

April 9, 2021

Michael MacCabe
New York State Department of Environmental Conservation
Division of Environmental Remediation
625 Broadway
Albany, NY 12233

**RE: Off-Site Groundwater Remediation Work Plan
561 Greenwich Street
New York, New York
Langan Project No.: 190043702
NYSDEC BCP Site No. C231129**

Dear Mr. MacCabe:

On behalf of the Rector, Church-Wardens, and Vestrymen of Trinity Church, in the city of New York, 561 HH LLC, and Remainderman 561 Greenwich LLC, collectively the Participants, we prepared this work plan to notify the New York State Department of Environmental Conservation (NYSDEC) of a proposed off-site dewatering system to address free-phase petroleum product and dissolved-phase petroleum-impacted groundwater within the Greenwich Street sidewalk fronting 561 Greenwich Street in New York, New York (the site). The site is enrolled in the NYSDEC Brownfield Cleanup Program (BCP) as BCP Site No. C231129.

The NYSDEC-approved March 10, 2020 Remedial Action Work Plan (RAWP) anticipated that off-site petroleum impacts in groundwater (NYSDEC Spill No. 1801068) would be addressed via on-site dewatering and treatment during site-wide remediation, in addition to in-situ remediation via sodium persulfate and powdered activated carbon (PAC) injections (see RAWP Section 5.5 and Appendix C – Remedial Design Memo). However, the support of excavation design was modified from soldier piles and lagging to be a continuous soil-mix wall around the perimeter of the site. The soil-mix wall acts as a hydraulic barrier, and thus off-site petroleum-impacted groundwater will not be treated through the existing on-site dewatering and treatment system.

On August 28, 2020, an about 0.2-foot-thick layer of light non-aqueous phase liquid (LNAPL) was detected in off-site monitoring well MW22. The monitoring well has since been inaccessible due to construction equipment that is staged above it and so follow-up well gauging has not been performed.

In order to recover and treat off-site LNAPL and petroleum-impacted groundwater, Langan proposes the following scope of work:

- Install three 4-inch-diameter polyvinyl chloride (PVC) wire-wrapped recovery wells within the Greenwich Street sidewalk surrounding monitoring well MW22;
- Extract groundwater from the recovery wells via submersible pneumatic pumps;
- Pump extracted groundwater through an equalization tank followed by an oil-water separator prior to treatment through the existing three-phase dewatering and treatment system, which consists of a settling tank, particulate bag filters, and activated carbon tanks, prior to discharge to the combined sewer in accordance with a New York City Department of Environmental Protection (NYCDEP) permit (Permit No. 913410);
- Collect baseline, bi-weekly, and post-dewatering groundwater samples from previously installed sidewalk wells and proposed recovery wells; and
- Perform a contingent off-site groundwater polishing measure via powdered activated carbon (PAC) injections (contingent on groundwater monitoring results).

The following sections provide details regarding the proposed scope of work:

Recovery Well Installation

A minimum of three 4-inch-diameter recovery wells (OS_RW01 through OS_RW03) will be installed with a track-mounted drill rig within the Greenwich Street sidewalk. The proposed recovery well locations are shown on Figure 1. Soil cuttings will be screened continuously with a photoionization detector (PID) equipped with a 10.6 electron volt bulb and for visual and olfactory evidence of environmental impacts (e.g., staining and odor). Drilling observations will be recorded in field notes. Soil cuttings will be segregated by material type and waste characterization cell for disposal with like on-site material to permitted off-site disposal facilities.

The wells will be constructed with 15-foot-long, 4-inch-diameter wire-wrapped polyvinyl chloride (PVC) well screens from about 3 to 18 feet below sidewalk grade (bsg) and Schedule 40 solid PVC risers to surface grade. The annulus of the borehole will be backfilled with No. 2 sand to about 2 feet above the screened interval (about 1 foot bsg), followed by a hydrated bentonite seal to surface. The wells will be finished with an expanding well plug and flush-mount steel manhole covers. The drilling subcontractor will develop all newly installed wells and temporarily containerize purged groundwater in United Nations/Department of Transportation (UN/DOT) 55-gallon steel drums for future treatment and discharge via the off-site groundwater treatment system.

Additionally, Langan will collect one sample of LNAPL from monitoring well MW22 or the adjacent recovery well for viscosity, density, and surface tension analyses in order to estimate the approximate volume of recoverable product within the subsurface in support of NYSDEC spill closure.

The Community Air Monitoring Program will be implemented in accordance with the March 10, 2020 RAWP during intrusive activities. Results of the CAMP will be provided in daily reports and the Final Engineering Report.

Groundwater Extraction and Treatment

Submersible pneumatic pumps will be installed in each of the recovery wells to pump off-site LNAPL and petroleum-impacted groundwater into an equalization tank (to encourage product to separate from groundwater after pumping), followed by an oil-water separator. Product will be periodically removed and containerized in a labeled, UN/DOT, 55-gallon steel drum for future off-site disposal. The effluent flow rate and volume from the oil-water separator will be monitored with a flow meter/totalizer prior to being pumped to the existing on-site three-phase dewatering and treatment system, which consists of a settling tank, particulate bag filters, and activated carbon tanks, prior to discharge to the combined sewer in accordance with a New York City Department of Environmental Protection (NYCDEP) permit (Permit No. 913410). The off-site groundwater treatment system assumes a total flow rate of between 1.5 and 2 gallons per minute (gpm) from each of the three recovery wells. Langan field personnel will document the system installation. The proposed location of the off-site groundwater treatment system is shown on Figure 1. Equipment specifications for the off-site groundwater treatment system are included as Attachment 1.

