls) in the clear well to support the Honeywell HC900 PLC in controlling the new submersible well pump's operation and speed.

Evans will utilize an existing penetration in the lower portion of the clear well's northern wall to feed two new Ebara EVMU 15 hp, 240V vertical multi-stage pumps. These pumps (in conjunction with a new hydro-pneumatic tank) will deliver a consistent process water pressure to the plating facility. A pressure transducer will monitor line pressure and support the Honeywell HC900 PLC, which will control the multi-stage pumps' speed. High and low pressures will also be monitored by the PLC. A manually operated valve will be installed to control the Village water supply connection to the delivery system, providing a backup water supply to the well. This will be a metered connection (reusing the existing water meter located in the Old Plant building), complete with a NYSDOH approved backflow prevention device. The existing 2-inch connection into the process water delivery line that feeds the Sodium Hypochlorite dilution system will be reinstalled with the existing meter and a new backflow prevention device.

Amphenol has recently installed a pressure transducer, magnetic flow meter, and variable frequency drive (VFD) on the well-air stripper water line. This equipment and instrumentation will be reused and incorporated into the West Well submersible pump delivery system and the Honeywell HC900 PLC.

Instrumentation and Control systems will be provided and installed by ACI Controls, working for Amphenol. Electrical disconnections, conduit and wiring materials, and new electrical connections for equipment will be provided by Amphenol utilizing its own personnel and Schuler-Haas. Both of these Contractors will be under contract directly with Amphenol.

4.0 Equipment Details

The following new equipment, instrumentation and control systems will be designed and installed under the project.

4.1 Submersible Well Pump

Refer to Appendix A – Amphenol West Well Submersible Pump Design Information for design calculations and pump performance curves.

4.1.1 Design Overview

- A new Christensen 6CHC two-stage submersible pump powered by a 10 hp, 240V Centripro motor will be installed in the existing west well. The following design assumptions have been made:
 - Amphenol staff have indicated that the existing electrical service in the West Well is 240V.
 - NYSDEC has concluded that the January 2017 technical memorandum entitled “Supplemental TRE Investigations and West Well/ Parking Lot Site Remediation Review” by JTM Associates, LLC is acceptable, and that the west well groundwater depletion rate may be modified such that the rate matches the rate at which Amphenol requires the well water for its Plating facility.
- The well pump design point is 200 gpm at 120 feet total dynamic head (TDH). The following design assumptions were made:
 - New 4-inch diameter ductile iron well drop pipe will be provided.
 - The base of the pump will be set at approximately 110’ below the lower level of the West Well building. That elevation is noted as being approximately 870.0’ +/- 1’ above sea level.

4.1.2 Major Components

Submersible Pump

Make/Model: Christensen/VIS-WF

Size: 6CHC 2-Stages

Pump Power: CentriPro 10 hp

Motor Speed: 3,600 rpm

Phase/Frequency/Volts: 3/60Hz/240V

VFD: Existing Altivar Process 630 Series

Accessories: Existing flow meter, Transducer(s), float switch(es)

4.1.3 Pump Operating Points

The well pump design operating point has been selected to maintain a specified water level within the west well clear well, working in tandem with the new process water delivery pumps (refer to 4.2 below). A VFD will be used to soft start the pump, and reduce pump speed/output as the water level in the clear well approaches its “high level” set point. The VFD will also allow for manual control of the pump speed should the well level need to be modified/controlled. An existing flow meter and transducer (located at the base of the clear well) will be reinstalled and integrated into the new Honeywell PLC. Pump curves and variable speed pump curves for the proposed submersible pump are included in Appendix A.

Design Point: 200 GPM @ 120 feet TDH (95% speed)

4.1.4 Proposed General Sequence of Construction

1. Remove the existing vertical turbine west well pump and 6-inch well piping, to be completed by Layne.
2. Deliver and install the new 4-inch ductile iron well piping and the new submersible well pump, to be completed by Layne.
3. Evans Mechanical to install the new piping to the air stripper.
4. Electrical and Instrumentation and Controls contractors to complete the electrical and controls connections.
5. Complete startup and testing of the new submersible well pump.

4.2 Process Water Delivery Pumps

Refer to the Appendix B – Amphenol West Well Process Water Delivery Pumps Design Information for design calculations and pump performance curves.

4.2.1 Design Overview

- Two new Ebara EVMU32-3 stainless steel vertical multi-stage pumps powered by 15 hp, 240V motors will be installed in the west well building, outside of and adjacent to the existing clear well. The following design assumptions have been made:
 - Amphenol staff have indicated that the existing electrical service in the West Well Building is 240V.
 - The Plating facility process water demands as indicated by Amphenol are 90-160 gpm. There is a brief period (approximately 8 hours) per week where the flows are near zero.
- The single pump design point is 160 gpm at 210 feet total dynamic head (TDH).
 - New 4-inch diameter Schedule 80 PVC pipe will be used throughout the west well project except as noted.
 - The base of the pump will set at the base of the West Well's lower level. That elevation is noted as being approximately 980.0' +/- 1' above sea level.

4.2.2 Proposed General Sequence of Construction

1. Remove the existing vertical turbine process water delivery pumps and the associated piping and instruments that are no longer in use and/or have reached the end of their useful service life.
2. Install the 2 pumps, new suction/discharge piping and appurtenances.
3. Allow the Electrical and Instrumentation and Controls contractors to complete the electrical and controls connections.
4. Complete startup and testing of the new process water delivery pumps using a new 4" bypass line on the pump discharge side. This line will discharge directly back into the clear well, and should be "throttled" to simulate the total dynamic head (TDH) that the new pumps will "see" when pumping to the new hydro pneumatic pressure vessel.
5. Close the current Village water supply connection (close gate valve).

4.2.3 Major Components

Delivery Pumps

Make/Model: Ebara/EVMUG32-3F1500T3S

Size: 3F1500T3S 3-Stages

Pump Power: 15 hp

Motor Speed: 3,500 rpm

Phase/Frequency/Volts: 3/60Hz/240V

VFD's: Altivar Process 630 Series

Accessories: Transducer, Hydropneumatic tank

Hydropneumatic Tank

Make/Model: Wesflex Supertank/FXA 800L, or approved equal

Size: 211 gallons, or approved equal

Reference Appendix C – Hydropneumatic Tank Design Information

4.2.4 Pump Operating Points

The process water delivery pumps have been selected and sized to operate at a range of operating points to maintain a specified line pressure range (55-90 psi). VFD's will be used to soft start the pumps and to reduce pump speed/output as the demand is decreased and the line pressure is increased. A pressure transducer will monitor the line pressure and (in conjunction with the PLC) will shut the pump off should line pressure elevate above an operator adjustable "high level" set point. Pump curves and variable speed pump curves for the new process water delivery pumps are included in Appendix B.

Design Point: 160 GPM @ 220 feet TDH (100% speed)

4.3 Process Piping Materials

All existing piping interior to the West Well building is scheduled to be removed and disposed of as clean scrap, unless otherwise indicated. All new piping used in the project, unless shown otherwise, will be Schedule 80 PVC with a pressure rating of at least 300 psi. Refer to the Appendix D – Schedule 80 PVC Submittal for Schedule 80 PVC Specifications. *Final Submittals will be submitted by Evans Mechanical. Support systems, joints and thrust restrain shall be the responsibility of the Mechanical Contractor, Evans Mechanical, to accommodate maximum operating and surge pressures.

4.4 Village Water Supply (Backup) Connection

This project will make provisions for an emergency backup water supply connection to the Village of Sidney water system. In the event that the well water delivery pump system fails, a manually operated gate valve would be opened which would allow the Plating Facility to continue to operate on Village water while repairs are being made. The connection will include a new Watts LF909 backflow prevention device and will utilize the Village's existing Sensus flow meter located in the Old Plant building.

The new backflow prevention device will be installed and tested by a NYSDOH certified tester (provided by Evans Mechanical). During the initial shutdown, before the permanent Village water supply connection is in place, Evans Mechanical will install a temporary Village water supply connection. This connection will rely on the existing backflow prevention device (located in Amphenol's Boiler Room).

5.0 Construction Drawings

B&L, Evans Mechanical, JTM Associates, and Amphenol have conducted multiple site visits which have resulted in development of the West Well Flow Schematic, attached hereto as Figure 1, which depicts the basis of design described herein. The final construction drawings will be schematic in nature showing the final design layout, construction details, and major components and locations. Construction means and methods including connection details and methods, and make and model of valves and other appurtenances, which are not critical to the project design, are not specified on the construction drawings, but will be proposed by the Mechanical Contractor (Evans Mechanical) during the build portion of the project. B&L staff will be present during construction to witness installation, assist with field questions, and verify conformance with the basis of design and final construction drawings.

All electrical work and instrumentation and controls is being completed by others. B&L has coordinated with Amphenol's subcontractors to define Amphenol's desired process controls and associated instrumentation. We understand that Amphenol is having other improvements to the building completed by Evans that are not related to the West Well Improvements project designed by B&L. Work related to these building improvements, including any mechanical/electrical/structural work that is not specifically described above, has not been reviewed by B&L and is the responsibility of Amphenol and others.

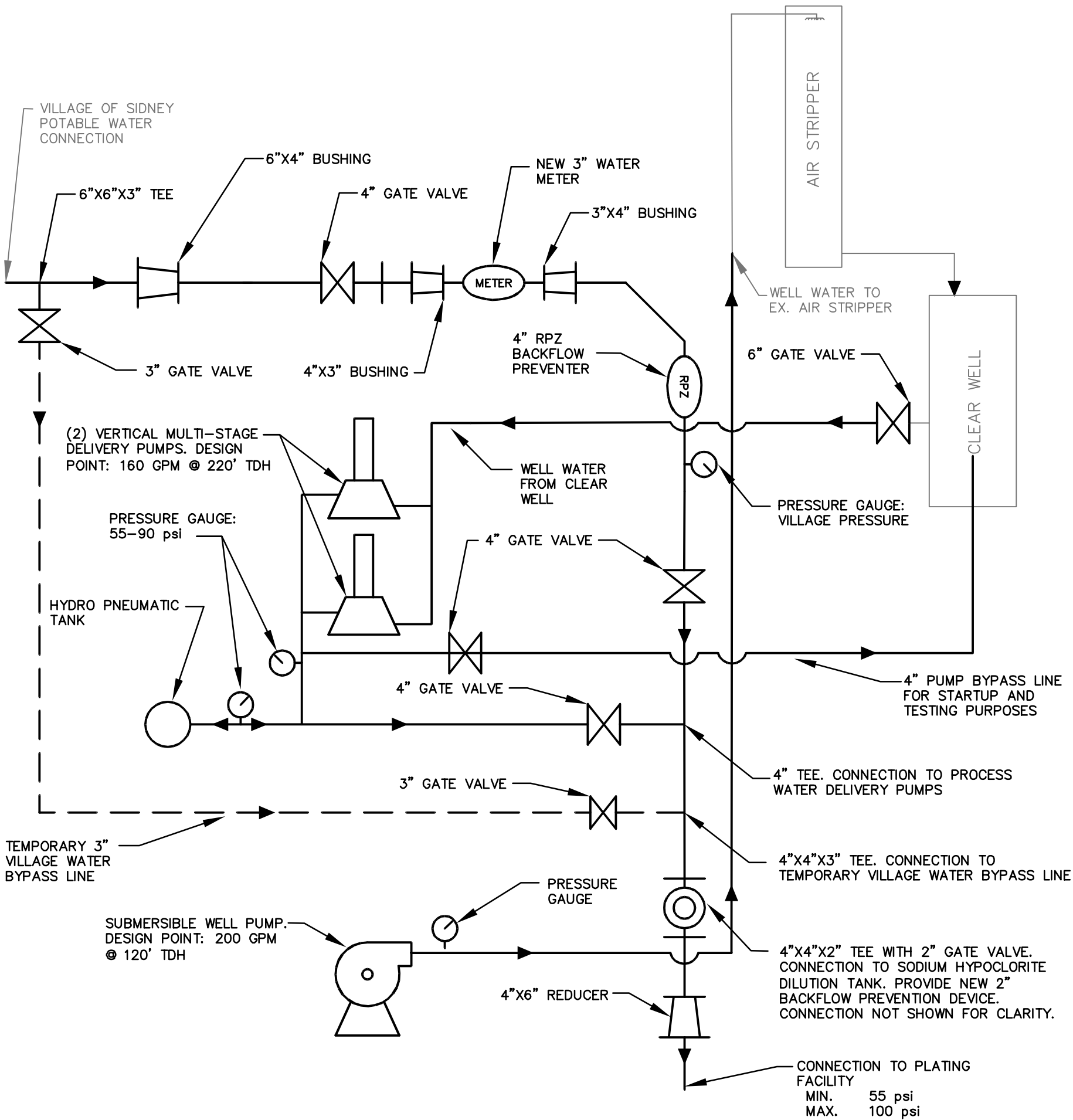
6.0 Construction Schedule

Work for the project is scheduled to begin during the summer shutdown between July 1st and July 9th, 2017. Based on the narrow window for construction, Evans intends to install a temporary bypass pipe to allow the Plating Facility to operate using only Village water while the West Well pumping system improvements are being constructed. The following completion dates are envisioned for the *General Sequence of Construction* milestones. It is anticipated that the start date is fixed, and the permanent Village water service connection will be before the end of the shutdown. The remaining dates and work milestones are estimates and may vary depending on the progress of work.

