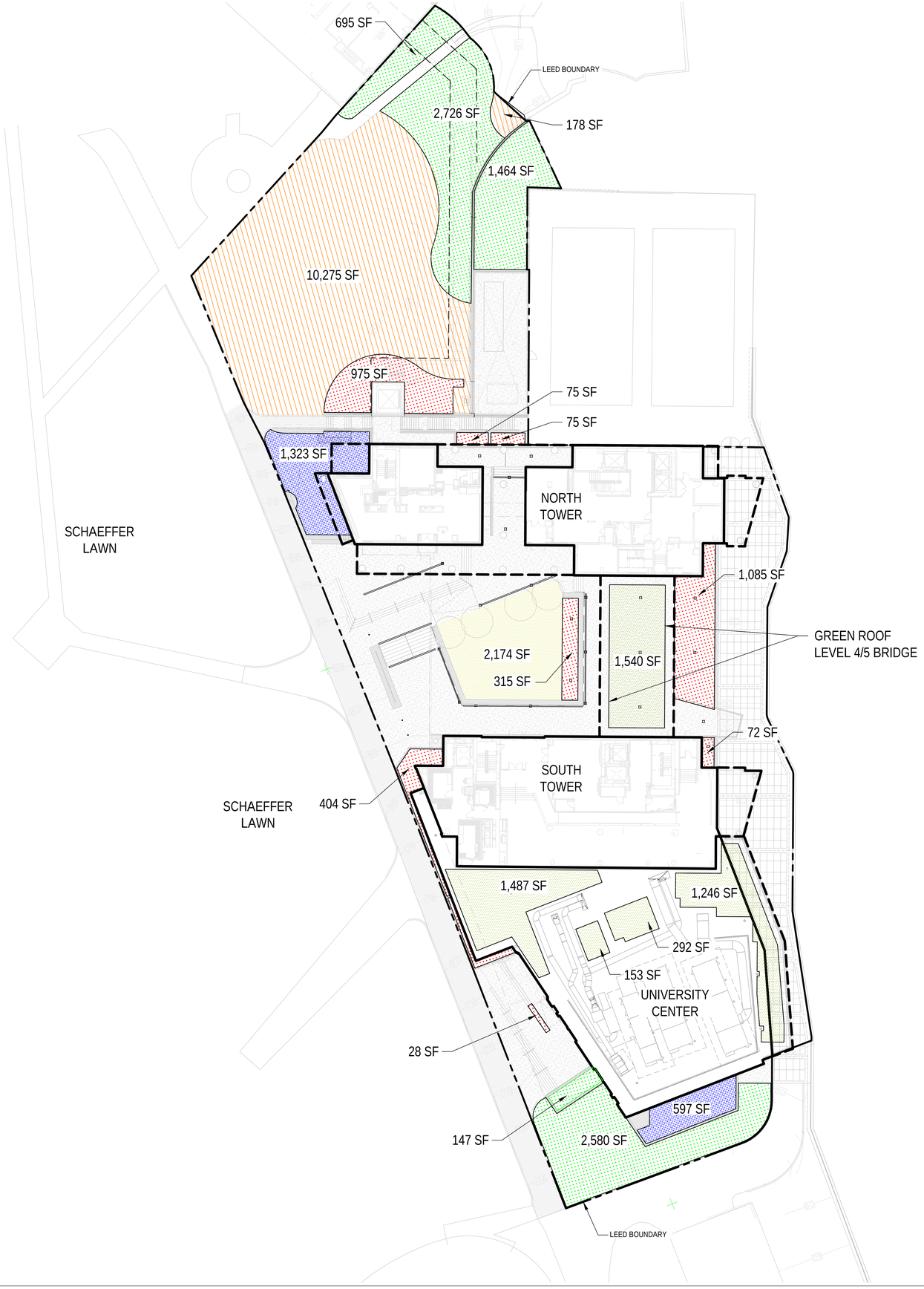


PLANTED AREAS (NON IRRIGATED)

- LAWN (NORTH OF TOWERS): 10,453 SF
- NATIVE PLANTINGS: 7,612 SF
- MICRO-BIORETENTION/RAIN GARDENS: 1,920 SF

TOTAL: 19,985 SF

PLANTED AREAS (IRRIGATED)

- PLANTING: 3,029 SF
- LAWN: 2,174 SF
- GREEN ROOF: 4,718 SF

TOTAL: 9,921 SF

LEED BOUNDARY: 72,562 SF

DESIGNCOLLECTIVE

601 EAST PRATT STREET, SUITE 300
BALTIMORE, MARYLAND 21202
T: 410.685.6655 F: 410.539.6242

ARCHITECTURE, PLANNING, INTERIORS
WWW.DESIGNCOLLECTIVE.COM

ISSUED FOR | DATE

SUBMISSION | 08/07/2020

CONSULTANT

OWNER / DEVELOPER
Stevens Institute of Technology

PROJECT NAME
STUDENT HOUSING & UNIVERSITY CENTER

PROJECT ADDRESS
1 Castle Point on Hudson
Hoboken, NJ 07030

PROJECT MANAGEMENT
DCI Project No. 409-15
Owner Project No.

"I certify that these documents were prepared or approved by me, and that I am a duly licensed landscape architect under the laws of the State of New Jersey, License No. 1039, expiration date 05/31/19"
By: Matt D'Amico, PLA
SEAL

SHEET TITLE
OUTDOOR WATER USE REDUCTION

SCALE
1" = 20'

SHEET NUMBER
WEP1-C1

The undersigned hereby certifies that this Submittal for Stevens UC & SH, in Hoboken, has been checked prior to transmittal to the Architect and it complies in all respects, except as noted, with the requirements of the Contract Documents and physical space limitations of the project site.	**Trade:** Sitework / Foundations
	Sub-Contractor: Nordic Contracting
	Date: 08.16.19
	Spec Section: 221453
	Submittal #: 221453-001.1
	Submittal Title: Rainwater Harvesting System
	FOR RECORD
Tishman Construction Corp. of NJ **Signed By:** Danielle Francabandiero	**Date:** 08.16.19
Name & Title: Danielle Francabandiero	

NOTE: This FOR RECORD submittal to accommodate further coordination between Langan and Rain Harvest System. Consultants to review and return "REVIEWED FOR INFORMATION AND CONTENT".

Contractor Name

SUBMITTAL COVER PAGE

JOB NAME: Stevens UC & SH

ARCHITECT: Design Collective, Inc.

CONTRACTOR: Tishman Construction Corp.

SUBMISSION FOR: North Tower ☐ South Tower ☐

University Center ☐ Site ☐

TRADE: Sitework

SPEC SECTION: 221453-Rainwater Harvesting System

DESCRIPTION: Rainwater Harvesting System Revised per engineers comments

DATE: 8-16-19

COMMENTS:

SUBMITTAL IS BASED ON SPECIFIED PRODUCTS: ☐

SUBMITTAL IS BASED ON VALUE ENGINEERING: ☐

(Provide Substitution Request Form If Not Shown on Drawings)

SUBMITTAL IS BASED ON CONTRACTOR SUBSTITUTES: ☐

DESCRIPTION: _____

(Provide Substitution Request Form If Not Shown on Drawings)

_____

DRAWING SHEET / DETAIL # FOR REFERNECE: _____

APPROXIMATE LEAD TIME (IF APPL): _____

REQUIRED ONSITE: _____

NORDIC CONTRACTING CO., INC.

111 HOWARD BOULEVARD LEDGEWOOD, NJ 07852
PHONE 973. 584. 2000 FAX 973. 252. 5656

DATE: 8-16-19	JOB: 19-742
ATTENTION: DANIELLE FRANCABANDIERO	
REFERENCE: STEVENS INSTITUTE OF TECHNOLOGY UNIVERSITY CENTER	
#18R1 Rainharvest Storm Water Tank	

TO: Tishman Construction
One River Front Plaza
Newark NJ 07102

We are sending ☐ enclosed ☐ under separate cover

( ) Prints ( ) Cuts ☒ For Approval
( ) Letters ( ) Specifications ❒ For Resubmission
( ) Samples ( ) Technical data ❒ For Your Use and Info.

COPIES	DATE	NUMBER	DESCRIPTION
Email	8-16-19	18R1	**Rain harvest Storm Water Tank**
			Revised per engineers comments and revised civil drawings

action: ( ) Approved ( ) Revise and Resubmit
( ) Approved as Noted ( ) Not Approved

By Matthew Cleffi – Project Engineer
NORDIC CONTRACTING CO., INC.

TJ EQUIPMENT COMPANY

Lawrence Industrial Park · 510B Abbott Drive · Broomall, PA 19008-4304
(Phone) 610-328-3001 · (Fax) 610-544-7515 · www.tjequipment.com
UL Tanks (single & double wall) · Electronic Leak Detection & Gauging Systems
ASME Lined Tanks & Hot Water Heaters · Pumps
SINCE 1977

Submittal Data

From: Mark J. Shelmerdine **Date: 4/12/19 REVISED 6/20/19**

Project:	**S.I.T. STUDENT HOUSING & UNIVERSITY CENTER**
Contractor:	**NORDIC CONTRACTING CO., INC.**
Contractor PO #:	**19-742**
Engineer:	**LANGAN**

RAINWATER HARVESTING SYSTEM

(1) (*) RainFlo 12,000 gallon, 8' Ø x 37' 5' long, underground, single-wall, fiberglass rainwater harvesting tank with (1) 8" inlet, (1) 10" outlet, (1) 2" ID half coupling, (1) 30" access opening 96" high riser, (1) 16' internal ladder, internal support for overflow siphon, complete deadman anchoring system (straps, turnbuckles included), (*) (1) Rainflo Flow inducer Rainwater Pump Station, 3 HP, 33 GPM avg., 48 GPM @ 60 PSI, variable speed pump, Aquavar Solo 2 pump controller w/transducer, 2" stainless steel floating filter w/10' hose, 9.5 gallon inline pressure tank and 16' 150 PSI reinforced discharge hose w/stainless steel com-lock fittings, liftout chain and splice kit, (1) Graf 6" calming inlet, (1) Graf 6" overflow siphon, (1) Graf Optimax industrial in-ground rainwater filter w/pedestrian lid (6" or 8") connections for roof areas (up to 16,000 square feet), (1) Graf Opticlean spray head for Optimax external filter, (2) 8" Fernco rubber pipe coupling with hose clamps, (3) 6" Fernco rubber pipe coupling with hose clamps.

Notes

1) (*) Revised submittal now reflects deep burial for the 12,000 gallon underground storage tank, increased HP and GPM for the Rainflo Flow inducer Rainwater Pump Station.

2) Engineer/contractor to verify, quantity, size, location & orientation of all fittings, access openings and inlet/outlet piping on the underground storage tank. If additional tank top fittings, increased inlet/outlet piping sizes are required please advise (additional charges may apply).

3) Engineer/contractor to verify burial depth of underground storage tank taking into consideration the invert of the inlet & outlet piping. 30" access opening on tank has a 96" high PVC riser with internal ladder.

4) Any fitting connections/penetrations that need to be made in 30" x 36" PVC riser (for pump discharge, any electrical connections, etc.) by others/installing contractor.

5) 3 way valve not included (as drawing CS501 does not show). If required, please advise (additional charges will apply).

6) Piping/connections (to inlet/outlet piping on the underground storage tank, etc.) by others/pipe supplier/installer.

7) Grade level manway covers by others/installing contractor.

4475 Alicia Lane
Cumming, GA 30028
678 771 0091
Russ@rainharvest.com

Rainwater Harvesting Systems
Submittal For:

S.I.T Student Housing and University Center

Rep;
TJ Equipment
Lawrence Industrial Park
Broomall, PA 19008
(610) 328-3001

Rev 1 - 6/14/19
-Updated Tank Configuration
-Pump Upgrade to 3HP

RAINWATER PRE-FILTER

Graf Optimax® Rainwater Filters

Self-cleaning rainwater filters with optimum performance and maximum water yield for residential, commercial, and industrial rainwater collection systems.

The Optimax® Rainwater Filter:

Featuring two models to meet the demands of residential, commercial and industrial rainwater harvesting installations, the Optimax filter is the professional choice for rainwater pre-filtration. Optimax filters provide a highly efficient, low maintenance, self-cleaning solution for the removal and prevention of debris from the collection system prior to entering the storage tank.

Optimax External Filtration System Features:

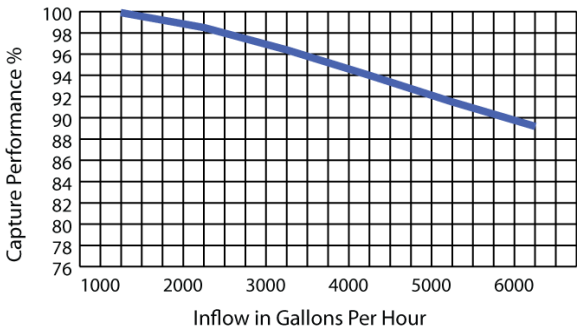
- Over 95% water yield
- Self-cleaning 0.35mm (.01”) mesh filter
- Up to 16,000 Sq. ft. roof area
- Variable installation depth with telescopic riser and lid
- Flush installation at ground level
- Minimum height offset between inlet and outlet
- Bolted, tamper-resistant cover
- Optional Opticlean® Sprayhead
- Available vehicle-loading option with cast iron lid
- Available above-ground installation kit

Model Overview:

Optimax Filter Models					
Model Name.	**Product Code**	**Max Sq. Ft.**	**Connections provided:**	**Inlet/Outlet Offset**	**Installation Depth**
Optimax External	340030	3,750 (4”) / 7,500 (6”)	4” and 6”	7”	22-41”
Optimax Industrial	340035	8,000 (6”) / 16,000 (8”)	6” and 8”	8.87”	31-59”*

*Depths can be increased further using optional extension rings

Performance: Optimax® External:

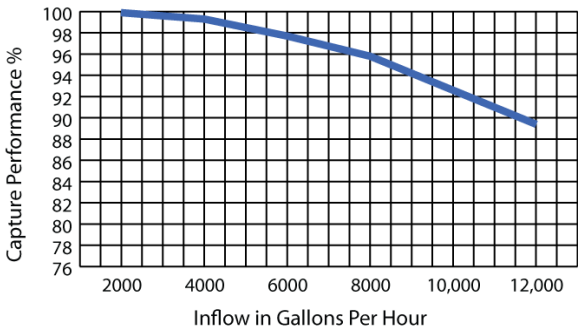


RESULTS IN PRACTICE:

A single-family home with 1,600 ft² roof area will collect 1000 gallons of water in 1 hour at a rate of 16 GPM (0.28G/sec.) during a typical 1" rain event.

At this rate with an efficiency of 99.9%, a 1,700 gallon tank will fill in 102 minutes.

Performance: Optimax® Industrial



RESULTS IN PRACTICE:

A commercial building with 7,000 ft² roof area will collect 6,190 gallons of water in 1 hour at a rate of 103 GPM (1.7G/sec.) during a typical 1" rain event.

At this rate with an efficiency of 96.5%, a 10,000 gallon tank will fill in 97 minutes.

