BOARD OF WATERWORKS COMMISSIONERS AGENDA

March 27, 2023 at 3:30 PM

Water Utility Admin Office, 72 Park Avenue, Sheboygan WI

Persons with disabilities who need accommodations to attend this meeting should contact the Sheboygan Water Utility, (920) 459-3805. Persons other than commission, committee, and board members who wish to participate remotely shall provide notice to the Utility at 920-459-3805 at least 24 hours before the meeting so that the person may be provided a remote link for that purpose.

OPENING OF MEETING

1. Pledge of Allegiance

MINUTES

2. Approve minutes of the February 20, 2023 meeting

REPORTS

3. Financial reports and approval of vouchers

4. Superintendent's report including operations, construction-maintenance, and customer relations/fiscal

ITEMS FOR DISCUSSION AND POSSIBLE ACTION

5. Review proposed US Cellular rental agreement update

6. Approval of Indiana Ave water main and water service project

7. Approval for purchase of replacement filter actuators

8. Approval for purchase of phosphate bulk storage tank

9. Approval for purchase of replacement UV backup batteries

10. Update on PFOS/PFOA monitoring

11. Approval of backwash tank flow meter

12. Approval for purchase of replacement computers

13. Review filter replacement study

PERSONNEL

14. Review covid leave status

NEXT MEETING

15. Next meeting will take place on: April 17, 2023

ADJOURN

16. Motion to Adjourn

In compliance with Wisconsin's Open Meetings Law, this agenda was posted in the following locations more than 24 hours prior to the time of the meeting:

City Hall • Mead Public Library
Sheboygan County Administration Building • City's website

City of Sheboygan
spirit on the lake Water Utility

REPORT OF BILLING

FEBRUARY 2023

		2023	2022	Increase or (Decrease)
Quarterly Metered*				
(Dist III - south of Union Ave)	Residential	226,005.40	218,483.31	7,522.09
	Multi-Family	28,347.10	27,260.80	1,086.30
	Commercial	35,746.48	31,090.83	4,655.65
	Industrial	18,042.71	16,604.55	1,438.16
	Public	9,508.19	8,620.59	887.60
	Subtotal	**317,649.88**	**302,060.08**	**15,589.80**

* *Billing for scheduled district only for the three preceding months usage.*

Public Fire Protection	69,641.10	68,729.20	911.90
Monthly Metered	369,986.60	381,452.19	(11,465.59)
Sheboygan Net	**757,277.58**	**752,241.47**	**5,036.11**
Sheboygan Falls	47979.85	52678.48	(4,698.63)
Kohler	27934.21	30885.16	(2,950.95)
Total	**833,191.64**	**835,805.11**	**(2,613.47)**

Total accumulative billing for 2023 is $1,596,771.38. An increase of $33,040.41 from 2022 accounted for as follows:

	2023-Total Year to Date
Sheboygan	41,430.47
Sheboygan Falls	(6,348.19)
Kohler	(2,041.87)
	33,040.41

Total bills mailed February, 2023: 6,636

Residential	6,044		
Multi-Family	91	Multi-Family	9
Commercial	325	Commercial	20
Industrial	45	Industrial	66
Public	27	Public	9
Quarterly	**6,532**	**Monthly**	**104**

City of Sheboygan Water Utility
spirit on the lake

CASH RESERVE
February 28, 2023

Ending balance on report for January 31, 2023		13,040,099.47
Plus:	Receipts	246,377.80
	Misc Receipts	12,046.57
	Direct Pay Receipts	369,032.30
	Stop Loss Reimbursement	-
	Money Market/CDARs Investment Interest	5,493.38
Minus:		
	Disbursements - vendors and payroll	(2,273,766.82)
	Bank Service Fees	(403.87)
	Health & Dental Claims/Adm Costs	(80,044.28)
	NSF Checks & Customer Refunds	(1,200.46)
	Invoice Cloud/Paymentech Deposit Fees	(8,404.90)
	Reallocate Sewer/Garbage - payments	747.71
	Reallocate Sewer/Garbage - monthly	698.21
	SDWL LSL Reimbursement	-
	SDWL RWI Reimbursement	-
	Automated Credit Card Payments	(5,450.31)
	Postage	(5,428.76)
	Utility Water Payments	(3,293.50)
Ending Balance	**February 28, 2023**	**$ 11,296,502.54**

Note: The above amount includes:

Bond Reserve Fund	644,319.88
LSL Revolving Loan Fund	202,106.25
Money Market Investment	4,007,070.32
ARPA Money Market Restricted - RWI	3,379,086.10
	-
Total	**$ 8,232,582.55**

General Unrestricted Operating Cash 3,063,919.99

City of Sheboygan Water Utility
spirit on the lake

APPROVAL OF VOUCHERS

February 28, 2023

Total Of The General Vouchers	$	2,058,453.07
Gross Payroll	$	201,421.98
Net Payroll	$	122,593.16

BOARD OF WATER COMMISSIONERS

PRESIDENT

SECRETARY

MEMBER

SUPERINTENDENT

February 2023

OPERATIONS' DEPARTMENT MONTHLY REPORT

	HIGH LIFT		LOW LIFT		2023 VS 2022
PUMPAGE	**2022**	**2023**	**2022**	**2023**	HL
Total in MG	353.356	320.848	354.732	330.397	-9.20%
Daily Average (MG)	12.620	11.477	12.669	11.800	
Max. Day (MG)	13.987	12.848	13.984	13.127	2023 VS 2021
					HL
Gal/KwH	1,185	1,157	4,824	4,892	-2.88%

ELECTRICAL COSTS					
	2022		**2023**		
A. Pumping:	**KwH**	**$**	**KwH**	**$**	
High Lift	296,051	$23,921.17	274,500	$24,057.31	
Low Lift	73,034	$5,901.20	67,102	$5,880.85	
Wash Pump 1	3,500	$282.80	3,500	$306.74	
Georgia St. Bstr.	47,700	$4,931.36	52,500	$5,583.37	
Wilgus Ave. Bstr.	2,800	$377.63	3,100	$442.09	
EE Pit / Bstr.	5,401	$693.16	5,973	$811.95	
Erie Ave. Bstr.	0	$0.00	11,200	$2,035.13	$/KwH
Sub Total	428,486	**$36,107.32**	417,875	**$39,117.45**	11.1%
B. Treat./Fiscal/Misc.	**KwH**	**$**	**KwH**	**$**	
Office & Maint. Bldg.	4,601	$479.78	4,589	$636.59	
Filter Plant / Pump Station / 2nd Service	56,415	$5,051.01	64,298	$6,126.82	
					$/KwH
Sub Total	61,016	**$5,530.79**	68,887	**$6,763.41**	8.3%
C. Distribution:	**KwH**	**$**	**KwH**	**$**	
Taylor Hill Tank	2,381	$318.68	3,612	$500.89	
Kohler Meter Pit	0	$0.00	0	$0.00	
EE Tower	1,852	$252.66	1,466	$216.78	
Washington (PRV) Pit	1,338	$197.00	1,305	$205.36	
Sub Total	5,571	**$768.34**	6,383	**$923.03**	$/KwH
Total Electrical Costs	**495,073**	**$42,406.45**	**493,145**	**$46,803.89**	10.8%
Electrical Cost / MG		$120.01		$145.64	

	2022		**2023**		
NATURAL GAS COSTS	CCF Used	Cost	CCF Used	Cost	
Production Facility	2,406	$1,798.41	2,130	$2,020.37	
South Basin	3,591	$2,863.40	3,089	$2,947.64	
Georgia St. Bstr.	182	$135.97			
Erie Ave. Bstr.	452	$362.48	353	$358.02	
Wilgus Ave. Bstr.	76	$73.47			
Office & Maint. Bldg.	1,269	$1,020.78	1,425	$1,372.69	$/CCF
Total Natural Gas Costs	7,976	**$6,254.51**	6,997	**$6,698.72**	22.1%
Natural Gas Cost / MG		$17.70		$20.85	

	2022		**2023**		
CHEMICAL COSTS	Lbs. Used	Cost	Lbs. Used	Cost	
Alum	81,457	$14,784.45	71,318	$14,370.58	11.0%
Carbon	0	$0.00	0	$0.00	#DIV/0!
Chlorine	5,729	$8,478.92	5,194	$10,543.82	37.2%
Fluoride	1,739	$2,417.21	1,474	$2,979.69	45.4%
KMnO4	0	$0.00	0	$0.00	#DIV/0!
Cationic Polymer	1,371	$2,125.21	0	$0.00	#DIV/0!
Liquid Phosphate	3,064	$4,834.99	3,621	$11,076.64	93.9%
Total Chemical Costs		**$32,640.78**		**$38,970.73**	19.4%
Chemical Cost / MG		$92.37		$121.27	
	Grand Total	**$81,301.74**		**$92,473.33**	13.74%
	Total Cost / MG	**$230.08**		**$287.76**	25.07%

YTD HL 2023 vs 2022	**-6.33%**	**YTD HL HIGH DAY PUMPAGE**	**13.403**	**January 30, 2023**
YTD HL 2023 vs 2021	**-2.34%**	**YTD HL LOW DAY PUMPAGE**	**9.294**	**January 1, 2023**

	YTD HL Ave Day
2023	**11.399**
2022	**12.187**
2021	**11.677**

NOTE:
Electrical costs include an Alliant Energy 8.3% rate increase approved by PSC.
all WPS bills available.

Not

COMPARATIVE SUMMARY OF PLANT OPERATIONS

February 2022 **vs** **February 2023**

Pumping Record

	High Lift				**Low Lift**		
	2022	**2023**	Diff.		**2022**	**2023**	Diff.
Tot. Water in MG	353.356	320.848	-9.20%	Tot. Water in MG	354.732	330.397	-6.86%
Daily Average	12.620	11.477	-9.06%	Daily Average	12.669	11.800	-6.86%
Maximum Day	13.987	12.848	-8.14%	Maximum Day	13.984	13.127	-6.13%
Minimum Day	9.989	9.477	-5.13%	Minimum Day	9.866	9.843	-0.23%
By Natural Gas	2.433	3.667	50.72%	By Natural Gas	2.433	2.166	-10.97%
Power in KWH	296,051	274,500	-7.28%	Power in KWH	73,034	67,102	-8.12%
Gals. per KWH	1,185	1,157	-2.33%	Gals. per KWH	4,824	4,892	1.40%
Power $ / KWH	$0.08080	$0.08764	8.47%	Power $ / KWH	----	----	----
Power $ / MG	$67.70	$74.86	$7.16	Power $ / MG	$16.64	$17.80	$1.16
Tot. Power $/MG	$121.26	$146.91	$25.65	Tot. Power $/MG	----	----	----

Treatment Chem.

Total Lbs.	Lbs. Used			Total Cost	Cost		
	2022	**2023**	Diff.		**2022**	**2023**	Diff.
Alum	81,457	71,318	-12.45%	Alum	$14,784.45	$14,370.58	($413.87)
Carbon			#DIV/0!	Carbon	$0.00	$0.00	$0.00
Chlorine	5,729	5,194	-9.34%	Chlorine	$8,478.92	$10,543.82	$2,064.90
KMnO4	0	0	#DIV/0!	KMnO4	$0.00	$0.00	$0.00
Polymer	1,371	0	-100.00%	Polymer	$2,125.21	$0.00	($2,125.21)
Liquid Phosphate	3,064	3,621	18.18%	Liquid Phosphate	$4,834.99	$11,076.64	$6,241.65
Lb/ MG:				Cost / MG:			
Alum	229.6	215.9	-6.00%	Alum	$41.68	$43.49	$1.82
Carbon	0.0	0.0	#DIV/0!	Carbon	#DIV/0!	#DIV/0!	#DIV/0!
Chlorine	16.2	15.7	-2.66%	Chlorine	$23.90	$31.91	$8.01
KMnO4	0.0	0.0	#DIV/0!	KMnO4	#DIV/0!	#DIV/0!	#DIV/0!
Liquid Phosphate	8.6	11.0	26.88%	Liquid Phosphate	$13.63	$33.53	$19.90

Fluoride:	**2022**	**2023**		Fluoride:	**2022**	**2023**	
Total Lbs.	1,739	1,474	-15.24%	Cost	$2,417.21	$2,979.69	$562.48
mg/l applied as F	0.67	0.74		Cost/MG	$6.85	$9.29	$2.44
Av. Res. Plt. Tap	0.72	0.71					

Water Quality:

	Raw			**TAP**	
	2022	**2023**		**2022**	**2023**
Turbidity	14.10	16.70	Turbidity	0.050	0.040
pH	8.20	8.26	pH	7.47	7.55
Alkalinity	119.0	114.5	Alkalinity	103.8	102.0
MF (E-Coli)	0.3	1.3	Plate Count	0.00	0.00
Temperature	32.7	33.8	Colilert	0	0
Wash-H20 % /LL	1.77	2.32	Temp.	33.8	35.7
Av. Flt. Run/hrs	148.3	92.0	Cl Res.	0.89	0.93
Av. ROF / MG	1.43	1.35			

Natural Gas:

	2022	**2023**		**2022**	**2023**	Diff.
Nat. Gas Heating	6,861	4,729	Plant & South Basin	$5,208.32	$4,503.42	($704.90)
Nat. Gas Pumping	68	490		$51.98	$464.59	$412.61

	CCF	Cost	**Natural Gas Cost**	**Natural Gas CCF**
#3 Gas Pump	117.8	$111.74	**$4,968.01**	**5,219**
#4 Gas Pump	180.0	$170.74		
#7 Gas Pump	100.0	$94.85		
Electric Generator	92.0	$87.26		
Pumping totals	**489.8**	**$464.59**		

February 2023

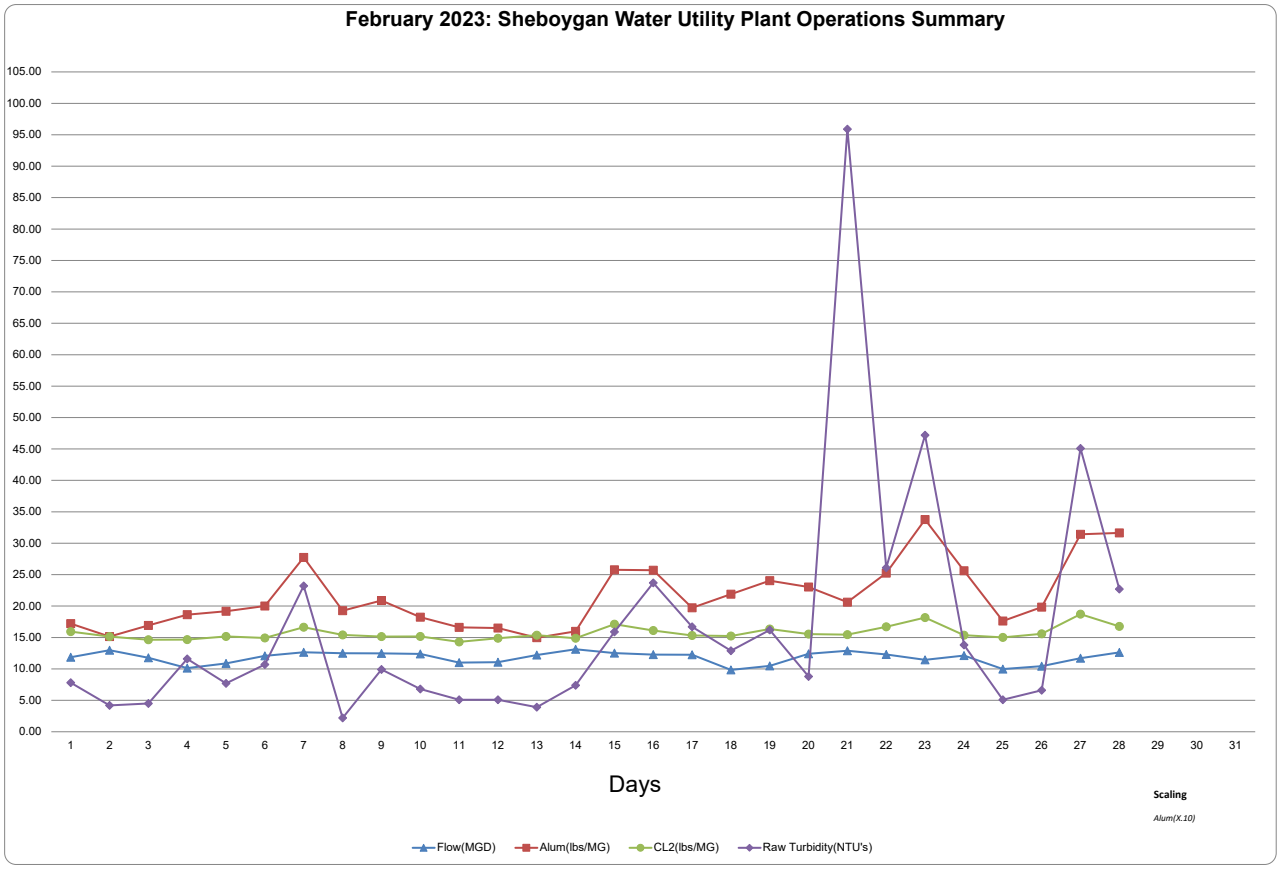
		3/1/2023	2/1/2023	
% Run	**Elapsed Time:**			
49.1%	No. 6 Pump	71,046.8	70,716.8	330.0
3.55%	Wash Pump Meter	5,666.59	5,642.73	23.86
0.6%	No. 7 Pump	795.1	791.1	4.0
0.0%	No. 8 Pump	59,540.3	59,540.3	0.0
99.4%	No. 9 Pump	26,165.0	25,497.0	668.0
1.0%	Wash Pump 2	92	85	7
	No. 1 Prime Pump	1,048.5	1,047.7	0.8
	No. 2 Prime Pump	1,125.3	1,123.9	1.4
Kw/Hr run	**Watthour Meters:**			
146.7	Wash Pump 1	1291.1	1286.1	3,500
64.4	No. 9 Pump	5907.61	5864.59	43,022
#DIV/0!	No. 8 Pump	6837.1	6837.1	0
73.0	No. 6 Pump	1528.2	1442.2	24,080
137.8	Wash Pump 2	9.637	8.833	965
539.7	No. 1 Pump	9443.776	9314.751	129,025
237.6	No. 2 Pump	4854.237	4850.707	3,530
298.8	No. 3 Pump	605.435	502.087	103,348
#DIV/0!	No. 4 Pump			0
480.7	No. 5 Pump	11,228.848	11,190.251	38,597
	Garage (MWatt/Hrs.)	1,086.45	1,083.07	3,380
	Power Co. (Step #3)	39,594	39,252	410,400
	Left Meter - OUTSIDE			
	Volume Used:			
	Nat. Gas (Correct)	45,578,104	45,404,886	217,735
	Elapsed Time:			
	Emer. Generator	1,071.1	1,066.5	4.6
% Run	**Elapsed Time:**			
35.6%	No. 1 Pump	17,512.5	17,273.4	239.1
2.2%	No. 2 Pump	20,714.26	20,699.40	14.86
51.5%	No. 3 Elec. Pump	2,074.4	1,728.5	345.9
0.6%	No. 3 Nat. Gas Pump	564.0	560.2	3.8
0.0%	No. 4 Elec. Pump	0.00	0.00	0.0
0.6%	No. 4 Nat. Gas Pump	67.7	63.7	4.0
11.9%	No. 5. Pump	23,480.390	23,400.090	80.300
0.2%	UV Building Generator	141.4	139.8	1.6

	3/1/2023	2/1/2023	
SLUDGE No. I Hour Meter	0.0	0.0	0
SYSTEM No. 2 Mag Meter	7,551,679	7,144,639	407,040
Recycle Meter (Reset to zero each month)			407,040

Power Cost	$0.0876405	Bill >>>>	$39,438.22	
	0.40407	KWH >>>	450,000	
Init. Chg.	$35,967.66		Low L. KWH	67,102
	$	KWH	L.L. Cost $	$5,880.85
Kohler Pit			High L. KWH	274,500
Horizon	$407.58	2,754	H.L. Cost $	$24,057.31
Taylor	$500.89	3,612		
ALT. 72 Park	$404.07	1,000	Total Cost	$29,938.17
Geo. Ave.	$5,583.37	52,500		
Wilgus Ave.	$442.09	3,100		
EE Pit	$811.95	5,973		
EE Tower	$216.78	1,466	Plant Costs	$6,126.82
Washington	$205.36	1,305		
Office	$636.59	4,589		
Erie Ave.	$2,035.13	11,200		
Total	$47,211.47	497,899		

SUMMARY

	HIGH LIFT		LOW LIFT	
	2022	2023	2022	2023
Tot. Pump	353.356	321.356	354.732	330.397
Daily Ave.	12.620	11.477	12.669	11.800
Max. Day	13.987	12.848	13.984	13.127
Min. Day	9.989	9.477	9.866	9.843
By Nat. Gas	2.433	3.667	2.433	2.166
Power KWH	296,051	274,500	73,034	67,102
Gals/KWH	1185	1157	4824	4892
Cost/KWH	$0.08080	$0.08764	*******	******
Cost/MG	$67.70	$74.86	$16.64	$17.80
Tot. Cost/MG	$121.26	$146.91	*******	*******


February 2023: Sheboygan Water Utility Plant Operations Summary
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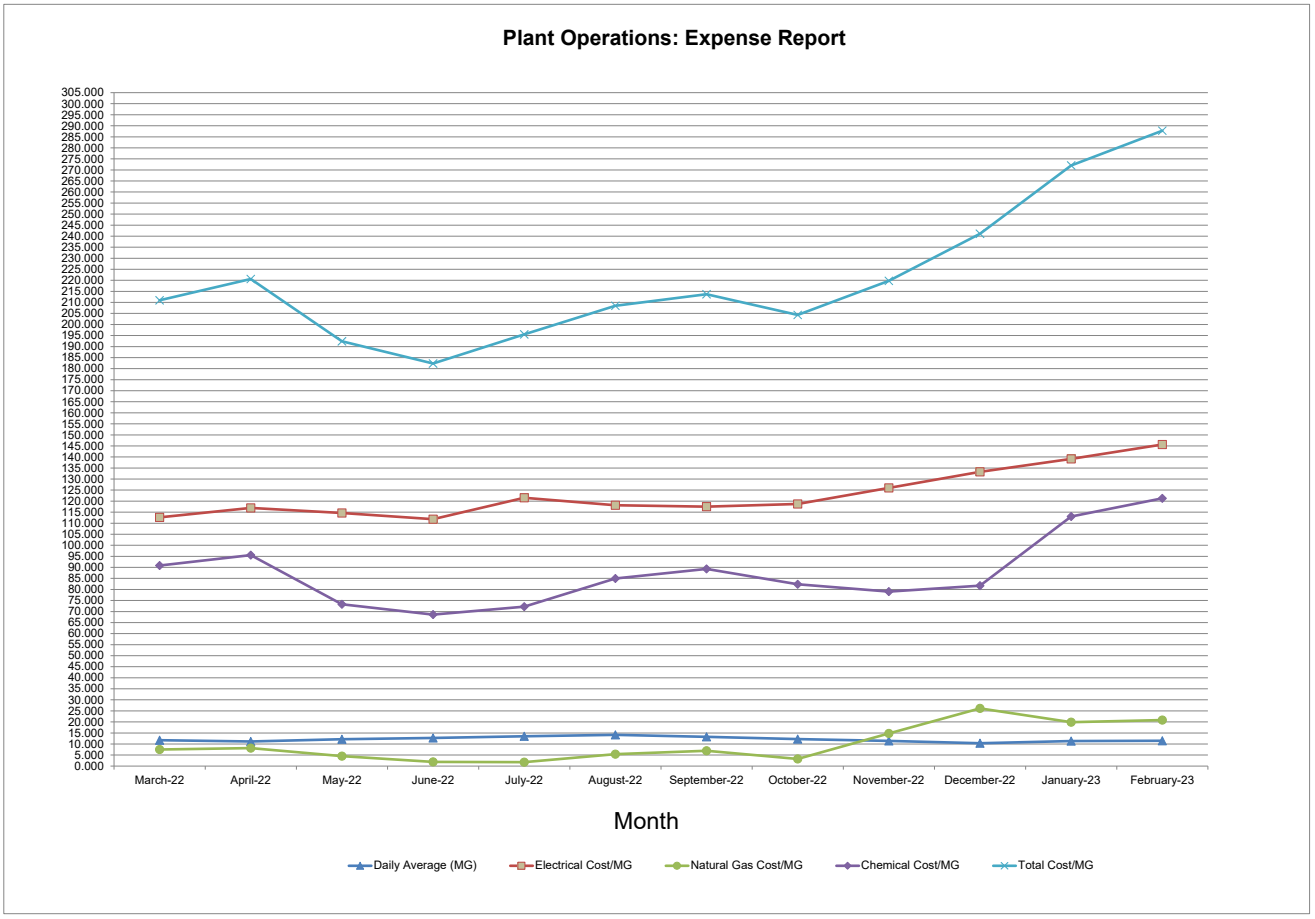
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
Days
Scaling
Alum(X.10)
Flow(MGD)
Alum(lbs/MG)
CL2(lbs/MG)
Raw Turbidity(NTU's)


Plant Operations: Expense Report
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May-22
June-22
July-22
August-22
September-22
October-22
November-22
December-22
January-23
February-23
Month
Daily Average (MG)
Electrical Cost/MG
Natural Gas Cost/MG
Chemical Cost/MG
Total Cost/MG

Filter Plant Maintenance Completed For February 2023

Yellow indicates days operating or running labs

Subject	StartDate	EndDate	Description
Intake Icing operations	1-Feb-23		Suction well/intake icing operations
Intake valves	1-Feb-23		Got intake valves 30 ǀ 36 free and working. Powered actuators, exercised valves in manual and remote
Greased south flocs	1-Feb-23		Greased south basin floc 1 -2 ǀ 3
South basin effluent analyzer	1-Feb-23		Cleaned south basin analyzer, flushed lines, flushed pump and recalibrated
South basin turbidity meter	1-Feb-23		Cleaned south basin turbidity meter
#6 filter vacuum	2-Feb-23		Vacuumed out #6 filter with crew vacuum trailer, lot of wet filter media under caps
Rate of flow decant valve	2-Feb-23		Rate of flow decant valve is sticking closed when running south basin sludge cycle and blowing fuses
Filter garbage and cardboard	2-Feb-23		Removed filter plant garbage and cardboard
BW basin rate of flow	3-Feb-23		BW basin rate of flow valve failing to open and not fully opening when decanting.
Horizon reagents	3-Feb-23		Replaced reagents at Horizon tower
Taylor hill	3-Feb-23		Brought reagents to taylor hill reservoir, checked dog house and pumped water from pipe gallery below
Georgia pump station	3-Feb-23		Maintenance checks and new reagents, checked emergency generator for proper coolant temp
Erie pump station	3-Feb-23		Maintenance checks at Erie pump station, need to bring new reagents following week
8 inch sludge valve	6-Feb-23		8 inch sludge valve stuck, pit had frozen layer on top, exercised valve and flushed valve 2 times, working again
Rate of flow valve sticking	6-Feb-23		Rate of flow valve on back wash basin stuck closed again, exercised valve in manual and placed back in remote, working as intended
East UV Ballast alarms	6-Feb-23		East UV ballast alarms going off, failure to communicate, trouble shooting issue
Tools for filter #6 inspection	6-Feb-23		Gathering equipment and tools needed for filter #6 inspection
January maintenance report	6-Feb-23		January maintenance report sent to Bill
Erie reagents	7-Feb-23		Replaced Erie reagents and pump station maintenance checks
Fueled plant truck	7-Feb-23		Fueled plant truck
Set up for filter #6 inspection	7-Feb-23		Set up for filter #6 inspection
Josh sick time	7-Feb-23		Josh sick time
East UV ballast #1	8-Feb-23		East UV ballast #1 located in main UV PLC cabinet failed and was replaced
#5 filter new pressure gauge	8-Feb-23		Installed new pressure gauge on filter #5
trouble shoot east UV	8-Feb-23		Trouble shooting issues with east UV SCADA screen, faults and alarms, waiting for reply from Trojan company
Dan operate 1st shift	9-Feb-23	9-Feb-23	Dan covering 1st shift operations
Filter pressure gauges	10-Feb-23		Installed filter pressure gauges 1 - 8
Filter plant Garbage	10-Feb-23		Removed filter plant garbage and cardboard
Menards	10-Feb-23		Menards for pipe fittings for pressure gauges
Dakota supply group	10-Feb-23		Dakota supply group for braided rubber hose
Erie reservoir	10-Feb-23		Erie reservoir changed reagents and maintenance checks on equipment and building
Fluoride bulk feed hose	10-Feb-23		Fluoride bulk tank pump feed hose replaced
Fluoride pump hose	10-Feb-23		Fluoride feed pump NP hose changed
Filter #4 pressure test	13-Feb-23		Filter #4 pressure test
Filter #5 pressure test	13-Feb-23		Filter #5 pressure test
Filer #7 Pressure test	13-Feb-23		Filter #7 pressure test
#ll filter influent actuator	13-Feb-23		#11 filter influent actuator trouble shooting, powered actuator and exercised, actuator working, will continue to monitor
Filter Gauge Install	14-Feb-23		Install new pressure gauges on filters 9, 10, and 11.
Filter #9 Pressure Test	14-Feb-23		Perform filter #9 pressure test.
Menards	14-Feb-23		Purchase 3/8ǀ and ¼ǀ stainless steel plumbing supplies.
Filter #1 Pressure Test	14-Feb-23		Filter #1 pressure test.
Filter #2 Pressure Test	14-Feb-23		Filter #2 pressure test.
Filter #3 Pressure Test	14-Feb-23		Perform filter #3 pressure test.
Light by wash pump 1	14-Feb-23		Replaced light by wash pump 1
Light in new flash mix area	14-Feb-23		Replaced light in new flash mix area
Filter #5 pressure test	15-Feb-23		Filter #5 pressure test
Filter #8 pressure test	15-Feb-23		Filter #8 pressure test
Filter #10 pressure test	15-Feb-23		Filter #10 pressure test
Sludge Pump #1	15-Feb-23		Look for water leaking into sludge pit; found ½ǀelbow leaking into sludge pit. Recommend pipe repair and inspect check valve.
Pressure Test Filter #11	15-Feb-23		Perform pressure test on filter #11.
Tap Feed Line	16-Feb-23		Flush and clean tap water sample feed line.
Wash Line Flow Meter	16-Feb-23		Begin designing wash line flow meter brackets.
Maintenance Shop	16-Feb-23		Organize tools, shelve parts, and clean bench.
Dan Operating 1st Shift	16-Feb-23	17-Feb-23	Dan covering first shift for Tyler.

