Jehn Water Consultants, Inc.
Water Resources Consulting

Celebrating Over 25 Years of Excellence

88 Inverness Cir East
Suite K-102

Englewood, Co 80112
(303) 321-8335

MEMORANDUM

TO: Adam Sommers

FROM: Hillary Banks & Gina Burke

DATE: December 18, 2019

SUBJECT: Arabian Acres Water Supply Study

JOB NO: 982.1

This Memorandum summarizes our work to evaluate the hydrogeologic conditions at the existing Arabian Acres wells, to provide recommendations for additional well locations, and to estimate sustainable pumping rates for each of the District's existing wells.

Alternative Water Sources

In order to recommend locations for additional water sources, we compiled geologic information and aerial photography for the property and surrounding area to identify potential fracture zones to be further evaluated in the field. Fractures in the Pikes Peak Granite underlying Arabian Acres tend to increase the potential for a productive well as the fracturing increases the bedrocks' capability to store and transmit water.

During a field visit conducted with AquaWorks, DBO on August 7th, 2019, we identified a site near the existing Well #3 to re-drill to a greater depth, and we identified a site near the existing Well #1 to drill a new well (Well #10) as an additional water source. That location was assessed for its proximity to the identified fracture zones, cost effectiveness as related to the proximity of existing infrastructure, equipment accessibility, and availability of land for an easement. In the cases of both the Well #3 re-drill and the potential new well, nearby homeowners' well locations must be identified to maintain the Division of Water Resources 600-foot spacing limitation, or the District must obtain consent from the existing well owners.

During that site visit with AquaWorks, DBO we assessed the existing wells' yields and the overall District water supply system. We understand that the existing system is using each well's submersible pump to transport water to ground surface, through the system piping to the control buildings, and then upgradient to the water storage tank. This system taxes

the submersible pump's ability to provide pressure and could produce a flow rate into the system that is less than the well's actual production rate. With the addition of booster pumps to the system, it may be possible to increase the existing system's production to meet current and future demands. To determine accurate production rates at each well, and estimate hydrogeologic properties, we proposed conducting short duration pumping tests at each of the existing wells within the District.

Pump Testing

On November 6th and 7th, 2019, short duration pumping tests were conducted on each of the Arabian Acres wells. The wells were pumped to waste at the wellheads in order to determine the actual pumping flow rate. During the tests the water level was recorded using a portable water level meter (MScope), and flow measurements were recorded using each well's newly installed totalizing flow meter. Each well was pumped at a continuous rate for two hours, or until the water level had dropped to the shut-off point. After the pumps were shut-off, water level recovery data was recorded.

Pump Testing Results and Hydrogeologic Parameters

The recorded drawdown, recovery and pumping data were input into spreadsheets for analysis. Theis and Cooper-Jacob methodologies were utilized to analyze drawdown and recovery data for interpretation of hydrogeologic parameters. Table 1 summarizes the static water level, the average pumping rate, the maximum observed pumping water level, and the estimated transmissivity. In the case of Wells #2 and #9, the average pumping rates were not high enough to produce observable drawdown in the wells, therefore hydrogeologic parameters could not be estimated.

Estimated Well Production

Using the hydrogeologic parameters estimated from the pump tests, we modeled the maximum pumping rate that each well could sustain for 24-hours of continuous pumping without reaching the well shut-off point. The results from these analyses are presented in Table 1. In the wells that reached the shut-off point during the pumping test, a lower pumping rate was modeled that would allow the well to run continuously. We do not recommend replacing the pumps in the wells at this time, however a pumping strategy that pumps the wells until shut-off, and then allows them to rest for several hours should be used.

Additionally, we modeled the maximum time that each well can pump at the observed average pumping rate before the well shut-off point is reached. In the case of Wells #1, #4, and #8 the wells reached the shut-off point during the two hour test, at the times noted in Table 1. Wells #2 and #9 did not result in observable drawdown, indicating that a higher pumping rate could be achieved with a higher capacity pump. Based on our modeling, Wells #2, #5, #6, #7, and #9 have the ability to pump continuously over a thirty day period without reaching the shut-off point, for a combined average pumping rate of 39 gpm. With the addition of Wells #1, #4, and #8 pumping with rest periods, we believe that the District can achieve an average pumping rate of 40 gpm. Completing the Well #3 re-drill and the potential new Well #10 will add additional production to the system for future demand and for margin of safety should any of the wells need maintenance or repair. Based on the

production at the original Well #3, an additional 5 gpm could be added to the total system production.

These results do not take into account any regional water level decline over time, or seasonal variability, and assume that the efficiency of the wells does not deteriorate significantly over time.

Recommendations

We recommend that the District replace Well #3 by having it re-drilled. We recommend that the new well be completed to a greater depth than the original Well #3 (20 feet below ground surface), and be completed with a larger screened interval to achieve the highest possible production rate. We recommend that following drilling and the completion of the well, the drilling contractor perform a pump test to determine the appropriate pump size to achieve a sustainable pumping rate. If an alternative water source is desired, drilling an additional Well #10 near existing Well #1 is the most economically and logistically viable location, and could provide additional production to the system. We recommend that Well #10 be drilled to a greater depth than Well #1 (120 feet below ground surface), and be completed with a larger screened interval to achieve the highest possible production rate. We also recommend that the drilling contractor perform a pump test to determine the appropriate pump size and pumping rate based on the well production. Finally, it may be possible to increase the existing system's production to meet current and future demands using the existing wells.

If there are any questions, please do not hesitate to call.

TABLE 1
Arabian Acres Wells Pump Testing Results

		Pump Testing Results							
	Well Depth	Static Water Level	Average Pumping Rate	Maximum Pumping Water Level	Length of Test	Modeled time pumping until pump shut-off at Average Pumping Rate	Estimated Transmissivity	Modeled Sustainable 24-hour pumping rate	Notes
	ft bgs	ft bgs	gpm	ft bgs	minutes	time	gpd/ft	gpm	
Well 1	120	12	13.2	105	73	73 minutes	100	5 to 8	Well ran dry during test
Well 2	300	6	13.5	8	120	undefined	undefined	>13.5[2]	Not enough observable drawdown to determine hydrogeologic parameters
Well 4	200	7	6.5	189	73	73 minutes	20	3 to 4	Well ran dry during test
Well 5	570	75	3.1	>238	107	>30 days	8	4 to 5	Pumping water level unknown, water level instrument stuck during test
Well 6	300	88	10.1	151	120	>30 days	104	15 to 20	
Well 7	400	66	7.9	189	120	>30 days	43	10 to 13	
Well 8	380	19	9.2	300	70	70 minutes	16	5 to 6	Well ran dry during test. Wells 8 and 2 were pumped concurrently during the test, and well to well interference may have reduced yield
Well 9	600	12	4.3	12	80	undefined	undefined	>4.3[2]	Not enough observable drawdown to determine hydrogeologic parameters
		Total: 63.7 gpm						Total: 89.8 gpm	

Notes:
1. Static water level and pumping water level are in feet below ground surface (ft bgs).
2. Pumping at Wells 2 and 9 did not result in observable drawdown, indicating that a higher pumping rate could be achieved with a higher capacity pump.

ARABIAN ACRES METROPOLITAN DISTRICT
TREATMENT IMPROVEMENT PROJECT
JANUARY 2020

VICINITY MAP
NOT TO SCALE

LOCATION MAP
NOT TO SCALE

SHEET LIST TABLE	
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GENERAL	
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G2	ABBREVIATIONS & SYMBOLS
G3	NOTES & REQUIREMENTS
G4	PROCESS FLOW DIAGRAM
G5	HYDRAULIC PROFILE
G6	WELL INSTALLATION DETAILS
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WST1	
WST2	WATER STORAGE TANK PLAN & SECTION
WST3	WATER STORAGE TANK DETAILS
CONTROL BUILDINGS	
CB1	CONTROL BUILDING A SITE PLAN
CB2	CONTROL BUILDING A PLAN
CB3	CONTROL BUILDING A SECTIONS
CB4	CONTROL BUILDING B SITE PLAN
CB5	CONTROL BUILDING B PLAN

SHEET LIST TABLE	
SHEET NUMBER	SHEET TITLE
CB6	CONTROL BUILDING B SECTIONS
CB7	CIVIL DETAILS
CB8	CIVIL DETAILS 2
CB9	EROSION CONTROL DETAILS
SCADA	
SC1	SCADA PLAN
STRUCTURAL	
S1	STRUCTURAL NOTES & SPECIFICATIONS
S2	FOUNDATION PLAN
S3	FOUNDATION DETAILS
ELECTRICAL	
E1	
E2	ELECTRICAL ONE LINE & TABLES
E3	CONTROL BUILDING A ELECTRICAL
E4	CONTROL BUILDING B ELECTRICAL
E5	ELECTRICAL WELL POWER

PROJECT TEAM:

OWNER:
ARABIAN ACRES METROPOLITAN DISTRICT
ATTN: WALKER SCHOOLER DISTRICT MANAGERS
614 N. TEJON ST
COLORADO SPRINGS, CO 80903

PROJECT MANAGER/CIVIL ENGINEER:
AQUAWORKS DBO, INC.
MR. ADAM SUMMERS, P.E.
3252 WILLIAMS STREET
DENVER, CO 80205
(303) 477-5915

ELECTRICAL ENGINEER:
STRAWNBRIDGE, INC.
MR. BILL BRUNNER, P.E.
14539 W. 57TH PLACE
ARVADA, CO 80002
(303) 403-0531

STRUCTURAL ENGINEER:
WALLACE ENGINEERING, INC.
MR. PRYCE JOYNER, P.E.
9990 PYRAMID CT, SUITE 350
ENGLEWOOD, CO 80112
(303) 359-1990

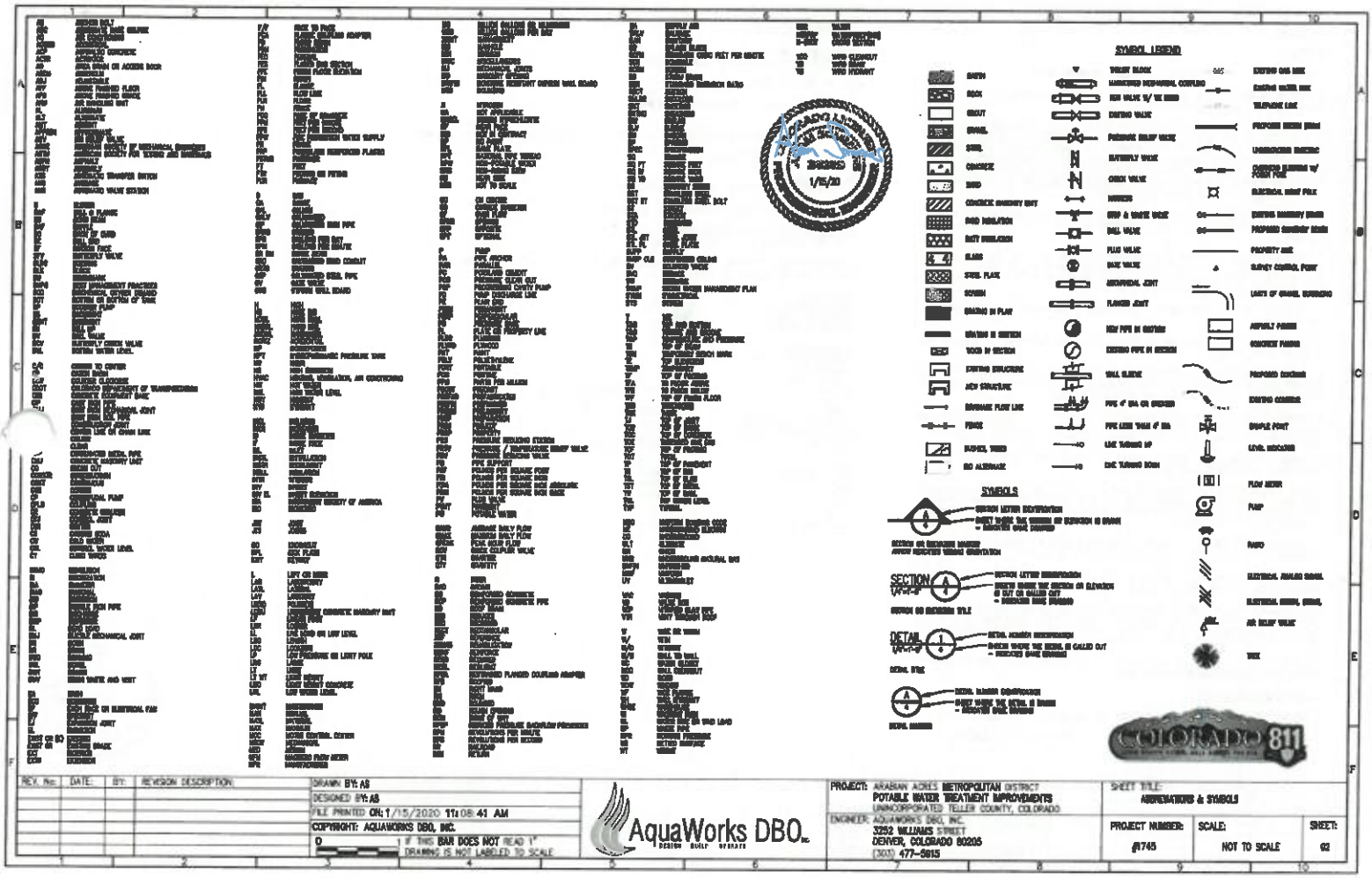
SYSTEM OPERATOR:
MR. LYNN WILLOW
5305 MANSICAL DRIVE
COLORADO SPRINGS, CO 80917
(719) 482-1525

AquaWorks DBO, Inc.
DESIGN BUILD OPERATE
3252 WILLIAMS STREET | DENVER
COLORADO | 80205 | (303) 477-5915

ARABIAN ACRES METROPOLITAN DISTRICT
UNINCORPORATED TELLER COUNTY, COLORADO

1/10/20

PCL XL error
Error: IllegalOperatorSequence
Operator: LineRelPath
Position: 1058367



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PROJECT: ARABIAN ACRES METROPOLITAN DISTRICT
POTABLE WATER TREATMENT IMPROVEMENTS
UNINCORPORATED TELLER COUNTY, COLORADO

ENGINEER: AQUAWORKS DBO, INC.
3252 WILLIAMS STREET
DENVER, COLORADO 80205
(303) 477-5815

SHEET TITLE: ABBREVIATIONS & SYMBOLS

PROJECT NUMBER:	SCALE:	SHEET:
#745	NOT TO SCALE	G2

NOTES:

GENERAL:

1. PROJECT ADDRESS: 72 SILBANI LANE, FLORISSANT, COLORADO, 80809.

2. PRIOR TO COMMENCEMENT OF ANY CONSTRUCTION, THE CONTRACTOR SHALL GIVE THE OWNER SEVENTY-TWO (72) HOURS ADVANCE NOTICE.

3. NO BELOW GRADE UTILITIES WERE LOCATED FOR THIS PLAN SET. CONTRACTOR IS RESPONSIBLE TO VERIFY THE LOCATION OF ALL UTILITIES PRIOR TO CONSTRUCTION AND TO COORDINATE WITH THE APPROPRIATE UTILITY COMPANY. CONTRACTOR IS RESPONSIBLE TO PROTECT UTILITIES DURING CONSTRUCTION. IF A CONFLICT EXISTS AND/OR A DESIGN MODIFICATION IS REQUIRED, OWNER AND CONTRACTOR SHALL COORDINATE WITH ENGINEER TO MODIFY THE DESIGN. DESIGN MODIFICATION(S) MUST BE APPROVED BY THE OWNER PRIOR TO BEGINNING CONSTRUCTION AFFECTED. FOR UTILITY LOCATE INFORMATION, CONTACT UNCC: (800) 922-1987.