Operational overview:

Unfiltered rainwater is delivered to the Optimax filter via the inlet port on the upper section of the housing where it is directed to the 3-layer cascade filter assembly. Leaves and other debris larger than 0.35mm traverse the cascade filter and are discharged through the stormwater outlet port. The first flow of fine particulates such as dust and pollen is flushed (known as a first flush function) until the stainless steel fine filter becomes saturated and fine particulates have been purged for approximately 2 minutes. Once the first flush is complete, the filtered rainwater passes through the cascade filter and travels out the tank outlet at the bottom of the filter housing.

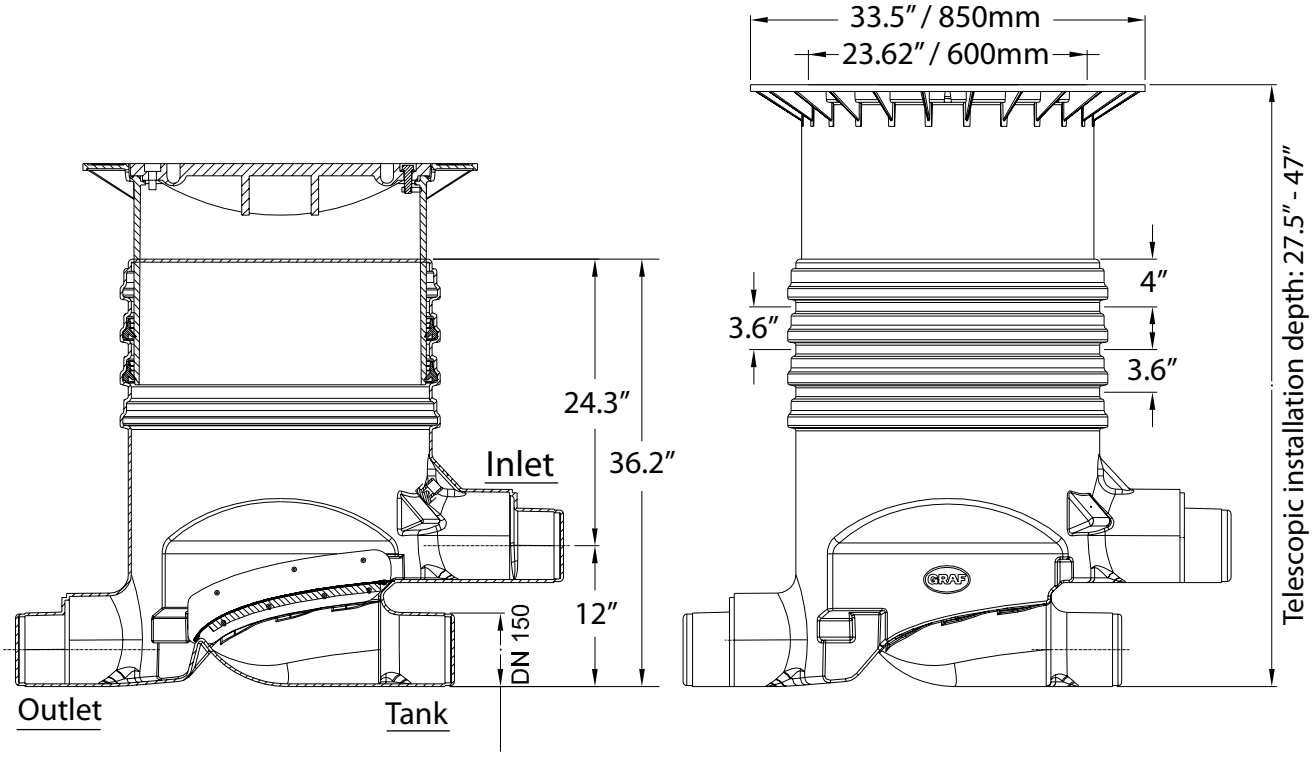
Opticlean® Filter Sprayhead:

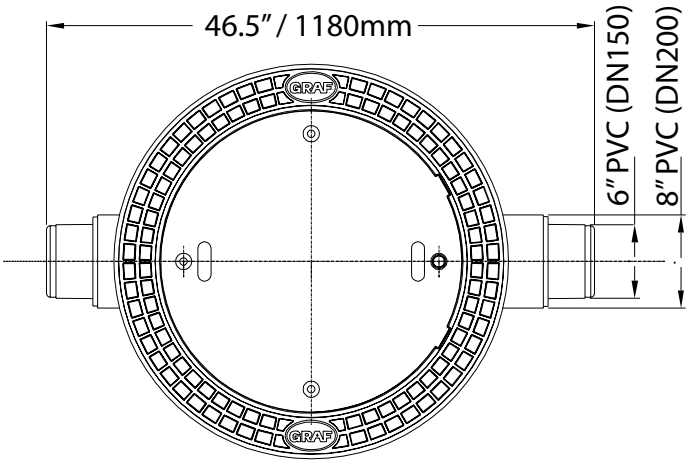
The optional filter sprayhead can be easily installed to provide hands-free cleaning of the Optimax filter surface with 16 powerful streams of water. The process can be fully automated by extending an irrigation zone to the sprayhead inlet and programming to clean at regular intervals, or it can be manually activated as desired.

Industrial Optimax® Filter

Product Number
340035 / 340036

US Adaptation by RainHarvest Systems





Otto Graf GmbH
Kunststsofferzeugnisse
79331 Teningen

Carl-Zeiss-Str. 2-6
Telefon 07641/589-0
Telefax 07641/589-50
Email: info@graf-online.de
www.graf-online.de

RainHarvest Systems, LLC
5190-D Performance Dr.
Cumming, GA 30040
Tel: 770-889-2533 Fax: 770-889-2577

Graf Optimax Industrial Performance

US Adaptation by RainHarvest Systems

Test Number 1

Inflow: 0.827 Gal/sec (2,977 Gal/hr)
Corresponds to heavy rainfall of 10.7 Gal/sec per acre on a roof area of 3,370 ft2 (roof coefficient: 1.0)
Yield rate: **99.8%**

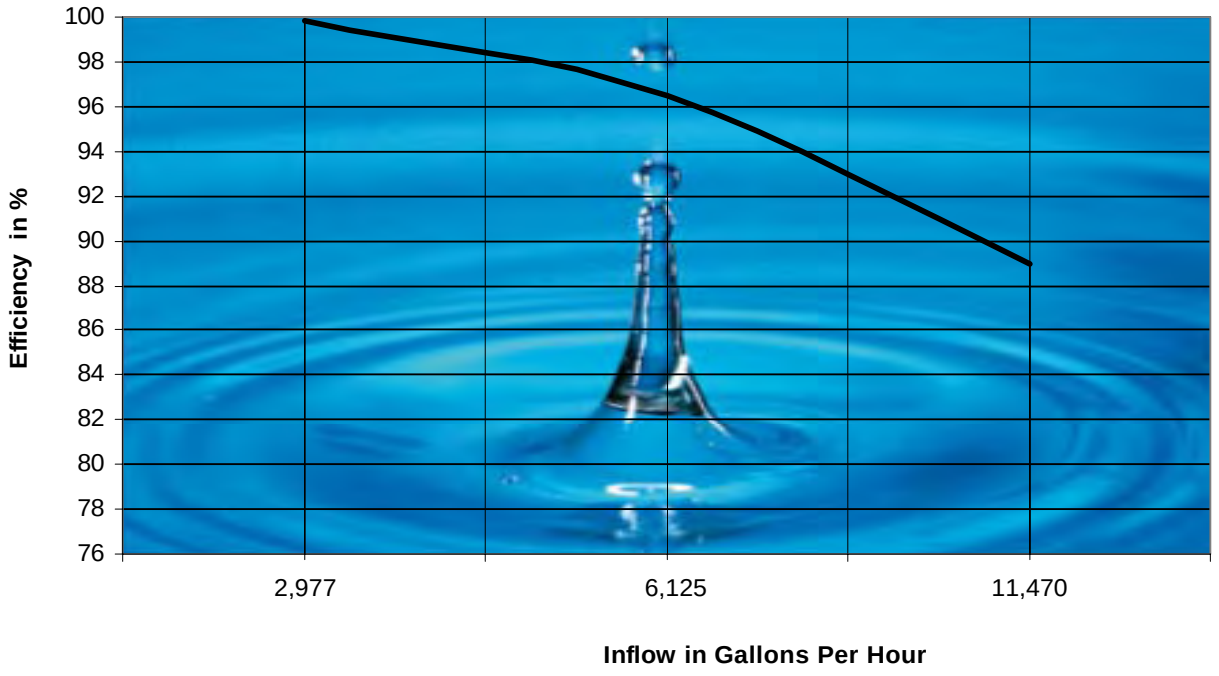
Test Number 2

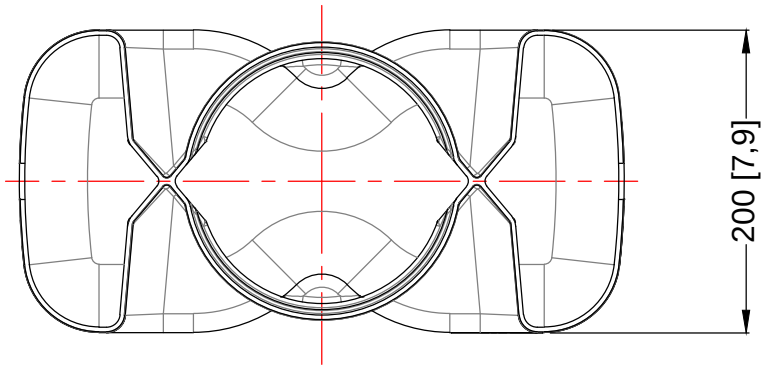
Inflow: 1.701 Gal/sec (6,125 Gal/hr)
Corresponds to heavy rainfall of 10.7 Gal/sec per acre on a roof area of 6,932 ft2 (roof coefficient: 1.0)
Yield rate: **96.5%**

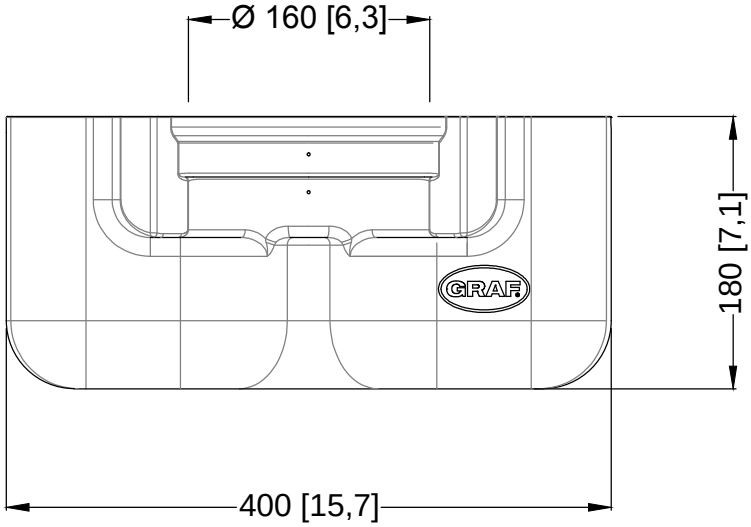
Test Number 3

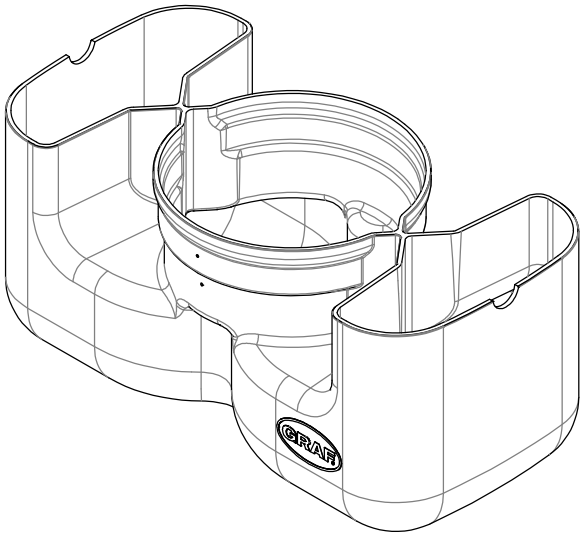
Inflow: 3.186 Gal/sec (11,470 Gal/hr)
Corresponds to heavy rainfall of 10.7 Gal/sec per acre on a roof area of 12,981 ft2 (roof coefficient: 1.0)
Yield rate: **89.0 %**

- Provides over 95 % water yield
- Low maintenance and self cleaning
- Variable installation depth of 28″ - 52″ using the telescopic dome shaft
- Minimal height offset (8.8″) between the inlet and outlet
- Maximum roof surface area:
  - 8,000 ft^2 using 6″ connections
  - 16,000 ft^2 using 8″ connections
- Optional Opticlean® filter sprayhead









D

GRAF Beruhigter Zulauftopf DN150

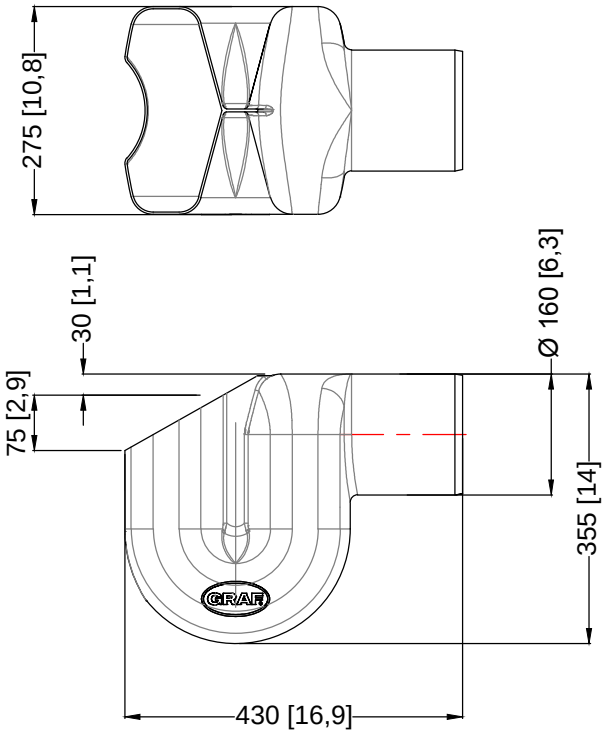
Artikel-Nr.
product no.
article no.
articulo no.
330453

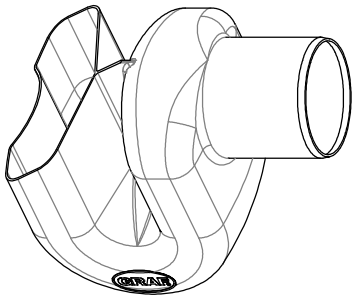
GB	ES	FR	revision
GRAF Calmed inlet digester DN150	GRAF Zapata de entrada tranquila DN150	GRAF Cuvette anti-remou DN150	

gezeichnet drawn	ISC	Gewicht weight	1,5 kg
Datum date	2016.02.29	Toleranz tolerance	+/- 3%
Maßstab scale	M 1:5	Einheiten units	mm [inch] gal. = US gal.

