DEPARTMENT OF ENVIRONMENTAL QUALITY
PERMITTING AND COMPLIANCE DIVISION

METCALF BUILDING
1520 E SIXTH AVE

MARC RACICOT, GOVERNOR

STATE OF MONTANA

(406)444-3080
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PO BOX 200901
HELENA, MONTANA 59620-0901

August 31, 1998

Environmental Quality Council
Room 432
State Capitol
Helena, MT 59620

RE: Valley Meadows Subdivison
Gallatin County

Dear Sir/Madam:

Enclosed please find an Environmental Assessment (EA) completed by this Program for the above referenced subdivision. Due to the minimal impacts anticipated from this proposal, this EA has not been circulated to all departments for comment, but has only been forwarded to yourselves and copied to the below.

If you have any questions or comments on the above or I can be of further assistance, please feel free to call on us at the Permitting and Compliance Division at 444-3080.

Sincerely,

Mark Peterson
for Dennis McKenna, Supervisor
Subdivision Section
Water Protection Bureau

RECEIVED
SEP 04 1998
ENVIRONMENTAL QUALITY COUNCIL

cc: Gallatin County Health Department
Dave Crawford, TD&H
File

DEPARTMENT OF ENVIRONMENTAL QUALITY
Metcalf Building, Helena, Montana 59620
(406)444-4323

ENVIRONMENTAL ASSESSMENT (EA)

Division/Bureau Department of Environmental Quality, Permitting and Compliance Division

Project or Application Valley Meadows Subdivision

Location Section 3, Township 1 South, Range 4 East

Description of Project This project is a 268 lot major subdivision in Gallatin County, that was previously approved in 1978 as Royal Village.

Water Supply The subdivision is to be supplied with water service through a new public water supply.

Sewage Treatment The subdivision is to be supplied with sewer service through a new public wastewater treatment system. The system consists of collection lines, a lift station, aerated lagoons, and rapid infiltration beds to dispose of the effluent to the groundwater system.

Storm Water Drainage Storm water will be routed to drainage sumps or road side ditches for infiltration.

Benefits and Purpose of Proposal This proposal will develop a 72.156 acre parcel into 268 lots, including 110 single family lots, 29 multi-family lots and 129 mobile home lots.

Special Circumstances None

Valley Meadows Subdivision
Gallatin County

POTENTIAL IMPACT ON PHYSICAL ENVIRONMENT

1. TERRESTRIAL AND AQUATIC LIFE AND HABITATS Minor

2. WATER QUALITY, QUANTITY AND DISTRIBUTION Minor. The subdivision will consist of 268 lots served by new public water and wastewater systems.

3. GEOLOGY AND SOIL QUALITY, STABILITY AND MOISTURE Minor

4. VEGETATION COVER, QUANTITY AND QUALITY Minor

5. AESTHETICS Minor

6. AIR QUALITY Minor

7. UNIQUE ENDANGERED, FRAGILE OR LIMITED ENVIRONMENTAL RESOURCE Unknown. No such resources have been identified or are expected.

8. DEMANDS ON ENVIRONMENTAL RESOURCE OF WATER, AIR AND ENERGY Minor. The applicant has demonstrated that there is adequate quantity of water to supply this subdivision.

9. HISTORICAL AND ARCHAEOLOGICAL SITES Minor.

CUMULATIVE AND SECONDARY IMPACTS Minor

POTENTIAL IMPACTS ON HUMAN ENVIRONMENT

1. SOCIAL STRUCTURES AND MORES Minor

2. CULTURE UNIQUENESS AND DIVERSITY Minor

3. LOCAL AND STATE TAX BASE AND TAX REVENUE Minor

4. AGRICULTURAL OR INDUSTRIAL PRODUCTION Minor

5. HUMAN HEALTH Minor

6. ACCESS TO AND QUALITY OF RECREATIONAL AND WILDERNESS ACTIVITIES Minor

7. QUANTITY AND DISTRIBUTION OF EMPLOYMENT Minor

8. DISTRIBUTION OF POPULATION Minor

9. DEMANDS FOR GOVERNMENTAL SERVICES Minor

10. INDUSTRIAL AND COMMERCIAL ACTIVITY Minor

11. LOCALLY ADOPTED ENVIRONMENTAL PLANS AND GOALS Unknown

CUMULATIVE AND SECONDARY IMPACTS Minor

Regulatory Impact Analysis

The Sanitation in Subdivisions Act imposes regulatory restrictions on this subdivision which require department review and approval of designs for water supply, wastewater treatment, storm water and solid waste disposal systems. Private property may not be developed for activities that require water supply or wastewater disposal until approval is issued by the Department of Environmental Quality. The impact on this private property is that the systems must be constructed at a cost to the applicant, and that several limitation may be imposed regarding the number of lots which may be created, treatment technologies which may be considered, and/or locations of buildings and sanitary facilities. These requirements have been established to protect public health and water quality.

Alternatives/Rationale:

The systems were proposed by the applicant in the initial application. The department accepts the systems proposed by the applicant as the most economically feasible approach.