Lower Level Bathroom	16-Feb-23		Clean lower level bathroom and shower.
Low Lift Vacuum Pumps	17-Feb-23		Check small water leak by vacuum/prime system.
Wilgus Ave.	17-Feb-23		Check pump drives, walk grounds, and inspect heater operation.
Taylor Hill	17-Feb-23		Replace reagents, walk grounds, and inspect heater operation.
Erie Ave.	17-Feb-23		Check reagents, walk grounds, and inspect heater operation.
Georgia Ave.	17-Feb-23		Check reagents, walk grounds, and inspect heater operation.
Horizon Ave.	17-Feb-23		Check reagents, walk grounds, and inspect heater operation.
Filters 7 and 8	20-Feb-23		Clean influent solenoid valves and exercise for validation; everything worked okay today.
Fluoride feed hose	20-Feb-23		Fluoride feed hose on blue/white pump replaced
Greased #5 engine HL	20-Feb-23		Grease #5 high lift motor and pump
Garbage/Metal	20-Feb-23		Throw out garbage and metal.
Reservoirs camera installation	21-Feb-23		Linked up with JSM security to check reservoirs for possible security camera installation, all reservoirs except horizon
Repaired pressure relief #3 HL	21-Feb-23		Repaired cooling water line pressure relief by #3 high lift pump
#1 High Lift greased	21-Feb-23		#1 high lift and pump greased
#3 high lift greased	21-Feb-23		#3 High lift pump and motor greased
#2 High Lift Pump Greased	21-Feb-23		Grease high lift #2, install new pressure gauge, and clean cooling water feed lines.
Small Sump	22-Feb-23		Grease motor, inspect coupling, and clean case.
Large Sump	22-Feb-23		Grease motor, add bearing oil, and clean area.
High Lift 5	22-Feb-23		Check cooling water, grease pump/motor, and clean case.
High Lift Pump 4	22-Feb-23		Check engine oil, grease pump, inspect battery, etc.
snow day	23-Feb-23		Snow day
Dakota Supply Group	24-Feb-23		Purchase 1 13/16**I** plugs, 1 ½**I** hole saw, hole saw drill, and price check stainless strut, threaded rod, nuts, washers, and clevis brackets.
Vacuum Pumps	24-Feb-23		Add grease to motor/pump, replace grease fitting on 2, inspect cooling water system, label, bleed gauges, and document maintenance performed; needs air vent rebuild.
Low Lift 9	24-Feb-23		Add grease to motor/pump, inspect cooling water system, label, bleed gauges, and document maintenance performed.
Low Lift 8	24-Feb-23		Add grease to motor/pump, inspect cooling water system, label, bleed gauges, and document maintenance performed.
Low Lift 7	24-Feb-23		Check oil in motor/pump/transmission, inspect cooling water system, label, bleed gauges, and document maintenance performed.
Low Lift 6	24-Feb-23		Add grease to motor/pump, inspect cooling water system, label, bleed gauges, and document maintenance performed.
Dakota Supply Group	24-Feb-23		Purchase/pickup low lift vacuum pump air vent repair kit.
Replaced Phosphate swan hoses	27-Feb-23		Replaced phosphate swan analyzer hoses in lab
Replaced phosphate reagents	27-Feb-23		Replaced phosphate swan analyzer reagents
trouble shoot DR5000	27-Feb-23		Trouble shoot on DR5000 lightbulb issue
Pipe gallery hanger project	27-Feb-23		Assessment and recon on pipe gallery pipe hanger replacement.
Plant back in AUTO	27-Feb-23		Put plant back in auto, put pumps back in flow pace
Erie Ave.	27-Feb-23		Inspect roof leak; removed ice damn, placed catch buckets, inspect when safe/possible.
Fire Extinguisher Pickup	27-Feb-23		Pickup all remote station fire extinguishers for inspection.
CVMIC Excavation Training	28-Feb-23		Attend CVMIC excavation training.
Dorner Filter 8	28-Feb-23		Moved wash valve open/closed setpoints (was looking like 40% open on indicator), moved physical stop ¼ turn, suspect butterfly valve has pin issue.
Filter Backwash Basin Valve Dorner	28-Feb-23		Jason diagnosed fuse blowing issue possibly related to voltage; current read 472v, suspect generator causes spikes, moved pins from 460v to 480v.
Plant Operations	28-Feb-23		Discuss filter 8 wash valve replacement, actuator installs, UPS installations, DR5000 service, UV battery update, and filter wash flow meter.
Dakota Supply Group	28-Feb-23		Purchase 1 ½**I** tap and acquire pricing for pipe gallery maintenance; stainless strut, threaded rod, and clevis pipe hanger.
Fire Extinguishers	28-Feb-23		Drop-off all remote station fire extinguishers for inspection.

City of Sheboygan
spirit on the lake Water Utility

MONTHLY DISTRIBUTION DEPARTMENT REPORT

February 2023

Distribution System Maintenance:

- Repaired water main break at N 25th St, South of Saemann Avenue.
- Poured temporary service hole repair patch for water main break.
- Completed hydrant checks.
- Trucked out spoils.
- Hauled in fill to replenish stock.

Taps:

- 1" tap at 1419 N 16th St. LSL was removed from system.
- 1" tap at 804 S 16th St. LSL was removed from system.

Building/Grounds Maintenance:

- General shop maintenance and cleaning.
- Snow removal at all Water Utility sites.
- Remodel occurred within garage and shop space.
- New breakroom was constructed on mezzanine of garage for C/M crew.
- Power supply for garage and shop area was upgraded.
- Pipe yard area was organized.

Equipment Maintenance:

- Performed routine maintenance and repairs on construction equipment and vehicle fleet.

Engineering:

- Indiana Avenue project was bid out as part of DPW Street Reconstruction Project.
- Design work occurred for N 20th St. LSL Project.
- Continued work on a GIS database and map to show water service material information for all Utility accounts.
- Project and property identifications for Michigan Ave and North 12th St. LSL projects.
- Monthly map and database updates.

City of Sheboygan Water Utility
spirit on the lake

Distribution System -- February 2023

Street Valves and Hydrant Valves Installed (including water main projects and others)

Location	Date Installed	Size ("), Jt	Installed By	Type

Total Valves Installed = 0

Street Valves and Hydrant Valves Removed

Location	Installed	Abandoned	Type

Total Valves Removed = 0

Street Valves and Hydrant Valves Abandoned

Location	Installed	Abandoned

Total Valves Abandoned = 0

Street Valves and Hydrant Valves Maintained

Location	Maintained	Size	By

Total Valves Maintained = 0

Hydrants Installed (including water main projects and others)

Location	Installed	Tr Size	Valve	By

Total Hydrants Installed = 0

Hydrants Removed (including water main projects and others)

Location	Installed	Removed	Hyd Valve?

Total Hydrants Removed = 0

Hydrants Abandoned (including water main projects and others)

Location	Installed	Abandoned	Tr Size	Hyd Valve?

Total Hydrants Abandoned = 0

Hydrants Maintained/Moved (including water main projects and others)

Location	Installed	Maintained

Total Hydrants Maintained/Moved = 0

Water Main Breaks

Location	Date	Size
North 25th Street, South of Saemann Ave.	2/4/2023	6"

Number of Water Main Breaks= 1

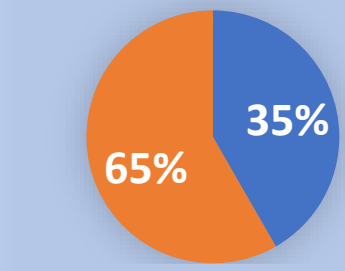
City of Sheboygan
spirit on the lake Water Utility

SUMMARY

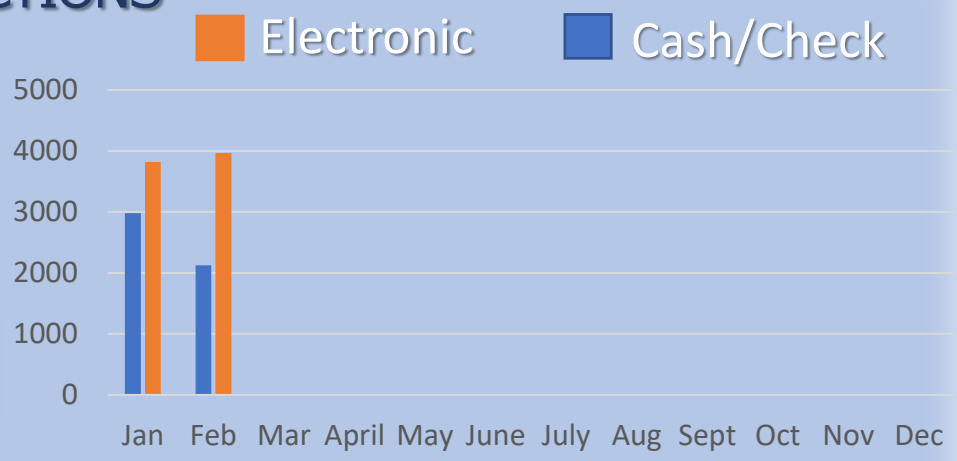
Number of feet of 4 inch water main installed	0.0	water main
Number of feet of 6 inch hydrant lead installed	0.0	
Number of feet of 6 inch water main installed	0.0	
Number of feet of 8 inch water main installed	0.0	
Number of feet of 12 inch water main installed	0.0	
Number of feet of 16 inch water main installed	0.0	
Number of feet of 20 inch water main installed	0.0	
Number of feet of 24 inch water main installed	0.0	
Number of feet of water main abandoned or removed	0.0	
Number of water main breaks repaired	1	
Number of hydrants installed	0	hydrants
Number of hydrants removed or abandoned	0	
Number of hydrants maintained or moved	0	
Number of street valves installed	0	valves
Number of hydrant valves installed	0	
Number of street valves removed or abandoned	0	
Number of hydrant valves removed or abandoned	0	
Number of valves maintained	0	
Number of water connections installed	2	

Customer Relations & Fiscal Summary

Payment Transactions



6,091
Total # of February Payments Processed



Collections

District 1

$1,084,084
Total Billed

$199,254
Outstanding After Due Date

1460
Past Due Letters Mailed

152
Disconnection Letters Mailed

9
Properties Disconnected

$82,827
Outstanding At Month End

Payments By Source

	February 2022	**February 2023**
Payment Window *(Cash/Check)*	**339**	**342**
Drop Box Payments	**195**	**143**
Electronic Payments	**3620**	**3967**
Mail Payments	**1796**	**1639**
Total Payments	**5950**	**6091**

Payments Returned NSF **15**

Utility Bills

Mailed
5,204

Total Paperless
1,227

Total Emailed Statements
3,533

February 2023

Customer Relations & Fiscal Summary

Property Transactions

	February 2022	**February 2023**
Account Transfers *(Finals)*	150	**132**
Property Data Requests	71	**51**

PSC Complaints

0 PSC Complaint(s) Filed

Accounts Payable

181 Invoice Items Paid

Customer Service

89 Customer Service Email Requests Completed

535 USS Calls Answered

8:11 USS Hours On the Phone

131 Lead ST Calls Completed *(Incoming & Outgoing)*

7:02 Lead ST Hours On the Phone

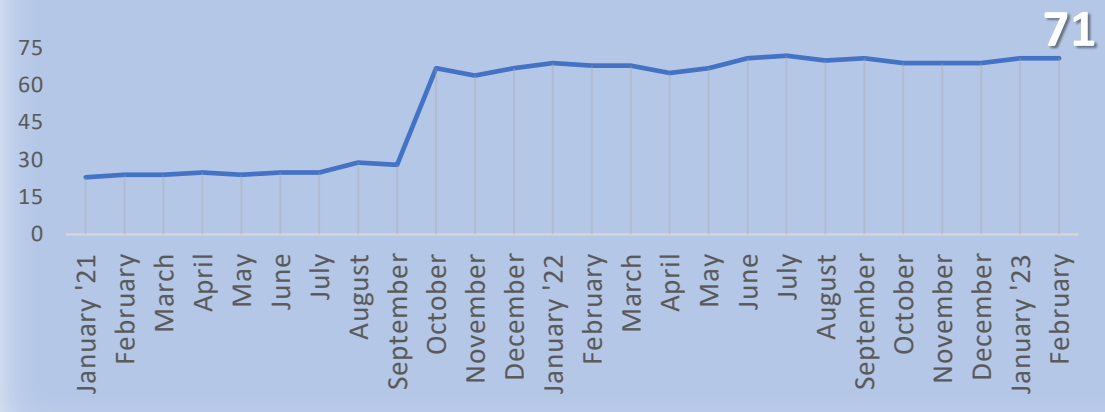
Customer Assistance Payments

Number of Payments Received: **16**

Total Dollars: **$2,526**

*Payments received from Wisconsin Emergency Rental Assistance Program, LIHWAP, Salvation Army, and St. Vincent DePaul for customer benefit.

Lead Service Line Replacement Active Loans

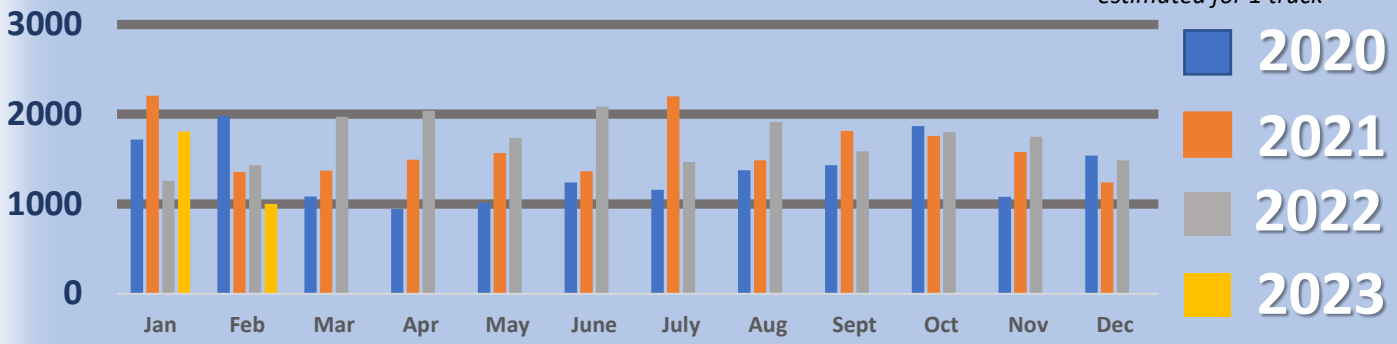


February 2023

Customer Relations & Fiscal Summary

Service Tech Miles Driven

October '22 miles are estimated for 1 truck



Cross Connection

111 Inspections by SWU

0 Inspections by Hydro Corp

3 Facilities with Compliance Issues

Lead Education

40 WDNR Lead in Drinking Water brochures distributed at home visits

Troubleshooting Work Orders Completed

75 Work orders completed for high consumptions, zero/low, and checks.

Leak Allowances Issued

0 Customer Requests

0 CCF Allowed @ Reduced Rate

Service Leaks

0 New Reported Leak(s)

2 Leak(s) Fixed or Off

3 Active Leak(s) Month End

Meters

138 Meters Installed/Replaced

49 Meters Tested

February 2023

Customer Relations & Fiscal Summary

Facebook Page

2 February New Followers

774 Total Followers

Website Visitors

3,268

2022 Visits in February: 3,119
Top Page Viewed: **Pay Your Bill**

Additional CR/F Activities February

- Service Techs (STs) continue their work replacing and testing water meters.
- LST and STs continued work creating program to test meters with the new Portable Large Meter Testing Device.
- USS issued bills to District 3 and Monthly customers.
- Submitted annual report to WDNR for Cross Connection Control.
- Attended kickoff meeting with InfoSend for the outsourcing and printing of Utility Bills.
- CR/F Supervisor, LST, and STs attended excavation and behavior-based safety training with CIVMIC.
- USS, LSLBS and LST attended online Badger Meter Beacon training.
- ST attended WIAWWA Distribution Seminar.

February 2023

Sheboygan Water Utility

BOARD OF WATER COMMISSIONERS

To: Joe Trueblood, Utility Superintendent

From: Dave McMillan, Distribution Supervisor

Subject: Indiana Avenue- South 17th Street to South 24th Water Main and Water Service Replacement

The Water Utility has budgeted for a water main and water service replacement project on Indiana Avenue from South 17th Street to South 24th Street. The project was bid in conjunction with the City of Sheboygan's Street Reconstruction Project. Dorner Inc. was the low bidder on the project. See below for the bid results on the project.

			Dorner Inc.	
Item Description	UofM	Quantity	Unit Price	Extension
Mobilization (SWU Items)	LS	1	$4,500.00	$4,500.00
Construction Staking (SWU Items)	LS	1	$2,300.00	$2,300.00
12-in PVC Water Main, Furnish & Install	LF	1340	$170.00	$227,800.00
12-in DIP Water Main, with Nitrile Gaskets, Furnish & Install	LF	660	$220.00	$145,200.00
8-in PVC Water Main, Furnish & Install	LF	320	$140.00	$44,800.00
6-in PVC Water Main, Furnish & Install	LF	58	$180.00	$10,440.00
6-in DI water main & hydrant lead, furnish & install	LF	120	$158.00	$18,960.00
12-in Valve and Box, Furnish & Install	EA	9	$5,100.00	$45,900.00
8-in Valve and Box, Furnish & Install	EA	4	$2,910.00	$11,640.00
6-in Valve and Box, Furnish & Install	EA	6	$2,075.00	$12,450.00
Fire Hydrant, Furnish & Install	EA	6	$6,300.00	$37,800.00
1-1/2-in Stone Foundation, Delivered and Placed	CY	300	$0.01	$3.00
Temporary Water Supply	LS	1	$2,500.00	$2,500.00
Manual Air Relief Assembly, Furnish & Install	EA	1	$1,615.00	$1,615.00
Long Water 1-in Service Replacement, Main to Curb Stop, Furnish & Install	LS	8	$3,000.00	$24,000.00
Short Water 1-in Service Replacement, Main to Curb Stop, Furnish & Install	LS	5	$1,275.00	$6,375.00
1-in Water Service Replacement, Curb Stop to Meter Setting, Furnish & Install	LS	14	$3,115.00	$43,610.00
Copper Reconnect	EA	15	$715.00	$10,725.00
Meter Setting Rebuild	EA	15	$525.00	$7,875.00
Electrical Grounding	EA	28	$525.00	$14,700.00
8-in DIP Water Main, with Nitrile Gaskets, Furnish and Install	LF	80	$155.00	$12,400.00
6-in DIP Water Main, with Nitrile Gaskets, Furnish and Install	LF	12	$240.00	$2,880.00
			Total	$688,473.00

Date: March 13, 2023

To: Joe Trueblood, Utility Superintendent

From: Bill Swearingen, Operations Supervisor

Subject: Filter Effluent Electric Actuators (Filters 1-6)

I would like to recommend replacing filter's 1-6 rate of flow electric actuators originally installed in 2002. These actuators are installed on the filter effluent piping and control the flow through the filter beds via SCADA. Filter 7 rate of flow actuator was problematic and was replaced 2017. Filters 8-11 rate of flow actuators would be scheduled for replacement in 2024.

The attached proposal includes programming, startup, and installation services.

2023 Budget Item: $45,000.00

Items	Unit	Total
(6) Filter Effluent Actuators	$7,682.00	$46,091.00

DORNER QUOTATION

Date: 3/7/2023
To: Sheboygan Water Utility
Proposal No. Q524aush
Ref: Filter ROF Valve 1-6 Actuator Replacement
Page: one of one
Attn: Andy Wellman & Bill Swearingen
Industry Code: 4952

FOB: Pre-Pay & Add
Terms: N30
Delivery: 12-14 weeks

Make Order To: Dorner Company
N61 W23043 Silver Spring Dr.
Sussex, WI 53089

Phone No: (262) 932-2100
Sales Contact: Gordie Hoeft
Prepared By: Pete Pronold

Item	Quan.	Description	Unit Price	Total
1	6	Replacement Auma SAR07.6-26B/GS63.3/AC01.2 electric actuator for use with Filter 1-6 rate of flow 12" Bray 30 butterfly valve. Dorner automation tags are 32436, 32437, 32438, 32439, 32440, 32441, Auma SO A02-6436. Pricing includes (2) two Dorner Service Technicians to remove existing actuators and install new actuators as described above. NOTE: All field wiring is by others.	$ 7,682	$ 46,091
		Auma electric actuator with features below		
		Modulating service		
		460/60/3 power		
		Six programmable relays		
		Space heater in switch compartment		
		Side mounted handwheel override		
		Aumatic controls including solid state starters, power supply, phase disciminator, local control station, 20 X 4 character LED display		
		Positioner - 4-20 ma input signal		
		24 VDC control voltage		
		MWG position transmitter		
		Double seal terminal compartment		
		60 second speed of operation		
		GS63.3 gearbox with indicator		
		NEMA 6P enclosure		
		Total		$ 46,091

Notes: Prices quoted are FOB Factory with freight pre-pay & add. Quote valid for 30 days. Any applicable taxes are not included in the above pricing. Delivery times are estimated and are not guaranteed.

Date: March 13, 2023

To: Joe Trueblood, Utility Superintendent

From: Bill Swearingen, Operations Supervisor

Subject: Phosphate system upgrade (additional bulk tanks)

The original phosphate bulk storage tank was built in 1994 and replaced in 2017 with a new bulk storage tank system that included 3 plastic vertical storage tanks that are manifolded together. Current total bulk storage capacity is 1,500 gallons (500-Gallon Each).

As the utility continues to improve and optimize its corrosion control treatment through additional lead testing, it's apparent that additional bulk storage is necessary to maintain a required 30-day bulk storage capacity. I would like to recommend adding two 500-gallon storage tanks to the bulk storage system, increasing the capacity to 2,500 gallons. Water utility staff will complete installation work.

2023 Budget Item: $12,000.00

Item	Unit	Total
(2) 500 Gallon Bulk Tanks Piping/Fittings Materials	$3,034.85	$6,069.70

QUOTATION

HDSFM
D/B/A USABLUEBOOK
PO Box 9004
Gurnee, IL 60031-9004
Toll free: 1-800-548-1234
Fax: (847) 689-3030

NO. 330164
Page 1
02/21/23

Ship-to: 1
SHEBOYGAN WATER UTILITY
C/O OPERATIONS DEPT
72 PARK AVE
SHEBOYGAN WI 53081-2958
USA

Bill-to: 15976
SHEBOYGAN WATER UTILITY
72 PARK AVE
SHEBOYGAN, WI 53081
USA

REFERENCE #	EXPIRES	SLSP	TERMS	WH	FREIGHT	SHIP VIA
CASE TA-7277	03/23/23	BKA	NET 30	01	FXD/PPD	VENDOR'S CHOICE

QUOTED BY: BKA | QUOTED TO: ANDY WELLMAN

ITEM	DESCRIPTION	QUANTITY	UM	PRICE	UM	EXTENSION
73799	Vertical Bulk Storage Tank 500-Gallon 46 x 76	2	EA	1495.95	EA	2991.90
	APPROXIMATE LEAD TIME 5-6 WEEKS ARAD ARO FREIGHT: $430.00 SUBJECT TO FUEL SURCHARGE CHEMICAL:ORTHOPHOSPHATE TO PLACE AN ORDER FOR A CUSTOM TANK: 1. EMAIL A SIGNED COPY OF THE QUOTE AND PURCHASE ORDER (IF REQUIRED) TO CUSTOMERSERVICE@USABLUEBOOK.COM 2. ALSO, INCLUDE A SIGNED COPY OF THE TANK DRAWING WITH ALL DESIRED FITTING LOCATIONS AND ANY OTHER CHANGES THAT NEED TO BE MADE. 3. IN SOME INSTANCES A MANUFACTURER'S CAD DRAWING MUST BE APPROVED. IN THIS CASE THE CAD DRAWING MUST BE REVIEWED AND APPROVED BEFORE TANK MANUFACTURING BEGINS. CAD DRAWINGS GENERALLY TAKE 1-2 WEEKS TO COMPLETE. 4. CUSTOM TANKS WILL NOT BE SENT TO PRODUCTION UNTIL A SIGNED DRAWING HAS BEEN RECEIVED. PLEASE ALLOW 5-6 WEEKS FOR DELIVERY AFTER DRAWING APPROVAL A.R.O. A COPY OF THE TANK DRAWING HAS BEEN SENT WITH THE QUOTE PLEASE SIGN AND RETURN THE DRAWING WITH YOUR ORDER TO APPROVE THE FITTING SCHEDULE. THE CUSTOMER IS RESPONSIBLE FOR OFFLOADING UPON DELIVERY THE APPROXIMATE WEIGHT OF TANK IS 100 POUNDS EACH **** IMPORTANT **** **** IMPORTANT **** **** IMPORTANT **** TANKS MUST BE FULLY INSPECTED PRIOR TO SIGNING FOR DELIVERY.					

CONTINUED

QUOTATION

HDSFM NO. 330164

D/B/A USABLUEBOOK
PO Box 9004 Page 2
Gurnee, IL 60031-9004
Toll free: 1-800-548-1234 02/21/23
Fax: (847) 689-3030

Ship-to: 1	Bill-to: 15976
SHEBOYGAN WATER UTILITY	SHEBOYGAN WATER UTILITY
C/O OPERATIONS DEPT	
72 PARK AVE	72 PARK AVE
SHEBOYGAN WI 53081-2958	SHEBOYGAN, WI 53081
USA	USA

REFERENCE #	EXPIRES	SLSP	TERMS	WH	FREIGHT	SHIP VIA
CASE TA-7277	03/23/23	BKA	NET 30	01	FXD/PPD	VENDOR'S CHOICE

QUOTED BY: BKA | QUOTED TO: ANDY WELLMAN

ITEM	DESCRIPTION	QUANTITY	UM	PRICE	UM	EXTENSION
	DAMAGES MUST BE NOTED ON THE SHIPPERS BILL OF LADING. ANY CLAIMS FOR DAMAGES THAT DON'T HAVE A SIGNED DAMAGED BILL OF LADING WILL NOT BE HONORED.					
	OVERFLOW					
23071	Bulkhead-Screw On Tank Fitting 2" Factory Installed	4	EA	214.35	EA	857.40
23079	Viton Gaskets for Screw On Bulkhead 2" Tank Fitting	4	EA	120.75	EA	483.00
23070	Bulkhead-Screw On Tank Fitting 1-1/2" Factory Installed	1	EA	174.35	EA	174.35
23078	Viton Gaskets for Screw On Bulkhead 1-1/2" Tank Fitting	1	EA	79.95	EA	79.95
	FILL					
23070	Bulkhead-Screw On Tank Fitting 1-1/2" Factory Installed	2	EA	174.35	EA	348.70
23078	Viton Gaskets for Screw On Bulkhead 1-1/2" Tank Fitting	2	EA	79.95	EA	159.90
	DRAIN					
23068	Bulkhead-Screw On Tank Fitting 1" Factory Installed	3	EA	131.15	EA	393.45
23076	Viton Gaskets for Screw On Bulkhead 1" Tank Fitting	3	EA	50.35	EA	151.05

Please note that your order may be subject to applicable taxes based on current rates at the time your order is completed.

CONTINUED

QUOTATION

HDSFM NO. 330164

D/B/A USABLUEBOOK
PO Box 9004 Page 3
Gurnee, IL 60031-9004
Toll free: 1-800-548-1234 02/21/23
Fax: (847) 689-3030

Ship-to: 1	Bill-to: 15976
SHEBOYGAN WATER UTILITY	SHEBOYGAN WATER UTILITY
C/O OPERATIONS DEPT	
72 PARK AVE	72 PARK AVE
SHEBOYGAN WI 53081-2958	SHEBOYGAN, WI 53081
USA	USA

REFERENCE #	EXPIRES	SLSP	TERMS	WH	FREIGHT	SHIP VIA
CASE TA-7277	03/23/23	BKA	NET 30	01	FXD/PPD	VENDOR'S CHOICE

QUOTED BY: BKA | QUOTED TO: ANDY WELLMAN

ITEM	DESCRIPTION	QUANTITY	UM	PRICE	UM	EXTENSION

TO ORDER --
For your convenience, you may simply sign below and return via fax to 847-689-3030. We will process your order promptly and fax a confirmation so you know we have it. If you prefer to call your order in or have additional questions or concerns, you may contact our Customer Service Department @ 800-548-1234. Please note any changes to the quantities or shipping address. Thanks for choosing USABlueBook.

Authorization Signature _____ PO Number (if required) _____

MERCHANDISE	MISC	TAX	FREIGHT	TOTAL
5639.70	.00	.00	430.00	6069.70

USE THIS QUOTE # ON PO's!

Date: March 15, 2023

To: Joe Trueblood, Utility Superintendent

From: Bill Swearingen, Operations Supervisor

Subject: UV System Battery Backups Upgrades

The UV system's battery backups have been in service since 2016. Eaton Corp. conducted an onsite survey of the battery backup system and is recommending UPS System preventative maintenance, with a full battery system update/replacement. The battery update includes installation of (36) new 5X8 batteries per manufacturers replacement schedule and recycling of old batteries. Work is performed by Eaton electrical service technician.