Otto Graf GmbH
Carl-Zeiss-Str. 2-6
DE-79331 Teningen
mail@graf.info
www.graf.info

GRAF



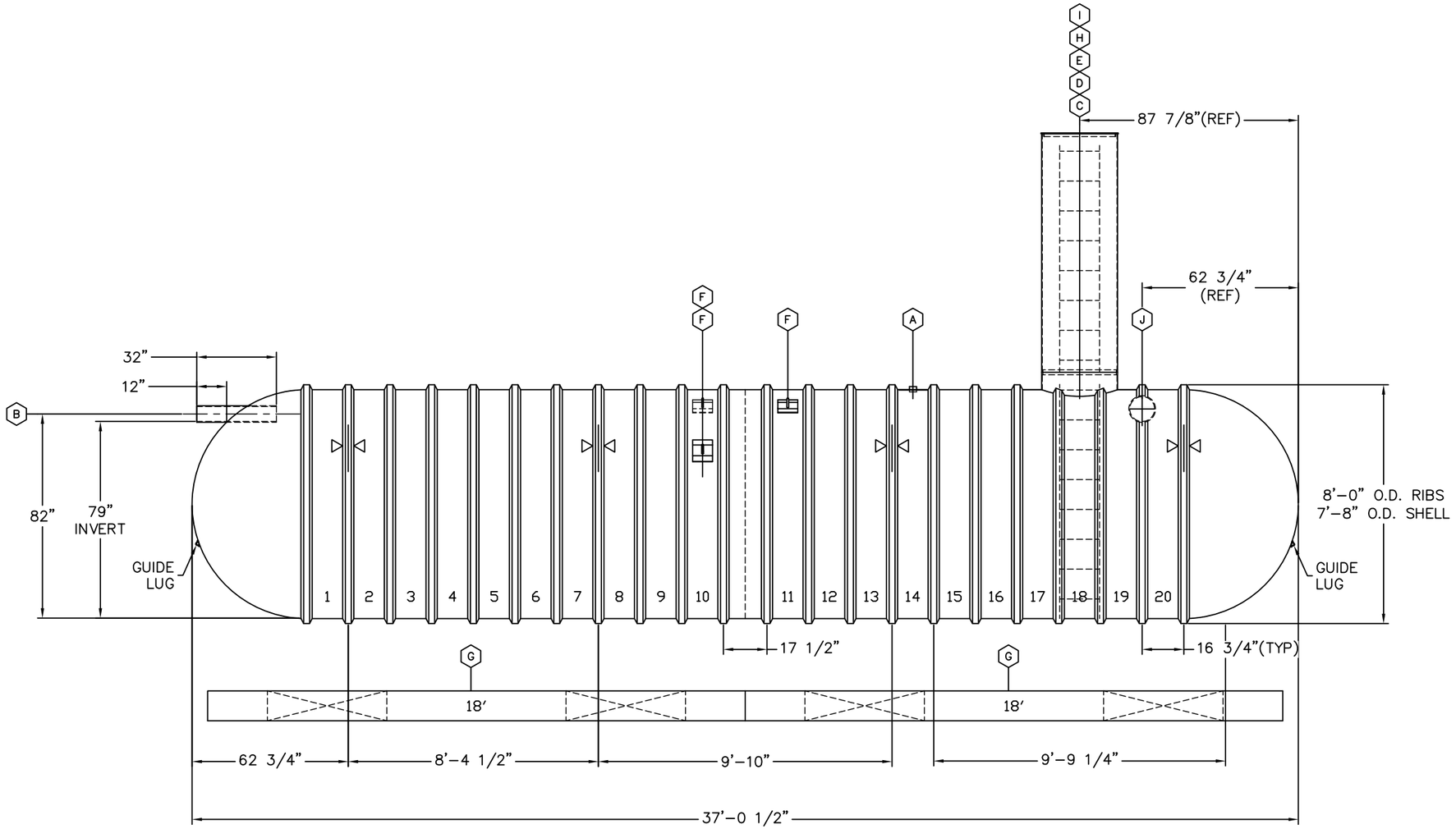


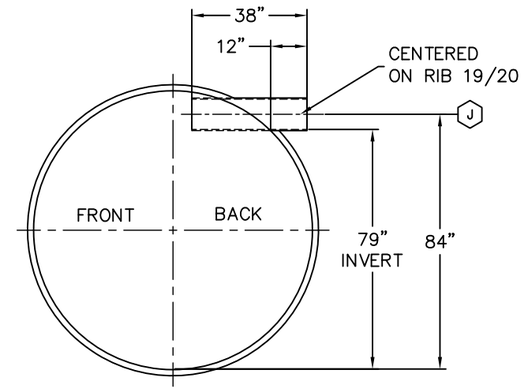
D GRAF Überlaufsiphon DN150			Artikel-Nr. product no. article no. articulo no. 330450
GB GRAF Overflow siphon DN150	ES GRAF Rebosadero DN150	FR GRAF Siphon de trop-plein DN150	revision
gezeichnet drawn ISC	Gewicht weight 2 kg	Otto Graf GmbH Carl-Zeiss-Str. 2-6 DE-79331 Teningen mail@graf.info www.graf.info	
Datum date 2016.02.29	Toleranz tolerance +/- 3%		
Maßstab scale M 1:10	Einheiten units mm [inch] gal. = US gal.		

STORAGE TANK

NOTES:

1. NOMINAL TANK WEIGHT : 5,650 lbs.
2. INVERT DIMENSION FROM TANK I.D.
3. TANK IS MADE FOR 8' MAXIMUM BURIAL DEPTH.





RIGHT SIDE VIEW

ITEM	QTY	DESCRIPTION
A	1	2"NPT FULL COUPLING SERVICE FITTING
B	1	6"DIA SCH 40 PVC HORIZONTAL PIPE
C	1	30" I.D. ACCESS OPENING WITH ALIGNMENT RING
D	1	30"DIA x 96"HIGH FRP ACCESS RISER
E	1	ALUMINUM LADDER (16"WIDE, TANK MOUNTED) FOR 8'DIA TANK
F	3	LIFTING LUG (10"x8") 17", 17" ,34"

G	4	18' PREFABRICATED CONCRETE DEADMEN
H	1	30"DIA RISER–TO–LID ADAPTER WITH FRP COVER
I	1	96"HIGH ALUMINUM LADDER (16"WIDE, RISER MOUNTED)
J	1	10'DIA SCH 40 PVC HORIZONTAL PIPE
▷◁	4	HOLD DOWN STRAP LOCATION

CUSTOMER DESIGNATION:

RAIN HARVEST, SIT STUDENT HOUSING

03	REVISED QTY ITEM B/ ADDED ITEM J					
	–					
DRN	DATE	CHK'D	DATE	APPR'D	DATE	
OJ	06–13–19	LB	06–13–19	–	–	
02	REVISED ITEMS B/ RELOCATE ITEMS / ADDED ITEMS H&I					
	–					
DRN	DATE	CHK'D	DATE	APPR'D	DATE	
OJ	06–11–19	LB	06–11–19	–	–	
01	REVISED ITEM B					
	–					
DRN	DATE	CHK'D	DATE	APPR'D	DATE	
OJ	04–10–19	LB	04–10–19	–	–	

XERXES CORPORATION

DRN: OJ	DATE: 04–09–19	TITLE: 8'DIA SW CAP. 12,000 GALLONS SIT STUDENT HOUSING	
CHK'D: DAG	DATE: 04–09–19		
APPR'D	DATE	DR. SIZE: B	DR. NUMBER: 660–709 / REV: 03
SALES MANAGER: TODD MITCHELL		SCALE: N.T.S	SHT 1 OF 1
INDUSTRY TYPE: M204 WATER COLLECTION & CONSERVATION			

ZCL | XERXES®
making a lasting difference®

Fiberglass Storage Tanks for Water Applications

The ZCL | Xerxes Advantage

We are the largest manufacturer of fiberglass underground storage tanks in the world. We have nearly 40 years of industry experience and have manufactured more than 200,000 tanks that protect the environment.

1 Environmental peace of mind

- Corrosion resistant, inside and out
- No lining, inspection or maintenance needed

2 Watertight protection

- Factory-assembled as single-piece tank
- Optional watertight testing available

3 Structural integrity

- Rated for H-20/HS-20 traffic loads
- Integral rib design creates structural strength
- Standard 7' burial; deep burial available upon request
- 5 To 1 safety factor

4 Easy shipping and installation

- Structurally strong but lightweight
- Cost-effective shipping
- Less heavy or specialized equipment needed
- Easy to install in remote and hard-to-access sites

5 Flexible design and installation options

- Single-, double- and triple-wall models
- Up to 60,000 gallons/227,000 liters
- Underground and aboveground installations

6 100% premium resin and glass

- No fillers used
- Carefully selected material suppliers
- Ongoing product quality improvements

Industry requirements

We can design our tanks to meet NFPA 20, 22 and 1142 standards.

We are NSF-, IAPMO-, UL- and ULC-listed.

The Fiberglass Advantage

Our fiberglass storage tanks offer customers significant design and performance advantages that make them a superior choice to concrete and other tanks.

+ONLINE
Visit **zcl.com** to learn more about the benefits of composite tanks.

Fiberglass versus concrete

- **Corrosion resistant:** Porous concrete, and the steel reinforcement that is typically required, can be subject to aggressive corrosion. Concrete is also vulnerable to cracks and leaks. In certain applications, it requires expensive liners that need inspection and maintenance. Corrosion-resistant fiberglass tanks don't require ongoing maintenance and last many years longer.
- **Watertight design:** Concrete tanks require partial assembly during installation, with a seal to join them. But our tanks are fully-assembled and tested before they leave the factory so they can be installed quickly and easily once the excavation is prepared.
- **Superior structural design:** Buried flat-top, precast concrete tanks are usually not rated for traffic load conditions. A design upgrade may be necessary, which increases costs. Our tanks are rated for H20/HS20 traffic loads.
- **Easier installation:** The majority of precast concrete tanks are limited to small capacities. Most larger tanks are formed and poured in the field, involving many days of site work, often in less-than-ideal conditions. Our one-piece, factory-manufactured fiberglass tanks can be installed in far less time, saving money.

Fiberglass versus steel

- **Corrosion resistant:** Metal can't match the corrosion resistance of composites. With buried tanks, both internal and external tank corrosion are serious concerns. Coatings and linings are the traditional protective choices with steel, which add to the cost and long-term maintenance. Also, coatings and linings are only as good as their surface preparation and application.
- **Easier installation:** Underground steel tanks weigh considerably more than fiberglass tanks of the same size. This adds to installation and shipping costs, and potentially limits the locations where steel tanks can be used. Lightweight fiberglass tanks call for smaller and much less expensive lifting equipment, allowing for installation even under difficult site conditions.

Water Collection Tanks

Case study:

Four ZCL | Xerxes 20,000-gallon tanks collect water from a 60,000-square-foot glass rooftop of the Milwaukee County Greenhouses in Wisconsin. They are part of a system that filters, disinfects and redistributes water for year-round irrigation inside the greenhouses. This translates into the capture and reuse of up to one million gallons of rainwater each year.

Greywater systems

Building codes are changing to accept greywater plumbing designs to maximize water-use management. Greywater systems capture drainage from sinks and showers, which can be filtered and reused for nonpotable water purposes like toilet water. Greywater collected in a fiberglass tank is distributed through a parallel plumbing system.

Rainwater harvesting systems

Rainwater collection tanks help reduce water consumption and provide sustainable benefits for homes, businesses and communities. Captured water is often use for irrigation purposes, reducing the use of potable water.

Stormwater management

When stormwater runs directly into sewer systems, it can result in groundwater contamination or an infrastructure overload. When allowed to run directly into watersheds, it can be a major source of pollution.

Many applications require stormwater runoff retention, rather than just capture and reuse. This retention often requires treating or filtering the water to improve its quality before it leaves the property. The collected stormwater can also be used for other applications, such as landscape irrigation.

A fiberglass tank has two distinct advantages over stormwater retention ponds: safety and space-saving. Our tanks are rated for H-20/HS-20 traffic loads, so they can be installed underground.

Our fiberglass tanks can be manufactured as both open-end and dome-end sections that are joined in the field. This allows for easy shipment and installation of a massive, multitank, watertight system (with unlimited capacities) for commercial, industrial, residential and public projects.

Case study:

A concept home in Texas incorporated two of our tanks for rainwater harvesting, which is especially important in this drought-prone area. The homeowner and designer chose 20,000-gallon/75,700-liter ZCL | Xerxes tanks because we could provide an NSF-listed label for the tanks that would provide the family's sole source of potable water. The collected rainwater goes through a three-step process to create potable water. Some of the harvested water is used to irrigate the property, particularly the vegetable garden the family planted above the underground tanks.

Xerxes Tank Data

	Nominal tank capacities (gallons)	Single-wall and double-wall tank lengths	Single-wall tank weights (lbs)	Double-wall tank weights (lbs)
4-foot-diameter tanks	600	6′-11 7/8″	600	900
	1,000	11′-3 7/8″	900	1,400
	1,500	16′-0″	1,400	2,100
6-foot-diameter tanks	1,500	10′-7 1/4″	1,000	1,700
	2,000	13′-5 3/4″	1,300	—
	2,500	13′-5 3/4″	—	2,200
	3,000	16′-4 1/4″	1,600	2,600
	4,000	21′11 1/8″	2,200	3,600
	5,000	26′-5″	2,600	4,300
	6,000	30′-8 3/4″	3,000	5,000
8-foot-diameter tanks	3,000	12′-3″	1,400	2,100
	4,000	15′- 1/2″	1,800	2,700
	5,000	17′-8 1/2″	2,200	3,200
	6,000	20′-6 1/2″	2,600	3,700
	7,000	23′-1″	3,000	4,300
	8,000	26′- 1/2″	3,400	4,800
	9,000	28′-9″	3,800	5,400
	10,000	31′-6 1/2″	4,200	5,900
	11,000	34′-4″	4,700	6,400
	12,000	37′- 1/2″	5,100	7,000
	13,000	41′-2″	5,600	7,600
	14,000	43′-11 1/2″	6,000	8,200
	15,000	46′- 9″	6,600	9,100
10-foot-diameter tanks	10,000	21′-5 1/4″	4,500	4,900
	11,000	22′-9 3/4″	4,800	5,200
	12,000	24′- 1/4″	5,100	5,600
	13,000	25′-6 3/4″	5,500	5,900
	14,000	26′-11 1/4″	5,800	6,300
	15,000	29′-5 3/4″	6,600	7,000
	20,000	37′-8 3/4″	8,600	9,000
	22,000	42′- 3/4″	9,700	10,500
	25,000	47′-6 3/4″	11,100	11,800
	30,000	55′-9 3/4″	13,200	14,000
	35,000	64′- 3/4″	15,400	16,500
	40,000	73′-8 1/4″	17,900	19,000
12-foot-diameter tanks	20,000	29′-4″	9,200	14,000
	25,000	35′-7″	10,800	16,600
	30,000	43′-1″	13,100	19,900
	35,000	49′-4″	14,700	22,500
	40,000	54′-4″	16,100	24,600
	48,000	65′-7″	19,300	29,500
	50,000	68′-1″	20,000	30,500

ZCL Tank Data

	Nominal tank capacities (liters)	Single-wall and double-wall tank lengths (millimeters)	Single-wall tank weights (kilograms)	Double-wall tank weights (kilograms)
4-foot-diameter tanks	2,500	2,295	300	400
	3,900	3,395	400	500
	5,000	4,380	500	600
6-foot-diameter tanks	10,000	4,520	500	900
	15,000	6,604	800	1,300
	20,000	8,465	1,000	1,700
	25,000	10,420	1,300	2,200
8-foot-diameter tanks	15,000	3,994	600	900
	20,000	5,137	900	1,200
	25,000	6,090	1,100	1,400
	30,000	7,264	1,300	1,700
	35,000	8,185	1,500	2,000
	40,000	9,392	1,800	2,300
	45,000	10,363	1,900	2,500
	50,000	11,328	2,100	2,700
	60,000	13,500	2,600	3,400
	65,000	14,522	2,900	3,700
10-foot-diameter tanks	50,000	7,449	2,600	2,900
	55,000	8,280	2,900	3,200
	60,000	8,827	3,100	3,300
	65,000	9,576	3,400	3,600
	70,000	10,395	3,600	3,900
	75,000	10,903	3,800	4,100
	80,000	11,582	4,000	4,400
	85,000	12,268	4,200	4,700
	90,000	13,068	4,500	5,000
	100,000	14,345	5,000	5,400
	110,000	15,723	5,400	5,900
	115,000	16,097	5,500	6,100
	135,000	18,745	6,400	7,100
	150,000	21,406	7,300	8,100
12-foot-diameter tanks	80,000	8,941	4,200	6,400
	95,000	10,846	4,900	7,600
	120,000	13,132	6,000	9,100
	135,000	15,037	6,700	10,300
	150,000	16,561	7,400	11,200
	185,000	19,990	8,800	13,400
	190,000	20,752	9,100	13,900

Multiple Facilities

Customers can rely on timely manufacturing and delivery of tanks and accessories.