4. ACTUAL LOCATIONS, DISTANCES, AND ELEVATIONS WILL BE GOVERNED BY ACTUAL FIELD CONDITIONS. CONTRACTOR TO FIELD VERIFY CONDITIONS AND REPORT ANY DISCREPANCIES TO THE ENGINEER.

5 CONTRACTOR SHALL BE REQUIRED TO RESTORE THE ROUTE OF WORK AND ANY DAMAGED EXISTING LANDSCAPE, STRUCTURES, OR IMPROVEMENTS AS THE RESULT OF WORK TO ORIGINAL CONDITION OR BETTER PRIOR TO ACCEPTANCE OF WORK. CONTRACTOR RESPONSIBLE FOR RESTORING SITE TO PRE-CONSTRUCTION CONDITION.

6. NO UTILITY SERVICE MAY BE DISCONNECTED WITHOUT PRIOR APPROVAL OF THE OWNER OR OWNER'S REPRESENTATIVE.

7. CONTRACTOR TO PROVIDE AND MAINTAIN TEMPORARY PORTABLE RESTROOM FACILITIES FOR THE DURATION OF THE PROJECT.

8. CONTRACTOR SHALL EXHIBIT NECESSARY SAFETY PRECAUTIONS DURING CONSTRUCTION, WHICH INCLUDES, BUT IS NOT LIMITED TO, SIGNAGE, SECURITY, AND EXCAVATION AS SET FORTH BY OSHA, PUBLICATION 2226, "EXCAVATION AND TRENCHING OPERATIONS."

9. CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROCUREMENT OF ALL PERMITS NECESSARY FOR THE CONSTRUCTION OF THE IMPROVEMENTS SHOWN INCLUDING BUT NOT LIMITED TO A COLORADO DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT CONSTRUCTION STORM WATER PERMIT.

10. CONTRACTOR SHALL VERIFY INVERT ELEVATIONS OF EXISTING VALVES, WATERLINES, STRUCTURES, AND OUTFALLS PRIOR TO CONSTRUCTION.

11. THE CONTRACTOR SHALL MAINTAIN ON SITE A FULL SET OF CONSTRUCTION DRAWINGS, RECORDING ALL INFORMATION PERTAINING TO THE CONSTRUCTION OF THE ORDINARY WATER TREATMENT PLANT IMPROVEMENTS. THESE RECORD DRAWINGS SHALL BE PROVIDED TO THE OWNER UPON COMPLETION OF THE PROJECT.

12. HORIZONTAL AND VERTICAL DEFLECTION OF THE PIPES SHALL NOT EXCEED MANUFACTURER'S RECOMMENDATIONS FOR THE PIPE MATERIAL AND TEST PRESSURE SPECIFIED.

13. THE HORIZONTAL DATUM IS COLORADO STATE PLANE COORDINATES (NAD 83), COLORADO ZONE 0502 (CENTRAL). THE VERTICAL DATUM IS NAVD 1988.

14. CONTRACTOR SHALL NOT SCALE FROM DRAWINGS FOR CONSTRUCTION PURPOSES. ANY MISSING DIMENSIONS OR DISCREPANCIES IN PLANS, FIELD STAKING, FIELD CONDITIONS OR PHYSICAL FEATURES SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER. IF CONTRACTOR PROCEEDS WITH THE WORK WITHOUT NOTIFYING ENGINEER HE DOES SO AT HIS OWN RISK.

15. IF CONFLICTS, QUESTIONS OR INTERPRETATION ARE REQUIRED CONTACT THE ENGINEER IN WRITING WITH A REQUEST FOR INFORMATION (RFI).

BUILDING REQUIREMENTS:

1. CONTRACTOR TO CONFORM TO CURRENT EDITION IBC AND TELLER COUNTY BUILDING CODES.

2. INSTALL PORTABLE FIRE EXTINGUISHERS THROUGHOUT THE BUILDINGS PER IFC AND NFPA 10.

REQUIREMENTS:

PUBLIC HEALTH:

1. AWWA B300-04a: STANDARD FOR HYPOCHLORITES.

2. ALL WETTED MATERIALS SHALL BE NSF 61 RATED.

3. AWS/AWWA C651-14: DISINFECTING WATER MAINS

ELECTRICAL:

1. CONTRACTOR TO COORDINATE MODIFICATIONS TO EXISTING ELECTRICAL SERVICE WITH UTILITY AND OWNER.

2. REFER TO ELECTRICAL DRAWINGS.

PROCESS PIPING:

1. CONTRACTOR TO PROVIDE ALL SUPPORTS AS REQUIRED.

2. ALL PROCESS PIPING SHALL BE SCH 80 PVC UNLESS OTHERWISE NOTED.

PIPING IDENTIFICATION REQUIREMENTS:

1. INCLUDE FLOW DIRECTION ARROW TAPE ON ALL PIPING.

2. ALL PIPING SHALL EITHER BE PAINTED OR LABELED USING THE FOLLOWING COLOR SCHEDULE (NOT ALL MAY BE INCLUDED WITH THIS PROJECT):

WATER LINES	
RAW OR RECYCLE	OLIVE GREEN
SETTLED OR CLARIFIED	AQUA
FINISHED OR POTABLE	DARK BLUE
CHEMICAL LINES	
ALUM OR PRIMARY COAGULANT	ORANGE
AMMONIA	WHITE
CARBON SLURRY	BLACK
CAUSTIC	YELLOW WITH GREEN BAND
CHLORINE	YELLOW
OZONE	YELLOW WITH ORANGE BAND
POLYMERS OR COAGULANTS	ORANGE WITH GREEN BAND
POTASSIUM PERMANGANATE	VIOLET
SODA ASH	LIGHT GREEN WITH ORANGE BAND
WASTE LINES	
BACKWASH WASTE	LIGHT BROWN
SLUDGE	DARK BROWN
SEWER	DARK GRAY
OTHER	
COMPRESSED AIR	DARK GREEN
GAS	RED

COLORADO LICENSED PROFESSIONAL ENGINEER 39884 1/15/20

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POTABLE WATER TREATMENT IMPROVEMENTS
UNINCORPORATED TELLER COUNTY, COLORADO

ENGINEER: AQUAWORKS DBO, INC.
3302 BILLINGS STREET
DENVER, COLORADO 80205
(303) 477-5915

SHEET TITLE: NOTES & REQUIREMENTS

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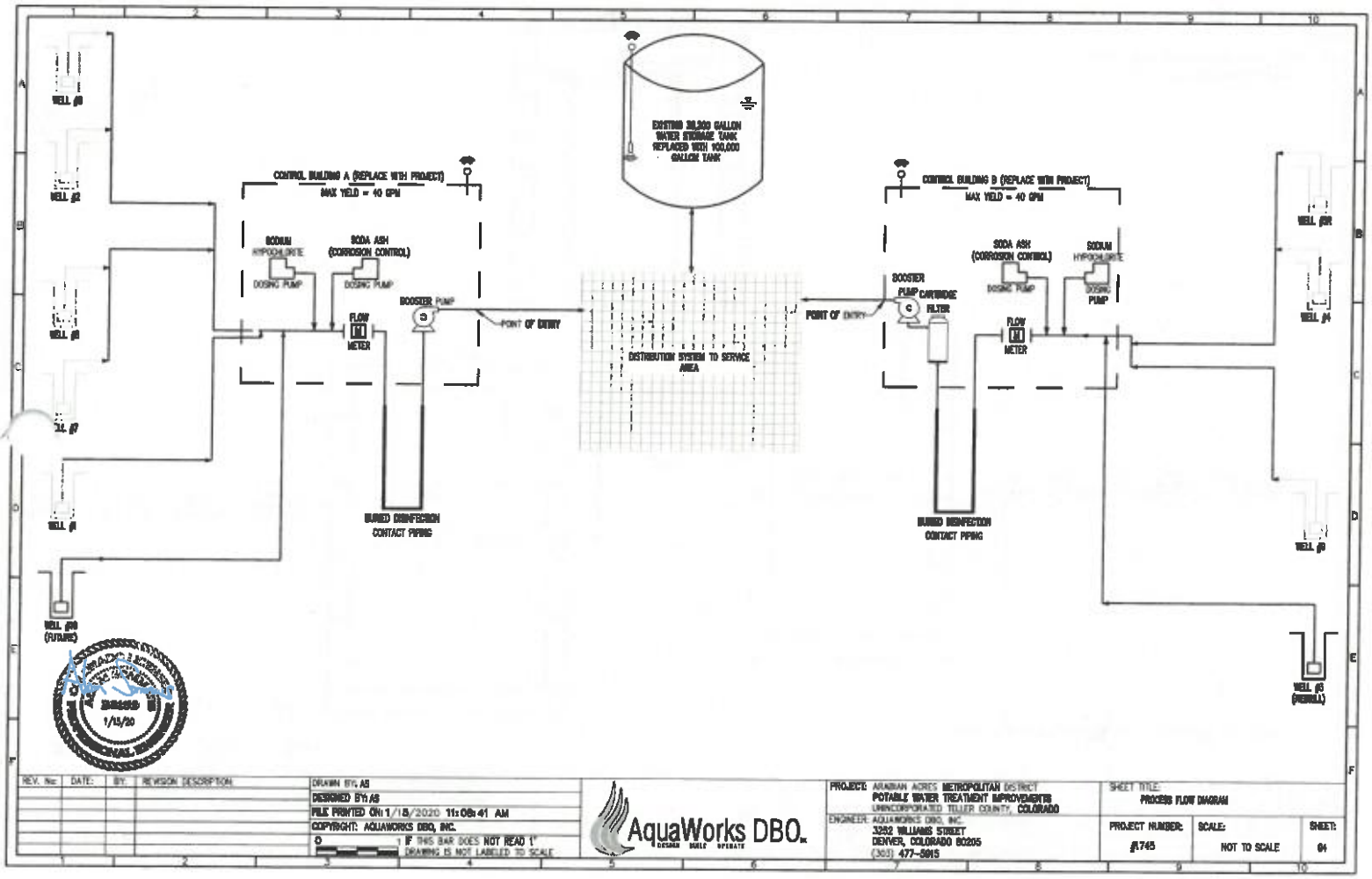

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POTABLE WATER TREATMENT IMPROVEMENTS
UNINCORPORATED TELLER COUNTY, COLORADO

ENGINEER: AQUAWORKS DBO, INC.
3282 WILLIAMS STREET
DENVER, COLORADO 80205
(303) 477-3915

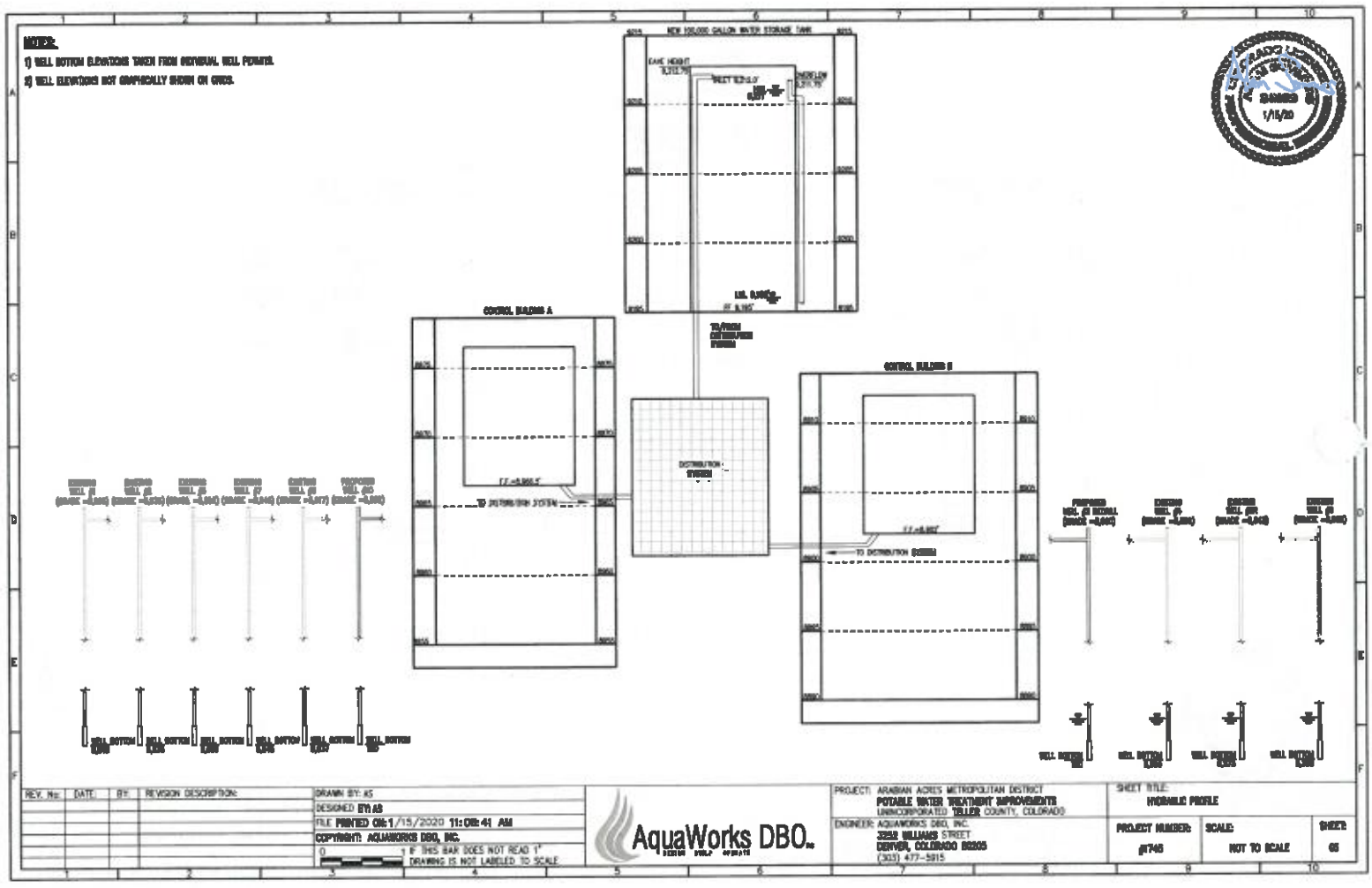
SHEET TITLE: PROCESS FLOW DIAGRAM

PROJECT NUMBER:	SCALE:	SHEET:
#1745	NOT TO SCALE	01

NOTES:

1) WELL BOTTOM ELEVATIONS TAKEN FROM INDIVIDUAL WELL PERMITS.

2) WELL ELEVATIONS NOT GRAPHICALLY SHOWN ON GWES.



