TOWN OF CASTLE ROCK
EQUIPMENT AND SERVICES ACQUISITION
AGREEMENT (PCWPF Ammonia Conversion Project)

DATE: June 16, 2020.

PARTIES: **TOWN OF CASTLE ROCK**, a Colorado municipal corporation, 100 N. Wilcox Street, Castle Rock, Colorado 80104 ("Town").

GARNEY CONSTRUCTION, a Missouri corporation, 1333 NW Vivion Road, Kansas City, MO 64118 ("Contractor").

RECITALS:

A. Town wishes to engage Contractor to provide the services more fully described in the following Agreement and Exhibits.

TERMS:

Section 1. **Scope of Services.** Contractor shall perform all of the services and provide all materials as set forth on ***Exhibit 1*** ("Work"). Contractor shall complete the Work consistent with standards and practices of the construction trade.

Section 2. **Total Obligation**. Town shall pay Contractor $354,353 for the full performance of the Work.

Section 3. **Payment**. Contractor shall invoice Town monthly for services rendered at the rates designated in ***Exhibit 1***. Town shall pay invoices within 30 days' receipt of such invoice. In no event shall payment exceed $354,353 unless authorized in writing by Town. Town may withhold payment in whole, or in part for the Work found by the Town to be defective, untimely, unsatisfactory, or otherwise not conforming to this Agreement, not in conformance with all applicable federal, state, and local laws, ordinances, rules and regulations, or if Contractor is in default of Section 6, below.

Section 4. **Completion.** Contractor understands time is of the essence in this Agreement**.** Contractor shall undertake the Work upon execution of this Agreement and complete the Work not later than November 30, 2020. Contractor shall devote adequate resources to assure timely completion of the Work in accordance with the standards specified in this Agreement. Contractor shall perform the Work under this Agreement using a standard of care, skill and diligence ordinarily used by reputable professionals performing under circumstances similar to those required by this Agreement.

Town shall have the right to terminate this Agreement at any time with 10 days written notice to Contractor. The Town's only obligation in the event of termination shall be payment of fees and expenses incurred up to and including the effective date of termination.

Section 5. **Subcontractors.** Contractor may utilize subcontractors to assist with specialized works as necessary to complete the Work. Contractor will submit any proposed subcontractor and the description of subcontractor services to the Town for its prior approval.

Section 6. **Inspection and Warranty**. Town reserves the right to inspect the Work provided under this Agreement at all reasonable times and places during the term of this Agreement. Alternatively, the Town may refuse the Work and cancel all or any part of this Agreement if Contractor fails to deliver all or any part of the Work in accordance with the terms and conditions of this Agreement. Failure by the Town to inspect and test the Work shall not relieve Contractor of such responsibility. Any acceptance by the Town shall not be deemed a waiver or settlement of any defect or nonconformity in such Work. If Town elects to accept nonconforming or defective Work, Town, in addition to its other remedies, shall be entitled to deduct a reasonable amount from the price thereof to compensate Town for the nonconformity or defect.

Contractor expressly warrants that all materials and/or equipment furnished under this Agreement shall be free from defects in materials or workmanship, are installed properly and in accordance with the manufacturer recommendations or other industry standards, and will function in a failure-free manner for a period of one (1) year from the date of delivery or installation. Contractor, shall, at its option, repair or replace any material and/or equipment that fail to satisfy this warranty during the warranty period. Additionally, Contractor agrees to assign to the Town all written manufacturer warranties relating to the supplies and to deliver such written warranties to the Town.

Section 7. **Risk of Loss**. With respect to any equipment provided under this Agreement, risk of loss shall not pass to the Town until such equipment has been received and accepted by the Town, pursuant to Section 6, above, at the destination specified by the Town. Contractor assumes full responsibility for packing, crating, marking, transporting, and liability for loss or damage in transit, notwithstanding any agreement by the Town to pay freight, express or other transportation charges.

Section 8. **Assignment.** This Agreement shall not be assigned by Contractor without the written consent of the Town.

Section 9. **Notice.** Any notice required or permitted by this Agreement shall be in writing and shall be deemed to have been sufficiently given for all purposes if sent by certified mail or registered mail, postage and fees prepaid, addressed to the party to whom such notice is to be given at the address set forth on the first page of this Agreement, or at such other address as has been previously furnished in writing to the other party or parties. Such notice shall be deemed given when deposited in the United States mail.

Section 10. **Prohibition Against Employing Illegal Aliens**. Contractor shall not knowingly employ or contract with an illegal alien to perform work under this contract. Contractor shall not enter into a contract with a subcontractor that fails to certify to the Contractor that the subcontractor shall not knowingly employ or contract with an illegal alien to perform work under this contract.

Contractor has confirmed the employment eligibility of all employees who are newly hired for employment to perform work under the public contract for services through participation in either the E-verify program or the Department program, as defined in C.R.S. §§ 8-17.5-101(3.3) and 8-17.5-101(3.7), respectively. Contractor is prohibited from using the E-verify program or Department program procedures to undertake pre-employment screening of job applicants while this contract is being performed.

If Contractor obtains actual knowledge that a subcontractor performing work under this Agreement for services knowingly employs or contracts with an illegal alien, Contractor shall:

A. Notify the subcontractor and the Town within three days that the Contractor has actual knowledge that the subcontractor is employing or contracting with an illegal alien; and

B. Terminate the subcontract with the subcontractor if within three days of receiving notice required pursuant to this paragraph the subcontractor does not stop employee or contracting with the illegal alien; except that the Contractor shall not terminate the contract with the subcontractor if during such three days the subcontractor provides information to establish that the subcontractor has not knowingly employed or contracted with an illegal alien.

Contractor shall comply with any reasonable request by the Department of Labor and Employment made in the course of an investigation that the Department is undertaking pursuant to the authority established in C.R.S. §8-17.5-102(5).

If Contractor violates a provision of this Agreement required pursuant to C.R.S. §8-17.5-102, Town may terminate the Agreement for breach of contract. If the Agreement is so terminated, the Contractor shall be liable for actual and consequential damages to the Town.

Section 11. <u>Insurance.</u> Contractor agrees to procure and maintain, at its own cost, the following policy or policies of insurance. Contractor shall not be relieved of any liability, claims, demands or other obligations assumed pursuant to this Agreement by reason of its failure to procure or maintain insurance, or by reason of its failure to procure or maintain insurance in sufficient amounts, durations, or types.

A. Contractor shall procure and maintain, and shall cause each subcontractor of the Contractor to procure and maintain a policy with the minimum insurance coverage listed below. Such coverage shall be procured and maintained with forms and insurers acceptable to the Town. All coverage shall be continuously maintained from the date of commencement of services hereunder. In the case of any claims-made policy, the necessary retroactive dates and extended reporting periods shall be procured to maintain such continuous coverage.

1. Workers Compensation insurance to cover obligations imposed by the Workers Compensation Act of Colorado and any other applicable laws for any employee engaged in the performance of Work under this contract, and Employer's Liability insurance with minimum limits of FIVE HUNDRED THOUSAND DOLLARS ($500,000) each accident, FIVE HUNDRED THOUSAND DOLLARS ($500,000) disease-policy limit, and FIVE HUNDRED THOUSAND DOLLARS ($500,000) disease-each employee.

2. Comprehensive General Liability insurance with minimum combined single limits of ONE MILLION DOLLARS ($1,000,000) each occurrence and ONE MILLION DOLLARS ($1,000,000) aggregate. The policy shall be applicable to all premises and operations. The policy shall include coverage for bodily injury, broad form property damage (including for contractual and employee acts), blanket contractual, independent contractors, products, and completed operations. The policy shall contain a severability of interests provision.

3. Comprehensive Automobile Liability Insurance with minimum combined single limits for bodily injury and property damage of not less than ONE MILLION DOLLARS ($1,000,000) each occurrence and ONE MILLION DOLLARS ($1,000,000) aggregate with respect to each of Contractor's owned, hired and/or non-owned vehicles assigned to or used in performance of the services. The policy shall contain a severability of interests provision.

B. The policies required above, except Workers' Compensation insurance and Employers' Liability insurance, shall be endorsed to include the Town, its officers and employees, as additional insureds. Every policy required above, except Workers' Compensation shall be primary insurance, and any insurance carried by the Town, its officers, or its employees, shall be excess and not contributory insurance to that provided by Contractor. The additional insured endorsement for the Comprehensive General Liability insurance required above shall not contain any exclusion for bodily injury or property damage arising from completed operations. The Contractor shall be solely responsible for any deductible losses under each of the policies required above.

C. Certificates of insurance shall be completed by Contractor's insurance agent as evidence that policies providing the required coverage, conditions and minimum limits are in full force and effect, and shall be subject to review and approval by the Town. Each certificate shall identify the Project and shall provide that coverage afforded under the policies shall not be cancelled, terminated or materially changed until at least 30 days prior written notice has been given to the Town. If the words "endeavor to" appear in the portion of the certificate addressing cancellation, those words shall be stricken from the certificate by the agent(s) completing the certificate. The Town reserves the right to request and receive a certified copy of any policy and any endorsement thereto.

D. Failure on the part of Contractor to procure or maintain policies providing the required coverage, conditions, and minimum limits shall constitute a material breach of contract upon which at the Town's discretion may procure or renew any such policy or any extended connection therewith, and all monies so paid by the Town shall be repaid by Contractor to the Town upon demand, or the Town may offset the cost of the premiums against any monies due to Contractor from the Town.

E. The parties understand and agree that the Town is relying on, and does not waive or intend to waive by any provision of this contract, the monetary limitations (presently $387,000 per person, $1,093,000 for two or more persons, per occurrence) or any other rights, immunities, and protections provided by the Colorado Governmental Immunity Act, §24-10-

101, *et seq*., C.R.S., as from time to time amended, or otherwise available to Town, its officers, or its employees.

Section 12. **Indemnification.** Contractor expressly agrees to indemnify and hold harmless Town or any of its officers or employees from any and all claims, damages, liability, or court awards including attorney's fees that are or may be awarded as a result of any loss, injury or damage sustained or claimed to have been sustained by anyone, including, but not limited to, any person, firm, partnership, or corporation, to the extent caused by the negligent acts, errors or omissions of Contractor or any of their employees or agents in performing work pursuant to this Agreement. In the event that any such suit or action is brought against Town, Town will give notice within ten (10) days thereof to Contractor.

Section 13. **Delays.** Any delays in or failure of performance by any party of his or its obligations under this Agreement shall be excused if such delays or failure are a result of acts of God, fires, floods, strikes, labor disputes, accidents, regulations or orders of civil or military authorities, shortages of labor or materials, or other causes, similar or dissimilar, which are beyond the control of such party.

Section 14. **Additional Documents.** The parties agree to execute any additional documents or take any additional action that is necessary to carry out this Agreement.

Section 15. **Entire Agreement.** This Agreement represents the entire agreement between the parties and there are no oral or collateral agreements or understandings. This Agreement may be amended only by an instrument in writing signed by the parties. If any other provision of this Agreement is held invalid or unenforceable, no other provision shall be affected by such holding, and all of the remaining provisions of this Agreement shall continue in full force and effect.

Section 16. **Time of the Essence.** Time is of the essence. If any payment or any other condition, obligation, or duty is not timely made, tendered or performed by either party, then this Agreement, at the option of the party who is not in default, may be terminated by the non-defaulting party, in which case, the non-defaulting party may recover such damages as may be proper.

Section 17. **Default and Remedies**. In the event either party should default in performance of its obligations under this agreement, and such default shall remain uncured for more than 10 days after notice of default is given to the defaulting party, the non-defaulting party shall be entitled to pursue any and all legal remedies and recover its reasonable attorney's fees and costs in such legal action. In addition, no Party will be entitled to lost profits, economic damages, or actual, direct, incidental, consequential, punitive or exemplary damages in the event of a default.

Section 18. **Waiver.** A waiver by any party to this Agreement of the breach of any term or provision of this Agreement shall not operate or be construed as a waiver of any subsequent breach by either party.

Section 19. **Governing Law.** This Agreement shall be governed by the laws of the State of Colorado.

Section 20. **Independent Contractor.** Contractor and Town hereby represent that Contractor is an independent contractor for all purposes hereunder. As such, Contractor is not covered by any worker's compensation insurance or any other insurance maintained by Town except as would apply to members of the general public. Contractor shall not create any indebtedness on behalf of the Town.