Construction Milestone	Completion Date
1. Break the Village water main connection contained in the west well pump house, drain the water from the line and from the clear well.	July 4 th
2. De-energize the existing pumps (Schuler Haas).	July 5 th
3. Disconnect and remove existing pumps and associated piping.	July 5 th
4. Install new Village supplied 3-inch water meter to be provided by Amphenol.	July 6 th
5. Complete the temporary Village bypass connection.	July 6 th
6. Reinstall water service to the Plating facility via the temporary Village bypass connection.	July 6 th
7. Install the permanent Village water service connection, complete with RPZ and Village water meter.	July 7 th
8. Disconnect the plating facility from the temporary Village bypass connection and reconnect through the permanent Village water service connection.	July 7 th
9. Remove the existing well pump and piping and replace it with a new submersible well pump and piping (Layne).	July 12 th
10. Install delivery pumps, associated valves and piping, and hydro pneumatic tank.	July 14 th
11. Complete all mechanical connections	July 14 th
12. Install instrumentation & control components (ACI)	July 17 th
13. Energize all pumps and associated instrumentation and controls (Schuler Haas)	July 17 th
14. Factory startup and testing on pumps and controls.	July 18 th
15. Disconnect from the Village connection using new process water delivery system as primary source of plating facility's non-contact cooling water.	July 18 th
16. Complete modifications to first floor grating.	July 21 st

Figure 1

West Well Demolition Plan

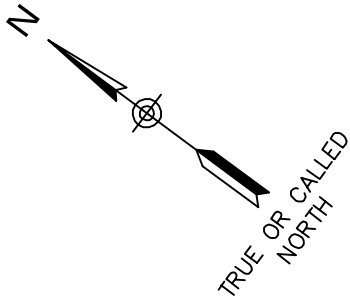


NOTES:

- 1) SCHEDULE 80 PVC EXCEPT WHERE SHOWN AS OTHERWISE
- 2) PROVIDE 2 $\frac{1}{2}$ " ISOLATION VALVES, 2 $\frac{1}{2}$ " CHECK VALVES AND FLANGE CONNECTION TO 2 $\frac{1}{2}$ " DELIVERY PUMP FLANGES W/ 4" STAINLESS STEEL HEADER TO DOWNSTREAM CONNECTION TO PROCESS WATER DELIVERY LINE. NOT SHOWN IN DRAWING FOR CLARITY.
- 3) WATTS LF909 RPZ BACKFLOW PREVENTER INSTALLED AND TESTED IN ACCORDANCE WITH DOH STANDARDS
- 4) NEW 3" WATER METER PROVIDED BY AMPHENOL (THROUGH THE VILLAGE OF SIDNEY)
- 5) ELECTRIC AND CONTROL WIRING BY SCHULER HAAS AND ACI CONTROLS.
- 6) CONSTRUCTION MEANS AND METHODS INCLUDING CONNECTION DETAILS AND METHODS, AND MAKE AND MODEL OF VALVES AND OTHER APPURTENANCES, WHICH ARE NOT CRITICAL TO THE PROJECT DESIGN, ARE NOT SPECIFIED, AND WILL BE THE RESPONSIBILITY OF THE MECHANICAL CONTRACTOR DURING THE BUILD PORTION OF THE PROJECT.
- 7) WORK RELATED TO BUILDING IMPROVEMENTS, INCLUDING MECHANICAL/ELECTRICAL/STRUCTURAL WORK THAT IS NOT SPECIFICALLY SHOWN IN THE DRAWINGS, HAS NOT BEEN REVIEWED BY B&L AND IS THE RESPONSIBILITY OF AMPHENOL AND OTHERS.



WEST WELL PROCESS WATER
DELIVERY SYSTEM
NTS



Barton
&L
Loguidice, D.P.C.



AMPHENOL CORPORATION
WEST WELL IMPROVEMENT PROJECT

WEST WELL FLOW SCHEMATIC
FINAL DESIGN

SIDNEY

DELAWARE COUNTY, NEW YORK

Figure Number

1

Project Number

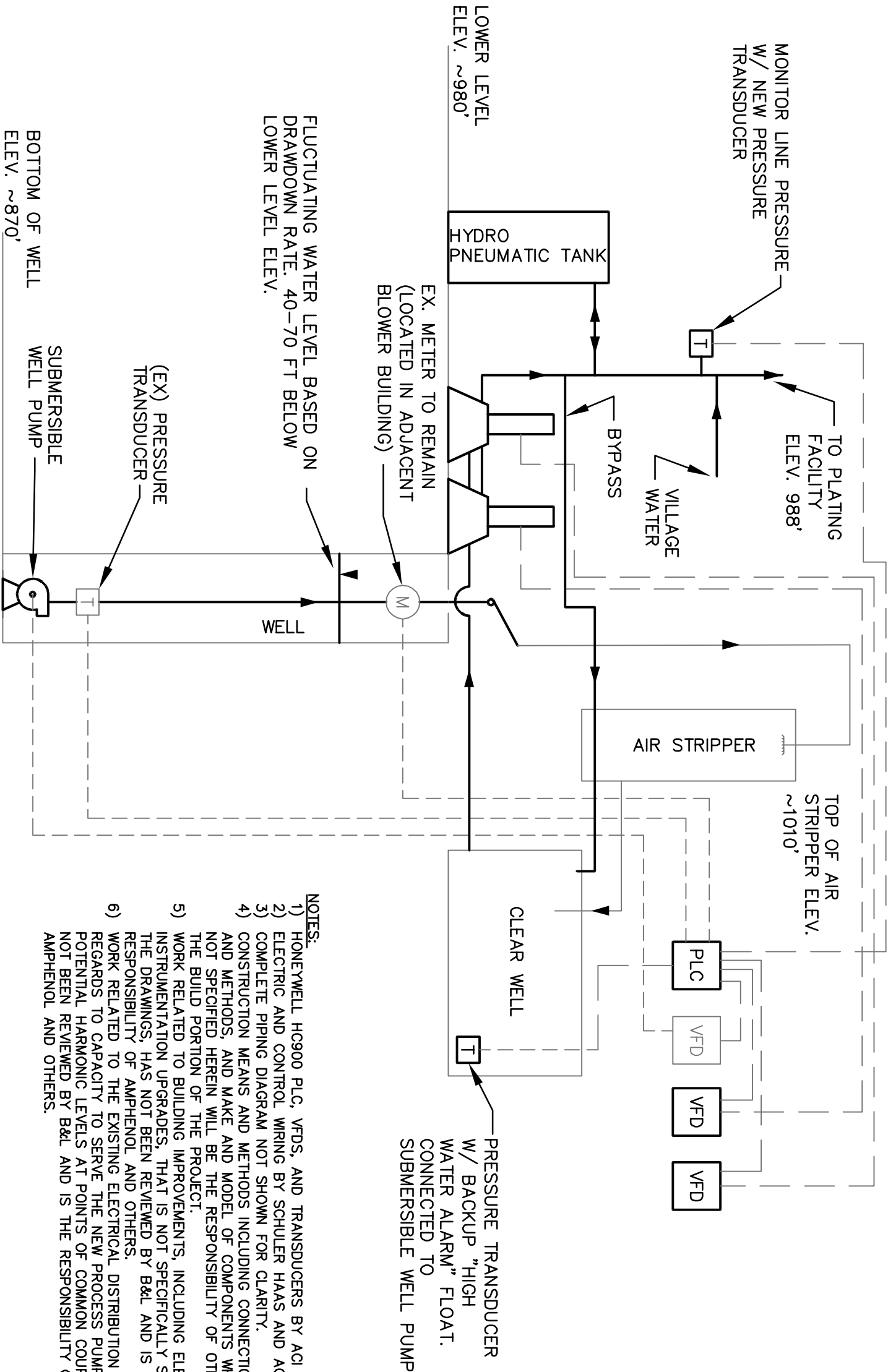
1153.008.002

Date
JUNE, 2017

Scale
N.T.S.

Figure 2

West Well Flow Schematic



WEST WELL PROCESS WATER
DELIVERY SYSTEM
NTS

- NOTES:
- 1) HONEYWELL HC900 PLC, VFDs, AND TRANSDUCERS BY ACI CONTROLS.
 - 2) ELECTRIC AND CONTROL WIRING BY SCHULER HAAS AND ACI CONTROLS.
 - 3) COMPLETE PIPING DIAGRAM NOT SHOWN FOR CLARITY.
 - 4) CONSTRUCTION MEANS AND METHODS INCLUDING CONNECTION DETAILS AND METHODS, AND MAKE AND MODEL OF COMPONENTS WHICH ARE NOT SPECIFIED HEREIN WILL BE THE RESPONSIBILITY OF OTHERS DURING THE BUILD PORTION OF THE PROJECT.
 - 5) WORK RELATED TO BUILDING IMPROVEMENTS, INCLUDING ELECTRICAL AND INSTRUMENTATION UPGRADES, THAT IS NOT SPECIFICALLY SHOWN IN THE DRAWINGS, HAS NOT BEEN REVIEWED BY B&L AND IS THE RESPONSIBILITY OF AMPHENOL AND OTHERS.
 - 6) WORK RELATED TO THE EXISTING ELECTRICAL DISTRIBUTION SYSTEM, IN REGARDS TO CAPACITY TO SERVE THE NEW PROCESS PUMPS AND POTENTIAL HARMONIC LEVELS AT POINTS OF COMMON COUPLING, HAS NOT BEEN REVIEWED BY B&L AND IS THE RESPONSIBILITY OF AMPHENOL AND OTHERS.

AMPHENOL CORPORATION
WEST WELL IMPROVEMENT PROJECT

WEST WELL FLOW SCHEMATIC
FINAL DESIGN

SIDNEY

DELAWARE COUNTY, NEW YORK

NO ALTERATION PERMITTED
HEREIN EXCEPT AS PROVIDED
BY THE NEW YORK STATE
EDUCATION LAW.

COMPLETED CONSTRUCTION

Significant Construction
Changes Are Shown

By: _____ Date: _____
Ck'd: _____ Date: _____

REVISIONS



Date
JUNE, 2017

Scale
N.T.S.

Sheet Number

2

Project Number

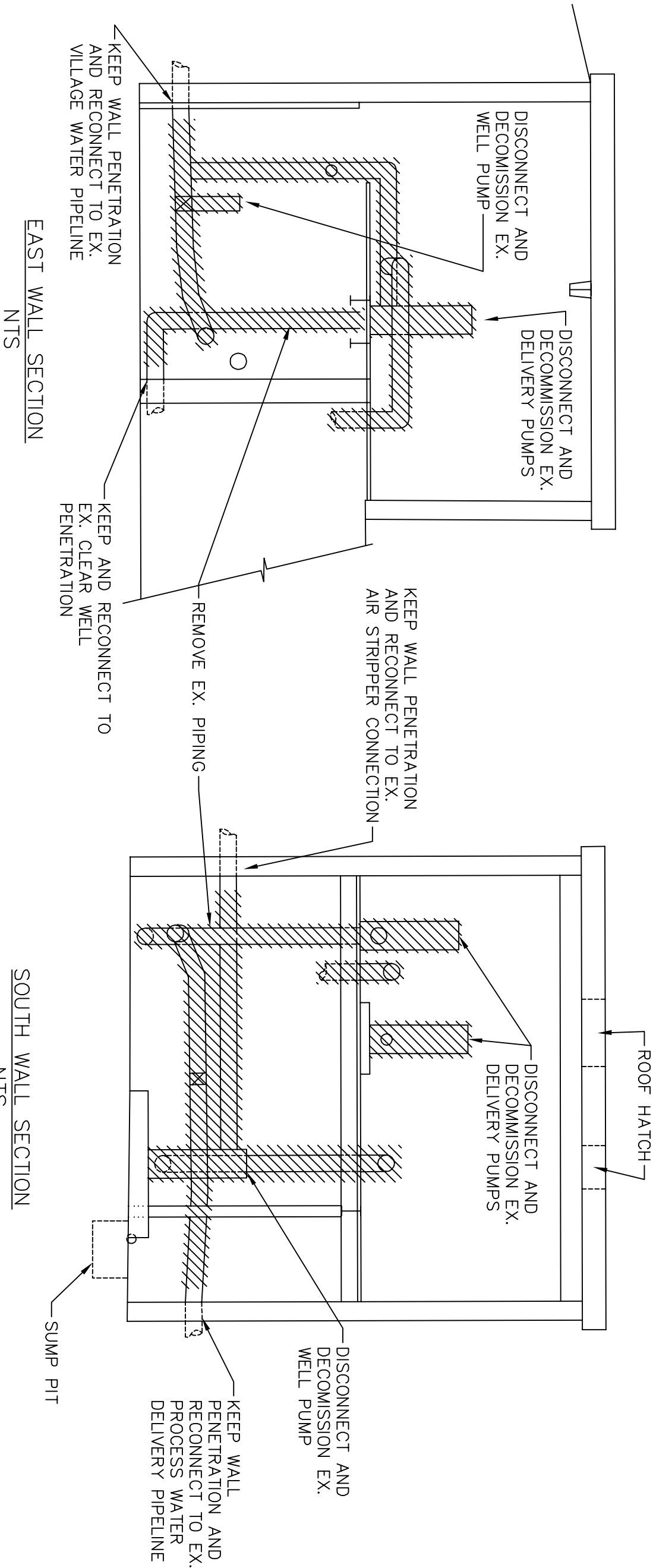
1153.008.002

Barton
& L
oguidice, D.P.C.

