Barton & Loguidice

July 15, 2022

Mr. Joshua Haugh
Project Manager
New York State Department of Environmental Conservation
Region 4
1130 South Westcott Road
Schenectady, New York 12306-2014

VIA ELECTRONIC MAIL

Re: Corrective Measures Investigation Work Plan, East Harbor Wall
ALCO-Maxon Site – Parcel B (Site No. C447043), Schenectady
Schenectady, NY

File: 1368.001.006

Dear Mr. Haugh:

Barton & Loguidice, D.P.C. (B&L), is providing this letter on behalf of Maxon ALCO Holdings, LLC, in response to the New York State Department of Environmental Conservation (NYSDEC or Department) electronic mail dated June 15, 2022, in which the Department provided comments regarding the Corrective Measures Investigation Work Plan, East Harbor Wall. B&L has reviewed the Department's comments and provides the following responses in italics:

1. Section 1.1, bullet list: Add a task for locating, compiling, and reviewing existing as-builts, designs, and record drawings.

   Response: The text has been updated to include the suggested bullet item.

2. Section 1.1, second bullet: DEC requests that additional figures be generated for the CM investigation report, including a site survey map, and site plan(s) and section plan(s) showing relevant features, surface elevations, systems, utilities, monitoring points, and other information related to the harbor wall underdrain and recovery system.

   Response: The Department's comment is noted and figures will be provided including available site information.

3. Figure 2: Correct the location of the baffles (which are shown within the dock system) and the recover wells (which are shown on the harbor wall).

   Response: Figure 2 has been revised.

Should the Department have any question, please feel free to contact me at 518-300-0770. The revised Corrective Measures Investigation Work Plan, East Harbor Wall has been enclosed.

Sincerely,

BARTON & LOGUIDICE, D.P.C.

Bryce D. Dingman
Sr. Managing Hydrogeologist

BDD/jms

Enclosure

ec: C. O'Neill, DER R4
G. Burke, DER CO
J. Andaloro, OGC CO
S. Lawrence, DOH
D. Ahl, Galesi
D. Sommer, Young/Sommer
S. Nostrand, B&L

Corrective Measures Investigation Work Plan
East Harbor Wall

Maxon ALCO Holdings, LLC

220 Harborside Drive, Suite 300
Schenectady, NY 12305

Prepared For

Maxon ALCO Holdings, LLC

220 Harborside Drive, Suite 300
Schenectady, NY 12305

May 2022
Revised July 2022

Barton&Loguidice

Maxon ALCO Holdings, LLC
Parcel B – BCP Site No. C447043
220 Harborside Drive, Suite 300
Schenectady, New York 12305

Corrective Measures Investigation Work Plan
East Harbor Wall

May 2022
Revised July 2022

Prepared For

Maxon ALCO Holdings, LLC.
220 Harborside Drive, Suite 300
Schenectady, New York 12305

Prepared By

Barton & Loguidice, Inc.
10 Airline Drive
Albany, New York 12205

Table of Contents

1.0 INTRODUCTION

The following work plan was prepared on behalf of Maxon ALCO Holdings, LLC, (Volunteer) (Schenectady, NY) by Barton & Loguidice, D.P.C. (B&L), as requested by the New York State Department of Environmental Conservation (NYSDEC). The purpose of this Corrective Measures Investigation Work Plan will be to obtain information associated with the design of the Eastern Mohawk Harbor Wall Underdrain System (ALCO-Maxon BCP Site C447043 Parcel B) and evaluate existing monitoring/recovery systems in place (i.e., Recovery Well #3 and adjacent monitoring wells RW-3A/B/C, MW-67, and MW-68). In addition, this work plan discusses the collection of as-built information of the underdrain system design, performance of a trend analysis associated with daily field observations and monitoring, and on-going maintenance recommendations.

1.1 Background

Following construction of the Mohawk Harbor in 2015 (Figure 1), periodic occurrences of residual sheen have been observed along the eastern harbor wall. In a letter correspondence to the NYSDEC dated May 26, 2017, it was noted that sheen was observed along the eastern harbor wall when river elevations were at or below the underdrain discharge pipes, and the apparent groundwater level behind the sheeting coincides with the elevation of the underdrain discharge pipe(s) (i.e. water level behind the wall was a higher elevation than the harbor surface). The sheen was actively responded to and contained through the use of temporary absorbent booms and pads, until the installation of baffles connected to the underdrain discharge pipe in the summer of 2017. Equipped with temporary absorbent socks, the baffles were installed to control the sheen originating from the sheet pile underdrain discharge pipe. To supplement the underdrain baffles, three (3) recovery wells were installed in 2017 to relieve excess groundwater behind the sheet wall, and potentially to recover residual petroleum which is conveyed to the on-site oil water separator. Recovery well #3 (RW-3) was installed along the eastern harbor wall and will be further evaluated as part of this work plan.

The purpose of this corrective measures investigation work plan is to obtain and summarize available information regarding the harbor wall design, including the underdrain discharge pipe, vertical baffles, and RW-3, and discuss any data gaps that requires in-field measurements to be performed. The work plan proposes to complete the following tasks:

- Survey relevant monitoring points and establish a reference point within the harbor;
- Generate a monitoring location figure;
- Replace submersible pump in RW-3;
- Evaluate historic information gathered during the weekly site inspections to determine any trends (weather conditions, surface water levels, measureable product thickness in relevant monitoring points)
- Locate, compile, and review existing as-builts, designs, and record drawings; and

- In-field measurements of underdrain discharge system to produce as-builts if they cannot be procured.

2.0 HARBOR WALL UNDERDRAIN SYSTEM DESIGN RECONNAISSANCE

2.1 Underdrain Discharge Pipe

The harbor underdrain discharge system was designed by Bergmann Associates, located in Albany, New York. The system is a continuous 6 inch perforated high density polyethylene (HDPE) pipe wrapped with filter fabric, buried in NYSDOT 733.2002 underdrain filter material type 2 construction subbase, and installed behind the harbor sheet piles and below the concrete walkway. The underdrain discharge system encompasses nearly the entire harbor. The system was designed with 8-inch schedule 40 steel pipe sleeves installed through the sheeting on 20 foot intervals. Each 8-inch outlet penetration was fitted with a 6 inch by 11 inch long Tide Flex Series 37G (or equivalent) check valve in order to regulate back pressure. According to the Tide Flex 37G fact sheet, the maximum backpressure for the proposed check valve is 75 pound per square inch (psi). The Tide Flex fact sheet has been included as Appendix A. The purpose of the underdrain discharge system is to regulate hydraulic back pressure on the land side of the sheet piles to prevent failure.

2.2 Underdrain Discharge Baffles

In accordance with the "Spill 1501720 – Proposed Underdrain Discharge Baffle Pipe" electronic letter submitted to the Department on May 26, 2017, and approved on June 8, 2017, Rifenburg was to install 5 to 25 baffle pipes along the eastern and southern Harbor walls. The proposed baffles were to be 8-inch diameter, 150# welding neck flange, with flange bolt holes to be welded to the discharge outfall pipe at an invert elevation of 209.50 feet above mean sea level (amsl). The inner edge of the flange was to be welded to the leading edge of discharge pipe utilizing a continuous weld to ensure a water tight seal. Three support brackets were to be welded to the existing sheet pile. The prefabricated baffles were to be bolted to the three support brackets and discharge pipe flange (Appendix B). All flanged fittings were to be fitted with full faced red rubber gaskets to ensure a water tight seal.

The bottom end of the baffle pipe was to be open to the harbor at an elevation of 205.0 feet amsl, and subsequent to installation the top end of the baffle pipe was to be installed at an elevation of 214.00 feet amsl and fitted with a loose fitting or vented, lockable, monitoring well cap. The baffles were installed in 2017 by Rifenburg, however as-builts are not available at this time but will be provided to the Department upon receipt. PIG absorbent socks are deployed in five (5) baffles near RW-3 where residual product is observed (Figure 2) and routinely monitored and replaced as needed.