Groundwater Monitoring

The off-site groundwater treatment system is proposed to operate for 3 months. Langan will collect groundwater samples periodically for analysis of volatile organic compounds (VOC) to monitor the performance of the off-site treatment system as follows:

- Baseline and post-treatment samples (two events) will be collected from previously installed sidewalk wells MW21, MW22, MW23, and recovery wells OS_RW02 and OS_RW03; and
- Bi-weekly performance monitoring samples will be collected from MW22 or OS_RW01, OS_RW02, and OS_RW03.

The samples will be collected in laboratory-supplied containers and will be sealed, labeled, and placed in an ice-chilled cooler (to attempt to maintain a temperature of about 4°C) for delivery to a New York State Department of Health (NYSDOH) Environmental Laboratory Approval Program (ELAP)-certified laboratory.

Groundwater samples will be collected in accordance with NYSDEC Division of Environmental Remediation (DER-10) and the United States Environmental Protection Agency (USEPA's) "Low Flow Purging and Sampling Procedures for the Collection of Groundwater Samples from Monitoring Wells" (EQASOP-GW4 revised September 2017). Before the groundwater samples

are collected, wells will be gauged and then continuously purged while groundwater quality parameters (pH, conductivity, turbidity, dissolved oxygen, temperature, and oxidation-reduction potential) are monitored. A multi-parameter flow-through water-quality meter will be used to monitor the groundwater-quality parameters prior to sampling. Samples will be collected with a peristaltic pump (or equivalent) and dedicated Teflon-lined polyethylene tubing. Purged groundwater will be temporarily containerized prior to being pumped through the off-site groundwater treatment system.

System Decommissioning

The off-site groundwater treatment system will be demobilized by the system subcontractor concurrently with the on-site dewatering and groundwater treatment system, which is anticipated to be after about 3 months of system operation. At that time, all equipment will be removed under Langan oversight. The recovery wells will be closed with flush-mounted well caps and the wells will be used for periodic groundwater monitoring until NYSDEC has determined that the off-site groundwater remedy has been completed. At that time, the wells will be decommissioned in accordance with NYSDEC Commissioner Policy 43 (CP-43): Groundwater Monitoring Well Decommissioning Policy.

Contingent Off-Site Groundwater Polishing Measure

Groundwater monitoring will be performed during operation of the system, following decommissioning of the system, and periodically thereafter to evaluate performance of the groundwater treatment remedy. If deemed necessary based on the results of ongoing performance monitoring following system decommissioning, an off-site groundwater polishing measure, consisting of PAC injections via a direct-push drill rig, will be performed within the off-site treatment area as described in Section 5.2 of the August 27, 2019 Remedial Design Memorandum.

Anticipated Schedule

Recovery well installation and development are scheduled for April 10, 2021. Baseline groundwater samples will be collected on April 16th, and the off-site groundwater treatment system will be mobilized on April 17th. The off-site groundwater treatment system will be connected to the existing treatment system between April 17 and 23, 2021. The off-site treatment system will operate for about 3 months, during which Langan will collect bi-weekly groundwater monitoring samples. Langan will provide the performance monitoring laboratory analytical results to the NYSDEC upon receipt. The system will be decommissioned after about 3 months of operation, or, if no free product is observed and a bulk reduction in dissolved concentrations of petroleum compounds has been achieved before 3 months of operation, a request will be made to NYSDEC to consider the off-site groundwater remedy complete and the off-site treatment system will be decommissioned. In both scenarios, post-treatment

groundwater samples will be collected and evaluated, and ongoing monitoring will be performed to determine if any additional remedial measures are required.

Should you have any questions, please call the undersigned at 212-479-5413. Thank you for your consideration.