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UNINCORPORATED TELLER COUNTY, COLORADO

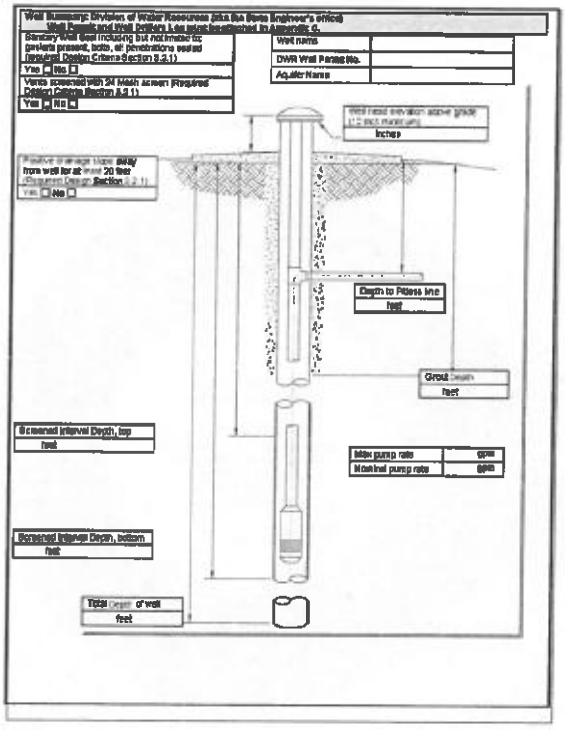
ENGINEER: AQUAWORKS DBO, INC.
3333 WILLIAMS STREET
DENVER, COLORADO 80205
(303) 477-5915

SHEET TITLE: HYDRAULIC PROFILE

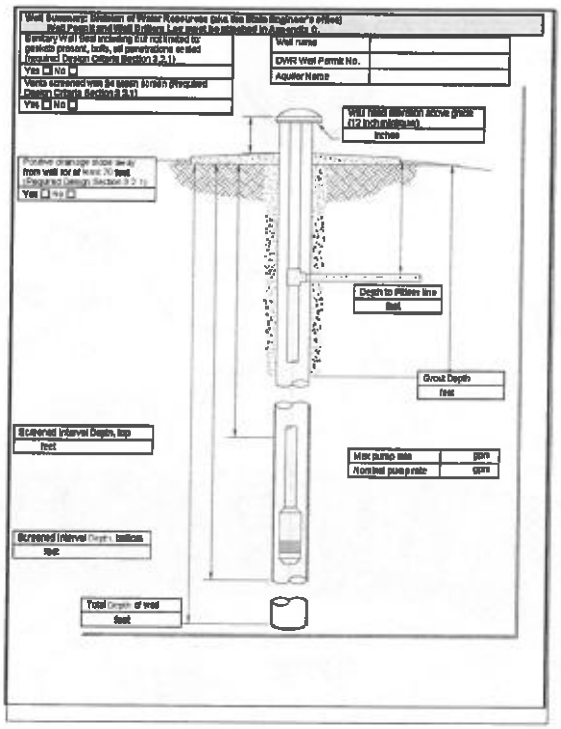
PROJECT NUMBER: #746

SCALE: NOT TO SCALE

SHEET: 05



WELL #3R INSTALLATION DETAIL
N.T.S.



WELL #10 INSTALLATION DETAIL
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UNINCORPORATED TELLER COUNTY, COLORADO

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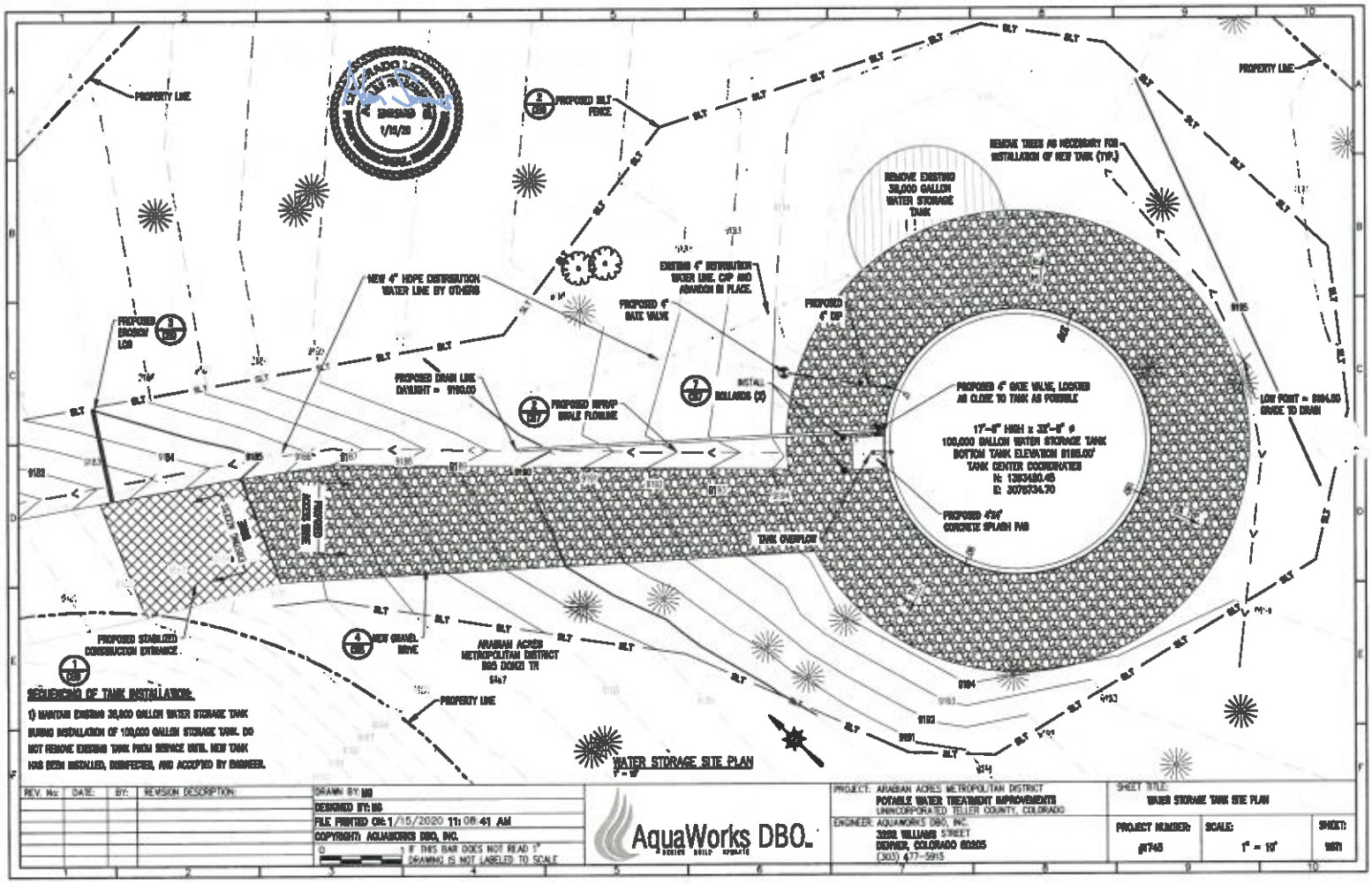
3252 WILLIAMS STREET
DENVER, COLORADO 80205
(303) 477-5815

SHEET TITLE: WELL INSTALLATION DETAILS

PROJECT NUMBER:	SCALE:	SHEET:
#745	TBD	08



SEQUENCING OF TANK INSTALLATION:

1) MAINTAIN EXISTING 30,000 GALLON WATER STORAGE TANK DURING INSTALLATION OF 100,000 GALLON STORAGE TANK. DO NOT REMOVE EXISTING TANK FROM SERVICE UNTIL NEW TANK HAS BEEN INSTALLED, DISINFECTED, AND ACCEPTED BY ENGINEER.

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POTABLE WATER TREATMENT IMPROVEMENTS
UNINCORPORATED TELLER COUNTY, COLORADO

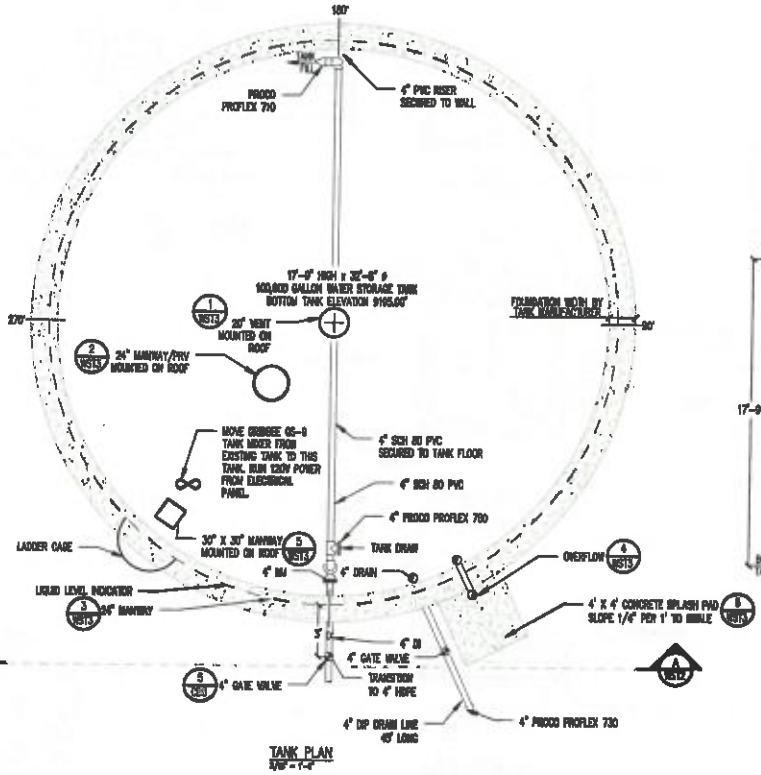
ENGINEER: AQUAWORKS DBO, INC.
3300 WILLIAMS STREET
DENVER, COLORADO 80205
(303) 477-5915

SHEET TITLE: WATER STORAGE TANK SITE PLAN

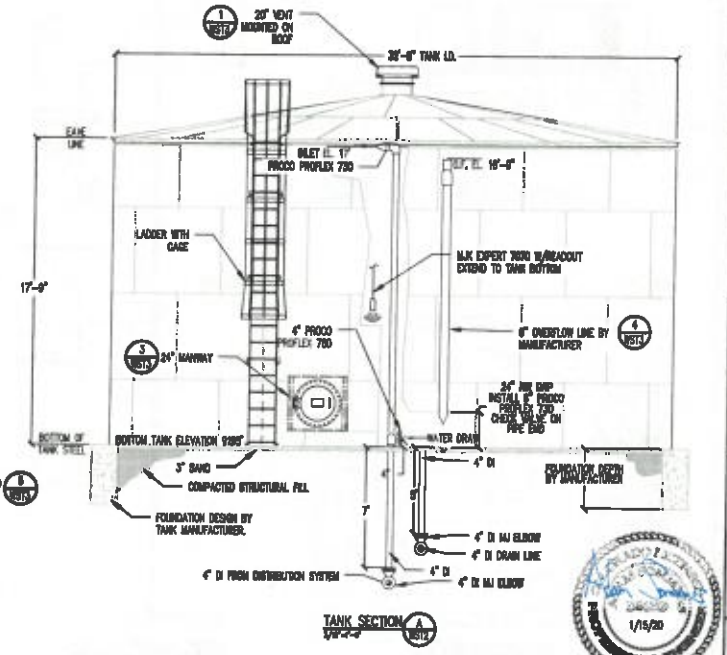
PROJECT NUMBER:	SCALE:	SHEET:
#1748	1" = 10'	1 OF 1

NOTES:

1) POWER EXISTING GROBEE & NEW LEVEL TRANSDUCER FROM ELECTRICAL PANEL ON SITE.



TANK PLAN
1/8" = 1'-0"



TANK SECTION
1/8" = 1'-0"

1/15/20

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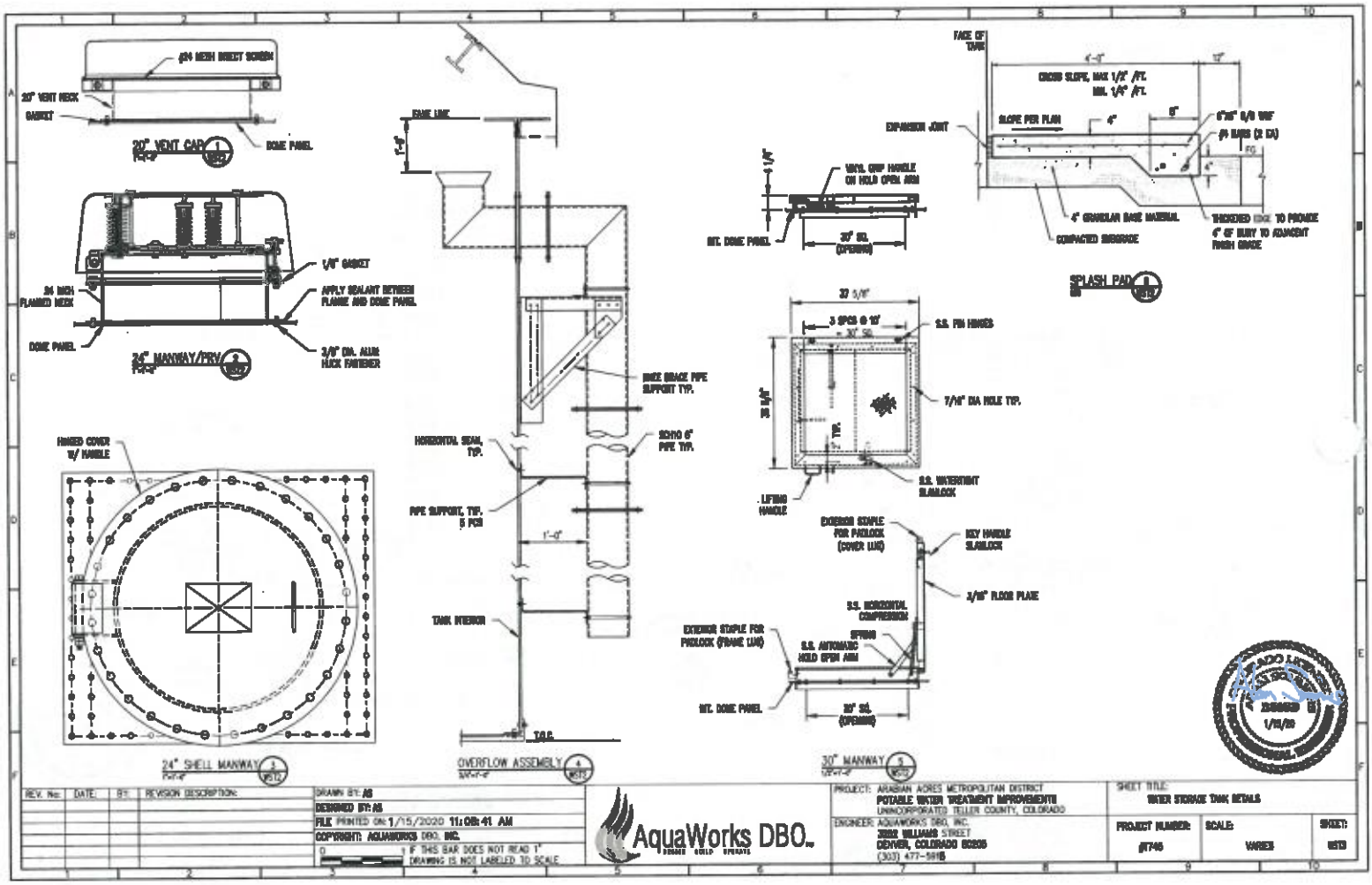
POTABLE WATER TREATMENT IMPROVEMENTS
UNINCORPORATED TELLER COUNTY, COLORADO