2.3 Underdrain Recovery Well #3 (RW-3)

In accordance with the "Spill 1501720 – Proposed Underdrain Recovery Well Installation" electronic letter submitted to the Department on June 7, 2017, and approved on June 8, 2017,

three (3) six inch diameter recovery wells were proposed to be installed in the harbor in June 2017. RW-3, located near the eastern wall stair well, was to be a 6 inch diameter, 12 foot deep product recovery well. The 10 foot screen was to be installed 1 foot to 11 foot below the finished grade, intersecting the underdrain stone behind the harbor sheet piles. Upon installation the well was to be developed and equipped with a Grundfos Redi-Flo3, stainless steel electronic submersible pump. The Grundfos Redi-Flo3 specification sheet is included as Appendix C.

At the time of proposal, various design considerations were being evaluated for optimal underground water pipe and electric to/from the recovery well. The conveyance system was installed, which includes the underground water pipe to the on-site 1,200 gallon oil/water separator with discharge to the City of Schenectady sanitary sewer, and underground electric utilities. All available information of the system will be compiled and provided to the Department.

3.0 SUPPLEMENTAL TASKS

3.1 Monitoring Point Survey

Existing Harbor groundwater recovery wells (RW-1, RW-2, and RW-3), and harbor monitoring wells RW-3A, RW-3B, RW-3C, MW-67, and MW-68 were surveyed on April 29th, 2022 by Hershberg and Hershberg's New York State-licensed surveyor. In addition, a reference point was established in the harbor to allow further evaluation of harbor surface elevation. Locations were reported in feet as horizontal coordinates referenced to the New York State plane coordinate system (NAD 1983), accurate to the nearest one-tenth (0.1) feet. Elevations were reported in feet referenced to the USGS mean sea level datum; ground levels at wellheads were measured to at least one-tenth (0.1) feet, and the top rim of the PVC riser and the lid of the protective cover on each monitoring well were measured to one-hundredth (0.01) feet. A summary of monitoring points, including well designations, associated PVC elevations, northings and eastings, and most recent groundwater surface elevation (April 2022) will be provided to the Department. Refer to Figure 2 for the location of relevant monitoring points.

3.2 Evaluation of Routine Inspections

3.2.1. Groundwater Recovery Well (RW-3)

Starting in November 2021, the static water level and product thickness, if any, within RW-3 has been monitored weekly using an Oil/Water Interface Probe and reported to the Department. Product thickness trends, if any, will be evaluated and compared to the Harbor surface water elevation for any correlating trends. A summary of findings will be provided to the Department.

3.2.2. Monitoring Well Locations RW-3A, 3B, and 3C

Starting in November 2021, the static water level and product thickness, if any, within RW-3A, -3B, or 3C has been monitored weekly using an Oil/Water Interface Probe and reported to the Department. Product thickness trends, if any, will be evaluated and compared to the Harbor surface water elevation for any correlating trends. A summary of findings will be provided to the Department.

3.3 Current Corrective Measure Techniques

To evaluate the effectiveness of the mitigation techniques currently in place (absorbents socks in baffles and wells) and proposed mitigation techniques (installation of replacement pump in RW-3), all absorbents socks employed in the baffles and RW-3A, -3B, and 3C will be removed which should allow unaffected product accumulation, if any, to occur within these monitoring locations. The absorbent pads located along the eastern harbor wall will remain installed to contain any sheen from entering the harbor. The product thickness and static water levels in RW-3, RW-3A, -3B, and 3C will be monitored throughout the month of July on a weekly basis. Conditions of the absorbent pads along the eastern harbor wall will be monitored closely and

replaced as needed. On August 1st, 2022 the absorbent socks will be employed in the five (5) baffles and RW-3A, -3B, and 3C and the replacement pump in RW-3 will be placed on-line. Product thickness and static water levels will be monitored throughout the month of August on a weekly basis. A summary of findings will be provided to the Department.

3.4 Installation of Replacement Pump in RW-3

It was noted by B&L staff that the submersible pump in RW-3 began malfunctioning and replacement alternatives were researched. A replacement pump (22SQE07-11 Stainless steel Grundfos submersible pump) for RW-3 was received in March of 2022 and is scheduled to be installed June 2022 by General Control Systems (GCS), located in Albany, NY. The specification sheet for the replacement pump is included as Appendix D.

4.0 CONTINUED MONITORING AND MAINTENANCE

Continued effort by the Volunteer to contain residual sheens from emanating into the Harbor are on-going. Remedial contractor, Precision Industrial Maintenance (PIM) has been contracted to install absorbent boom/sweeps along the eastern dock section and replace them as needed. The condition of the Harbor is inspected daily by Galesi maintenance staff and/or B&L and documents the conditions of the harbor booms/sweeps, presence of sheen (fully contained or not), noticeable odors, and if floating debris is impacting the effectiveness of the booms/sweeps. B&L's weekly inspection documents static water levels and product thickness in RW-3, RW-3A, RW-3B, and RW-3C, and the condition of absorbent socks in baffles and RW-3A, RW-3B, and RW-3C, and any corrective actions required. The daily monitoring log is provided to the Department on a weekly basis.

Provided in the table below are the point of contacts for the site concerns and response.

Company	Contact	Phone Number
Galesi	Bill Battaglia	(518) 356-4445
Precision Industrial Maintenance (PIM)	Scott Kramer	(518) 817-5408
Barton & Loguidice, D.P.C. (B&L)	Bryce Dingman	(518) 300-0770
New York State Department of Environmental Conservation (NYSDEC)	Joshua Haugh	(518) 357-2008

5.0 SCHEDULE

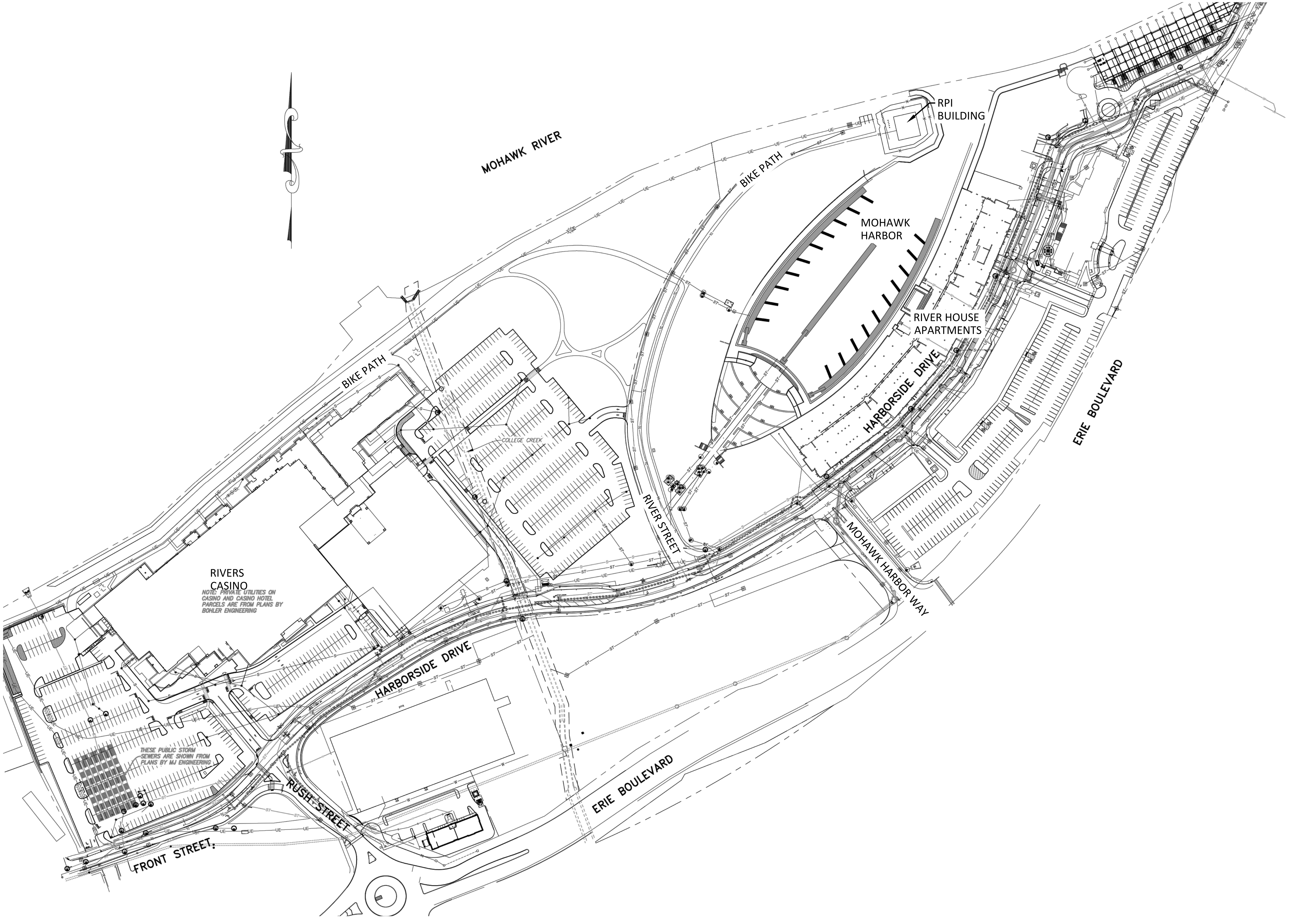
A preliminary schedule is provided below. Note that the following schedule is generic in nature, given the unknown time period between review and approval of the work plan and findings report. A schedule with estimated durations from the date of submittal of the work plan is included in the following table.