Section 21. **No Third Party Beneficiaries.** It is expressly understood and agreed that enforcement of the terms and conditions of this Agreement, and all rights of action relating to such enforcement, shall be strictly reserved to Town and Contractor, and nothing contained in this Agreement shall give or allow any such claim or right of action by any other third party on such Agreement. It is the express intention of the parties that any person other than Town or Contractor receiving services or benefits under this Agreement shall be deemed to be an incidental beneficiary only.

ATTEST:

_____
Lisa Anderson, Town Clerk

TOWN OF CASTLE ROCK

_____
Jason Gray, Mayor

Approved as to form:

_____
Robert J. Slentz, Town Attorney

Approved as to content:

_____
Mark Marlowe, Director of Castle Rock Water

CONTRACTOR:

GARNEY CONSTRUCTION

By: _____

Its: Joel Heimbuck, Director of Operation

Exhibit 1

PROJECT:	Plum Creek Water Purification Facility LAS Conversion		**PROJECT NUMBER**
OWNER:	Town of Castle Rock		6323
CONTRACTOR:	Garney Construction		
PM:	Walt Schwarz		

Location: Plum Creek Water Purification Facility Advanced Treatment Project

Requested Additional Calendar Days

Item #	Engineering Directive	Description	Extended Cost
1		LAS Conversion	$ 354,353
		Total	$ 354,353

Contractor: Garney Construction
Date: May 12, 2020

By: Heath R. Brooks

By:
Date:

LAS Conversion Proposal

LAS Conversion

Labor	Total Regular Time Costs	Total Over Time Costs	Total Regular Time Hours	Total Over Time Hours	EXTENDED COST	Contingency	Comments
Sr Project Manager	$ 79.66	NA			$ -		
Project Engineer	$ 47.97	NA	64		$ 3,070		
Sr Project Superintendent	$ 81.70	NA			$ -		
Field Engineer	$ 45.48	NA	64		$ 2,911		
Mechanical Superintendent	$ 45.34	$ 68.01	320		$ 14,509		8 Week Operation
Foreman	$ 43.69	$ 65.54	320		$ 13,981		
Operator	$ 30.71	$ 46.07			$ -		
Carpenter	$ 36.50	$ 54.75	640		$ 23,360		2 Carpenters
Mechanical	$ 36.50	$ 54.75	640		$ 23,360		2 Mechanical
Laborer	$ 26.36	$ 39.54	320		$ 8,435		1 Laborers
Safety Manager	$ 61.92	NA	16		$ 991		
					$ 90,616		

Equipment	Hourly Rate	Daily Rate	Weekly Rate	Monthly Rate	Operating Cost/Hr	Hours On Site	Days On Site	Weeks On Site	Months On Site	Operating Hours	EXTENDED COST
PM Truck	$ 4.00					144					$ 576
Superintendent Truck	$ 8.00					320					$ 2,560
DEERE 350 EXCAVATOR	$ 128.37	$ 862.68	$ 3,450.72	$ 12,329.13	$ 85.55						$ -
CASE 821F LOADER	$ 68.81	$ 457.01	$ 1,833.19	$ 6,552.26	$ 49.05						$ -
DEERE 624 LOADER	$ 55.46	$ 369.72	$ 1,468.61	$ 5,247.97	$ 41.95						$ -
WATER TRUCK 4000 gal	$ 18.32			$ 3,224.06	$ 34.60						$ -
TRENCH BOXES	$ 11.36			$ 2,000.00							$ -
BEDDING BOX	$ 8.89			$ 1,564.64							$ -
DEMOLITION SAW	$ 1.96			$ 345.00	$ 1.60						$ -
PUMP (4")	$ 8.00			$ 1,300.00	$ 10.70						$ -
SUBMERSIBLE PUMP (2")	$ 1.42			$ 250.00	$ 1.30						$ -
											$ -
											$ -
											$ -
											$ -
											$ -
											$ -
Small Tools						632					$ 1,580
Fuel, Oil, Grease											$ 941
										TOTALS	**$ 5,657**

MATERIALS

VENDOR	REFERENCE	DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL
MTE		Fiberglass Tanks	1	LS	$ 92,870.00	$ 92,870
Chemical Feed Piping		Ryan Herco	1	LS	$ 20,000.00	$ 20,000
Miscellaneous		Safety Materials	1	LS	$ 10,000.00	$ 10,000
Miscellaneous		Temporary Enclosure	1	LS	$ 5,000.00	$ 5,000
Miscellaneous		Miscellaneous Materials	1	LS	$ 15,500.00	$ 15,500
						$ -
						$ -
						$ -
						$ -
					TOTALS	**$ 143,370**

SERVICES

Subcontractor	REFERENCE	DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL
Site Services		Sanitary Services, Dumpster, Etc.	1	LS	$ 22,500.00	$ 22,500
StressCon		Remove and replace precast pannels	1	LS	$ 29,540.00	$ 29,540
Diamond Saw Cutting		Concrete Saw Cuting	1	LS	$ 5,200.00	$ 5,200
Coblaco		Painting	1	LS	$ 2,000.00	$ 2,000
Absolute Welding			1	LS	$ 2,750.00	$ 2,750
AmWest			1	LS	$ 5,000.00	$ 5,000
Ground Engineering		Concrete and welding testing and inspections	1	LS	$ 1,500.00	$ 1,500
					TOTALS	**$ 68,490**

Summary:	TOTALS
Direct Cost of Labor	$ 90,616
Direct Cost of Equipment	$ 5,657
Direct Cost of Material	$ 143,370
Direct Cost of Subcontractors	$ 68,490
Subcontractor Markup 15%	$ 10,274
Contractors Fee on Labor, Materials 15%	$ 35,946
Subtotal:	$ 354,353
Direct Cost of Bond / Insurance Premium	$ -
TOTAL COST	**$ 354,353**

Town of Castle Rock, Colorado

Plum Creek Water Purification Facility
Liquid Ammonium Sulfate Conversion

THESE PLANS HAVE BEEN REVIEWED BY THE TOWN OF CASTLE ROCK FOR CONCEPT ONLY. THE REVIEW DOES NOT IMPLY RESPONSIBILITY BY THE REVIEWING DEPARTMENT, THE TOWN ENGINEER OR THE TOWN OF CASTLE ROCK FOR ACCURACY AND CORRECTNESS OF THE CALCULATIONS. FURTHERMORE, THE REVIEW DOES NOT IMPLY THAT QUANTITIES OF ITEMS ON THE PLANS ARE THE FINAL QUANTITIES REQUIRED. THE REVIEW SHALL NOT BE CONSTRUED FOR ANY REASON AS ACCEPTANCE OF FINANCIAL RESPONSIBILITY BY THE TOWN FOR ADDITIONAL QUANTITIES OF ITEMS SHOWN THAT MAY BE REQUIRED DURING THE CONSTRUCTION PHASE.

ALL WORK SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE TOWN OF CASTLE ROCK "STANDARD CONSTRUCTION SPECIFICATIONS FOR PUBLIC WORKS" AND/OR OTHER TOWN-APPROVED APPLICABLE STANDARDS.

I HEREBY AFFIRM THAT THESE FINAL CONSTRUCTION PLANS WERE PREPARED UNDER MY DIRECT SUPERVISION, IN ACCORDANCE WITH ALL APPLICABLE TOWN OF CASTLE ROCK & STATE OF COLORADO STANDARDS & STATUES, RESPECTFULLY; AND THAT I AM FULLY RESPONSIBLE FOR ALL DESIGN & REVISIONS TO SAID PLANS.

JASON J. SCHAEFER *DATE*

Contract Drawings

Issued for 100% Design Review

April, 2020

Burns & McDonnell Project No 123220

TOWN OF CASTLE ROCK APPROVALS
THESE PLANS ARE HEREBY APPROVED FOR ONE YEAR FROM DATE OF UTILITIES DEPARTMENT APPROVAL

Recommended Approval By:

Engineering Division *Date*

Approved By:

UTILITIES DEPARTMENT *Date*

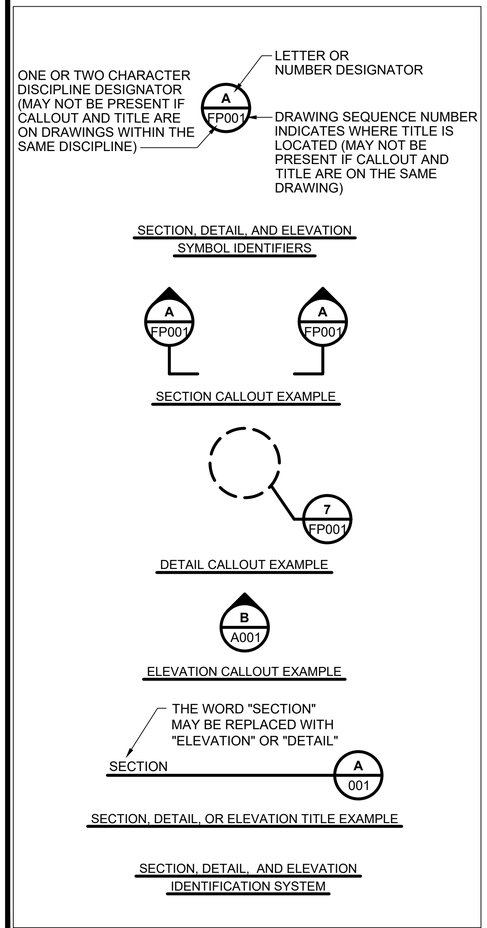
no.	date	by	ckd	description
A	4/02/20	HM	JS	ISSUED FOR REVIEW
B	4/22/20	HM	JS	ISSUED FOR 100% DESIGN REVIEW

PRELIMINARY - NOT FOR CONSTRUCTION

BURNS McDONNELL

Cover

TOWN OF CASTLE ROCK
COLORADO



Contract Drawings

GENERAL	
G001	COVER
G002	INDEX
STRUCTURAL	
S001	ENLARGED CHEMICAL ROOM PLAN AND SECTION
PROCESS	
D001	PROCESS LEGEND AND ABBREVIATIONS
D002	PROCESS DETAILS AND EQUIPMENT SCHEDULE
DD001	ENLARGED CHEMICAL ROOM PLAN AND SECTION
DD002	CHEMICAL TANK AND ACCESSORIES DEMOLITION PLAN
D100	CHEMICAL ROOM FLOOR PLAN
D200	LIQUID AMMONIUM SULFATE CHEMICAL FEED SYSTEM

Project Location

no.	date	by	ckd	description
A	4/02/20	HM	JS	ISSUED FOR REVIEW
B	4/22/20	HM	JS	ISSUED FOR 100% DESIGN REVIEW