2023 Budget Item: $10,000.00

Item	Total
UPS Preventive Maintenance Turnkey Battery Update/Recycling	$22,117.26

Eaton UPS Service Cart: 385146
Cart Date: 03/06/2023
(Effective until 04/05/2023)

Bret Quinnell,
Eaton Corporation
W126N7250 Flint Dr
Menomonee Falls, WI 53051
6084950197
Email: bretsquinnell@eaton.com

Prepared For:
Billing Contact: Bill Swearingen,
Billing Company: Sheboygan Water Utility
72 PARK AVE
Sheboygan, WI 53081
920-459-3812
Email: billswearingen@sheboyganwater.org

For Covered Equipment at Site:
Site Contact: Bill Swearingen,
Site Company: Sheboygan Water Utility
72 PARK AVE
Sheboygan, WI 53081
920-459-3812
Email: billswearingen@sheboyganwater.org

We are pleased to provide the following services proposal for your power quality equipment. Please refer to the Scopes of Work (SOW) for descriptions of service coverage and exclusions. Eaton Corporation terms and conditions (Eaton Corp. Service Agreement T-0 attachment) govern this proposal, and any purchase order submitted to Eaton pursuant thereto. Additional or different terms proposed by Buyer, whether in its purchase order or otherwise, shall not be binding upon Eaton Corporation and are hereby rejected unless expressly agreed to in writing by Eaton Corporation. Eaton Corporation cannot be held liable, and Buyer shall not be entitled to any damages and/or indemnifications, in case Eaton Corporation is prevented, hindered or delayed from or in performing any of its obligations resulting from the impact of the outbreak of COVID-19 for reasons not attributable to Eaton Corporation.

Serial Number	New/Renewal	Model Description	Battery Type, Quantity	Coverage Type
EJ406UXX01	N	93PM-60-100	VRLA Sealed, 36	

Quantity 1, Eaton 93PM-60-100, VRLA Sealed, 36

- 1x per term: UPS Preventive Maintenance, Business Hours (5x8) (0006NXXX-0160)

Battery Replacement Items

- Full battery update. 5X8 Battery Replacement. Includes all 36 new batteries. Turnkey installation. Eaton will bring batteries to site on day of job. Includes battery replacement and recycling of old batteries.

Grand Total Price: **$22,117.26**

- Non Contract Payment Terms: Net 30 days, Billing Cycle: Upon Completion
- Service quotes valued at less than $5,000 may be subject to Eaton's prepayment requirement. Prepayment may be made via credit card, ACH transaction or a check mailed to Eaton prior to order acceptance. All credit card transactions with Eaton will incur a 3.5% service fee.
- Important Tax Notice: Tax is not included in the above purchase price. All orders will be subject to all applicable sales tax unless a current tax exemption certificate is on file covering the state shown in the ship-to address or service equipment location.
- To purchase (renew) your service contract, please sign and date below.
- Return all attachments with purchase order for **Eaton products** to:
  - Eaton Corporation, 8609 Six Forks Road, Raleigh, NC 27615, Tel 800/843-9433, Fax 800/228-1899.
  - Make Payments for Eaton products to: Eaton Corporation, 29085 Network Place, Chicago, IL 60673-1290

Accepted By: Name Title Date Purchase Order Number
Print Name:

Date: March 23, 2023

To: Joe Trueblood, Utility Superintendent

From: Bill Swearingen, Operations Supervisor

Subject: PFAS Monitoring Updates

Currently, the utility is participating in Wisconsin Department of Natural Resources PFAS testing, specifically PFOA and PFOS contaminants, which are a subset of PFAS compounds. As you are aware, PFAS (polyfluoroalkyl substances) are manmade synthetic chemical compounds and exist in industrial and consumer products. These chemicals do not readily breakdown in the environment. Historically, test results in Lake Michigan and drinking water have been found to be at very low levels and well below health advisory standards. WDNR current Maximum Contaminant Level for PFOA and PFOS is 0.000070 mg/L (70 parts per trillion). This level is set for the combined concentration of PFOA and PFOS.

The utility has tested for 18 PFAS contaminants and 16 were not detectable:

- Perfluorooctanoic acid (PFOA) *****
- Perfluorooctanesulfonic acid (PFOS) *****
- Perfluorobutanesulfonic acid (PFBS)
- Perfluoroheptanoic acid (PFHpA)
- Perfluorohexanesulfonic acid (PFHxS)
- Perfluorononanoic acid (PFNA)
- Perfluorodecanoic acid (PFDA)
- Perfluorohexanoic acid (PFHxA)
- Perfluorododecanoic acid (PFDoA)
- Perfluorotridecanoic acid (PFTrDA)
- Perfluoroundecanoic acid (PFUnA)
- N-ethyl Perfluorooctanesulfonamidoacetic acid
- N-methyl Perfluorooctanesulfonamidoacetic acid
- HFPO-DA/GenX
- ADONA
- 9Cl-PF3ONS/F-53B Major
- 11Cl-PF3OUdS/F-53B Minor
- Perfluorotetradecanoic acid (PFTeDA)

***** Our 2023 first quarter test results for PFOA and PFOS are detectable at 1.9 part per trillion.

Recently, the US EPA released a draft Maximum Contaminant Level (MCL) standard of 4.0 parts per trillion for both PFOA and PFOS. The proposed regulation is under public review with the US EPA, before developing into a final regulation.

Following mandatory WDNR PFAS quarterly monitoring, the utility will also participate in US EPA Unregulated Contaminant Monitoring Rule (UCMR) testing. The Utility has participated in UCMR testing since early 2000s. The UCMR system generates a new list of contaminants identified for monitoring and the monitoring program is administered by the Environmental Protection Agency via Wisconsin Department of Natural Resources. This testing will begin in October 2024. The utility will collect samples and testing for 29 PFAS compounds and one metal compound (lithium).

Date: March 23, 2023

To: Joe Trueblood, Utility Superintendent

From: Bill Swearingen, Operations Supervisor

Subject: Backwash Tank Flow Meter

During filter study workshops, CDM Smith recommended a flow meter be installed on the existing backwash system as an improvement in measuring filter backwash loading rates. Energenecs identified that an Ultrasonic transit time flowmeter clamp-on version would be suitable for this application. Energenec's Service Tech (assisted by OM Techs) successfully installed a demo unit on existing backwash water line on March 13, 2023.

The unit has proven to be reliable and accurate. I would like to recommend moving forward with purchasing the new head unit which would replace the demo unit.

Energenecs
Process. Control. Service.

Order Number : 0038049
Order Date : 3/13/2023
Salesperson : Gary W. Dean

QUOTE

Sold To :
Sheboygan Water Utility
72 Park Avenue
Sheboygan, WI 53081-2958

Ship To :
Sheboygan Water Utility
72 Park Avenue
Attn: Andy Wellman
Tag: Washwater flow meter
Sheboygan, WI 53082

Confirm To : Andrew Wellman **Customer Number :** SHE008 **Expected Date:** 4/13/2023

Customer P.O.	Ship VIA	Terms	Order Type :
QUOTE: Andy Wellman	UPS GROUND	Net 30 Days	SRV

Item Code	Unit	Ordered	Shipped	Back Order	Cost/Unit	Amount
9W4BA 1-AALHFPDACAACAEA 1	EACH	1.00	0.00	0.00	9,300.00	9,300.00
Prosonic Flow W 400, 9W4BA 1, 1 set Ultrasonic transit time flowmeter Clamp-on version. Application: Bidirectional flow measurement for water+ wastewater and process water and hydropower plants. Mounting without process interruption. Maintenance-free installation. Corrosion-resistant transmitter version. 4-line display, touch control. : : Clamp-on device for Water + : : Wastewater with web server. AA Approval; Transmitter; Sensor: Non-hazardous area L Power Supply: 100-240VAC/24VAC/DC H Output; Input: 4-20mA HART, pulse/freq., switch output F Display; Operation: 4-line ilium.; touch control P Transmitter Housing: Remote, alu, coated D Electrical Connection: Thread NPT1/2 AC Sensor Version: C-100 (1 MHz) A Process Temperature: -20 ... 80oC, -4 ... 176oF AC Cable: 15m/45ft, -40 ... 80oC, -40 ... 176oF AE I nstallation Set: DN200-DN600, 8"-24" A 1 Device Model: 1						
/LABOR	HOUR	1.00	0.00	0.00	135.00	135.00
Labor						
CS / install / startup / two-way flow strap on flow meter billed at T&M.						
/ZONE 1	EACH	1.00	0.00	0.00	85.00	85.00
Trip Charge						

Continued

700 East Milan Drive Saukville, Wisconsin 53080 262-377-6360 Fax 262-377-1515
e-mail: info@energenecs.com • web: www.energenecs.com

Energenecs
Process. Control. Service.

Order Number : 0038049
Order Date : 3/13/2023
Salesperson : Gary W. Dean

QUOTE

Sold To :
Sheboygan Water Utility
72 Park Avenue
Sheboygan, WI 53081-2958

Ship To :
Sheboygan Water Utility
72 Park Avenue
Attn: Andy Wellman
Tag: Washwater flow meter
Sheboygan, WI 53082

Confirm To : Andrew Wellman **Customer Number :** SHE008 **Expected Date:** 4/13/2023

Customer P.O.	Ship VIA	Terms	Order Type :
QUOTE: Andy Wellman	UPS GROUND	Net 30 Days	SRV

Item Code	Unit	Ordered	Shipped	Back Order	Cost/Unit	Amount
/MISC SUPPLIES - SERV	EACH	1.00	0.00	0.00	0.00	0.00
Misc Supplies - SRV						
Misc tech supplies determined by assigned tech						
/FREIGHT	EACH	1.00	0.00	0.00	0.00	0.00
Freight and Handling						
UPS Gr. PP & Add / (35 days)						

Convenience Fee of 3.5% will be added to all invoices paid by credit card.

Quotes and Sales Orders will be converted to an Invoice.
Do not pay off a Quote or Sales Order.

Harvest Zoho

Net Order:	9,520.00
Less Discount:	0.00
Sales Tax:	0.00
Order Total:	9,520.00

City of Sheboygan Water Utility
spirit on the lake

OnTech Laptop Purchase

3/27/2023

The attached proposal is for the purchase of a laptop for the GIS/Civil Engineering Technician. This laptop will be used as a remote workstation. The laptop can run all required Engineering related software.

Proposal Total: $3,099

N85W16186 Appleton Ave
Menomonee Falls, Wiscons
www.ontech.com
(262) 522-8560

Hardware

Description	Price	Qty	Ext. Price
Dell Precision 5770 17" Mobile Workstation - Full HD Plus - 1920 x 1200 - Intel Core i7 12th Gen i7-12800H Tetradeca-core (14 Core) 2.40 GHz - 32GB (2x16GB) Total RAM - 512GB SSD NVMe - Titan Gray - Intel Chip - Win 10 Pro 64-bit (includes Win 11 Pro License) - NVIDIA RTX A3000 with 12 GB - 1 Year Hardware Service with Onsite/In-Home Service After Remote Diagnosis 	$3,099.00	1	$3,099.00

Subtotal: $3,099.00

N85W16186 Appleton Ave
Menomonee Falls, Wiscons
www.ontech.com
(262) 522-8560

New - Engineering Laptop

Quote Information:

Quote #: 012774

Version:
Delivery Date:
Expiration Date:

Prepared for:

City of Sheboygan Water Utility

72 Park Ave
Sheboygan, WI 53081
Tamara Scheuren
(920) 459-3800
tamarascheuren@sheboyganwater.org

Prepared by:

Ontech Systems Inc.

Jackie Buehler
(262) 522-8560 x100
jackie@ontech.com

Quote Summary

Description	Amount
Hardware	$3,099.00
Total:	$3,099.00

For full quote view with product descriptions, warranty information and disclaimers, please review PDF.

Note: Quote is valid for 15 days.

Taxes, shipping, handling and other fees may apply.
We reserve the right to cancel orders arising from pricing or other errors.

Note: Please do not pay from quote, invoice to follow.

Ontech Systems Inc.

Signature:

Name: Jackie Buehler

Title: Inside Sales/Office Manager

Date: 03/15/2023

City of Sheboygan Water Utility

Signature:

Name: Tamara Scheuren

Date:

City of Sheboygan Water Utility
spirit on the lake

OnTech Computer Purchase

3/27/2023

The attached proposal is for the purchase of computers, equipment, and estimated labor to deploy. The computers needing replacement were deployed in March of 2017 and are now six years old.

1- Replacement Computer for Lead Service Line and Billing Specialist

3- Replacement Computers for the Utility Support Specialists

1- Replacement Monitor for Utility Accountant

2- Replacement Monitors for Utility Support Specialists

Proposal Total: $10,177

N85W16186 Appleton Ave
Menomonee Falls, Wiscons
www.ontech.com
(262) 522-8560

Hardware

Description		Price	Qty	Ext. Price
Dell OptiPlex 7000 Desktop Computer - Intel Core i7 12th Gen i7-12700 Dodeca-core (12 Core) 2.10 GHz - 32 GB RAM DDR4 SDRAM - 512 GB M.2 PCI Express NVMe 3.0 x4 SSD - Small Form Factor - Black - Intel Chip - Windows 10 Pro - Intel UHD Graphics 770 DDR4 SDRAM - DVD-Writer - English Keyboard - 260 W		$1,699.00	4	$6,796.00
ViewSonic 27" 1080p IPS Monitor with Adaptive Sync, HDMI, DisplayPort, and VGA - 27" Monitor - IPS Technology - Full HD 1920 x 1080p - 16.7 Million Colors - Adaptive Sync - 250 Nit - 7ms - 75Hz Refresh Rate - HDMI - VGA - DisplayPort - Speaker		$169.00	3	$507.00
StarTech.com Travel A/V adapter: 3-in-1 DisplayPort to VGA DVI or HDMI converter - Connect a DisplayPort-equipped PC to an HDMI, VGA, or DVI Display - Connect Laptop to TV - DisplayPort to DVI - DisplayPort to VGA - DisplayPort to HDMI - DP to DVI - DP to VGA - DP to HDMI		$49.00	6	$294.00
			Subtotal:	$7,597.00

PC Mover

Description	Price	Qty	Ext. Price
PCmover 11 Enterprise VLA L1 Full (EN) PCmover 11 Enterprise VLA L1 Full (EN) 5-25 User License	$45.00	4	$180.00
		Subtotal:	$180.00

Services

Description	Price	Qty	Ext. Price
Estimated Installation & Configuration: 12-16 Hours *Note: this is a time estimate that will be invoiced separately during our semi-monthly billing for actual time of service.*	$150.00	16	$2,400.00
		Subtotal:	$2,400.00

N85W16186 Appleton Ave
Menomonee Falls, Wiscons
www.ontech.com
(262) 522-8560

Replacement PCs with New Displays & Licensing

Quote Information:

Quote #: 012570

Version:
Delivery Date:
Expiration Date:

Prepared for:

City of Sheboygan Water Utility

72 Park Ave
Sheboygan, WI 53081
Tamara Scheuren
(920) 459-3800
tamarascheuren@sheboyganwater.org

Prepared by:

Ontech Systems Inc.

Sam DuKatz
(262) 522-8560
sam@ontech.com

Quote Summary

Description	Amount
Hardware	$7,597.00
PC Mover	$180.00
Services	$2,400.00
Total:	$10,177.00

For full quote view with product descriptions, warranty information and disclaimers, please review PDF.

Note: Quote is valid for 15 days.

Taxes, shipping, handling and other fees may apply.
We reserve the right to cancel orders arising from pricing or other errors.

Note: Please do not pay from quote, invoice to follow.

Ontech Systems Inc.

Signature:

Name: Sam DuKatz

Title: Sales Support Specialist

Date: 03/15/2023

City of Sheboygan Water Utility

Signature:

Name: Tamara Scheuren

Date:

CDM Smith

Technical Memorandum

To: *Sheboygan Water Utility*

From: *CDM Smith Inc.*

Date: *March 20, 2023*

Subject: *WTP Filter Rehabilitation and Underdrain Evaluation- Updated Memorandum*

ES.0 Executive Summary

The Sheboygan Water Utility (Utility) commissioned CDM Smith to evaluate alternatives for rehabilitating existing filters following the failed underdrain media support caps. This memorandum provides a summary of the rehabilitation alternatives, projected costs, non-cost evaluation of underdrain options, and recommendations.

Following a detailed evaluation of underdrain options and consideration of non-cost factors, the two stainless steel underdrain options are being considered for design and construction. The Utility will also consider ways to incorporate air scour in a future filter retrofit.

1.0 Background

The Sheboygan Water Utility (Utility) owns and operates a water treatment plant (WTP) that serves the City of Sheboygan, City of Sheboygan Falls, and Village of Kohler. The WTP has a design capacity of 36 million gallons per day (MGD) with an average flow of 13 MGD. The WTP treats raw water from Lake Michigan with a series of treatment steps, including alum/polymer coagulation, rapid mixing, flocculation, sedimentation, tri-media filtration, and disinfection using UV and chlorine.

1.1 Current Filter Operation

The WTP has eleven (11) granular-media filters, with the following dimensions:

- Filter Nos, 1 through 9 each have a surface area of approximately 698 square feet. Each filter is divided into two cells (11.25 feet by 31 feet each cell) by a center gullet.
- Filter Nos. 10 and 11 have a surface area of approximately 1,040 square feet. Each filter is divided into two cells (17.33 feet by 30 feet each cell) by a center gullet.

Typical filter run times between backwashes are reported to be approximately 150 hours in the winter and 100 – 125 hours in the summer. Media is cleaned through a conventional backwash procedure that includes surface wash (with surface sweeps) followed by low-rate and high-rate backwash. Backwash water is supplied from a washwater tank, using chlorinated water. The backwash process is controlled manually by Utility staff. A valve on the washwater supply to each filter is modulated to control the flow of backwash water into the filters.

Filter Media Analysis

The filter media profile appears to produce excellent water quality, and CDM Smith recommends maintaining the same profile. The current media profile is shown below:

- Filter Nos, 1 through 9:
  - 16 inches of anthracite
  - 12 inches of sand
  - 3 ½ inches of garnet sand
  - 2 inches of garnet gravel
- Filter Nos. 10 and 11:
  - 8 inches of anthracite
  - 12 inches of sand
  - 3 ½ inches of garnet sand
  - 2 inches of garnet gravel

The Utility collected filter media samples from Filter No. 6. **Table 1-1** shows the results of the filter media analysis conducted by Bowser-Morner, Inc. Six samples were collected each from sand and anthracite layers. The results appear to shows that the media is starting to show sign of its age. The uniformity coefficient is above the AWWA recommended value and above CDM Smith's specification. It is CDM Smith's recommendation that the media be replace with the same existing profile when the underdrains are replaced. Appendix A includes the media sample analysis results provided by the Utility.

Table 1-1. Analysis of Filter Media Samples

Property	Anthracite		Silica Sand	
	AWWA B100-16	Sheboygan Filter	AWWA B100-16	Sheboygan Filter
Specific Gravity	> 1.4	1.70 – 1.85	> 2.5	2.65 – 2.75
Acid Solubility	< 5%	2.4% - 3.7%	< 5%	1.6% - 1.9%
Effective Size, mm	0.60 – 1.60	0.56 – 0.93	0.35 – 0.65	0.31 – 0.34
Uniformity Coefficient	≤1.7	1.4 – 2.1	≤1.7	1.8
Mohs Hardness	>2.7	3	N/A	7
Elemental Analysis	N/A		Across the 6 samples analyzed, the percent composition of Calcium ranged from 4.2% to 7.5%. The Aluminum in the samples ranged from 4.8% to 5.6%.	

1.2 Previous Filter Rehabilitations

Filter Nos. 1 through 9 were renovated in phases between 1996 and 1999. The renovation included new filter underdrains, new media, and new surface wash sweeps. The installed underdrains were Universal Type S plastic (HDPE) block underdrains manufactured by Leopold, now known as Xylem Leopold (Leopold). The underdrains included an IMS (Integral Media Support) Cap media support layer. With a thickness of approximately 1-inch, the IMS Cap takes less space than traditional gravel media support which has a thickness of approximately 12 inches. The IMS Cap allowed space for increased depth of filter media within the filter cells than if traditional gravel support media was used. The IMS caps were constructed by sintering plastic beads to create a complex path that prevents media entry into the underdrain.

Filter Nos. 10 and 11 were renovated in 2002. The renovation included new filter underdrains, new media, and new surface wash sweeps. The installed underdrains were Leopold Universal Type SL plastic (HDPE) block underdrains and included the use of IMS caps.

Following an underdrain failure in Filter No. 11 in 2007, the underdrains and media in this filter were replaced in kind. Following an underdrain failure in Filter No. 10 in 2018, the underdrains and media in this filter were replaced using Leopold Type XA plastic (HDPE) block underdrains. The new underdrains installed in Filter No. 10 included the IMS 200 media support cap. While similar in function to the original IMS cap, the IMS 200 cap is constructed differently, which provides for more control of the media retention slot sizing. The IMS 200 caps appear to be less susceptible to plugging than the original IMS caps.

1.3 2022 Filter Underdrain Failure

During a filter inspection in August 2022 various sink holes were observed in the top of the media in Filter No. 5, suggesting a potential breech in the underdrain system. Utility staff arranged for the media to be removed from both cells of Filter No. 5. Inspection of the filter underdrain system found split IMS caps on two of the underdrains along with signs of sealant failure at the ends of most of the caps. These signs indicated a suspected plugging of the IMS caps, as have been seen at many other water treatment plants that utilize this filter underdrain product. Two representative IMS caps were removed from Filter No. 5 and sent to Leopold for autopsy analysis. The testing conducted by Leopold confirmed that the IMS caps within Filter No. 5 were plugged.

Utility staff procured new IMS 200 caps from Leopold to replace the existing IMS caps within Filter No. 5 as an interim solution. Utility staff completed all necessary underdrain preparations and installed the replacement IMS 200 caps within Filter No. 5. Utility staff procured and installed new filter media and returned Filter No. 5 to service on December 12, 2022.

1.4 Filter Underdrain Rehabilitation

Following the 2022 failure of Filter No. 5, Utility staff conducted pressure monitoring of all the filter basins at the Sheboygan WTP which identified that nearly all the filters are showing some degree of increased pressure that is expected to be the result of plugging of the IMS caps. Filter No. 6 in

particular is showing higher than expected pressure, and the Utility is moving forward with cap replacement.

As a result of these failures and concerns, the Utility commissioned CDM Smith to evaluate alternative underdrains with the intent to move forward with a new underdrain system.

3.0 Underdrain Manufacturer Workshops

To gather information for determining the best path forward for rehabilitating the filters, CDM Smith led virtual workshops with three leading underdrain manufacturers (AWI, Roberts and Leopold) and the Utility on November 10 and 11, 2022.

The manufacturers presented options for underdrain configurations that could be applied to the rehabilitation of the filters. Following these presentations, CDM Smith provided further recommendations regarding which underdrain configurations should be allowed for bidding.

3.1 AWI – Stainless Steel Underdrains

AWI presented their Phoenix underdrain with separate air and water chambers. This underdrain is stainless steel with punched media retention slots and does not require support gravel. **Figure 3-1** shows a sample of the underdrain lateral.

Figure 3-1: AWI Phoenix Underdrain Lateral

This underdrain is installed with grout strips over the flume and anchor bolts across the length of the lateral. This reduces installation schedule since it does not require grout to be applied over the filter slab. The lateral does not lay flush on the filter floor. The distribution orifices are custom cut based on hydraulic modeling to optimize uniform distribution throughout the filter. The laterals are manufactured in the US.

This underdrain is compatible with air scour; the connection to the air header for this configuration utilized flexible tubing, while the rest of the piping was stainless steel. **Figure 3-2** shows how air and water move through the underdrains.

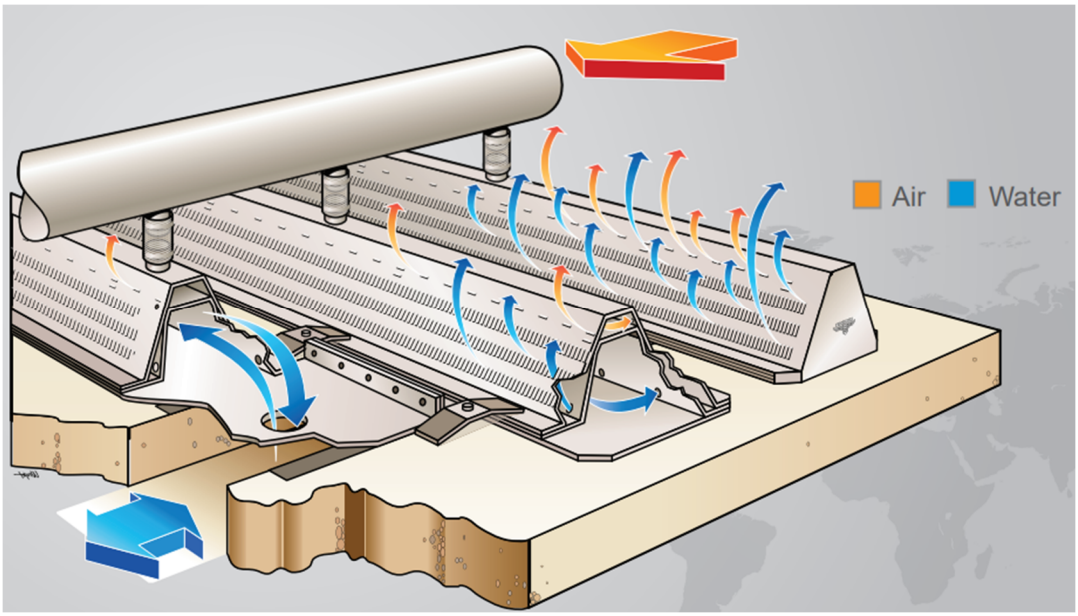


Figure 3-2: Air and water distribution through AWI Phoenix laterals.

AWI's Phoenix underdrain is made in three difference heights: Ultra Low Profile, Low Profile, and High Volume. With the lower profile options, the maximum length of the lateral is more limited than the high volume option. Additionally, the headloss would be greater in the same application for a ultra-low then for low profile or high volume. Based on the length of the filters AWI recommends the low profile lateral. However, with the low profile option, the headloss through the underdrain would be much higher than for the comparable underdrains from the other manufacturers. For this reason, the high volume option may be considered instead as it has a lower headloss than the low profile.

3.2 Roberts – Stainless Steel Underdrains

Roberts presented their Trilateral underdrains with options for combined and separated air and water chambers. Drawings for this design are included in **Appendix B**. These underdrains are stainless steel with punched retention slots and do not require support gravel but may be used with it. The Trilateral product with separate air and water chambers is a new offering from Roberts and does not have many installations; however, the technology is similar to the AWI Phoenix product. **Figure 3-3** shows an installation of the Roberts stainless trilateral underdrain.

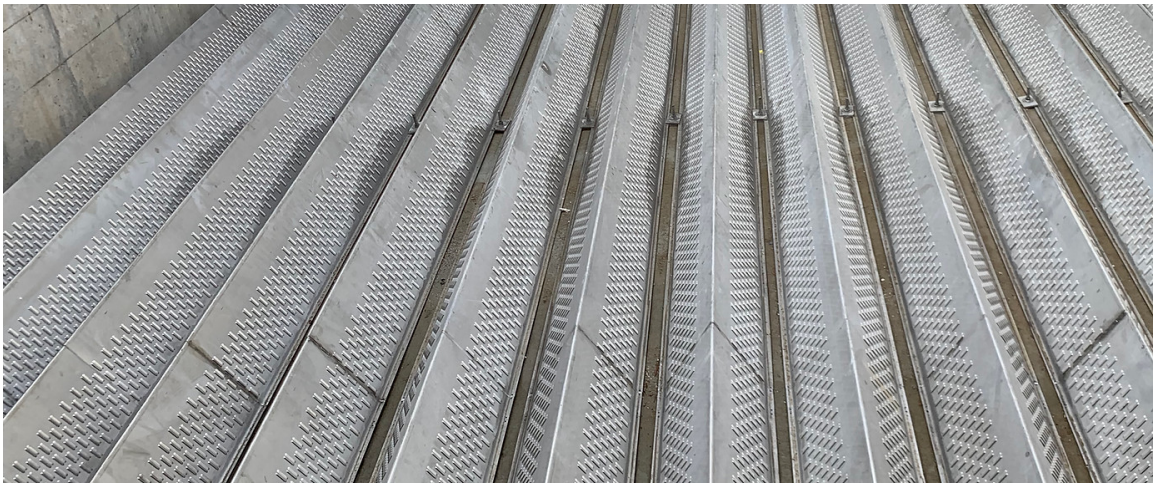


Figure 3-3: Roberts Trilateral Stainless-steel underdrain installation

This stainless-steel underdrain installation requires a level floor. The laterals are then mechanically anchored and bolted flush onto the floor. This system is also compatible with air scour and uses entirely stainless-steel piping and the laterals themselves are made with 14-gauge stainless steel. The punched media retention orifices feature a winged shape, each orifice being connected to the lateral on three sides.

3.3 Leopold – Plastic Underdrains

Leopold presented their Type XA, Type SA, and Type 360 underdrains, all plastic underdrains of varying shapes. Types XA and SA were presented with or without an IMS® 200 media support cap, which requires support gravel if the cap is omitted. The Type 360 underdrains were as a new product designed with orifices for air and water on all sides of the raised underdrain. The Type S was originally installed in the Utility's filters with older sintered bead media support cap design, or the original IMS® cap. This media support cap has had failures in other installations and has been replaced by a media support cap with laser cut slots. **Figures 3-4** shows the Type XA underdrain block. The Type 360 is shown in **Figure 3-5**.

Figure 3-4: Type XA underdrain without cap

Figure 3-5: Type 360 underdrain

The Type XA block is newer and has a lower profile than the Type S, leaving more room for media above. The Type XA also has a structure underneath that allows greater uplift resistance in the grout installation. The Type XA can be used with air scour, using the IMS® cap or gravel for media retention. The plastic block installation requires grout poured under and around the plastic blocks to form a monolithic structure regardless of the underdrain block type. This installation may be considered more challenging than the installation for the stainless-steel options. Additionally, single laterals cannot be removed for repair or inspection without taking all underdrains out of the filter.

The Type 360 is installed similarly to the stainless steel laterals presented by other manufacturers, with anchored bolts to hold down the laterals instead of the grout used for the plastic block products. There are orifices on all sides of the lateral for air and water to pass through and these orifices are sized to retain the media in the filter. This underdrain product is new and does not have many installations. Due to this limited experience with the Type 360 product, the Type XA product will be the focus for comparison to other underdrains.