Milestone	Estimated time from Work Plan Submittal
Submit Draft Corrective Measures Investigation Work Plan (CMIWP)	May 27, 2022
Receive Comments from NYSDEC	June 10, 2022
Submittal of Final Draft CMIWP	June 17, 2022
NYSDEC Approval of Final CMIWP Work Plan	June 24, 2022
Field Activity Performance	July - August 2022
Development Investigation Findings Summary Report	September 2022
Submit Draft Investigation Findings Summary Report to the NYSDEC for Review	October 2022
Receive Comments from NYSDEC	October 2022
Submit Final Investigation Findings Summary Report to the NYSDEC	October 2022

6.0 SUMMARY OF FINDINGS

A summary of findings, procurement of as-built drawings of the harbor wall system, baffle system, observed data trends and recommendations and conclusions will be presented to the Department.

Figure 1



MAXON ALCO HOLDINGS, LLC.

EAST HARBOR WALL CORRECTIVE MEASURES INVESTIGATION WORK PLAN

SITE PLAN

CITY OF SCHENECTADY

SCHENECTADY COUNTY, NEW YORK

B&L

443 Electronics Parkway
Liverpool, NY
13088

Barton & Loguidice, D.P.C.

Date
MAY 2022

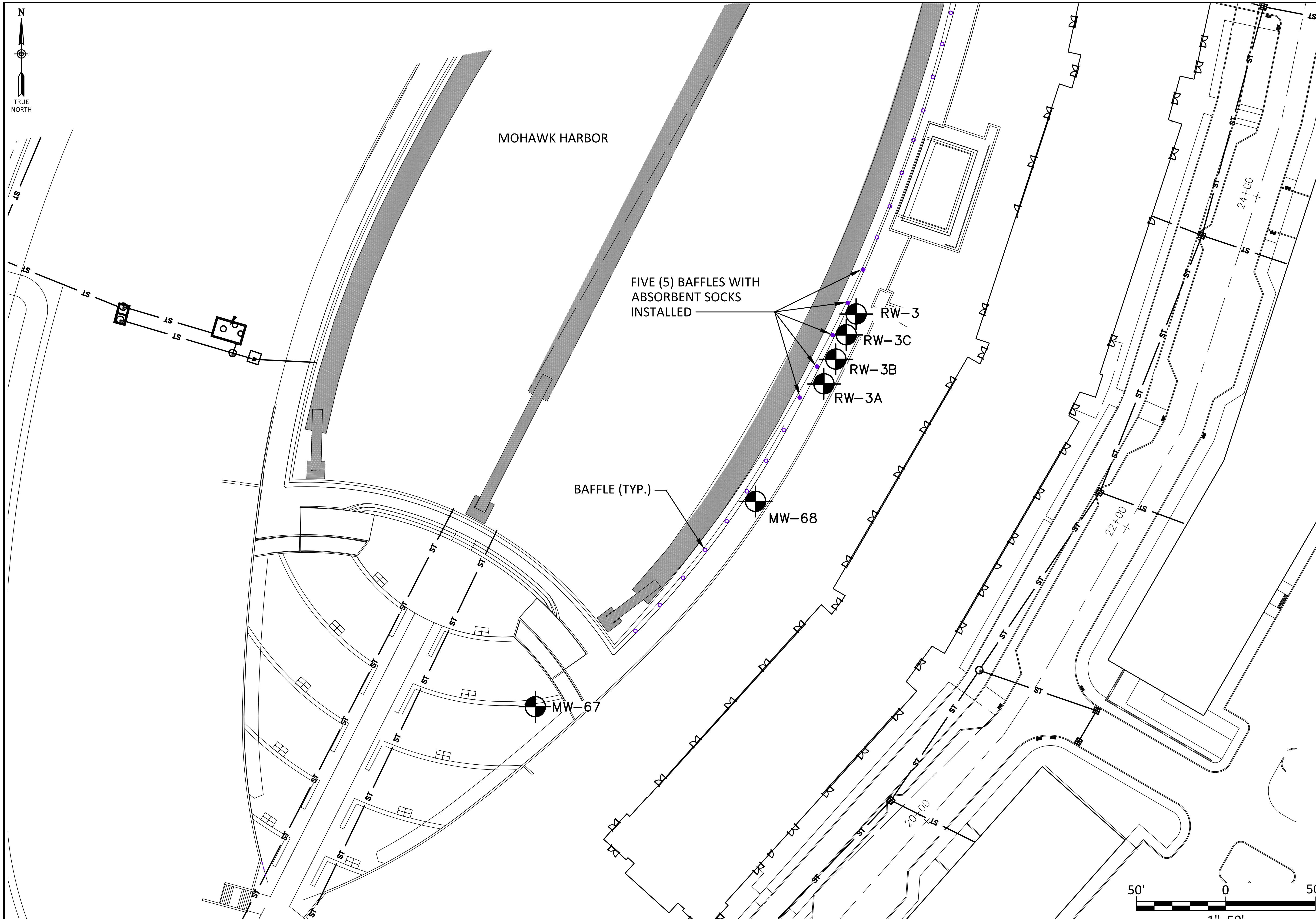
Scale
NOT TO SCALE

Figure Number
1

Project Number
1368.001.006

Plotted: May 20, 2022 - 2:32PM SYR By: bas
Z:\BL-Vault\D2\18217AD2-1C71-4823-8927-99D5C4054147\0\2614000-2614999\2614263\1\L\Figure 1 - Site Plan (ID 2614263).dwg

Figure 2



MAXON ALCO HOLDINGS, LLC, AS AGENT FOR SCHENECTAEDY METROPLEX DEVELOPMENT AUTHORITY
EAST HARBOR WALL CORRECTIVE MEASURES INVESTIGATION WORK PLAN

MONITORING POINTS

CITY OF SCHENECTADY

SCHENECTADY COUNTY, NEW YORK

B&L
Barton & Loguidice, D.P.C.
443 Electronics Parkway
Liverpool, NY
13088

Date
JULY 2022

Scale
1" = 50'

Figure Number
2

Project Number
1368.001.006

Plotted: Jul 14, 2022 – 8:27AM SYR By: WBG
Z:\BL-Vault\ID2\18217AD2-1C71-4823-8927-99D5C4054147\0\2613000-2613999\2613853\L\L\1368.001.006_ EAST HARBOR WALL CM FIGURE 2 (ID 2613853).dwg