Sincerely,

**Langan Engineering, Environmental, Surveying
Landscape Architecture and Geology, D.P.C.**



Michael Burke, PG, CHMM
Principal/Vice President

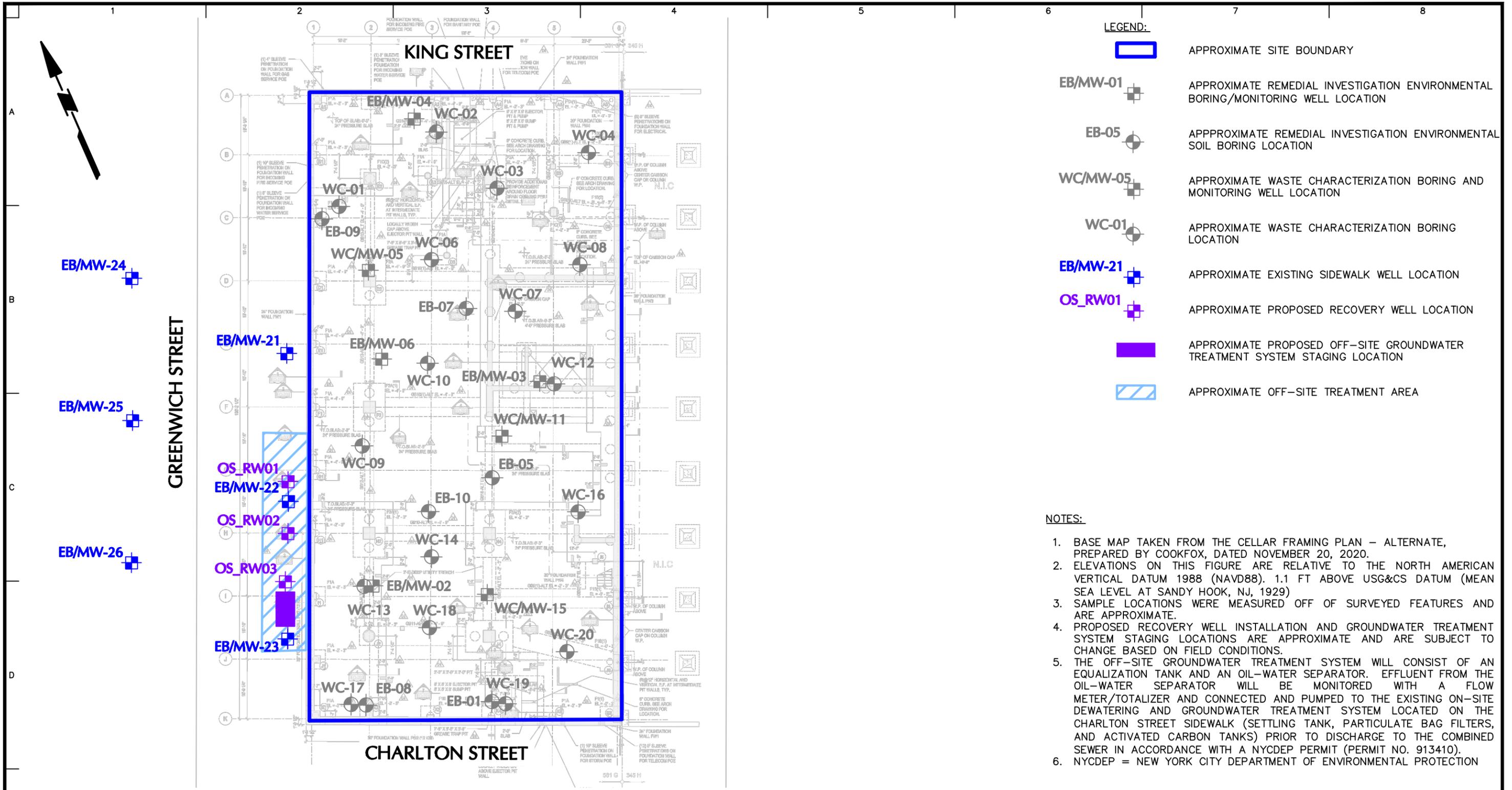
Enclosure:

Figure 1 – Proposed Recovery Well and Off-Site Groundwater Treatment System Location Plan

Attachment 1 – Equipment Specifications

cc: P. McMahon, E. Adkins - Langan

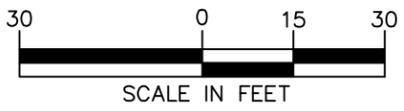
FIGURE



- LEGEND:**
-  APPROXIMATE SITE BOUNDARY
 -  EB/MW-01 APPROXIMATE REMEDIAL INVESTIGATION ENVIRONMENTAL BORING/MONITORING WELL LOCATION
 -  EB-05 APPROXIMATE REMEDIAL INVESTIGATION ENVIRONMENTAL SOIL BORING LOCATION
 -  WC/MW-05 APPROXIMATE WASTE CHARACTERIZATION BORING AND MONITORING WELL LOCATION
 -  WC-01 APPROXIMATE WASTE CHARACTERIZATION BORING LOCATION
 -  EB/MW-21 APPROXIMATE EXISTING SIDEWALK WELL LOCATION
 -  OS_RW01 APPROXIMATE PROPOSED RECOVERY WELL LOCATION
 -  APPROXIMATE PROPOSED OFF-SITE GROUNDWATER TREATMENT SYSTEM STAGING LOCATION
 -  APPROXIMATE OFF-SITE TREATMENT AREA