With six manufacturing facilities throughout North America, we're never far from customers when they need fiberglass tanks and accessories shipped. Our US and Canadian facilities can provide tanks with UL, ULC, NSF and IAPMO listings to our customers.

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ZCL | XERXES®
making a lasting difference®

RAINWATER PUMPING SYSTEM

Flow Inducer Rainwater Pump Stations

High performance mid-range automatic pump stations for large residential, commercial, and light-industrial rainwater collection systems.

The Flow Inducer Product Line:

RainFlo Flow Inducer Kits are specially designed for rainwater collection systems using the highest quality components and packaged in a complete and easy to install bundle at an unbeatable price point. Using time-tested Goulds pump technology, these pump stations perfectly fill the performance gap between traditional standalone pumps and more expensive high-end pump stations.

All RainFlo Flow Induction Kits include:

- High Performance Three Phase Motor, 230V
- Variable Speed, Balanced Flow Pump Controller with Transducer (15' cable)
- Water End with Sand and Abrasion Resistant Floating Stack Design
- Flow Induction Pump Chamber with 15 degree Inclination
- 2" Stainless Steel Floating Filter with 10' hose
- 8.2 Gallon Inline Pressure Tank (13.9 Gal on FI-6000 model)

Model Overview:

Flow Induction Pump Station Models			
Model No.	**Motor HP**	**Avg GPM**	**GPM @ 60 PSI**
FI-1800	1.5 HP	18	29
FI-2500	2 HP	25	34
FI-3300	3 HP	33	48
FI-6000	5 HP	60	59

Flow Characteristics:

Maximum pump flow (GPM) at selected pressures (PSI) at 0' vertical lift)								
PSI:	**30**	**40**	**50**	**60**	**70**	**80**	**90**	**100**
FI-1800	35	33	31	29	26	24	21	18
FI-2500	40	38	35	34	32	29	27	25
FI-3300	60	53	51	48	44	40	36	32
FI-6000	60	60	60	59	57	55	53	51

Efficiency:

			Best Efficiency		Max Runout	
Model No.	**HP**	**TDH**	**Flow (GPM)**	**TDH (ft)**	**Flow (GPM)**	**TDH (ft)**
FI-1800	1.5	315	18	237	37	55
FI-2500	2	358	25	238	40	69
FI-3300	3	390	33	230	60	70
FI-6000	5	681	33	390	60	120

Operational overview:

The balanced flow pump controller provides user-adjustable constant pressure using an energy-efficient variable speed pump motor. Using pressure measurements from the transducer, the controller adjusts the pump speed in order to maintain constant pressure, rather than the traditional on-off switched operation of traditional systems. The balanced flow controller provides continuous monitoring of motor current draw, voltage, temperature and loss of pressure. Systems ship factory-set at 50 PSI but can be easily adjusted to higher pressures in the field.

Flow Induction Chamber: The RainFlo Flow Induction Chamber is a specially designed water sealed pump housing which directs incoming water flow over the pump motor, providing necessary cooling, 15º pump inclination for longer bearing life, floating extractor intake, convenient 2" threaded output and compression sealed wiring port. Specially designed stainless steel motor centralizers with PVC pads keep the pump assembly stabilized and centered in the induction chamber for uniform flow and cooling. Vibration dampening rubber feet on the incline supports help protect fiberglass and plastic tanks from abrasion and reduce motor noise. A stainless steel lifting lug and tether assist in lowering the system into the tank. As with the motor assembly, the flow induction chamber is constructed with potable quality components.

Energy Efficient: By converting single phase input to 3 phase pump output, the controller can reduce energy consumption by 50%.

Rain tight Controller: The controller is rated NEMA 3R (Rain tight) so it may be located outdoors. It must be mounted vertically.

Dry-run Protection: This function protects the system from running dry. When the pressure transducer (included) detects inadequate water supply, the pump is automatically disabled. The controller will re-test for water supply until water is detected.

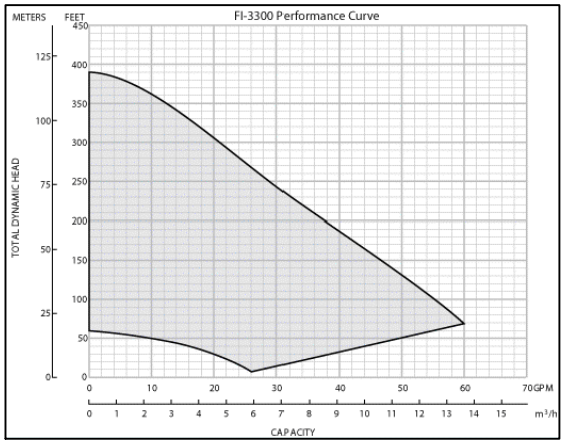
Broken Pipe Protection: The drive will turn off if the system pressure drops 20 PSI below the system set point pressure for a minimum of 30 seconds. (*This fault must be manually reset, it will not clear automatically, and this may prevent property damage if a pipe breaks*.)

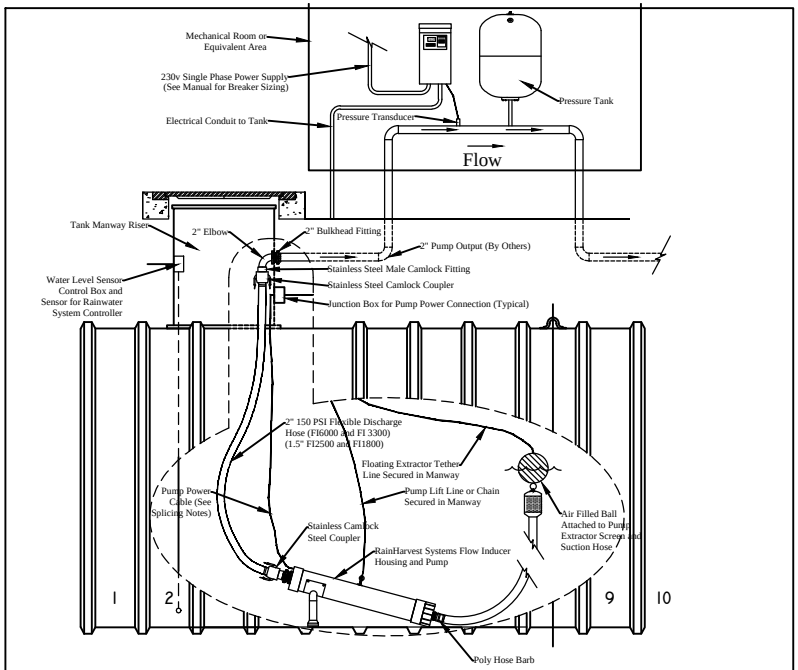
Auxiliary Switch Input: For connection of an external switch or control device used to start and stop the pump. Devices such as an over-pressure switch, level (float) switch or any other non-powered switch

In order to provide the highest water quality and safety, the RainFlo and Flow Inducer product labeling shown in the image is not applied to production units.

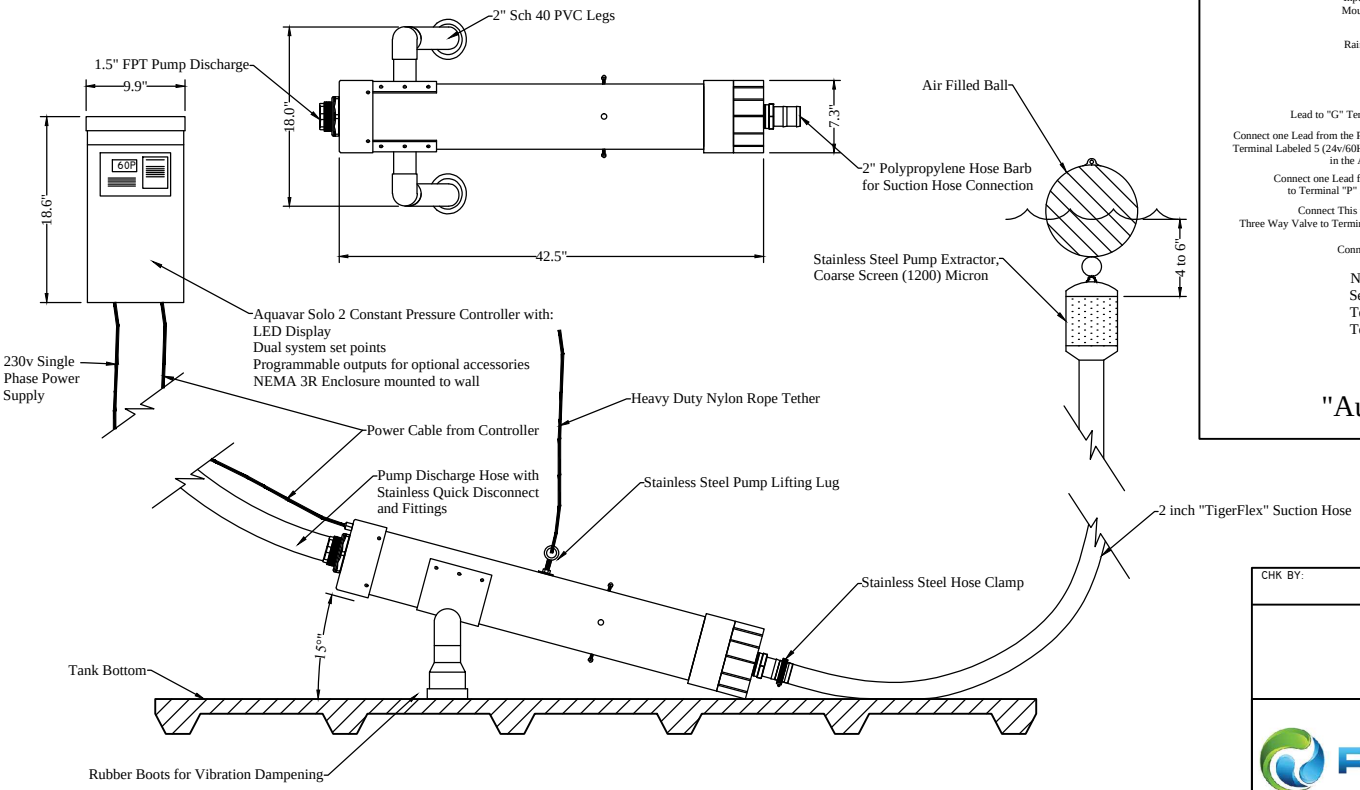
RainFlo Flow Inducer Pump Station

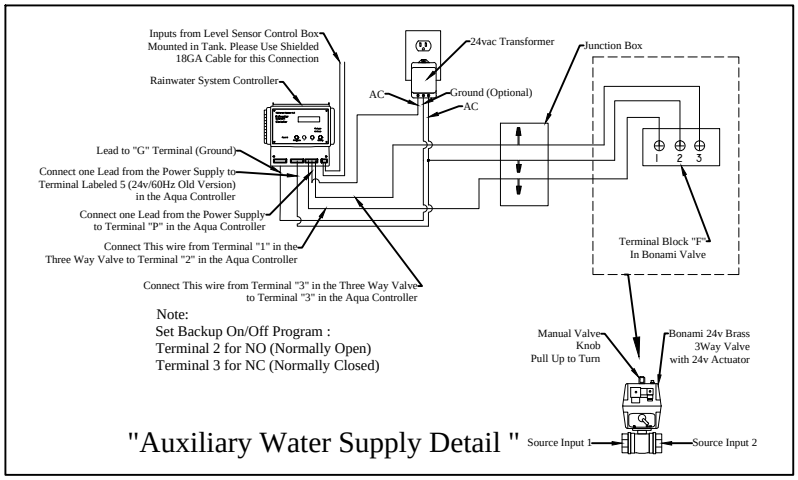
1. High Performance Three Phase 230 volt Motor
2. Single phase 230V supply to automatic pump controller
3. Variable Speed, Pump Controller with Transducer (15' cable standard longer cables Available)
4. Water End with Sand and Abrasion Resistant Floating Stack Design
5. 2" Stainless Steel Floating Filter with 10' hose
6. Flow Induction Pump Chamber with 15 degree Inclination. Proven design for rainwater collection systems
7. 9 Gallon Inline Pressure Tank





"Pump Discharge Detail"





"Auxiliary Water Supply Detail "

NOTE: This drawing is for illustrative purposes only. Actual systems and designs may vary. Always check with local building codes as they will apply.Electrical work to be performed by licensed professional. Points of use shall be labeled as: "Non Potable water, Do Not Drink!

CHK BY:	APP BY:	DRAWN BY	QUOTE NO.	SH.#
		CMG	.	1 OF 1

RainFlo FI-3300 Pumping System and Backup Valve Control System

RainHarvest Systems LLC.
6075 Parkway North Drive Suite D
Cumming, GA 30040
Tel: 770-889-2533 Fax: 770-889-2577

TECHNICAL BROCHURE
B35-85GS R1

FEATURES

Powered for Continuous Operation: All ratings are within the working limits of the motor as recommended by the motor manufacturer. Pump can be operated continuously without damage to the motor.

Field Serviceable: Units have left hand threads and are field serviceable with common tools and readily available repair parts.

Sand Handling Design: Our face clearance, floating impeller stack has proven itself for over 50 years as a superior sand handling, durable pump design.

FDA Compliant Non-Metallic Parts: Impellers, diffusers and bearing spiders are constructed of glass filled engineered composites. They are corrosion resistant and non-toxic.

Discharge Head/Check Valve: Cast 303 stainless steel for strength and durability. Two cast-in safety line loops for installer convenience. The built-in check valve is constructed of stainless steel and FDA compliant BUNA rubber for abrasion resistance and quiet operation.

Motor Adapter: Cast 303 stainless steel for rigid, accurate alignment of pump and motor. Easy access to motor mounting nuts using standard open end wrench.