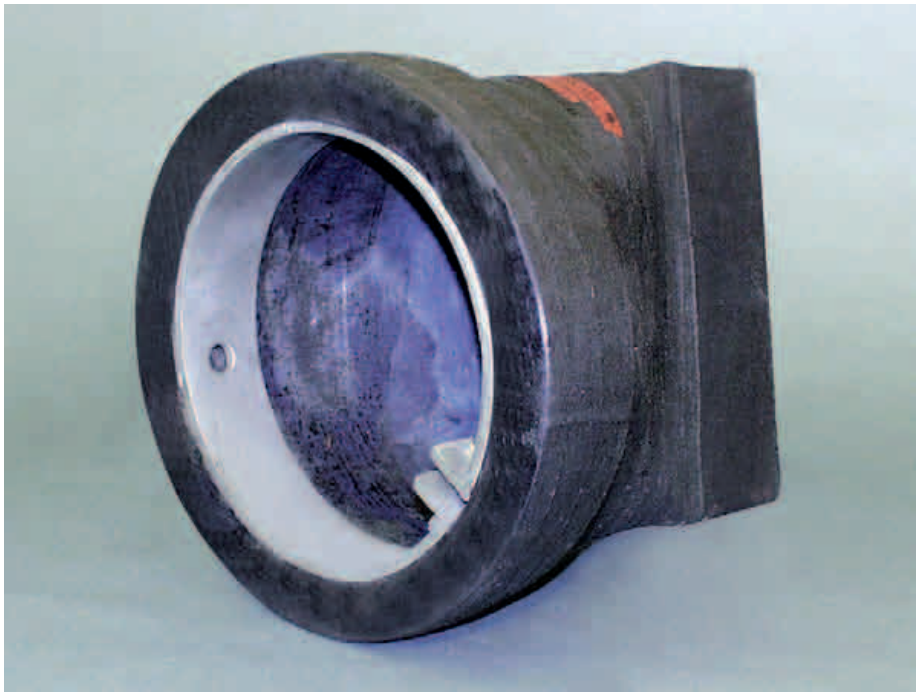
Appendix A

Series 37G

- Fits inside pipe I.D.
- Fastened with internal expansion clamp.
- Features all-elastomer, maintenance-free design.
- Is custom-built to customer specifications.
- Closes on entrapped solids.

Materials of Construction

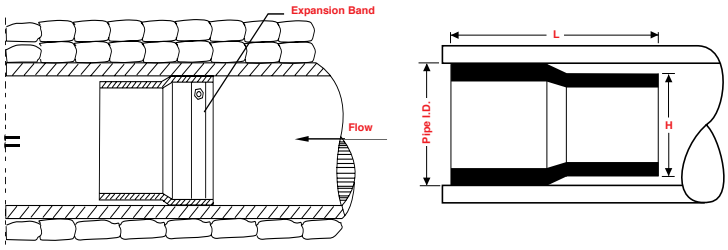
- Valves are available in pure gum rubber, neoprene, Hypalon®, buna-N, Viton® and EPDM.
- Stainless steel expansion clamps.



The Series 37G InLine Check Valve was developed specifically for installations where clearance below the invert of a pipe is insufficient to clear the flange of the standard Series 37. The 37G effectively has a zero face-to-face dimension since it can be completely slipped into an existing pipe. Piping modifications are not required to provide space for the valve. The Series 37G design uses the slip-on principle in reverse.

A special clamp that expands outward is provided to secure the valve to the inside of a pipe, enabling the valve to be installed easily on the outlet pipe from a manhole, such as in a CSO system.

The pressure drop of the Series 37G is increased because of the smaller I.D. required to fit the check valve in the line. Tideflex® Technologies recommends the valves be pinned to the pipe. Each clamp has four pre-drilled holes to allow installation of anchors/bolts. Contact our engineering staff for additional information.



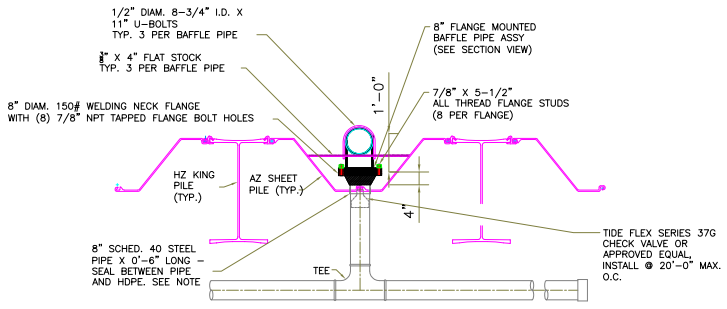
Dimensions Series 37G Check Valve

Nominal Size* (Pipe I.D.)	Length L	Height of Bill H	Max. Backpressure (psi)	
			Standard Tideflex®	With Saddle Support
2	5	1 7/8	150	CONTACT FACTORY
3	5 1/2	2 7/8	100	
4	7	3 7/8	75	
6	11	5 7/8	75	
8	12 1/2	7 7/8	60	
10	15 1/2	9 7/8	45	
12	18 1/2	11 7/8	35	
14	22	13 3/4	25	
16	23	15 3/4	20	
18	24	17 3/4	15	
20	32	19 3/4	10	
24	37	23 3/4	10	
30	41	29 3/4	8	
36	47	35 3/4	8	
42	49	41 1/2	5	
48	52	47 1/2	5	
54	57	53 1/2	5	
60	64	59 1/2	5	
72	73	71 1/2	5	

Numbers indicate maximum dimensions in inches.
Contact engineering staff to verify overall dimensions.
** Other sizes available; consult factory. Valves are also made for non-standard pipe I.D.'s.*