- NOTES:**
1. BASE MAP TAKEN FROM THE CELLAR FRAMING PLAN – ALTERNATE, PREPARED BY COOKFOX, DATED NOVEMBER 20, 2020.
 2. ELEVATIONS ON THIS FIGURE ARE RELATIVE TO THE NORTH AMERICAN VERTICAL DATUM 1988 (NAVD88). 1.1 FT ABOVE USG&CS DATUM (MEAN SEA LEVEL AT SANDY HOOK, NJ, 1929)
 3. SAMPLE LOCATIONS WERE MEASURED OFF OF SURVEYED FEATURES AND ARE APPROXIMATE.
 4. PROPOSED RECOVERY WELL INSTALLATION AND GROUNDWATER TREATMENT SYSTEM STAGING LOCATIONS ARE APPROXIMATE AND ARE SUBJECT TO CHANGE BASED ON FIELD CONDITIONS.
 5. THE OFF-SITE GROUNDWATER TREATMENT SYSTEM WILL CONSIST OF AN EQUALIZATION TANK AND AN OIL-WATER SEPARATOR. EFFLUENT FROM THE OIL-WATER SEPARATOR WILL BE MONITORED WITH A FLOW METER/TOTALIZER AND CONNECTED AND PUMPED TO THE EXISTING ON-SITE DEWATERING AND GROUNDWATER TREATMENT SYSTEM LOCATED ON THE CHARLTON STREET SIDEWALK (SETTLING TANK, PARTICULATE BAG FILTERS, AND ACTIVATED CARBON TANKS) PRIOR TO DISCHARGE TO THE COMBINED SEWER IN ACCORDANCE WITH A NYCDEP PERMIT (PERMIT NO. 913410).
 6. NYCDEP = NEW YORK CITY DEPARTMENT OF ENVIRONMENTAL PROTECTION

WARNING: IT IS A VIOLATION OF THE NYS EDUCATION LAW ARTICLE 145 FOR ANY PERSON, UNLESS HE IS ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, TO ALTER THIS ITEM IN ANY WAY.



LANGAN
 Langan Engineering, Environmental, Surveying,
 Landscape Architecture and Geology, D.P.C.
 21 Penn Plaza, 360 West 31st Street, 8th Floor
 New York, NY 10001
 T: 212.479.5400 F: 212.479.5444 www.langan.com

Project
561 GREENWICH STREET
 BLOCK No. 598, LOT No. 42
 NEW YORK NEW YORK

Figure Title
PROPOSED RECOVERY WELL AND OFF-SITE GROUNDWATER TREATMENT SYSTEM LOCATION PLAN

Project No. 190043701	Figure No. 1
Date 03/30/2021	
Drawn By KR	
Checked By ERA	
Sheet 1 of 1	

ATTACHMENT 1
EQUIPMENT SPECIFICATIONS

LDAP4+B

Low-Drawdown Bottom Inlet, Short

Max. Flow 7.0 gpm (26.5 lpm)

O.D. 3.6 in (91 mm)

Length 39.3 in. (100 cm)



Description

The AP4+ Low-Drawdown Bottom Inlet AutoPump provides maximum capabilities and flow in a bottom inlet pump for 4" (100 mm) diameter and larger wells with very short water columns and/or the need to pump down to as low as 11.5 inches (29 cm) above the bottom. It is offered in optional versions to handle even the most severe remediation and landfill pumping applications, and delivers flow rates up to 7 gpm (26.5 lpm). The AP4+ Low Drawdown Bottom Inlet AutoPump is complemented by the most comprehensive selection of accessories to provide a complete system to meet site specific requirements. Call QED for prompt, no-obligation assistance on your pumping project needs.

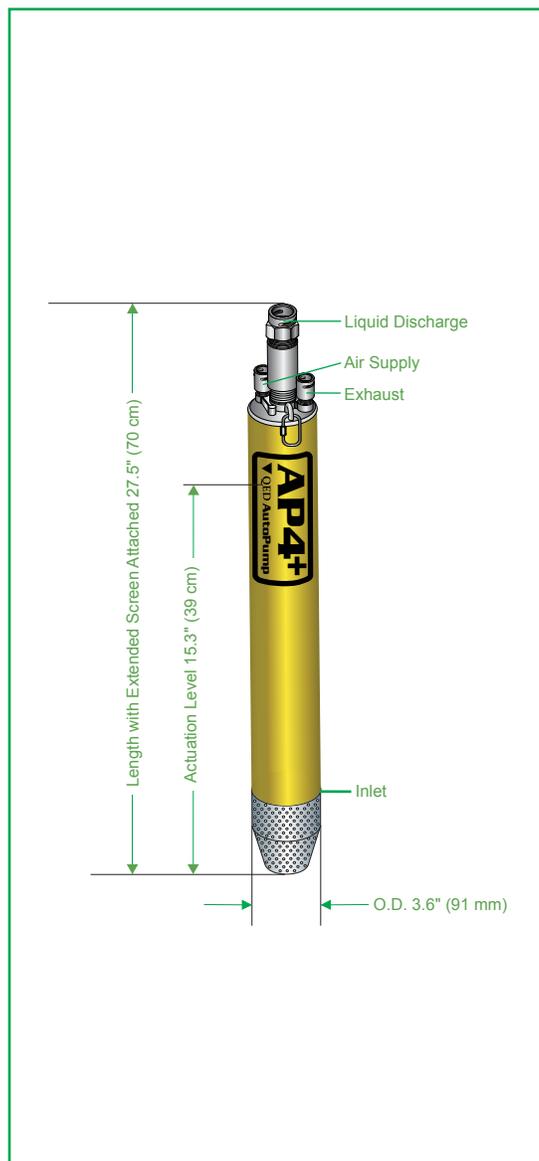
The AutoPump Heritage

The AP4+ Low-Drawdown Bottom Inlet AutoPump is part of the famous AutoPump family of original automatic air-powered pumps, developed in the mid 1980s specifically to handle unique pumping needs at remediation and landfill sites. Over the years they've proven their durability at thousands of sites worldwide. AutoPumps are designed to handle difficult pumping challenges that other pumps can't, such as hydrocarbons, solvents, suspended solids, corrosives, temperature extremes, viscous fluids and frequent start/stop cycles. Beyond just the pump, AutoPump systems offer the most complete range of tubing, hose, connectors, wellhead caps and accessories to help your installation go smoothly. This superior pumping heritage, application experience and support back up every AutoPump you put to work on your project.