ENGINEER: AQUAWORKS DBO, INC.
3252 WILLIAMS STREET
DENVER, COLORADO 80205
(303) 477-3015

SHEET TITLE: WATER STORAGE TANK PLAN & SECTION

PROJECT NUMBER:	SCALE:	SHEET:
#1745	3/16" = 1'-0"	VST2



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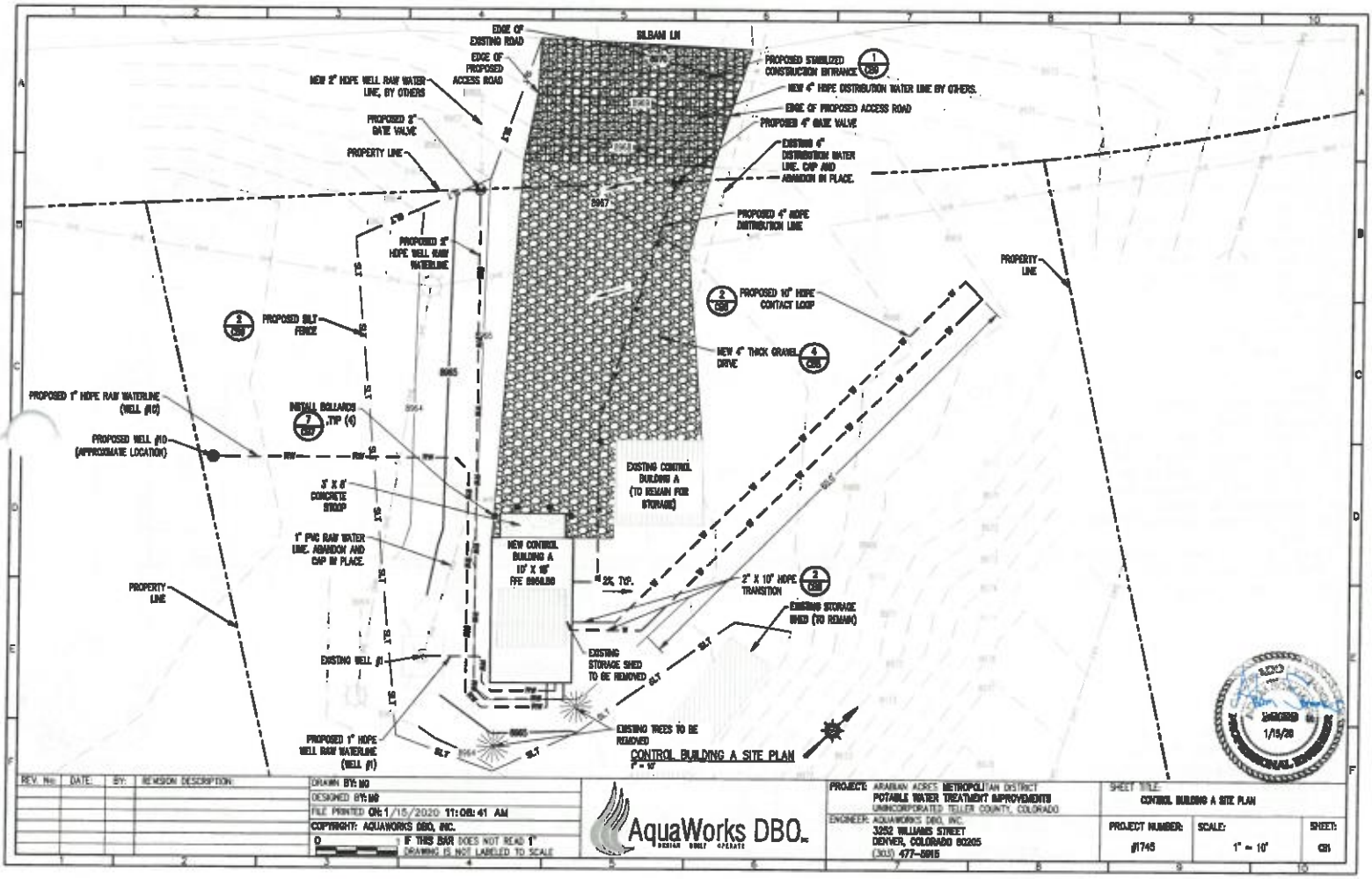
UNINCORPORATED TELLER COUNTY, COLORADO

ENGINEER: AQUAWORKS DBO, INC.
2002 WILLIAMS STREET
DENVER, COLORADO 80205
(303) 477-5918

SHEET TITLE: WATER STORAGE TANK DETAILS

PROJECT NUMBER:	SCALE:	SHEET:
#1746	VARIES	ST3



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UNINCORPORATED TELLER COUNTY, COLORADO

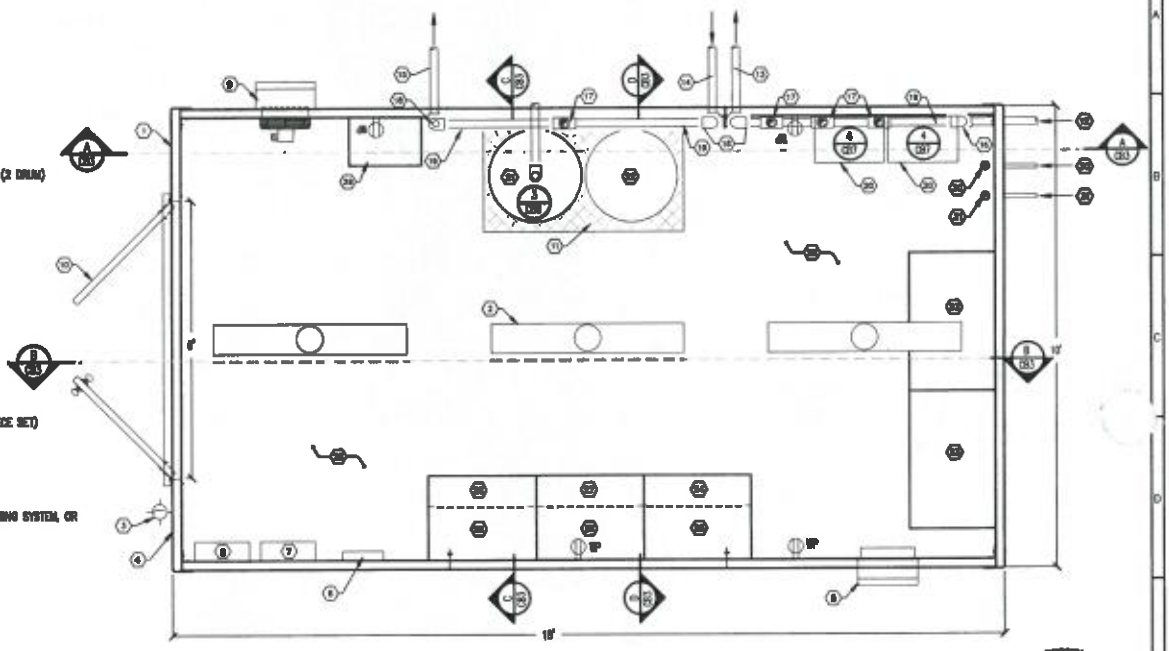
ENGINEER: AQUAWORKS DBO, INC.
3252 WILLIAMS STREET
DENVER, COLORADO 80205
(303) 477-5615

SHEET TITLE: CONTROL BUILDING A SITE PLAN

PROJECT NUMBER:	SCALE:	SHEET:
#1745	1" = 10'	C01

EQUIPMENT NOTES:

1. OPENCHANNELFLOW.COM 10' X 15' PREFABRICATED BUILDING
2. INTERIOR LED LIGHT (TYP)
3. EXTERIOR LED LIGHT WITH PHOTO CELL
4. LIGHT AND FAN SWITCHES
5. 12" X 12" INTAKE LOUVER
6. NIGHTIDE TECHNOLOGIES SCADA PANEL HTT 3100-E14-AC-IR
7. NEMA 1 200A MAIN LUG LOAD CENTER
8. 9,000 WATT HEATER
9. 800 CFM EXHAUST FAN WITH FIBERGLASS HOOD
10. 72" DOUBLE DOOR
11. SECONDARY CONTAINMENT FLEXIBLE ULTRA-SPILL DECK WITH BLADDER (2 DRUM)
12. 2" RAW WATER HDPE FROM WELLS #2, #6, #7, #8
13. 2" HDPE TO CHLORINE CONTACT LOOP
14. 2" HDPE FROM CHLORINE CONTACT LOOP
15. 2" HDPE TO DISTRIBUTION SYSTEM
16. 2" PVC ELBOW
17. 2" X 2" X 2" PVC TEE
18. SIOUX CHIEF WATER HAMMER ARRESTOR 667-F
19. 2" PVC
20. CHEM FEED SYSTEM
21. SODIUM HYPOCHLORITE (55 GALLONS)
22. SODA ASH (55 GALLONS)
23. NEWAGE PRODUCTS PRO 3.0 SERIES MULTIUSE LOCKER (PART OF 6 PIECE SET)
24. NEWAGE PRODUCTS PRO 3.0 SERIES BASE CABINET
25. NEWAGE PRODUCTS PRO 3.0 SERIES TOOL CABINET
26. NEWAGE PRODUCTS PRO 3.0 SERIES WALL CABINET
27. NEWAGE PRODUCTS BAMBOO WORKTOP
28. COAT TREATMENT BUILDING FLOOR SLAB WITH CASTAMIA ECOCOR 2IN COATING SYSTEM, OR APPROVED EQUAL.
29. 5 HP PACKAGE BOOSTER PUMP SKID. USA BLUEBOOK ITEM #29198.
30. WELL #1 HDPE RAW WATER LINE & 1" FLOW METER
31. WELL #10 HDPE RAW WATER LINE & 1" FLOW METER



CONTROL BUILDING A
1/2" = 1'

GENERAL NOTES:

1) ALL ABOVE GRADE PIPING SHALL BE SCH 80 PVC
2) ALL BELOW GRADE PIPING SHALL BE HDPE DR 11
3) 1" RAW WATER METERS & RADIOS SUPPLIED BY OWNER

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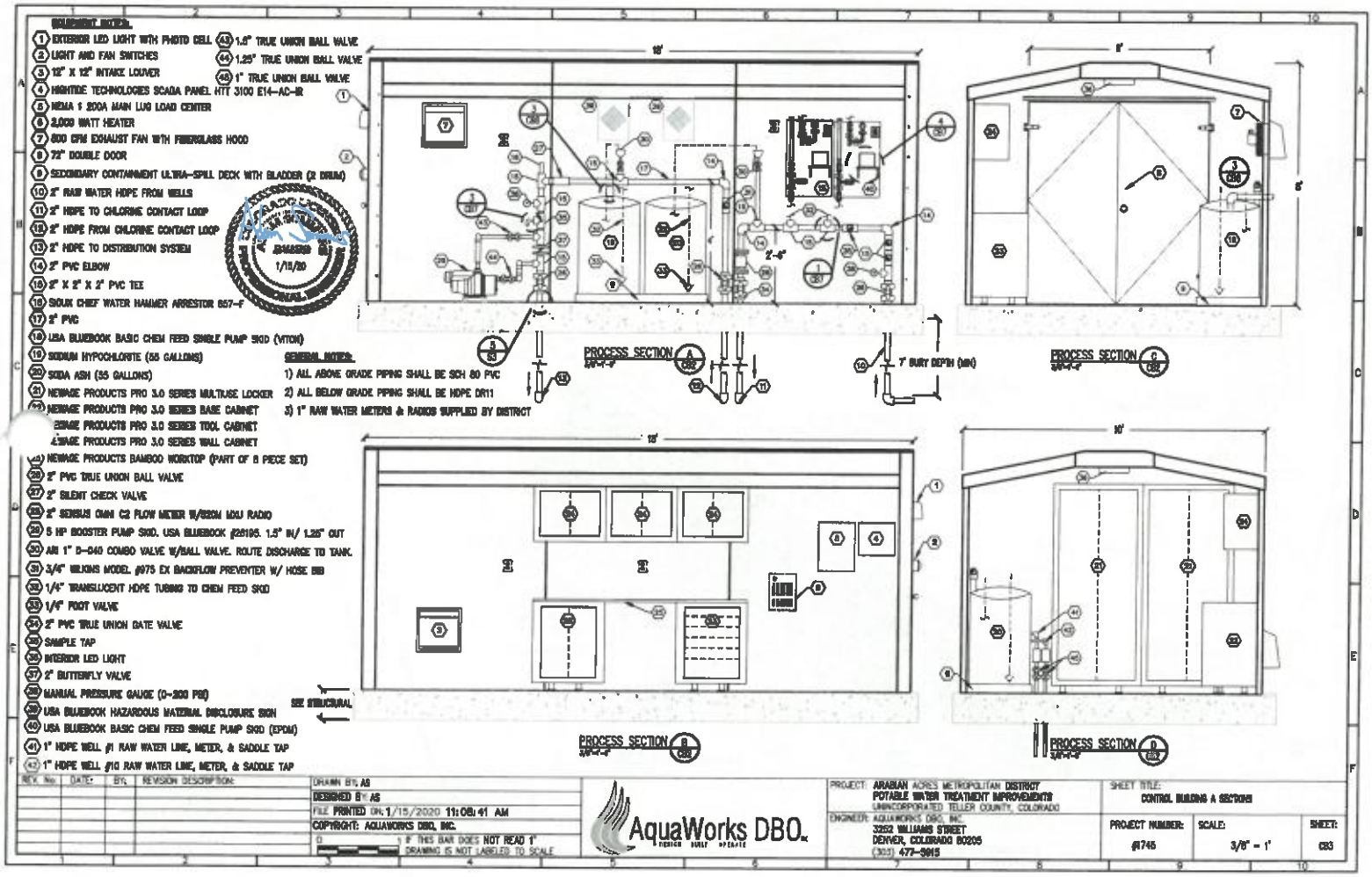
PROJECT: ARABIAN ACRES METROPOLITAN DISTRICT
POTABLE WATER TREATMENT IMPROVEMENTS
UNINCORPORATED TELLER COUNTY, COLORADO