EXISTING
I&C
NEW PIPING

Figure 3

West Well Flow Schematic

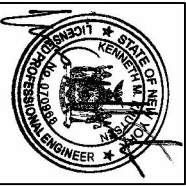


NOTES:

- 1.CONTRACTOR SHALL FIELD VERIFY ALL EXISTING UTILITIES PRIOR TO CONSTRUCTION.
- 2.CONTRACTOR SHALL ARRANGE THE SHUT OFF OF UTILITIES WITH THE OWNER AND ALL UTILITY COMPANIES, AS NECESSARY. VERIFY THAT UTILITIES HAVE BEEN DISCONNECTED AND/OR CAPPED BEFORE STARTING DEMOLITION OPERATIONS.
- 3.CONTRACTOR SHALL COORDINATE WITH THE OWNER FOR TAGGING OF ANY MECHANICAL OR ELECTRICAL EQUIPMENT FOR SALVAGE. CONTRACTOR SHALL REMOVE AND DISPOSE OF ALL OTHER EQUIPMENT AS SHOWN ON THE PLANS AND AS PREVIOUSLY COORDINATED.
- 4.DO NOT USE CUTTING TORCHES UNTIL WORK AREA IS CLEARED OF FLAMMABLE MATERIALS. AT CONCEALED SPACES, SUCH AS DUCT AND PIPE INTERIORS, VERIFY CONDITION AND CONTENTS OF CONCEALED SPACE PRIOR TO FLAME-CUTTING OPERATIONS.



EXISTING TO
BE REMOVED



AMPHENOL CORPORATION
WEST WELL IMPROVEMENT PROJECT
WEST WELL DEMOLITION PLAN
FINAL DESIGN

SIDNEY

DELAWARE COUNTY, NEW YORK

NO ALTERATION PERMITTED HEREON EXCEPT AS PROVIDED UNDER SECTION 7208, NEW YORK STATE EDUCATION LAW.	
COMPLETED CONSTRUCTION	
Significant Construction Changes Are Shown	
By _____	Date _____
Ck'd _____	Date _____

REVISIONS

Date
JUNE, 2017

Scale
N.T.S.

Sheet Number
3

Project Number
1153.008.002

Appendix A

Amphenol West Well Submersible Pump Design Information



Engineers • Environmental Scientists • Planners • Landscape Architects

443 Electronics Parkway
Liverpool, NY 13088

Telephone: 315-457-5200 • Facsimile: 315-451-0052

JOB	Amphenol West Well		
SHEET NO.	1	OF	2
CALCULATED BY	LJT	DATE	5/30/2017
CHECKED BY	KMK	DATE	6/4/2017
SUBJECT	Submersible West Well System Curve		

Determine (Static) Head

Well water level from Layne Drawdown Test Report (depth below lower floor elevation)

0 gpm	40 ft
150 gpm	55 ft
220 gpm	70 ft
300 gpm	75 ft

Determine Friction Head

Pipe Segment	Pump Discharge
Pipe Material	DIP Class 52
C Value	100
Pipe I.D.(inch)	4.22
I.D. (FT)	0.352

	<u>NO.</u>	<u>@</u>	<u>FEET</u>
Pipe (FT)			160
Check Valve	1	23	23.0
Gate Valve	2	3	5.0
Globe Valve			0.0
90 Bend S.R.	4	11	44.0
Tee (Line)			0.0
45 Bend			0.0
Tee (90)	2	20	40.0
Contraction (d/D=1/4)	1	10	10.0
Entrance Loss	1	9	9.0
Equivalent Length			291

Flow (gpm)	0
Velocity (ft/sec)	0.0
Friction Loss (ft/ft)	0.0
Friction Loss (ft)	0.0
TDH (FT) @ 0 GPM =	40 ft

Flow (gpm)	150
Velocity (ft/sec)	3.4
Friction Loss (ft/ft)	0.0
Friction Loss (ft)	5.8
TDH (FT) @ 150 GPM =	61 ft

Flow (gpm)	220
Velocity (ft/sec)	5.0
Friction Loss (ft/ft)	0.0
Friction Loss (ft)	11.8
TDH (FT) @ 220 GPM =	82 ft



Engineers • Environmental Scientists • Planners • Landscape Architects

443 Electronics Parkway

Liverpool, NY 13088

Telephone: 315-457-5200 • Facsimile: 315-451-0052

JOB Amphenol West Well

SHEET NO. 2 OF 2

CALCULATED BY LJT DATE 5/30/2017

CHECKED BY DATE

SUBJECT Submersible West Well System Curve

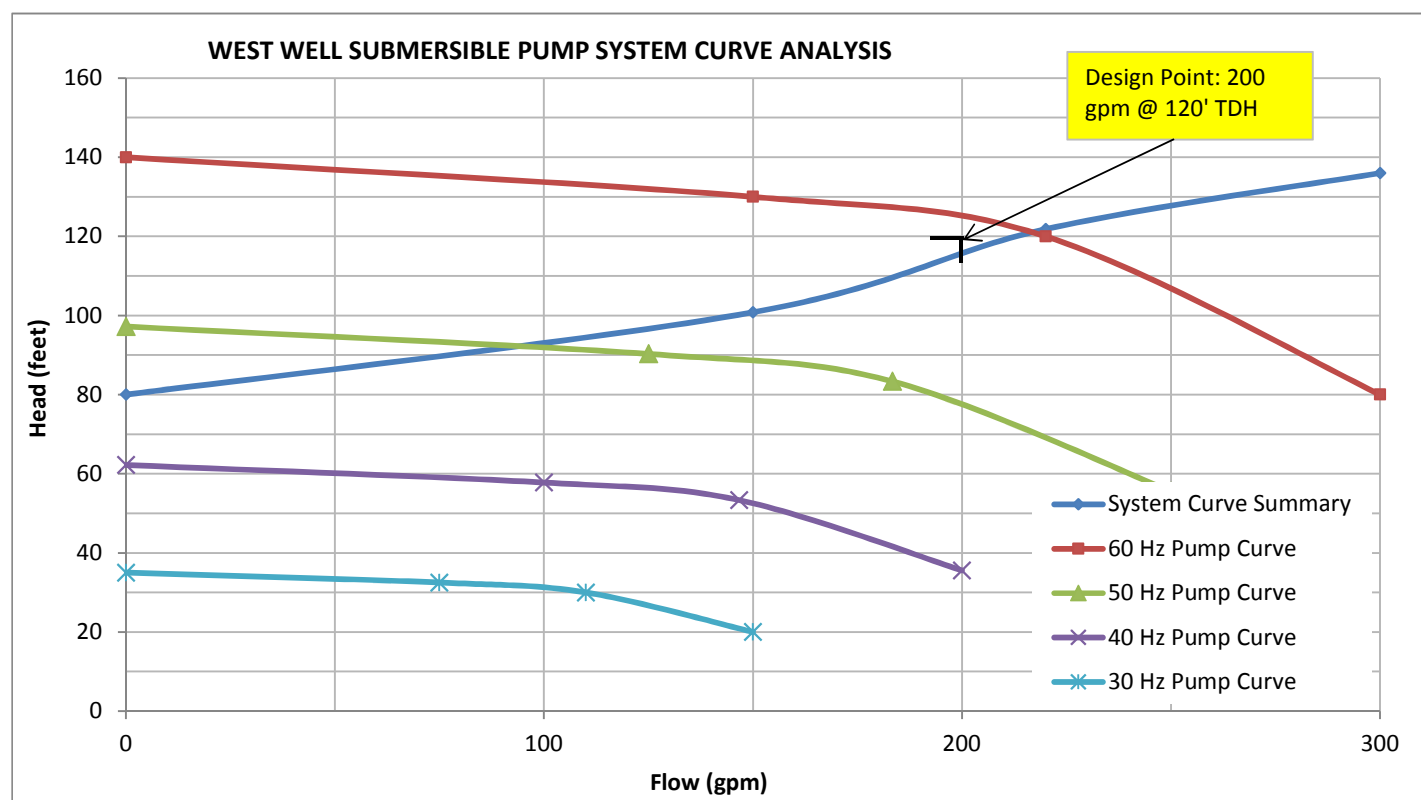
Flow (gpm) 300
Velocity (ft/sec) 6.9
Friction Loss (ft/ft) 0.1
Friction Loss (ft) 21.0
TDH (FT) @ 300 GPM = 96 ft

Add friction losses from spray nozzle located at the top of air stripper
Estimated to be equivalent of 40'

System Curve Summary

Variable Speed Pump Curve - Goulds 6CHC 2 stage, 15 HP

Flow (gpm)	Head (ft)	Nozzle (ft)	60		50		40		30		Hz RPM
			3500		2917		2333		1750		
			Flow	Head	Flow	Head	Flow	Head	Flow	Head	
0	80	40	0	140	0	97	0	62	0	35	
150	101	40	150	130	125	90	100	58	75	33	
220	122	40	220	120	183.33	83	147	53	110	30	
300	136	40	300	80	250	56	200	36	150	20	



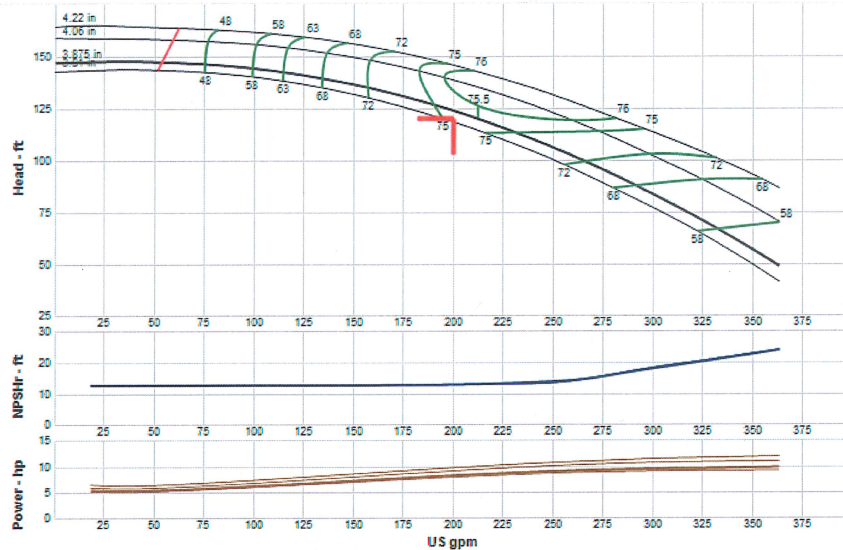


PERFORMANCE CURVE

Quote Number: 3301-170424-029:1

Model: VIS-WF

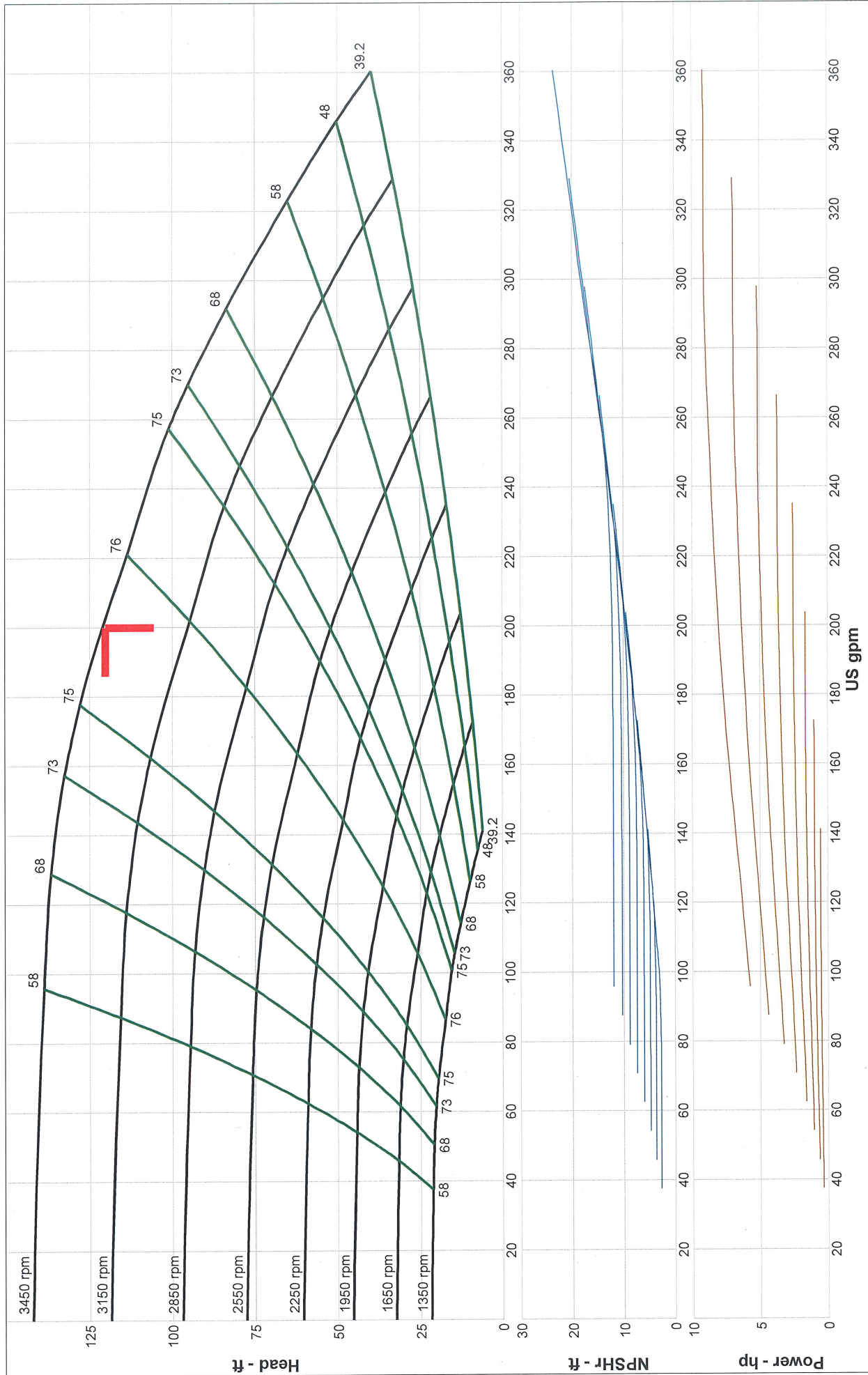
Size: 6CHC 2 Stage(s)



Driver Size Criteria:	Max power on design curve (NOL)	Best Efficiency:	75.50 %
Speed:	3480 RPM	Flow at BEP:	212.00 USGPM
Impeller Trim:	3.875 inch	Min Flow:	53.00 USGPM
Additional Impeller Trim:	3.8750 inch	Derate Factor:	1.0000
Frequency:	60 Hz	Specified NPSH Avail:	34.00 ft
Impeller Maximum Trim:	4.220 inch	NPSH Required:	13.00 ft
Specified Flow:	200.00 USGPM	Shut-Off Head:	147.00 ft
Specified Head:	120.000 ft	Fluid Type:	Water
Head at Design:	124.00 ft	Temperature / Specific Gravity:	70.00°F / 0.9999
Efficiency at Design:	75.30 %	Viscosity:	0.9695 cP
Power at Design:	8 Hp	Allowable Sphere Size:	0.47 inch
Flow on Design Trim @ Max Pwr:	363.00 USGPM	Thrust K Factor:	2.10 lbs/ft
Max Power on Design Curve:	9.88 Hp	Additional Thrust K Factor:	2.10 lbs/ft

DO NOT USE FOR CONSTRUCTION UNLESS CERTIFIED

Certified by	
Date of certification	
Pump serial number	
Project Name	Amphenol Pump 2
Tag	



Discharge Sizes-3", 4". Curves are certified for water at 60°F only. Consult factory for performance with any other fluid.