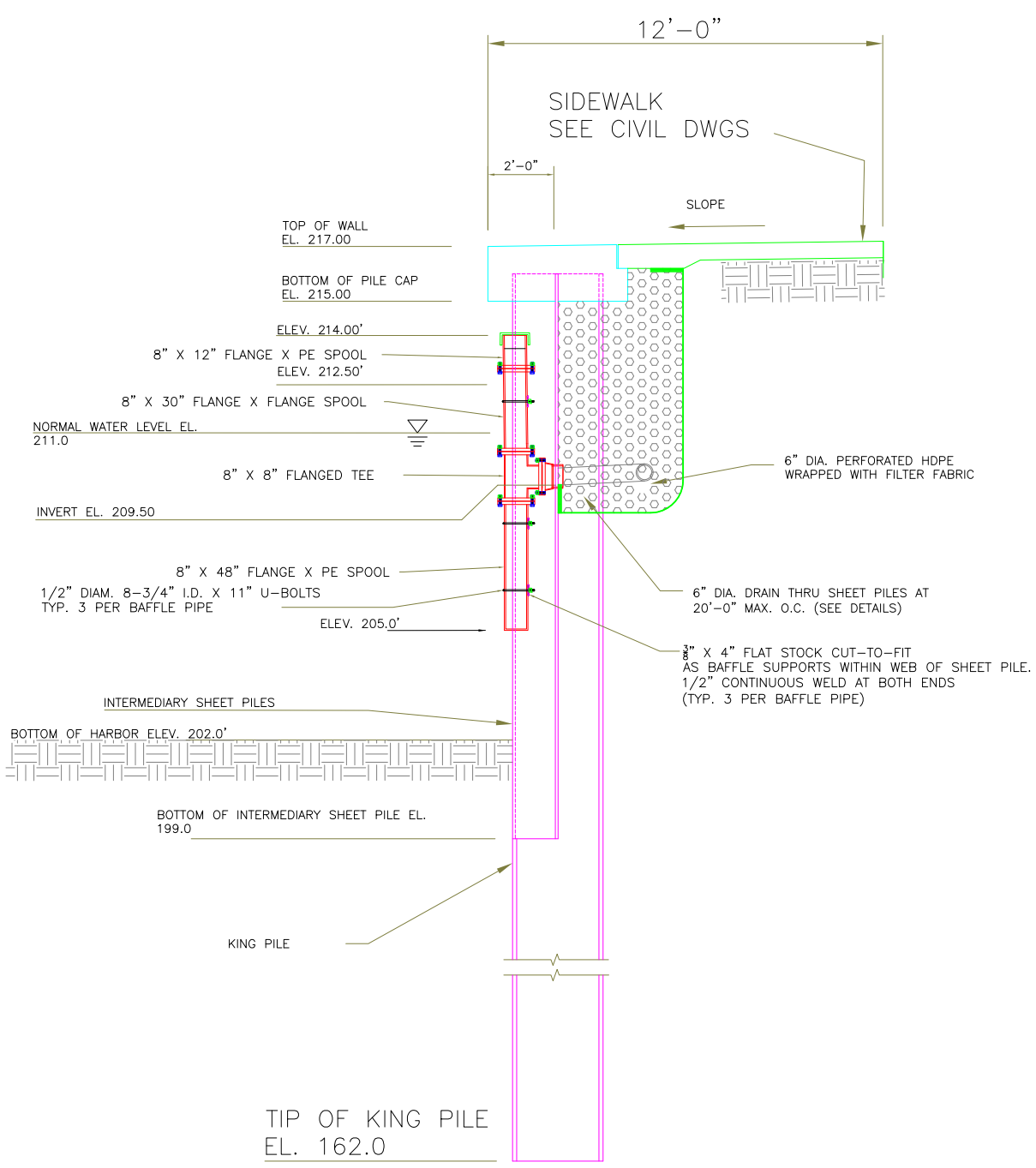
Appendix B

CONTRACTOR SKETCH FOR UNDERDRAIN DISCHARGE BAFFLES



NOTES:
1. ALL FLANGES SHALL BE WATER-TIGHT AND FITTED WITH FULL-FACED RED RUBBER GASKETS.

PLAN VIEW DETAIL



NOTES:
1. ALL FLANGES SHALL BE WATER-TIGHT AND FITTED WITH FULL-FACED RED RUBBER GASKETS.
2. ALL PIPE SHALL BE FABRICATED USING 8" SCH40 BLACK STEEL PIPE (8-5/8" O.D. & 8" I.D.)

SECTION VIEW

MOHAWK HARBOR		
DRAWN B BARTON	DATE 5/18/17	
APPROVED	DATE	
SCALE	SHEET 1 OF 1	PROJECT NO. 11511

Appendix C

GO TO GEOTECH

Electrical Submersible Pumps

Grundfos Redi-Flo3™ SQE-NE Environmental Pumps

The Grundfos Redi-Flo3 SQE-NE electrical submersible pump is ideal for the removal of polluted groundwater. Users have the capability to change the pump performance while the pump is installed in the well.

Typical applications include: environmental remediation, leachate extraction, total fluids recovery, tank-to-tank transfer, and sampling. Systems are available for your portable or dedicated pumping needs.

FEATURES

- **Advanced Electronics**
  The Grundfos micro-frequency converter offers the capability to control and communicate with the pump to monitor performance and set operating parameters.
- **Permanent-Soft Start System**
  The motor has a soft-start system which allows the pump to start with gradually increasing speed and with the highest possible starting torque.
- **Rugged Design**
  The pump uses "floating" impellers. Each impeller has its own tungsten carbide/ceramic bearing. This design and the environmentally tough 316 stainless steel and PVDF construction provide excellent wear resistance and solids handling capability.
- **Permanent-Magnet Motor**
  The motor is protected against: dry-run, over-voltage, under-voltage, overload and over-temperature and up-thrust.
- **Reliable Check Valves**
  Reliable built-in spring loaded check valve lets you operate the pump in a position from vertical to horizontal.

ACCESSORIES

Redi-Flo3™ SQE-NE CU 300 Status Box & Grundfos GO Remote*

The optional CU 300 Status Box and MI301 IR Remote at the surface allows you to communicate with the pump's integrated electronics through the standard power leads. No additional wires are required! This feature provides the direct use of 2 analog inputs and 1 digital input without adding any extra electronics and cost.

Pump status readout and parameter changes can be easily performed at the surface with the MI301 and smart device* or the PC Tool software.

*Smart phone or other smart device not included.

Wear Resistant Bearings

Permanent Magnet Motor

Advanced Electronics

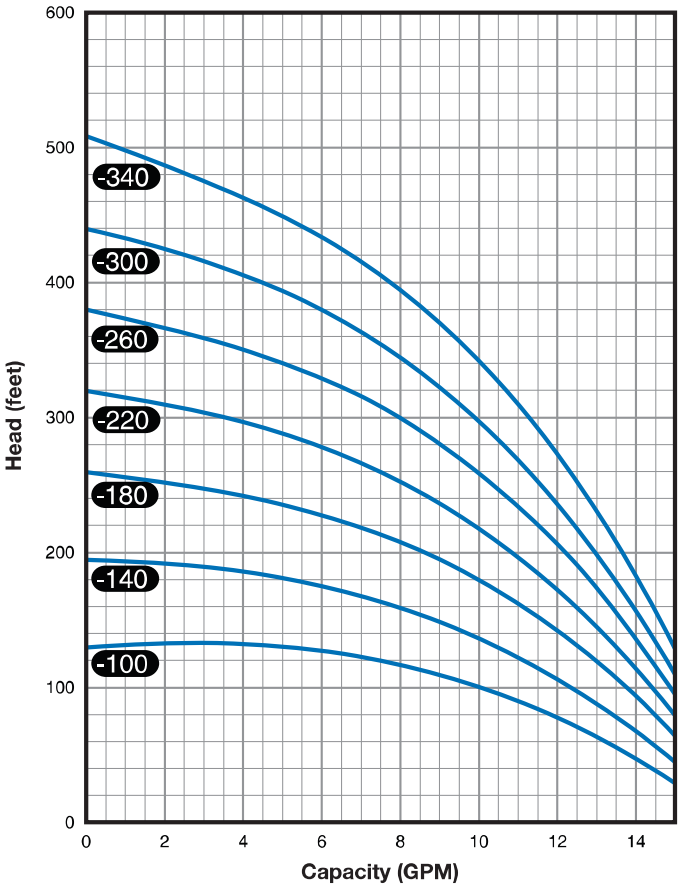
CALL GEOTECH TODAY (800) 833-7958

Geotech Environmental Equipment, Inc.
2650 East 40th Avenue • Denver, Colorado 80205
(303) 320-4764 • **(800) 833-7958** • FAX (303) 322-7242
email: sales@geotechenv.com website: www.geotechenv.com