Stainless Steel Casing: Polished stainless steel is strong and corrosion resistant.

Hex Shaft Design: Six sided shafts for positive impeller drive.

Engineered Polymer Bearings: The proprietary, engineered polymer bearing material is strong and resistant to abrasion and wear. The enclosed upper bearing is mounted in a durable Noryl® bearing spider for excellent abrasion resistance.

e-GS

35GS, 45GS, 65GS & 85GS

35-85 GPM 1-10HP, 60 HZ, SUBMERSIBLE PUMPS

BUILT IN THE USA
ENGINEERED, ASSEMBLED & TESTED

GOULDS WATER TECHNOLOGY
a xylem brand

WATER END DATA

Series	Model	Required HP	Stages	Water End	
				Length (in)	Weight (lbs)
35GS	35GS10	1	6	14.2	8
	35GS15	1.5	8	16.6	9
	35GS20	2	10	19.1	10
	35GS30	3	14	24.0	13
	35GS50	5	23	36.4	20
	35GS75	7.5	36	53.0	28
	35GS100	10	46	65.2	34
45GS	45GS15	1.5	5	12.9	8
	45GS20	2	7	15.4	9
	45GS30	3	10	19.0	10
	45GS50	5	17	27.7	15
	45GS75	7.5	25	38.9	21
	45GS100	10	34	50.6	27
65GS	65GS15	1.5	6	19.1	10
	65GS20	2	7	21.2	11
	65GS30	3	10	27.4	12
	65GS50	5	16	41.2	18
	65GS75	7.5	26	62.3	35
	65GS100	10	33	76.8	42
85GS	85GS30	3	8	29.4	13
	85GS50	5	14	42.8	18
	85GS75	7.5	21	63.8	35
	85GS100	10	27	79.9	41

NOMENCLATURE – SOLD AS WATER ENDS ONLY

35 GS 20

GPM at — 35, 45, 65, 85 Best Efficiency

GS Pump Series

Horsepower Code

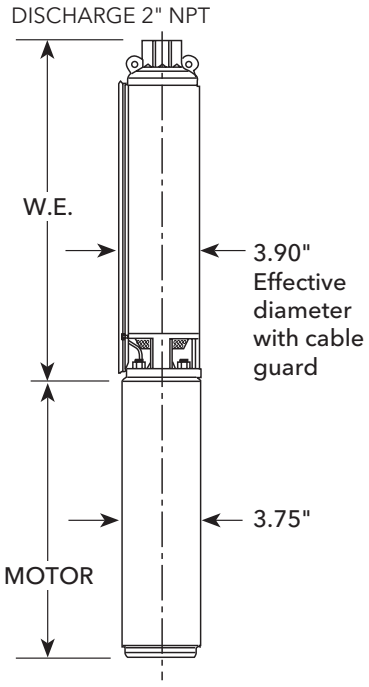
10 = 1
15 = 1 1/2
20 = 2
30 = 3
50 = 5
75 = 7 1/2
100 = 10

SPECIFICATIONS

Model	Flow Range GPM	Horse-Power Range	Best Efficiency GPM	Discharge Connection	Minimum Well Size	Rotation
35GS	10-50	1.0 - 10	35	2"	4"	CCW
45GS	20 - 65	1.5 - 10	45	2"	4"	CCW
65GS	30 - 80	1.5 - 10	65	2"	4"	CCW
85GS	40 - 120	3.0 - 10	85	2"	4"	CCW

"GS" SERIES MATERIALS OF CONSTRUCTION

Part Name	Material
Discharge Head	AISI 303 SS
Check Valve Poppet	AISI 303 SS
Check Valve Seal	BUNA, FDA Compliant
Check Valve Seat	AISI 304 SS
Check Valve Retaining Ring	AISI 302 SS
Bearing Spider - Upper	Noryl
Bearing	Proprietary Engineered Polymer
Klipring	AISI 301 SS
Diffuser	Noryl
Impeller	Noryl
Bowl	AISI 304 SS
Intermediate Sleeve*	AISI 304 SS, Powder Metal
Intermediate Shaft Coupling*	AISI 304 SS, Powder Metal
Intermediate Bearing Spider*	Noryl
Intermediate Bearing Spider*	AISI 303 SS
Shim	AISI 304 SS
Screws - Cable Guard	AISI 304 SS
Motor Adapter	AISI 303 SS
Casing	AISI 304 SS
Shaft	17-4 PH Stainless Steel
Coupling	AISI 304 SS, Powder Metal
Cable Guard	AISI 304 SS
Suction Screen	AISI 304 SS



CENTRIPRO 4" SINGLE-PHASE MOTORS

Order No.	Type	HP	Volts	Length in. (mm)	Weight lb. (kg.)
M10422	2-wire PSC	1	230	13.3 (337)	24.5 (11.1)
M15422		1.5		14.9 (378)	28.9 (13.1)
M10412	3-wire	1	230	11.7 (297)	23.1 (10.5)
M15412		1.5		13.6 (345)	27.4 (12.4)
M20412		2		15.1 (383)	31.0 (14.1)
M30412		3		18.3 (466)	40.0 (18.1)
M50412		5		27.7 (703)	70.0 (31.8)

CENTRIPRO 4" THREE-PHASE MOTORS

Order No.	HP	Volts	Length in. (mm)	Weight lb. (kg.)
M10430	1	200	11.7 (297)	22 (10.4)
M15430	1.5		11.7 (297)	22 (10.4)
M20430	2		13.8 (351)	28 (12.7)
M30430	3		15.3 (389)	32 (14.5)
M50430	5		21.7 (550)	55 (24.9)
M75430	7.5		27.7 (703)	70 (31.8)
M10432	1	230	11.7 (297)	23 (10.4)
M15432	1.5		11.7 (297)	23 (10.4)
M20432	2		13.8 (351)	28 (12.7)
M30432	3		15.3 (389)	32 (14.5)
M50432	5		21.7 (550)	55 (24.9)
M75432	7.5		27.7 (703)	70 (31.8)
M10434	1	460	11.7 (297)	23 (10.4)
M15434	1.5		11.7 (297)	23 (10.4)
M20434	2		13.8 (351)	28 (12.7)
M30434	3		15.3 (389)	32 (14.5)
M50434	5		21.7 (550)	55 (24.9)
M75434	7.5		27.7 (703)	70 (31.8)
M100434	10		–	–
M15437	1.5	575	11.7 (297)	23 (10.4)
M20437	2		15.3 (389)	32 (14.5)
M30437	3		15.3 (389)	32 (14.5)
M50437	5		27.7 (703)	70 (31.8)
M75437	7.5		27.7 (703)	70 (31.8)

NEMA MOTOR

- Corrosion resistant stainless steel construction.
- Built-in surge arrestor is provided on single phase motors through 5 HP.
- Stainless steel splined shaft.
- Hermetically sealed windings.
- Replaceable motor lead assembly.
- NEMA mounting dimensions.
- Control box is required with 3 wire single phase units.
- Three phase units require a magnetic starter with three leg Class 10 overload protection.

AGENCY LISTINGS

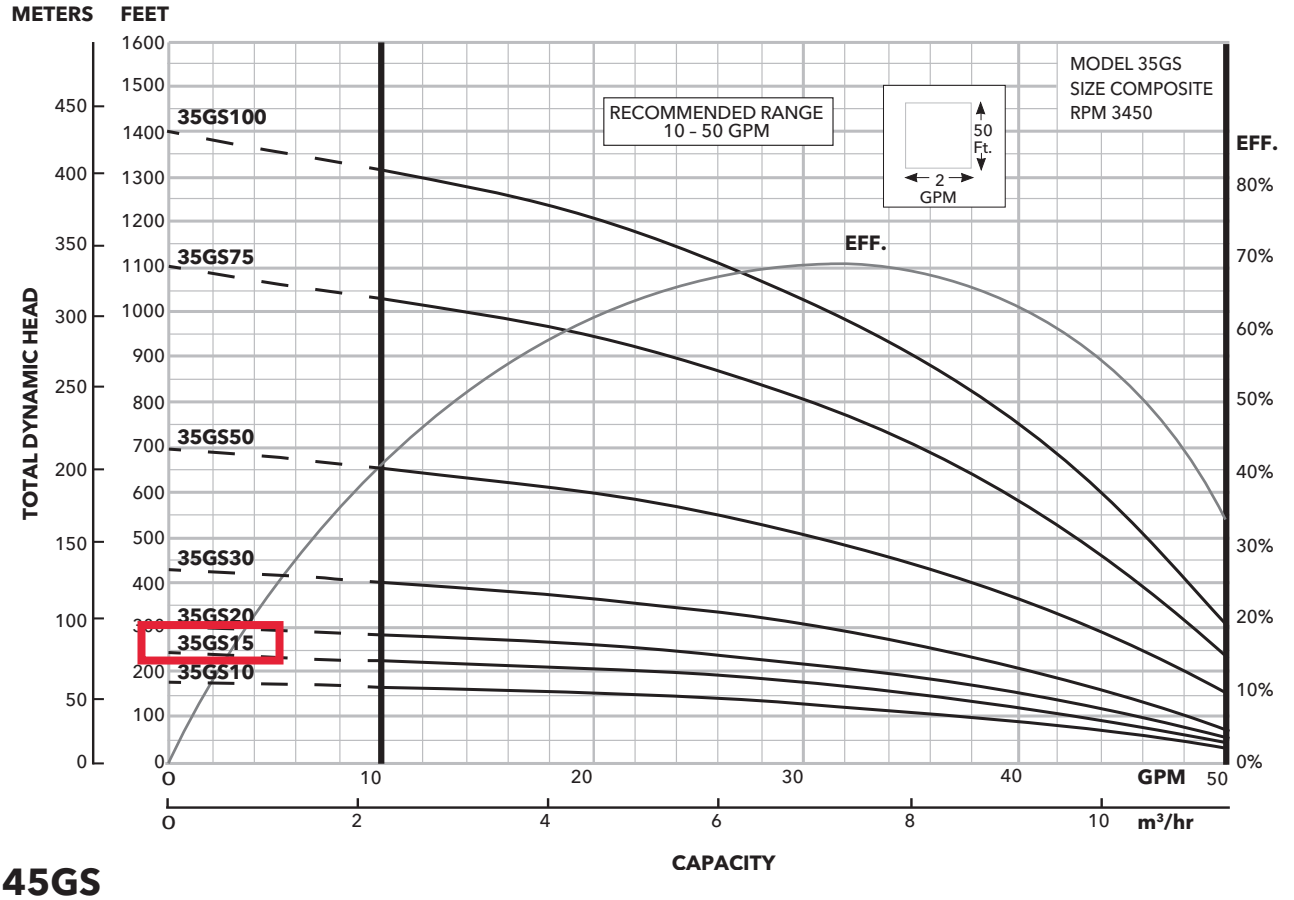
CentriPro Motor - tested to UL778 and CAN 22.2 by CSA International (Canadian Standards Association)

CentriPro Motor - Certified to NSF/ANSI 61, Annex G, Drinking Water System Components 4P49

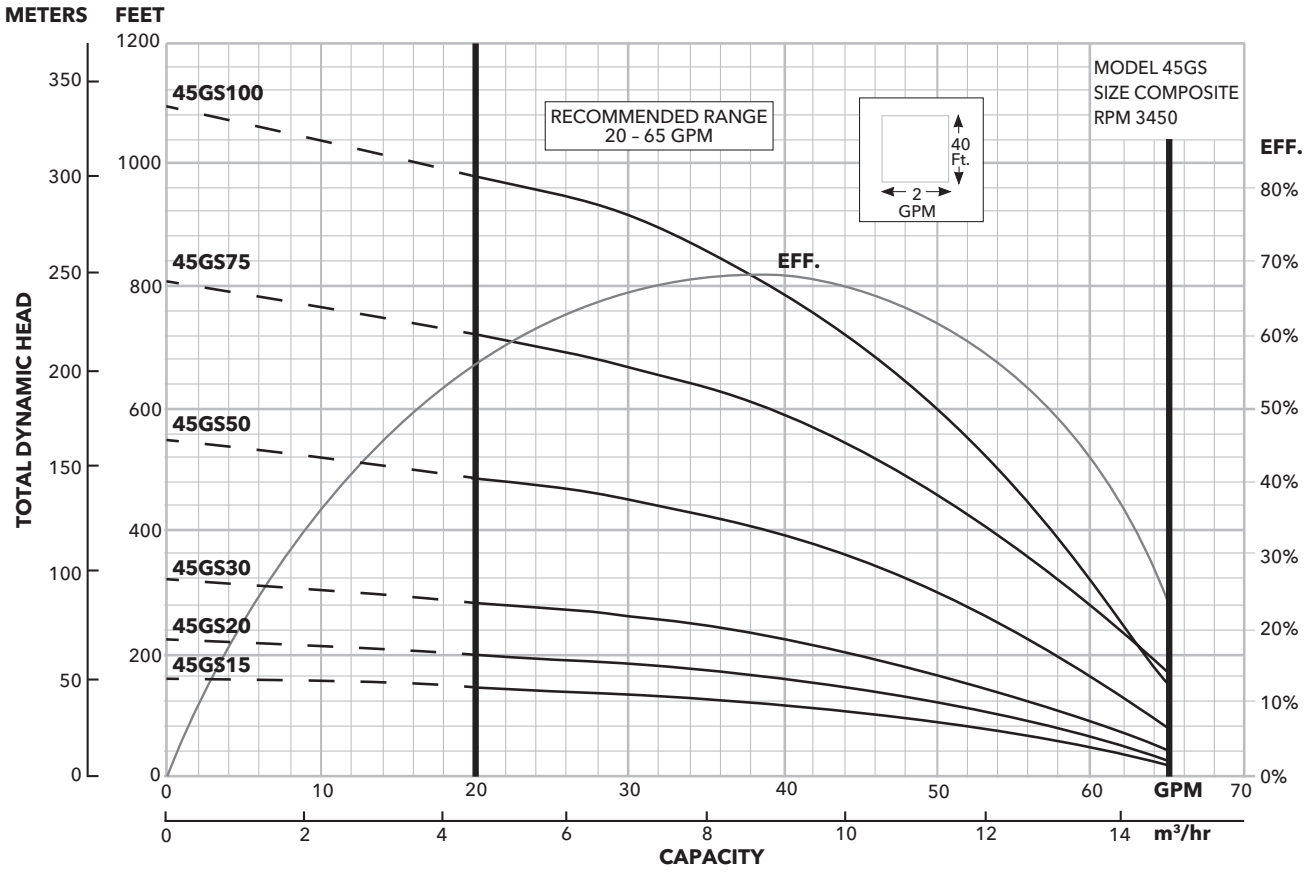
NSF/ANSI 372 – Drinking Water System Components – Lead Content

CLASS 6853 01 - Low Lead Content Certification Program - - Plumbing Products

Model 35GS



Model 45GS



TECHNICAL BROCHURE
BAQSOLO2 R3

AQUAVAR SOLO²™

CONSTANT PRESSURE CONTROLLERS FOR: 1Ø – 3-WIRE MOTORS,
1Ø – 2-WIRE CENTRIPRO MOTORS, 3Ø MOTORS

BUILT IN THE USA
ENGINEERED, ASSEMBLED & TESTED

CentriPro
a xylem brand

FEATURES

LED display clearly indicates actual system pressure, output frequency, current draw and error log.