Company: Xylem
Name:
4/24/2017

Submersible 60 Hz
Catalog: Goulds Sub 60Hz, Vers 3.63
Submersible - 3600

Size: 6CHC 2 stage
Speed: 1350 - 3450 rpm
Dia: 3.9375 in
Curve: E6206CCPC2



TURBINE SUBMITTAL

Quote Number: 3301-170424-029:1

Model: VIS-WF

Size: 6CHC 2 Stage(s)

OPERATING CONDITIONS

Temp / SG: 70.00° F / SP.GR 0.9999
Fluid type: Water
Vapor pressure 0.3633 psi
Viscosity 0.9695 cP
Specified flow: 200.00 USGPM
Total dynamic head: 124.00 ft
Pumping level: 0.00 ft

PERFORMANCE AT 3480 RPM

Bowl efficiency: 75.30 % @design, 75.50 % Best Efficiency
Run out capacity: 363.00 USGPM
Power: 8 Hp @design, 9.88 Hp NOL
NPSHr: 13.00 ft @design
Design thrust: 265.00 lb @design
Shut off pressure: 63.63 psi

MATERIALS AND DIMENSIONS

Bowl: Cast Iron CL30 Enamel
Bowl Wear Ring Material: None
Impeller: 316SS
Impeller Wear Ring Material: Not Included
Impeller Balance: Mnf.Standard
Impeller Lock Method: Taper lock
Impeller diameter: 3.875 inch
Bowl shaft: 416SS, 1.000 inch diam.
Suction adapter bearings Bronze C90300 "G" Modified
Bowl bearings: Bronze
Suction adapter: Ductile Iron 65-45-12
Bowl features No Added Features
TPL: 0.00 ft
Sump/Pit Depth: 0.00 ft
Documentation: Standard pump installation and operation manual and order data

DRIVER

Type: Standard
Manufacturer: CentriPro
Rating: 10 Hp [7.5 kW]
Motor Diameter / Frame / Enclosure: 6 inch / 6 inch / SUBM
Phase / Frequency / Volts 3 / 60 Hz / 230
Speed: 3600 RPM
Construction: STD

DO NOT USE FOR CONSTRUCTION UNLESS CERTIFIED

Certified by:

Date

Quotation number:

3301-170424-029

Project:

Amphenol Pump 2

Tag:



TURBINE SUBMITTAL

Quote Number: 3301-170424-029:1

Model: VIS-WF

Size: 6CHC 2 Stage(s)

Coupling material: SST 416

TESTING

Hydrostatic: None

Performance: None

Final Inspection: None

Other: None

COATING

Coating information: Standard Green Enamel; Bowl Assembly - STD; Riser Assembly - STD; Head Assembly - STD

ADDITIONAL FEATURES

Check valve: None

Sanitary Well Seal: No

Additional bowl features: None added

Additional riser features: None added

Additional driver features: None added

Additional head features: None added

Additional misc. features: None added

WEIGHTS

Total bowl weight: 75 lbs

Column weight: 0 lbs

Head weight: 0 lbs

Driver weight: 143 lbs

Total unit weight: 218 lbs

Our offer does not include specific review and incorporation of any Statutory or Regulatory Requirements and the offer is limited to the requirements of the design specifications. Should any Statutory or Regulatory requirements need to be reviewed and incorporated then the Customer is responsible to identify those and provide copies for review and revision of our offer.

Our quotation is offered in accordance with our comments and exceptions identified in our proposal and governed by our standard terms and conditions of sale – Xylem Americas attached hereafter.

For units requiring performance test, all performance tests will be conducted per ANSI/HI 14.6 standards unless otherwise noted in the selection software submittal documents. Test results meeting with grade 2B tolerances for pumps with a rated shaft power of 134HP or less and grade 1B for greater than 134HP will be considered passing.

Customer is responsible for verifying that the recommendations made and the materials selected are satisfactory for the Customer's intended environment and Customer's use of the selected pump. Customer is responsible for determining the suitability of Xylem recommendations for all operating conditions within Customer's and/or End User's control. Xylem disclaims all warranties, express or implied warranties, including, but not limited to, warranties of merchantability and fitness for a particular purpose and all express warranties other than the limited express warranty set forth in the attached standard terms and conditions of sale – Xylem Americas attached hereafter.

Xylem does not guarantee any pump intake configuration. The hydraulic and structural adequacies of these structures are the sole responsibility of the Customer or his representatives. Further, Xylem accepts no liability arising out of unsatisfactory pump intake field operating conditions.

The Customer or his representatives are referred to the Hydraulic Institute Standards for recommendations on pump intake design. To optimize the hydraulic design of a field pump intake configuration, the Customer should strongly consider performing a detailed scale model pump intake study. However, the adequacies of these recommendations are the sole responsibility of the Customer.

DO NOT USE FOR CONSTRUCTION UNLESS CERTIFIED

Certified by:

Date

Quotation number:

3301-170424-029

Project:

Amphenol Pump 2

Tag:



HYDRAULIC ANALYSIS

Quote Number: 3301-170424-029:1

Model: VIS-WF

Size: 6CHC 2 Stage(s)

OVERALL PUMP PARAMETERS

Capacity:	200.00 USGPM	Total Dynamic Head:	124.00 ft
Total Pump Length:	0.00 ft	Impeller Trim:	3.875 inch
Pump Type:	VIS -Submersible Vertical Turbine (Borehole) Pumps	Number of Stages:	2
Pump K-Factor:	2.10 lbs/ft	Pumping Level:	0.00 ft
Additional Pump K-Factor:	2.10 lbs/ft		
Pump Operating Speed [RPM]:	3480		

BOWL DATA

Total Bowl Length:	24.570 inch	Bowl Shaft Limit :	139 Hp
Bowl Shaft Diameter:	1.000 inch	Bowl Shaft Material:	416SS
Bowl Diameter:	5.500 inch		

COLUMN DATA

Column Diameter :	4 inch	Column Elongation:	0.00001 inch
Column Wall Thickness:	0.230 inch	Shut Off Column Elongation:	0.00001 inch
Column Load:	177.60 lb		

HORSEPOWER DATA

Bowl Hp at Design:	8 Hp	Rating:	10 Hp [7.5 kW]
Thrust Load Loss:	0.00000 Hp		

OTHER DATA

Hydraulic Thrust:	260.40 lb	Actual Head Above Grade:	123.69 ft
Thrust at Shut Off:	313.27 lb	Shut Off Discharge Pressure:	63.63 psi
Column Loss:	0.02 ft	NPSHa:	34.00 ft
Head Loss:	0.30 ft	NPSHr:	13.00 ft @design
Total Loss:	0.31 ft	NPSH Margin:	2.00 ft
Thrust at Design:	265.00 lb		

EFFICIENCY DATA

Bowl Efficiency:	75.50 %	Overall Efficiency:	0.00 %
Motor Efficiency:	0.00 %	KWH per 1000 gallons:	0.00
Pump Efficiency:	75.10 %		

FLUID DATA

Fluid Type:	Water	Specific Gravity:	0.9999
Temperature:	70.00°F	Viscosity:	0.9695 cP

COMPONENT WEIGHTS

Bowl Weight:	75 lbs	Column Weight:	0 lbs
Head Weight:	0 lbs	Can Weight:	
Driver Weight:	143 lbs	Total Pump Weight:	218 lbs

DO NOT USE FOR CONSTRUCTION UNLESS CERTIFIED

Certified by	
Date of certification	
Pump serial number	
Project Name	Amphenol Pump 2
Tag	



OUTLINE DRAWING

Quote Number: 3301-170424-029:1

Model: VIS-WF

Size: 6CHC 2 Stage(s)

PUMP DATA

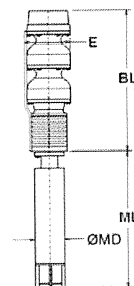
No. of Units	1.00	each
Model:	VIS-WF 6CHC	
Stages:	2	
Riser Size:	4	
Flow:	200.00	USGPM
Head:	124.00	ft
Driver Mfq:	CentriPro	
Rating:	10 Hp [7.5 kW]	
Speed:	3480	RPM
PH:	3	
Frequency:	60	Hz
Voltage:	230	

DIMENSIONS

AD	0.00	inch
BL	24.57	inch
COL	4.00	inch
DD	0.00	inch
MIN SUB	13.58	inch
DH	0.00	inch
G	0.00	inch
H	0.00	inch
HH	0.00	inch
J	0.00	inch
K	0	
MD	6	inch
ML	26.97	inch
E (R)	0.00	inch
TPL	0.00	inch
CV Dia.		
Head		
Flanged	150#	
Rating		

Weights

Total bowl	75	lb
Total column	0.00	lb
Discharge head	0	lb
Driver	143	lb
Approx weight	218	lb



No. NOTES

- 1 T.P.L. (Total Pump Length) is the distance to lowest projection on pump \pm 1.0 inch.
- 2 Tolerance on all dimensions is .12 or \pm .12 inch per 5 ft, whichever is greater.
- 3 All dimensions shown are in inches unless otherwise specified.
- 4 Drawing not to scale.

DO NOT USE FOR CONSTRUCTION UNLESS CERTIFIED

Certified by	
Date of certification	
Pump serial number	
Project Name	Amphenol Pump 2
Tag	

Appendix B

Amphenol West Well Process Water Delivery Pumps Design Information



Engineers • Environmental Scientists • Planners • Landscape Architects

443 Electronics Parkway
Liverpool, NY 13088

Telephone: 315-457-5200 • Facsimile: 315-451-0052

JOB	Amphenol West Well		
SHEET NO.	1	OF	2
CALCULATED BY	LJT	DATE	5/30/2017
CHECKED BY	KMK	DATE	6/4/2017
SUBJECT	Process Water Delivery System Curve		

Determine Static Head

Static Head (Lawson Survey)

Lower Level of west well: 980 ft

~Elevation of Pipe at NE corner of plating: 988 ft

Static Head: 8 ft

Determine Friction Head

Pipe Segment	Pump Discharge	W. Well to Plating Bldg.
Pipe Material	Schedul 80 PVC	Class 52 DIP
C Value	120	100
Pipe I.D.(inch)	3.83	6.28
I.D. (FT)	0.319	0.523

	<u>NO.</u>	<u>@</u>	<u>FEET</u>		<u>NO.</u>	<u>@</u>	<u>FEET</u>
Pipe (FT)			50				75
Check Valve	1	23	23.0			51	0
Gate Valve	2	3	5.0	1	4	4	
Globe Valve			0.0			9	0
90 Bend S.R.	4	11	44.0	2	16	32	
Tee (Line)			0.0			11	0
45 Bend			0.0			9	0
Tee (90)	2	20	40.0			31	0
Contraction (d/D=1/4)	1	10	10.0			10	0
Entrance Loss	1	9	9.0			9	0
Equivalent Length			181				111

Flow (gpm)		0		0
Velocity (ft/sec)		0.0		0.0
Friction Loss (ft/ft)		0.0		0.0
Friction Loss (ft)		0.0		0.0
TDH (FT) @		0 GPM	=	8 ft

Flow (gpm)		90		90
Velocity (ft/sec)		2.5		0.9
Friction Loss (ft/ft)		0.0		0.0
Friction Loss (ft)		1.6		0.1
TDH (FT) @		90 GPM	=	10 ft

Flow (gpm)		160		160
Velocity (ft/sec)		4.5		1.7
Friction Loss (ft/ft)		0.0		0.0
Friction Loss (ft)		4.7		0.4
TDH (FT) @		160 GPM	=	13 ft



Engineers • Environmental Scientists • Planners • Landscape Architects

443 Electronics Parkway

Liverpool, NY 13088

Telephone: 315-457-5200 • Facsimile: 315-451-0052

JOB Amphenol West Well

SHEET NO. 2 OF 2

CALCULATED BY LJT DATE 5/30/2017

CHECKED BY DATE

SUBJECT Process Water Delivery System Curve

Flow (gpm)	200	200
Velocity (ft/sec)	5.6	2.1
Friction Loss (ft/ft)	0.0	0.0
Friction Loss (ft)	7.1	0.5
TDH (FT) @ 200 GPM = 16 ft		

Add equivalent of 90 psi for maximum desired pressure at the northeast corner of the plating facility