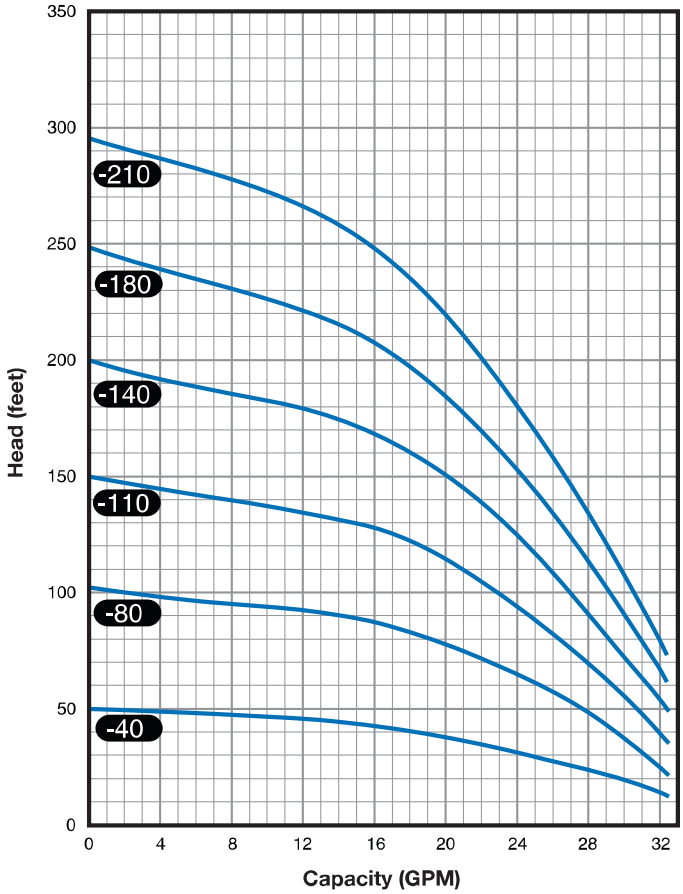
Electrical Submersible Pumps

Grundfos Redi-Flo3™ SQE-NE Environmental Pumps

PERFORMANCE



Grundfos Redi-Flo3™ SQE-NE 10gpm



Grundfos Redi-Flo3™ SQE-NE 22gpm

CALL GEOTECH TODAY (800) 833-7958

Geotech Environmental Equipment, Inc.
2650 East 40th Avenue • Denver, Colorado 80205
(303) 320-4764 • **(800) 833-7958** • FAX (303) 322-7242
email: sales@geotechenv.com website: www.geotechenv.com

Electrical Submersible Pumps

Grundfos Redi-Flo3™ SQE-NE Environmental Pumps

SPECIFICATIONS

General:

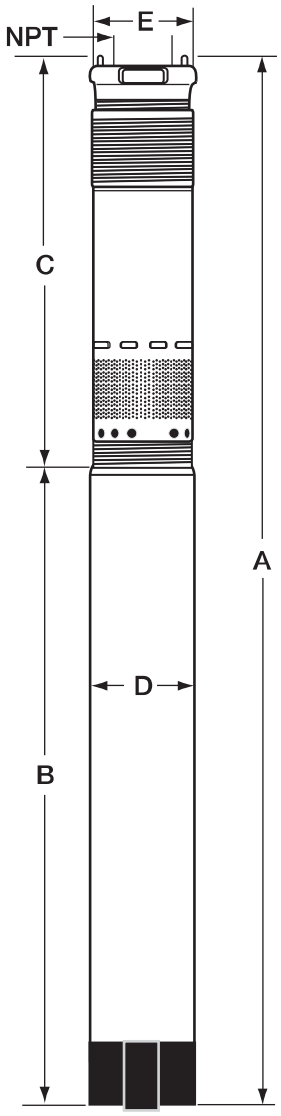
Well Diameter	Minimum 3 in. (76 mm)
Installation Depth	Maximum 500 ft. (150 m) below static water table
Variable Speed Control	30%-100% (3,000, 10,700 RPM)
Material	Stainless steel complying with DIN W.-Nr 1.4401 (AISI 316), PVDF and FPM rubber

Electric:

Supply Voltage	1 x 200-240V +6% / -10%, 50 / 60 Hz PE 1 x 100-115V
Operation via Generator	The generator output must be equal to the motor P1(KW) +10%
Starting Current	The motor starting current is equal to the highest value stated on the motor nameplate
Starting	Soft-start
Run-up Time	2 seconds maximum
Motor Protection	The motor is protected against: dry-run, over-voltage, under-voltage, overload, over-temperature and upthrust
Power Factor	PF = 1
Service Factor	0.5-1.85 HP @ 115V / 230V 0.75-2.05 HP @ 230V 1.0-2.25 HP @ 230V 1.5-1.65 HP @ 230V
Motor Cable	2 Wire with ground, Tefzel® Cable Kit (Santoprene® available)
pH Values	5-9
Liquid Temperature	The temperature of the pumped liquid should not exceed 104°F

Note: If liquids with a viscosity or specific gravity higher than that of water are to be pumped, please contact Geotech Environmental Equipment, Inc.

Minimum Ambient Temperature	4°F (-15°C)
Maximum Ambient Temperature	+104°F (40°C)
Maximum Liquid Temperature	86°F (30°C)



Dimensions and Weight:

Model Number	HP	Discharge Size	Dimensions in Inches (cm) A	B	C	D	E	Approximate Ship Weight lbs. (kg)
10Redi-Flo3 SQE-100NE	½	1 ¼" NPT	30.4 (77.2)	19.8 (50.3)	10.6 (27)	2.6 (6.6)	2.9 (7.4)	12 (5.4)
10Redi-Flo3 SQE-140NE	½	1 ¼" NPT	30.4 (77.2)	19.8 (50.3)	10.6 (27)	2.6 (6.6)	2.9 (7.4)	12 (5.4)
10Redi-Flo3 SQE-180NE	¾	1 ¼" NPT	31.5 (80)	19.8 (50.3)	11.6 (29.5)	2.6 (6.6)	2.9 (7.4)	13 (5.9)
10Redi-Flo3 SQE-220NE	¾	1 ¼" NPT	33.6 (77.7)	19.8 (50.3)	13.7 (34.8)	2.6 (6.6)	2.9 (7.4)	13 (5.9)
10Redi-Flo3 SQE-260NE	1	1 ¼" NPT	35.0 (89)	21.3 (54.1)	13.7 (34.8)	2.6 (6.6)	2.9 (7.4)	16 (7.3)
10Redi-Flo3 SQE-300NE	1	1 ¼" NPT	36.1 (91.7)	21.3 (54.1)	14.8 (37.6)	2.6 (6.6)	2.9 (7.4)	16 (7.3)
10Redi-Flo3 SQE-340NE	1	1 ¼" NPT	38.2 (97)	21.3 (54.1)	16.9 (42.9)	2.6 (6.6)	2.9 (7.4)	16 (7.3)
22Redi-Flo3 SQE-40NE	½	1 ½" NPT	30.4 (77.2)	19.8 (50.3)	10.6 (27)	2.6 (6.6)	2.9 (7.4)	12 (5.4)
22Redi-Flo3 SQE-80NE	½	1 ½" NPT	30.4 (77.2)	19.8 (50.3)	10.6 (27)	2.6 (6.6)	2.9 (7.4)	12 (5.4)
22Redi-Flo3 SQE-110NE	¾	1 ½" NPT	31.5 (80)	19.8 (50.3)	11.6 (29.5)	2.6 (6.6)	2.9 (7.4)	13 (5.9)
22Redi-Flo3 SQE-140NE	¾	1 ½" NPT	33.6 (77.7)	19.8 (50.3)	13.7 (34.8)	2.6 (6.6)	2.9 (7.4)	13 (5.9)
22Redi-Flo3 SQE-180NE	1	1 ½" NPT	38.2 (97)	21.3 (54.1)	16.9 (42.9)	2.6 (6.6)	2.9 (7.4)	16 (7.3)
22Redi-Flo3 SQE-210NE	1 ½	1 ½" NPT	38.2 (97)	21.3 (54.1)	16.9 (42.9)	2.6 (6.6)	2.9 (7.4)	16 (7.3)

Note: Weights include pump ends with motors.

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Appendix D

1. Product Introduction

SQ pumps are submersible pumps available in the following versions:

- SQ
- SQ-N
- SQE
- SQE-N
- SQE-NE.

Applications

SQ and SQE pumps are suitable for both continuous and intermittent operation for a variety of applications:

- domestic water supply
- small waterworks
- irrigation
- tank applications
- pressure boosting.

SQE-NE pumps are suitable for environmental applications, such as remedial pumping or sampling at:

- refuse dumps
- chemical sites
- industrial sites
- garages and petrol stations.

Note: For other applications, please contact Grundfos.

Features and Benefits

SQ pumps offer the following features:

- dry-running protection
- high pump and motor efficiency
- wear resistance
- protection against upthrust
- soft starter
- overvoltage and undervoltage protection
- overload protection
- overtemperature protection.

Additionally, SQE pumps offer the following benefits:

- variable speed
- electronic control and communication.

The motors are based on the most recent technology within permanent magnets. This technology is the main reason for the high efficiency of the motors. The motors have a built-in electronic unit containing a frequency converter featuring soft start.