Advantages

1. **The original automatic air-powered well pump, proven worldwide over 18 years**
2. **The highest flow rates and deepest pumping capabilities in the industry in a low drawdown bottom-fill pump**
3. **Patented, proven design for superior reliability and durability, even in severe applications**
4. **Handles solids, solvents, hydrocarbons corrosive conditions, viscous fluids and high temperatures beyond the limits of electric pumps**
5. **One-year warranty**

Pump Dimensions



Specifications & Operating Requirements

Model	4" - Low Drawdown AP4+ Bottom Inlet
Liquid Inlet Location	Bottom
O.D.	3.6 in. (91 mm)
Overall Length With Extended Screen	27.5 in. (70 cm)
Weight	11.7 lbs. (5.3 kg)
Maximum Flow Rate	7 gpm (26.5 lpm)* - See Flow Rate Chart
Pump Volume/Cycle	0.11 - 0.16 gal (.42 - .61 L)
Minimum Accuation Level	15.3 in. (39 cm)
Maximum Depth	250 ft. (76 m)
Air Pressure	5 - 120 psi (0.4 - 8.4 kg/cm ²)
Air Usage	.32 - 2.86 scf/gal. (2.2 - 21.5 liter of air / fluid liter) - See air usage chart
Minimum Liquid Density	0.7 SpG (0.7 g/cm ³)
Standard Construction Materials¹	
Pump Body	Fiberglass or Stainless Steel
Pump Ends	Stainless Steel
Internal Components	Stainless Steel, Viton, PVDF ² , Hastelloy-C
Tube & Hose Fittings	Brass or Stainless Steel
Fitting Type	Barbs, Quick Connects or Easy Fittings
Tube & Hose Options	
Tubing Materials²	Nylon
Sizes - Liquid Discharge	1 in. (25 mm) or 1-1/4 in. (32 mm) OD
Pump Air Supply	1/2 in. (13 mm) OD
Air Exhaust	5/8 in. (16 mm) OD
Hose Material	Nitrile
Sizes - Liquid Discharge	3/4 in. (19 mm) or 1 in. (25 mm) ID
Pump Air Supply	3/8 in. (9.5 mm) ID
Air Exhaust	1/2 in. (13 mm) ID

¹ Material upgrades available

² Applies to QED supplied tubing; other tubing sources may not conform to QED fittings.

Low-Drawdown AP4+ AutoPumps are warranted for one (1) year.

Application Limits (Base model)

AP4+ AutoPumps are designed to handle the application ranges described below. For applications outside these ranges, consult QED about AP4+ upgrades.

Maximum Temperature: 180°F (82°C)