Dual system set points for advanced system application.

Programmable output relay can be configured to run optional accessories such as a chlorinator, or link to a home monitoring system.

NEMA 3R Enclosure: Rainproof, outdoor/indoor rated enclosure.

Current Limit Selector Switch: Rotary switch to set current limit to match motor Service Factor Amps (SFA).

Dry Well Sensitivity Switch: Choice of low or high sensitivity.

Pressure Drop: Choose a 5 or 20 PSI pressure drop for restarts.

Low Pressure Cut-Off: Set on or off depending on application.

Constant Pressure: Provides consistent pressure even as flow requirements vary.

Controller acts as a pump protection and troubleshooting device. Flashing lights indicate system faults.

Standard pressure sensor cable is 10' long. Optional lengths of 25', 50', 100', 150' and 200' are available.

Integrated output motor filter protects the motor from voltage spikes and limits electrical interference with devices such as portable telephones, radios, televisions and garage door openers.

Cooling Fan: Allows operation in ambient temperatures up to 122°F.

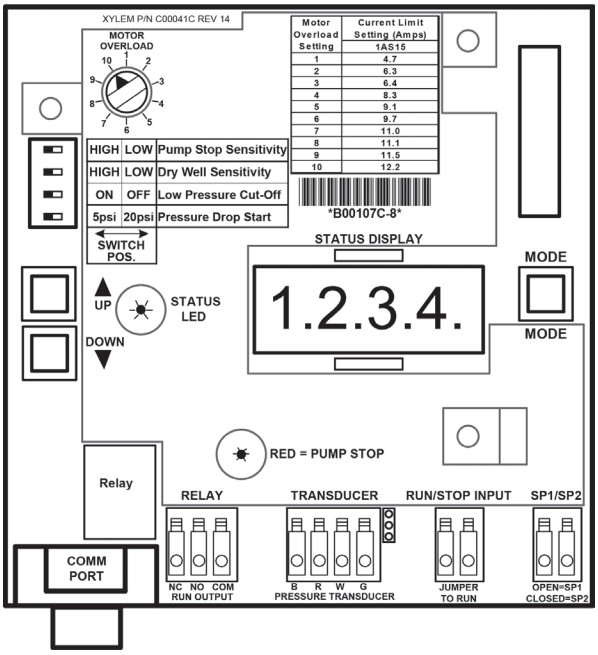
AGENCY LISTINGS

C US — Tested to UL 508C and CSA 22.2 0-M91, 14-95 and 0.4-M1982 Standards By Canadian Standards Association File #LR38549

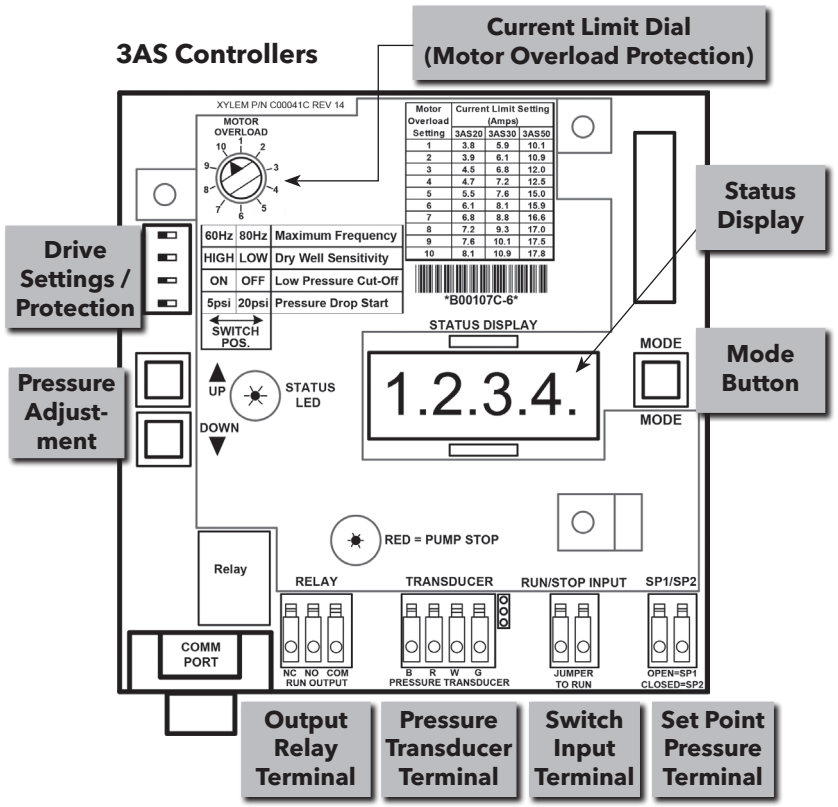
NSF/ANSI 61-G — Drinking Water System Components – Health Effects & Optional Annex G - Class 6861 18 - Mechanical Devices - NSF/ANSI 61 - Certified to NSF/ANSI 61 Sect. 8 (including optional Annex G)

USER INTERFACE BOARD

1AS Controllers



3AS Controllers



SPECIFICATIONS – 3Ø MODELS / 1Ø INPUT AND 3Ø OUTPUT

Controller Temperature Range:

- Minimum Ambient Temperature: -4°F (-20°C)
- Maximum Ambient Temperture: +122°F (+50°C)

Input Voltage: single-phase, 230 Volt, two (2) wire grounded system.

Output Voltage: variable frequency, variable voltage, three-phase power to the motor.

Speed Selector Switch: Selects Output Frequency of either –

- 30 - 60 Hz - Use matched HP Water End and Motor
- 30 - 80 Hz - Use mis-matched Water End and Motor

Enclosure Dimensions:

- Height: 18.6"
- Width: 9.9"
- Depth: 5.3"

Packaged Dimensions:

- Height: 21"
- Width: 13"
- Depth: 8"

Motor Compatibility with 3AS_ _ Models

HP	Three Phase	
	CentriPro & Pentek XE	Franklin & Grundfos
¾	Yes	Yes
1	Yes	Yes
1½	Yes	Yes
2	Yes	Yes
3	Yes	Yes
5	Yes	①

① Amps may be higher than controller overload range - use of these motors will current limit and provide reduced performance.

3AS20 SPECIFICATIONS

- HP Range: ¾ to 2
- Unit Weight: 19 lbs.
- Packaged Weight: 23 lbs.
- Pressure Set point adjustable from 20 - 85 psi using the standard 100 psi sensor. ①

3AS30 SPECIFICATIONS

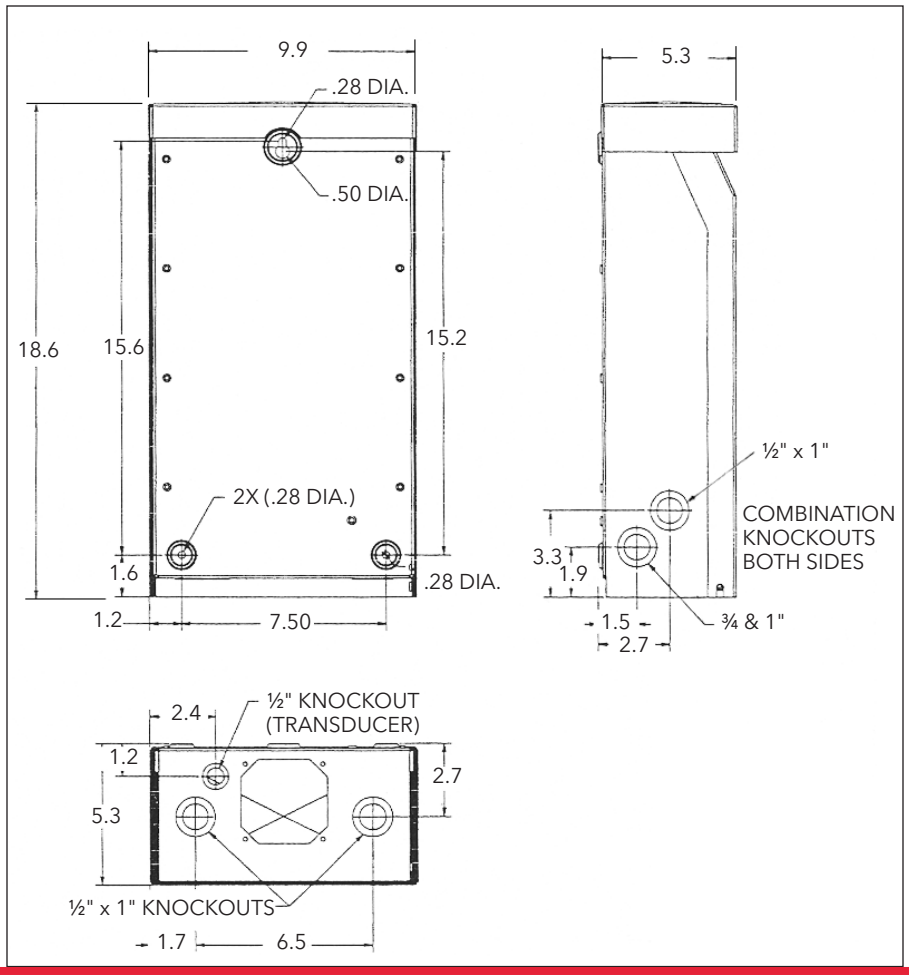
- HP Range: 1½ to 3
- Unit Weight: 20 lbs.
- Packaged Weight: 24 lbs.
- Pressure Set point adjustable from 20 - 85 psi using the standard 100 psi sensor. ①

3AS50 SPECIFICATIONS

- HP Range: 3 to 5
- Unit Weight: 25 lbs.
- Packaged Weight: 29 lbs.
- Pressure Set point adjustable from 20 - 100 psi using the standard 200 psi sensor. ①

① Higher pressures are available using a higher pressure sensor. See page 4.

DIMENSIONS (inches) – ALL MODELS



SPECIFICATIONS – 1AS15 – 1Ø MODEL – 1Ø INPUT AND 1Ø OUTPUT

Controller Temperature Range:

- Minimum Ambient Temperature: 14°F (-10°C)
- Maximum Ambient Temperture: 122°F (50°C)

Input Voltage: single-phase, 230 Volt, two (2) wire grounded system.

Output Voltage: 1Ø, variable voltage, variable frequency, single phase power to the 2-wire or 3-wire motor

Speed/Frequency: 30-60 only

Enclosure Dimensions:

- Height: 18.6"
- Width: 9.9"
- Depth: 5.3"

Packaged Dimensions:

- Height: 21"
- Width: 13"
- Depth: 8"

1AS15 SPECIFICATIONS

- Unit Weight: 19 lbs.
- Packaged Weight: 23 lbs.
- Pressure Set point adjustable from 20 - 85 psi using the standard 100 psi transducer.
- HP Range:

Motor Compatibility with Aquavar SOLO 1AS15

HP	Single Phase 2-Wire		Single Phase 3-Wire	
	CentriPro & Pentek XE	Franklin, Grundfos and Flint & Walling	CentriPro & Pentek XE	Franklin, Grundfos and Flint & Walling
½	Yes	Yes	Yes	Yes
¾	Yes	Yes	Yes	Yes
1	Yes	Yes	Yes	Yes
1½	Yes	Yes	Yes	Yes
2	No	No	Yes	①

① Amps are higher than controller overload range - use of these motors will current limit and provide reduced performance.

TANK SIZING

Diaphragm Tank Sizing and Pre-Set Pressure Recommendations:

Diaphragm type (captive air) tanks are required on these systems.

Table 1: Tank Sizing Selection

Maximum Pump GPM	Recommended Tanks	
	Total Volume	Order Number
10	1.9	V6P
24	4.9	V15P
36	7.3	V25P
70	13.9	V45
100	19.9	V60

Use Total Tank Volume, not drawdown volume, to select the proper tank size. The total tank volume should be approximately 20% of the pump's maximum flow. For example, when using a 10 gpm pump the system requires a minimum 2 gallon (total volume) tank.

The tank sizing recommendations are field proven to prevent objectionable pressure drops on start-up and provide smooth operation for the majority of variable speed pump systems.

When using the default, 5 PSI pressure drop, setting: Set the tank pressure, while tank is empty of water, to 20 psi below the desired system pressure setting. Ex. for a 50 psi system pressure, charge the tank to 30 psi.

See IOM for other settings or if using a large tank.

Table 2: Controller, Breaker, Generator Sizing

Motor		Controller Model ②				Circuit Breaker ③	Generator ④ (VA)
HP	Voltage ①	1AS15	3AS20	3AS30	3AS50		
½	230					15	2200
	200						
¾	230						2900
	200						
1	230						3500
	200						
1½	230					20	4400
	200						
2	230					30	6100
	200						
3	230						8100
	200						
						40	
5	230					50	13300
	200						

① Supply voltage must be 196 VAC – 265 VAC.

② Shaded areas indicate which controller models can be used with which motors. Lighter shading indicates combinations where controller will limit peak performance to 85% of catalog value for pump/motor.

③ Circuit Breaker or Dual Element Time Delay Fuse Size (Amps) protecting branch circuit supplying controller.

④ Minimum size of single phase 240 V generator required.

Table 3: Service Factor Amps All Motors

HP	230 Volt									200 Volt	
	1Ø 2-Wire			1Ø 3-Wire			3Ø			3Ø	
	CentriPro[1]	Franklin	Grundfos	CentriPro	Franklin	Grundfos	CentriPro	Franklin	Grundfos	CentriPro	Franklin
½	4.7/4.7	6	6	6.3	6	6	N/A	N/A	N/A	N/A	N/A
¾	6.4/6.2	8	8.4	8.3	8	8.4	3.9	3.8	N/A	4.5	4.4
1	9.1/8.1	9.8	9.8	9.7	9.8	9.8	4.7	4.7	N/A	5.5	5.4
1½	11.0/10.4	13.1[2]	13.1[2]	11.1	11.5	11.6	6.1	5.9	7.3	7.2	6.8
2	N/A	N/A	N/A	12.2	13.2[2]	13.2[2]	7.6	8.1	8.7	8.8	9.3
3	N/A	N/A	N/A	N/A	N/A	N/A	10.1	10.9	12.2	12	12.5
5	N/A	N/A	N/A	N/A	N/A	N/A	17.5	17.8	19.8[2]	20.2[2]	20.5[2]

1. CentriPro 2-Wire motors have Generation 1 and Generation 2 amp ratings, see motor nameplate or motor data sticker that was supplied with motor.

2. Amps are higher than controller overload range - use of these motors will current limit and provide reduced performance.

PRESSURE RANGES FOR ALL AVAILABLE TRANSDUCERS

Transducer	1AS15 / 3AS20		3AS30		3AS50	
	Minimum PSI	Maximum PSI	Minimum PSI	Maximum PSI	Minimum PSI	Maximum PSI
100 PSI ①	20	85	20	85	10	50
200 PSI ②	40	170	40	170	20	100
300 PSI	60	255	60	255	30	150

① Standard on 1AS15/3AS20, 3AS30 ② Standard on 3AS50

Warning! Exploding tank can injure or kill, some combinations of Transducer and Controller allow system pressure adjustment to exceed the maximum working pressure of the tank and piping.

Ensure system pressure is set below the maximum working pressure of the tank and system piping.