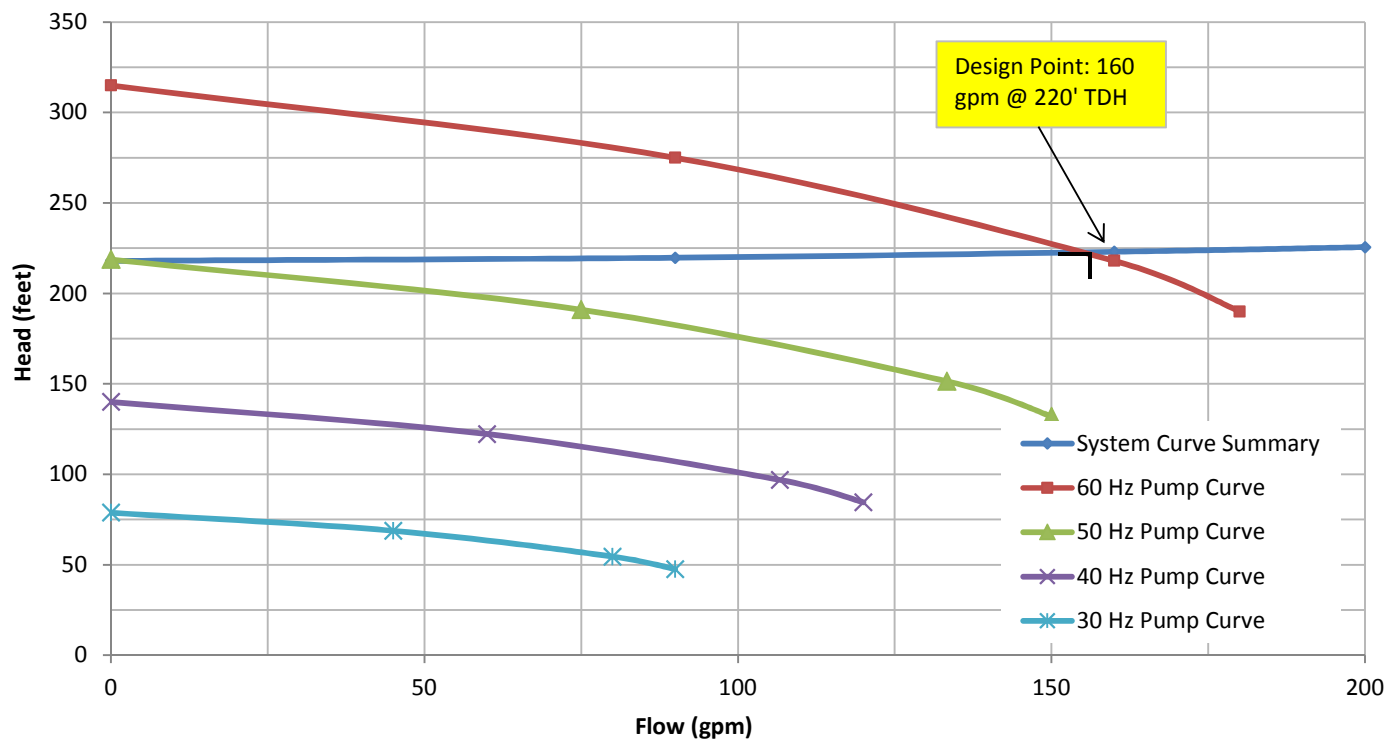
Add 90 psi = 210 ft

System Curve Summary

Variable Speed Pump Curve - Ebara EVMU32-3, 3 stages, 15 HP

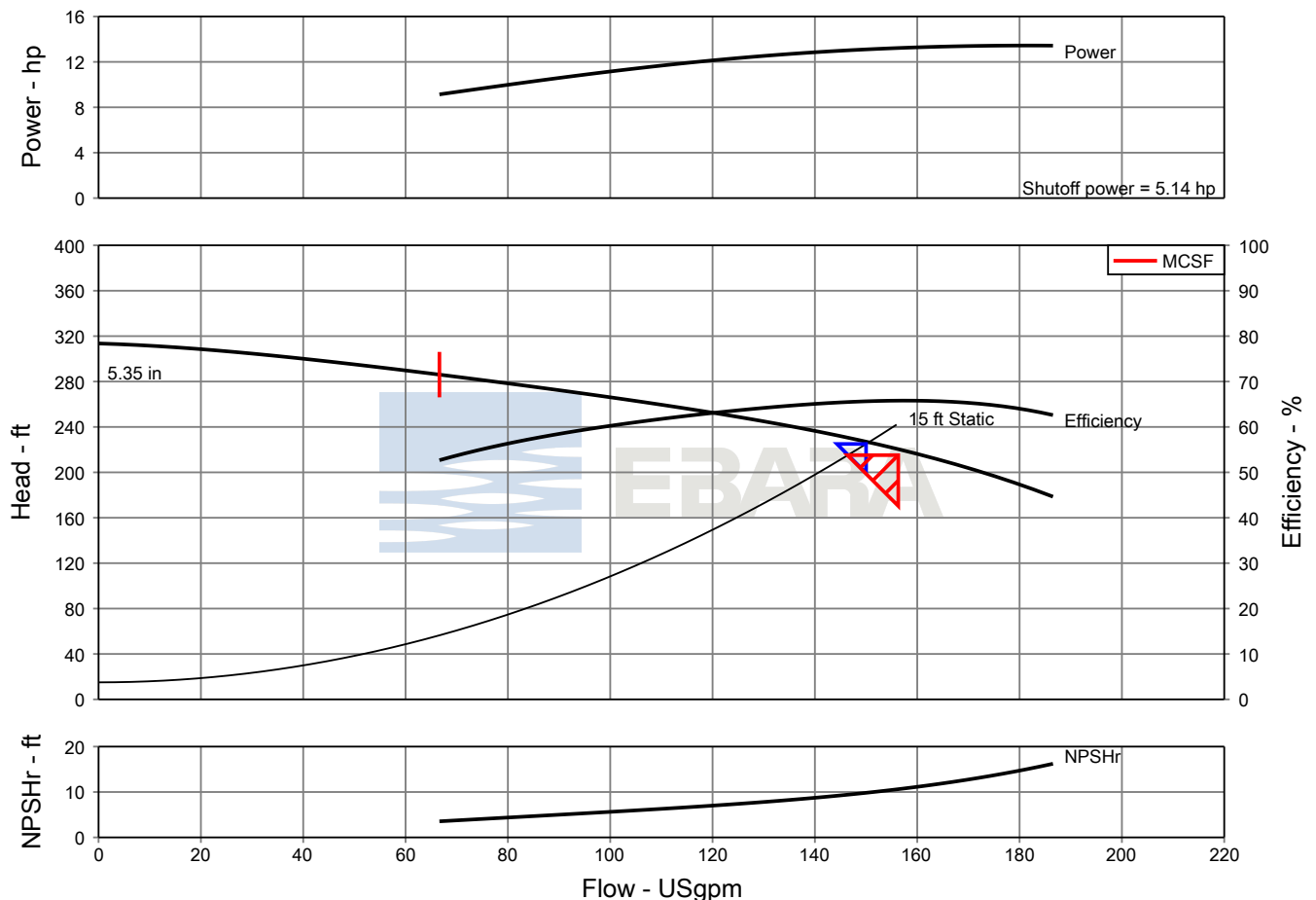
Flow (gpm)	Head (ft)	Max. desired pressure (ft)	60		50		40		30		Hz RPM
			3500		2917		2333		1750		
			Flow	Head	Flow	Head	Flow	Head	Flow	Head	
0	218	210	0	315	0	219	0	140	0	79	
90	220	210	90	275	75	191	60	122	45	69	
160	223	210	160	218	133.33	151	107	97	80	55	
200	226	210	180	190	150	132	120	84	90	48	

PROCESS WATER DELIVERY PUMP SYSTEM CURVE ANALYSIS (SINGLE PUMP)



Item number	: Default	Product Description	: EVMU32-3
Service	:	Stages	: 3
Quantity	: 1	Based on curve number	: EVMU32-3
Quote number	:	Date last saved	: 31 May 2017 4:52 PM

Operating Conditions		Liquid	
Flow, rated	: 156.3 USgpm	Liquid type	: Water
Differential head / pressure, rated (requested)	: 215.2 ft	Additional liquid description	:
Differential head / pressure, rated (actual)	: 220.4 ft	Solids diameter, max	: 0.00 in
Suction pressure, rated / max	: 0.00 / 0.00 psi.g	Solids concentration, by volume	: 0.00 %
NPSH available, rated	: Ample	Temperature, max	: 68.00 deg F
Frequency	: 60 Hz	Fluid density, rated / max	: 1.000 / 1.000 SG
Performance		Viscosity, rated	: 1.00 cP
Speed, rated	: 3480 rpm	Vapor pressure, rated	: 0.00 psi.a
Impeller diameter, rated	: 5.35 in	Material	
Impeller diameter, maximum	: 5.35 in	Material selected	: Stainless Steel
Impeller diameter, minimum	: 5.35 in	Pressure Data	
Efficiency	: 65.79 %	Maximum working pressure	: 95.42 psi.g
NPSH required / margin required	: 10.62 / 0.00 ft	Maximum allowable working pressure	: 232.0 psi.g
Ns (imp. eye flow) / Nss (imp. eye flow)	: 1,750 / 7,332 US Units	Maximum allowable suction pressure	: N/A
MCSF	: 66.62 USgpm	Hydrostatic test pressure	: N/A
Head, maximum, rated diameter	: 313.5 ft	Driver & Power Data (@Max density)	
Head rise to shutoff	: 42.24 %	Driver sizing specification	: Rated power
Flow, best eff. point	: 157.7 USgpm	Margin over specification	: 0.00 %
Flow ratio, rated / BEP	: 99.14 %	Service factor	: 1.15
Diameter ratio (rated / max)	: 100.00 %	Power, hydraulic	: 8.70 hp
Head ratio (rated dia / max dia)	: 100.00 %	Power, rated	: 13.22 hp
Cq/Ch/Ce/Cn [ANSI/HI 9.6.7-2010]	: 1.00 / 1.00 / 1.00 / 1.00	Power, maximum, rated diameter	: 13.44 hp
Selection status	: Acceptable	Minimum recommended motor rating	: 15.00 hp / 11.19 kW (Fixed)

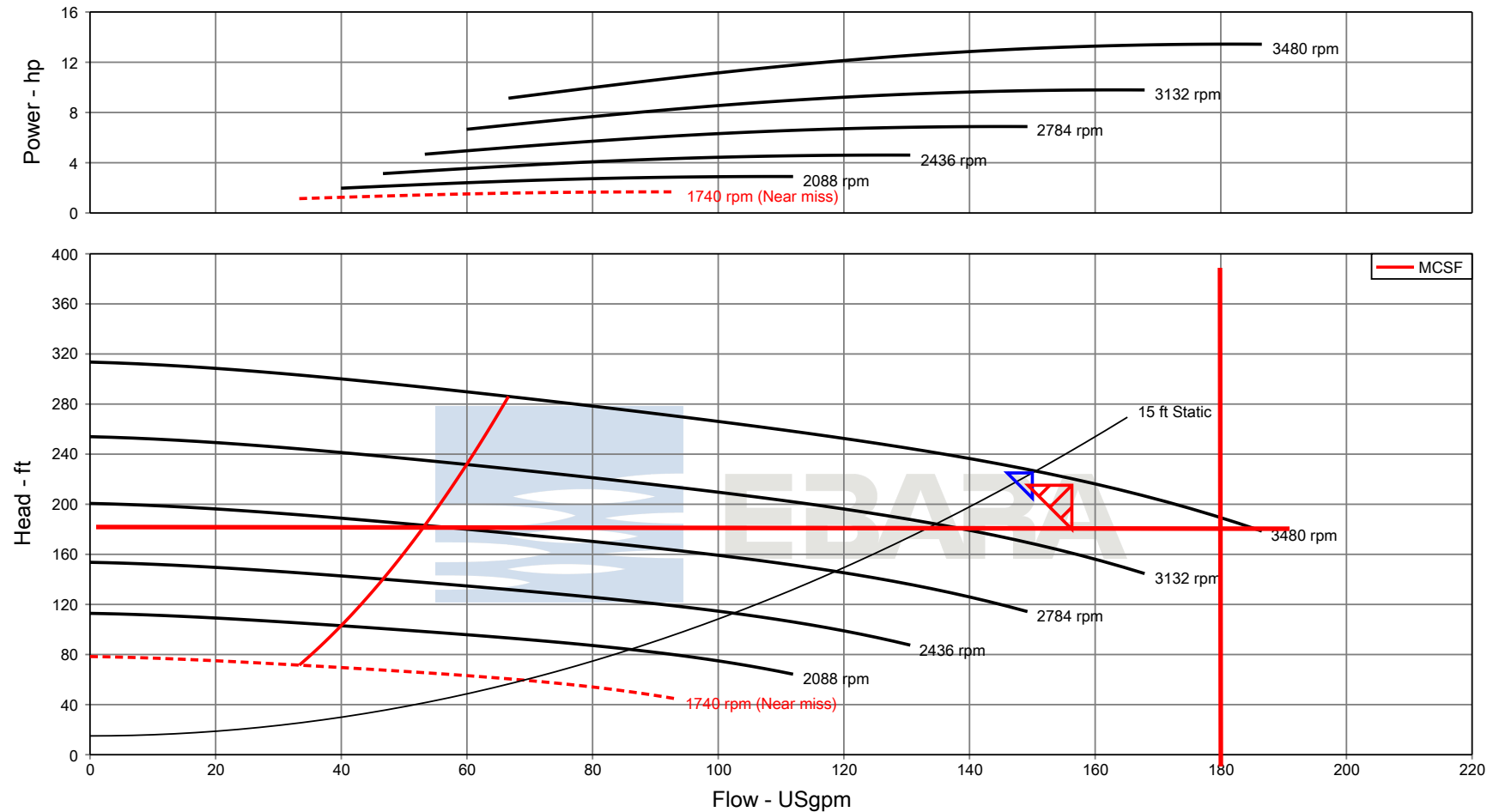




Customer : Siewert Eq
Reference : EVMU 32-3-2

Multi-Speed Performance Curve

Ebara Quotation System 17.2.2.0



Item number	: Default	Product Description	: EVMU32-3	Flow, rated	: 156.3 USgpm
Service	:	Stages	: 3	Differential head / pressure, rated	: 215.2 ft
Quantity	: 1	Efficiency	: 65.79 %	Speed, rated	: 3480 rpm
Quote number	:	Power, rated	: 13.22 hp	Impeller diameter, rated	: 5.35 in
Based on curve number	: EVMU32-3	NPSH required	: 10.62 ft	Fluid density, rated / max	: 1.000 / 1.000 SG
Date last saved	: 31 May 2017 5:03 PM	Frequency	: 60 Hz	Viscosity	: 1.00 cP
		Nominal speed	: 3480 rpm	Cq/Ch/Ce/Cn [ANSI/HI 9.6.7-2010]	: 1.00 / 1.00 / 1.00 / 1.00