ENGINEER: AQUAWORKS DBO, INC.
3900 WILLIAMS STREET
DENVER, COLORADO 80205
(303) 477-5818

SHEET TITLE: CONTROL BUILDING A PLAN

PROJECT NUMBER:	SCALE:	SHEET:
#1745	1/2" = 1'	C02



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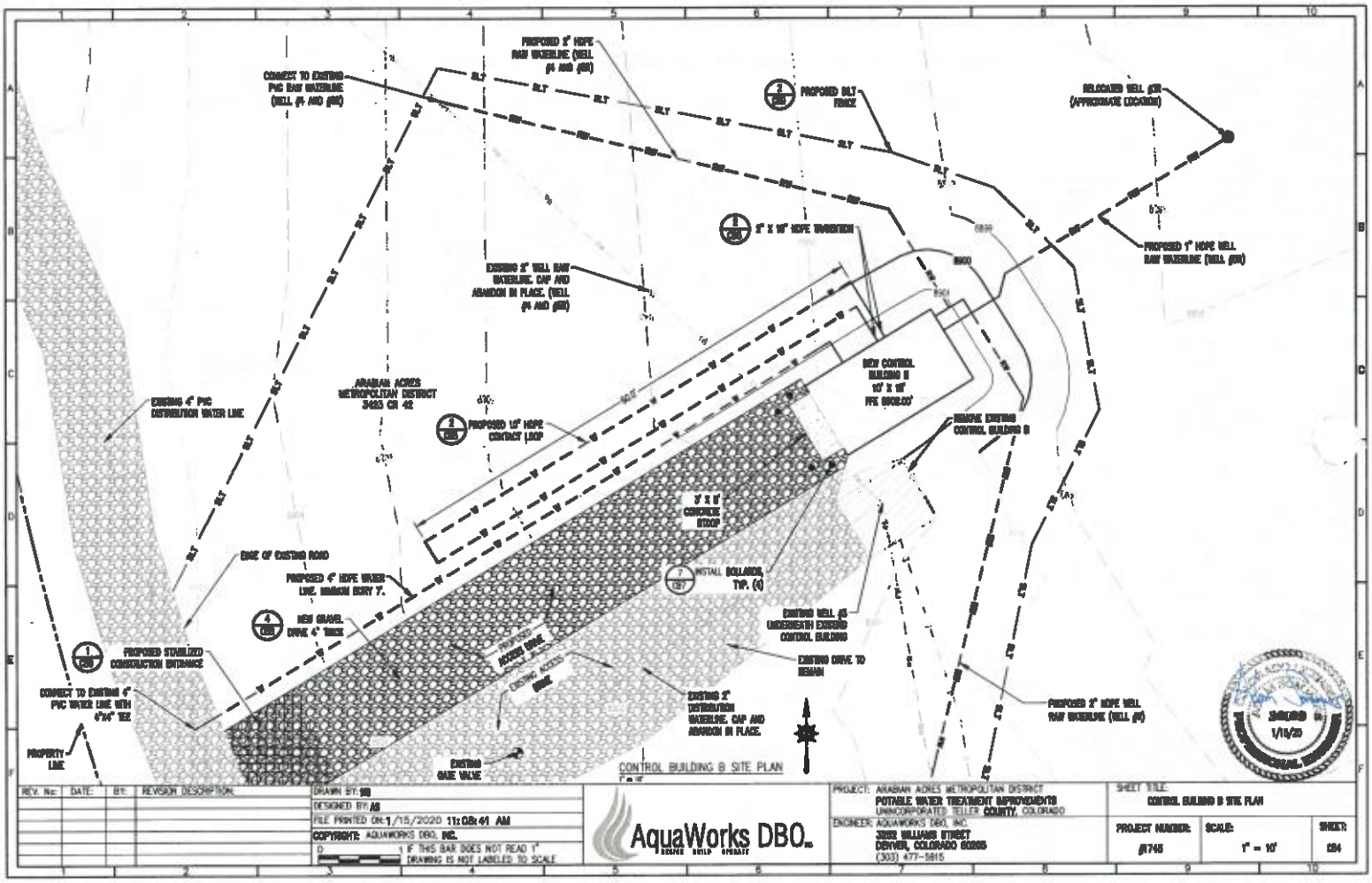
PROJECT: ARABIAN ACRES METROPOLITAN DISTRICT
POTABLE WATER TREATMENT IMPROVEMENTS
UNINCORPORATED TELLER COUNTY, COLORADO

ENGINEER: AQUAWORKS DBO, INC.
3262 WILLIAMS STREET
DENVER, COLORADO 80205
(303) 477-3915

SHEET TITLE: CONTROL BUILDING A SECTIONS

PROJECT NUMBER:	SCALE:	SHEET:
#1745	3/8" = 1'	C83


PROPOSED 2" HDPE RAW WATERLINE (WELL #4 AND #5R)
CONNECT TO EXISTING PVC RAW WATERLINE (WELL #4 AND #5R)
PROPOSED SLT FENCE
RELOCATED WELL #5R (APPROXIMATE LOCATION)
3' X 10' HDPE WARMEN
PROPOSED 1" HDPE WELL RAW WATERLINE (WELL #5R)
EXISTING 2" WELL RAW WATERLINE, CAP AND ABANDON IN PLACE. (WELL #4 AND #5R)
NEW CONTROL BUILDING B 10' X 16' PVC BUILDG'
ARABIAN ACRES METROPOLITAN DISTRICT 3493 CR 42
EXISTING 4" PVC DISTRIBUTION WATER LINE
PROPOSED 10' HDPE CONTACT LOOP
REMOVE EXISTING CONTROL BUILDING B
3' X 5' CONCRETE STOOP
EDGE OF EXISTING ROAD
PROPOSED 4" HDPE WATER LINE, MINIMUM BURY 7'.
INSTALL BOLLARDS, TYP. (4)
NEW GRAVEL DRIVE 4" THICK
EXISTING WELL #5 UNDERNEATH EXISTING CONTROL BUILDING
PROPOSED STABILIZED CONSTRUCTION ENTRANCE
EXISTING DRIVE TO REMAIN
CONNECT TO EXISTING 4" PVC WATER LINE WITH 4"X4" TEE
EXISTING 2" DISTRIBUTION WATERLINE, CAP AND ABANDON IN PLACE.
PROPERTY LINE
EXISTING GATE VALVE
PROPOSED 2" HDPE WELL RAW WATERLINE (WELL #4)
CONTROL BUILDING B SITE PLAN
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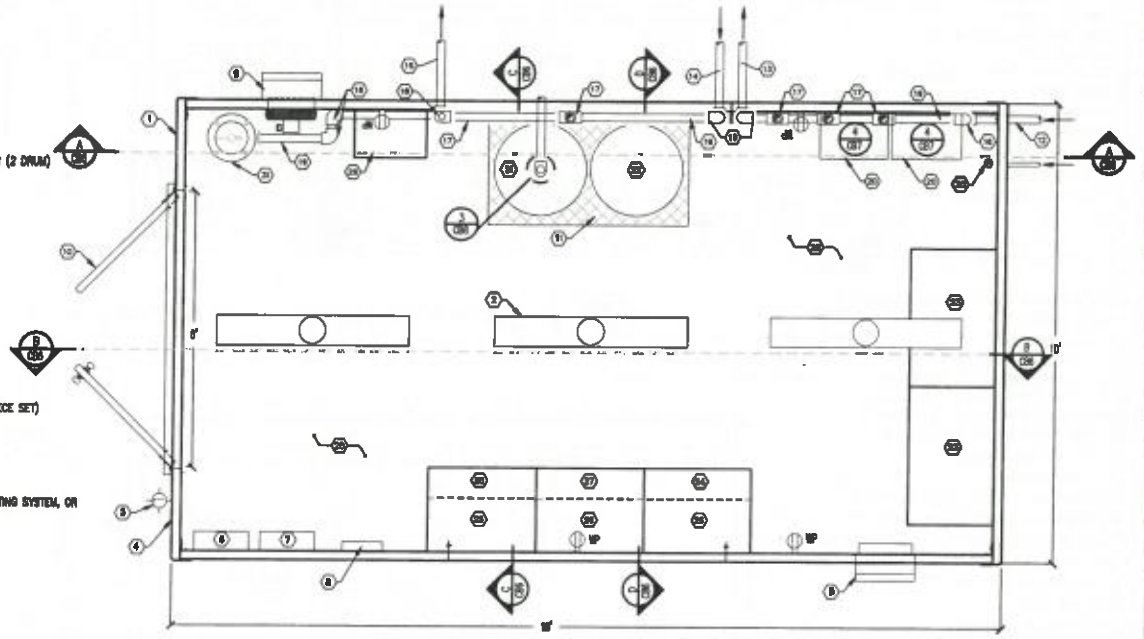
PROJECT: ARABIAN ACRES METROPOLITAN DISTRICT
POTABLE WATER TREATMENT IMPROVEMENTS
UNINCORPORATED TELLER COUNTY, COLORADO
ENGINEER: AQUAWORKS DBO, INC.
3992 WILLIAMS STREET
DENVER, COLORADO 80205
(303) 477-5915
SHEET TITLE: CONTROL BUILDING B SITE PLAN
PROJECT NUMBER: 19745
SCALE: 1" = 10'
SHEET: C04
1/15/20

EQUIPMENT NOTES:

1. OPENCHANNELFLOW.COM 10' X 16' PREFABRICATED BUILDING
2. INTERIOR LED LIGHT (TYP)
3. EXTERIOR LED LIGHT WITH PHOTO CELL
4. LIGHT AND FAN SWITCHES
5. 12" X 12" INTAKE LOUVER
6. HEINTZE SCADA PANEL HTT 3600 -E14-AC-IR
7. NEMA 1 200A MAIN LUG LOAD CENTER
8. 3,000 WATT HEATER
9. 800 CFM EXHAUST FAN WITH FIBERGLASS HOOD
10. 72" DOUBLE DOOR
11. SECONDARY CONTAINMENT FLEXIBLE ULTRA-SPILL DECK WITH BLADDER (2 DRUM)
12. 2" RAW WATER DIP FROM WELLS #4, 5R, 9
13. 2" HDPE TO CHLORINE CONTACT LOOP
14. 2" HDPE FROM CHLORINE CONTACT LOOP
15. 2" HDPE TO DISTRIBUTION SYSTEM
16. 2" PVC ELBOW
17. 2" X 2" X 2" PVC TEE
18. SIOUX CHIEF WATER HAMMER ARRESTOR 657-F
19. 2" PVC
20. CHEM FEED SYSTEM
21. SODIUM HYPOCHLORITE (35 GALLONS)
    SODA ASH (55 GALLONS)
    LEWAGE PRODUCTS PRO 3.0 SERIES MULTIUSE LOCKER (PART OF 8 PIECE SET)
25. NEWAGE PRODUCTS PRO 3.0 SERIES BASE CABINET
26. NEWAGE PRODUCTS PRO 3.0 SERIES TOOL CABINET
27. NEWAGE PRODUCTS PRO 3.0 SERIES WALL CABINET
28. NEWAGE PRODUCTS BAMBOO WORKTOP
29. COAT TREATMENT BUILDING FLOOR SLAB WITH CASTAGRA ECODUR 201 COATING SYSTEM, OR APPROVED EQUAL.
30. 5 HP PACKAGE BOOSTER PUMP SKID. USA BLUEBOOK ITEM #26185.
32. WELL #3R RAW WATER LINE & 1" FLOW METER
31. REUSE EXISTING BAG FILTER CANISTER



CONTROL BUILDING B
1/2" = 1'-0"

GENERAL NOTES:

1) ALL ABOVE GRADE PIPING SHALL BE SCH 80 PVC
2) ALL BELOW GRADE PIPING SHALL BE HDPE DR 11
3) 1" RAW WATER METERS & RADIOS SUPPLIED BY OWNER

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Design Build Operate

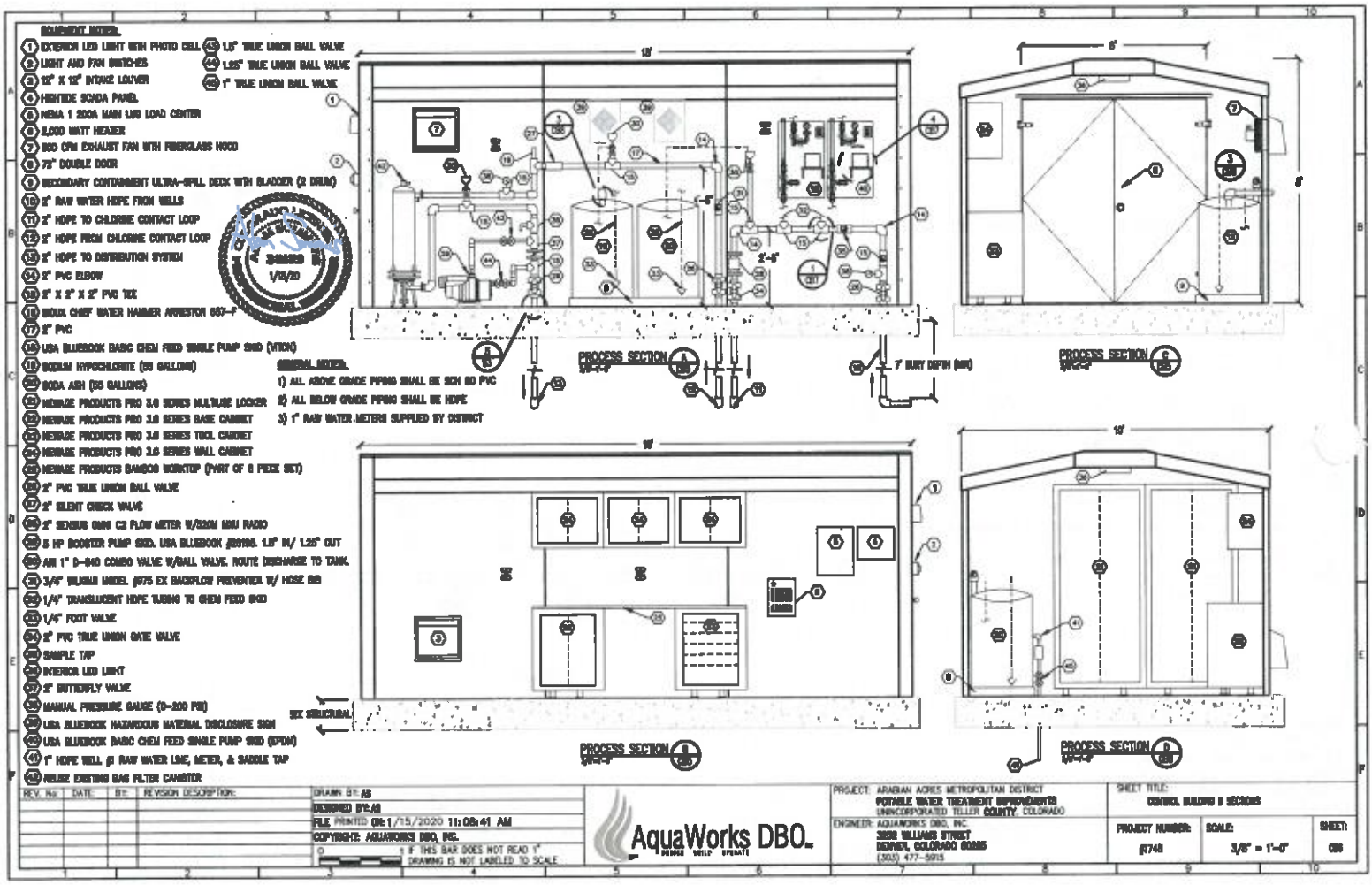
PROJECT: ARAPAHOE ACRES METROPOLITAN DISTRICT
POTABLE WATER TREATMENT IMPROVEMENTS
UNINCORPORATED TELLER COUNTY, COLORADO

ENGINEER: AQUAWORKS DBO, INC.
3253 WILLIAMS STREET
DENVER, COLORADO 80205
(303) 477-6615

SHEET TITLE: CONTROL BUILDING B PLAN

PROJECT NUMBER:	SCALE:	SHEET:
#1745	1/2" = 1'-0"	C25

1/15/20



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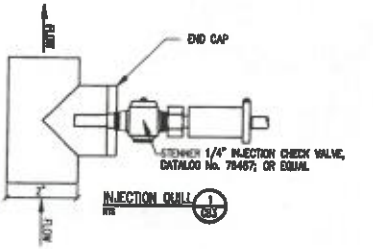
PROJECT: ARABIAN ACRES METROPOLITAN DISTRICT
POTABLE WATER TREATMENT IMPROVEMENTS
UNINCORPORATED TELLER COUNTY, COLORADO

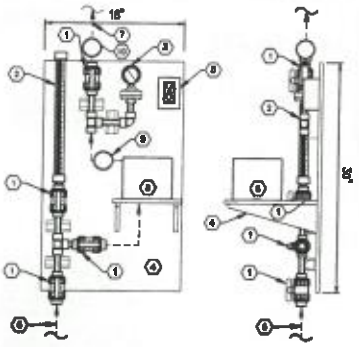
ENGINEER: AQUAWORKS DBO, INC.
3333 WILLIAMS STREET
DENVER, COLORADO 80205
(303) 477-5915

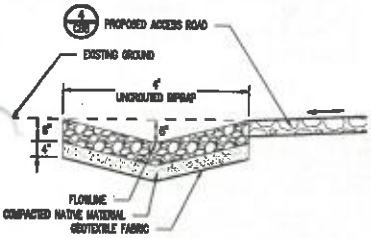
SHEET TITLE: CONTROL BUILDING B SECTIONS

PROJECT NUMBER:	SCALE:	SHEET:
#1748	3/8" = 1'-0"	C06



INJECTION QUILL 1 CHM





RIP RAP 2 CHM

EQUIPMENT NOTES:

1. 1/2" BALL VALVE
2. CALIBRATION COLUMN
3. PRESSURE GAUGE (200 PSI)
4. HDPE BACK PANEL AND STAND
5. DUPLEX GFCI OUTLET
6. 1/4" CHEM FEED TRANSLUCENT SUCTION LINE FROM TANK
7. 1/4" CHEM FEED TRANSLUCENT DISCHARGE LINE TO INJECTION QUILL
8. PULSATRON LPC4EA-KTC1 CHEMICAL FEED PUMP
9. PULSAFEEDER 1/2" PRESSURE RELIEF VALVE
10. PULSAFEEDER 1/2" BACK PRESSURE VALVE

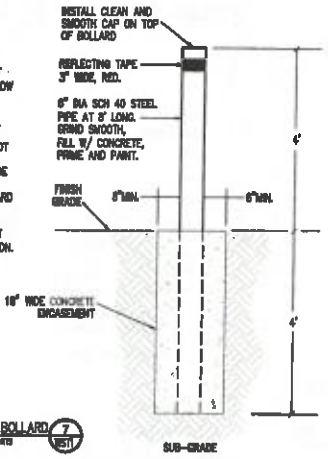
GENERAL NOTES:

1) USE WHITE COMPONENTS FOR SODIUM HYPOCHLORITE SKID AND EPDM COMPONENTS FOR SODA ASH.
2) ITEMS 1-5 INCLUDED IN USABLUEBOOK SKID. ALL OTHERS SUPPLIED SEPARATELY.