PRELIMINARY - NOT FOR CONSTRUCTION

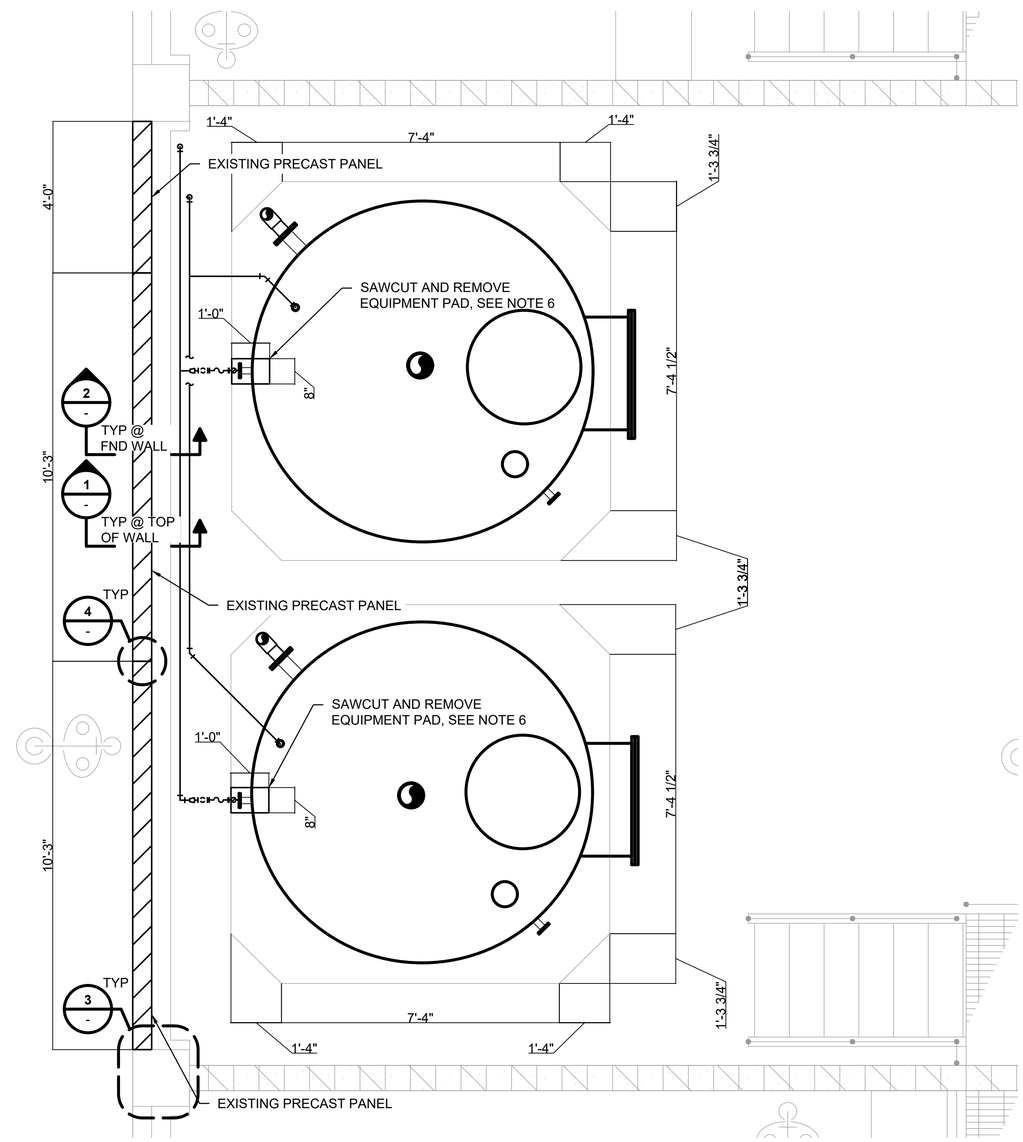
BURNS McDONNELL

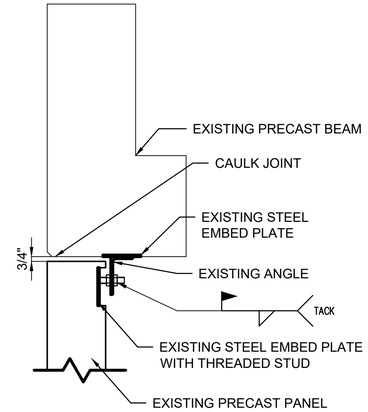
Plum Creek Water Purification Facility
Liquid Ammonium Sulfate Conversion

123220

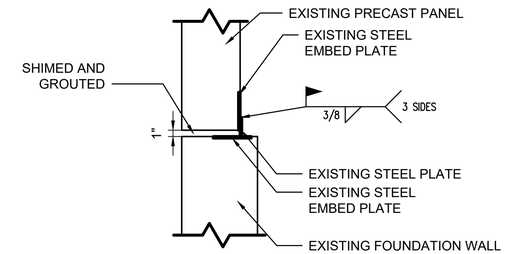
Index

Exhibit 1

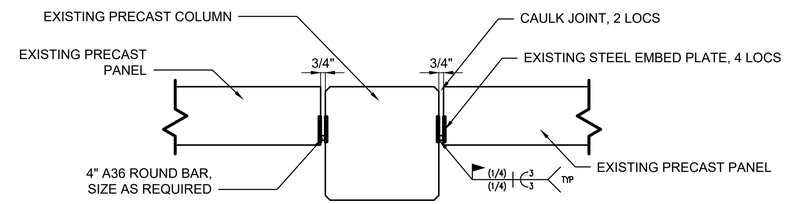




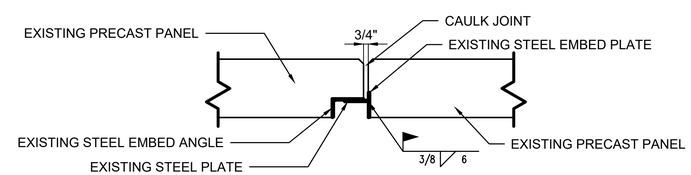
DETAIL - ELEVATION 1 -



DETAIL - ELEVATION 2 -



DETAIL - ENLARGED PLAN 3 -



DETAIL - ENLARGED PLAN 4 -

NOTES:

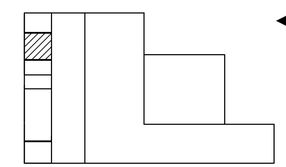
1. DETAILS 1 THROUGH 4 ABOVE ARE ORIGINAL INSTALLATION DETAILS FROM THE PRECAST MANUFACTURER STRESSCON. CONTRACTOR TO SELECTIVELY DEMO CONNECTIONS AS INDICATED BELOW.
   - A. DETAIL 1: GRIND EXISTING TACK WELD HOLDING NUT IN PLACE. REMOVE NUT TO ALLOW REMOVAL OF PANEL. REMOVE SEALANT BETWEEN TOP OF PANEL AND PRECAST BEAM. DETAIL OCCURS IN TWO LOCATIONS ON EACH PANEL (6 TOTAL LOCS).
   - B. DETAIL 2: GRIND EXISTING 3/8" FILLET WELD CONNECTING VERTICAL PLATE TO EMBED PLATE. REMOVE GROUT AND SHIMS BETWEEN BOTTOM OF PANEL AND FOUNDATION WALL. DETAIL OCCURS IN TWO LOCATION ON EACH PANEL (6 TOTAL LOCS).
   - C. DETAIL 3: GRIND EXISTING FLARE BEVEL WELDS BETWEEN EMBED PLATES AND ROUND BAR. REMOVE SEALANT BETWEEN PANELS AND PRECAST COLUMNS. DETAIL OCCURS IN ONE LOCATION ON EACH PANEL ADJACENT TO PRECAST COLUMNS (2 TOTAL LOCS).
   - D. DETAIL 4: GRIND 3/8" FILLET WELD BETWEEN STEEL PLATE AND EMBED PLATE. REMOVE SEALANT BETWEEN TWO PANELS. DETAIL OCCURS IN TWO LOCATIONS AT EACH PANEL TO PANEL JOINT (4 TOTAL LOCS).
2. CONTRACTOR TO REMOVE EXISTING PRECAST PANELS ON THE WEST SIDE OF THE AQUEOUS AMMONIA ROOM. PRECAST PANELS TO BE REMOVED AS REQUIRED TO FACILITATE REMOVAL OF EXISTING STEEL TANKS AND INSTALLATION OF NEW FRP TANKS.
3. CONTRACTOR TO ENSURE PANELS ARE ADEQUATELY SUPPORTED AND PROTECTED FROM DAMAGE DURING CONNECTION DEMOLITION AND ALL STAGES OF REMOVAL AND RE-INSTALLATION. CONTRACTOR SHALL BE RESPONSIBLE FOR MEANS AND METHODS OF CONSTRUCTION INCLUDING, BUT NOT LIMITED TO, SHORING AND TEMPORARY BRACING TO PROVIDE STRUCTURAL STABILITY DURING CONSTRUCTION.
4. CONTRACTOR TO RE-INSTALL PANELS. CONTRACTOR TO RE-CONNECT PRECAST PANELS TO OTHER ELEMENTS AND EACH OTHER AS SHOWN IN THE DETAILS ABOVE. SEE REFERENCE SPECIFICATION 03 41 00 FOR ADDITIONAL INSTALLATION REQUIREMENTS.
5. CONTRACTOR TO PROVIDE GROUT AND SEALANT AT THE PANEL JOINTS AS SHOWN IN THE DETAIL ABOVE. GROUT AND SEALANT TO MATCH EXISTING COLOR.
6. CONTRACTOR TO SAWCUT AND REMOVE EXISTING EQUIPMENT PAD TO EXTENTS SHOWN AT NEW TANK NOZZLE. COORDINATE LOCATION OF SAWCUT WITH TANK MANUFACTURER.
   - A. REPAIR EXPOSED REBARBY THE FOLLOWING:
     - a. CHIP CONCRETE AND GRIND REBAR 1" BELOW CONCRETE SURFACE.
     - b. REPAIR CONCRETE WITH SIKATOP 123 PLUS.
     - c. APPLY SIKAGARD 62 TO CONCRETE AFTER PUNCH.
7. TANK ANCHORS SHALL BE DESIGNED BY A PROFESSIONAL ENGINEER IN THE STATE OF COLORADO. CALCULATIONS TO BE SUBMITTED FOR REVIEW. CONTRACTOR TO VERIFY SIZE AND THICKNESS OF EXISTING EQUIPMENT PADS. ANCHORS TO BE STAINLESS STEEL SET WITH HILTI HIT-RE500 V3 ADHESIVE.

0 1' 2' 4'
SCALE IN FEET

NORTH

INDICATES PANELS TO BE REMOVED AND REINSTALLED

no.	date	by	ckd	description
A	04/01/20	JZ	AH	ISSUED FOR REVIEW
B	4/22/20	JZ	AH	ISSUED FOR 100% DESIGN REVIEW



PRELIMINARY - NOT FOR CONSTRUCTION

BURNS McDONNELL

date	detailed
APRIL 2020	J. ZEMLICKA
designed	**checked**
J. ZEMLICKA	A. HUNDLEY

TOWN OF CASTLE ROCK COLORADO

TOWN OF CASTLE ROCK LAS CONVERSION

ENLARGED CHEMICAL ROOM PLAN AND SECTIONS

project	contract
123220	

drawing **S100** rev. **B**

sheet 3 of 9

file 123220S100.dwg

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Exhibit 1

SINGLE LINE PIPING

- NEW
- EXISTING
- 18" PIPE SIZE AND DIRECTION OF FLOW
- GATE VALVE (GV) OR MUD VALVE (MV)
- GLOBE VALVE
- BUTTERFLY VALVE (BFV)
- CHECK VALVE (CV)
- STOP CHECK VALVE
- PLUG VALVE (PV)
- 3-WAY VALVE
- ANGLE VALVE
- RELIEF OR BACKPRESSURE VALVE
- HOSE GATE DRAIN VALVE
- PINCH VALVE
- NEEDLE VALVE
- DIAPHRAM VALVE
- BALL VALVE (BV)
- P — SELF-CONTAINED PRESSURE REDUCING (REGULATING VALVE)
- BP — BACKFLOW PREVENTER
- VB — VACUUM BREAKER
- MS — MOISTURE SEPARATOR
- T — IN-LINE TOTALIZING FLOW METER
- LOCKED OPEN
- LOCKED CLOSED
- NO — NORMALLY OPEN
- NC — NORMALLY CLOSED
- FLEXIBLE HOSE
- EXPANSION ELEMENT (JOINT)
- FLEXIBLE BALL JOINT
- BASKET TYPE STRAINER
- TEE TYPE STRAINER
- Y-TYPE STRAINER
- FLANGED COUPLING ADAPTER (FCA)
- RETAINER FLANGE
- DRAINER ASSEMBLY
- INSULATING FLANGE (I.F.)
- RESTRICTING ORIFICE
- SIGHT FLOW INDICATOR
- ELBOW TURNING DOWN
- ELBOW TURNING UP
- TYPICAL PIPE BREAK
- PIPES IN SECTION
- TEE TURNING DOWN
- TEE TURNING UP
- ABOVE / PIPES CROSSING / BELOW
- ABOVE / PIPES CROSSING WITH BREAK-OUT TO SHOW PIPES OR EQUIPMENT BELOW / BELOW
- M — IN-LINE FLOW METER
- CLEANOUT (CO)
- DISCHARGE ELBOW ASSEMBLY
- STRAIGHTENING VANE
- REMOVABLE PLUG
- REMOVABLE CAP
- WELDED CAP
- BF — BLIND FLANGE
- DRIP POCKET ASSEMBLY
- STEAM TRAP ASSEMBLY
- AC — AIR COCK
- HB — HOSE BIBB
- WH — WALL HYDRANT
- PIPE ANCHOR
- PIPE GUIDE
- REDUCER
- UNION
- QUICK DISCONNECT COUPLING
- VENT THROUGH ROOF
- INJECTOR
- CENTRIFUGAL PUMP
- DIAPHRAGM METERING PUMP
- A — AIR RELEASE VALVE
- V — VACUUM VALVE
- AV — AIR AND VACUUM VALVE
- V — VACUUM TRAP
- WATER SURFACE (WS)
- PULSATION DAMPENER W/ ISOLATION BALL VALVE
- CALIBRATION COLUMN
- ROTAMETER
- STATIC MIXER
- GAUGE SEAL
- DIAPHRAM PROTECTED PRESSURE SWITCH
- PC — CHEMICAL APPLICATION POINT
- PIPE SUPPORT LOCATION