4.0 Findings and Discussion

Following the underdrain manufacturer workshops, CDM Smith developed a table of non-cost factors to be used in comparing the underdrain options presented. For each manufacturer, a preferred product for the Sheboygan WTP application was selected based on manufacturer recommendation for the application and CDM Smith experience with the product. For Leopold this was the Type XA Underdrain with IMS® 200 Media Support Cap, for AWI this would be the Low Profile Phoenix Underdrain (although the High Volume may be beneficial for lower headloss), and for Roberts the stainless-steel Trilateral with separate air and water chambers was selected for comparison. **Table 4-1** provides a comparison between the preferred products from each manufacturer.

Table 4-1. Summary of Preferred Underdrain Product from Each Manufacturer for Sheboygan WTP Application

	Leopold	AWI	Roberts
Product	XA Underdrain with IMS® 200 Cap	Phoenix Low Profile	Trilateral SS
Material	HDPE	316L SS	316L SS
Description	Grout and mechanical hold-down anchor system	316L Stainless steel mechanical hold downs epoxy anchored into the filter box	316L Stainless steel mechanical hold downs epoxy anchored into the filter box
Lateral Height	10 3/8-inches	5 1/4 – inches	8 inches
Warranty	5 years	5 years	5 years
Advantages	- Familiar product/operation - Plastic material results in lower purchase cost for laterals.	- Could be installed in-house - Can remove single lateral for repair - Minimal risk of fouling - Easier installation. - Allows for more reliable quality control as mechanical anchors can be tested to verify correct installation.	- Could be installed in-house - Can remove single lateral for repair - Minimal risk of fouling - Easier installation - Thicker gauge SS - Allows for more reliable quality control as mechanical anchors can be tested to verify correct installation.
Disadvantages	- Cannot remove single lateral without impacting other laterals. - More complex and labor-intensive installation that requires close quality control of grout and placement to be successful.	- Dead space under lateral. Stainless steel material results in higher purchase price of laterals. - Slight risk of corrosion	- Stainless steel material results in higher purchase price of laterals. - Slight risk of corrosion
Fail points	- Failure of media retention caps - Sealant failure - Relies on good quality and placement of grout (grout under tension)	- Hold down anchor failure - Corrosion	- Hold down anchor failure - Corrosion
Headloss	32"	65"	32"
Uplift Pressure	Type XA is 30 psi. (IMS® 200 cap is 15 psi	2,400 PSF (16.7 psi)	1,200 PSF (8.3 psi) with 5/16" think plates between the laterals and 2,400 PSF (16.7 psi) with 1/2" plates
Number of Installations	Type S - >1,500 Type XA - >500	approximately 240	14

4.1 Additional Concerns and Recommendations for the Filter Underdrains

4.1.1 Potential for Backwash Flow Maldistribution

Maldistribution in the backwash supply could result in zones of higher backwash pressure and zones of poor backwashing. Modern filter installations can overcome these challenges through the following strategies:

- Use of varying sized openings/orifices in the center underdrain blocks to obtain a consistent backwash flow along the full length of the filter center backwash feed gullet;
- Use of influent flow baffles as the backwash water enters the gullet to reduce the influent water velocity;
- Use of computational fluid dynamic (CFD) modeling of the filter installation to design the location and size of the block openings and baffles;
- Post-installation backwash flow or piezometer testing to field verify the installation matches the results of the CFD design.

These strategies are applicable to all of the underdrain products being considered for the Sheboygan WTP and should be implemented regardless of which underdrain product is selected.

4.1.2 No Backwash Relief Piping

The Utility does have air relief venting, but currently there is no vent relief outlet for the backwash supply water piping at the filter gullet. Vent relief piping are typically added to reduce the potential for future catastrophic filter underdrain failures. The Utility did note that the maximum head available for backwash supply from the backwash tank is not high, and since there is no backwash pumping supply in this case, adding backwash relief piping is not as critical in this case.

4.1.3 Use of Air Scour In Lieu of Surface Wash for Auxiliary Wash

The addition of air scour to a filter backwash procedure has been shown to significantly improve the backwash cleaning effectiveness. The addition of air scour might provide a measurable benefit to the WTP in improved filter performance and lower backwash water use. Life-cycle cost evaluations conducted on other Midwestern water facilities locations have shown that operation and maintenance cost savings can off-set the capital cost associated with implementing air scour.

New air scour blowers, air scour header piping, and appurtenances would be required to implement air scour at WTP, but all underdrain options for retrofit are compatible with air scour.

4.2 Non-Cost Evaluation

CDM Smith prepared a matrix of criteria to be used to evaluate non-cost items about each potential underdrain product. **Table 4-2** shows this matric with scores filled in by Sheboygan staff in discussion with the CDM Smith team. The weighting of each sub criterium within the primary criteria and weighting of each primary criterium within the total score is also shown in the table. In this evaluation, AWI and Roberts ranked similarly, around 3.6, while Leopold ranked behind these two with a score of 2.3. Based on this non-cost evaluation, the top two vendors are used in the final cost or budgeting (Table 5-2).

Table 4-2. Non-cost evaluation matrix of underdrain alternatives

Primary Criteria (PC) and Weight	Sub-criteria (SC) and Weight	Unweighted SC scores			Weighted PC Scores			Reasoning for Score
		AWI	Roberts	Leopold	AWI	Roberts	Leopold	
Installation (30%)					1.29	1.095	0.765	
	Ease of Installation (25%)	4.7	4.1	2				Leopold requires the more grout and leveling
	Number of Installations (25%)	4	3	4.2				Leopold has the most installations, followed by AWI
	Ease of Repair /Replacement (25%)	4	3	1				Stainless Steel Underdrains can be removed as a single lateral
	Ability to add Air Scour (25%)	4.5	4.5	3				AWI and Roberts design for future air scour addition
Impact on Media/WQ (20%)					0.94	0.9	0.52	
	Height of Underdrain (and room for media and freeboard) (50%)	5	4.4	2.1				Based on lateral height and whether support gravel is needed
	Filter Performance /Longevity (50%)	4.4	4.6	3.1				Leopold has experienced more failures
Reliability and Performance (30%)					1.1	1.28	0.86	
	Potential Fail Points (33%)	3	4	1				Grout failure and clogging more likely with Leopold. Corrosion as a fail point for AWI and Roberts. Space under lateral as fail point for AWI.
	Headloss (33%)	4	4	4				Comparable headloss
	Material of Construction /Corrosion (33%)	4.1	4.8	3.6				Roberts provides stronger gauge stainless than AWI. Leopold is plastic.
Company Experience and Service Record (20%)					0.72	0.75	0.59	
	Experience (50%)	4.2	4.5	4.9				Leopold has most installations
	Service Record (50%)	3	3	1				AWI and Roberts Service not tested, but Leopold was challenging to work with in initial stages of filter failure
	Cumulative Weighted Score:				**4.06**	**4.02**	**2.73**	

5.0 Alternatives and Next Steps

The following is a summary of various alternatives to address the underdrains at the WTP. The description of each alternative includes advantages and disadvantages.

5.1 Alternative 1 Replace Existing Underdrains with new Leopold XA Plastic Block Underdrains

This alternative includes the removal and replacement of the existing underdrains with the latest version of the Leopold XA underdrain with IMS200 caps (shown in Figure **5-1**). Under this alternative, the existing underdrains would be demolished and removed from the filter basins. A bed of grout would be applied to the filter floor before the laterals (made of connected plastic blocks with IMS200® Caps factory installed on top of the blocks) are placed. A new mechanical anchoring system would be installed around the laterals. After 12 hours, grout would be placed to fill in the space around the laterals.

The advantages and disadvantages of this alternative include the following:

Alternative 2 Advantages:

- HDPE material used in Leopold's XA Plastic Block would eliminate concern about underdrain corrosion.

Alternative 2 Disadvantages:

- The installation process for this type of plastic underdrain is relatively complex. Close supervision would be required during installation of the underdrains and grout to ensure a complete and reliable underdrain system.
- While the XA underdrain has a lower profile than the existing Leopold S block, it is taller than either the AWI or Roberts options and thus would have less freeboard for media expansion than the other underdrain options.
- While this IMS200® Cap design appears to be less prone to plugging than the existing IMS® Caps, there is limited long-term data on the performance of this system, particularly for the treatment of Great Lakes water.

Figure 5-1. Type XA underdrain with IMS® 200 cap.

5.2 Alternative 2 Replace Existing Underdrain with New AWI Phoenix Stainless Steel Underdrain

This alternative includes the removal and replacement of the existing underdrains with new stainless steel underdrains. AWI Stainless steel laterals come in a trapezoidal (shown in **Figure 5-2**) shape. Direct media support is attained through the usage of a dual folded plate system with a series of bridge punches in the top plate. The double 90-degree plates create high shear velocity of the water passing through, thus minimizes fouling. Stainless steel laterals provide greater corrosion resistance than cast iron laterals that were once commonly used in filter underdrain designs. The risk of corrosion is low because the laterals are nearly always submerged. This is supported by field experience of AWI underdrains operating for many years with no signs of corrosion.

These underdrains have a simpler installation process than plastic block underdrains. A gasket atop grout strips seal off the flume, then concrete anchors and hold-down clamps are used to secure the

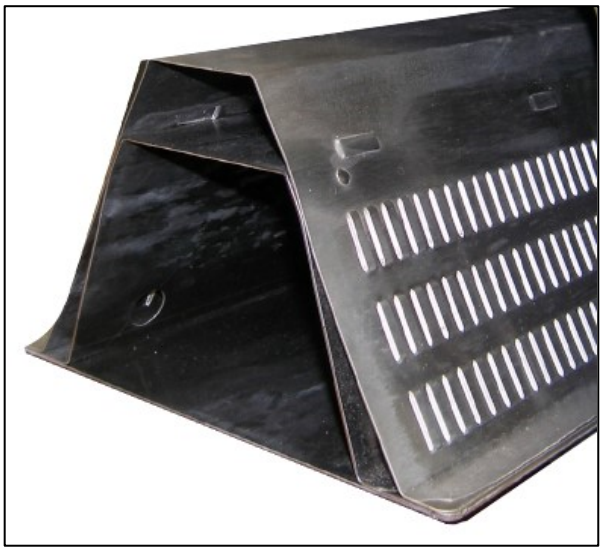


Figure 5-2. Stainless steel underdrain from AWI

lateral to the filter floor. The AWI Phoenix installation does not require grout poured to level the entire filter floor. Instead, the underdrains rest on the grout strips at each end, when a small space between the underdrain and the middle of the filter floor. The underdrains are held in place with mechanical anchoring.

Alternative 2 Advantages:

- The AWI Phoenix underdrain has the lowest profile among all three alternatives, leaving the most room for additional media or filter bed expansion.
- The installation process for the stainless steel underdrains is relatively simple allowing for quicker installation and filter downtime.
- Unlike plastic block underdrains, stainless steel underdrains can be readily removed for cleaning, inspection, and maintenance, if ever needed, and then reinstalled without impacts to the structural integrity of the system.

Alternative 2 Disadvantages:

- Stainless steel underdrains do face a slight risk of corrosion, although this has only been seen in rare instances and is typically related to filters that are kept out of service, without being submerged for long periods of time.

5.3 Alternative 3 Replace Existing Underdrains with New Roberts Trilateral Stainless Steel Underdrains

This alternative includes the removal and replacement of the existing underdrains with new stainless steel underdrains. The Roberts trilateral underdrain comes in a triangular (shown in **Figure 5-3**) shape. Direct media support is attained through the usage of a dual folded plate system with a series of punches in the top plate. Each of these punches is supported by the plate on three sides of the punch. The double 90-degree plates create high shear velocity of the water passing through, thus minimizes fouling. Stainless steel laterals provide greater corrosion resistance than cast iron laterals that were once commonly used in filter underdrain designs. The risk of corrosion is low because the laterals are nearly always submerged.

Installation of the Roberts Trilateral underdrain requires beginning with a level filter floor, which requires a pour of grout over the clean filter floor. Then the Trilateral underdrain rests flush on the bottom of the floor, held in place with a mechanical anchor system.

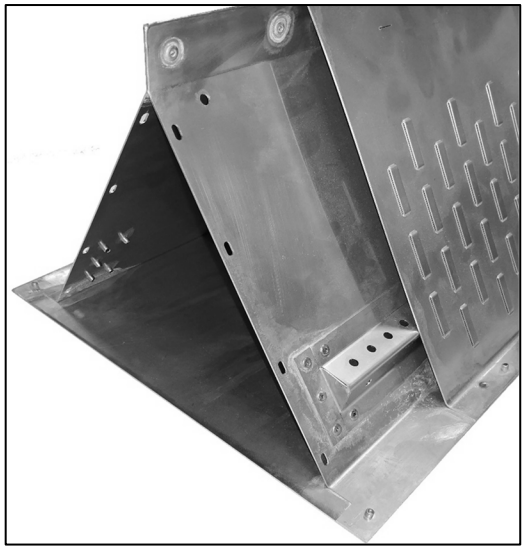


Figure 5-3. Stainless steel underdrain from Roberts Filter

The advantages and disadvantages of this alternative include the following:

Alternative 3 Advantages:

- The Roberts Trilateral has a lower profile than the Leopold XA Block underdrain.
- The installation process for the stainless steel underdrains is relatively simple allowing for quicker installation and filter downtime.
- Unlike plastic block underdrains, stainless steel underdrains can be readily removed for cleaning, inspection, and maintenance, if ever needed, and then reinstalled without impacts to the structural integrity of the system.

Alternative 3 Disadvantages:

- Stainless steel underdrains do face a slight risk of corrosion, although this has only been seen in rare instances and is typically related to filters that are kept out of service, without being submerged for long periods of time.

5.5 Conceptual Cost Comparison of Alternatives

Vendors for the alternatives in **Table 5-1** have provided budgetary level estimates for underdrain laterals for the Utility to consider. These estimates do not include the costs for new air scour blowers and header pipe. These costs also do not include installation. The actual cost of the recommended alternative will depend on actual labor and material costs, competitive market conditions, final project scope, implementation schedule, and other factors.

Table 5-1. Conceptual Equipment Costs of New Filter Underdrain Alternatives[1, 2]

Alternatives	Budgetary Underdrain Equipment Estimate for 11 Filters
Leopold Type XA Underdrains with IMS® 200 Cap	$1,000,000
Leopold Type 360 Underdrains	$870,000
AWI Phoenix Low Profile Underdrains	$1,900,000
Roberts Trilateral Underdrains [3]	$2,200,000

Notes:
(1) Costs do not include any costs for filter pipe gallery improvements.
(2) Costs are based budgetary level estimates provided by the vendors in late 2022 – early 2023. Above costs do not include construction, which can be lower for the stainless steel options.
(3) Roberts estimate was provided including media, for a total of $2,988,625. They report that 73% of this total is for underdrains and the other 27% is the media.

Conceptual estimates the total project costs have been developed and are shown in **Table 5-2**. Based on the rankings from the non-cost comparison in **Table 4-2**, only stainless-steel underdrains from AWI and Roberts were considered moving forward. A contingency of 25% is added to the construction cost to cover undeveloped design details, such as installation of pressure monitoring devices for backwash water supply and installation of backwash vent line provisions. This 25% contingency also covers the development of a sequence of construction and associated site constraints.

A mark-up 15% is added to the construction cost for engineering design, construction management, administrative, and legal. A 10% mark-up is added to cover contractor's overhead and profit.

These contingencies and mark-ups are appropriate at a planning level to allow for unforeseen and undefined cost items. It is important to note that the cost estimates are in today's dollars (not escalated) and are preliminary planning-level costs based on information available at the time of the estimates and are "order of magnitude". The actual cost of the recommended alternative will depend on actual labor and material costs, competitive market conditions, final project scope, implementation schedule, and other factors. As a result, the final costs will most likely vary from the estimates presented herein. Finally, cost does not include engineering design or construction management.

Table 5-2. Conceptual Capital Costs of Filter Retrofit [1, 2, 3, 4]

	Conceptual Capital Costs per Filter	Conceptual Capital Costs for 11 Filters
Stainless Steel Underdrains	$ 600,000	$ 6,600,000
Install Air Scour Blower and Piping	Not Applicable	$ 2,000,000
Install New Media	$ 160,000	$ 1,800,000
Total:		**$ 10,400,000**

Notes:
(1) Costs do not include any costs for filter pipe gallery improvements.
(2) Costs are in today's dollars and have not been escalated.
(3) Costs include the mark-ups noted above
(4) Costs are based on cost information from recent similar projects.

5.6 PFAS Regulations

On March 14th, 2023, EPA proposed National Drinking Water Standards for six PFAS (PFOS, PFOA, PFNA, PFBS, PFHxS, and GenX). The draft rule proposes a combination of traditional Maximum Contaminant Levels (MCLs) and a novel Hazard Index (HI) concept.

The proposed MCLs and HI are as follows:

- 4.0 ng/L or ppt MCL PFOA
- 4.0 ng/L or ppt MCL PFOS
- 1.0 (unitless, NOT 1 ppt) Hazard Index (HI) for a mixture of PFNA, PFHxS, PFBS, and GenX

Based on historical testing done by the Utility, levels of PFOA and PFOS are below the proposed MCLs, however the Utility will continue to monitor for PFAS to confirm that it will comply with the proposed rules. There is currently a 60-day public comment period with the Final Rule anticipated to be released by early 2024. The proposed rule requires compliance 3 years after promulgation.

As part of this Filter Rehabilitation Project, the Utility will evaluate if a different media option should be considered to allow removal of PFAS.

5.7 Recommendations and Next Steps

In addition to underdrain and media replacement, CDM Smith also recommends the following additional steps:

- Continue to closely monitor filter operation, backwash pressure and other filter parameters until the filters are fully rehabilitated.
- Consider incorporating air scour and backwash supply modifications at the WTP as part of the filter rehabilitation project for operation and maintenance cost savings and improved filter performance.

Appendix A – Filter Media Analysis Results

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LABORATORY REPORT

Report To: Sheboygan Water Utility
Attn: Bill Swearingen
72 Park Ave.
Sheboygan, WI 53081

Report Date: 02/15/23
Job No.: 208715
Report No.: 118928
No. of Pages: 2

Project/Plant: Filter #6 Media Core Testing
Test Method: AWWA B100-16

Date Received: 01/19/23
Date Sampled: 01/16/23

Sample ID: **Anthracite Sample 1 Top**

USA Std.	Nominal, mm	Effective, mm	Percent Passing
#8	2.36	2.36	**100.0**
#10	2.00	2.004	**99.6**
#12	1.70	1.724	**97.1**
#14	1.40	1.369	**78.1**
#16	1.18	1.195	**42.7**
#18	1.00	1.003	**17.5**
#20	0.850	0.870	**11.0**
#25	0.710	0.715	**10.1**
#30	0.600	0.598	**9.6**
#35	0.500	0.500	**7.6**
#40	0.425	0.418	**3.6**
#45	0.355	0.353	**1.8**
#50	0.300	0.289	**1.5**
#60	0.250	0.242	**0.8**
Effective Size, mm:			**0.69**
Uniformity Coefficient:			**1.9**
Acid Solubility, %:			**3.7**
Specific Gravity, (Apparent):			**1.70**
Moh's Hardness:			**3**

Should you have any questions or if we may be of further service, please contact me at 937-236-8805, extension 322.

Respectfully submitted,
BOWSER-MORNER, INC.

Karl A. Fletcher
Vice President
Director of Laboratory Services

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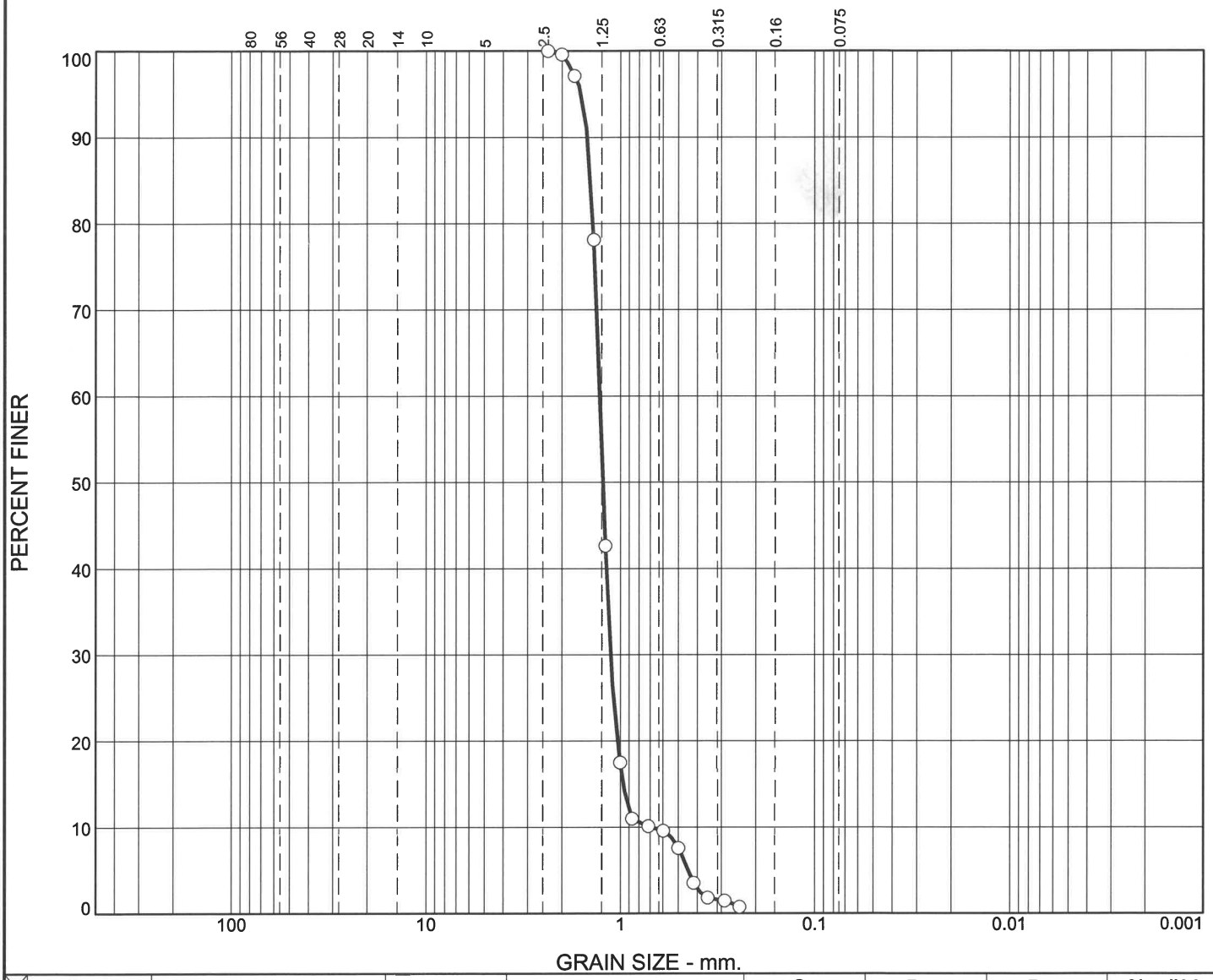

	C_u	C_u spec.	D_{10}	D_{10} spec.	C_u	D_{10}	D_{60}	% - #30
○	1.85		0.6900				1.2754	9.6

Material and Supplier

○ Anthracite Sample 1 Top

Project No. 208715 **Client:** Sheboygan Water

Project: Filter #6 Media Core Testing

○ **Location:** Date Received: 1/19/23

Remarks:

BOWSER-MORNER, INC.

Dayton, Ohio

Tested By: RAS

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Attn: Bill Swearingen
72 Park Ave.
Sheboygan, WI 53081

Report Date: 02/15/23
Job No.: 208715
Report No.: 118929
No. of Pages: 2

Project/Plant: Filter #6 Media Core Testing
Test Method: AWWA B100-16

Date Received: 01/19/23
Date Sampled: 01/16/23

Sample ID: **Anthracite Sample 2 Top**

USA Std.	Nominal, mm	Effective, mm	Percent Passing
#10	2.00	2.004	**100.0**
#12	1.70	1.724	**98.6**
#14	1.40	1.369	**82.6**
#16	1.18	1.195	**48.0**
#18	1.00	1.003	**16.7**
#20	0.850	0.870	**7.2**
#25	0.710	0.715	**5.8**
#30	0.600	0.598	**5.4**
#35	0.500	0.500	**4.7**
#40	0.425	0.418	**2.3**
#45	0.355	0.353	**0.8**
#50	0.300	0.289	**0.5**
Effective Size, mm:			**0.93**
Uniformity Coefficient:			**1.4**
Acid Solubility, %:			**2.8**
Specific Gravity, (Apparent):			**1.73**
Moh's Hardness:			**3**

Should you have any questions or if we may be of further service, please contact me at 937-236-8805, extension 322.

Respectfully submitted,
BOWSER-MORNER, INC.

Karl A. Fletcher
Vice President
Director of Laboratory Services

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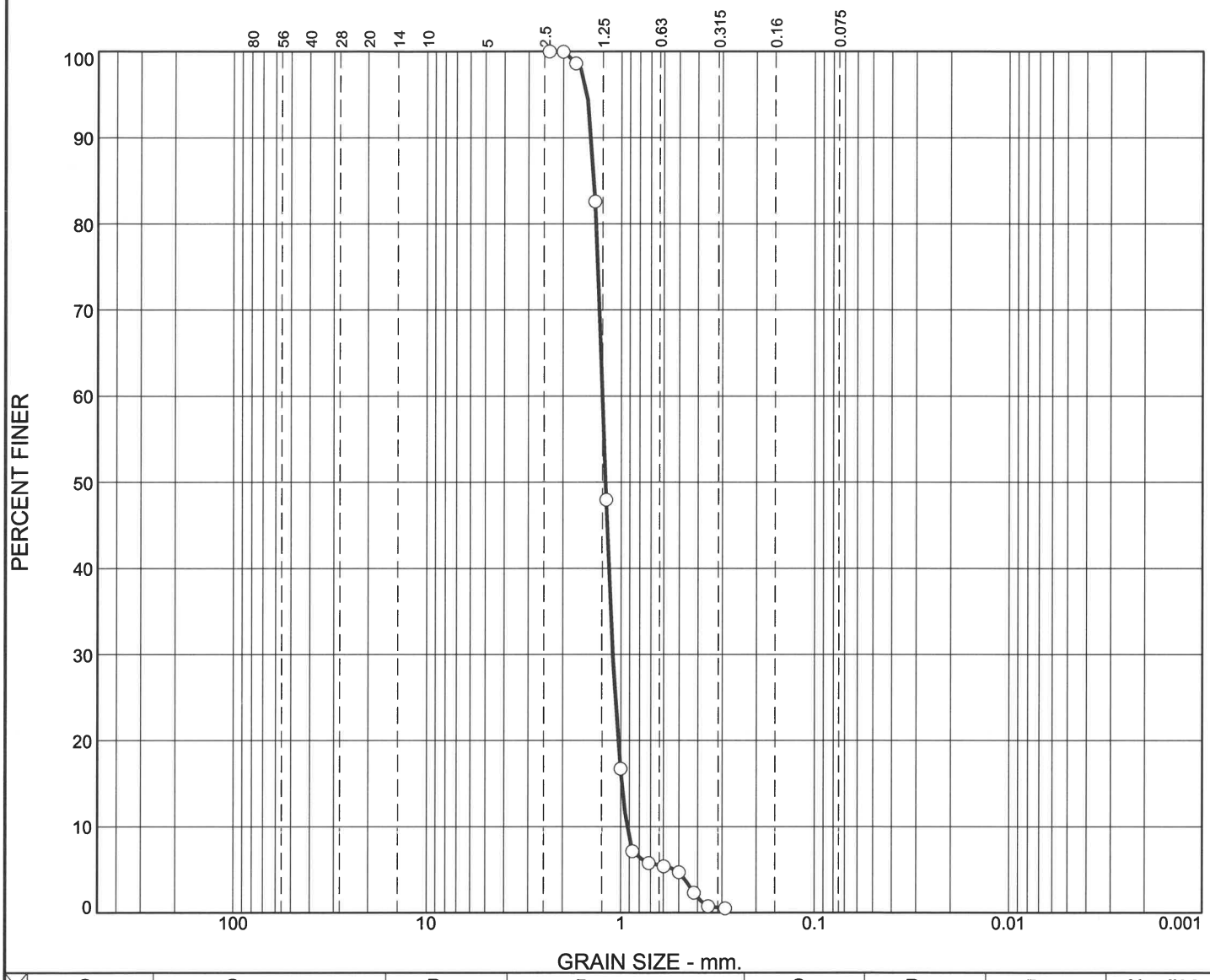

	C_u	C_u spec.	D_{10}	D_{10} spec.	C_u	D_{10}	D_{60}	% - #30
○	1.35		0.9264				1.2502	5.4

Material and Supplier

○ Anthracite Sample 2 Top

Project No. 208715 **Client:** Sheboygan Water

Project: Filter #6 Media Core Testing

○ **Location:** Date Received: 1/19/23

BOWSER-MORNER, INC.

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Report Date: 02/15/23
Job No.: 208715
Report No.: 118930
No. of Pages: 2

Project/Plant: Filter #6 Media Core Testing
Test Method: AWWA B100-16

Date Received: 01/19/23
Date Sampled: 01/16/23

Sample ID: **Anthracite Sample 3 Top**

USA Std.	Nominal, mm	Effective, mm	Percent Passing
#8	2.36	2.36	**100.0**
#10	2.00	2.004	**99.7**
#12	1.70	1.724	**98.4**
#14	1.40	1.369	**82.9**
#16	1.18	1.195	**50.3**
#18	1.00	1.003	**20.8**
#20	0.850	0.870	**11.5**
#25	0.710	0.715	**9.9**
#30	0.600	0.598	**8.5**
#35	0.500	0.500	**5.2**
#40	0.425	0.418	**2.4**
#45	0.355	0.353	**1.4**
#50	0.300	0.289	**1.0**
#60	0.250	0.242	**0.5**
Effective Size, mm:			**0.72**
Uniformity Coefficient:			**1.7**
Acid Solubility, %:			**2.8**
Specific Gravity, (Apparent):			**1.81**
Moh's Hardness:			**3**

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Respectfully submitted,
BOWSER-MORNER, INC.