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Product Information Packet

EBARA INTERNATIONAL CORPORATION

VEM3713T

15HP,3450RPM,3PH,60HZ,215TC,3750M,TEFC,F

Part Detail							
Revision:	D	Status:	PRD/A	Change #:		Proprietary:	No
Type:	AC	Elec. Spec:	37WGY719	CD Diagram:	CD0005	Mfg Plant:	
Mech. Spec:	37A003	Layout:	37LYA003	Poles:	02	Created Date:	04-20-2015
Base:	N	Eff. Date:	01-20-2017	Leads:	9#14		

Specs			
Enclosure:	TEFC	Insulation Class:	F
Frame:	215TC	Inverter Code:	Not Inverter
Frame Material:	Steel	KVA Code:	K
Output @ Frequency:	15.000 HP @ 60 HZ	Lifting Lugs:	Standard Lifting Lugs
Synchronous Speed @ Frequency:	3600 RPM @ 60 HZ	Locked Bearing Indicator:	Locked Bearing
Voltage @ Frequency:	460.0 V @ 60 HZ	Motor Lead Quantity/Wire Size:	9 @ 14 AWG
	230.0 V @ 60 HZ	Motor Lead Exit:	Ko Box
XP Class and Group:	None	Motor Lead Termination:	Flying Leads
XP Division:	Not Applicable	Motor Type:	3750M
Agency Approvals:	CSA	Mounting Arrangement:	F1
	CSA EEV	Power Factor:	91
	UR	Product Family:	General Purpose
Auxiliary Box:	No Auxiliary Box	Pulley End Bearing Type:	Ball
Auxiliary Box Lead Termination:	None	Pulley Face Code:	C-Face
Base Indicator:	No Mounting	Pulley Shaft Indicator:	Standard
Bearing Grease Type:	Polyrex EM (-20F +300F)	Rodent Screen:	None
Blower:	None	Shaft Extension Location:	Pulley End
Current @ Voltage:	17.000 A @ 460.0 V	Shaft Ground Indicator:	No Shaft Grounding

	34.000 A @ 230.0 V	Shaft Rotation:	Reversible
	37.500 A @ 208.0 V	Shaft Slinger Indicator:	No Slinger
Design Code:	A	Speed Code:	Single Speed
Drip Cover:	No Drip Cover	Motor Standards:	NEMA
Duty Rating:	CONT	Starting Method:	Direct on line
Electrically Isolated Bearing:	Not Electrically Isolated	Thermal Device - Bearing:	None
Feedback Device:	No Feedback	Thermal Device - Winding:	None
Front Face Code:	Standard	Vibration Sensor Indicator:	No Vibration Sensor
Front Shaft Indicator:	None	Winding Thermal 1:	None
Heater Indicator:	No Heater	Winding Thermal 2:	None

Nameplate NP3441LUA

CAT.NO.	VEM3713T										
SPEC.	37A003Y719G1										
HP	15										
VOLTS	230/460										
AMP	34/17										
RPM	3450										
FRAME	215TC				HZ		60			PH	3
SER.F.	1.15		CODE	K	DES		A	CL		F	
NEMA-NOM-EFF	91			PF	91						
RATING	40C AMB-CONT										
CC	010A			USABLE AT 208V					37.5		
DE	6307			ODE	6206						
ENCL	TEFC		SN								
INVERTER READY											
10:1)VT3-60H(20:1											
50Hz 15HP 190/380V 40/20A											

Parts List		
Part Number	Description	Quantity
SA299823	SA 37A003Y719G1	1.000 EA
RA286856	RA 37A003Y719G1	1.000 EA
HW3200A01	3/8-16X3/4 I-BLT WELDED F/S	1.000 EA
37CB3006	37 CB CASTING W/1.38 LEAD HOLE @ 6:00	1.000 EA
37GS1000SP	GASKET, CONDUIT BOX STD., .06 THICK LEXI	1.000 EA
51XW2520A12	.25-20 X .75, TAPTITE II, HEX WSHR SLTD	2.000 EA
11XW1032G06	10-32 X .38, TAPTITE II, HEX WSHR SLTD U	1.000 EA
37EP3101A01	FR ENDPLATE, FOR ROUTING PURPOSES	1.000 EA
HW4500A01	1641B(ALEMITE)400 UNIV, GREASE FITT	1.000 EA
HW5100A06	W2420-025 WVY WSHR (WB)	1.000 EA
37PE3300A01	PUEP ASSEMBLY FOR ROUTING	1.000 EA
HW4500A01	1641B(ALEMITE)400 UNIV, GREASE FITT	1.000 EA
10XN2520A30	HEX HD CAP SCREW-STD THD-.25 X 20 THD PE	4.000 EA
HW1001A25	LOCKWASHER 1/4, ZINC PLT .493 OD, .255 I	4.000 EA
XY3118A12	5/16-18 HEX NUT DIRECTIONAL SERRATION	4.000 EA
51XB1214A20	12-14X1.25 HXWSSLD SERTYB	1.000 EA
07FH4007SP	PRIMED	1.000 EA
51XW1032A06	10-32 X .38, TAPTITE II, HEX WSHR SLTD S	3.000 EA
37CB4516	LIPPED LID FOR 37 FRAME NEC KOBX	1.000 EA
37GS1008	37 GS FOR CB LID - LEXIDE	1.000 EA
51XW0832A07	8-32 X .44, TAPTITE II, HEX WSHR SLTD SE	4.000 EA
HW2501F21	KEY, 5/16 SQ X 2.375	1.000 EA
HA7000A02	KEY RETAINER RING, 1 1/8 DIA, 1 3/8 DIA	1.000 EA
LB1115N	LABEL,LIFTING DEVICE (ON ROLLS)	1.000 EA

Parts List (continued)		
Part Number	Description	Quantity
85XU0407S04	4X1/4 U DRIVE PIN STAINLESS	2.000 EA
MJ1000A02	GREASE, POLYREX EM EXXON (USe 4824-15A)	0.050 LB
36FN3000C02	EXFN, PLASTIC, 5.25 OD, 1.175 ID	1.000 EA
MG1000Y03	MUNSELL 2.53Y 6.70/ 4.60, GLOSS 20,	0.028 GA
HA3104A18	THRUBOLT- 5/16-18 X14.000	4.000 EA
LC0005E01	CONN.DIA./WARNING LABEL (LC0005/LB1119N)	1.000 EA
NP3441LUA	ALUM SUPER-E VPWM INV READY UL	1.000 EA
37PA1039	PALLET PACK GRP, PRINT PK1026A06	1.000 EA
PK3082	STYROFOAM CRADLE	1.000 EA
MN416A01	TAG-INSTAL-MAINT no wire (1000/bx) 11/14	1.000 EA

AC Induction Motor Performance Data

Record # 53406 - Typical performance - not guaranteed values

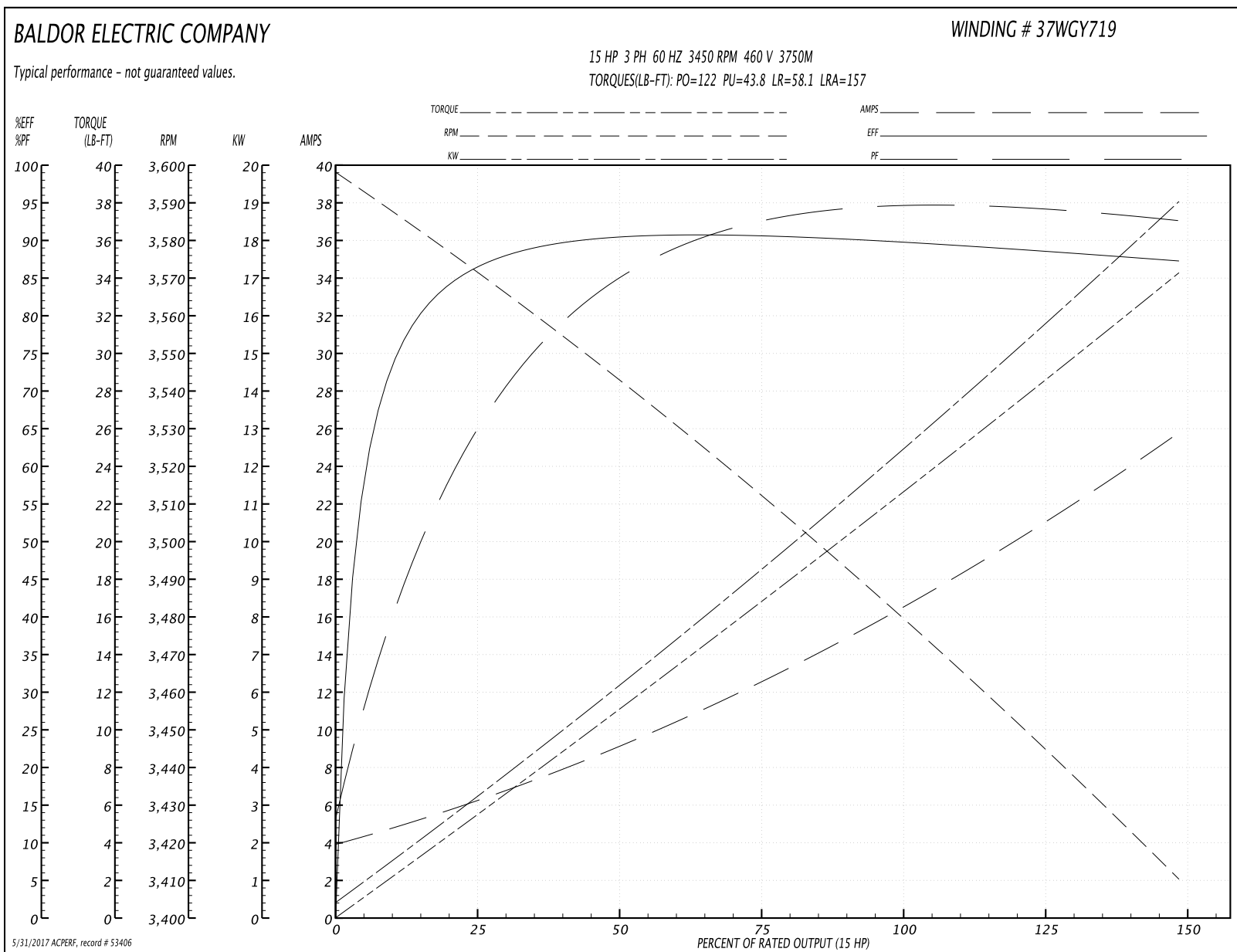
Winding: 37WGY719-R032	Type: 3750M	Enclosure: TEFC
-------------------------------	--------------------	------------------------

Nameplate Data				460 V, 60 Hz: High Voltage Connection	
Rated Output (HP)	15			Full Load Torque	22.2 LB-FT
Volts	230/460			Start Configuration	direct on line
Full Load Amps	34/17			Breakdown Torque	122 LB-FT
R.P.M.	3450			Pull-up Torque	43.8 LB-FT
Hz	60	Phase	3	Locked-rotor Torque	58.1 LB-FT
NEMA Design Code	A	KVA Code	K	Starting Current	157 A
Service Factor (S.F.)	1.15			No-load Current	4.25 A
NEMA Nom. Eff.	91	Power Factor	91	Line-line Res. @ 25°C	0.539 Ω
Rating - Duty	40C AMB-CONT			Temp. Rise @ Rated Load	80°C
S.F. Amps				Temp. Rise @ S.F. Load	99°C
				Locked-rotor Power Factor	31.9
				Rotor inertia	0.457 LB-FT ²