DOUBLE LINE PIPING

- GATE VALVE
- BUTTERFLY VALVE
- FLANGED COUPLING ADAPTOR
- REDUCER
- FLANGED PIPING
- DOUBLE BOLTED SLEEVE COUPLING
- EXPANSION JOINT
- MECHANICAL JOINT PIPING
- HARNESSED SLEEVE COUPLING
- PUMP CONTROL VALVE
- CHECK VALVE
- BALL VALVE
- A/O — AIR/OIL CYLINDER
- PLUG VALVE
- INLINE STRAINER
- DISMANTLING JOINT
- ELBOW TURNING DOWN
- ELBOW TURNING UP
- ABOVE / PIPES CROSSING / BELOW
- TYPICAL PIPE BREAK
- ABOVE / PIPES CROSSING WITH BREAK-OUT TO SHOW PIPES OR EQUIPMENT BELOW / BELOW
- PIPES IN SECTION

ABBREVIATIONS

AAG	ABOVE AT GRADE	GMF	GRANULAR MEDIA FILTER	PW	POTABLE WATER
AFF	ABOVE FINISHED FLOOR	HGL	HYDRAULIC GRADE LINE	RED	REDUCER
AFG	ABOVE FINISHED GRADE	HWL	HIGH WATER LEVEL	RW	RAW WATER LINE
BD	BLOWDOWN	ID	INNER DIAMETER	SAN	SANITARY SEWER
BFV	BUTTERFLY VALVE	IE	INVERT ELEVATION	SAV	SURGE ANTICIPATION VALVE
BOC	BOTTOM OF CONCRETE	INV	INVERT	SCH	SCHEDULE
BV	BALL VALVE	LWL	LOWER WATER LEVEL	SG	SLUICE GATE
CA	COMPRESSED AIR	MAX	MAXIMUM	SQ	SQUARE
CI	CAST IRON	MF	MEMBRANE FILTRATION	SST	STAINLESS STEEL
CL	CENTERLINE	MG	MILLION GALLONS	TBD	TO BE DETERMINED
CP	COAGULANT PUMP	MGD	MILLION GALLONS PER DAY	TBR	TO BE REMOVED
CO	CLEANOUT	MIN	MINIMUM	TCR	TOWN OF CASTLE ROCK
CV	CHECK VALVE	NG	NATURAL GAS	TEMP	TEMPORARY
DIA/Ø	DIAMETER	NIC	NOT IN CONTRACT	THRU	THROUGH
DIP	DUCTILE IRON PIPE	OC	ON CENTER	TOC	TOP OF CONCRETE
DR	DRAIN	OVE	OVERHEAD ELECTRIC	TOS	TOP OF STEEL
DV	DRAIN VALVE	OVF	OVERFLOW	TOW	TOP OF WALL
EL	ELEVATION	PCV	PUMP CONTROL VALVE	UGE	UNDERGROUND ELECTRIC
FCA	FLANGED COUPLING ADAPTER	PCW	POTABLE COLD WATER	UGT	UNDERGROUND TELEPHONE
FF	FINISHED FLOOR	PD	PROCESS DRAIN	UNO	UNLESS NOTED OTHERWISE
FM	FORCE MAIN	PS	PIPE SUPPORT	VT	VERTICAL TURBINE
FP	FIRE PROTECTION	PSI	POUNDS PER SQUARE INCH	W	WATER SUPPLY LINE
FRP	FIBERGLASS REINFORCED PLASTIC	PV	PLUG VALVE	WS	WATER SURFACE
FW	FINISHED WATER	PVC	POLYVINYL CHLORIDE		

VALVE OPERATORS

- S — SOLENOID
- D — DIAPHRAGM
- M — MOTOR

TAGS

- 74 — EQUIPMENT TAG
- 145 — VALVE TAG

NOTES:

1. THIS IS A STANDARD PROCESS LEGEND AND NOT ALL ITEMS OR EQUIPMENT AS DESIGNATED HEREON ARE USED ON THIS PROJECT.
2. THIS SHEET ONLY APPLIES TO PROCESS DRAWINGS LABELED DXXX.

no.	date	by	ckd	description
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H. MORTON	J. SCHAEFER

TOWN OF CASTLE ROCK COLORADO

TOWN OF CASTLE ROCK LAS CONVERSION

PROCESS LEGEND AND ABBREVIATIONS

project	contract
123220	

drawing **D001** — rev. **B**

sheet 4 of 9

file 10476D001.dwg

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Scale For Microfilming: Millimeters / Inches

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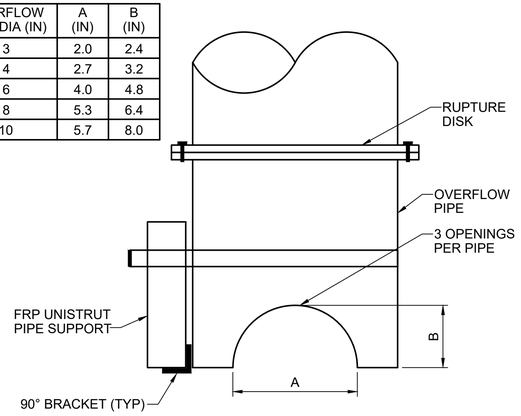
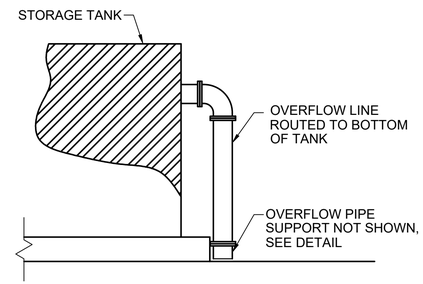
Exhibit 1

OVERFLOW PIPE DIA (IN)	A (IN)	B (IN)
3	2.0	2.4
4	2.7	3.2
6	4.0	4.8
8	5.3	6.4
10	5.7	8.0



OVERFLOW PIPE SUPPORT DETAIL
NOT TO SCALE



NOTE:
REFER TO CHEMICAL FEED SYSTEM DWGS FOR VENT AND OVERFLOW SIZES.

OVERFLOW DETAIL
NOT TO SCALE

EQUIPMENT SCHEDULE XX

NO.	EQUIPMENT TAG	DESCRIPTION	SPECIFICATION SECTION
1	PC-AST-5302	CHEMICAL TANK	43 41 45
2	PC-AST-5303	CHEMICAL TANK	43 41 45

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TOWN OF CASTLE ROCK COLORADO

TOWN OF CASTLE ROCK LAS CONVERSION

PROCESS DETAILS AND EQUIPMENT SCHEDULE

project	contract
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drawing **D002** – rev. **B**

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file 10476D002.dwg

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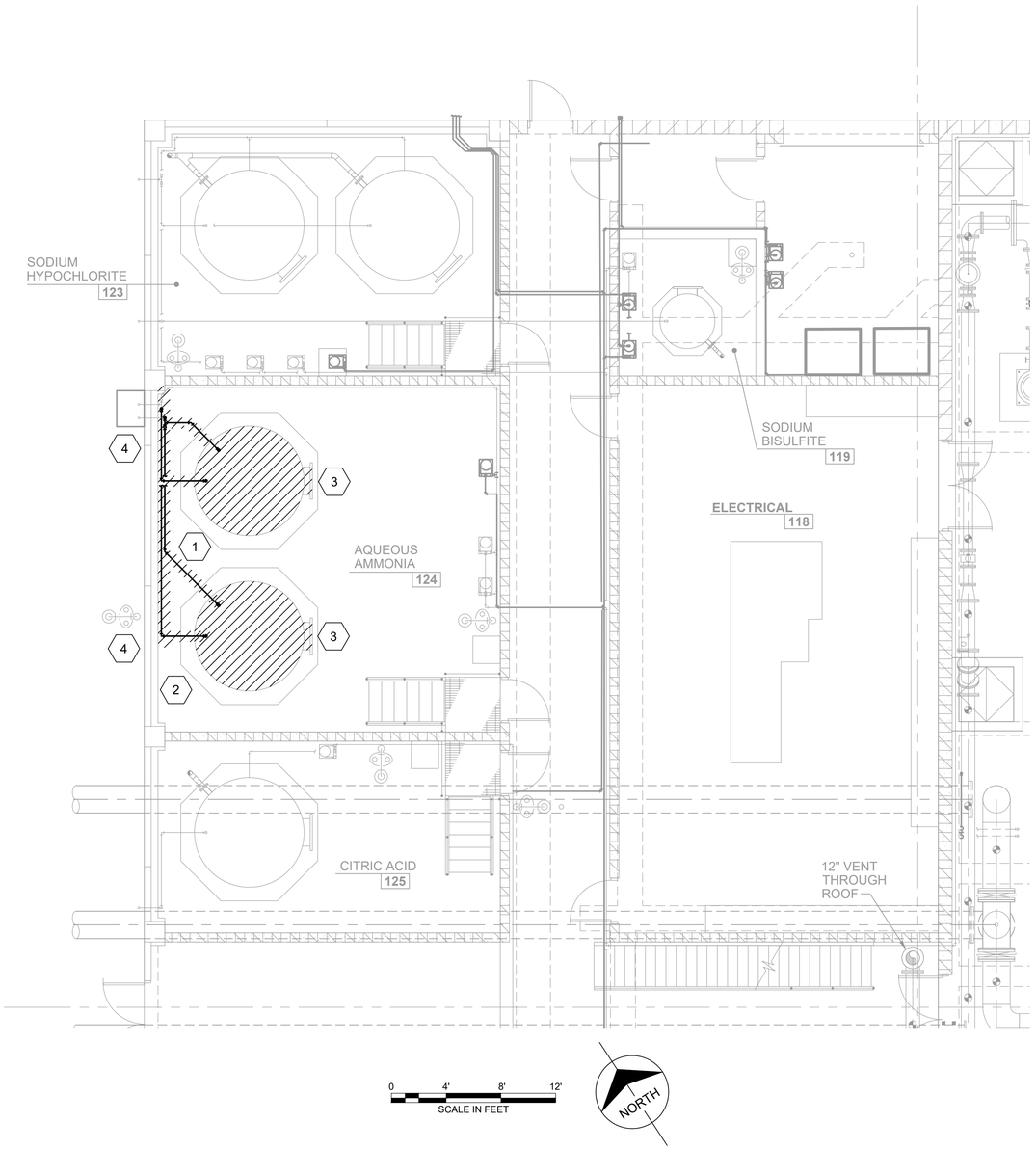

KEYED NOTES

1. REMOVE AND REINSTALL EXISTING PIPING, AS NEEDED FOR TANK REMOVAL. IF PIPE HAS BEEN DAMAGED OR CANNOT BE REINSTALLED, REPLACE PIPING. EXISTING PIPING INSTALLED ON PRECAST PANELS, INCLUDES: EYEWASH SUPPLY LINE, TANK INLET LINES, CHEMICAL FILL STATION PIPING AND ACCESSORIES.

2. DEMOLISH EXISTING CONDUIT FOR THE TANK OUTLET VALVE. REMOVE AND REINSTALL OR RELOCATE EXISTING CONDUIT FOR THE CHEMICAL FILL STATION LEVEL INDICATORS.

3. DEMOLISH ALL EXISTING TANK ACCESSORIES, INCLUDING BUT NOT LIMITED TO: OVERFLOWS, VENTS, VAPOR RECOVERY, AND SITE GAUGES.

4. REMOVE AND PROTECT EXISTING FIXTURES (EX. CHEMICAL FILL STATION AND EMERGENCY EYEWASH/SHOWER) DURING CONSTRUCTION. REINSTALL AND REPAIR FIXTURES TO ORIGINAL CONDITION.