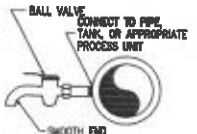
CHEMICAL FEED SYSTEM 4 CHM

NOTES:

1. PROVIDE SUITABLE SUBGRADE FOR STABLE INSTALLATION.
2. ENCASE BOLLARD IN A MINIMUM OF 18" DIAMETER OF CONCRETE TO 4' BELOW GRADE.
3. FILL PIPE WITH CONCRETE AND PROVIDE CLEAN CAP FOR TOP OF PIPE.
4. CONCRETE: CONCRETE MIX SHALL YIELD A COMPRESSIVE STRENGTH OF NOT LESS THAN 4,000 PSI AFTER 28 DAYS. MINIMUM UNCOVERED CURING TIME TO BE 36 HOURS.
5. PROVIDE 6' LONG STEEL PIPE. BOLLARD TO BE COATED WITH ZINC CHROMATE PRIMER PRIOR TO INSTALLATION. PAINT OUTSIDE OF PIPE WITH RUST-RESISTANT PAINT COLOR PER OWNER'S SPECIFICATION.



BOLLARD 7 CST



SAMPLE TAP 3 CST

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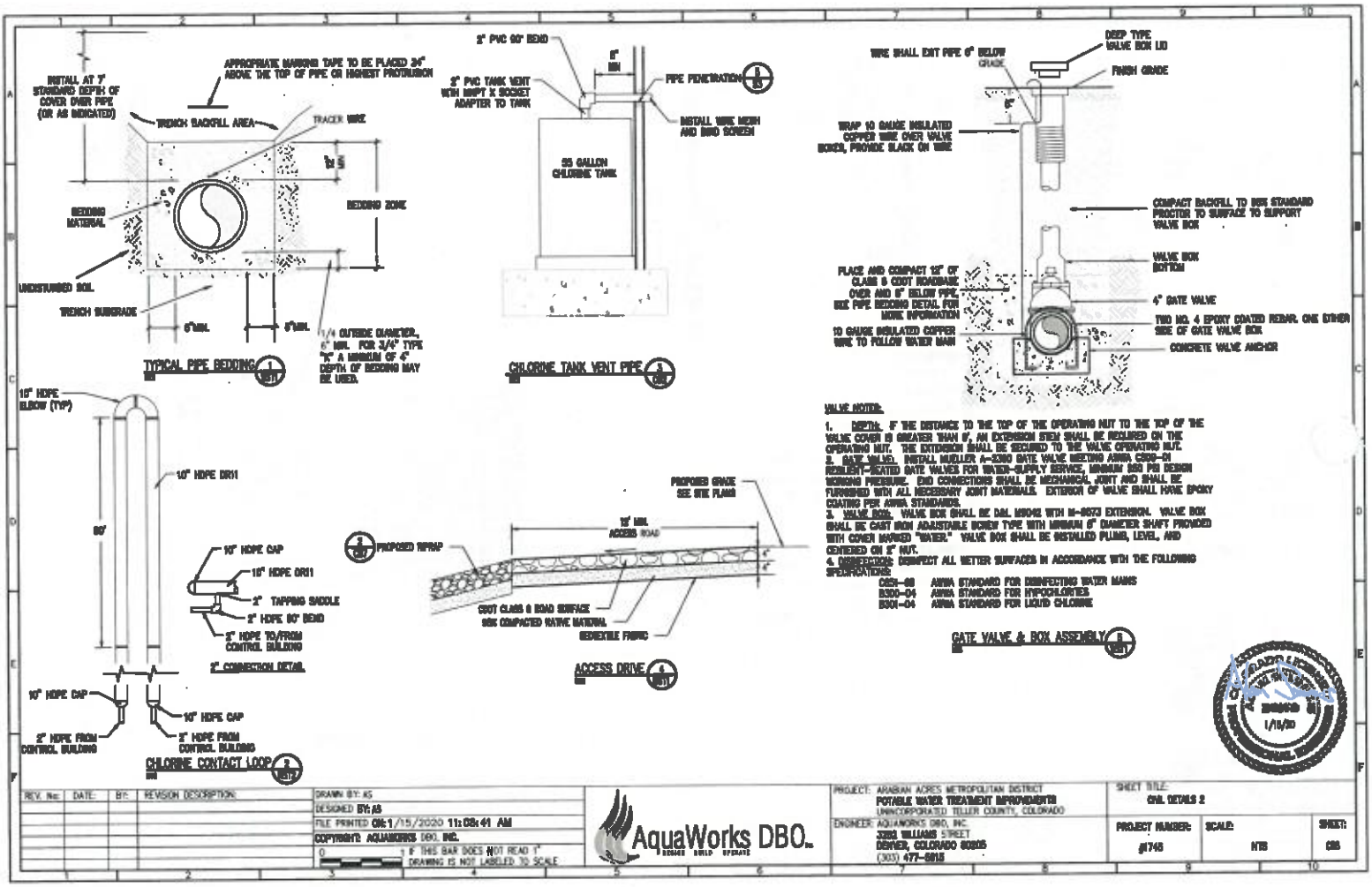
PROJECT: ARABIAN ACRES METROPOLITAN DISTRICT
POTABLE WATER TREATMENT IMPROVEMENTS
UNINCORPORATED TELLER COUNTY, COLORADO

ENGINEER: AQUAWORKS DBO, INC.
3252 WILLIAMS STREET
DENVER, COLORADO 80205
(303) 477-5815

SHEET TITLE: CIVIL DETAILS

PROJECT NUMBER:	SCALE:	SHEET:
#1745	NTS	C07



VALVE NOTES:

1. DEPTH: IF THE DISTANCE TO THE TOP OF THE OPERATING NUT TO THE TOP OF THE VALVE COVER IS GREATER THAN 6', AN EXTENSION STEM SHALL BE REQUIRED ON THE OPERATING NUT. THE EXTENSION SHALL BE SECURED TO THE VALVE OPERATING NUT.
2. GATE VALVE: INSTALL MUELLER A-2360 GATE VALVE MEETING AWWA C509-01 RESILIENT-SEATED GATE VALVES FOR WATER-SUPPLY SERVICE, MINIMUM 200 PSI DESIGN WORKING PRESSURE. END CONNECTIONS SHALL BE MECHANICAL JOINT AND SHALL BE FURNISHED WITH ALL NECESSARY JOINT MATERIALS. EXTERIOR OF VALVE SHALL HAVE EPOXY COATING PER AWWA STANDARDS.
3. VALVE BOX: VALVE BOX SHALL BE DAL MROME WITH M-9673 EXTENSION. VALVE BOX SHALL BE CAST IRON ADJUSTABLE SCREW TYPE WITH MINIMUM 6" DIAMETER SHAFT PROVIDED WITH COVER MARKED "WATER." VALVE BOX SHALL BE INSTALLED PLUMB, LEVEL, AND CENTERED ON 2" NUT.
4. DISINFECTION: DISINFECT ALL WETTER SURFACES IN ACCORDANCE WITH THE FOLLOWING SPECIFICATIONS:
   - C651-92 AWWA STANDARD FOR DISINFECTING WATER MAINS
   - B300-04 AWWA STANDARD FOR HYPOCHLORITES
   - B301-04 AWWA STANDARD FOR LIQUID CHLORINE

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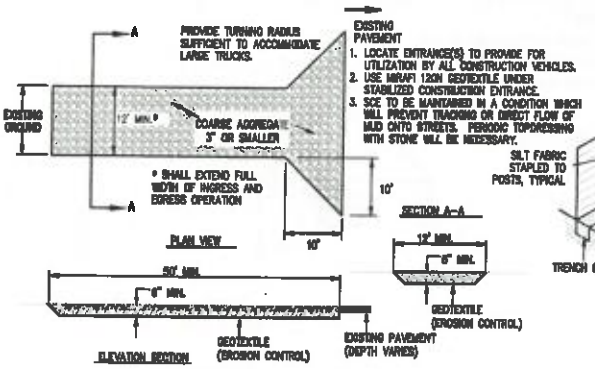
PROJECT: ARAPAHOE ACRES METROPOLITAN DISTRICT
POTABLE WATER TREATMENT IMPROVEMENTS
UNINCORPORATED TELLER COUNTY, COLORADO

ENGINEER: AQUAWORKS DBO, INC.
3303 WILLIAMS STREET
DENVER, COLORADO 80205
(303) 477-6915

SHEET TITLE: CIVIL DETAILS 2

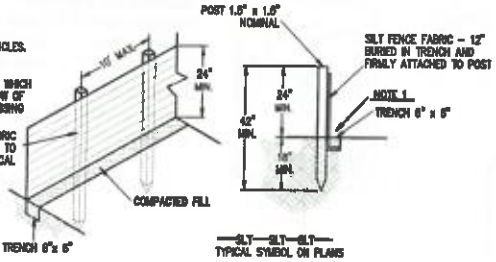
PROJECT NUMBER:	SCALE:	SHEET:
#1748	NTS	C05

1/15/20



1. LOCATE ENTRANCE(S) TO PROVIDE FOR UTILIZATION BY ALL CONSTRUCTION VEHICLES.
2. USE MIRAFI 120N GEOTEXTILE UNDER STABILIZED CONSTRUCTION ENTRANCE.
3. SCE TO BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OR DIRECT FLOW OF MUD ONTO STREETS. PERIODIC TOPDRESSING WITH STONE WILL BE NECESSARY.

STABILIZED CONSTRUCTION ENTRANCE 1 (SCE)



SILT FENCE 2 (SCE)

EROSION CONTROL DETAIL NOTES:

1. CONTRACTOR TO REMOVE ACCUMULATED SEDIMENT WHEN IT REACHES ONE THIRD OF PROTECTION FEATURE HEIGHT. CONTRACTOR SHALL PERFORM CONTINUOUS INSPECTION FOR PROPER FUNCTION.
2. SILT FENCE POSTS SHALL BE METAL OR WOOD WITH A MINIMUM LENGTH OF 48 INCHES. METAL POSTS SHALL BE "STUDDED TEE" OR "U" TYPE WITH A MINIMUM WEIGHT OF 1.33 POUNDS PER LINEAR FOOT. WOOD POSTS SHALL HAVE A MINIMUM DIAMETER OR CROSS SECTION OF 2 INCHES. SILT FENCE GEOTEXTILE SHALL BE ATTACHED TO POSTS WITH THREE OR MORE STAPLES PER POST.
3. SILT FENCE SHALL BE INSTALLED IN LOCATIONS SPECIFIED IN THE PLANS PRIOR TO ANY GRUBBING OR GRADING ACTIVITY. SEDIMENT SHALL BE REMOVED FROM BEHIND THE SILT FENCE WHEN IT ACCUMULATES TO ONE HALF THE EXPOSED GEOTEXTILE HEIGHT AND SHALL BE DISPOSED OF.
4. EROSION LOGS: EROSION LOGS SHALL BE CURLED ASPEN WOOD EXCELSIOR WITH A CONSISTENT WIDTH OF FIBERS EVENLY DISTRIBUTED THROUGHOUT THE LOG. THE CASING SHALL BE SEAMLESS, PHOTODEGRADABLE TUBE MESTING AND SHALL HAVE MINIMUM DEGRADATION AS SHOWN BELOW. THE CURLED ASPEN WOOD EXCELSIOR SHALL BE FUNGUS FREE, RESIN FREE AND SHALL BE FREE OF GROWTH OR GERMINATION INHIBITING SUBSTANCES. STAKES TO SECURE EROSION LOGS SHALL CONSIST OF PINEWOOD OR HARDWOOD.
5. THE CONTRACTOR SHALL MAINTAIN THE EROSION LOGS DURING CONSTRUCTION TO PREVENT SEDIMENT FROM PASSING OVER OR UNDER THE LOGS OR FROM SEDIMENT ACCUMULATION GREATER THAN 33% OF THE ORIGINAL EXPOSED HEIGHT OF EACH EROSION LOG. STAKES SHALL BE EMBEDDED A MINIMUM OF DEPTH OF 6 INCHES.

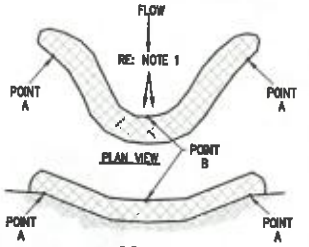
EROSION CONTROL SPECIFICATIONS:

NOMINAL DIMENSIONS OF EROSION LOGS:

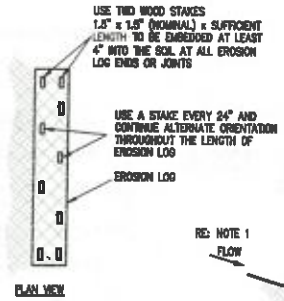
DIAMETER	LENGTH	WEIGHT	STAKE DIMENSIONS
12 INCH	7-10 FEET	2.5 LBS/FOOT	1.5X1.5X24 INCHES

GEOTEXTILE FOR SILT FENCE:

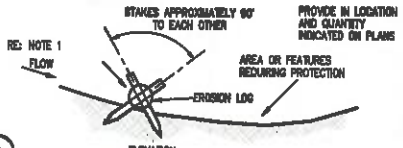
PROPERTY	SPECIFICATION	TEST METHOD
GRAB STRENGTH, N (LBS)	400 (90)	ASTM D 4632
ELONGATION, % MIN	50 MAXIMUM	ASTM D 4632
APPARENT OPENING SIZE	0.84 MAXIMUM	ASTM D 4751
ULTRAVIOLET DEGRADATION	70% STRENGTH RETAINED (AT 500 HOURS)	ASTM D 4355
PERMEABILITY S-1	0.01 MINIMUM	ASTM D 4491



EROSION LOG DITCH INSTALLATION 3 (SCE)



TYPICAL STAKE INSTALLATION A



TYPICAL EROSION LOG APPLICATION B

SPECIES	VARIETY	PERCENT OF MIX	BROADCAST PLS LBS/AC
BLUE GRAMA	LOVINGTON	20	1.2
LITTLE BLUESTEM	PASTURE	15	2.1
SHEEP FESCUE	COVER	15	1.4
ARIZONA FESCUE	REDONDO	10	0.9
INDIAN RICEGRASS	PALOMA	10	2.5
CANDY BLUEGRASS	CANDAR	10	0.6
WESTERN WHEATGRASS	ROSANA	10	3.2
THICKSPIKE WHEATGRASS	ORTANA	10	2.2
TOTAL:		100%	14.1 LBS/AC

NOTE: PROVIDE MULCH AND TACKIFIER TO MEET GERMINATION REQUIREMENTS.