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Director of Laboratory Services

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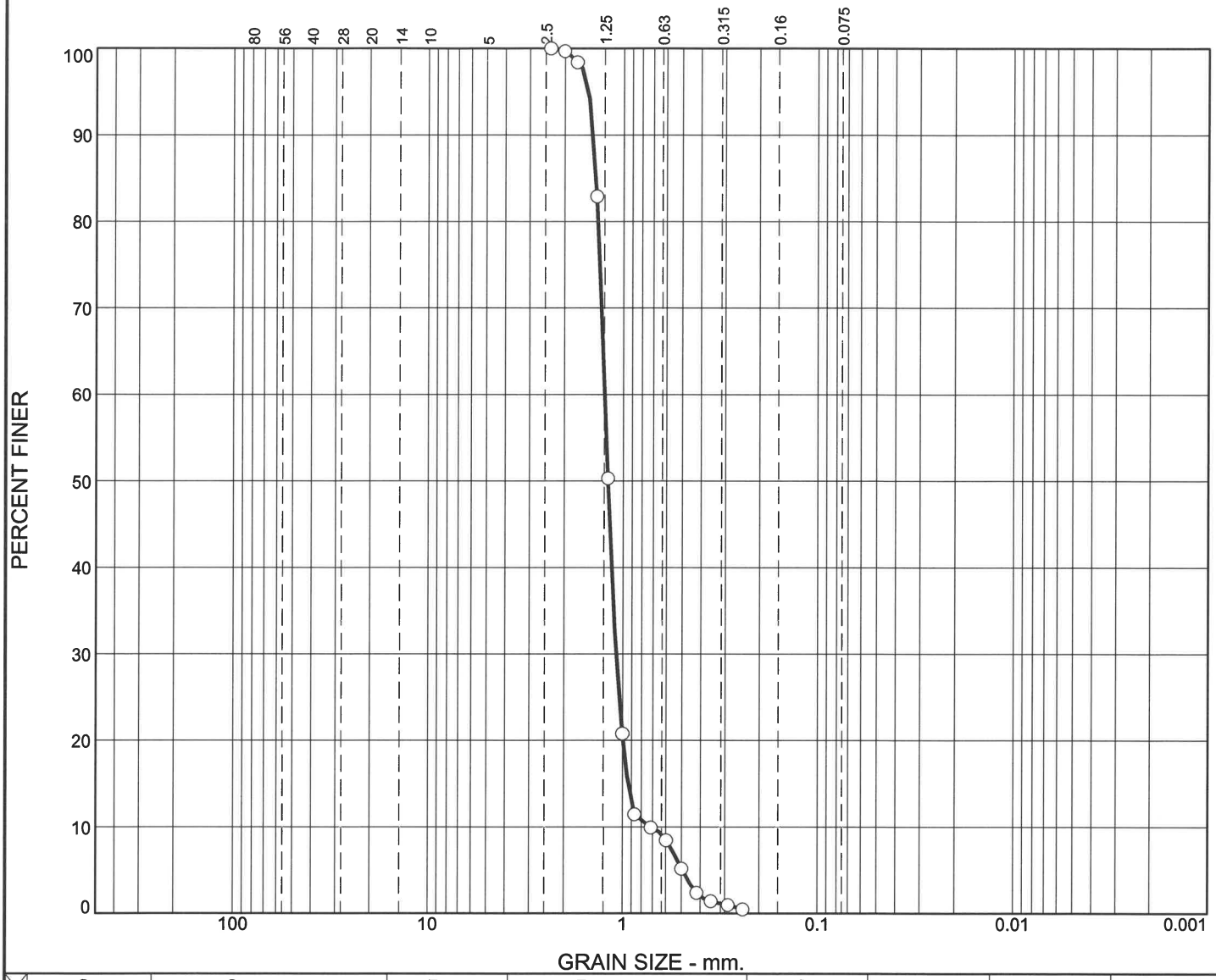

	C_u	C_u spec.	D_{10}	D_{10} spec.	C_u	D_{10}	D_{60}	% - #30
○	1.72		0.7213				1.2424	8.5

Material and Supplier

○ Anthracite Sample 3

Project No. 208715 **Client:** Sheboygan Water

Project: Filter #6 Media Core Testing

○ **Location:** Date Received: 1/19/23

Remarks:

BOWSER-MORNER, INC.

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Attn: Bill Swearingen
72 Park Ave.
Sheboygan, WI 53081

Project/Plant: Filter #6 Media Core Testing
Test Method: AWWA B100-16
Sample ID: **Anthracite Sample 4 Top**

Report Date: 02/15/23
Job No.: 208715
Report No.: 118931
No. of Pages: 2
Date Received: 01/19/23
Date Sampled: 01/16/23

USA Std.	Nominal, mm	Effective, mm	Percent Passing
#8	2.36	2.36	**100.0**
#10	2.00	2.004	**99.8**
#12	1.70	1.724	**96.7**
#14	1.40	1.369	**77.8**
#16	1.18	1.195	**47.2**
#18	1.00	1.003	**17.2**
#20	0.850	0.870	**10.6**
#25	0.710	0.715	**9.6**
#30	0.600	0.598	**8.3**
#35	0.500	0.500	**5.7**
#40	0.425	0.418	**3.0**
#45	0.355	0.353	**1.7**
#50	0.300	0.289	**1.2**
#60	0.250	0.242	**0.5**
Effective Size, mm:			**0.82**
Uniformity Coefficient:			**1.5**
Acid Solubility, %:			**2.4**
Specific Gravity, (Apparent):			**1.85**
Moh's Hardness:			**3**

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Respectfully submitted,
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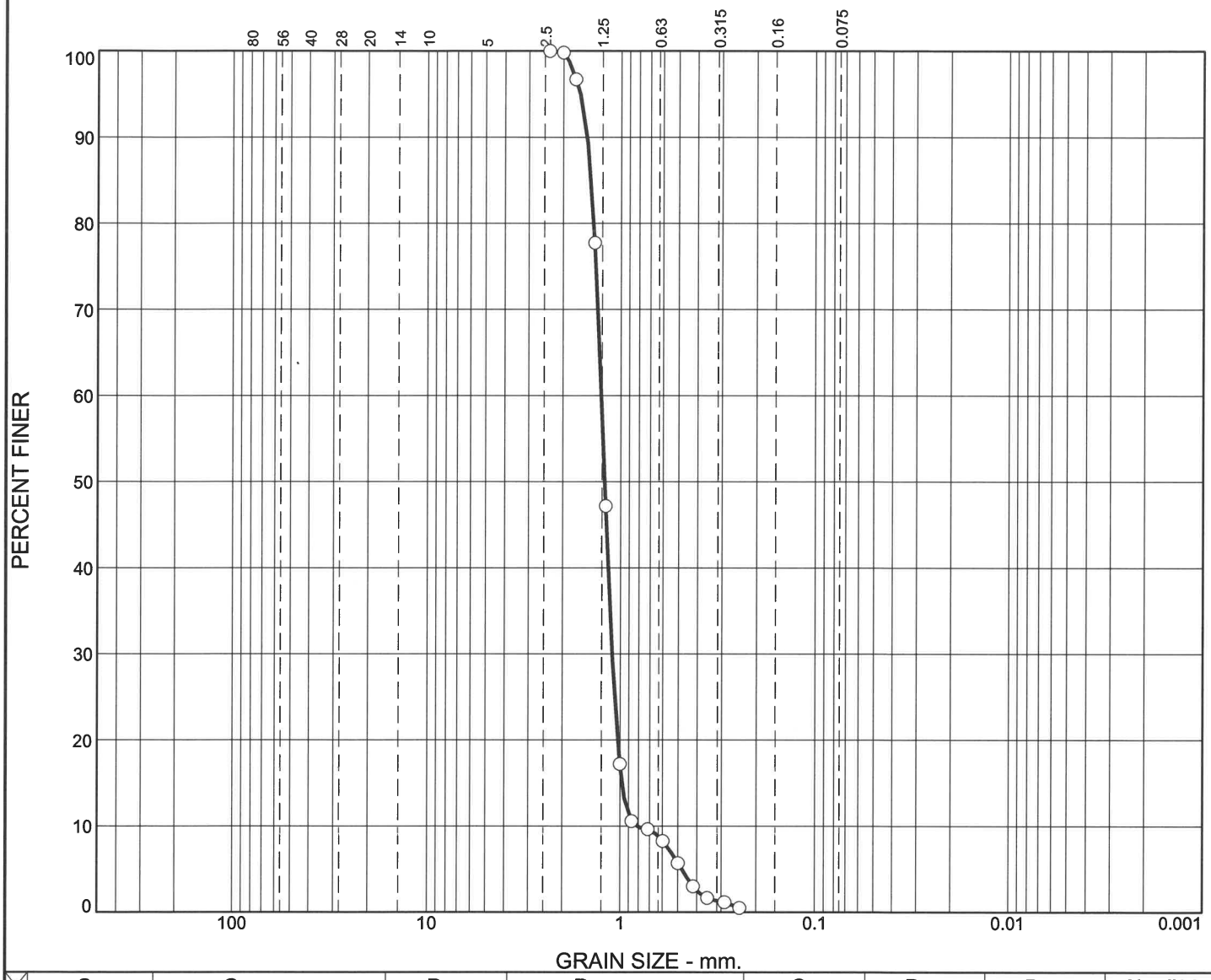

	C_u	C_u spec.	D_{10}	D_{10} spec.	C_u	D_{10}	D_{60}	% - #30
○	1.54		0.8214				1.2613	8.3

Material and Supplier

○ Anthracite Sample 4

Project No. 208715 **Client:** Sheboygan Water

Project: Filter #6 Media Core Testing

○ **Location:** Date Received: 1/19/23

Remarks:

BOWSER-MORNER, INC.

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Tested By: RAS

BOWSER-MORNER, INC.

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Sheboygan, WI 53081

Report Date: 02/15/23
Job No.: 208715
Report No.: 118932
No. of Pages: 2

Project/Plant: Filter #6 Media Core Testing
Test Method: AWWA B100-16

Date Received: 01/19/23
Date Sampled: 01/16/23

Sample ID: **Anthracite Sample 5 Top**

USA Std.	Nominal, mm	Effective, mm	Percent Passing
#8	2.36	2.36	**100.0**
#10	2.00	2.004	**99.8**
#12	1.70	1.724	**98.4**
#14	1.40	1.369	**87.6**
#16	1.18	1.195	**60.6**
#18	1.00	1.003	**29.9**
#20	0.850	0.870	**17.4**
#25	0.710	0.715	**14.9**
#30	0.600	0.598	**11.7**
#35	0.500	0.500	**7.0**
#40	0.425	0.418	**3.5**
#45	0.355	0.353	**2.2**
#50	0.300	0.289	**1.4**
#60	0.250	0.242	**0.5**
Effective Size, mm:			**0.56**
Uniformity Coefficient:			**2.1**
Acid Solubility, %:			**2.7**
Specific Gravity, (Apparent):			**1.74**
Moh's Hardness:			**3**

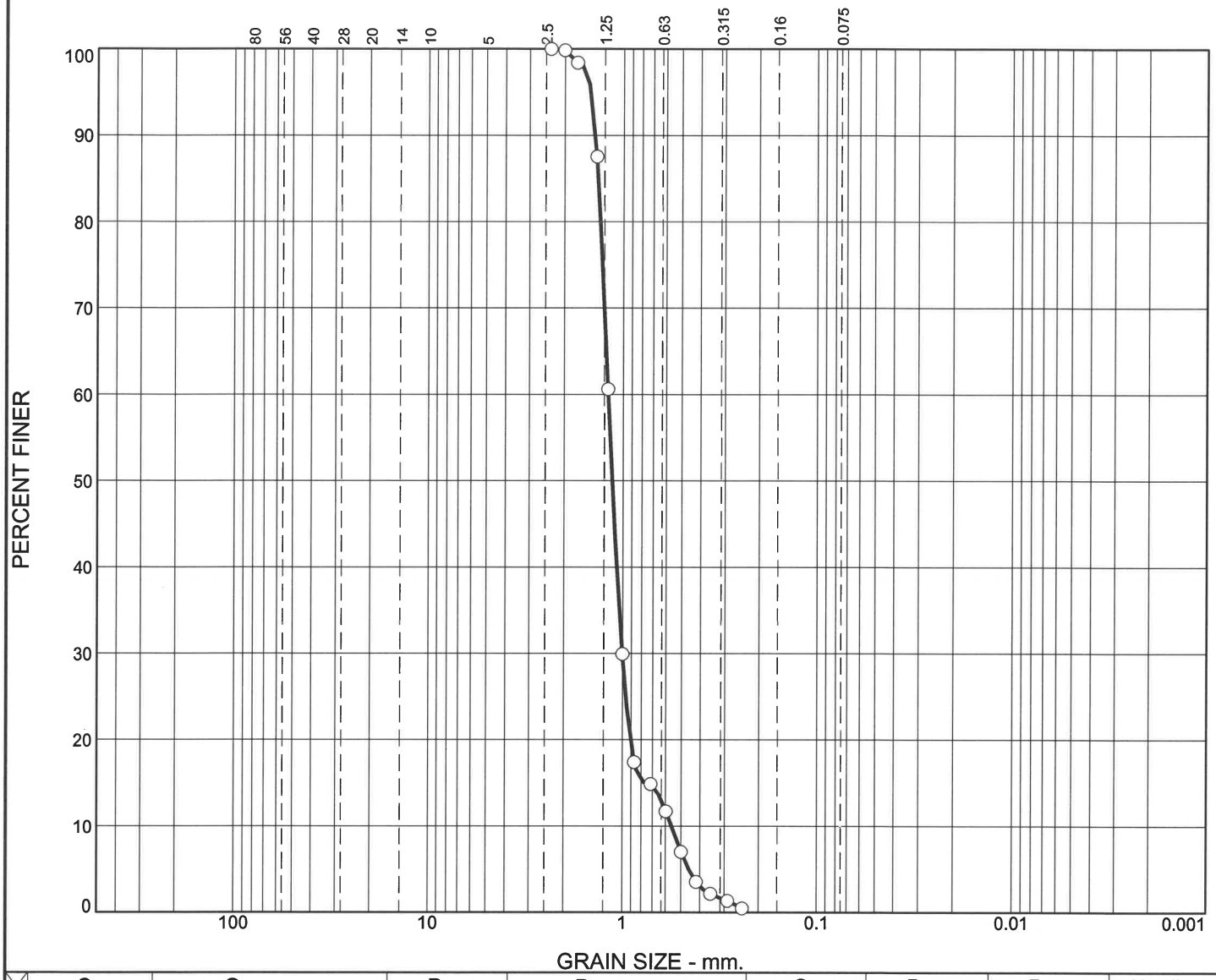
Should you have any questions or if we may be of further service, please contact me at 937-236-8805, extension 322.

Respectfully submitted,
BOWSER-MORNER, INC.

Karl A. Fletcher
Vice President
Director of Laboratory Services

KAF/ras/drj
118932
1-File
1-billswearingen@sheboyganwater.org

GRAIN SIZE DISTRIBUTION REPORT



	C_u	C_u spec.	D_{10}	D_{10} spec.	C_u	D_{10}	D_{60}	% - #30
○	2.13		0.5604				1.1914	11.8

Material and Supplier

○ Anthracite Sample 5

Project No. 208715 **Client:** Sheboygan Water

Project: Filter #6 Media Core Testing

○ **Location:** Date Received: 1/19/23

Remarks:

BOWSER-MORNER, INC.

Dayton, Ohio

Tested By: RAS

BOWSER-MORNER, INC.

Delivery Address: 4518 Taylorsville Rd • Dayton, Ohio 45424 **Mailing Address:** P.O. Box 51 • Dayton, Ohio 4540

AASHTO/ISO 17025 Accredited • USACE Validated ACIL INDEPENDENCE

LABORATORY REPORT

Report To: Sheboygan Water Utility
Attn: Bill Swearingen
72 Park Ave.
Sheboygan, WI 53081

Report Date: 02/15/23
Job No.: 208715
Report No.: 118933
No. of Pages: 2

Project/Plant: Filter #6 Media Core Testing
Test Method: AWWA B100-16

Date Received: 01/19/23
Date Sampled: 01/16/23

Sample ID: **Anthracite Sample 6 Top**

USA Std.	Nominal, mm	Effective, mm	Percent Passing
#8	2.36	2.36	**100.0**
#10	2.00	2.004	**99.9**
#12	1.70	1.724	**98.8**
#14	1.40	1.369	**86.2**
#16	1.18	1.195	**53.5**
#18	1.00	1.003	**21.4**
#20	0.850	0.870	**10.3**
#25	0.710	0.715	**8.5**
#30	0.600	0.598	**8.0**
#35	0.500	0.500	**6.9**
#40	0.425	0.418	**3.6**
#45	0.355	0.353	**1.5**
#50	0.300	0.289	**1.0**
#60	0.250	0.242	**0.6**
Effective Size, mm:			**0.85**
Uniformity Coefficient:			**1.4**
Acid Solubility, %:			**2.9**
Specific Gravity, (Apparent):			**1.74**
Moh's Hardness:			**3**

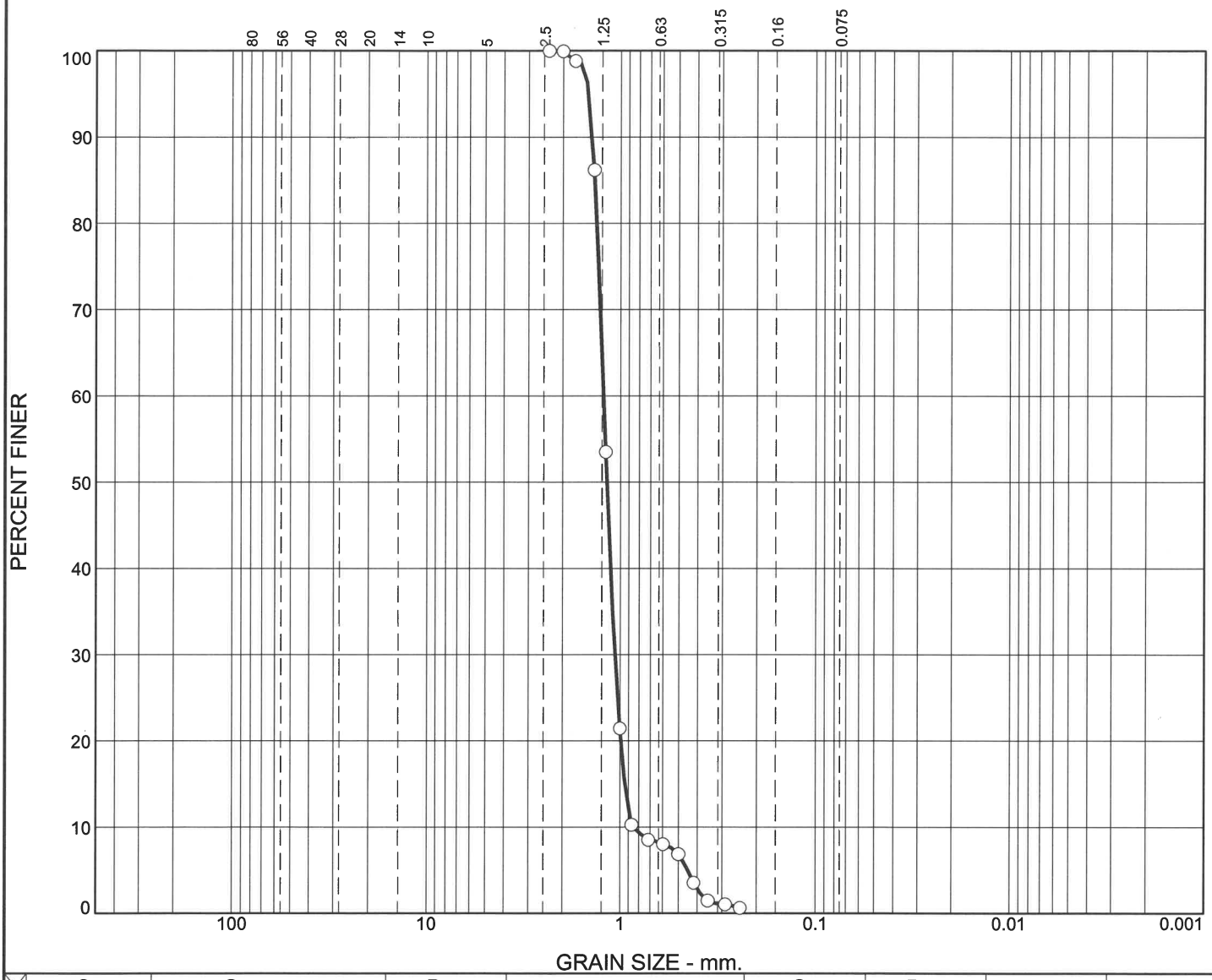
Should you have any questions or if we may be of further service, please contact me at 937-236-8805, extension 322.

Respectfully submitted,
BOWSER-MORNER, INC.

Karl A. Fletcher
Vice President
Director of Laboratory Services

KAF/ras/drj
118933
1-File
1-billswearingen@sheboyganwater.org

GRAIN SIZE DISTRIBUTION REPORT



	C_u	C_u spec.	D_{10}	D_{10} spec.	C_u	D_{10}	D_{60}	% - #30
○	1.44		0.8490				1.2259	8.0

Material and Supplier

○ Anthracite Sample 6

Project No. 208715 **Client:** Sheboygan Water

Project: Filter #6 Media Core Testing

○ **Location:** Date Received: 1/19/23

Remarks:

BOWSER-MORNER, INC.

Dayton, Ohio

Tested By: RAS

BOWSER-MORNER, INC.

Delivery Address: 4518 Taylorsville Rd • Dayton, Ohio 45424 **Mailing Address:** P.O. Box 51 • Dayton, Ohio 454

AASHTO/ISO 17025 Accredited • USACE Validated

LABORATORY REPORT

Report To: Sheboygan Water Utility
Attn: Bill Swearingen
72 Park Ave.
Sheboygan, WI 53081

Project/Plant: Filter #6 Media Core Testing
Test Method: AWWA B100-16
Sample ID: **Sand Sample 1 Bottom**

Report Date: 02/15/23
Job No.: 208715
Report No.: 118934
No. of Pages: 2
Date Received: 01/19/23
Date Sampled: 01/16/23

USA Std.	Nominal, mm	Effective, mm	Percent Passing
#8	2.36	2.36	**100.0**
#10	2.00	2.044	**99.9**
#12	1.70	1.703	**99.6**
#14	1.40	1.400	**97.9**
#16	1.18	1.200	**94.5**
#18	1.00	0.994	**91.1**
#20	0.850	0.870	**89.7**
#25	0.710	0.706	**84.8**
#30	0.600	0.605	**60.8**
#35	0.500	0.499	**29.0**
#40	0.425	0.414	**20.0**
#45	0.355	0.345	**10.2**
#50	0.300	0.297	**4.6**
#60	0.250	0.247	**1.0**
#70	0.212	0.212	**0.4**
Effective Size, mm:			**0.34**
Uniformity Coefficient:			**1.8**
Acid Solubility, %:			**1.6**
Specific Gravity, (Apparent):			**2.75**
Moh's Hardness:			**7**
Aluminum, %:			**4.9**
Calcium, %:			**7.5**

Should you have any questions or if we may be of further service, please contact me at 937-236-8805, extension 322.

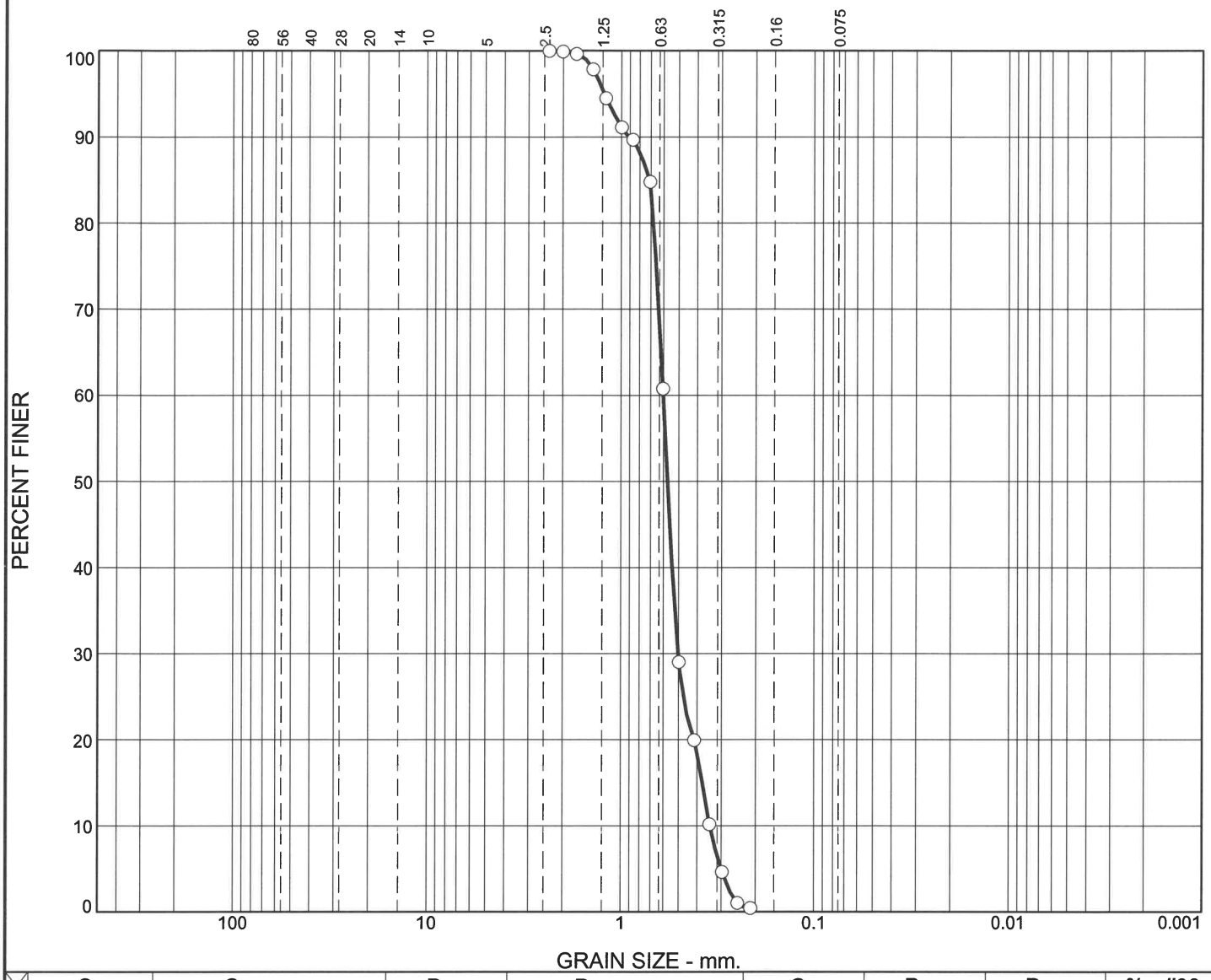
Respectfully submitted,

BOWSER-MORNER, INC.

Karl A. Fletcher
Vice President
Director of Laboratory Services

KAF/ras/drj
118934
1-File
1-billswearingen@sheboyganwater.org

GRAIN SIZE DISTRIBUTION REPORT



	C_u	C_u spec.	D_{10}	D_{10} spec.	C_u	D_{10}	D_{60}	% - #30
○	1.75		0.3438				0.6025	59.2

Material and Supplier

○ Sand Sample 1

Project No. 208715 **Client:** Sheboygan Water

Project: Filter #6 Media Core Testing

○ **Location:** Date Received: 1/19/23

BOWSER-MORNER, INC.

Dayton, Ohio

Remarks:

Tested By: RAS

BOWSER-MORNER, INC.

Delivery Address: 4518 Taylorsville Rd • Dayton, Ohio 45424 **Mailing Address:** P.O. Box 51 • Dayton, Ohio 4540

AASHTO/ISO 17025 Accredited • USACE Validated

LABORATORY REPORT

Report To: Sheboygan Water Utility
Attn: Bill Swearingen
72 Park Ave.
Sheboygan, WI 53081

Project/Plant: Filter #6 Media Core Testing
Test Method: AWWA B100-16
Sample ID: **Sand Sample 2 Bottom**

Report Date: 02/15/23
Job No.: 208715
Report No.: 118935
No. of Pages: 2
Date Received: 01/19/23
Date Sampled: 01/16/23

USA Std.	Nominal, mm	Effective, mm	Percent Passing
#10	2.00	2.044	**100.0**
#12	1.70	1.703	**99.4**
#14	1.40	1.400	**97.8**
#16	1.18	1.200	**95.9**
#18	1.00	0.994	**94.5**
#20	0.850	0.870	**93.8**
#25	0.710	0.706	**90.0**
#30	0.600	0.605	**68.6**
#35	0.500	0.499	**32.4**
#40	0.425	0.414	**22.2**
#45	0.355	0.345	**13.9**
#50	0.300	0.297	**6.8**
#60	0.250	0.247	**1.6**
#70	0.212	0.212	**0.6**
Effective Size, mm:			**0.32**
Uniformity Coefficient:			**1.8**
Acid Solubility, %:			**1.6**
Specific Gravity, (Apparent):			**2.75**
Moh's Hardness:			**7**
Aluminum, %:			**4.9**
Calcium, %:			**6.5**

Should you have any questions or if we may be of further service, please contact me at 937-236-8805, extension 322.