NOTES

1. CONTINUOUS AMMONIUM HYDROXIDE OR AMMONIUM SULFATE DOSING OPERATIONS SHALL BE MAINTAINED DURING CONSTRUCTION PER THE FOLLOWING SEQUENCE OF WORK.
   - 1.1. CONTRACTOR SHALL INSTALL THE NEW LIQUID END ON ONE OF THE DIAPHRAGM PUMPS, WHILE THE AMMONIUM HYDROXIDE SYSTEM IS STILL IN OPERATION.
   - 1.2. THE TOWN SHALL PROCURE AN AMMONIUM SULFATE TOTE AND INSTALL IT IN THE HALLWAY, NEAR THE DOUBLE DOORS, WITH NECESSARY CONTAINMENT.
   - 1.3. THE CONTRACTOR SHALL INSTALL TEMPORARY PIPING FROM THE TOTE TO THE PUMP HEADER. PIPING SHALL BE FLEXIBLE PVC AND RUN FROM THE EXISTING DOUBLE DOOR ENTRACE TO THE CHEMICAL FEED PANELS .
   - 1.4. CONTRACTOR SHALL COMPLETE ALL NECESSARY CONNECTIONS TO ENABLE THE TOWN TO PUMP OUT OF THE TOTE VIA THE MODIFIED DIAPHRAGM PUMP.
   - 1.5. CONTRACTOR SHALL CLOSE ALL AMMONIUM HYDROXIDE TANK OUTLET VALVES AND FLUSH ALL CHEMICAL LINES, UNDER THE SUPERVISION AND INSTRUCTION OF THE TOWN.
   - 1.6. THE TOWN SHALL BE ABLE TO USE THE CHEMICAL TOTE AND THE MODIFIED DIAPHRAGM PUMP TO DELIVER AMMONIUM SULFATE DURING CONSTRUCTION.
   - 1.7. CONTRACTOR SHALL REPLACE THE LIQUID END ON THE SECOND DIAPHRAGM PUMP AS SOON AS THE FIRST PUMP IS OPERATIONAL TO PROVIDE A REDUNDANT AMMONIUM SULFATE PUMP.
   - 1.7. TOWN SHALL REMOVE AND DISPOSE OF ALL EXISTING AMMONIUM HYDROXIDE FROM THE EXISTING CHEMICAL TANKS.
   - 1.8. CONTRACTOR SHALL PROVIDE TEMPORARY HEAT AND BARRIERS, AS NECESSARY, TO CREATE CONDITIONS ADEQUATE FOR AMMONIUM SULFATE PUMPING AND PROTECT THE EXISTING PUMPS AND PANELS FROM CONSTRUCTION DUST.
   - 1.9. ONCE THE ABOVE STEPS ARE COMPELETE, CONTRACTOR MAY REMOVE THE EXISTING TANKS.

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TOWN OF CASTLE ROCK COLORADO

TOWN OF CASTLE ROCK LAS CONVERSION

ENLARGED CHEMICAL ROOM PLAN AND SECTIONS

project	contract
123220	

drawing **DD001** – rev. **B**

sheet 6 of 9

file 104762DD001.dwg

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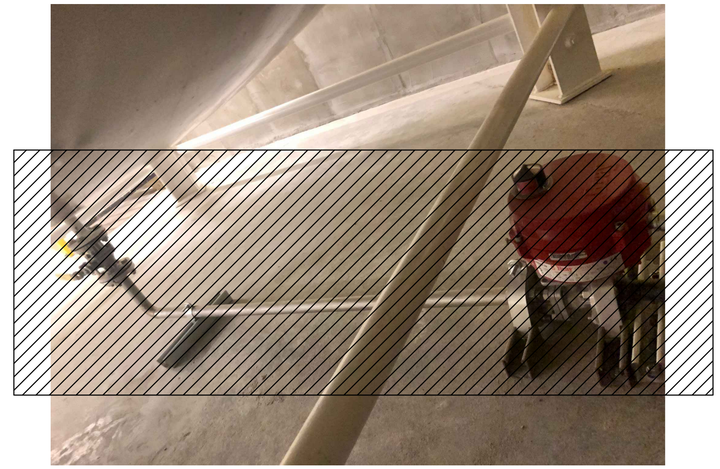
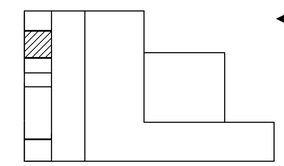
1. DEMOLISH ALL EXISTING TANK ACCESSORIES, INCLUDING BUT NOT LIMITED TO: OVERFLOWS, VENTS, VAPOR RECOVERY, AND SITE GAUGES.
2. DETACH EXISTING LEVEL SENSOR CONDUIT FROM TOP OF TANKS. DO NOT DEMOLISH.
3. REMOVE AND REINSTALL LEVEL SENSOR.
4. DEMOLISH EXISTING STAINLESS STEEL TANK OUTLET AND ACTUATED VALVE. DO NOT DEMOLISH EXISTING PVC OUTLET PIPING. VALVE ACTUATOR SHALL BE RETURNED TO OWNER.





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TOWN OF CASTLE ROCK COLORADO

TOWN OF CASTLE ROCK
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CHEMICAL TANK AND ACCESSORIES DEMOLITION PLAN

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123220	

drawing **DD002** – rev. **B**

sheet 7 of 9

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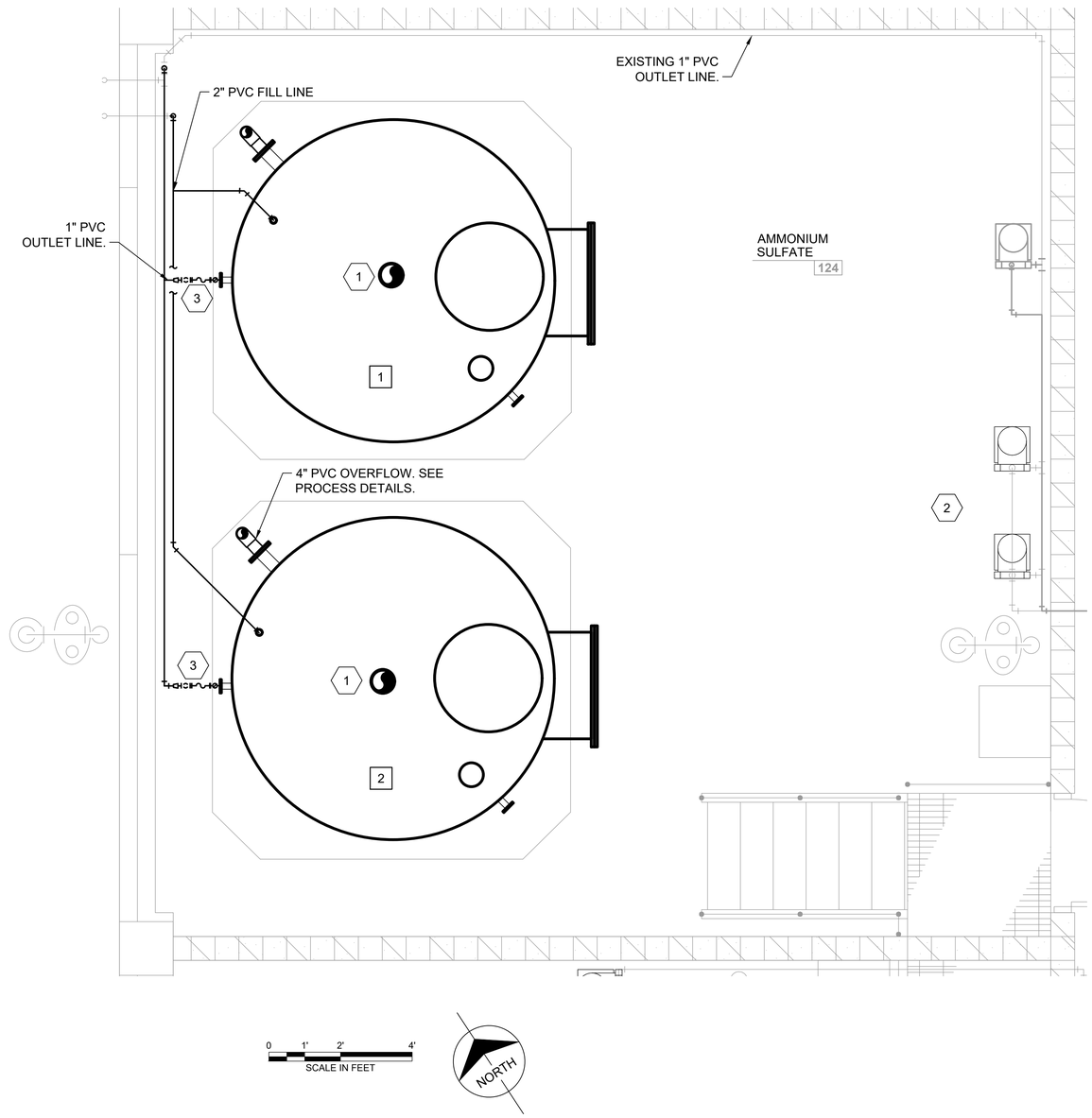

KEYED NOTES

1. COMBINE TANK VENTS AND VENT THROUGH THE ROOF. REUSE EXISTING ROOF PENETRATION AND PIPING, IF POSSIBLE. TANK VENT SHALL BE A MINIMUM OF 8".
2. CONTRACTOR SHALL REPLACE THE TWO (2) EXISTING DIAPHRAGM PUMP LIQUID END WITH A NEW LIQUID END (INCLUDING PUMP HEAD AND DIAPHRAGM), CAPABLE OF PUMPING 7.6 GPH. NEW LIQUID END SHALL USE A 2" DIAPHRAGM. LIQUID END MATERIALS SHALL BE COMPATIBLE WITH AMMONIUM SULFATE. CONTRACTOR SHALL REPLACE EXISTING STAINLESS STEEL TUBING WITH FLEXIBLE PVC. PERISTALTIC PUMP DOES NOT REQUIRE ANY MODIFICATIONS.
3. CONTRACTOR SHALL CUT THE EXISTING TANK PAD, AS NECESSARY, TO PROVIDE A BLOCK OUT FOR THE TANK OUTLET. SEE STRUCTURAL DRAWINGS.

NOTES

1. ALL PIPE SUPPORTS WITHIN THE CONTAINMENT AREA SHALL BE FRP.
2. VALVES NOT SHOWN FOR CLARITY. SEE D200 FOR VALVE INFORMATION.
3. REFER TO TANK DATA SHEET IN SPECIFICATIONS FOR TANK NOZZLE SCHEDULE.

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CHEMICAL ROOM FLOOR PLAN

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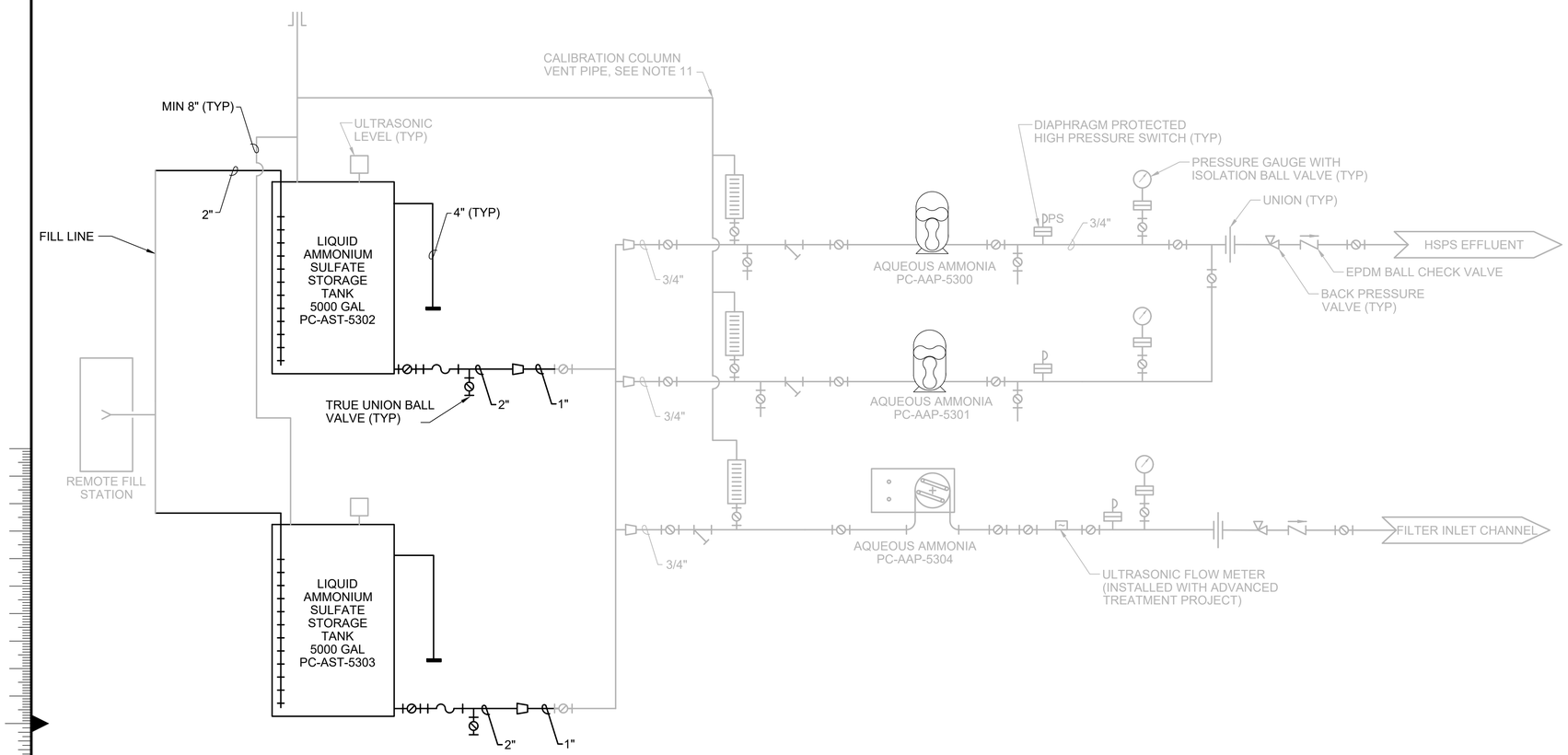