Protect tank and piping against overpressure, install a properly sized pressure relief valve (PRV) able to pass full pump flow at the maximum working pressure of the tank. In finished basements or where PRV blow-off can cause property damage, pipe the PRV to a suitable drain.

Table 4: Wire Sizing
Maximum Cable Lengths in Feet to Limit Voltage Drop to 5% for 230 V Systems ①

1AS15 Controller to Motor – Controllers with 2-Wire 1Ø Motors

Motor Lead Lengths - CentriPro 2-Wire Motors - Based on Service Factor Amps, 30° C Ambient and 5% Voltage Drop														
Motor Rating				60° C & 75° C Insulation - AWG Copper Wire Size										
Volts	HP	kW	SFA	14	12	10	8	6	4	2	1/0	2/0	3/0	4/0
230	½	0.37	4.7	466	742	1183	1874	2915	4648	7379	11733	14803	18688	23544
	¾	0.55	6.4	342	545	869	1376	2141	3413	5419	8617	10871	13724	17290
	1	0.75	9.1	241	383	611	968	1506	2400	3811	6060	7646	9652	12160
	1½	1.1	11.0	199	317	505	801	1246	1986	3153	5013	6325	7985	10060

1AS15 Controller to Motor – Controllers with 3-Wire 1Ø Motors

Motor Lead Lengths - CentriPro 3-Wire Motors (CSIR) - Based on Service Factor Amps, 30° C Ambient and 5% Voltage Drop														
Motor Rating				60° C & 75° C Insulation - AWG Copper Wire Size										
Volts	HP	kW	SFA	14	12	10	8	6	4	2	1/0	2/0	3/0	4/0
230	½	0.37	6.3	348	553	883	1398	2175	3467	5505	8753	11044	13942	17564
	¾	0.55	8.3	264	420	670	1061	1651	2632	4178	6644	8383	10582	13332
	1	0.75	9.7	226	359	573	908	1413	2252	3575	5685	7173	9055	11408
	1½	1.1	11.1	197	314	501	793	1234	1968	3124	4968	6268	7913	9969
	2	1.5	12.2	180	286	456	722	1123	1790	2843	4520	5703	7199	9070

All Models – Service Entrance to Controller

Controller Input	Motor HP	Copper Wire Size 75°C Insulation Exposed to a Maximum of 50°C (122°F) Ambient Temperature ②																	
		14	12	10	8	6	4	3	2	1	1/0	2/0	3/0	4/0	250	300	350	400	500
230V 1 PH	¾	279	445	706	1020	1608	2552	3186	4019	5065	6383	8055							
	1	226	360	571	824	1300	2064	2576	3250	4095	5161	6513	8201						
	1½	*	**286**	455	657	1036	1644	2052	2589	3262	4111	5188	6533	8236	9710				
	2	*	*	**331**	478	754	1197	1495	1886	2376	2995	3779	4759	5999	7073	8455	9852		
	3	*	*	**246**	355	561	890	1111	1401	1766	2225	2808	3536	4458	5256	6283	7321	8343	
	5	*	*	*	**218**	**343**	545	680	858	1081	1363	1720	2165	2730	3219	3847	4483	5109	6348

3AS20, 30, 50 Controller to Motor – Controllers with 3Ø Motors

Controller Output	Motor HP	Copper Wire Size 75°C Insulation Exposed to a Maximum of 50°C (122°F) Ambient Temperature ②																	
		14	12	10	8	6	4	3	2	1	1/0	2/0	3/0	4/0	250	300	350	400	500
230V 3 PH	¾	690	1100	1748	2523	3978	6316	7884	9945										
	1	558	890	1413	2040	3216	5106	6375	8041										
	1½	445	709	1126	1625	2562	4068	5078	6406	8072									
	2	324	516	820	1184	1866	2963	3699	4666	5879	7410	9351							
	3	241	384	609	880	1387	2202	2749	3467	4369	5506	6949	8750						
	5	*	235	373	539	849	1348	1683	2123	2675	3372	4255	5358	6755	7964	9520			

① Reduce lengths by 13% for 200 V systems. * Wire does not meet the N.E.C. ampacity requirement.
② Lengths in bold require 90° C wire. Shading indicates 40° C maximum ambient.

The lengths in each of the Wire Sizing tables represent 100% of the allowable voltage drop when motor is running at full load. When sizing wire, the voltage drop of each wire segment must be included. The total must not exceed 100% of the allowable drop. Take for example a 1.5 HP motor with a distance from Service Entrance to Controller of 100' and 500' between the Controller and Motor.

- Service Entrance to Controller = 100' of 10 AWG (100/455) = 22 % (455' is from the S.E. to Controller chart)
- Controller to Motor = 500' of 12 AWG (500/709) = 71 % (709' is from the Controller to Motor chart)

Total Drop (must be ≤ 100%) 93 %

If the distance from the Controller to Motor was 600' (600/709) = 85% + 22% = 107%, we would need to use #10 wire for that segment, ex. 600/1126 = 53% + 22% (for 100' of #10) = 75% which is acceptable. It is also acceptable to use different wire sizes for the Buried and Well sections of wire.

3Ø, 4" MOTORS – ELECTRICAL DATA, 60 HERTZ 3450 RPM

CentriPro #	Red Jacket #	HP	kW	Volts	SF	Full Load		Service Factor		Locked Rotor Amps	Line - Line Resistance
						Amps	Watts	Amps	Watts		
M07430	75C323	0.75	0.55	200	1.5	3.8	812	4.5	1140	32	2.6-3.0
M10430	100C323	1	0.75		1.4	4.6	1150	5.5	1500	29	3.4-3.9
M15430	150C323	1.5	1.1		1.3	6.3	1560	7.2	1950	40	1.9-2.5
M20430	200C323	2	1.5		1.25	7.5	2015	8.8	2490	51	1.4-2.0
M30430	300C323	3	2.2		1.15	10.9	2890	12.0	3290	71	0.9-1.3
M50430	500C323	5	3.7		1.15	18.3	4850	20.2	5515	113	0.4-0.8
M07432	75C313	0.75	0.55	230	1.5	3.3	850	3.9	1185	27	3.3-4.3
M10432	100C313	1	0.75		1.4	4.0	1090	4.7	1450	26.1	4.1-5.1
M15432	150C313	1.5	1.1		1.3	5.2	1490	6.1	1930	32.4	2.8-3.4
M20432	200C313	2	1.5		1.25	6.5	1990	7.6	2450	44	1.8-2.4
M30432	300C313	3	2.2		1.15	9.2	2880	10.1	3280	58.9	1.3-1.7
M50432	500C313	5	3.7		1.15	15.7	4925	17.5	5650	93	.85-1.25

1Ø, 4" MOTORS – ELECTRICAL DATA, 60 HERTZ 3450 RPM

Type	Motor Order Number		HP	KW	Volts	SF	Full Load		Service Factor		Locked Rotor Amps	Winding Resistance	
	CentriPro	Red Jacket					Amps	Watts	Amps	Watts		Main	Start
2 Wire PSC	M05422	50C211	0.5	0.37	230	1.6	3.7	834	4.7	1073	19.5	4.5-5.2	–
	M07422	75C211	0.75	0.55		1.5	5.0	1130	6.4	1459	24.8	3.0-4.8	–
	M10422	100C211	1.0	0.75		1.4	7.9	1679	9.1	1990	21.7	4.2-5.2	–
	M15422	150C211	1.5	1.1		1.3	9.2	2108	11.0	2520	42.0	1.9-2.3	–
3 Wire	M05412	50C311	0.5	0.37		1.6	5.5	745	6.3	1033	22.3	4.2-4.9	17.4-18.7
	M07412	75C311	0.75	0.55		1.5	7.2	1014	8.3	1381	32.0	2.6-3.6	11.8-13
	M10412	100C311	1	0.75		1.4	8.4	1267	9.7	1672	41.2	2.2-3.2	11.3-12.3
	M15412	150C311	1.5	1.1		1.3	9.7	1693	11.1	2187	47.8	1.6-2.3	7.9-8.7
	M20412	200C311	2	1.5		1.25	9.9	2170	12.2	2660	49.4	1.6-2.2	10.8-12.0

The AQUAVAR SOLO²™ 1AS15 model 30-60 hertz speeds only.

The AQUAVAR SOLO²™ 3AS models provide the option of operating the system at either 30-60 or 30-80 hertz speeds.

	30 - 60 Hertz (Standard Speed) Setting		30 - 80 Hertz (High Speed) Setting	
Controller	Water End	Motor HP	Water End	Motor HP
3AS20	1	1	½	1
3AS20	1½	1½	¾	1½
3AS20	2	2	1	2
3AS30	1½	1½	¾	1½
3AS30	2	2	1	2
3AS30	3	3	1½	3
3AS50	5	5	3	5

When using the "80 hertz" setting with mis-matched water ends and motors, use the larger pump curve as the top curve. The bottom, or 30 hertz, curve is calculated using the smaller wet end curve and the Affinity Laws. The ProPak Bulletins define performance curves. See BGPROPAK60 or BGPROPAK80 for curves.

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2) a leading global water technology company.

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Seneca Falls, NY 13148
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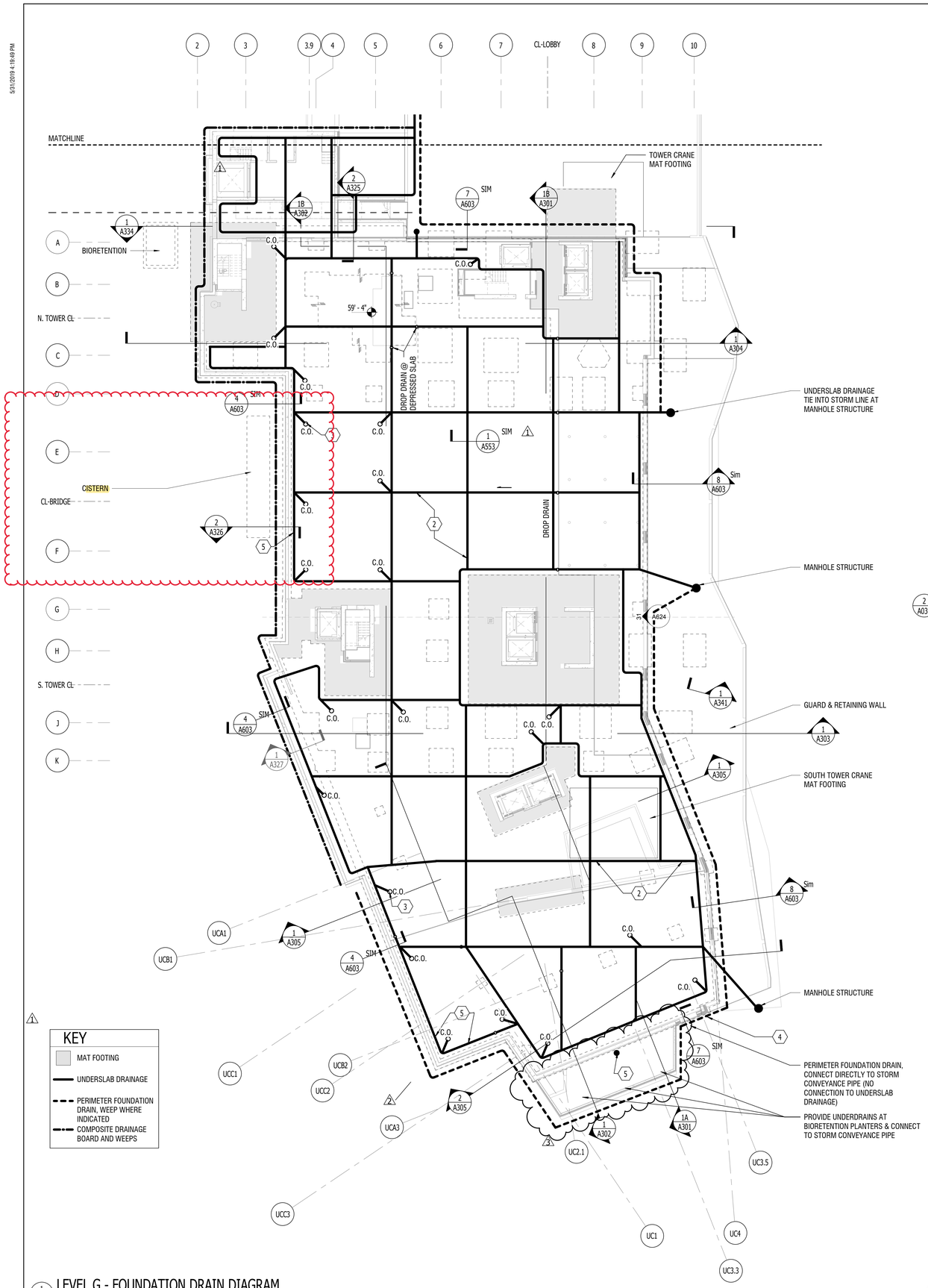
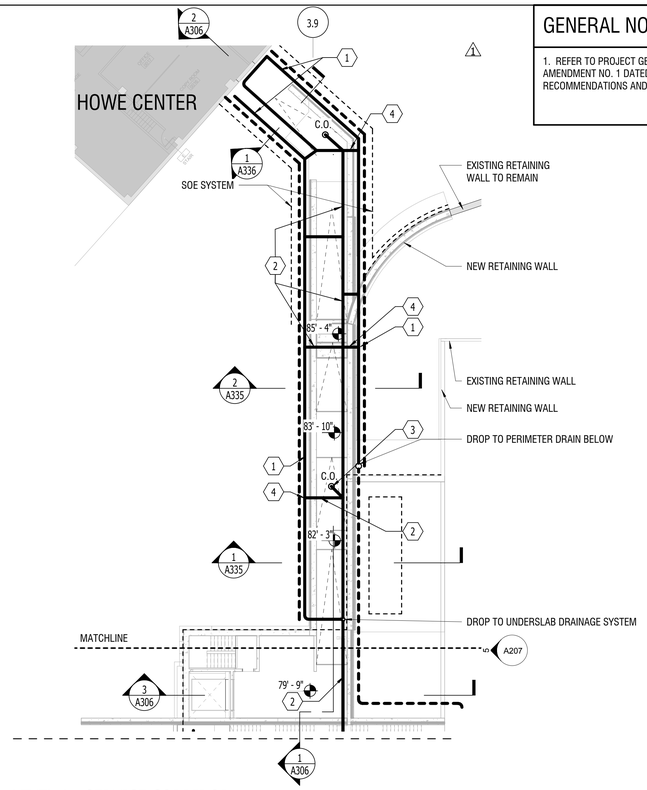
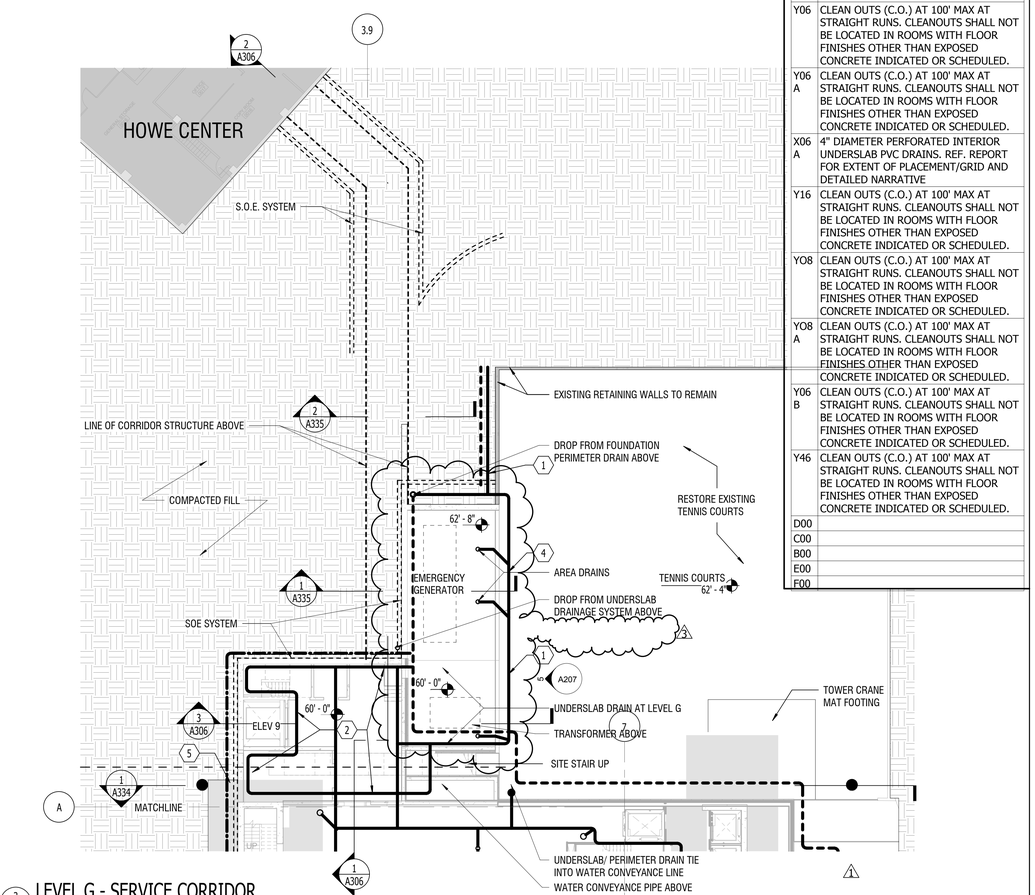