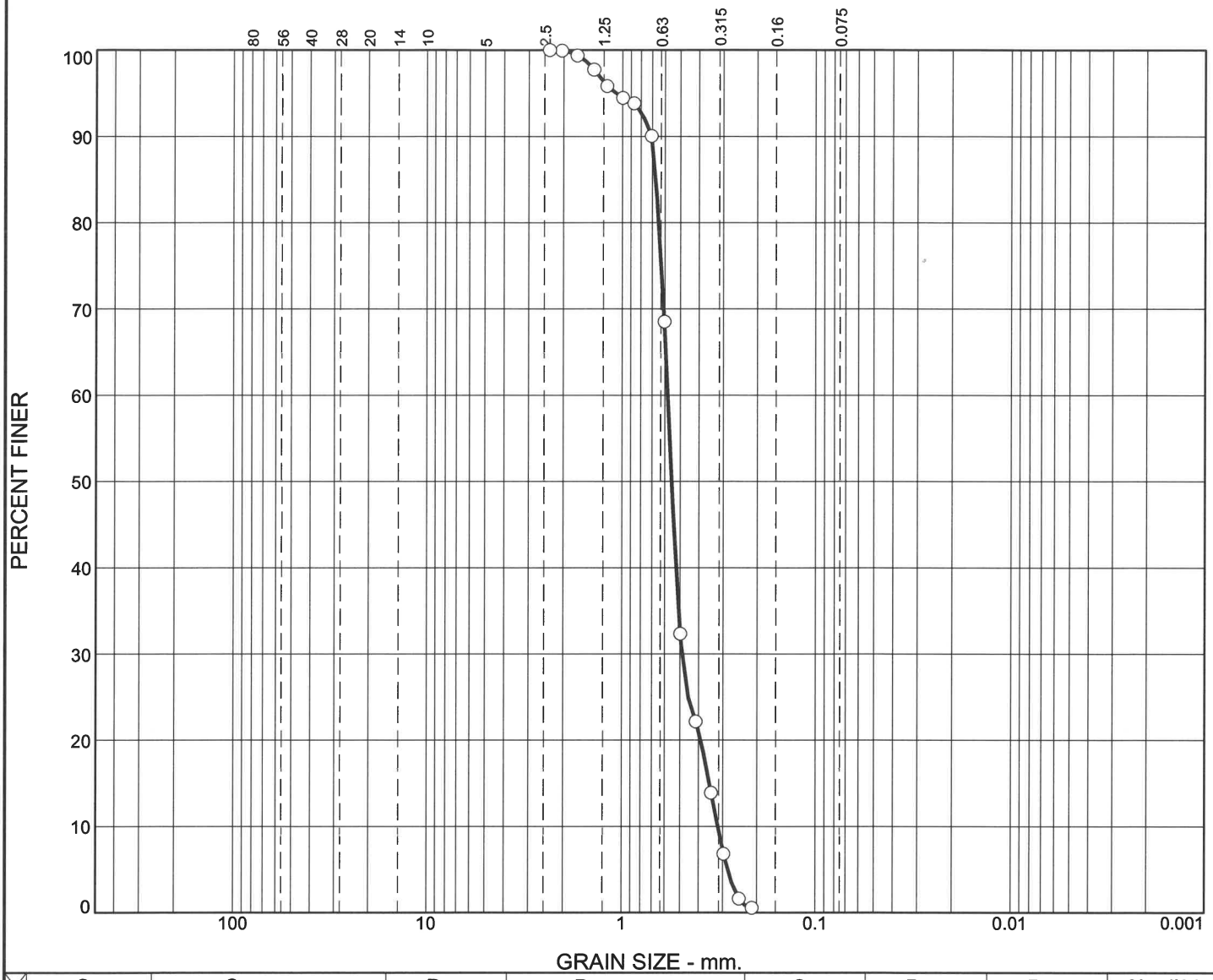
Respectfully submitted,

BOWSER-MORNER, INC.

Karl A. Fletcher
Vice President
Director of Laboratory Services

KAF/ras/drj
118935
1-File
1-billswearingen@sheboyganwater.org

GRAIN SIZE DISTRIBUTION REPORT



	C_u	C_u spec.	D_{10}	D_{10} spec.	C_u	D_{10}	D_{60}	% - #30
○	1.82		0.3190				0.5798	66.9

Material and Supplier

○ Sand Sample 2

Project No. 208715 **Client:** Sheboygan Water

Project: Filter #6 Media Core Testing

○ **Location:** Date Received: 1/19/23

Remarks:

BOWSER-MORNER, INC.

Dayton, Ohio

Tested By: RAS

BOWSER-MORNER, INC.

Delivery Address: 4518 Taylorsville Rd • Dayton, Ohio 45424 **Mailing Address:** P.O. Box 51 • Dayton, Ohio 454

AASHTO/ISO 17025 Accredited • USACE Validated

LABORATORY REPORT

Report To: Sheboygan Water Utility
Attn: Bill Swearingen
72 Park Ave.
Sheboygan, WI 53081

Project/Plant: Filter #6 Media Core Testing
Test Method: AWWA B100-16
Sample ID: **Sand Sample 3 Bottom**

Report Date: 02/15/23
Job No.: 208715
Report No.: 118936
No. of Pages: 2
Date Received: 01/19/23
Date Sampled: 01/16/23

USA Std.	Nominal, mm	Effective, mm	Percent Passing
#8	2.36	2.36	**100.0**
#10	2.00	2.044	**99.8**
#12	1.70	1.703	**99.1**
#14	1.40	1.400	**96.6**
#16	1.18	1.200	**92.8**
#18	1.00	0.994	**89.5**
#20	0.850	0.870	**88.2**
#25	0.710	0.706	**84.7**
#30	0.600	0.605	**65.2**
#35	0.500	0.499	**30.9**
#40	0.425	0.414	**20.1**
#45	0.355	0.345	**11.7**
#50	0.300	0.297	**5.9**
#60	0.250	0.247	**1.4**
#70	0.212	0.212	**0.1**
Effective Size, mm:			**0.33**
Uniformity Coefficient:			**1.8**
Acid Solubility, %:			**1.8**
Specific Gravity, (Apparent):			**2.71**
Moh's Hardness:			**7**
Aluminum, %:			**5.0**
Calcium, %:			**6.4**

Should you have any questions or if we may be of further service, please contact me at 937-236-8805, extension 322.

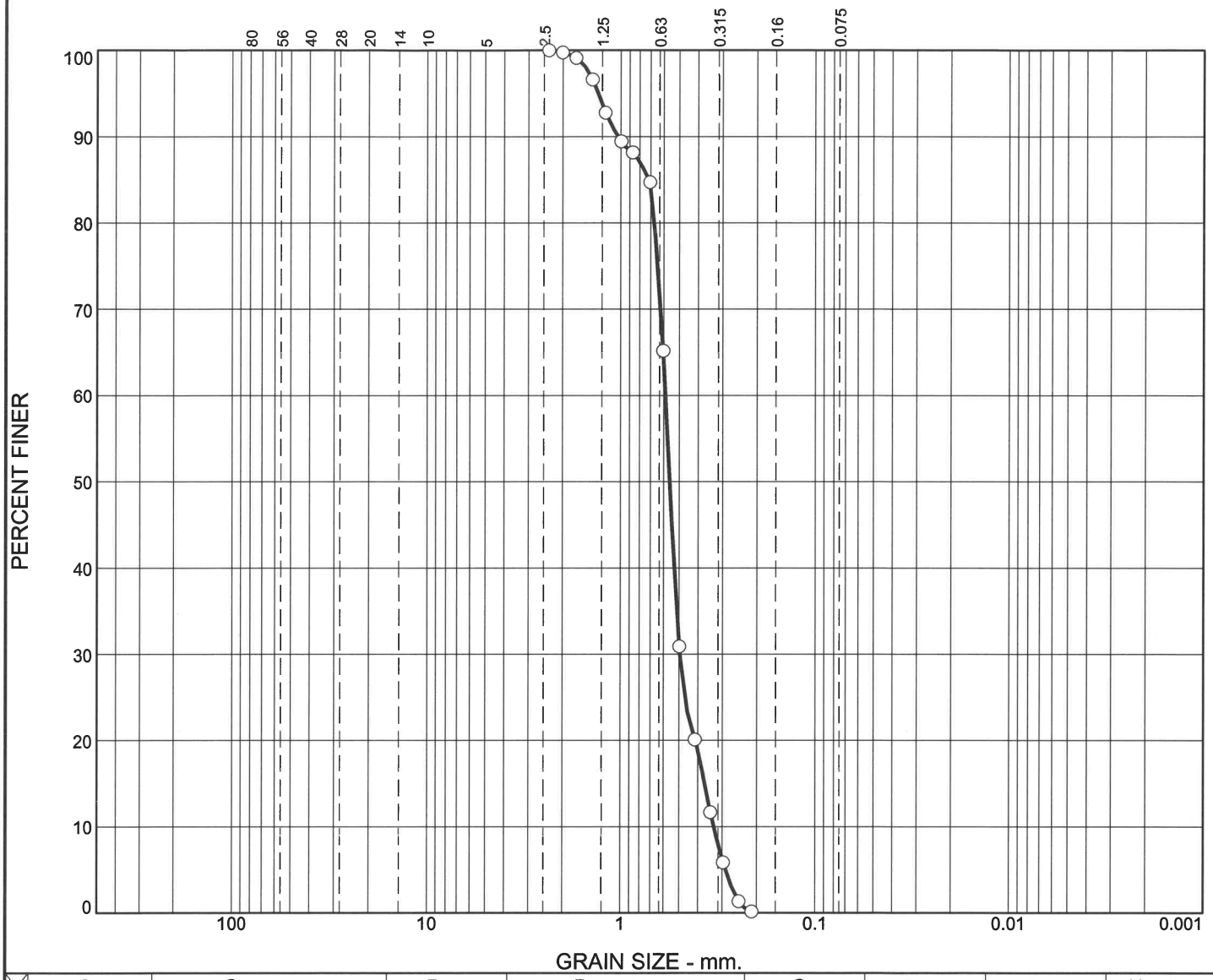
Respectfully submitted,

BOWSER-MORNER, INC.

Karl A. Fletcher
Vice President
Director of Laboratory Services

KAF/ras/drj
118936
1-File
1-billswearingen@sheboyganwater.org

GRAIN SIZE DISTRIBUTION REPORT



	C_u	C_u spec.	D_{10}	D_{10} spec.	C_u	D_{10}	D_{60}	% - #30
○	1.77		0.3322				0.5882	63.7

Material and Supplier

○ Sand Sample 3

Project No. 208715 **Client:** Sheboygan Water

Project: Filter #6 Media Core Testing

○ **Location:** Date Received: 1/19/23

Remarks:

BOWSER-MORNER, INC.

Dayton, Ohio

Tested By: RAS

BOWSER-MORNER, INC.

Delivery Address: 4518 Taylorsville Rd • Dayton, Ohio 45424 **Mailing Address:** P.O. Box 51 • Dayton, Ohio 4540

AASHTO/ISO 17025 Accredited • USACE Validated

LABORATORY REPORT

Report To: Sheboygan Water Utility
Attn: Bill Swearingen
72 Park Ave.
Sheboygan, WI 53081

Project/Plant: Filter #6 Media Core Testing
Test Method: AWWA B100-16
Sample ID: **Sand Sample 4 Bottom**

Report Date: 02/15/23
Job No.: 208715
Report No.: 118937
No. of Pages: 2
Date Received: 01/19/23
Date Sampled: 01/16/23

USA Std.	Nominal, mm	Effective, mm	Percent Passing
#10	2.00	2.044	**100.0**
#12	1.70	1.703	**99.6**
#14	1.40	1.400	**97.7**
#16	1.18	1.200	**95.6**
#18	1.00	0.994	**93.7**
#20	0.850	0.870	**92.8**
#25	0.710	0.706	**89.6**
#30	0.600	0.605	**66.2**
#35	0.500	0.499	**29.8**
#40	0.425	0.414	**21.4**
#45	0.355	0.345	**13.4**
#50	0.300	0.297	**6.3**
#60	0.250	0.247	**1.6**
#70	0.212	0.212	**0.6**
Effective Size, mm:			**0.32**
Uniformity Coefficient:			**1.8**
Acid Solubility, %:			**1.6**
Specific Gravity, (Apparent):			**2.74**
Moh's Hardness:			**7**
Aluminum, %:			**4.8**
Calcium, %:			**6.4**

Should you have any questions or if we may be of further service, please contact me at 937-236-8805, extension 322.

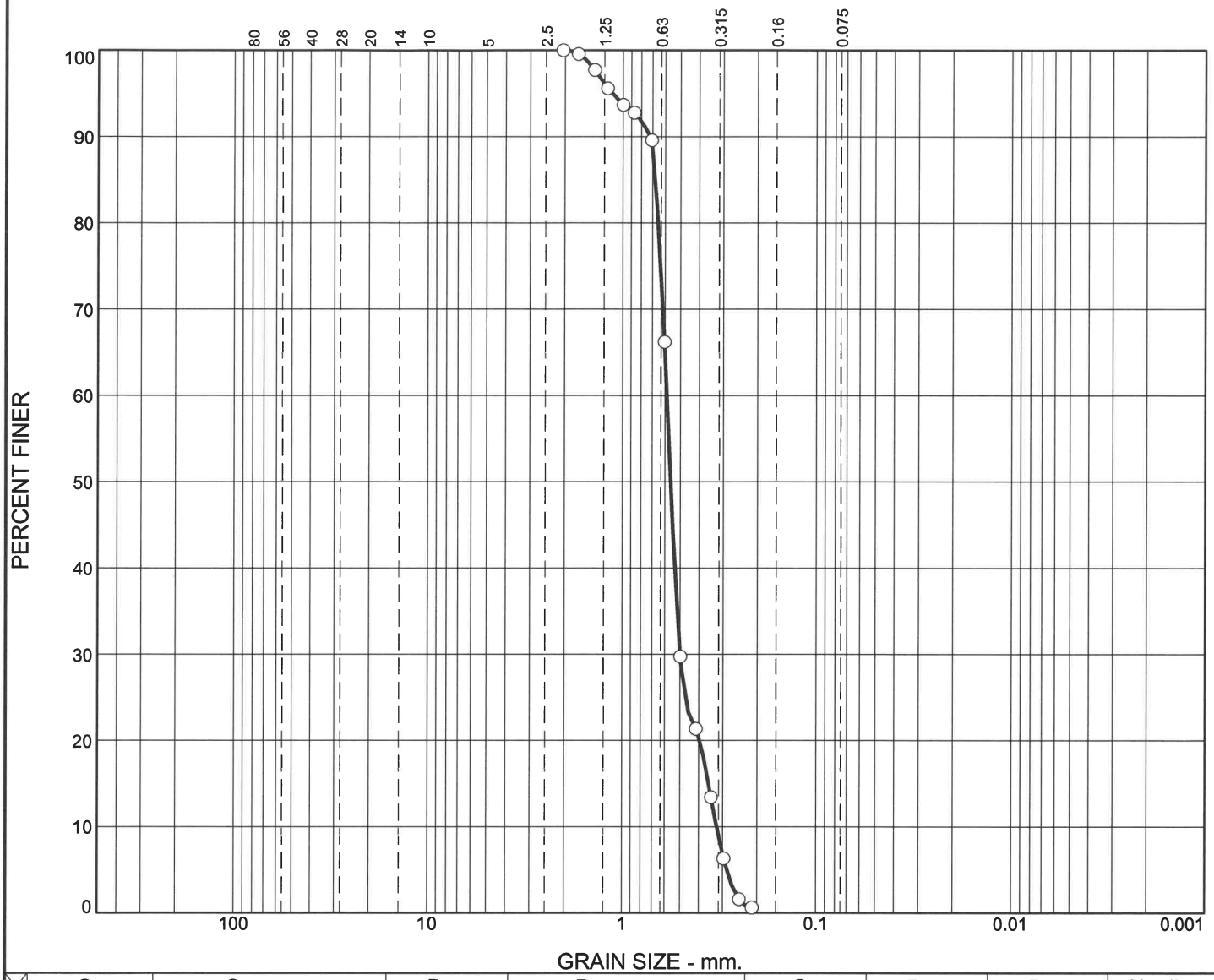
Respectfully submitted,

BOWSER-MORNER, INC.

Karl A. Fletcher
Vice President
Director of Laboratory Services

KAF/ras/drj
118937
1-File
1-billswearingen@sheboyganwater.org

GRAIN SIZE DISTRIBUTION REPORT



	C_u	C_u spec.	D_{10}	D_{10} spec.	C_u	D_{10}	D_{60}	% - #30
○	1.82		0.3226				0.5872	64.5

Material and Supplier

○ Sand Sample 4

Project No. 208715 **Client:** Sheboygan Water

Project: Filter #6 Media Core Testing

○ **Location:** Date Received: 1/19/23

Remarks:

BOWSER-MORNER, INC.

Dayton, Ohio

Tested By: RAS

BOWSER-MORNER, INC.

Delivery Address: 4518 Taylorsville Rd • Dayton, Ohio 45424 **Mailing Address:** P.O. Box 51 • Dayton, Ohio 4540

AASHTO/ISO 17025 Accredited • USACE Validated

LABORATORY REPORT

Report To: Sheboygan Water Utility
Attn: Bill Swearingen
72 Park Ave.
Sheboygan, WI 53081

Project/Plant: Filter #6 Media Core Testing
Test Method: AWWA B100-16
Sample ID: **Sand Sample 5 Bottom**

Report Date: 02/15/23
Job No.: 208715
Report No.: 118938
No. of Pages: 2
Date Received: 01/19/23
Date Sampled: 01/16/23

USA Std.	Nominal, mm	Effective, mm	Percent Passing
#8	2.36	2.36	**100.0**
#10	2.00	2.044	**99.1**
#12	1.70	1.703	**98.2**
#14	1.40	1.400	**93.8**
#16	1.18	1.200	**85.4**
#18	1.00	0.994	**78.6**
#20	0.850	0.870	**76.4**
#25	0.710	0.706	**73.5**
#30	0.600	0.605	**58.7**
#35	0.500	0.499	**30.8**
#40	0.425	0.414	**19.7**
#45	0.355	0.345	**11.0**
#50	0.300	0.297	**5.8**
#60	0.250	0.247	**1.5**
#70	0.212	0.212	**0.6**
Effective Size, mm:			**0.34**
Uniformity Coefficient:			**1.8**
Acid Solubility, %:			**1.9**
Specific Gravity, (Apparent):			**2.70**
Moh's Hardness:			**7**
Aluminum, %:			**5.6**
Calcium, %:			**4.2**

Should you have any questions or if we may be of further service, please contact me at 937-236-8805, extension 322.

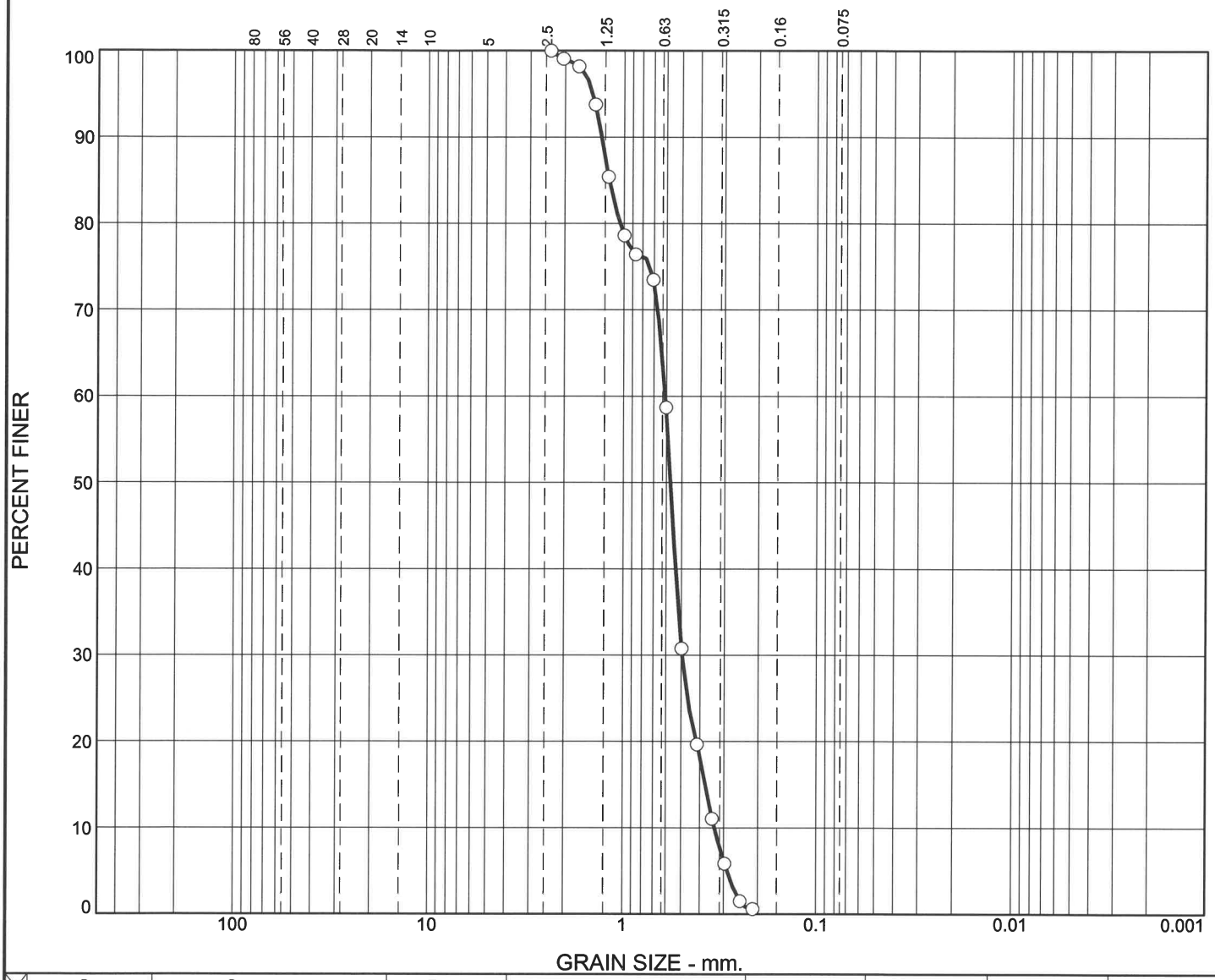
Respectfully submitted,

BOWSER-MORNER, INC.

Karl A. Fletcher
Vice President
Director of Laboratory Services

KAF/ras/drj
118938
1-File
1-billswearingen@sheboyganwater.org

GRAIN SIZE DISTRIBUTION REPORT



	C_u	C_u spec.	D_{10}	D_{10} spec.	C_u	D_{10}	D_{60}	% - #30
○	1.82		0.3363				0.6108	57.5

Material and Supplier

○ Sand Sample 5

Project No. 208715 **Client:** Sheboygan Water

Project: Filter #6 Media Core Testing

○ **Location:** Date Received: 1/19/23

Remarks:

BOWSER-MORNER, INC.

Dayton, Ohio

Tested By: RAS

BOWSER-MORNER, INC.

Delivery Address: 4518 Taylorsville Rd • Dayton, Ohio 45424 **Mailing Address:** P.O. Box 51 • Dayton, Ohio 45401

AASHTO/ISO 17025 Accredited • USACE Validated ACIL INDEPENDENCE

LABORATORY REPORT

Report To: Sheboygan Water Utility
Attn: Bill Swearingen
72 Park Ave.
Sheboygan, WI 53081

Project/Plant: Filter #6 Media Core Testing
Test Method: AWWA B100-16
Sample ID: **Sand Sample 6 Bottom**

Report Date: 02/15/23
Job No.: 208715
Report No.: 118939
No. of Pages: 2
Date Received: 01/19/23
Date Sampled: 01/16/23

USA Std.	Nominal, mm	Effective, mm	Percent Passing
#8	2.36	2.36	**100.0**
#10	2.00	2.044	**99.7**
#12	1.70	1.703	**98.9**
#14	1.40	1.400	**96.3**
#16	1.18	1.200	**93.1**
#18	1.00	0.994	**91.1**
#20	0.850	0.870	**90.3**
#25	0.710	0.706	**86.7**
#30	0.600	0.605	**67.9**
#35	0.500	0.499	**33.9**
#40	0.425	0.414	**22.3**
#45	0.355	0.345	**14.2**
#50	0.300	0.297	**7.6**
#60	0.250	0.247	**2.0**
#70	0.212	0.212	**1.2**
#80	0.180	0.180	**0.6**
Effective Size, mm:			**0.31**
Uniformity Coefficient:			**1.8**
Acid Solubility, %:			**1.7**
Specific Gravity, (Apparent):			**2.65**
Moh's Hardness:			**7**
Aluminum, %:			**5.0**
Calcium, %:			**6.3**

Should you have any questions or if we may be of further service, please contact me at 937-236-8805, extension 322.

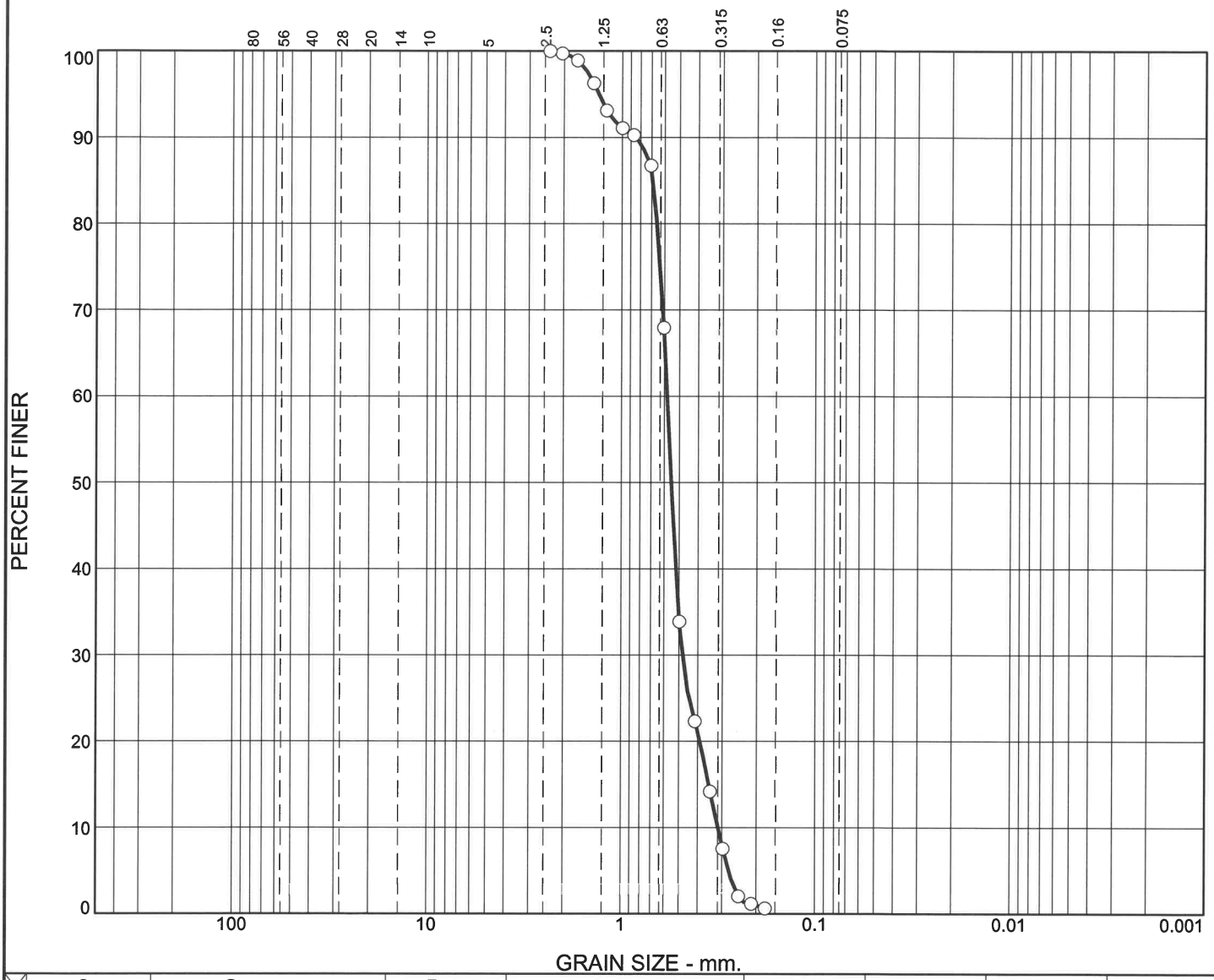
Respectfully submitted,

BOWSER-MORNER, INC.

Karl A. Fletcher
Vice President
Director of Laboratory Services

KAF/ras/drj
118939
1-File
1-billswearingen@sheboyganwater.org

GRAIN SIZE DISTRIBUTION REPORT



	C_u	C_u spec.	D_{10}	D_{10} spec.	C_u	D_{10}	D_{60}	% - #30
○	1.84		0.3148				0.5794	66.5

Material and Supplier

○ Sand Sample 6

Project No. 208715 **Client:** Sheboygan Water

Project: Filter #6 Media Core Testing

○ **Location:** Date Received: 1/19/23

Remarks:

BOWSER-MORNER, INC.