NOTES:

1. ALL CHEMICAL PIPING SHALL BE SOCKET WELDED SCH. 80 PVC MEETING ASTM D1785 AND ASTM D2467 UNLESS OTHERWISE NOTED. FLEXIBLE TUBING SHALL BE SCH 80 PVC.
2. SEE SPECIFICATION 43 32 78 FOR STORAGE TANKS
3. PROVIDE PIPE REDUCERS AT THE LOCATION OF ALL ACCESSORIES AND CONNECTING PIPES THAT ARE LARGER OR SMALLER THAN THE MAIN PIPE SIZE.
4. PIPING IS SHOWN SCHEMATICALLY, ROUTE LINES TO PROVIDE MAXIMUM CLEARANCE AND TO PROVIDE ACCESS TO ALL ACCESSORIES. CONTRACTOR SHALL FIELD ROUTE ALL PIPING AND SUPPORT AT SUFFICIENT INTERVALS FOR INTENDED SERVICE.
5. PROVIDE FRP UNISTRUT FOR PIPE SUPPORT SYSTEMS LOCATED INSIDE AND BELOW THE SECONDARY CONTAINMENT WALLS.
6. ALL GASKETS SHALL BE BUNA-N OR EPDM.
7. CONTRACTOR SHALL SLOPE BULK FILL CHEMICAL LINES TO DRAIN INTO STORAGE TANK.
8. CONTRACTOR SHALL REPLACE THE TWO (2) EXISTING DIAPHRAGM PUMP LIQUID END WITH A NEW LIQUID END (INCLUDING PUMP HEAD AND DIAPHRAGM), CAPABLE OF PUMPING 7.6 GPH. NEW LIQUID END SHALL USE A 2" DIAPHRAGM. LIQUID END MATERIALS SHALL BE COMPATIBLE WITH AMMONIUM SULFATE. CONTRACTOR SHALL REPLACE EXISTING STAINLESS STEEL TUBING WITH FLEXIBLE PVC. PERISTALTIC PUMP DOES NOT REQUIRE ANY MODIFICATIONS.
9. ALL BALL VALVES SHALL BE PVC TYPE 1 GRADE 1 WITH EPDM SEALS. BALL VALVES SHALL BE SPEARS SERIES 2000, ASAHI TYPE 21, HAYWARD, OR ENGINEER APPROVED EQUAL. VALVES SHALL BE DOUBLE UNION DESIGN WITH SOCKET ENDS.
10. REUSE EXISTING VENT PIPE AND PENETRATION, IF POSSIBLE. MINIMUM VENT SIZE SHALL BE 8".

PUMP PROGRAMMING CHANGES:

1. CONTRACTOR SHALL UPDATE PROGRAMMING TO REFLECT THE LIQUID AMMONIUM SULFATE AVAILABLE AMMONIA.
2. CONTRACTOR SHALL UPDATE THE MAXIMUM PUMP CAPACITY TO REFLECT THE DIAPHRAGM PUMP CHANGES.

CHEMICAL: AMMONIUM SULFATE
CHEMICAL FORMULA: $(NH)_4SO_4$
TYPE OF SYSTEM: BULK LIQUID

Peak Flow =	12	MGD
Phase 1 Flow =	6	MGD
Minimum Flow =	1	MGD

Chemical Characteristics	
Delivery Point(s)	Clearwell, BAF Influent
Delivered Conc. (%)	38.0%
Density (lb/gal)	10.6
(NH4)2SO4 to NH4 Conversion	0.27
Available Ammonia (lb/gal)	1.1

Biologically Active Filter Influent

Parameter	Peak Flow Conditions			Phase 1 Flow Conditions			Minimum Flow Conditions		
	Maximum	Average	Minimum	Maximum	Average	Minimum	Maximum	Average	Minimum
Dosage (mg/L)	1.0	0.5	0.1	1.0	0.5	0.1	1.0	0.5	0.1
Usage (lb/day)	100	50	10	50	25	5	8	4	1
Usage (gallons/day)	91	46	9	46	23	5	8	4	1
Usage (gallons/minute)	0.06	0.03	0.01	0.03	0.02	0.003	0.01	0.003	0.001
Usage (gallons/hour)	3.8	1.9	0.4	1.9	0.9	0.2	0.3	0.2	0.03

Clearwell

Parameter	Peak Flow Conditions			Phase 1 Flow Conditions			Minimum Flow Conditions		
	Maximum	Average	Minimum	Maximum	Average	Minimum	Maximum	Average	Minimum
Dosage (mg/L)	2.0	1.1	0.6	2.0	1.1	0.6	2.0	1.1	0.6
Usage (lb/day)	200	110	60	100	55	30	17	9	5
Usage (gallons/day)	182	100	55	91	50	27	15	8	5
Usage (gallons/minute)	0.13	0.07	0.04	0.06	0.03	0.019	0.01	0.006	0.003
Usage (gallons/hour)	7.6	4.2	2.3	3.8	2.1	1.1	0.6	0.3	0.19

Biologically Active Filter Influent

Metering Pump Characteristics	
No. of Pumps	1
Max. Pump Cap. (gph)	3.8
Min. Pump Cap. (gph)	0.03
Turndown Ratio	120

Clearwell

Metering Pump Characteristics	
No. of Pumps	1+1
Max. Pump Cap. (gph)	7.6
Min. Pump Cap. (gph)	0.19
Turndown Ratio	40

Bulk Storage	
No. of Days	30
Usage (gpd)	146
Required Storage Volume	4,373
No. of Tanks	2
Total Storage Volume (gal)	10,000
Actual Days of Storage	137

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TOWN OF CASTLE ROCK COLORADO

TOWN OF CASTLE ROCK
LAS CONVERSION

LIQUID AMMONIUM SULFATE CHEMICAL FEED SYSTEM

project	contract
123220	

drawing **D200** – rev. **B**

sheet 9 of 9

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TOWN OF CASTLE ROCK, COLORADO

LIQUID AMMONIUM SULFATE CONVERSION

ISSUED FOR REVIEW

TECHNICAL SPECIFICATIONS

BURNS & MCDONNELL PROJECT NO. 123220

APRIL 2020

Exhibit 1

TABLE OF CONTENTS

Project Manual
Town of Castle Rock

Liquid Ammonium Sulfate Conversion
Project No. 123220

Division 00	**GENERAL CONDITIONS**
00 01 07	Index and Certification Page
Division 01	**GENERAL REQUIREMENTS**
01 11 00	Summary of Work
Division 02	**EXISTING CONDITIONS**
02 41 13	Selective Demolition
Division 43	**GAS and LIQUID HANDLING and STORAGE EQUIPMENT**
43 41 45	Fiberglass Reinforced Plastic Tanks

CLIENT NAME Town of Castle Rock
PROJECT NAME Liquid Ammonium Sulfate Conversion
PROJECT NO. 123220

DOCUMENT 00 01 07 – INDEX AND CERTIFICATION PAGE

SPECIFICATION INDEX

DOCUMENT/ DIVISION	DESCRIPTION
00	General Conditions
01	General Requirements
02	Existing Conditions
03	Concrete
07	Thermal and Moisture Protection
43	Gas and Liquid Handling and Storage Equipment

CERTIFICATION(S)

END OF DOCUMENT 00 01 07

DIVISION 1 – GENERAL REQUIREMENTS

SECTION 01 11 00 - SUMMARY OF WORK

PART 1 - GENERAL

1.01 SUMMARY:

A. This Section summarizes the Work covered in detail in the complete Contract Documents.

B. Owner: The Town of Castle Rock is contracting for Work described in the Contract Documents.

1. Contract Identification: Plum Creek Water Purification Facility Liquid Ammonium Sulfate Conversion
2. Work Site Location: 1929 Liggett Road, Castle Rock, Colorado 80109

C. Engineer: The Contract Documents were prepared by Burns & McDonnell Engineering Company, Inc., 9785 Maroon Circle, Centennial, Colorado 80112.

D. Construction Manager: Garney Companies, Inc. is Construction Manager for the Project and is Project's Constructor. In the Contract Documents, the terms "Construction Manager" and "Contractor" are synonymous.

1.02 PROJECT DESCRIPTION:

A. Description of Project: The Work to be performed under the provisions of these Contract Documents consists of the removal and demolition of the existing ammonium hydroxide tanks and the installation of new ammonium sulfate tanks. The project includes the removal and reinstallation of precast panels, removal and reinstallation of piping, chemical pipe modifications, demolition of existing steel tanks, installation of FRP tanks, existing pump modifications, and programming modifications.

1.03 WORK BY OTHERS:

A. Work Under Other Contracts: None.

B. Work by Owner: Removal and disposal of existing chemical in the storage tanks.

1.04 CONTRACTOR'S USE OF PREMISES:

A. Limited Use:

1. Limit use of the premises for storage and execution of the Work to allow for Owner occupancy. Confine operations to areas within Contract limits indicated. Portions of Site outside the Contract limits shall not be disturbed.
2. Coordinate with other separate contractors and Owner to avoid interference of operations.
3. Conduct operations so as to ensure the least inconvenience to Owner.

1.05 OWNER'S USE OF PREMISES:

A. Full Owner Occupancy: The Owner will occupy the Site and existing building during the entire construction period. Cooperate with the Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with the Owner's operations.

B. Partial Owner Occupancy: The Owner reserves the right to occupy and to place and install equipment in completed areas of the building, prior to Substantial Completion provided that such occupancy does not interfere with completion of the Work. Such placing of equipment and partial occupancy shall not constitute acceptance of the total Work.

SECTION 01 11 00 - SUMMARY OF WORK: continued

1.06 WORK SEQUENCE:

A. General: Construction sequence shall be determined by Contractor subject to Owner's need for continuous operation of existing facilities.

B. Continuous Service of Existing Facilities: Exercise caution and schedule operations to ensure that functioning of present facilities will not be disrupted. Shutdown of Owner's operating facilities to perform the Work shall be held to a minimum length of time and shall be coordinated with Owner who shall have control over the timing and schedules of such shutdowns.

C. Contractor shall construct a temporary chemical dosing system to enable the Town to continuously dose ammonium hydroxide or ammonium sulfate throughout construction. See the Contract Drawings for more information.

1.07 OWNER-FURNISHED EQUIPMENT AND MATERIALS:

A. Equipment: The following Equipment and Materials will be furnished and paid for by Owner:
   1. None.

1.08 MEASUREMENT AND PAYMENT:

A. Guaranteed Maximum Price Contracts: All Work indicated and specified in the Contract Documents shall be included in the Guaranteed Maximum Price.

1.09 COPIES OF DOCUMENTS:

A. Furnished Copies: After execution of Agreement, Contractor will be furnished at no cost, an Adobe PDF set of Contract Documents consisting of full-size Contract Drawings including revised Drawings, and the Project Manual, in addition to those used in execution of the Agreement.

1.10 LIST OF DRAWINGS:

A. Contract Drawings:
   1. Each sheet of the Contract Drawings bears the following general title: Plum Creek Water Purification Facility Liquid Ammonium Sulfate Conversion.
   2. Individual sheet numbers and titles are as stated on index sheet under "Contract Drawings".