SQ pumps are fitted with a single-phase Grundfos MS 3 or MS 3-NE motor, and by means of the built-in frequency converter, the motor is driven at a constant speed.

SQE pumps are also fitted with a single-phase Grundfos MSE 3 or MSE 3-NE motor. Both motor types can communicate with the Grundfos CU 300 and CU 301 control units, which can be operated with Grundfos GO Remote.

SQE pumps feature variable speed which is offered through frequency control. This means that the pump can be set to operate in any duty point in the range between the pump minimum and maximum performance curves.

CU 301 is specially developed for applications where a constant pressure is required.

CU 300 and CU 301 provide full control of SQE pumps. In case of pump fault, the front of the CU 300 or CU 301 shows an alarm. Grundfos GO Remote enables monitoring of the installation and changing of the factory settings.

SQE pumps can operate without a CU 300 or CU 301. However, in such case, the pump does not offer all the features available when connected to a CU 300 or a CU 301.

Pump and motor range

Product	Description	Material
SQ, SQE pump	(1, 2, 3, 5, and 7 m^3/h)	Stainless steel EN 1.4301, AISI 304
SQ-N, SQE-N pump	(1, 2, 3, 5, and 7 m^3/h)	Stainless steel EN 1.4401, AISI 316
SQE-NE pump	(2 and 5 m^3/h)	Stainless steel EN 1.4401, AISI 316
MS 3 motor	Single-phase Max. 1.85 kW	Stainless steel EN 1.4301, AISI 304
MS 3-NE motor	Single-phase Max. 1.85 kW	Stainless steel EN 1.4401, AISI 316
MSE 3 motor	Single-phase Max. 1.85 kW	Stainless steel EN 1.4301, AISI 304
MSE 3-NE motor	Single-phase Max. 1.85 kW	Stainless steel EN 1.4401, AISI 316

Pipe connection

Pump type	Threaded connection
SQ 1, SQ 2, SQ 3	Rp 1 1/4
SQ 5, SQ 7	Rp 1 1/2

Type key

Code	Example	SQ	E	2	-55
	Type range				
	Basic version				
E	Electronic control and communication				
	Rated flow rate [m^3/h]				
	Head [m] at rated flow rate				
	Material code: Stainless steel EN 1.4301				
N	Stainless steel EN 1.4401				

Pumped liquids

The SQ and SQE pumps are suitable for pumping thin, clean, non-aggressive, non-explosive liquids, not containing solid or long-fibred particles larger than sand grains. The pH value of the pumped liquid should be between 5 and 9.

The SQE-NE pumps are applicable in contaminated or hydrogen-carbonate-containing groundwater. The pH value should be between 2 and 13.

For further information, see section *8. Resistance list, SQE-NE*.

Sand content

The maximum sand content allowed is 50 g/m^3.

A higher sand content will reduce pump life due to wear.

Temperature

Due to differences in regulations, temperature limits have been determined according to the following regions:

- West European
- Central European
- Asian-Pacific
- North American.

For the West European, Central European and Asian-Pacific region, the following table applies:

Flow velocity past the motor	Max. liquid temperature [°C (°F)]
0 m/s (free convection)	35 (95)
Min. 0.15 m/s	40 (105)

Temperature limit on the motor nameplate: 35 °C.

Note: UL accepts only one temperature limit to be stamped on the motor nameplate. Identical motors are used in the following regions:

- West European
- Central European
- Asian-Pacific
- North America.

For the North American region, the following table applies:

Flow velocity past the motor	Max. liquid temperature [°C (°F)]
0 m/s (free convection)	30 (86)

Note: According to UL regulations, the temperature of the pumped liquid must not exceed 86 °F (30 °C) for products in the North American region.

Viscosity

The pumping of liquids with a viscosity higher than that of water will cause the following:

- head loss
- higher power consumption.

If in doubt, contact Grundfos.

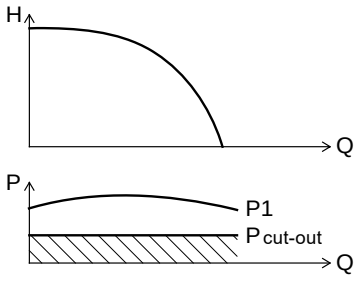
2. Features and benefits

Dry-running protection

The pumps are protected against dry running. A value of $p_{cut-out}$ ensures cut-out of the pump in case of water shortage in the borehole, thus preventing a burnout of the motor.

The dry-running protection is active after 30 seconds of operation. The dry-running alarm is activated when the load has been below the minimum power limit for an accumulated time of 5 seconds.

$P_{cut-out}$ is factory-set both for the SQ and SQE pumps. On SQE, the dry-run limit can be adjusted with Grundfos GO.



TM01 2751 2298

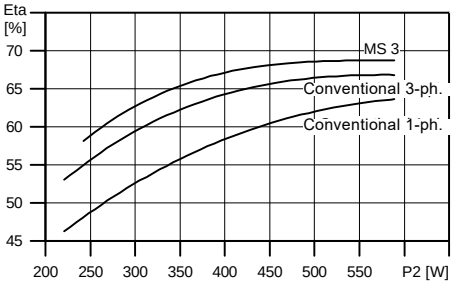
Fig. 3 Dry-running protection

High pump efficiency

The hydraulic pump components are polyamide-reinforced with 30 % glass fibre. The hydraulic design ensures high pump efficiency, yielding low energy consumption and thus low energy costs.

High motor efficiency

The motors are designed according to the permanent-magnet principle (PM motor), featuring high efficiency within a wide performance range.



TM01 2698 2298

Fig. 4 Comparison of motor efficiency

Wear resistance

The pump impellers are not fastened to the shaft ("floating"). Each impeller has its own tungsten carbide/ceramic bearing. The design and the materials chosen ensure high wear resistance to sand, thus long product life.

TM01 3141 3498

Fig. 5 Impellers

Protection against upthrust

Starting up a pump with a very low counter pressure involves the risk of the entire impeller stack being lifted. This phenomenon is called upthrust. Upthrust may cause breakdown of both pump and motor.

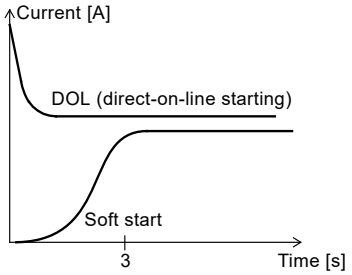
The motors are fitted with an upthrust bearing protecting both pump and motor against upthrust, thus preventing breakdown during the critical start up phase.

Excellent starting capabilities

The integrated electronic unit of the motor includes soft starting. Soft starting reduces the starting current, thus gives the pump a smooth and steady acceleration.

The soft starter minimises the risk of wear of the pump and prevents overloading of the mains during start up.

The excellent starting capabilities are a result of the high locked-rotor torque of the permanent-magnet motor, and the few pump stages. High starting reliability also applies in case of low voltage supply.



TM01 3479 4198

Fig. 6 Comparison of locked-rotor current

Overvoltage and undervoltage protection

Overvoltage and undervoltage may occur in case of unstable voltage supply.

The integrated protection of all motors prevents damage to the motor in case the voltage moves outside the permissible voltage range.

The pump is cut out if the voltage falls below 150 V or rises above 315 V. The motor automatically restarts when the voltage returns within the permissible range. Consequently, no extra protection relay is required.

Overload protection

If the pump is exposed to heavy load, the current consumption rises. The motor automatically compensates for this by reducing the speed. If the speed falls below 3000 min^{-1}, the motor is cut out.

If the rotor is prevented from rotating, it is automatically detected and the power supply is cut out. Consequently, no extra motor protection is required.

Overtemperature protection

A permanent-magnet motor gives off very little heat to its surroundings. In combination with an efficient internal circulation system leading the heat away from the rotor, stator and bearings, optimum operating conditions are ensured for the motor.