1 A030 LEVEL G - FOUNDATION DRAIN DIAGRAM
1/16" = 1'-0"



2 A030 LEVEL 1 - SERVICE CORRIDOR
1/16" = 1'-0"



3 A030 LEVEL G - SERVICE CORRIDOR
1/16" = 1'-0"

GENERAL NOTES

1. REFER TO PROJECT GEOTECHNICAL REPORT AMENDMENT NO. 1 DATED 11 AUGUST 2017 RECOMMENDATIONS AND DETAILS.

PLAN NOTES

1. COORDINATE WITH SITE STORM DRAIN LOCATION
2. VERIFY ALL COMPONENTS OF FOUNDATION DRAINAGE SYSTEM MEETS REQUIREMENTS OF CODE
3. ALL PIPING GRAVITY FLOW CONNECTION TO STORM LINE

PLAN KEYNOTES (#)

X01	4" DIAMETER PERFORATED SCHEDULE 80 POLYETHYLENE PIPE FOR PERIMETER FOUNDATION DRAIN LINES
X06	4" DIAMETER PERFORATED INTERIOR UNDERSLAB PVC DRAINS. REF. REPORT FOR EXTENT OF PLACEMENT/GRID AND DETAILED NARRATIVE
X06 B	CLEAN OUTS (C.O.) AT 100' MAX AT STRAIGHT RUNS. CLEANOUTS SHALL NOT BE LOCATED IN ROOMS WITH FLOOR FINISHES OTHER THAN EXPOSED CONCRETE INDICATED OR SCHEDULED.
X16	4" PVC WEEP TO TIE PERIMETER DRAIN INTO UNDERSLAB DRAIN LINES @ 5'-0" MAX O.C.
X92	AT S.O.E. FORMED FOUNDATION WALL, PROVIDE 1/2" COMPOSITE DRAINAGE BOARD WITH WEEPS @ 5' O.C. THROUGH FOUNDATIONS TO UNDERSLAB DRAINAGE SYSTEM
XO8	CLEAN OUTS (C.O.) AT 100' MAX AT STRAIGHT RUNS. CLEANOUTS SHALL NOT BE LOCATED IN ROOMS WITH FLOOR FINISHES OTHER THAN EXPOSED CONCRETE INDICATED OR SCHEDULED.
XO8 A	CLEAN OUTS (C.O.) AT 100' MAX AT STRAIGHT RUNS. CLEANOUTS SHALL NOT BE LOCATED IN ROOMS WITH FLOOR FINISHES OTHER THAN EXPOSED CONCRETE INDICATED OR SCHEDULED.
X10	CLEAN OUTS (C.O.) AT 100' MAX AT STRAIGHT RUNS. CLEANOUTS SHALL NOT BE LOCATED IN ROOMS WITH FLOOR FINISHES OTHER THAN EXPOSED CONCRETE INDICATED OR SCHEDULED.
X95	CLEAN OUTS (C.O.) AT 100' MAX AT STRAIGHT RUNS. CLEANOUTS SHALL NOT BE LOCATED IN ROOMS WITH FLOOR FINISHES OTHER THAN EXPOSED CONCRETE INDICATED OR SCHEDULED.
Y01	CLEAN OUTS (C.O.) AT 100' MAX AT STRAIGHT RUNS. CLEANOUTS SHALL NOT BE LOCATED IN ROOMS WITH FLOOR FINISHES OTHER THAN EXPOSED CONCRETE INDICATED OR SCHEDULED.
Y03	CLEAN OUTS (C.O.) AT 100' MAX AT STRAIGHT RUNS. CLEANOUTS SHALL NOT BE LOCATED IN ROOMS WITH FLOOR FINISHES OTHER THAN EXPOSED CONCRETE INDICATED OR SCHEDULED.
Y06	CLEAN OUTS (C.O.) AT 100' MAX AT STRAIGHT RUNS. CLEANOUTS SHALL NOT BE LOCATED IN ROOMS WITH FLOOR FINISHES OTHER THAN EXPOSED CONCRETE INDICATED OR SCHEDULED.
Y06 A	CLEAN OUTS (C.O.) AT 100' MAX AT STRAIGHT RUNS. CLEANOUTS SHALL NOT BE LOCATED IN ROOMS WITH FLOOR FINISHES OTHER THAN EXPOSED CONCRETE INDICATED OR SCHEDULED.
X06 A	4" DIAMETER PERFORATED INTERIOR UNDERSLAB PVC DRAINS. REF. REPORT FOR EXTENT OF PLACEMENT/GRID AND DETAILED NARRATIVE
Y16	CLEAN OUTS (C.O.) AT 100' MAX AT STRAIGHT RUNS. CLEANOUTS SHALL NOT BE LOCATED IN ROOMS WITH FLOOR FINISHES OTHER THAN EXPOSED CONCRETE INDICATED OR SCHEDULED.
YO8	CLEAN OUTS (C.O.) AT 100' MAX AT STRAIGHT RUNS. CLEANOUTS SHALL NOT BE LOCATED IN ROOMS WITH FLOOR FINISHES OTHER THAN EXPOSED CONCRETE INDICATED OR SCHEDULED.
YO8 A	CLEAN OUTS (C.O.) AT 100' MAX AT STRAIGHT RUNS. CLEANOUTS SHALL NOT BE LOCATED IN ROOMS WITH FLOOR FINISHES OTHER THAN EXPOSED CONCRETE INDICATED OR SCHEDULED.
Y06 B	CLEAN OUTS (C.O.) AT 100' MAX AT STRAIGHT RUNS. CLEANOUTS SHALL NOT BE LOCATED IN ROOMS WITH FLOOR FINISHES OTHER THAN EXPOSED CONCRETE INDICATED OR SCHEDULED.
Y46	CLEAN OUTS (C.O.) AT 100' MAX AT STRAIGHT RUNS. CLEANOUTS SHALL NOT BE LOCATED IN ROOMS WITH FLOOR FINISHES OTHER THAN EXPOSED CONCRETE INDICATED OR SCHEDULED.
D00	
C00	
B00	
E00	
F00	

DESIGN COLLECTIVE
ARCHITECTURE, PLANNING, INTERIORS
601 EAST PRATT STREET, SUITE 300
BALTIMORE, MARYLAND 21202
T: 410.685.6655 F: 410.539.6242
WWW.DESIGNCOLLECTIVE.COM

ISSUED FOR		DATE
	FOUNDATION TO GRADE	02/15/2019
1	FTG ADDENDUM 1	02/27/2019
	FOUND - GRADE PERMIT	03/11/2019
2	STRUCT. & FENESTRAT.	03/29/2019
3	CONSTRUCTION DOCS.	05/31/2019

CONSULTANT

OWNER / DEVELOPER
Stevens Institute of Technology

PROJECT NAME
STUDENT HOUSING & UNIVERSITY CENTER

PROJECT ADDRESS
1 Castle Point on Hudson
Hoboken, NJ 07030

PROJECT MANAGEMENT
DCI Project No. 409-15
Owner Project No.

SEAL

SHEET TITLE
FOUNDATION DRAIN DIAGRAM

SCALE
1/16" = 1'-0"

SHEET NUMBER
A030

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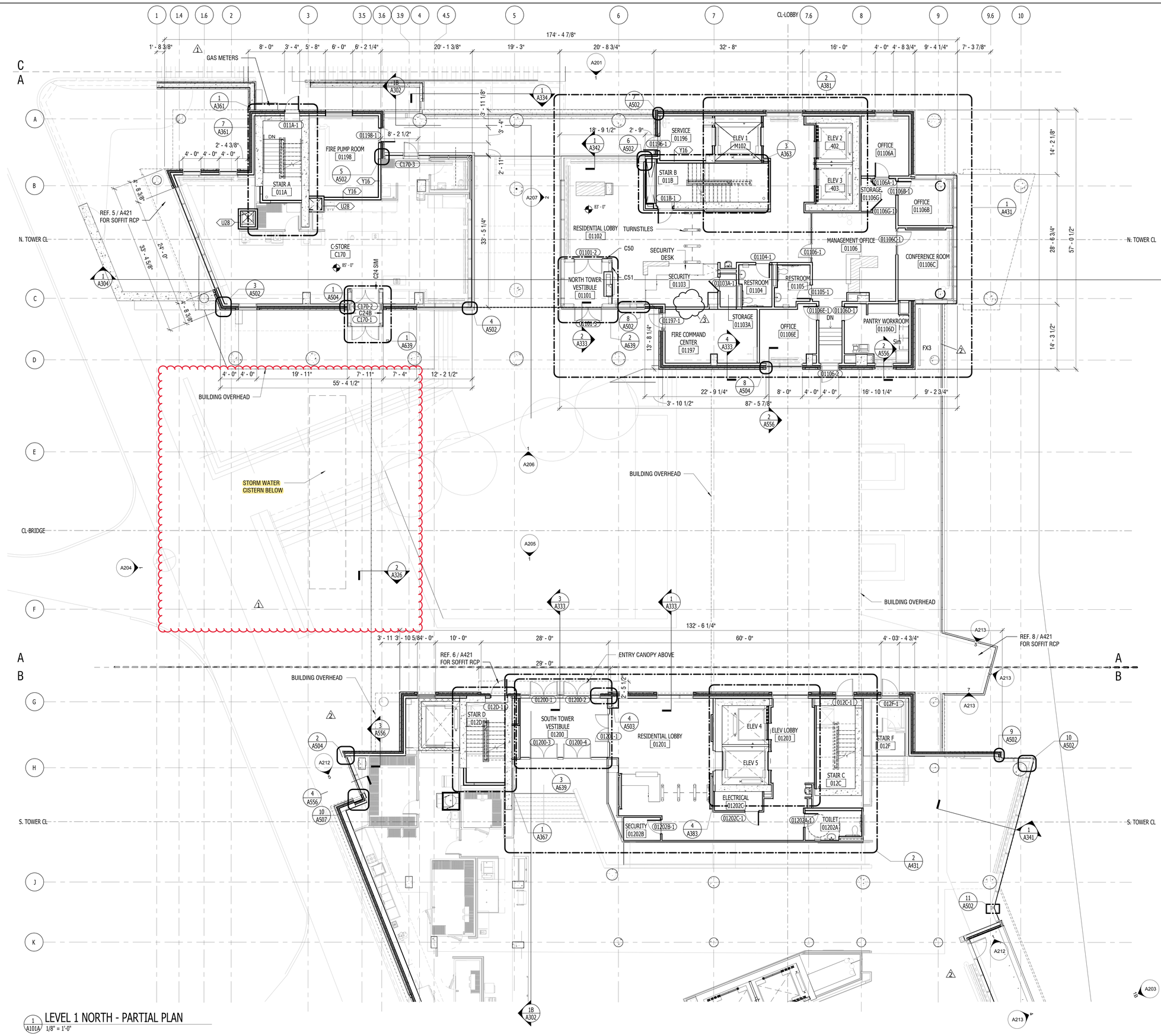
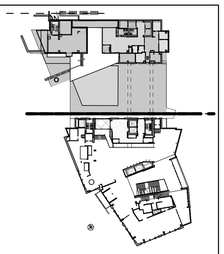


1 LEVEL 1 NORTH - PARTIAL PLAN
A101A 1/8" = 1'-0"



LEVEL 1 KEY PLAN

0' 4' 8' 16'

DESIGNCOLLECTIVE

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ARCHITECTURE, PLANNING, INTERIORS
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	ISSUED FOR	DATE
	FOUNDATION TO GRADE	02/15/2019
1	FTG ADDENDUM 1	02/27/2019
	FOUND - GRADE PERMIT	03/11/2019
	STRUCT. & FENESTRAT.	03/29/2019
2	MEP & ENVELOPE	04/30/2019
3	CONSTRUCTION DOCS.	05/31/2019

CONSULTANT

OWNER / DEVELOPER
Stevens Institute of Technology

PROJECT NAME
STUDENT HOUSING & UNIVERSITY CENTER

PROJECT ADDRESS
1 Castle Point on Hudson
Hoboken, NJ 07030

PROJECT MANAGEMENT
DCI Project No. 409-15
Owner Project No.

SEAL

SHEET TITLE
LEVEL 1 NORTH - PARTIAL PLAN

SCALE
As indicated

SHEET NUMBER
A101A

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1 P_LEVEL G_PLAN_SHEET_SOUTH
1/8" = 1'-0"

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601 EAST PRATT STREET, SUITE 300
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ISSUED FOR		DATE
	DESIGN DEVELOPMENT	06/29/2018
3	MEP & ENVELOPE	04/30/2019
4	CONSTRUCTION DOCS	05/31/2019

CONSULTANT

JBB
80 PINE STREET
NEW YORK, NEW YORK 10005 USA
TEL: 212.530.9300
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OWNER / DEVELOPER

PROJECT NAME

STUDENT HOUSING & UNIVERSITY CENTER

PROJECT MANAGEMENT

DCI Project No. 15649.M.000

SEAL

SHEET TITLE

GROUND LEVEL PLUMBING FLOOR PLAN - SOUTH

SCALE

1/8" = 1'-0"

SHEET NUMBER

P-100B