pH Range: 4-9

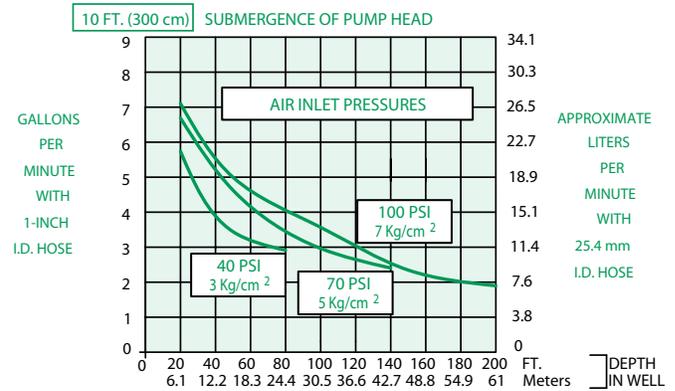
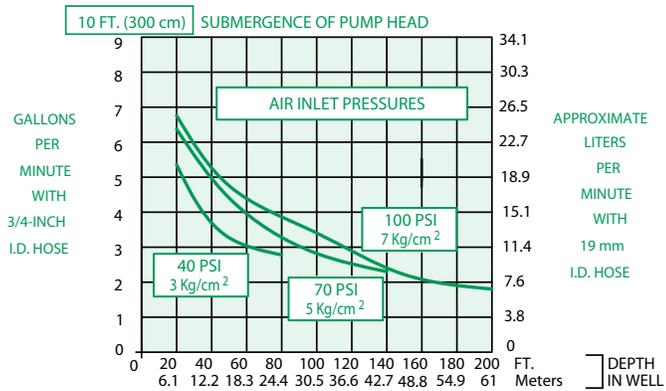
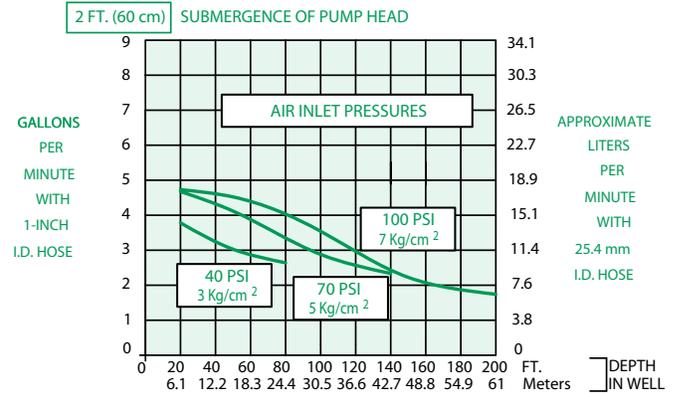
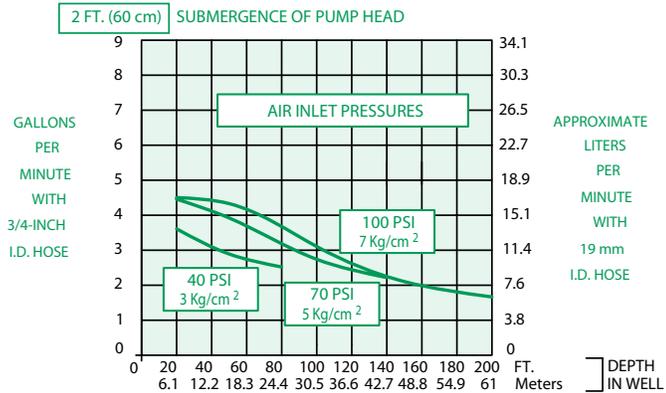
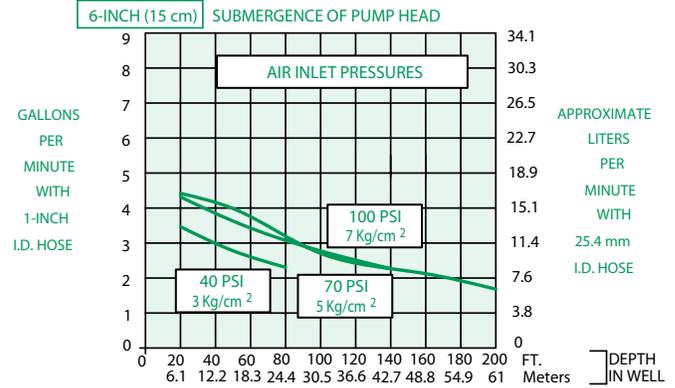
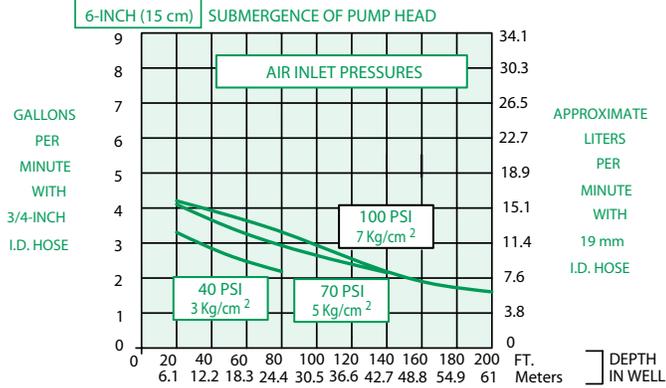
Solvents and Fuels: diesel, gasoline, JP1-JP6, #2 heating oils, BTEX, MTBE, landfill liquids

***Consult QED for higher flow requirements**

Flow Rates¹

3/4 inch (19 mm)
Inside Diameter Discharge Hose
 (Equivalent to 1-Inch O.D. Tubing)

1 inch (25.4 mm)
Inside Diameter Discharge Hose
 (Equivalent to 1.25-Inch O.D. Tubing)

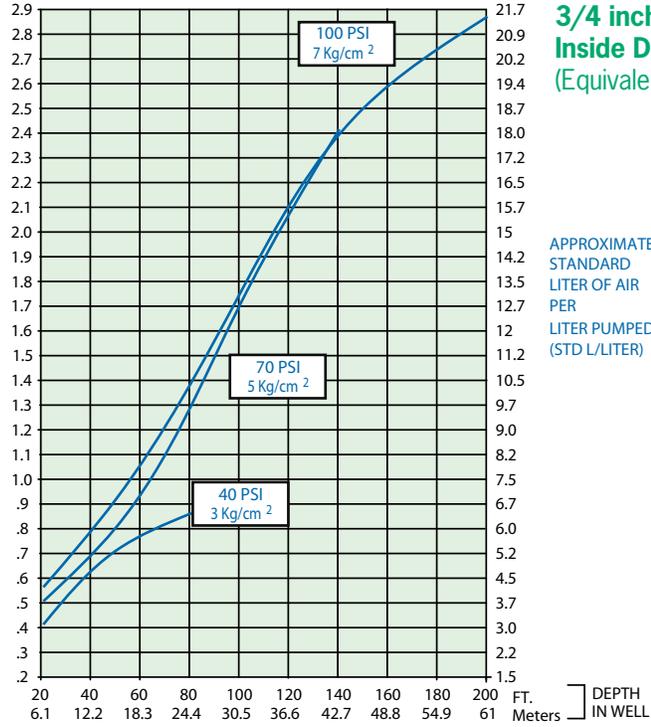


¹FLOW RATES MAY VARY WITH SITE CONDITIONS. CALL QED FOR TECHNICAL ASSISTANCE.