SEED MIX AND MULCH 4

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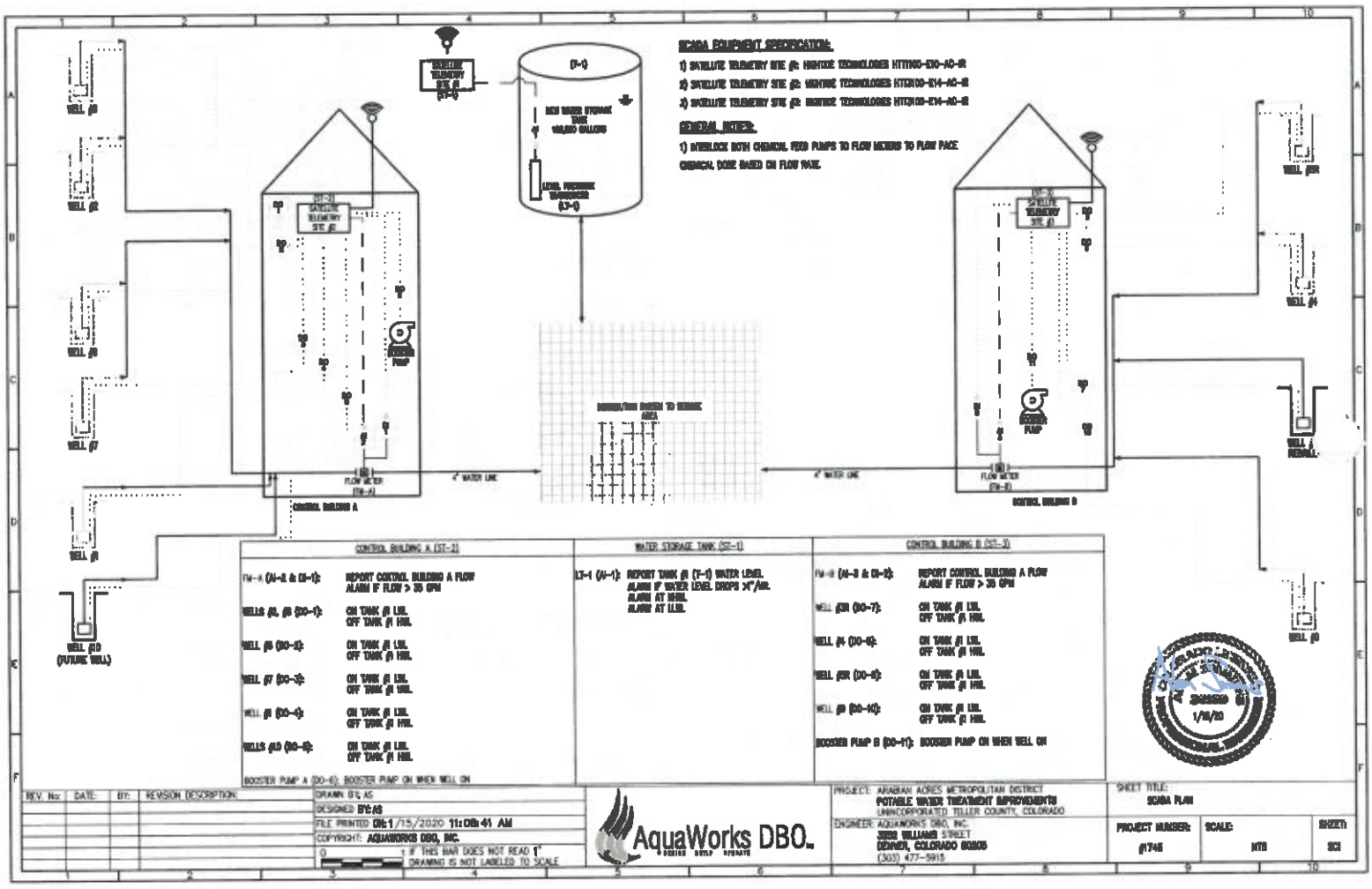
POTABLE WATER TREATMENT IMPROVEMENTS
UNINCORPORATED TELLER COUNTY, COLORADO

ENGINEER: AQUAWORKS DBO, INC.
3252 WILLIAMS STREET
DENVER, COLORADO 80205
(303) 477-5815

SHEET TITLE: EROSION CONTROL DETAILS

PROJECT NUMBER:	SCALE:	SHEET:
#1745	TBD	C89



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AquaWorks DBO.

PROJECT: ARABIAN ACRES METROPOLITAN DISTRICT
POTABLE WATER TREATMENT IMPROVEMENTS
UNINCORPORATED TELLER COUNTY, COLORADO

ENGINEER: AQUAWORKS DBO, INC.
3333 WILLIAMS STREET
DENVER, COLORADO 80205
(303) 477-5915

SHEET TITLE: SCADA PLAN

PROJECT NUMBER:	SCALE:	SHEET:
#1746	NTS	SC1

DESIGN PARAMETERS

1.	BUILDING CODE	2015 IBC WITH TCBC AMMENDMENTS
2.	LIVE LOADS	
	A. ROOF	20 PSF
3.	ROOF SNOW LOAD	
	A. GROUND SNOW LOAD, Pg	40 PSF
	B. FLAT ROOF SNOW LOAD, Pf	40 PSF
	C. SNOW EXPOSURE FACTOR, Ce	1.0
	D. SNOW LOAD IMPORTANCE FACTOR, I	1.1
	E. THERMAL FACTOR, Ct	1.1
4.	WIND DESIGN DATA	
	A. ULTIMATE WIND SPEED (3 SECOND GUST), V	130 MPH (Vasd=100 MPH)
	B. RISK CATEGORY	II
	C. WIND EXPOSURE CATEGORY	C
	D. INTERNAL PRESSURE COEFFICIENT, Gcpi	+/- 0.18
	E. DESIGN WIND PRESSURE ON MAIN WIND FORCE RESISTING SYSTEM (MWFRS) (ASD)	+/- 0.18
	1) WALLS	
	WINDWARD	13 PSF
	LEEWARD	-8 PSF
	2) ROOF	
	0-6 FT	-16 PSF
	> 6 FT	-12 PSF
	OVERHANGS	-26 PSF
	F. DESIGN WIND PRESSURE ON COMPONENTS AND CLADDING (ASD)	
	1) WALLS (20 SQUARE FEET EFFECTIVE WIND AREA)	
	END ZONES	26 PSF
	INTERIOR ZONES	21 PSF
	2) ROOF (GROSS UPLIFT) -20 SQUARE FEET EFFECTIVE WIND AREA	
	CORNER ZONES	47 PSF
	END ZONES	34 PSF
	INTERIOR ZONES	22 PSF
	G. WIDTH OF END ZONES	3.0
5.	EARTHQUAKE DESIGN DATA	
	A. SEISMIC IMPORTANCE FACTOR, I	1.25
	B. MAPPED SPECTRAL RESPONSE ACCELERATION, Ss	24.7%
	C. MAPPED SPECTRAL RESPONSE ACCELERATION, S1	6.8%
	D. SITE CLASS	C
	E. SPECTRAL RESPONSE COEFFICIENT, Sds	0.198
	F. SPECTRAL RESPONSE COEFFICIENT, Sd1	0.074
	G. SEISMIC DESIGN CATEGORY	B

sullivan
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DEFERRED STRUCTURAL SUBMITTALS

1. THE FOLLOWING STRUCTURAL COMPONENTS SHALL BE DESIGNED AND SUBMITTED BY OTHERS FOR APPROVAL IN ACCORDANCE WITH DRAWINGS AND SPECIFICATIONS.
   A. PRE-ENGINEERED FIBERGLASS BUILDINGS.
2. DOCUMENTS FOR DEFERRED STRUCTURAL SUBMITTAL ITEMS SHALL BE DESIGNED, SEALED AND SIGNED BY A PROFESSIONAL ENGINEER LICENSED IN THE STATE WHERE THE PROJECT IS LOCATED. THE DEFERRED SUBMITTAL DOCUMENTS SHALL BE SUBMITTED TO THE ARCHITECT OR ENGINEER OF RECORD WHO SHALL REVIEW THEM AND FORWARD THEM TO THE BUILDING OFFICIAL AS REQUESTED WITH A NOTATION INDICATING THAT THE DEFERRED SUBMITTAL DOCUMENTS HAVE BEEN REVIEWED AND BEEN FOUND TO BE IN GENERAL CONFORMANCE TO THE DESIGN OF THE BUILDING. THE DEFERRED SUBMITTAL ITEMS SHALL NOT BE INSTALLED UNTIL THE DESIGN AND SUBMITTAL DOCUMENTS HAVE BEEN APPROVED BY THE BUILDING OFFICIAL.

PRE-ENGINEERED FIBERGLASS BUILDING

1. PRE-ENGINEERED FIBERGLASS BUILDING ELEMENTS SHALL BE DESIGNED BY THE MANUFACTURER AND SHALL COMPLY WITH THE REQUIREMENTS OF LOCAL BUILDING CODES AS LISTED IN "DESIGN PARAMETERS" AND THE FIBERGLASS BUILDING MANUFACTURERS' ASSOCIATION DESIGN MANUAL. IN ADDITION, THE FIBERGLASS BUILDING ELEMENTS SHALL BE DESIGNED FOR ALL LOADS INDICATED ON THE DRAWINGS.
2. THE FIBERGLASS BUILDING MANUFACTURER IS RESPONSIBLE FOR PROVIDING FIBERGLASS BUILDING INSTALLATION INSTRUCTIONS. REF. FOUNDATION DETAILS FOR TYPE, DIAMETER, AND LOCATION OF ANCHOR BOLTS FOR THE FIBERGLASS BUILDING.
3. THE FIBERGLASS BUILDING SHALL BEAR AS INDICATED ON PLANS.
4. DEFLECTION LIMITS SHALL BE IN ACCORDANCE WITH THE REFERENCED BUILDING CODE REQUIREMENTS AND APPROPRIATE FOR THE BUILDING COMPONENTS AND FINISHES SPECIFIED. BUILDING MANUFACTURER SHALL BE RESPONSIBLE FOR DETERMINATION OF DEFLECTION LIMITS.
5. SHOP DRAWING SUBMITTALS (INCLUDING DRAWINGS AND CALCULATIONS) SHALL BEAR THE SEAL OF A PROFESSIONAL ENGINEER LICENSED IN THE STATE WHERE THE PROJECT IS LOCATED. INCLUDE FOUNDATION REACTIONS OF ALL FRAMING MEMBERS ON THE SHOP DRAWINGS FOR ALL LOAD COMBINATIONS. INDICATE WHETHER THESE LOADS ARE ULTIMATE OR SERVICE LOADS. INDICATE WHICH LOAD COMBINATION APPLIES THE LARGEST LOAD TO FOUNDATIONS.
6. FOUNDATIONS PROVIDING SUPPORT TO THE FIBERGLASS BUILDING FRAMES OF THE BUILDING HAVE BEEN DESIGNED FOR PINNED TYPE CONNECTIONS ONLY. DO NOT FIX THE BASE OF THE FIBERGLASS BUILDING WALLS.
7. A 1/3 INCREASE IN ALLOWABLE STRESS SHALL NOT BE USED FOR DESIGN. HOWEVER, A LOAD REDUCTION SHALL BE ALLOWED IN ACCORDANCE WITH ASCE-7 WHEN TWO OR MORE TRANSIENT LOADS IN COMBINATION WITH DEAD LOADS ARE APPLIED.
8. FIBERGLASS BUILDING MANUFACTURER SHALL PROVIDE ROOF BRACING, WALL BRACING AND/OR PORTAL FRAMES AS REQUIRED TO ADEQUATELY RESIST WIND AND SEISMIC LOADS. THEIR LOCATIONS AND SIZES SHALL BE COORDINATED WITH THE ARCHITECTURAL AND ENGINEERING DRAWINGS AND INTENT.
9. FIBERGLASS BUILDING MANUFACTURER SHALL BE RESPONSIBLE FOR ALL FRAMING ABOVE SLAB OR TOP OF FOUNDATION PILASTER AND WALL ELEVATIONS, WHICHEVER IS HIGHER. THIS INCLUDES, BUT IS NOT LIMITED TO, WIND GIRTS AND COLUMNS, EXTERIOR JAMBS AND LINTELS, AND MECHANICAL/ELECTRICAL EQUIPMENT SUPPORT. ALL SUPPLEMENTAL FRAMING SHALL MEET OR EXCEED THE LOAD AND DEFLECTION REQUIREMENTS OF THE MANUFACTURER.
10. THE FIBERGLASS BUILDING MANUFACTURER IS RESPONSIBLE FOR COORDINATING FIBERGLASS BUILDING ELEMENTS WITH THE CONSTRUCTION DRAWINGS AND INTENT.
11. NO OVERSTRESS OF FIBERGLASS BUILDING MEMBERS IS ALLOWED.

GENERAL NOTES

GENERAL

1. STRUCTURAL ELEMENTS ARE NON-SELF SUPPORTING AND REQUIRE INTERACTION WITH OTHER ELEMENTS FOR STABILITY AND RESISTANCE TO LATERAL FORCES. FRAMING AND WALLS SHALL BE TEMPORARILY BRACED BY THE CONTRACTOR UNTIL PERMANENT BRACING, FLOOR AND ROOF DECKS, AND WALLS HAVE BEEN INSTALLED AND CONNECTIONS BETWEEN THESE ELEMENTS HAVE BEEN MADE.
2. THE SPECIFICATIONS AND STRUCTURAL DRAWINGS REPRESENT THE FINISHED STRUCTURE AND DO NOT INDICATE THE METHOD OF CONSTRUCTION, UNLESS NOTED OTHERWISE. THE CONTRACTOR IS SOLELY RESPONSIBLE FOR THE MEANS, METHODS, TECHNIQUES, SEQUENCES, AND OPERATION OF CONSTRUCTION AND SAFETY PRECAUTIONS AND PROGRAMS INCIDENTAL THERETO.
3. THE SIZE AND LOCATION OF EQUIPMENT PADS AND PENETRATIONS THROUGH THE STRUCTURE FOR MECHANICAL, ELECTRICAL, AND PLUMBING WORK SHALL BE VERIFIED BY THE CONTRACTOR. PENETRATIONS SHALL BE SUBJECT TO APPROVAL BY THE STRUCTURAL ENGINEER. REFER TO CONTROL BUILDING PLAN DRAWINGS FOR OPENING LOCATIONS NOT SHOWN ON THE STRUCTURAL DRAWINGS.
4. USE ONLY DIMENSIONS INDICATED ON THE DRAWINGS. DO NOT SCALE DRAWINGS OR USE ANY DIMENSIONS TAKEN FROM ELECTRONIC DRAWING FILES.
5. ASSUME EQUAL SPACING IF NOT INDICATED ON DRAWINGS.
6. ARCHITECTURAL, MECHANICAL AND ELECTRICAL COMPONENTS AND SYSTEMS SHALL BE DESIGNED AND CONSTRUCTED TO RESIST SEISMIC FORCES AS DETERMINED IN ASCE 7.