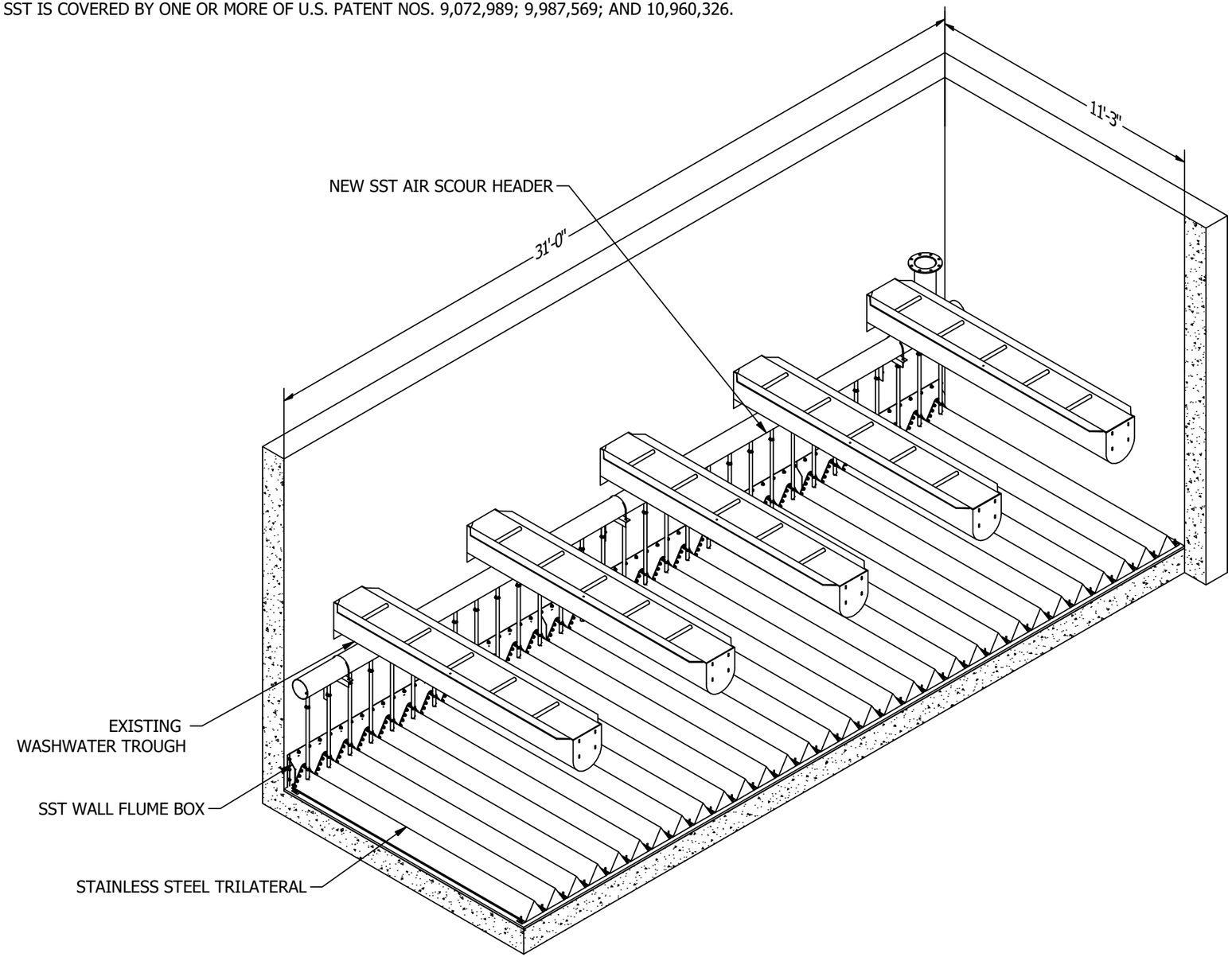
Dayton, Ohio

Tested By: RAS

Appendix B – Roberts Underdrain Drawings

GENERAL NOTES:

1. ROBERTS PROPOSES FURNISHING THE FOLLOWING EQUIPMENT FOR INSTALLATION BY OTHERS IN FILTERS 1-9: THIRTY-ONE (31) STAINLESS STEEL TRILATERAL UNDERDRAIN LATERALS, HOLDDOWNS AND HARDWARE, WALL FLUME BOX AND REPLACEMENT AIR CONNECTION PARTS.
2. DIMENSIONS AND OTHER INFORMATION PRESENTED ON THIS DRAWING REPRESENT ROBERTS INTERPRETATION OF THE PROJECT REQUIREMENTS BASED UPON THE PLANS AND SPECIFICATIONS PREPARED BY OTHERS. ROBERTS HAS NOT AND WILL NOT MAKE ANY SITE SURVEY AND WE EXPECT THE PURCHASER TO VERIFY ALL MEASUREMENTS SHOWN, PROVIDE NEW INFORMATION WHERE REQUIRED, AND ADVISE US OF ANY CONDITIONS NOT HERETOFORE DISCLOSED THAT WILL IMPACT THE DESIGN OR OPERATION OF OUR EQUIPMENT. ROBERTS WILL ASSUME NO RESPONSIBILITY FOR ANY COST ASSOCIATED WITH EXTRA WORK NECESSITATED BY UNDISCLOSED CONDITIONS.
3. DESIGN SHOWN IS PRELIMINARY AND SUBJECT TO CHANGE.
4. ROBERTS TRILATERAL SST IS COVERED BY ONE OR MORE OF U.S. PATENT NOS. 9,072,989; 9,987,569; AND 10,960,326.



ISO VIEW

(REF DWG 22-1212-M8 FOR PLAN VIEW)
(TYP OF FILTERS 1 THRU 9 RIGHT BAY.
LEFT BAY IS A MIRRORED DESIGN)

PRELIMINARY 12/12/2022

DRAWN: CRE
DATE: 12/12/2022
CHECKED:
DATE:

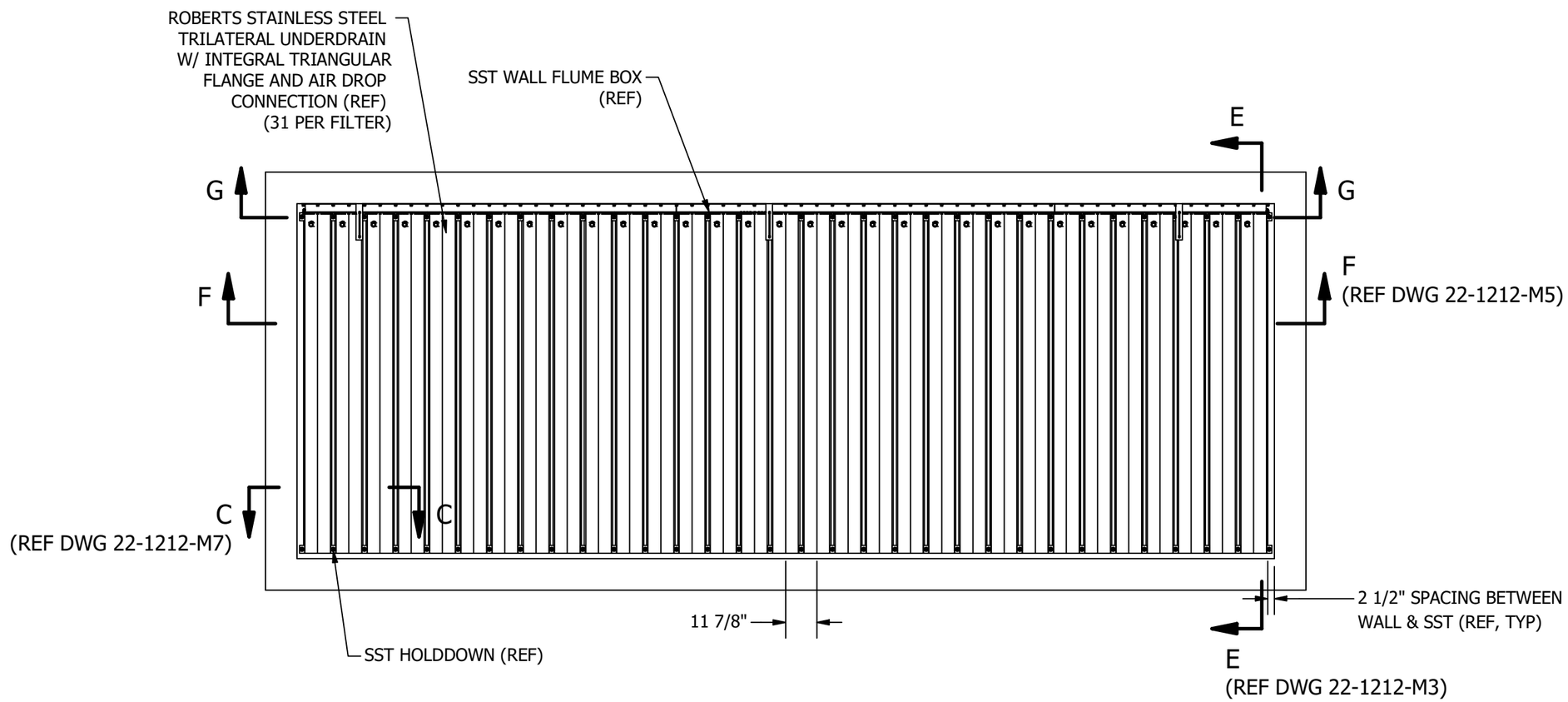
©ROBERTS WATER TECHNOLOGIES, INC.
COATESVILLE, PENNSYLVANIA 19320

FILTER 1-9 STAINLESS STEEL TRILATERAL
ISOMETRIC VIEW
SHEBOYGAN, WI

SCALE: 5/16" = 1'
CONTRACT: 22-1212-T
SECTION: A
DWG NO.: 22-1212-M

NOTES:

- REF DWG 22-1212-M4 FOR ANCHOR LAYOUT.
- TROUGHS AND AIR PIPING HIDDEN FROM PLAN VIEW FOR CLARITY.



PLAN VIEW

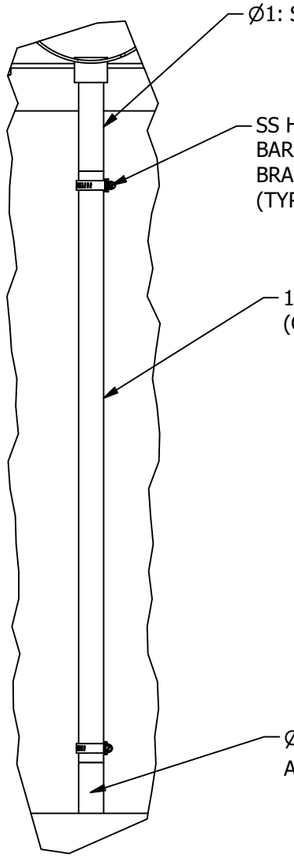
DRAWN: CRE
DATE: 12/12/2022
CHECKED:
DATE:

ROBERTS WATER TECHNOLOGIES, INC.
COATESVILLE, PENNSYLVANIA 19320

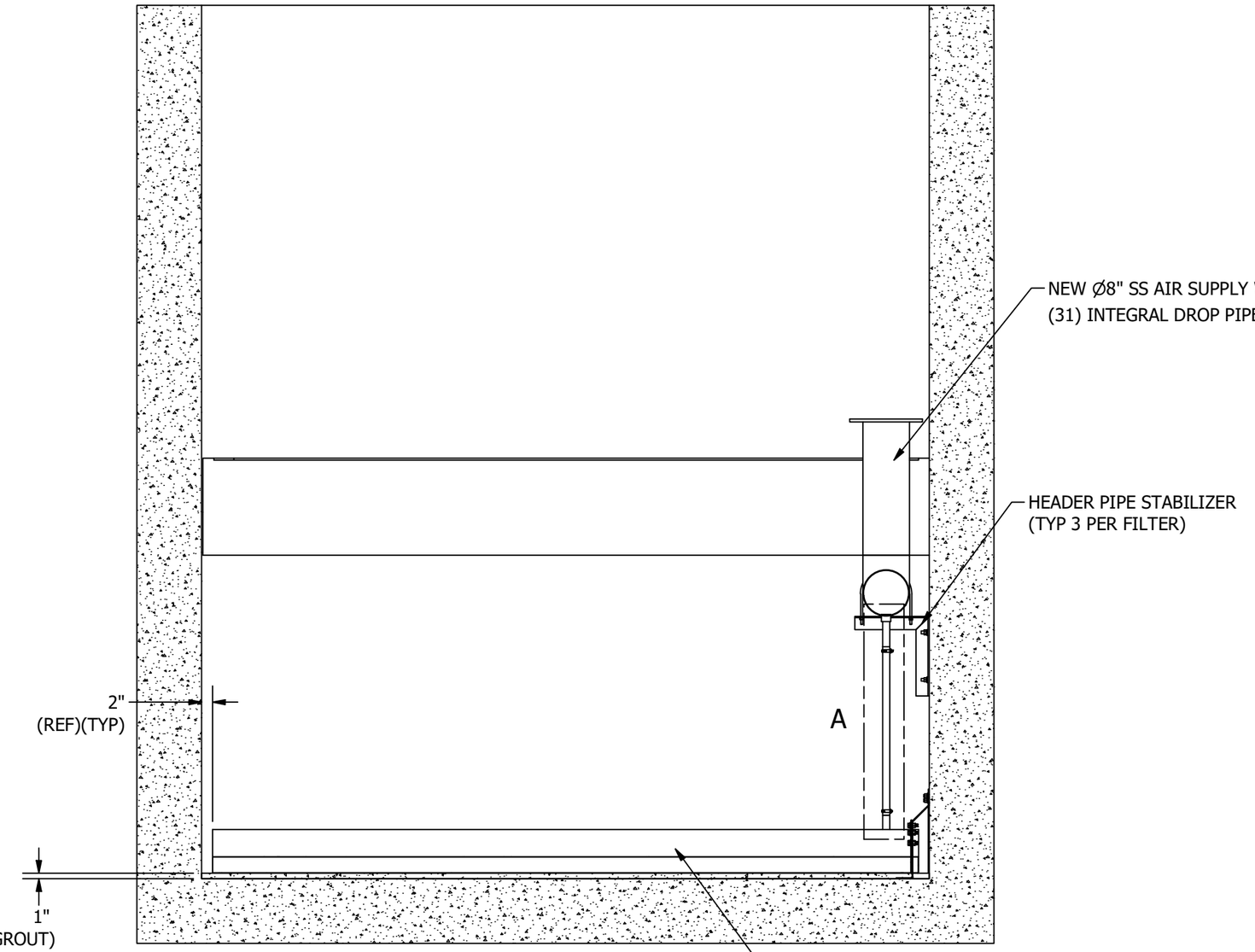
FILTERS 1-9 STAINLESS STEEL TRILATERAL
PLAN VIEW
SHEBOYGAN, WI

SCALE: 3/8" = 1'
CONTRACT: 22-1212-T
SECTION: A
DWG NO.: 22-1212-M

PRELIMINARY 12/12/2022



DETAIL A
SCALE 1 1/2" = 1'-0"



SECTION E-E
SCALE 1/2" = 1'

PRELIMINARY 12/12/2022

DRAWN: CRE
DATE: 12/12/2022
CHECKED:
DATE:

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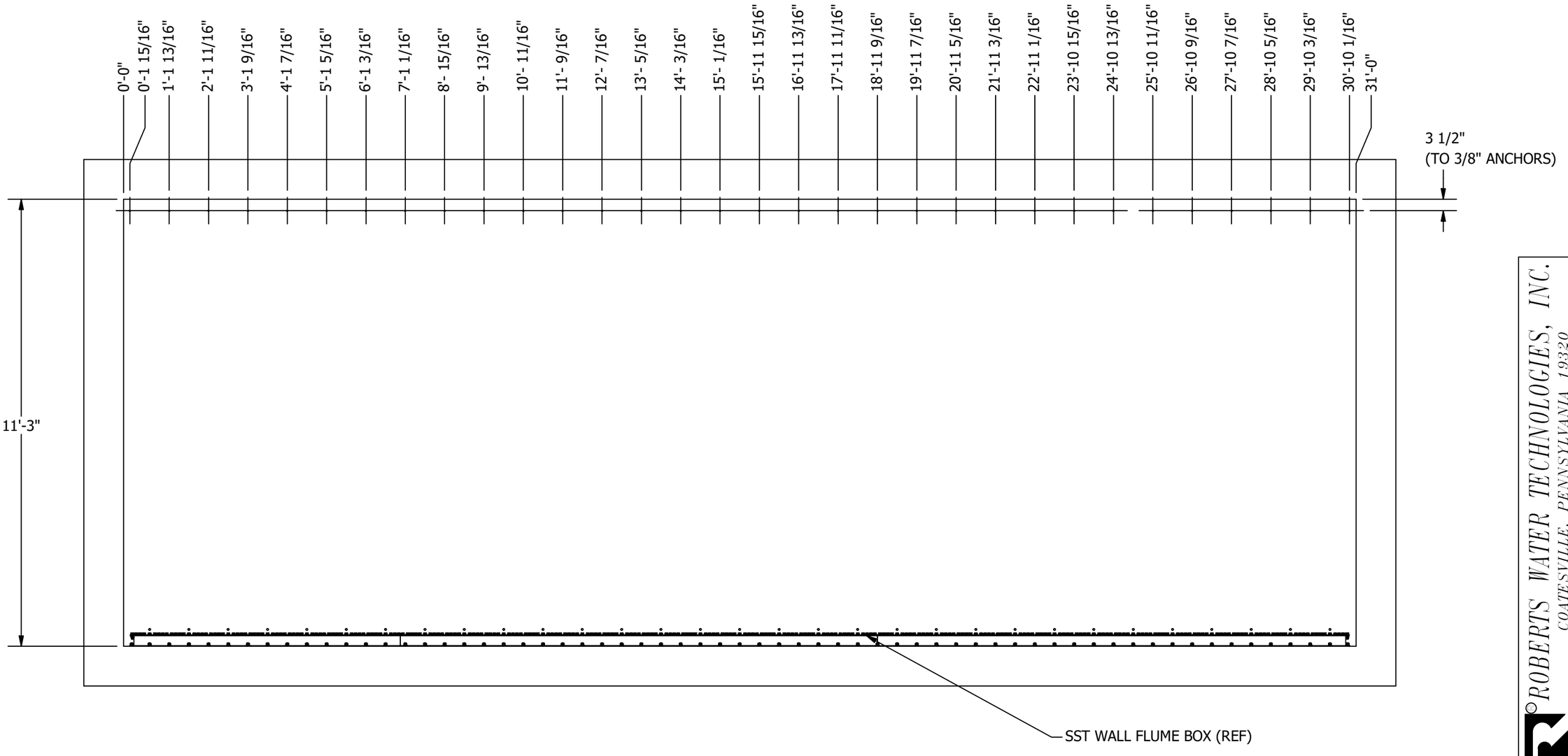
FILTERS 1-9 STAINLESS STEEL TRILATERAL
ELEVATION SECTION E-E
SHEBOYGAN, WI

SCALE: AS SHOWN
CONTRACT: 22-1212-T
SECTION: A
DWG NO.: 22-1212-M

NOTES:

1. LOCATE AND PLACE ANCHORS BEFORE POURING LEVELING GROUT.
2. LEVEL THE FLOOR BY USING LEVELING GROUT AND POUR AROUND ANCHORS.



PLAN VIEW - ANCHOR & GASKET LAYOUT

SCALE: 3/8" = 1'

PRELIMINARY 12/12/2022

DRAWN: CRE
DATE: 12/12/2022
CHECKED:
DATE:

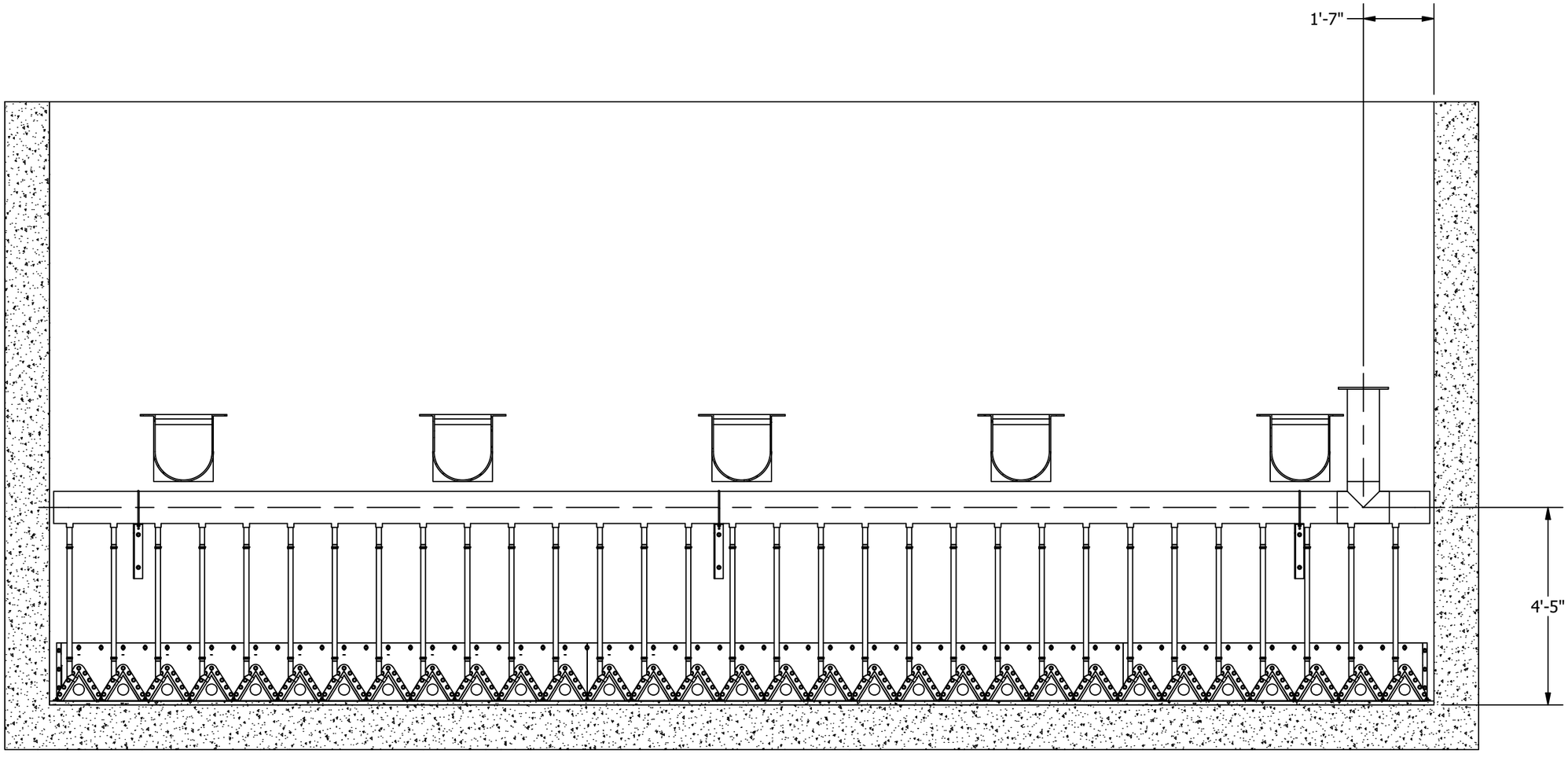
ROBERTS WATER TECHNOLOGIES, INC.
COATESVILLE, PENNSYLVANIA 19320

FILTERS 1-9 ANCHOR/GASKET LAYOUT
FOR STAINLESS STEEL TRILATERAL
SHEBOYGAN, WI

SCALE: 1/2" - 1'-0"
CONTRACT: 22-1212-T
SECTION: A
DWG NO.: 22-1212-M

NOTES:

1. ENSURE PIPE SUPPORTS ARE LEVEL. DIMENSIONS ARE TAKEN FROM FLOOR ASSUMING LEVEL FLOOR.



SECTION F-F

SCALE 3/8" = 1'

(REF DWG 22-1212-M2)

PRELIMINARY 12/12/2022

DRAWN: CRE
DATE: 12/12/2022
CHECKED:
DATE:

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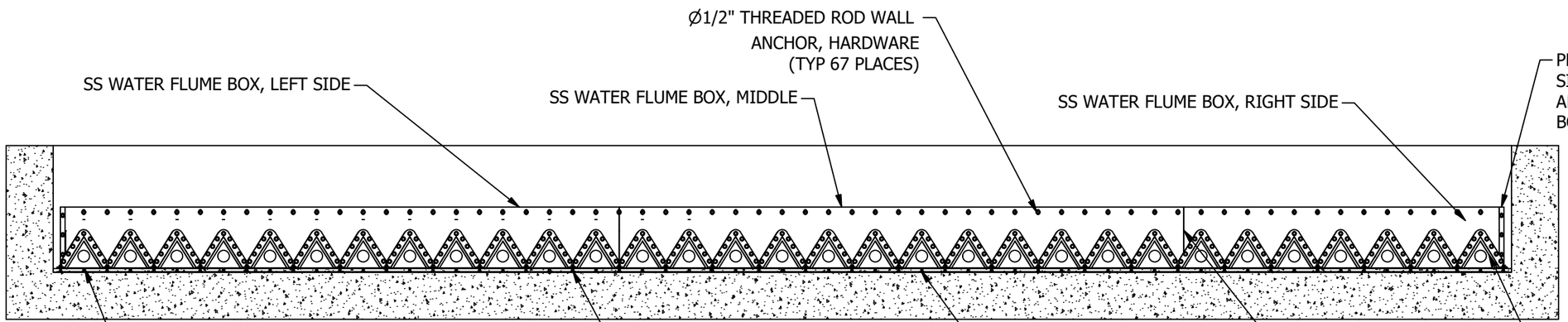
FILTERS 1-9 FLUME SECTION F-F
HEADER & DROP PIPE ASSEMBLY
SHEBOYGAN, WI

SCALE: 3/4"=1'
CONTRACT: 22-1212-T
SECTION: A
DWG NO.: 22-1212-M

NOTES:

1. BEFORE INSTALLATION, MAKES SURE WALL IS FLAT WITHIN ±1/8", MAKE SURE THE FLOOR IS LEVEL WITHIN ±1/8".
2. USE BOX TO LOCATE ANCHORS THAT ARE TO BE FASTENED INTO FLOOR AND WALL. MAKE SURE BOX IS LEVEL WHEN MARKING PLACEMENT OF ANCHORS. USE SHIMS IF NEEDED.
3. REMOVE BOX, DRILL AND PLACE ANCHORS WITH HILTI HY-200 OR EQUAL.
4. PLACE SIKAFLEX-1A ON THE BACK SIDE OF NEOPRENE GASKET AND PLACE ON THE WALL AND FLOOR AROUND THE ANCHORS TO LINE UP WITH THE OUTER FLANGES OF THE FLUME BOX.
5. PLACE SIKAFLEX-1A ON GASKET OR BOX AND PLACE BOX ONTO FLOOR AND WALL. SECURE BOX IN PLACE WITH HARDWARE.
6. USE LEVELING GROUT TO LEVEL THE FLOOR AND COVER THE BOTTOM OF THE BOX WITH 1" OF GROUT.
7. USE SIKAFLEX-1A ON BOTH SIDES OF THE TRIANGULAR GASKET, USE SIKAFLX-1A ON GASKET AND PLACE ON FLOOR UP AGAINST FLUME BOX. PUT SIKAFLEX ON THE BOTTOM OF THE LATERAL AND INSTALL LATERAL WITH BOLTS AND HARDWARE.
8. SECURE LATERAL TO THE FLOOR WITH HOLDDOWN CLIPS.



SECTION G-G

SCALE 3/8" = 1'

PRELIMINARY 12/12/2022

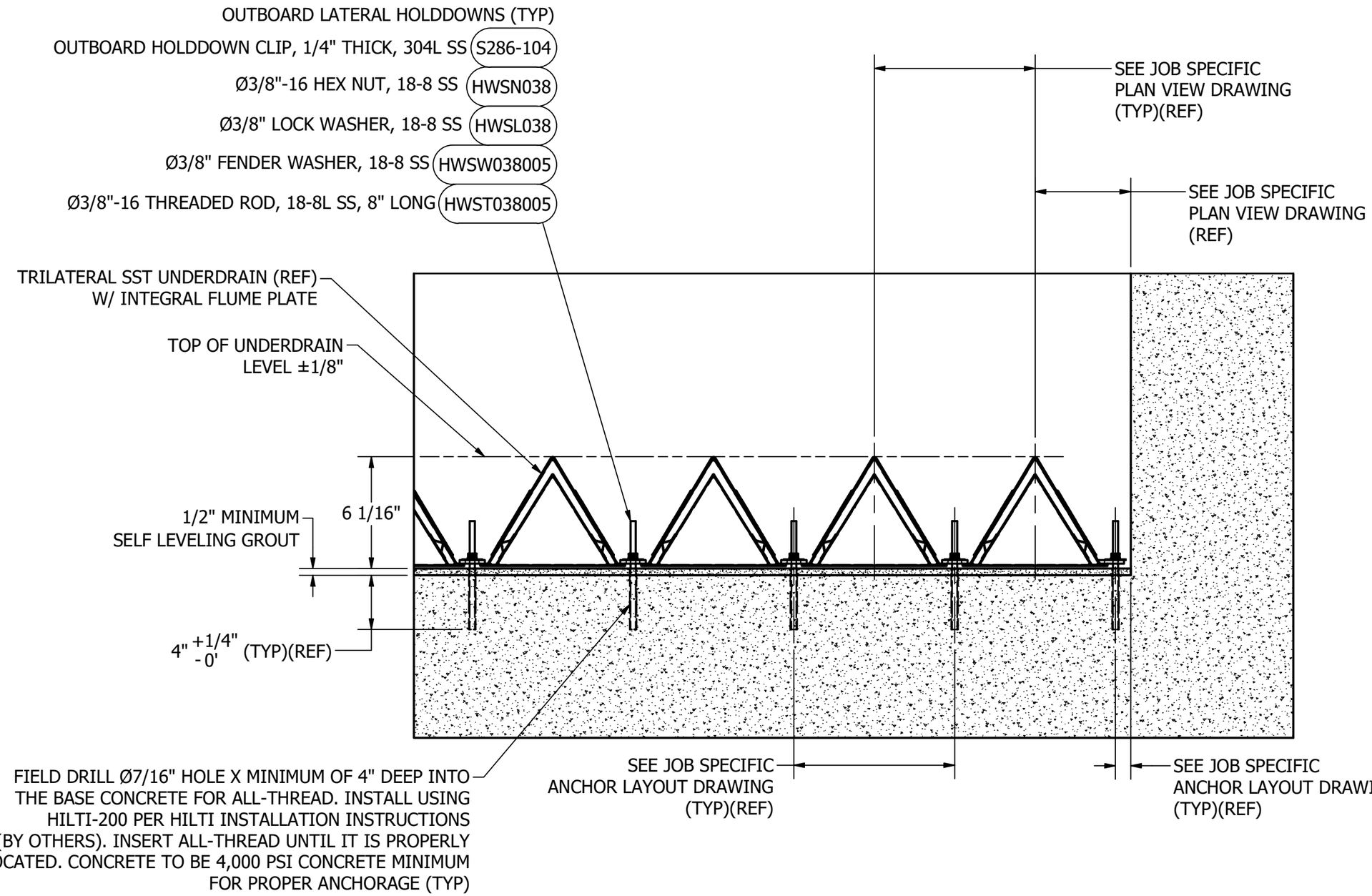
DRAWN: CRE
DATE: 12/12/2022
CHECKED:
DATE:

ROBERTS WATER TECHNOLOGIES, INC.
COATESVILLE, PENNSYLVANIA 19320

FILTERS 1-9 FLUME BOX SECTION G-G
STAINLESS STEEL TRILATERAL
SHEBOYGAN, WI

SCALE: 1/2" = 1'-0"
CONTRACT: 22-1212-T
SECTION: A
DWG NO.: 22-1212-M

NOTES:
OUTBOARD HOLDDOWN CLIP S286-104 TO OVERLAP LATERAL EDGE A MINIMUM OF 1/4".