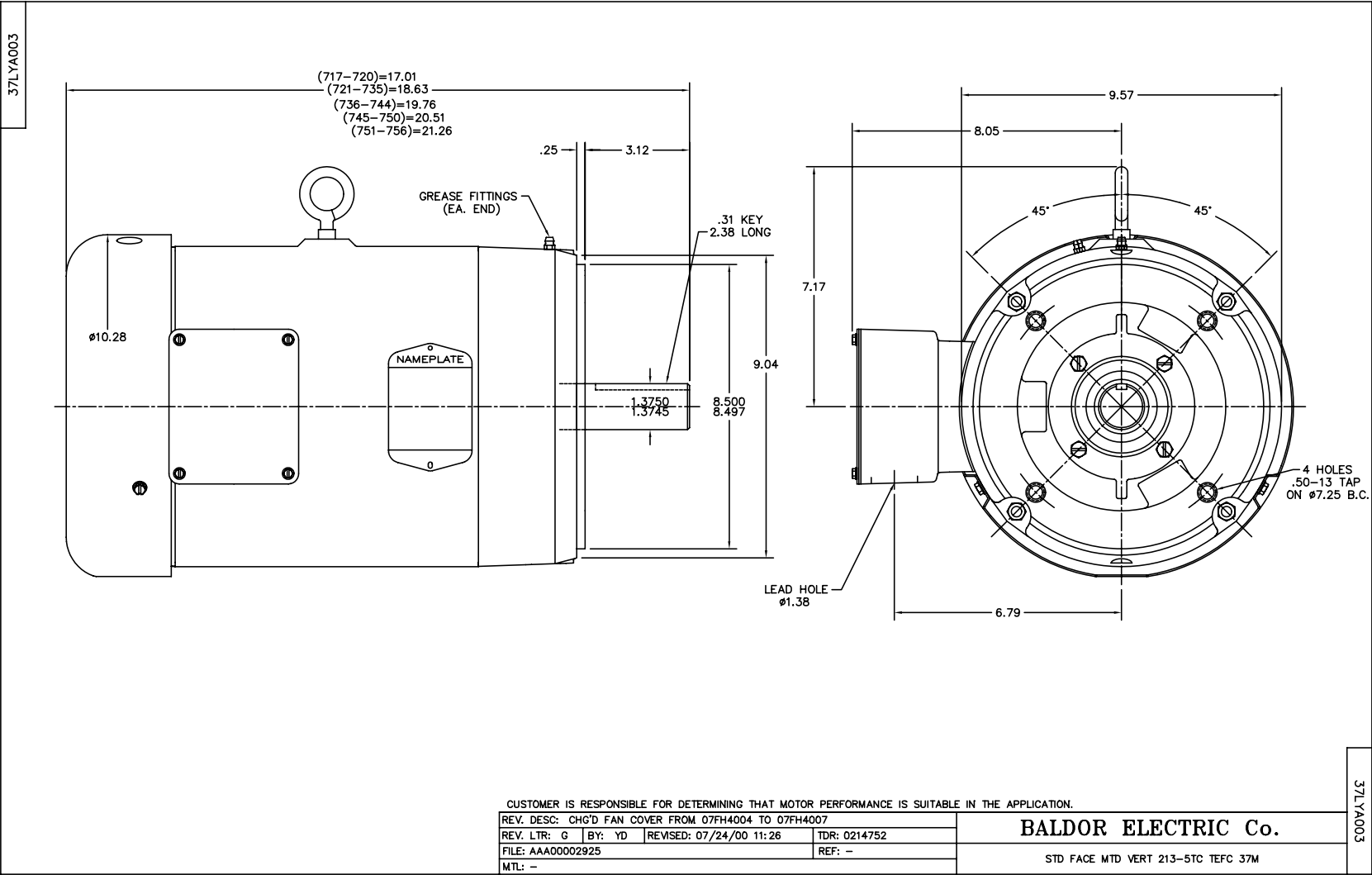
Load Characteristics 460 V, 60 Hz, 15 HP

% of Rated Load	25	50	75	100	125	150	S.F.
Power Factor	68	87	91	93	93	93	93
Efficiency	85.4	89.8	90.8	91	88.7	87.2	89.3
Speed	3572	3545	3514	3483	3447	3410	3461
Line amperes	5.64	8.7	12.5	16.4	20.9	25.6	19.1

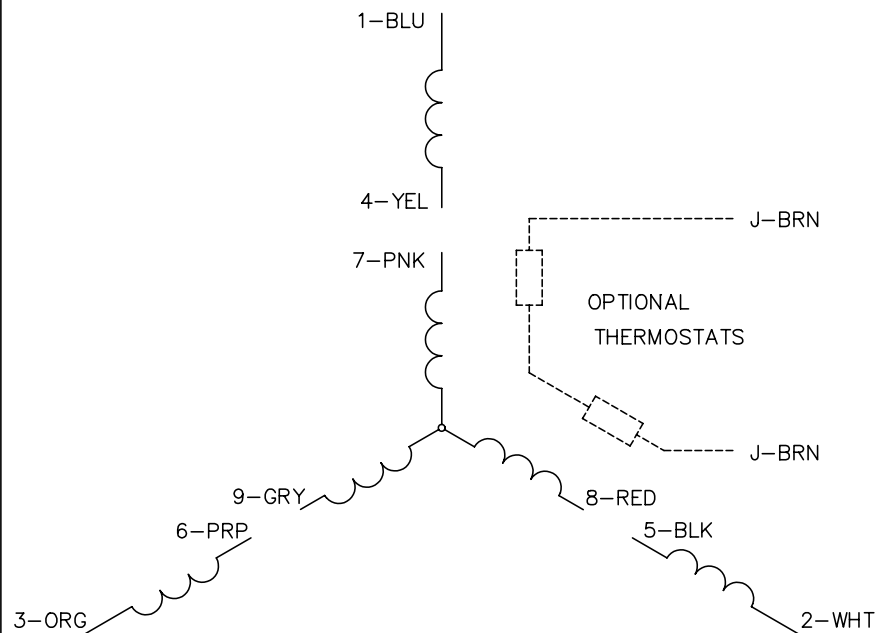
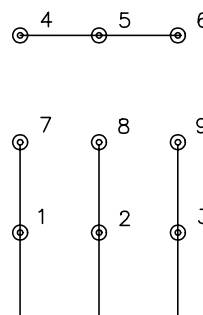
Performance Graph at 460V, 60Hz, 15.0HP Typical performance - Not guaranteed values



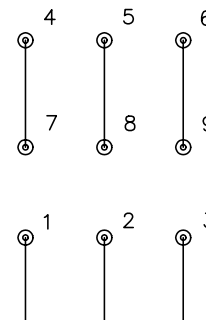
5/31/2017 ACPERF, record # 53406



CD0005

LOW VOLTAGE
(2Y)

LINE

HIGH VOLTAGE
(1Y)

LINE

NOTES:

1. INTERCHANGE ANY TWO LINE LEADS TO REVERSE ROTATION.
2. OPTIONAL THERMOSTATS ARE PROVIDED WHEN SPECIFIED.
3. ACTUAL NUMBER OF INTERNAL PARALLEL CIRCUITS MAY BE A MULTIPLE OF THOSE SHOWN ABOVE.
4. LEAD COLORS ARE OPTIONAL. LEADS MUST ALWAYS BE NUMBERED AS SHOWN.

REV. DESC: REVISE TO SHOW OPTIONAL COLORS

REV. LTR: E BY: JLP

REVISED: 01/19/99 10:15

TDR: 0171435

900000

FILE: AAA00005140

MDL: -

MTL: -

BALDOR ELECTRIC Co.

3PH, DV, 9 LEADS

CD0005

Appendix C

Hydropneumatic Tank Design Information



BLADDER STYLE - HYDRO-PNEUMATIC TANKS

Sizing for Hydro-Pneumatic Tanks

Job Name: Amphenol West Well Date: 5/30/17

Job Location: Sidney, NY Salesman: _____

Contact Name: _____ Model #: _____

Information Required:

- | | | |
|--|------------|---------|
| 1. Drawdown (Water tank must supply) | <u>90</u> | gallons |
| 2. Minimum Pressure (Pump turn on Pressure) | <u>55</u> | PSI |
| 3. Maximum Pressure (Pump shut off Pressure) | <u>100</u> | PSI |

Model Selection: for BLADDER style tanks

- | | | |
|---|--------------|---------|
| 4. Enter Required Drawdown. (from line 1. above) | <u>90</u> | gallons |
| 5. Using acceptance factor table, find and enter the acceptance factor. | <u>0.436</u> | |
| 6. Divide line 4 by line 5, enter total tank volume. | <u>206</u> | gallons |
-



SINCE 1908

wessels
company

ACCEPTANCE FACTOR CHART

This table incorporates atmospheric pressure (14.7 psi at sea level)

USE GAGE PRESSURE. Example: A system operating between a minimum operating pressure of 20 psig (fill pressure) and a maximum operating (usually 10% below the relief valve setting) of 40 psig has an acceptance factor of 0.366. To find the acceptance factor, start at the top of the table and locate the minimum operating pressure. Next, locate the minimum operating pressure on the left index. Where the two lines intersect is the acceptance factor.

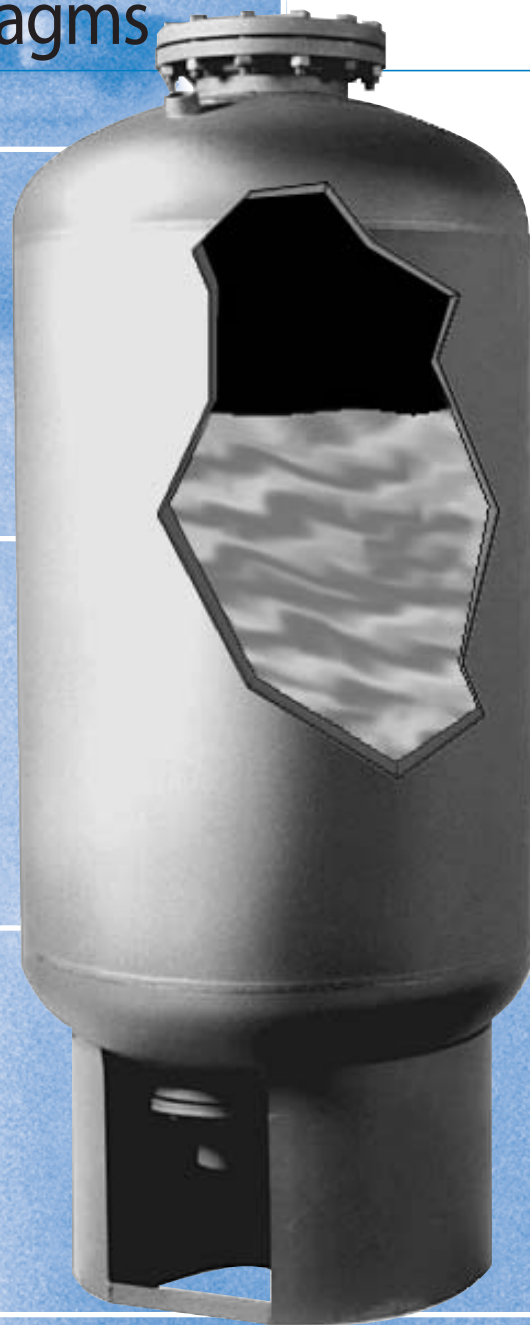
(Use Gauge Pressure)

P₀ MAXIMUM OPERATING PRESSURE PSIG	P_f - MINIMUM OPERATING PRESSURE AT TANK (PSIG)											
	5	10	12	15	20	25	30	35	40	45	50	55
10	0.202											
12	0.262	0.075										
15	0.337	0.168	0.101									
20	0.432	0.288	0.231	0.144								
25	0.504	0.378	0.328	0.252	0.126	—						
27	0.527	0.408	0.360	0.288	0.168	—						
30	0.560	0.447	0.403	0.336	0.224	0.112						
35	0.604	0.503	0.463	0.403	0.302	0.202	0.101					
40	0.640	0.548	0.512	0.457	0.366	0.274	0.183	0.091				
45	0.670	0.586	0.553	0.503	0.419	0.335	0.251	0.168	0.084	—		
50	0.696	0.618	0.587	0.541	0.464	0.386	0.309	0.232	0.155	0.078		
55	0.717	0.646	0.617	0.574	0.502	0.430	0.359	0.287	0.215	0.144	0.072	
60	0.736	0.669	0.643	0.602	0.536	0.469	0.402	0.335	0.268	0.201	0.134	0.067
65	0.753	0.690	0.665	0.627	0.565	0.502	0.439	0.376	0.314	0.251	0.188	0.125
70	0.767	0.708	0.685	0.649	0.590	0.531	0.472	0.413	0.354	0.295	0.236	0.177
75	0.780	0.725	0.702	0.669	0.613	0.558	0.502	0.446	0.390	0.333	0.279	0.223
80	0.792	0.739	0.718	0.686	0.634	0.581	0.528	0.475	0.422	0.370	0.317	0.264
85	0.802	0.752	0.732	0.702	0.652	0.602	0.552	0.502	0.451	0.401	0.351	0.301
90	0.812	0.764	0.745	0.716	0.669	0.621	0.573	0.525	0.478	0.430	0.382	0.335
95	0.820	0.775	0.757	0.729	0.684	0.638	0.593	0.547	0.501	0.456	0.410	0.365
100	0.828	0.785	0.767	0.741	0.698	0.654	0.610	0.567	0.523	0.479	0.436	0.392
105	0.835	0.794	0.777	0.752	0.710	0.668	0.626	0.585	0.543	0.501	0.459	0.418
110	0.842	0.802	0.786	0.762	0.723	0.682	0.642	0.601	0.561	0.521	0.481	0.441
115	0.848	0.810	0.794	0.771	0.734	0.694	0.655	0.617	0.578	0.540	0.501	0.463
120	0.854	0.817	0.802	0.780	0.742	0.705	0.668	0.631	0.594	0.557	0.520	0.483
125	0.859	0.823	0.809	0.787	0.752	0.716	0.680	0.644	0.608	0.573	0.537	0.501
130	0.864	0.829	0.815	0.795	0.760	0.726	0.691	0.657	0.622	0.586	0.553	0.519
135	0.868	0.835	0.822	0.802	0.768	0.735	0.701	0.668	0.635	0.601	0.563	0.534
140	0.873	0.840	0.827	0.808	0.776	0.743	0.711	0.679	0.647	0.614	0.582	0.550
145	0.877	0.845	0.833	0.814	0.783	0.751	0.720	0.689	0.658	0.628	0.595	0.564
150	0.880	0.850	0.838	0.820	0.789	0.759	0.729	0.699	0.668	0.638	0.608	0.577
155	0.884	0.854	0.843	0.825	0.795	0.766	0.736	0.707	0.677	0.648	0.618	0.589
160	0.887	0.859	0.847	0.830	0.801	0.773	0.744	0.716	0.687	0.658	0.630	0.601
165	0.890	0.863	0.851	0.835	0.807	0.779	0.751	0.724	0.696	0.668	0.640	0.612
170	0.893	0.866	0.855	0.839	0.812	0.785	0.758	0.731	0.704	0.677	0.649	0.622