B. Reference Information:
   1. Plum Creek Water Purification Facility Conforming to Construction Records.

1.11 GENERAL REQUIREMENT DOCUMENTS

A. All general requirement specifications (Division 01) from the Plum Creek Advanced Treatment Project shall apply to the Plum Creek Liquid Ammonium Sulfate Project. These specifications include:

01 25 00	Substitutions
01 31 00	Project Coordination and Meetings
01 32 00	Construction Progress Schedules and Reports
01 32 33	Construction Photographs
01 33 00	Submittals
01 40 00	Contractor QA/QC
01 42 00	Definitions and Standards
01 51 00	Temporary Utilities and Facilities
01 52 00	Field Offices and Sheds
01 57 00	Temporary Barriers and Controls

SECTION 01 11 00 - SUMMARY OF WORK: continued

01 58 00	Project Identification and Signs
01 60 00	Equipment and Materials
01 73 29	Cutting and Patching
01 75 00	Manufacturer's Field Services
01 78 00	Contract Closeout
01 78 36	Warranties

1.12 REFERENCE SPECIFICATIONS

A. The following specifications from the from the Plum Creek Advanced Treatment Project shall apply to the Plum Creek Liquid Ammonium Sulfate Project:

03 41 00	Precast Structural Concrete
07 92 00	Joint Sealants

PART 2 - PRODUCTS - NOT APPLICABLE.

PART 3 - EXECUTION – NOT APPLICABLE.

END OF SECTION 01 11 00

Exhibit 1

DIVISION 2 – EXISTING CONDITIONS

SECTION 02 41 13 – SELECTIVE DEMOLITION

PART 1 - GENERAL

1.01 SUMMARY:

A. This Section includes the removal of existing construction to limits as indicated and specified herein. Demolition includes, but may not be limited to, the complete or partial removal and disposal of materials of the following:
   1. Piping, valves.
   2. Equipment.
   3. Electrical Conduit.
   4. Other items as indicated.

1.02 SUBMITTALS:

A. Schedule of Demolition:
   1. Submit as specified in DIVISION 1.
   2. Submit proposed methods and operations of demolition for review prior to the start of Work. Include in the schedule the coordination for shutoff, capping, and continuation of utility services as required.
   3. Provide a detailed sequence of demolition and removal Work to ensure the uninterrupted progress of Owner's operations.

1.03 JOB CONDITIONS:

A. Owner will be continuously occupying areas of the Site adjacent to areas of selective demolition. Conduct selective demolition Work in a manner that will minimize need for disruption of Owner's normal operations. Provide Owner a minimum of 72 hours' advance notice of demolition activities which will severely impact Owner's normal operations.

B. Condition of Structures to be Demolished:
   1. Owner assumes no responsibility for actual condition of structures to be demolished.
   2. Owner's removal and salvage operations will be complete prior to start of demolition Work.
   3. Contractor is responsible to repair or replace any damaged elements that are to be reinstalled.

C. Protections:
   1. Ensure the safe passage of persons around the area of demolition. Conduct operations to prevent injury to adjacent buildings, structures, other facilities, and persons.
   2. Provide interior and exterior shoring, bracing, or support to prevent movement, settlement, or collapse of structures to be demolished and adjacent facilities to remain.
   3. Protect from damage existing finished facilities that are to remain in place and become exposed during demolition operations.
   4. Protect floors with suitable coverings when necessary.
   5. Construct temporary, insulated, solid, dustproof partitions where required to separate areas where noisy or extensive dirt or dust operations are performed. Equip partitions with dustproof doors and security locks if required.
   6. Provide temporary weather protection during interval between demolition and removal of existing construction on exterior surfaces, and installation of new construction to ensure that no water leakage or damage occurs to structure or interior areas of existing building.
   7. Remove protections at completion of Work.

SECTION 02 41 13 - DEMOLITION: continued

D. Explosives: The use of explosives will not be permitted.
E. Traffic:
   1. Conduct demolition operations and the removal of debris to ensure minimum interference with roads, streets, walks, and other adjacent occupied or used facilities.
   2. Do not close, block, or otherwise obstruct streets, walks, or other occupied or used facilities without permission from the governing authority or Owner. Provide alternate routes around closed or obstructed traffic ways if required by governing authorities.
F. Promptly repair damages caused to adjacent facilities by demolition operations at no cost to Owner.
G. Utility Services:
   1. Maintain existing utilities; keep in service and protect against damage during demolition operations.
   2. Do not interrupt existing utilities serving occupied or used facilities, except when authorized in writing by Engineer, Owner, or authorities having jurisdiction. Provide temporary services during interruptions to existing utilities.
   3. Owner will shut off utilities serving each area. Disconnecting and sealing indicated utilities before starting demolition operations shall be done by Owner.

PART 2 - PRODUCTS

2.01 SALVAGE OF MATERIALS:
A. Remove, store, redesign as required, and reinstall as equipment as indicated throughout Construction Drawings. Salavaged materials include, but are not limited to:
   1. Potable water piping.
   2. Emergency Eyewash/Shower.
   3. Chemical Fill Station.
   4. Tank Level Sensor and Conduit.
   5. Vent piping.
B. Contractor shall coordinate with Owner and Engineer regarding specific equipment and materials to be returned to the Owner after removal or placed in an Owner-designated location.

2.02 HANDLING AND STORAGE:
A. Carefully dismantle Equipment and Materials to be reused or returned to Owner in a manner to avoid damage.
B. Store Equipment and Materials to be reused in a manner to avoid corrosion, staining, breakage, or damage from any cause.

PART 3 - EXECUTION

3.01 INSPECTION:
A. Prior to commencement of demolition Work, inspect areas in which demolition will be performed. Photograph existing conditions of structures, surfaces, equipment, or surrounding properties according to SECTION 01 32 33 which could be misconstrued as damage resulting from demolition operations. File with Owner prior to starting Work.
B. All equipment required for removals shall be provided by the Contractor.

SECTION 02 41 13 - DEMOLITION: continued

3.02 PREPARATION:

A. Provide interior and exterior shoring, bracing, or support to prevent movement, settlement, or collapse of structures to be demolished and adjacent facilities to remain:
   1. Cease operations and notify Owner immediately if safety of structure appears to be endangered. Take precautions to support structure until determination is made for continuing operations.
   2. Cover and protect furniture, fixtures, and other items to remain from soiling or damage when demolition Work is performed in rooms or areas from which such items have not been removed.

B. Locate, identify, stub off, and disconnect utility services that are indicated to remain:
   1. Provide bypass connections as necessary to maintain continuity of service to occupied areas of building. Provide minimum of 72 hours' advance notice to Owner if shutdown of service is necessary during changeover.

3.03 DEMOLITION:

A. Perform demolition in a systematic manner. Use such methods as required to complete demolition indicated on Drawings in accordance with demolition schedule and governing regulations:
   1. Locate demolition equipment throughout structure and promptly remove debris to avoid imposing excessive loads on supporting walls, floors, or framing.
   2. Provide services for effective air and water pollution controls as required by local authorities having jurisdiction.
   3. Demolition of Roads or Paved Areas: Break up and remove construction including surface, base, and subbase unless otherwise indicated to remain.

B. If unanticipated mechanical, electrical, or structural elements which conflict with intended function or design are encountered, investigate and measure both nature and extent of the conflict. Engineer and Owner will confer to determine the appropriate actions. The demolition schedule shall be rearranged as necessary to continue overall job progress.

C. Equipment, Ducts, Lighting Fixtures, Piping, Conduit, Brackets, Hangers, and Supports: Remove items to extent indicated, including ceiling, wall, and floor anchors. Patch anchor holes where ceiling, walls, and floors are to remain.

D. Pollution Controls:
   1. Use water sprinkling, temporary enclosures, and other suitable methods to limit the amount of dust and dirt rising and scattering in the air to the lowest practical level. Comply with governing regulations pertaining to environmental protection.
   2. Do not use water when it may create hazardous or objectionable conditions such as ice, flooding, and pollution.
   3. Clean adjacent structures and area of dust, dirt, and debris caused by demolition operations.

3.04 SALVAGE MATERIALS:

A. Salvage Items:
   1. Where indicated on Drawings and Specifications, carefully remove items. Clean, store, and turn over to Owner and obtain receipt. When applicable, reinstall equipment per designs and specifications.
   2. Historic artifacts, including cornerstones and their contents, commemorative plaques and tablets, antiques, and other articles of historic significance remain the property of Owner. Notify Owner if such items are encountered, and obtain acceptance regarding method of removal and salvage for Owner.

SECTION 02 41 13 - DEMOLITION: continued

3.05 DISPOSAL OF DEMOLITION MATERIALS:

A. Remove debris, rubbish, and other materials resulting from demolition operations.
B. If hazardous materials are encountered during demolition operations, comply with applicable regulations, laws, and ordinances concerning removal, handling, and protection against exposure or environmental pollution.
C. Burning of removed materials from demolished structures will not be permitted on the Site.
D. Transport materials removed from demolished structures and dispose of off the Site.

3.06 CONNECTIONS TO EXISTING CONSTRUCTION:

A. Cut and remove portions of existing construction as required to allow for proper installation of new construction.
B. Shore and brace existing structure until permanent supports are completed, and to maintain structure in a safe condition.
C. Repair all damage as a result of installation of shoring and bracing.
D. Cap, seal, or abandon pipe and cable as indicated.

3.07 CLEANUP AND REPAIR:

A. Upon completion of demolition Work, remove tools, equipment, and demolished materials from site. Remove protections and leave interior areas broom clean.
B. Repair demolition performed in excess of that required. Return structures and surfaces that will remain to condition existing prior to commencement of demolition Work. Repair adjacent construction or surfaces soiled or damaged by demolition Work.

END OF SECTION 02 41 13

DIVISION 43 – GAS AND LIQUID HANDLING AND STORAGE EQUIPMENT

SECTION 43 41 45 – FIBERGLASS STORAGE TANKS

PART 1 - GENERAL

1.01 SUMMARY:

A. The Contractor will install the materials and equipment procured under this purchase agreement.

B. This section includes fiberglass reinforced plastic (FRP) tanks and associated appurtenances for two (2) Ammonium Sulfate Storage Tanks, including appurtenances to facilitate loading and unloading of 38% ammonium sulfate solution. The minimum liquid capacity of each tank shall be 5,000 gallons.

C. The FRP tank equipment shall include: bulk storage tanks, flange connections, blind flanges, vent connections, fasteners, couplings, hold down lugs, sight tubes, and other accessories specified herein.

1.02 RELATED REQUIREMENTS:

A. Division 01

1.03 REFERENCE STANDARDS:

A. Applicable Standards:

1. American Society for Testing and Materials (ASTM):
   a. C582, Table 5 – Standard Specification for Classifying Visual Defects in Glass Reinforced Laminates.
   b. D638 – Standard Test Method for Tensile Properties of Plastics.
   c. D695 – Standard Test Method for Compressive Properties of Rigid Plastics.
   d. D696 – Standard Test Method for Coefficient of Linear Thermal Expansion of Plastics Between -30°C and 30°C with a Vitreous Silica Dilatometer
   e. D790 – Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.
   f. D792 – Standard Test Methods for Density and Specific Gravity (Relative Density) of Plastics by Displacement.
   g. D2583 – Standard Test Method for Indentation Hardness of Rigid Plastics by Means of a Barcol Impresser.
   h. D3299 – Standard Specification for Filament Wound Glass - Fiber - Reinforced Thermostat Resin Chemical Resistant Tanks.
   i. F593 – Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs.
   j. F594 – Standard Specification for Stainless Steel Nuts.

1.04 SUBMITTALS:

A. Submit as specified in DIVISION 01.

B. Submittals required shall include, but are not limited to, the following:

1. Complete layout drawings with details of tanks, including critical dimensions and locations of all fittings, manways, ladders, hold-down straps, and other accessories.
2. Fabricator's catalog information, descriptive literature, specifications, and identification of materials of construction.

3. Complete resin system information, including resin manufacturer's descriptive literature for recommended resin including chemical resistance tables and resin manufacturer's written statement that the recommended resin is suitable for specified service
4. Tank data indicating equipment number, pressure rating, diameter, straight shell length, overall length, wall thickness, corrosion barrier thickness, and details of nozzle designs.
5. Fabricator's detailed requirements for tank foundations and supports including any foundation pad block out requirements for side-bottom drain flanges.
6. Recommended bolt torques for all bolted FRP connections.
7. Fabricator's Certificate of Compliance with fabrication requirements.
8. Recommended gasket material.
9. Special shipping, storage and protection, and handling instructions.
10. Fabricator's written/printed installation and tank support instructions.
11. Temporary Storage Requirements
12. All manuals, drawings, parts lists, and special tools required for assembly, maintenance, and operation.
13. Operation and Maintenance Manuals in accordance with SECTION 01 33 00.
    a. In addition to the Operation and Maintenance Manual requirements included in Section 01 33 00, provide an equipment description sheet that lists the following:
        (1) Equipment tag number
        (2) Equipment description and function
        (3) Manufacturer name, address, and contact information
        (4) Local vendor name, address, and contact information
        (5) Nameplate data
        (6) Required spare parts
        (7) Periodic maintenance required
        (8) Lifecyle length (in years or hours of runtime)
        (9) Effect of equipment failure on system

C. Prior to delivery, Manufacturer shall submit certification that Equipment has successfully completed shop leakage test.