Air Consumption



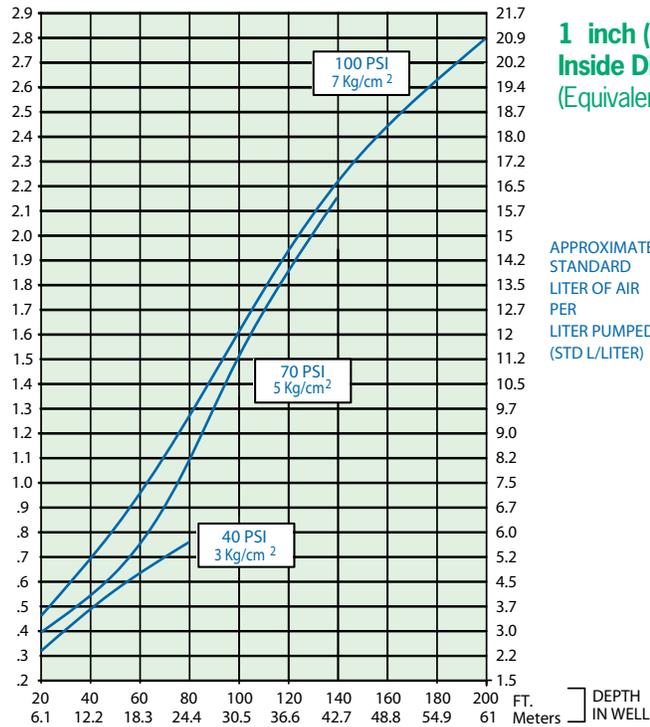
STANDARD
CUBIC FEET OF AIR
PER
GALLON PUMPED
(SCF/GAL)



3/4 inch (19 mm)
Inside Diameter Discharge Hose
(Equivalent to 1-Inch O.D. Tubing)

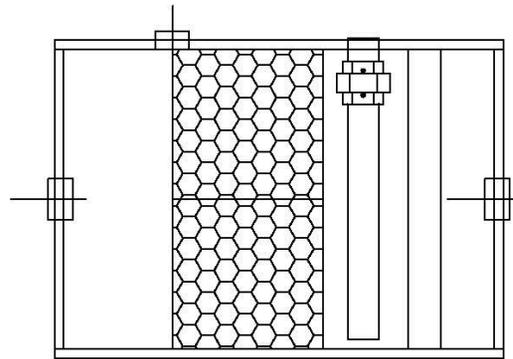
APPROXIMATE
STANDARD
LITER OF AIR
PER
LITER PUMPED
(STD L/LITER)

STANDARD
CUBIC FEET OF AIR
PER
GALLON PUMPED
(SCF/GAL)

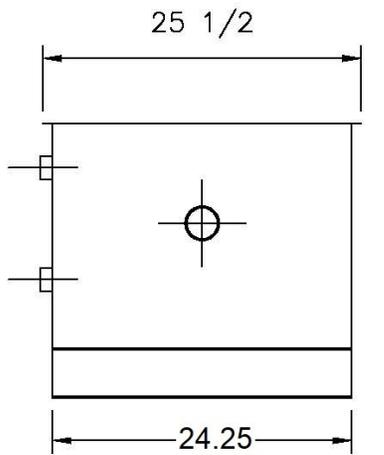


1 inch (25.4 mm)
Inside Diameter Discharge Hose
(Equivalent to 1.25-Inch O.D. Tubing)

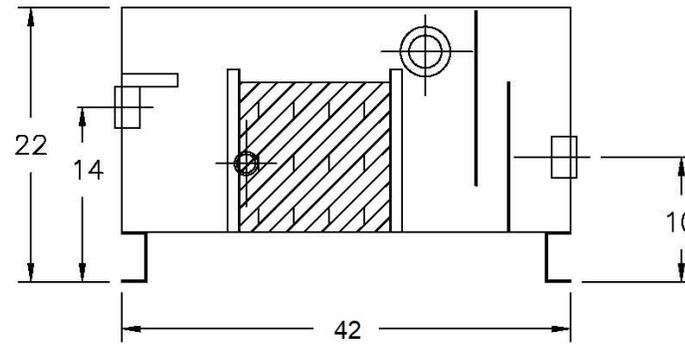
APPROXIMATE
STANDARD
LITER OF AIR
PER
LITER PUMPED
(STD L/LITER)



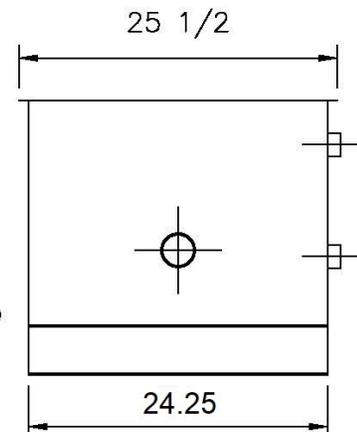
PLAN VIEW



LEFT SIDE VIEW



ELEVATION



RIGHT SIDE VIEW



**Theia Water Oil/Water Separator
Model TU-5SS OWS**

Liberty Pumps®

NEW!