FOUNDATIONS

1. FOOTING DESIGNS ARE BASED ON AN ALLOWABLE SOIL BEARING PRESSURE OF 2,000 PSF BASED ON THE GEOTECHNICAL REPORT BY KUMAR & ASSOCIATES, INC. DATED MAY 10, 2019.
2. CONTRACTOR AND TESTING LABORATORY REPRESENTATIVE SHALL READ THE GEOTECHNICAL REPORT AND BECOME THOROUGHLY FAMILIAR WITH SITE AND SUBGRADE INFORMATION GIVEN THEREIN. THE CONTRACTOR SHALL BE RESPONSIBLE FOR DETERMINING EXACT QUANTITIES OF CUT AND FILL FOR ESTIMATING AND CONSTRUCTION. SUBGRADE SHALL BE PREPARED AS NOTED IN THE GEOTECHNICAL REPORT.
3. A QUALIFIED AND REGISTERED GEOTECHNICAL ENGINEER, LICENSED IN THE STATE WHERE THE PROJECT IS LOCATED AND WORKING FOR THE TESTING LABORATORY, SHALL DETERMINE CONFORMANCE OF THE FOUNDATION BEARING STRATA WITH THE FOUNDATION DESIGN CRITERIA ABOVE, AND ALL OTHER CONTRACT DOCUMENTS. TESTING LABORATORY SHALL NOTIFY CONTRACTOR, ARCHITECT AND CONSULTING ENGINEER OF ANY CONDITIONS NOT IN ACCORDANCE WITH FOUNDATION DESIGN CRITERIA OR CONTRACT DOCUMENTS.
4. CONCRETE SLAB AND FOOTINGS SHALL BEAR ON A MINIMUM OF 1 FOOT OF PROPERLY MOISTURE CONDITIONED AND COMPACTED STRUCTURAL SUB-BASE WITH LIMITATIONS NOTED IN THE GEOTECHNICAL REPORT. PROVIDE STRUCTURAL FILL DIRECTLY BELOW THE BUILDING AND 8 FEET BEYOND THE EDGES OF BUILDING. PLACE PROPERLY COMPACTED FILL AGAINST THE SIDES OF PERIMETER FOOTINGS AS NOTED IN THE GEOTECHNICAL REPORT.
5. EXTERIOR FOOTINGS SHALL BEAR AT OR BELOW MINIMUM BEARING DEPTH. MINIMUM FROST DEPTH IS 30 INCHES BELOW ADJACENT FINISHED GRADE.
6. PROVIDE UNIFORM BEARING SURFACE FOR SLABS AND FOOTINGS WITH 6 INCHES OF CLASS 1 MATERIAL, PROPERLY COMPACTED AS NOTED IN THE GEOTECHNICAL REPORT.
7. AVOID DAMAGE TO UNDERGROUND UTILITIES SUCH AS WATER MAINS, SANITARY SEWERS, BURIED CABLES, ETC., WHICH MIGHT EXTEND ACROSS OR ADJOIN SITE.
8. DO NOT PLACE CONCRETE ON FROZEN SUBGRADE OR ON SUBGRADE CONTAINING FROZEN MATERIALS. VERIFY THAT FORMS, REINFORCING STEEL AND ADJACENT CONCRETE SURFACES ARE FREE OF FROST, SNOW AND ICE AND THAT TEMPERATURE OF THESE MATERIALS IS ABOVE 32 DEGREES F BEFORE PLACING CONCRETE.

CONCRETE

1. CONCRETE SPECIFICATIONS SHALL BE AS FOLLOWS:
   A. EXTERIOR CONCRETE AND INTERIOR CONCRETE EXPOSED TO FREEZE-THAW, AND CONCRETE SLABS AND WALLS PERMANENTLY EXPOSED TO THE EXTERIOR: MINIMUM 28 DAY COMPRESSIVE STRENGTH = 4500 PSI. PROPORTIONED TO HAVE A MAXIMUM WATER/CEMENT RATIO OF 0.45. SLUMP = 3" - 5". ALL CONCRETE EXPOSED TO THE EXTERIOR SHALL BE AIR-ENTRAINED WITH MINIMUM TOTAL AIR CONTENT OF 6% +/- 1% BY VOLUME PER ASTM C231 FOR 3/4" AGGREGATE AND LARGER. REFERENCE ACI 318 TABLE 4.4.1, TOTAL AIR CONTENT FOR CONCRETE EXPOSED TO CYCLES OF FREEZING AND THAWING, EXPOSURE CLASS F2, FOR SMALLER AGGREGATE SIZES.
   B. PORTLAND CEMENT SHALL CONFORM TO ASTM C-150, TYPE I OR II.
   C. AGGREGATES FOR NORMAL WEIGHT CONCRETE SHALL CONFORM TO ASTM C-33.
2. MATERIALS OR ADMIXTURES SHALL NOT CONTAIN ANY CALCIUM CHLORIDE.
3. REINFORCING STEEL SHALL MEET THE FOLLOWING:
   A. DEFORMED BARS — ASTM A615, GRADE 60
   B. WELDED WIRE FABRIC — ASTM A185
4. WHERE DOWELS ARE INDICATED BUT NOT SIZED, PROVIDE DOWELS THAT MATCH SIZE AND LOCATION OF MAIN REINFORCEMENT STEEL AND LAP SPLICE WITH THE MAIN REINFORCING STEEL. REINFORCING BARS SHALL BE SPLICED AS NOTED IN THE REINFORCING LAP SCHEDULE.
5. REFER TO ACI 318 LATEST EDITION FOR CONCRETE COVER, ACI 315 LATEST EDITION FOR DETAILING PRACTICES AND FABRICATION, AND ACI 301 LATEST EDITION FOR STANDARD PRACTICE FOR MIXING AND PLACING CONCRETE. REFER TO ACI 306R-16 FOR REQUIRED COLD WEATHER CONCRETING PROCEDURES.
6. PROVIDE CORNER BARS THAT MATCH AND LAP CONTINUOUS REINFORCEMENT SIZE AND QUANTITY AT INTERSECTIONS AND CORNERS OF WALLS AND FOUNDATIONS. REF 2-S3.
7. ANCHORS INSTALLED IN HARDENED CONCRETE SHALL BE USED WHERE SPECIFIED ON THE CONTRACT DRAWINGS. CARE SHALL BE TAKEN IN PLACING POST-INSTALLED ANCHORS TO AVOID CONFLICTS WITH EXISTING REINFORCING. HOLES SHALL BE DRILLED, DRY AND CLEANED AND ANCHORS INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S PUBLISHED WRITTEN INSTRUCTIONS AND APPLICABLE ESR REPORT. REFERENCE DETAILS FOR ANCHOR SIZE AND EMBEDMENT. SUBSTITUTION REQUESTS FOR PRODUCTS OTHER THAN THOSE SPECIFIED ON THE CONTRACT DRAWINGS SHALL BE SUBMITTED BY THE CONTRACTOR TO THE ENGINEER-OF-RECORD ALONG WITH CALCULATIONS THAT ARE SIGNED AND SEALED BY THE QUALIFIED PROFESSIONAL ENGINEER RESPONSIBLE FOR THEIR PREPARATION AND LICENSED IN THE STATE WHERE THE PROJECT IS LOCATED. THE CALCULATIONS SHALL DEMONSTRATE THAT THE SUBSTITUTED PRODUCT IS CAPABLE OF ACHIEVING THE PERTINENT EQUIVALENT PERFORMANCE VALUES (MINIMUM) OF THE SPECIFIED PRODUCT USING THE APPROPRIATE DESIGN PROCEDURE AND/OR STANDARD(S) AS REQUIRED BY THE BUILDING CODE. ALLOWABLE SUBSTITUTIONS FOR POST-INSTALLED ANCHORS IN CONCRETE ARE:
   A. HILTI HIT-RE 500-SD EPOXY ADHESIVE (ICC-ES ESR-2322).
   B. HILTI HIT-HY 200 ADHESIVE (ICC-ES ESR-3187)
   C. HILTI KWIK BOLT TZ EXPANSION ANCHOR (ICC-ES ESR-1917).
   D. SIMPSON STRONG-TIE SET-XP EPOXY ADHESIVE (ICC-ES ESR-2508).
   E. SIMPSON STRONG-TIE AT-XP ADHESIVE (IAPMO UES ER-263).
   F. SIMPSON STRONG-TIE STRONG BOLT 2 WEDGE ANCHOR (ICC-ES ESR-3037).
8. CONTROL JOINTS SHALL BE LOCATED AS SHOWN ON PLANS OR AS DIRECTED BY THE STRUCTURAL ENGINEER. SLAB SHALL BE PLACED IN A SINGLE POUR WITHOUT CONSTRUCTION JOINTS.

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PROJECT: ARABIAN ACRES METROPOLITAN DISTRICT POTABLE WATER TREATMENT IMPROVEMENTS TELLER COUNTY, COLORADO

ENGINEER: AQUAWORKS DBO, INC.
3252 WILLIAMS STREET
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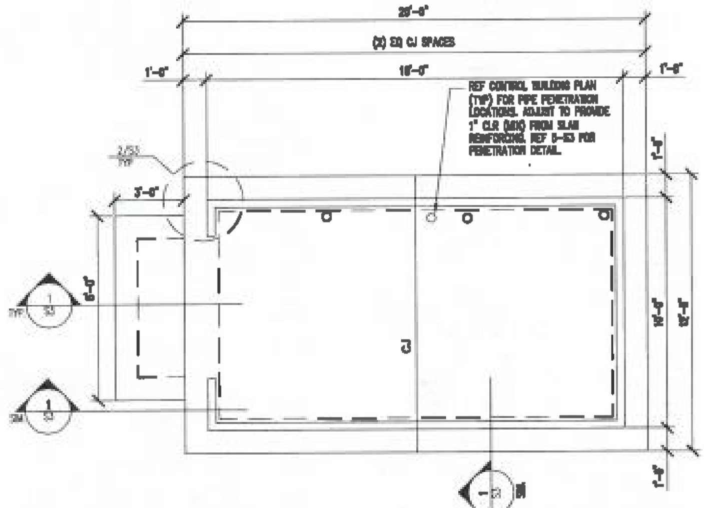
SHEET TITLE: STRUCTURAL NOTES & SPECIFICATIONS

PROJECT NUMBER:	SCALE:	SHEET:
#1745	N.T.S.	S1



CONTROL BUILDINGS A & B FOUNDATION PLAN

SCALE: 1/4" = 1'-0"

FOUNDATION PLAN NOTES:

1. 3.5" CONCRETE SLAB REINFORCED WITH #4 AT 12" ON CENTER EACH WAY AT CENTER OF SLAB. PLACE SLAB OVER 6" BASE OF WELL GRADED GRANULAR FILL, OVER NEWLY PLACED, COMPACTED FILL. PREPARE SUBGRADE PER GEOTECHNICAL RECOMMENDATIONS FROM REPORT REFERENCED ON SHEET S1.
2. EXTERIOR GRADE ELEVATION VARIES, REF CIVIL. SLOPE BOTTOM OF FOOTING TO MAINTAIN MINIMUM BEARING DEPTH.
3. REFERENCE PROCESS PLANS AND SECTIONS FOR SIZE AND LOCATIONS OF PENETRATIONS, TYP.
4. C.J. = SAW CUT CONTRACTION JOINT (REFERENCE DETAIL 3-S3).
5. REFERENCE DETAIL 1-S3 FOR TYPICAL ANCHOR ROD DETAIL.

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POTABLE WATER TREATMENT IMPROVEMENTS
TELLER COUNTY, COLORADO

ENGINEER: AQUAWORKS DBO, INC.
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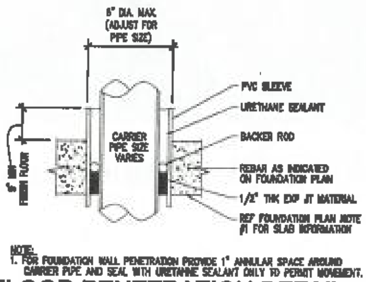
SHEET TITLE: FOUNDATION PLAN

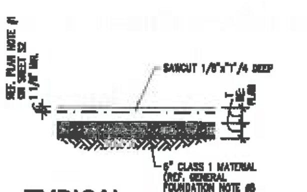
PROJECT NUMBER:	SCALE:	SHEET:
#1745	1/4" = 1'-0"	S2



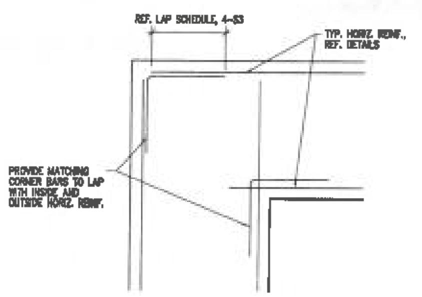
5/S3 **FLOOR PENETRATION DETAIL**
NO SCALE

STEEL REINF. LAP SCHEDULE				
BAR SIZE	CONCRETE LAP SPLICE (CLASS B) (IN)			
	f'c = 3000psi		f'c = 4500psi/5000psi	
	TOP	OTHER	TOP	OTHER
3	17	16	16	16
4	23	18	19	18
5	[illegible]	[illegible]	[illegible]	[illegible]
6	34	26	[illegible]	21
7	49	38	40	31
8	56	43	48	35

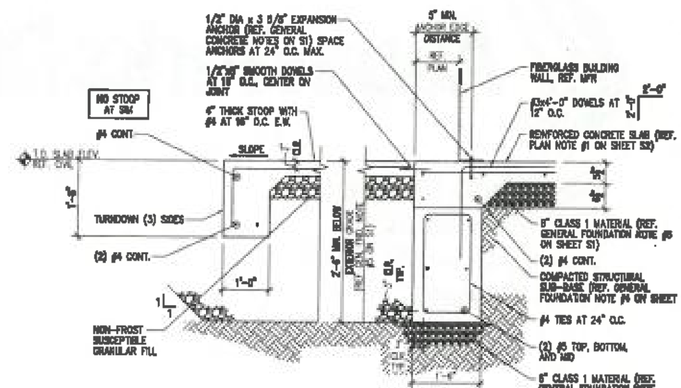
4/S3 **STEEL REINFORCING LAP SCHEDULE**
NO SCALE



3/S3 **TYPICAL CONTRACTION JOINT**
SCALE: 1/2" = 1'-0"



2/S3 **TYPICAL CONCRETE CORNER**
SCALE: 1/2" = 1'-0"



1/S3 **TYPICAL SECTION**
SCALE: 1/2" = 1'-0"

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SHEET TITLE: FOUNDATION DETAILS
PROJECT NUMBER: #1745
SCALE: 1/2" = 1'-0"
SHEET: S3

Potable Water Distribution and Treatment Improvement Project

Specification Manual

Preliminary – Not for Construction

Arabian Acres Metropolitan District

Unincorporated Teller County, Colorado

January 2020

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