1.05 QUALITY ASSURANCE:

A. Factory Tests:
1. Conduct all standard factory tests and all tests required by the applicable codes and standards.
2. Submit certificates of completion of factory tests as Submittals prior to delivery.

1.06 DESIGN REQUIREMENTS:

A. Design tank, including wall thickness, methods and locations of support, and stiffener requirements. Design shall be sealed by a Colorado Registered Professional Engineer and shall consider the following conditions (2018 International Building Code).
B. Tanks will be located indoors.
C. Maximum earthquake spectral response accelerations:
1. $S_{Ds} = 0.229$ g
2. $S_{D1} = 0.094$ g
D. Seismic Design Category: C.
E. Buoyancy-Restraint: Design tank and tank restraints to withstand submergence in stored chemical up to 3 feet in depth.

SECTION 43 41 45 – FIBERGLASS STORAGE TANKS: continued

1.07 WARRANTY:

A. The warranty shall comply with the requirements of SECTION 01 78 36 and shall extend for 5 years.

1.08 DELIVERY, STORAGE, AND HANDLING:

A. Pack and ship tanks in manner that does not cause cracks or spidering of any tank surface.
B. Provide Contractor with requirements for temporary storage.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS:

A. Acceptable tank manufacturers include those regularly engaged in manufacture of FRP tanks with a minimum of five years of experience.
   1. Augusta Fiberglass.
   2. Design Tanks.
   3. Ershigs.
   4. Palmer of Garden City (part of Worthington Industries).
   5. Belding Tank Technologies.
   6. Engineer Approved Equal.
B. Acceptable resin manufacturers.
   1. Ashland.
   2. Dow.
   3. Interplastics.
   4. Reichhold.
   5. Engineer Approved Equal.

2.02 DESIGN:

A. Design Conditions:
   1. Location: Indoors.
   2. Operating Pressure: Atmospheric.
   1. Indoor Ambient Temperature: 40ºF to 100°F
   3. Tanks shall be designed to support accessory Equipment such as ladders, drop tubes, and the like.
B. Product Storage Requirements:
   1. All tanks shall be vented as required by application.
   2. Tanks shall be designed, at a minimum, for storing liquids with a specific gravity of 1.8. Appropriate safety factors shall be utilized as determined by manufacturer.
C. Tanks shall be designed to be filled by pneumatically unloaded trucks.
D. Storage tanks shall be as follows:
   1. Designed to store the chemical specified per the Tank Data Sheets.
   2. Designed to withstand hydrostatic load of fluid to the top of the tank vent flange fitting.
   3. Single wall, vertical tank with flat bottom and domed top.
   4. Provide with connections located as indicated on Tank Data Sheets.
   5. Shop fabricated.
E. Tanks shall be NSF 61 certified.

2.03 CHOP-HOOP FILAMENT WOUND TANK MATERIALS:

A. Resins:

1. The resins to be used are to be commercially available polyester or vinylester and are not to contain pigments or fillers unless otherwise specified.
2. The resins to be used are the responsibility of the tank manufacturer. The manufacturer is responsible for verifying the adequacy of these resins from published test results and technical publications for the specified service.
3. The resins to be used shall be suitable for the intended service.
4. Ultraviolet light absorber: 0.25% by weight.

B. Reinforcement:
1. Veil: Chemical surfacing mat, Type C (chemical) glass or Nexus, 10 mils thick (minimum), with a finish and a binder compatible with the lay-up resin. The glass to resin ratio shall be 20/80.
2. Interior Corrosion Barrier: Resin-rich interior surface of nominal 90 to 100 mils using chopped Type E glass backing the veil. Glass to resin ratio shall be 30/70. Use no additive in the corrosion barrier.
3. Chopped Strand Mat: Type E glass, minimum 1-1/2 ounces per square foot, with saline finish and styrene soluble binder.
4. Continuous roving used in chopper gun for spray-up: Type E glass.
5. Woven Roving: Type E glass, nominal 24 ounces per square yard, 4 by 5 weave, with saline type finish.
6. Continuous roving used for filament winding: Type E glass with saline type finish, with a nominal yield of at least 110 strand yards per pound. Glass to resin ratio for the structural wall shall be 50/50.
7. Exterior Corrosion Barrier: When required by the manufacturer for a given chemical service, an exterior corrosion barrier is to be added to the tank wall. Chopped Type E glass is to be used with resin for a thickness or 45 mils, and the glass to resin ratio shall be 70/30.

2.04 NOZZLES:

A. Nozzles shall be of hand-lay-up construction with the flange and size neck molded as one integral unit.
B. Provide nozzles as indicated on the Tank Data Sheets. Provide side bottom drain flanges where indicated for complete draining of storage tank.
C. Gusseted with conical type gussets.
D. Two gaskets for each nozzle. Gaskets shall be 1/8-inch thick full-face elastomeric material having a hardness of Shore A60 plus or minus 5. Gasket material shall be suitable for the intended service.
E. All flanged nozzles: ANSI 150 lb, rated at 100 psi with dimensions appropriate for pressure rating.
F. The back face of all flanges shall be spot-faced, flat and parallel to the flange face of sufficient diameter to accept an SAE metal washer under the bolthead or nut.
G. The flange face shall be perpendicular to the axis of the pipe within ½ degree and shall be flat to plus or minus 1/16 inch.
H. Flanged nozzle projection shall be 6-inches (nozzle face to nearest outside tank surface). Flange bolt holes shall symmetrically straddle the tank centerlines.
I. For nozzles located on the top of the tanks and identified as blind flange, provide ½-inch thick clear PVC blind flanges drilled to match flanged nozzles for visual inspection of the tank interior.
J. Nozzle flange bolts shall comply with ASTM F593 and ASTM F594 Type 316 Stainless Steel Bolts and Nuts.

SECTION 43 41 45 – FIBERGLASS STORAGE TANKS: continued

2.05 APPURTENANCES:

A. Provide all connections necessary for complete installation as indicated and as specified.
B. Flanged fittings less than 20 inches shall be conically gusted.
C. Tank Support:
   1. Hold down lugs shall be provided on bottom supported tanks and shall be capable of withstanding operating loads on the tank. See structural drawings for anchor bolt requirements. Tank Manufacturer shall provide calculations stamped by a Colorado PE and drawings for tank supports.
D. Nameplate:
   2. Mark each tank with encapsulated paper tag or stainless-steel nameplate not less than 4 by 6 inches in size; attach to outside of tank wall.
   3. Print the following information on nameplates:
      a. Name of manufacturer.
      b. Type of Chemical
      c. Capacity in gallons.
      d. Manufacturer serial number.
      e. Year built.
      f. Maximum specific gravity.
      g. Design pressure and temperature.
      h. Resin.
   4. Provide gallonage tape with 500-gallon increments for local tank level indication on chop hoop tanks. Provide gallonage tape with 100-gallon increments for local tank level indication on centrifugal cast tanks.
E. Flanged Manways:
   1. All manways shall be 24-inch diameter.
   2. All manways shall be furnished with gaskets, stainless steel bolts, and covers compatible with chemical to be stored.
   3. Locate as indicated.
F. Inlet Elbow:
   1. Provide 45º elbow, internal to the tank, at the tank inlet to direct the chemical to the wall of the tank.
   2. Chemical shall not freely cascade into the tank.
G. Sight Tubes:
   1. Provide one-piece sight tube as indicated with 1” flanged connections to side of tank at top and bottom with isolation ball valve between tank connections and sight tube. Multiple sight tubes or sight tubes joined together using couplings are not acceptable.
   2. Acceptable Manufacturers
      a. Jogler, Model ULSS.
      b. Engineer Approved Equal.
   3. Sight tube shall be reinforced with a minimum of two (2) armored shield angles with gallonage scale tape corresponding to tank volume affixed to angle. Sight tube shall also include height markings in ft and inches.
   4. Sight tube shall be fitted with supports in addition to flanged connection at a minimum spacing of 3’-0”.
      a. Tank manufacturer shall provide all required connections on tank to affix sight tube supports.
   5. All wetted parts shall be compatible with the solution being stored.
   6. Furnish flange isolation kits for connections between flanges of dissimilar metals.
H. Lifting Lugs:

SECTION 43 41 45 – FIBERGLASS STORAGE TANKS: continued

1. Shall be provided on all tanks.
2. Shall be capable of withstanding weight of tank with a safety factor of 3.0.
3. Shall be located per manufacturer's recommendations.

I. Venting:
1. One top tank vent flange connection at location shown in Tank Data sheets. Tanks shall be properly vented for the type of material and flow rates expected.
2. Vent shall not be smaller than 8-inch and shall be sized by the tank manufacturer as required to protect tank from damage during fill or discharge.
   a. Fill line size shall be 2 inches.
   b. Discharge flow rate should be calculated based on the maximum discharge flow rate by gravity for an initially full tank from a single nozzle located on the side of the tank.

2.06 SPECIAL FABRICATION REQUIREMENTS:

A. Fabrication Quality Control:
1. Process and quality control shall be constantly monitored and manufacturer must maintain manufacturing and quality control records for each tank.
2. The first layer surface shall be clean, smooth and uninterrupted with no cracks or crazes.
3. No foreign matter large enough to reach the surface of the first layer is allowed.
4. The exterior of the tank shall exhibit good workmanship; smooth and uniform with no exposed fibers, sharp projections or uncoated sanded areas. The exterior surface shall be properly cured.

2.07 TANK SCHEDULE:

A. See tank data sheets.

2.08 NOZZLE SCHEDULE:

A. See tank data sheets.

PART 3 - EXECUTION

3.01 MANUFACTURER’S FIELD SERVICES:

A. Provide installation, start-up, and testing services for Equipment as specified in DIVISION 01.
B. Provide video recording of all classroom training sessions to the Owner.
C. Tank Supplier/Manufacturer shall observe the installation of the of the first FRP tank on the job site and shall approve the installation process to be utilized for all subsequent FRP tank installations.

3.02 MANUFACTURER'S TEST PROCEDURES:

A. Hardness Test: Measure Barcol hardness according to ASTM D2583. Barcol hardness must be a minimum of 90% of manufacturer's recommendation.
B. Acetone Sensitivity Test: An acetone sensitivity test shall be performed by rubbing a small amount of acetone on a laminate surface until the acetone evaporates. If the surface becomes softened or tacky, the surface shall be considered insufficiently cured.
C. Visual Inspection: The visual inspection shall be made of all surfaces for laminate defects.
D. Other Tests:
1. Manufacturer should maintain records of tensile and flexural strength tests and glass content tests by an independent laboratory on sample specimens for purchaser’s review.
2. All cut-outs and/or tank coupons shall be delivered to Owner.

SECTION 43 41 45 – FIBERGLASS STORAGE TANKS: continued

3.03 INSTALLATION:

A. In accordance with the manufacturer's written instructions.

B. The tank manufacturer shall coordinate foundation pad block outs and any special requirements for types of nozzles provided with the Contractor.

C. Provide anchor bolts, stainless steel bolts, nuts, and washers, and all other equipment required for tank installation.

3.04 SHOP AND FIELD QUALITY CONTROL:

A. Functional Test:

1. Hydrostatic leak test with the tank full of clean water to overflow level. Allow water to stand for 24 hours to verify no leakage before shipping tank. Provide written report to Contractor within 7 days of test completion and prior to delivery.

3.05 END OF 5-YEAR WARRANTY INSPECTION:

A. Inspection:

1. Perform on equipment by authorized manufacturer's representative.
2. Perform within 60 days prior to date of warranty expiration.
3. Ascertain or appraise the following:
   a. Status of equipment and installation.
   b. Adherence to manufacturer's recommended maintenance and operation of equipment.
   c. Interior and exterior condition and ability to remain a long-term corrosion resistant storage vessel.
4. Make adjustments and repairs necessary to restore equipment within original tolerances.
5. Submit a written letter report to Owner with copy to Engineer covering the inspection items and including recommendations where applicable.

END OF SECTION 43 41 45