290-Series



Quick-Disconnect
Power Cord

One-Piece Cast
Motor Housing

POWDER
COATED
TOUGH™

MODEL 293

3
Year Warranty

Available with
Vertical Float

Cast Iron Submersible Effluent/Sump Pumps

3/4 hp
1-1/2" Discharge
3/4" Solids Handling

Features:

- Liberty's unique, one-piece "Uni-Body" casting
- Quick-disconnect 10' standard power cord allows replacement of cord in seconds without breaking seals to motor (other lengths available)
- Permanently lubricated upper and lower bearings
- Oil-filled, hermetically sealed motors with thermal overload protection
- Stainless steel, removable bottom screen
 - Stainless steel rotor shaft
 - Stainless steel fasteners

115 V. Models:

- 290 Manual
- 291 Wide-Angle Float with Quick Disconnect
- 293 Wide-Angle Float, Series Plug
- 297 VMF, vertical magnetic float for heavy-duty sump pump applications

208-230 V. Models:

- 290HV Manual
- 291HV Wide-Angle Float with Quick Disconnect
- 293HV Wide-Angle Float, Series Plug
- 297HV Vertical Magnetic Float (VMF) Switch

Wide-Angle Floats are mercury-free,
mechanically activated.

innovate. evolve.

290-SERIES

3/4 hp Submersible Effluent/Sump Pumps

The Liberty 290 series provides a cost effective “mid-range” pump for on-site waste water systems, liquid waste transfer and commercial heavy-duty sump pump applications that require higher head or more flow. Designed around Liberty’s unique “Uni-Body” casting, the 290-Series will provide years of reliable performance.

All Models Feature:

- Semi-Open impeller permitting passage of solids up to 3/4"
- 416 stainless steel rotor shaft
- Permanently lubricated upper and lower ball bearing
- Epoxy powder coat finish
- All fasteners – corrosion-resistant stainless steel
- 1 1/2" Discharge
- Stainless steel bottom screen – easily removable
- Maximum fluid temperature: 140° F.
- **290-Series Cord Lengths**

Model	10'	25'(-2)	35'(-3)	50'(-5)
290	Standard	Optional	Optional	Optional
291	Standard	Optional	Optional	Optional
293	Standard	Optional	Optional	N/A
297	Standard	Optional	N/A	N/A

10' cord length standard on all models. For optional lengths, add "-2, -3 or -5" suffix to model number.
Example: for model 290 with 35' cord. Order 290-3

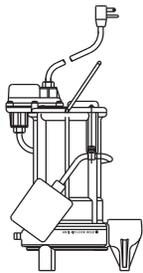
Motor Specifications

3/4 hp 60 Hz 3450 RPM
Oil filled, thermally protected

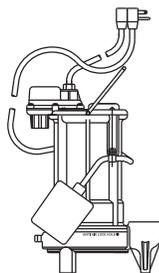
115 V. Models 10.4 amps
208/230 V. Models 5.3 amps



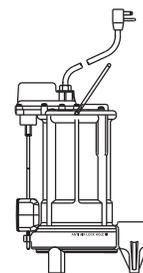
Model 290
Manual,
no switch



Model 291
Wide angle
float switch
with quick-
disconnect



Model 293
Wide angle
float switch
with series
(piggy-back)
plug



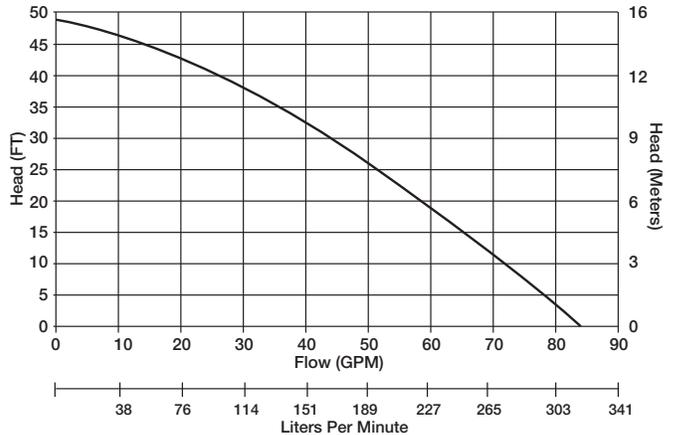
**Model 297
VMF-Series**
Vertical mag-
netic float for
smaller pits –
will operate in
a 10" diameter
sump



us Certified

Specifications are subject to change without notice.

Performance Curve: 290-Series



Dimensional Data:

Weight: 31 lbs.
Height: 13"
Major Width: 10" (model 297)

Minimum Sump Diameters:

Model 291, 293...14"
Model 297 VMF...10"

Factory switch settings	Model 291, 293	Model 297 VMF
Turn on level	13"	9.5"
Turn off level	7"	4.0"

The Model 293 features a fully adjustable wide-angle float. Differential adjustments can be made easily by tethering the float to the discharge pipe or other mounting point. Vertical float model 297 is not adjustable.