As an extra protection, the electronic unit has a built-in temperature sensor. When the temperature exceeds a critical limit, the motor is cut out. When the temperature returns below the limit, the motor is automatically cut in again.

Reliability

The motors have been designed with high reliability and have the following features:

- tungsten carbide or ceramic bearings
- thrust bearings protecting against downthrust
- product life equal to conventional AC motors.

Variable speed

The MSE 3 motor enables variable speed control within the range of 3,000 to 10,700 min^{-1}. The pump can be set to operate in any duty point within the 3,000 to 10,700 min^{-1} performance range of the pump. Consequently, the pump performance can be adapted to any specific requirement.

The variable-speed control facility requires the use of a CU 300 or CU 301 control unit and Grundfos GO Remote. See page 28.

Installation

SQ and SQE may be installed vertically, horizontally or in any position in between.

Note: The pump must not fall below the horizontal level in relation to the motor.

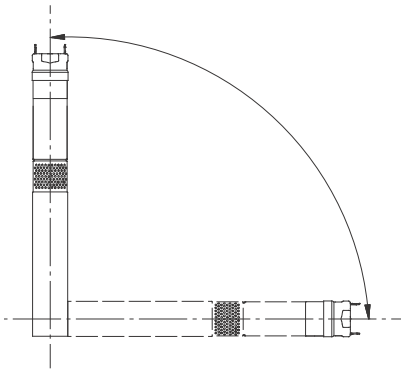


Fig. 7 Installation of SQ/SQE pumps

The following features ensure simple installation of the pump:

- built-in non-return valve with spring
- low weight facilitating handling
- installation in 3-inch or larger boreholes
- on/off switch without extra motor starter or starter box necessary
- SQE available with cable with a motor plug (up to 100 m).

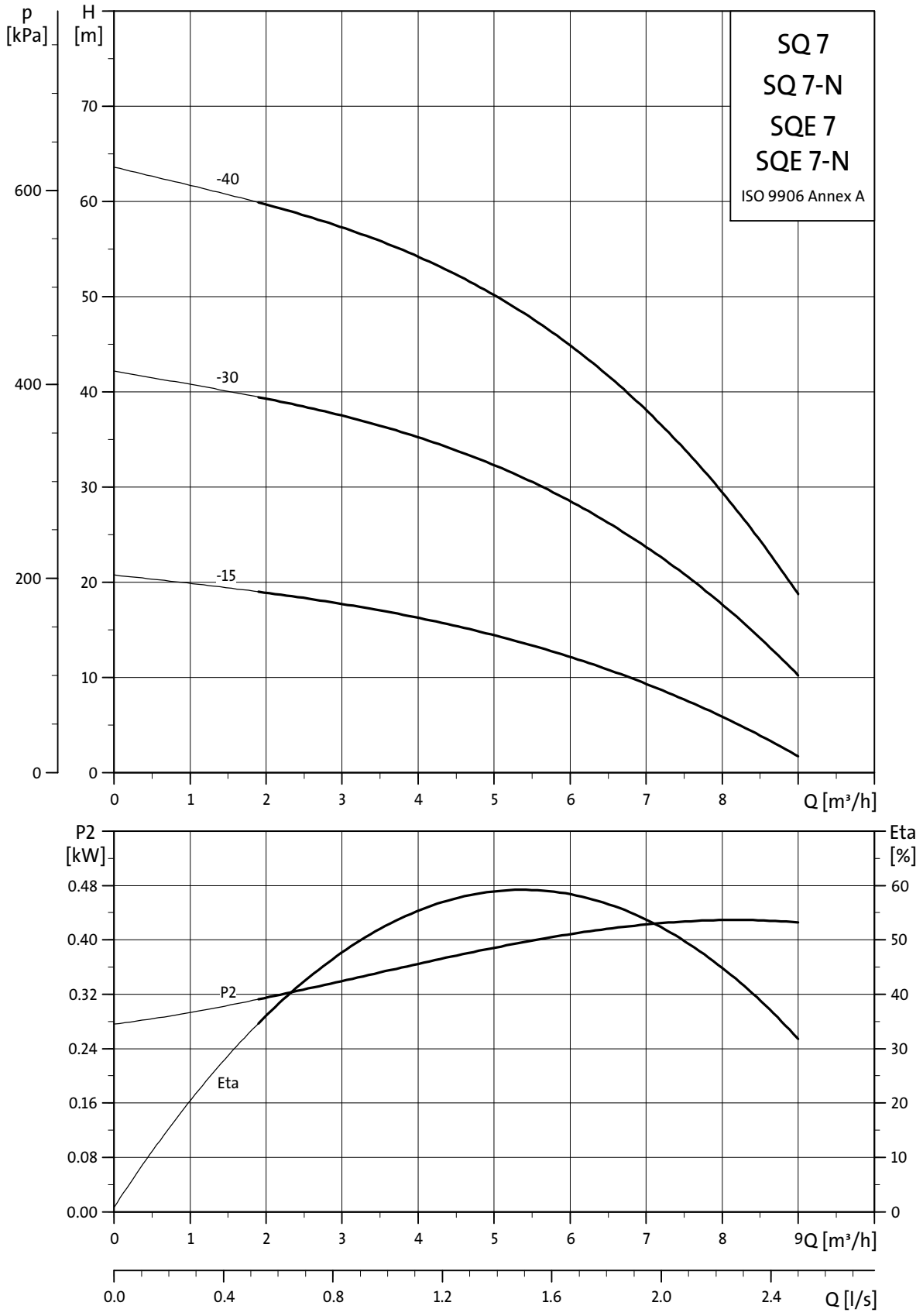
For horizontal installation, we recommend that you install the pump in a flow sleeve, for the following reasons:

- to ensure sufficient flow velocity past the motor, thus provide sufficient cooling
- to prevent motor and electronic unit from being buried in sand or mud.

Service

The modular pump and motor design facilitates installation and service. The cable and plug are fitted to the pump with screws, which enables replacement.

SQ 7, SQ 7-N, SQE 7, SQE 7-N



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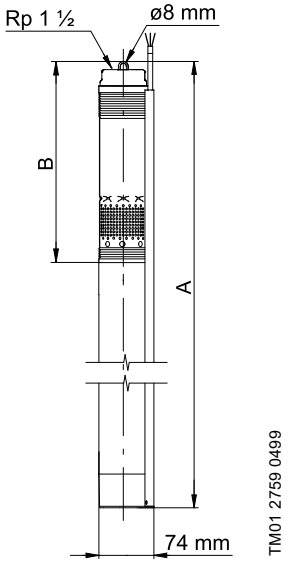
Dimensions and weights



Pump type	Number of stages	Motor		Dimensions [mm]		Net weight [kg][1]	Shipping volume [m³][1]
		Type	Output power (P2) [kW]	A	B		
SQ 7-15 (-N) SQE 7-15 (-N)	1	MS 3 (-NE) MSE 3 (-NE)	0.7	743	265	4.7	0.0092
SQ 7-30 (-N) SQE 7-30 (-N)	2	MS 3 (-NE) MSE 3 (-NE)	1.15	743	265	5.2	0.0092
SQ 7-40 (-N) SQE 7-40 (-N)	3	MS 3 (-NE) MSE 3 (-NE)	1.55	860	346	6.1	0.0104

[1] Including pump, motor, 1.5-metre cable and cable guard.

Electrical data, 1 × 200-240 V, 50/60 Hz

Pump type	Input power, motor (P1) [kW]	Output power, motor (P2) [kW]	Required input power, pump [kW]	Rated current $I_{1/1}$ [A]		Rated motor efficiency (η) [%]
				230 V	200 V	
SQ 7-15 (-N) SQE 7-15 (-N)	0.73	0.70	0.48	3.1	3.7	70
SQ 7-30 (-N) SQE 7-30 (-N)	1.26	1.15	0.90	5.5	6.4	73
SQ 7-40 (-N) SQE 7-40 (-N)	1.81	1.55	1.31	7.8	9.3	74

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