NOTE: For pressures not shown above, use $1 - (P_f + \text{atmospheric} \div P_0 + \text{atmospheric})$

WESFLEX SUPERTANKS

Hydro-pneumatic Well and
Water System Tanks with
Replaceable and Fixed Diaphragms



SINCE 1908
wessels
company

Headquarters & Factory
101 Tank St.
Greenwood, IN 46143
(317) 888-9800
Fax: (317) 888-9988

WESFLEX SUPERTANKS

DIAPHRAGM TYPE HYDRO-PNEUMATIC TANKS

POWERFUL TANKS FOR POWERFUL WATER SYSTEMS

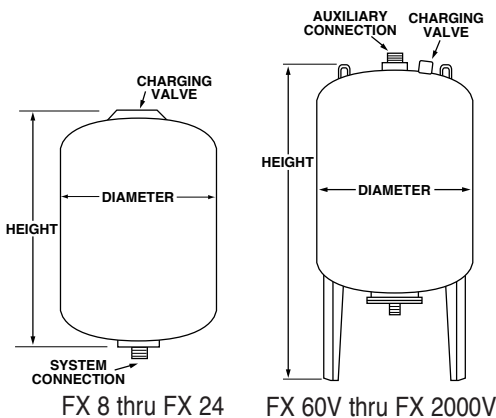
Wesflex FX and FXA replaceable diaphragm water system tanks are for use in potable water well systems and booster pump applications of all sizes. They are designed to maintain system pressure when the pump is not operating and to increase the pump and water system life by reducing system cycling time. The heavy-duty replaceable diaphragm keeps the water permanently isolated from the pre-charged air cushion. This arrangement prevents water logging due to absorption of air into the water. The water is "in the bag" and never touches the steel tank. No more "red water."

In the unlikely event of a diaphragm failure, only the diaphragm needs replacing, not the entire tank assembly and costly replumbing necessary in such a change. The large acceptance volume allows maximum drawdown and reduction of up to 80% in tank size. Standard models available up to 250 PSI operating pressure. Tanks are available for use in the largest high-rise buildings, irrigation systems, municipal wells, pressure boosting systems, and more. Units can be manifolded for additional capacity.

TYPE FX WATER TANKS – THE ULTIMATE IN WATER SYSTEM PROTECTION

Replaceable diaphragm type water system tanks for residential and commercial well water and booster applications in sizes 2.11 to 528 gallons. Heaviest deep drawn steel shells in the industry provide added material strength and higher pressure capabilities for an extremely powerful water system.

- ☐ Permanent separation of air and water over the life of the system
- ☐ Water is "in the bag." Steel tank never touches water and is not subject to corrosion
- ☐ Replaceable diaphragm
- ☐ 150 PSI deep draw steel tank for extra durability and safe use
- ☐ Three point steel leg design with full air circulation
- ☐ 3/4" system connection for ease of installation
- ☐ Highly rust resistant baked epoxy finish for extra protection
- ☐ Factory pre-charged and field adjustable



Model Number	Size U.S. Gal.	Tank Diameter	Tank Length	NPT System Connection	NPT System Connection	Shipping Weight Pounds
FX 8	2.11	8"	13"	3/4"	–	7
FX 19	5.02	11"	16"	3/4"	–	13
FX 24	6.34	14"	13"	3/4"	–	15
FX 60V	16	15"	34"	1"	–	39
FX 80V	21	18"	34"	1"	–	49
FX 100V	26	18"	38"	1"	1/2"	61
FX 200V	52	22"	49"	1 1/2"	1/2"	112
FX 300V	80	25"	55"	1 1/2"	1/2"	141
FX 500V	132	31"	61"	1 1/2"	1/2"	265
FX 750V	198	31"	79"	1 1/2"	1/2"	330
FX 1000V	264	37"	77"	2"	1/2"	398
FX 2000V	528	50"	84"	2"	1/2"	835

150 P.S.I. operating pressure - 200 F maximum temperature - Factory pre-charge 30 P.S.I.

TYPICAL SPECIFICATIONS

Furnish and install as shown on plans a _____ gallon _____" diameter X _____" (high) pre-charged hydro-pneumatic tank with replaceable heavy duty butyl rubber diaphragm. The tank shall have a .302" - 32 charging valve connection (standard tire valve) to facilitate the on-site charging of the tank to meet system requirements. The water is to be contained in a butyl diaphragm. The tank shall have a baked epoxy exterior finish.

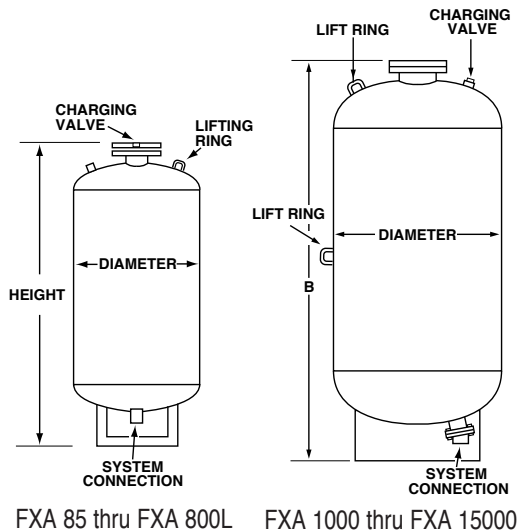
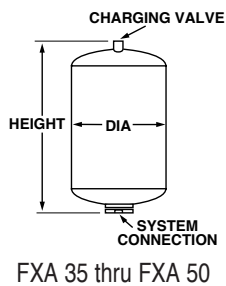
Each tank shall be Wessels model number FX _____ or approved equal.

TYPE FXA WATER TANKS

ASME replaceable diaphragm type water system tanks for commercial, industrial and municipal well water and booster applications sizes 10 to 3963 gallons.

Type FXA water system control tanks are designed for jobs that require high pressure centralized water storage for community wells, high-rise buildings, irrigation systems, and pressure boosting applications where the ultimate in performance and quality is required. Hefty drawdown prevents pumps from over cycling and allows saving of electrical energy by reducing frequent pump starts. Assists the pump in meeting peak demands. Models available up to 250 PSIG and higher working pressures. Efficient design allows use of smaller sizes to save on space and installation costs.

- ☐ ASME section VIII construction
- ☐ Permanent separation of air and water over the life of the system
- ☐ Water is "in the bag." Steel tank never touches water and is not subject to corrosion.
- ☐ Never water logs, no "red water"
- ☐ Replaceable diaphragm
- ☐ Standard pressures 125 PSI, 200 PSI and 250 PSI
- ☐ Can be manifolded for additional capacity
- ☐ Factory pre-charged and field adjustable



Model Number	Tank & Acceptance Vol. (gals.)	Dimensions		NPT System Connection	NPT System Connection	Shipping Weight Pounds
		Diameter (in)	Height (in)			
FXA 35	10	12	25	3/4"	-	40
FXA 50	13	14	25	3/4"	-	50
FXA 85	23	16	37	1"	1/2"	90
FXA 130	35	20	37	1"	1/2"	125
FXA 200	53	24	43	1 1/2"	1/2"	210
FXA 300	79	24	55	1 1/2"	3/4"	225
FXA 400	106	30	49	1 1/2"	3/4"	300
FXA 500	132	30	57	2"	3/4"	330
FXA 600	158	30	65	2"	3/4"	360
FXA 700	185	30	80	2"	-	600
FXA 800L	211	32	76	2"	3/4"	475
FXA 1000	264	36	87	3"	-	735
FXA 1200	317	36	98	3"	-	745
FXA 1400	370	36	111	3"	-	900
FXA 1600	422	48	84	3"	-	1210
FXA 2000	528	48	97	3"	-	1305
FXA 2500	660	48	114	4"	-	1430
FXA 3000L	792	48	134	4"	-	1575
FXA 3000S	792	60	93	4"	-	2169
FXA 4000	1056	60	115	4"	-	2638
FXA 5000	1320	60	138	4"	-	3246
FXA 7500	1980	72	140	4"	-	4080
FXA 10000	2640	72	172	4"	-	4920
FXA 15000	3963	72	243	4"	-	6000

240 F maximum temperature - Factory pre-charge 30 PSI. Prime painted exterior finish.

TYPICAL SPECIFICATIONS

Furnish and install as shown on plans a _____ gallon _____" diameter X _____" (high) pre-charged steel hydro-pneumatic tank with replaceable heavy duty butyl rubber diaphragm. The tank shall have NPT system connections and a .302" - 32 charging valve connection (standard tire valve) to facilitate the on-site charging of the tank to meet system requirements. The tank must be constructed and stamped in accordance with Section VIII of the ASME Boiler and Pressure Vessel Code.

Each tank shall be Wessels model number FXA _____ or approved equal.

Appendix D

Schedule 80 PVC Submittal

SUBMITTAL FOR CHARLOTTE PIPE® PVC SCHEDULE 80 PRESSURE PIPE AND FITTING SYSTEM

 Date: 5/31/17

 Job Name: Amphenol -West Well Improvements

 Location: Sidney, NY

 Engineer: Barton & Loguidice, DPC

 Contractor: Evans Mechanical

► Scope:

This specification covers PVC Schedule 80 pipe and fittings for pressure applications. This system is intended for pressure applications where the operating temperature will not exceed 140° F.

► Specification:

Pipe and fittings shall be manufactured from virgin rigid PVC (polyvinyl chloride) vinyl compounds with a cell class of 12454 as identified in ASTM D 1784.

PVC Schedule 80 pipe shall be Iron Pipe Size (IPS) conforming to ASTM D 1785. Injection molded PVC Schedule 80 fittings shall conform to ASTM D 2467. PVC Schedule 80 threaded fittings shall conform to ASTM D 2464. Pipe and fittings shall be manufactured as a system and be the product of one manufacturer. All pipe and fittings shall be manufactured in the United States. Pipe and fittings shall conform to NSF International Standard 61 or the health effects portion of NSF Standard 14.

► Installation:

Installation shall comply with the latest installation instructions published by Charlotte Pipe and Foundry and shall conform to all applicable plumbing, fire, and building code requirements. Buried pipe shall be installed in accordance with ASTM F 1668 and ASTM D 2774. Solvent cement joints shall be made in a two-step process with a primer meeting ASTM F 656 and a medium- or heavy-bodied solvent cement conforming to ASTM D 2564. The system shall be protected from chemical agents, fire-stopping materials, thread sealant, plasticized-vinyl products or other aggressive chemical agents not compatible with PVC compounds. The system shall be hydrostatically tested after installation. **WARNING!** Never test with or transport/store compressed air or gas in PVC pipe or fittings. Doing so can result in explosive failures and cause severe injury or death.

► Referenced Standards:

ASTM D 1784: Rigid Vinyl Compounds

ASTM D 1785: PVC Plastic Pipe, Schedule 80

ASTM D 2464 or D 2467: PVC Threaded Fittings, Schedule 80

ASTM D 2467: PVC Socket Fittings, Schedule 80

ASTM D 2564: Solvent Cements for PVC Pipe and Fittings


ASTM D 2774: Underground Installation of Thermoplastic Pressure Piping

ASTM F 1668: Procedures for Buried Plastic Pipe


NSF Standard 14: Plastic Piping Components & Related Materials

NSF Standard 61: Drinking Water System Components—Health Effects

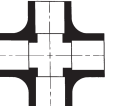





Quarter Bend



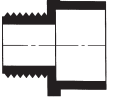
Eighth Bend



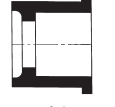
Cross



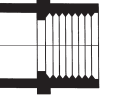
Street Quarter Bend




Male Adapter




Bushing




Female Adapter




Cap



Plug



Tee



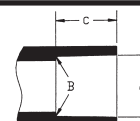
Coupling

Not all fitting patterns shown

PIPE REFERENCE GUIDE

Product	Sizes Available																
	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	4	6	8	10	12	14	16
PVC Schedule 80	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•

Schedule 80 Tapered Socket Dimensions



PVC SCHEDULE 80 - ASTM D 2467

Nominal Size	Schedule 80 and Schedule 40 Socket Diameter Entrance A	Bottom B	Tolerance	Schedule 80 Socket Length C (Minimum)	Schedule 40 Socket Length C (Minimum)
1/2	0.848	0.836	±0.004	0.875	0.688
3/4	1.058	1.046	±0.004	1.000	0.719
1	1.325	1.310	±0.005	1.125	0.875
1 1/4	1.670	1.655	±0.005	1.250	0.938
1 1/2	1.912	1.894	±0.006	1.375	1.094
2	2.387	2.369	±0.006	1.500	1.156
2 1/2	2.889	2.868	±0.007	1.750	1.750
3	3.516	3.492	±0.008	1.875	1.875
4	4.518	4.491	±0.009	2.250	2.000
6	6.647	6.614	±0.011	3.000	3.000
8	8.655	8.610	±0.015	4.000	4.000
10	10.780	10.735	±0.015	5.000	5.000
12	12.780	12.735	±0.015	6.000	6.000