SECTION C-C
SCALE 1 1/2" = 1'-0"
(REF JOB SPECIFIC PLAN VIEW)

S286-M21

ROBERTS WATER TECHNOLOGIES, INC.
COATESVILLE, PENNSYLVANIA 19320

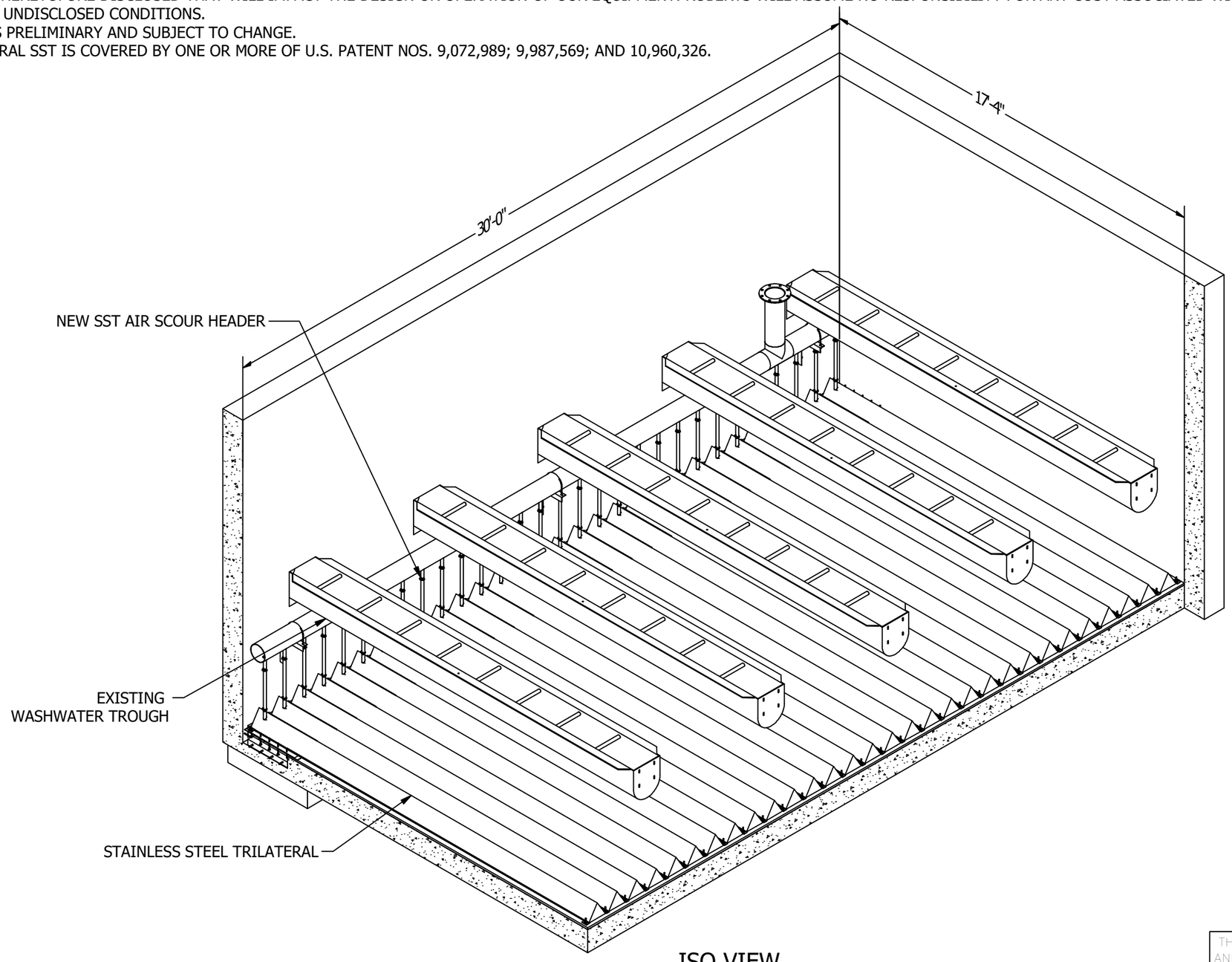
STAINLESS STEEL TRILATERAL
ELEVATION C-C
(OUTBOARD AUXILIART Ø3/8" ANCHORS, 304 SS)

DRAWN: CRE
CHECKED:
DATE: 12/12/2022
DATE:

SCALE: 1 1/2" = 1'-0"
CONTRACT: 22-1212-T
SECTION: A
DWG NO.: 22-1212-M

GENERAL NOTES:

1. ROBERTS PROPOSES FURNISHING THE FOLLOWING EQUIPMENT FOR INSTALLATION BY OTHERS IN FILTERS 10-11: THIRTY (30) STAINLESS STEEL TRILATERAL UNDERDRAIN LATERALS, HOLDDOWNS AND HARDWARE, WALL FLUME BOX AND REPLACEMENT AIR CONNECTION PARTS.
2. DIMENSIONS AND OTHER INFORMATION PRESENTED ON THIS DRAWING REPRESENT ROBERTS INTERPRETATION OF THE PROJECT REQUIREMENTS BASED UPON THE PLANS AND SPECIFICATIONS PREPARED BY OTHERS. ROBERTS HAS NOT AND WILL NOT MAKE ANY SITE SURVEY AND WE EXPECT THE PURCHASER TO VERIFY ALL MEASUREMENTS SHOWN, PROVIDE NEW INFORMATION WHERE REQUIRED, AND ADVISE US OF ANY CONDITIONS NOT HERETOFORE DISCLOSED THAT WILL IMPACT THE DESIGN OR OPERATION OF OUR EQUIPMENT. ROBERTS WILL ASSUME NO RESPONSIBILITY FOR ANY COST ASSOCIATED WITH EXTRA WORK NECESSITATED BY UNDISCLOSED CONDITIONS.
3. DESIGN SHOWN IS PRELIMINARY AND SUBJECT TO CHANGE.
4. ROBERTS TRILATERAL SST IS COVERED BY ONE OR MORE OF U.S. PATENT NOS. 9,072,989; 9,987,569; AND 10,960,326.



ISO VIEW

(REF DWG 22-1212-M11 FOR PLAN VIEW)
(TYP OF FILTERS 10 & 11 RIGHT BAY.
LEFT BAY IS A MIRRORED DESIGN)

PRELIMINARY 12/12/2022

DRAWN: CRE
DATE: 12/12/2022
CHECKED:
DATE:

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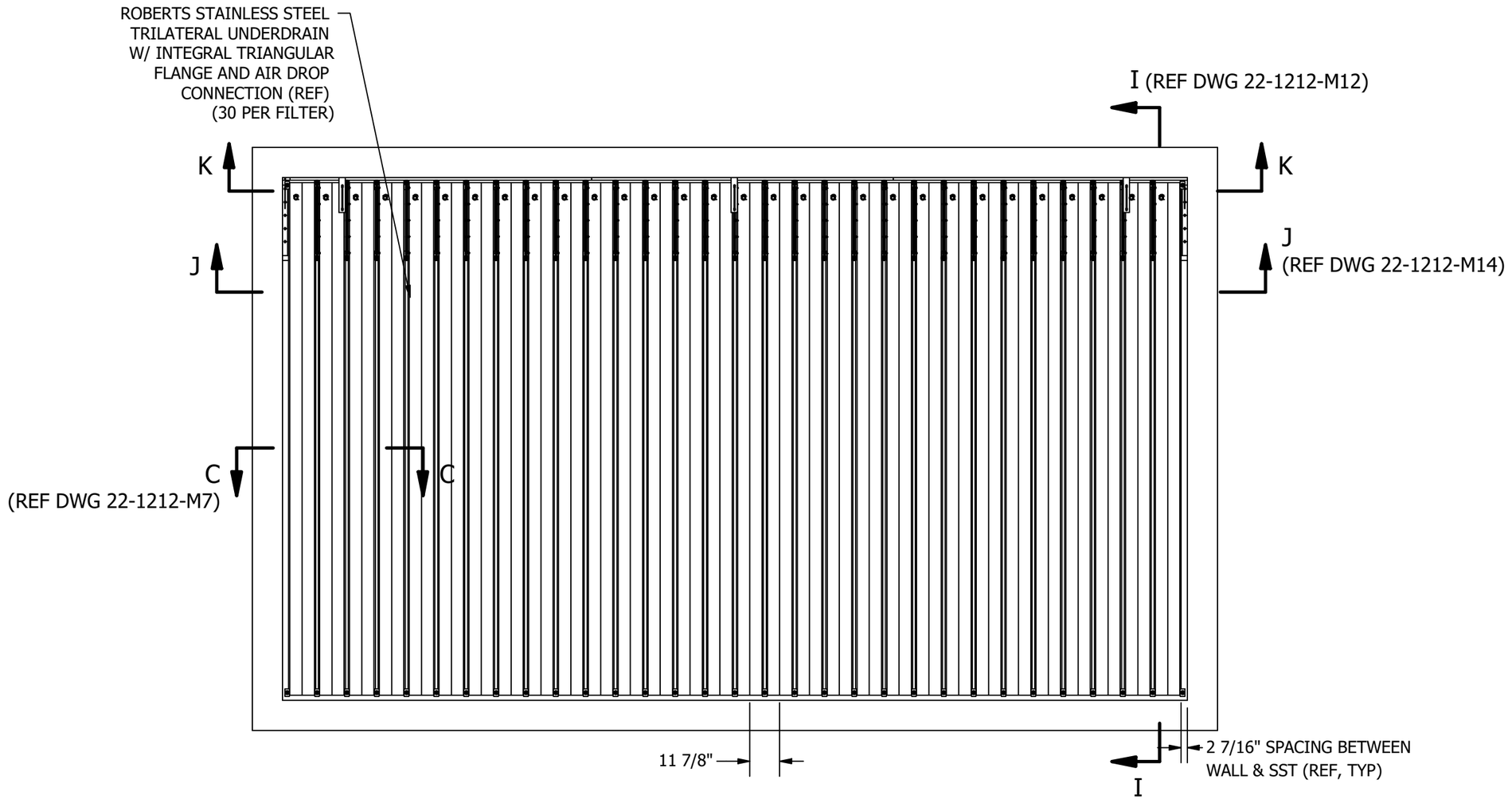
FILTER 10-11 STAINLESS STEEL TRILATERAL
ISOMETRIC VIEW
SHEBOYGAN, WI

SCALE: 5/16" = 1'
CONTRACT: 22-1212-T
SECTION: A
DWG NO.: 22-1212-M1

NOTES:
- REF DWG 22-1212-M13 FOR ANCHOR LAYOUT.
- TROUGHS AND AIR PIPING HIDDEN FROM PLAN VIEW FOR CLARITY.



PLAN VIEW

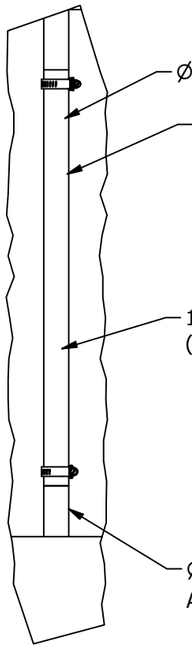
PRELIMINARY 12/12/2022

DRAWN: CRE
DATE: 12/12/2022
CHECKED:
DATE:

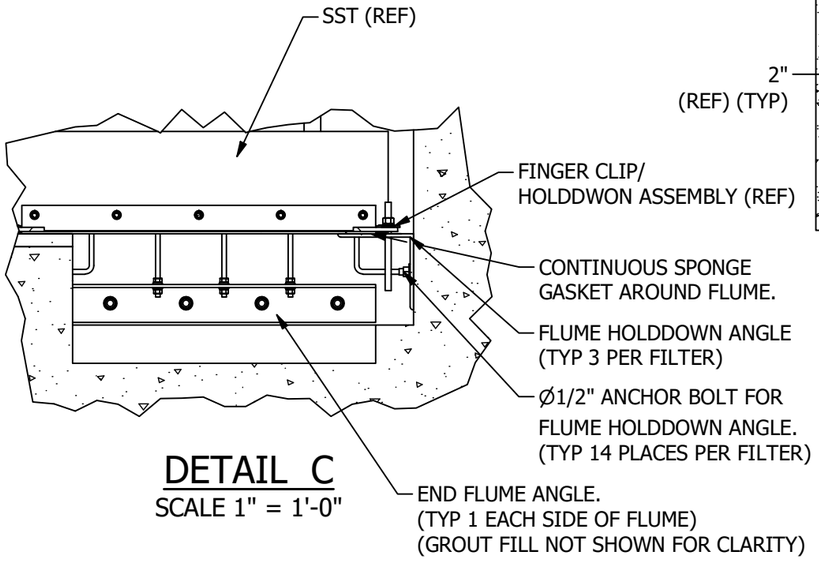
ROBERTS WATER TECHNOLOGIES, INC.
COATESVILLE, PENNSYLVANIA 19320

FILTERS 10-11 STAINLESS STEEL TRILATERAL
PLAN VIEW
SHEBOYGAN, WI

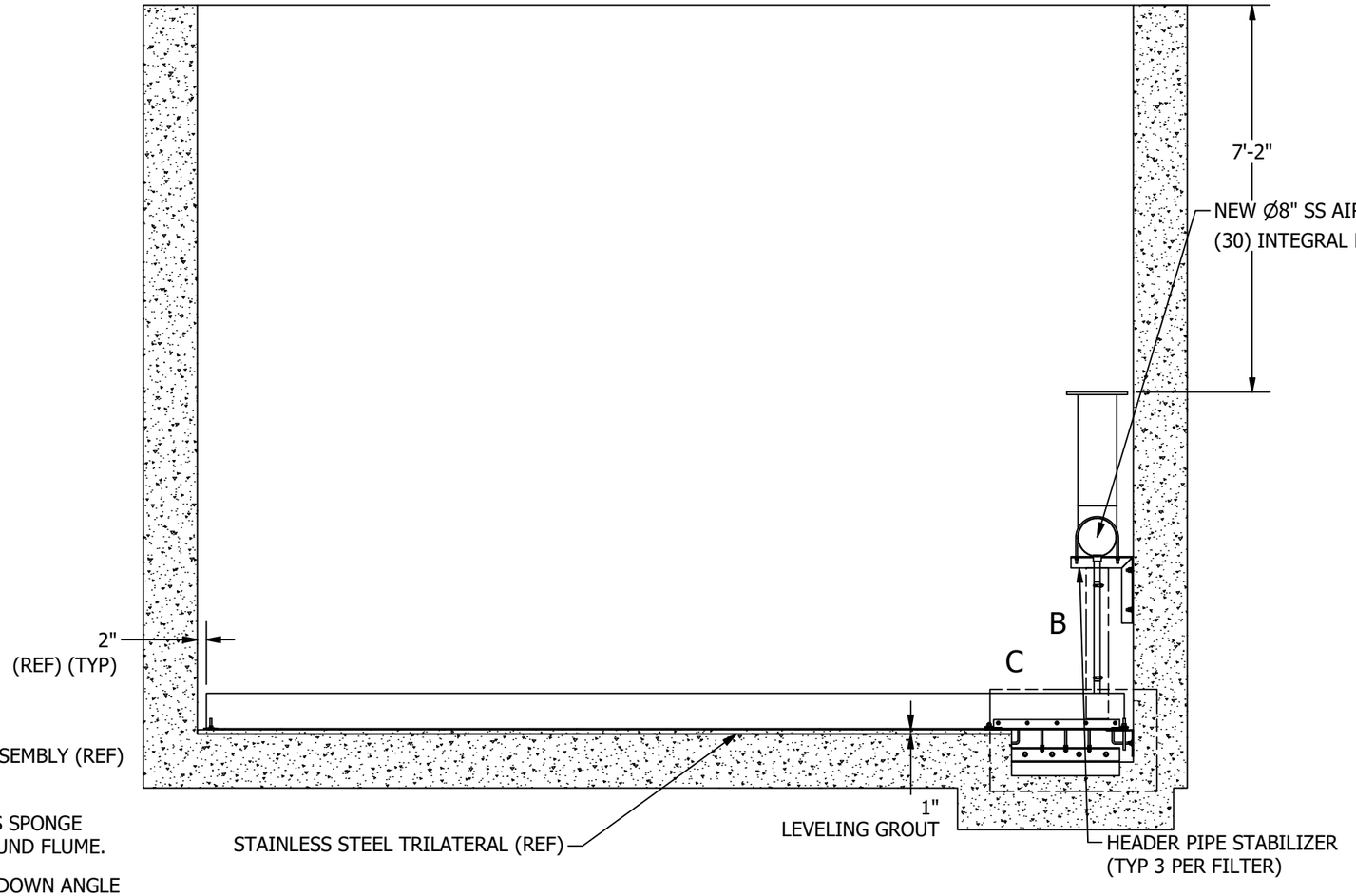
SCALE: 3/8" = 1'
CONTRACT: 22-1212-T
SECTION: A
DWG NO.: 22-1212-M1



DETAIL B
SCALE 1 1/2" = 1'-0"



DETAIL C
SCALE 1" = 1'-0"



SECTION I-I
SCALE 3/8" = 1'

DRAWN: CRE
DATE: 12/12/2022
CHECKED:
DATE:

ROBERTS WATER TECHNOLOGIES, INC.
COATESVILLE, PENNSYLVANIA 19320

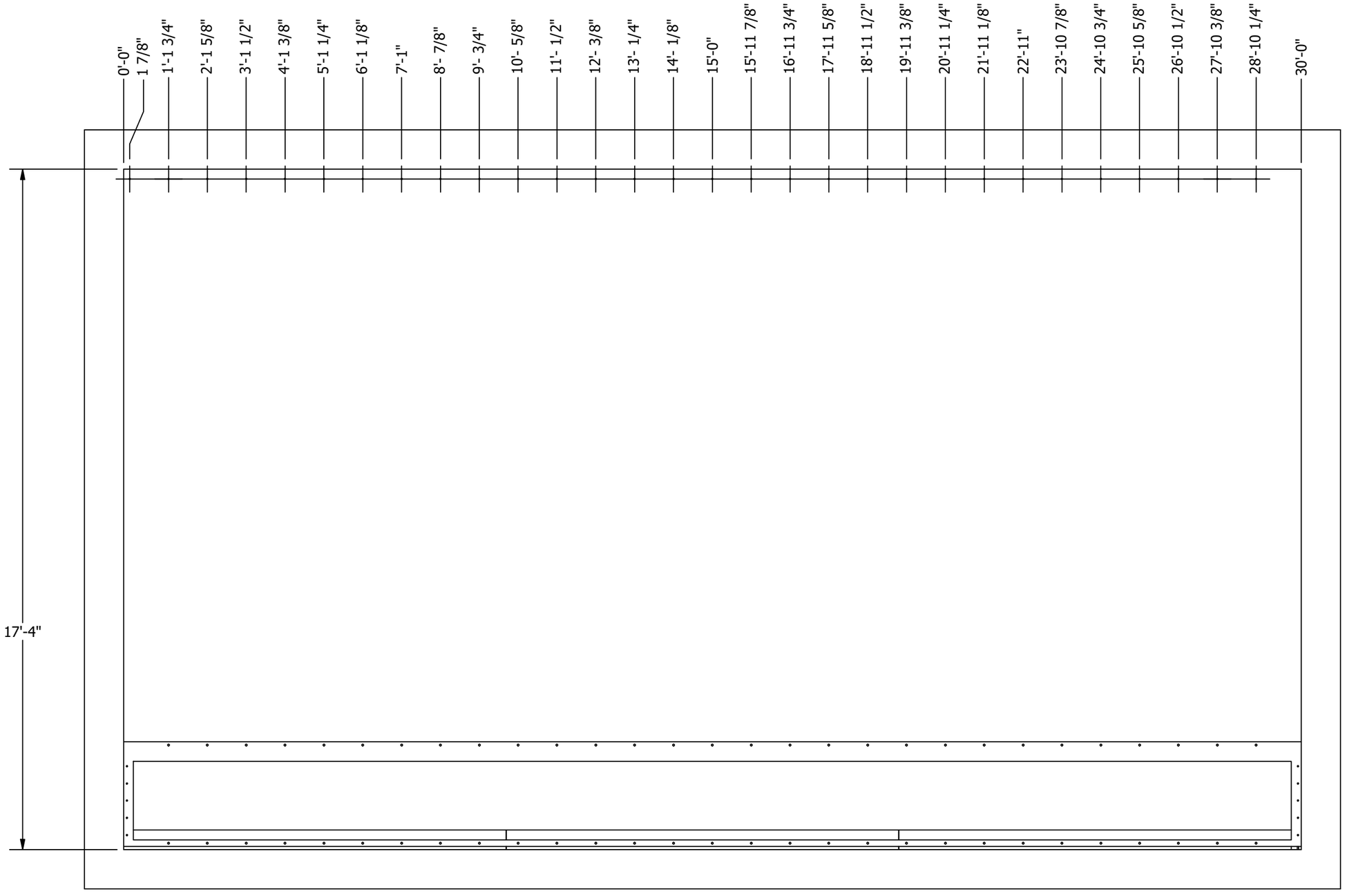
FILTERS 10-11 STAINLESS STEEL TRILATERAL
ELEVATION SECTION E-E
SHEBOYGAN, WI

SCALE: AS SHOWN
CONTRACT: 22-1212-T
SECTION: A
DWG NO.: 22-1212-M1

PRELIMINARY 12/12/2022

NOTES:

1. LOCATE AND PLACE ANCHORS BEFORE POURING LEVELING GROUT.
2. LEVEL THE FLOOR BY USING LEVELING GROUT AND POUR AROUND ANCHORS.



PLAN VIEW - ANCHOR & GASKET LAYOUT

SCALE: 3/8" = 1'

PRELIMINARY 12/12/2022

DRAWN: CRE
DATE: 12/12/2022
CHECKED:
DATE:

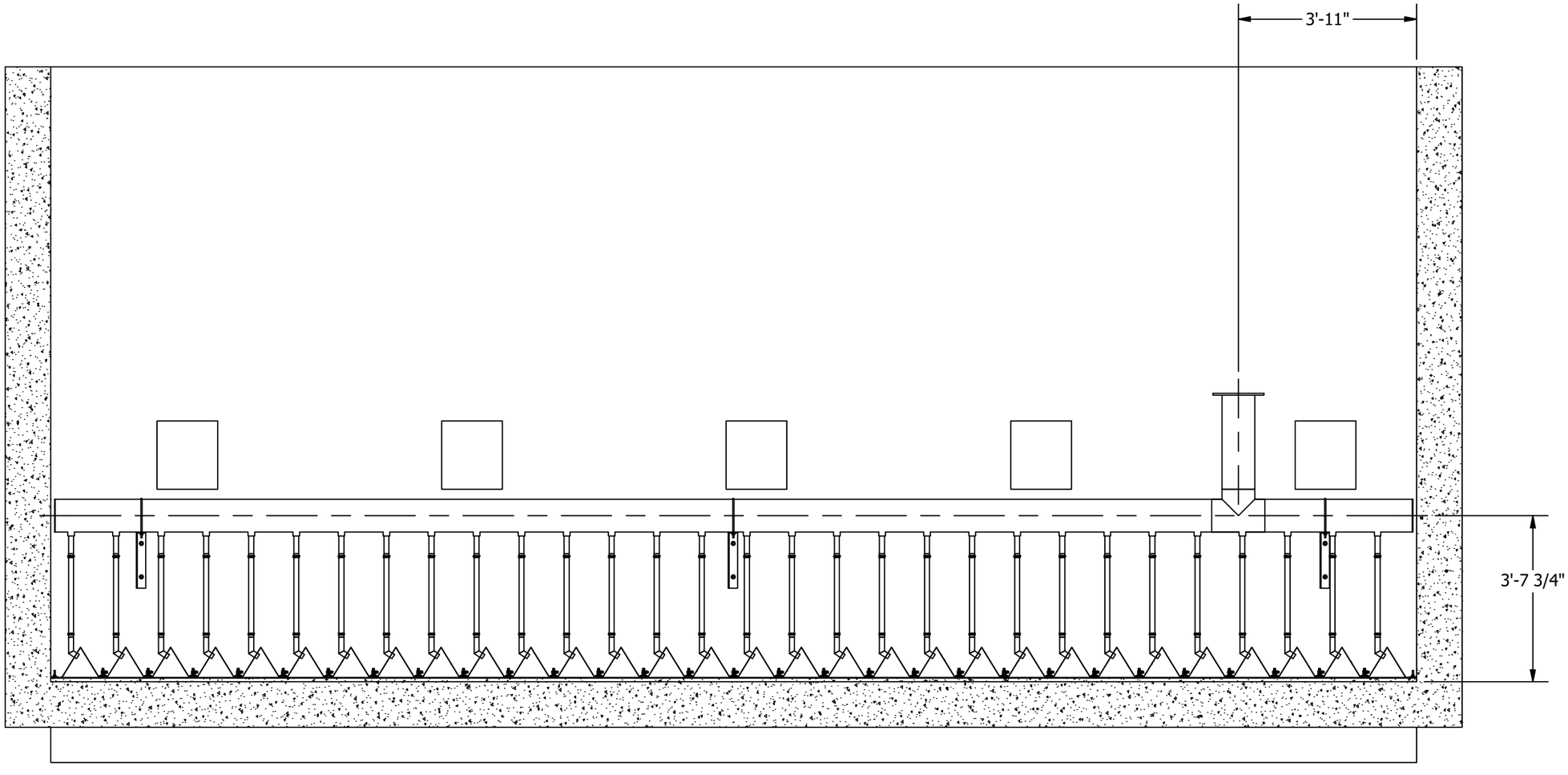
ROBERTS WATER TECHNOLOGIES, INC.
COATESVILLE, PENNSYLVANIA 19320

FILTERS 10-11 ANCHOR/GASKET LAYOUT
FOR STAINLESS STEEL TRILATERAL
SHEBOYGAN, WI

SCALE: 1/2" - 1'-0"
CONTRACT: 22-1212-T
SECTION: A
DWG NO.: 22-1212-M1

NOTES:

1. ENSURE PIPE SUPPORTS ARE LEVEL. DIMENSIONS ARE TAKEN FROM FLOOR ASSUMING LEVEL FLOOR.



SECTION J-J

SCALE 3/8" = 1'

(REF DWG 22-1212-M2)

PRELIMINARY 12/12/2022

DRAWN: CRE
DATE: 12/12/2022
CHECKED:
DATE:

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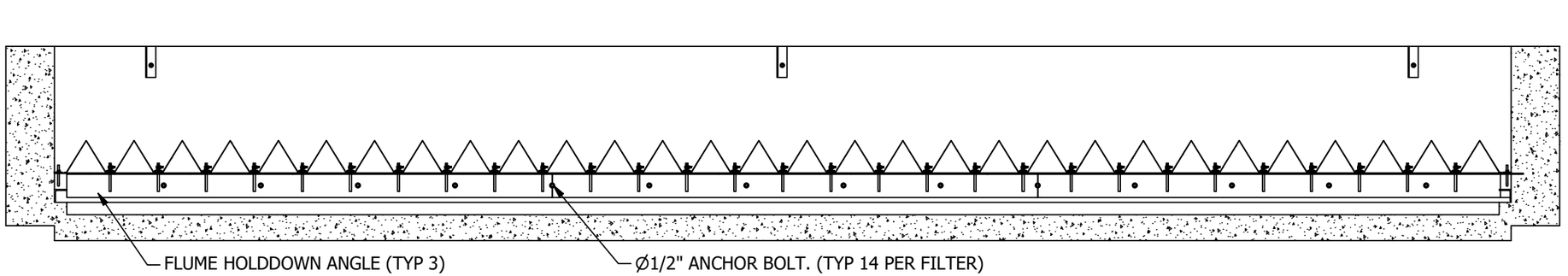
FILTERS 10-11 FLUME SECTION J-J
HEADER & DROP PIPE ASSEMBLY
SHEBOYGAN, WI

SCALE: 3/4"=1'
CONTRACT: 22-1212-T
SECTION: A
DWG NO.: 22-1212-M1

NOTES:

1. PLACE SIKAFLEX-1A ON THE BACK SIDE OF NEOPRENE GASKET AND PLACE ON THE FLOOR AROUND THE ANCHORS.
2. PLACE SIKAFLEX-1A ON GASKET AND PLACE BOX ONTO FLOOR.
3. USE LEVELING GROUT TO LEVEL THE FLOOR WITH 1" OF GROUT.
4. PUT SIKAFLEX ON THE BOTTOM OF THE LATERAL AND INSTALL LATERAL WITH BOLTS AND HARDWARE.
5. SECURE LATERAL TO THE FLOOR WITH HOLDDOWN CLIPS.



SECTION K-K

SCALE 3/8" = 1'

PRELIMINARY 12/12/2022

DRAWN: CRE
DATE: 12/12/2022
CHECKED:
DATE:

ROBERTS WATER TECHNOLOGIES, INC.
COATESVILLE, PENNSYLVANIA 19320

FILTERS 10-11 FLUME BOX SECTION K-K
STAINLESS STEEL TRILATERAL
SHEBOYGAN, WI

SCALE: 1/2" = 1'-0"
CONTRACT: 22-1212-T
SECTION: A
DWG NO.: 22-1212-M1