Individuals or groups contributing to this EA
Subdivision Section, Water Protection Bureau, Permitting and Compliance Division

EA prepared by: Mark Peterson

Date: August 31, 1998

ARTICLE 4
CONSTRUCTION SPECIFICATIONS
4-B FLEXIBLE MEMBRANE LINER

RECEIVED
JUN 22 1998
MT. DEPT. OF ENV. QUALITY
PERMITTING & COMPLIANCE DIV

1. GENERAL.

1.1 Description. This section describes the minimum physical characteristics and the installation and acceptance criteria for the flexible membrane liner incorporated on this project.

The membrane liner is to be installed in both sewage treatment ponds, Cells I and II. The ponds will be utilized to treat normal municipal wastewater. The liner materials shall be resistant to all chemicals normally found in municipal wastewater and shall not deteriorate when exposed to sunlight (ultraviolet light).

Three alternative membrane liners are specified herein. The Contractor may select and install any one of the three membrane liners. Typical installation details are shown on the attached drawing. Different materials require different details and the Contractor shall be careful to only utilize these details that are appropriate for the liner type. The liner manufacturer shall review and approve all details and recommend changes where appropriate. All changes, however, are subject to the approval of the Engineer.

1.2. Submittals.

1.2.1 Shop Drawings. The Contractor shall submit five (5) copies of detailed drawings indicating the method of liner installation, including the methods of jointing, sealing around penetrations, terminating the lining, and methods of anchoring.

1.2.2 Certification.

1.2.2.1 Physical Characteristics. The Contractor shall submit five (5) copies of the liner installation contractor's certification that the material supplied meets or exceeds the physical characteristics for the particular flexible membrane liner specified herein. Separate certifications for roll goods as manufactured, as fabricated and as factory seamed are required.

1.2.2.2 Earthen Subgrade and Cover Material. The Contractor shall submit five (5) copies of the liner manufacturer's certification that the earthen subgrade is acceptable and suitable for the installation of the flexible membrane liner. The submittal shall include a statement that the condition of earthen subgrade as constructed does not threaten the performance of the flexible membrane liner and that the liner manufacturer accepts the installation as constructed without qualification.

APPROVED
Montana Department of
Environmental Quality
Permitting and Compliance Division
M Peterson 8/3/98
Reviewer Date

ASTM D-751	Method of Testing Coated Fabrics
ASTM D-1203	Test Methods for Volatile Loss from Plastics Using Activated Carbon Methods
ASTM D-1204	Test Methods for Lineal Dimensional Changes of Non-Rigid Thermoplastic Sheeting or Film at Elevated Temperature
ASTM D-2136	Test Method for Coated Fabrics - Low-Temperature Bend Test
ASTM D-2156	Test Method for Smoke Density in Flue Gases from Burning Distillates Fuel
ASTM D-3083	Specification for Flexible Poly (Vinyl Chloride) Plastic Sheeting for Pond, Canal, and Reservoir Lining
ASTM D-3084	Practice for Alpha Spectrometry of Water

3. MATERIALS.

3.1 General. Materials supplied shall be suitable for use in typical municipal wastewater or meet or exceed the physical characteristics specified herein. All materials shall be first quality, industrial grade, virgin material meeting specific public health and safety requirements. Material shall not be reworked, remanufactured or reused. The membrane liners shall be free of holes, blisters, undisbursed raw materials, exposed scrim or any sign of contamination.

The membrane material shall be one of three types: (1) 60 mil high density polyethylene; (2) 36 mil reinforced chlorosulfonated polyethylene (hypalon); or (3) 45 mil reinforced polypropylene. The reinforced hypalon and polypropylene shall be made by encapsulating reinforcing polyester between two equally heavy gauge sheets of industrial grade Hypalon or polypropylene such that the nominal thickness of the completed sheet shall be as specified. Reinforcement shall be 10 x 10 1000 denier polyester scrim. The Hypalon or polypropylene sheeting shall be make up a minimum of 45 percent by weight of the composite sheeting. The edges of the scrim shall be encapsulated a minimum of 3/8 inch (+/- 1/4") so that no exposed scrim shows on the edge and the edge is water sealed. Membrane liners shall be free of all manufacturing or fabricating defects, including pinholes, blisters, and unbonded surfaces, before delivery to the site. Material with exposed fabric reinforcement or indication of delamination or other defects will not be permitted and shall be replaced.

PROPERTY	TEST METHOD	VALUE
3. Modulus at 100% Elongation		20
b. Membrane Fabric Breaking Strength	ASTM D-751, Method A	25
Hydrostatic Resistance, (pounds/sq.in. minimum)	ASTM D-751, Method A Procedure 1	250
Ply Adhesion, Each Direction, (pounds/in. minimum)	ASTM D-413 Machine Method	8
Water Absorption, maximum ASTM D-471 30 mil unsupported sheet (% weight gain)	120 days @ 70°F	2.0
II. Seam Requirements		
Bonded Seam Strength (factory seam, breaking factor, lb./width)	ASTM D-751 (as modified in NSF #54)*	160
Peel Adhesion (pounds/in. minimum)	ASTM D-513 (as modified in NSF #54)*	Ply sep. plane of scrim 10 lb/in
Resistance to Soil Burial (percent change maximum in original value)	ASTM D-3083 (as modified in NSF #54)*	
Peel Adhesion		-20
Bonded Seam Strength		-25

* (National Sanitation Foundation Standard Number 54)

3.2.2 Sealants and Adhesives. All sealants and adhesives used in the fabrication and installation of the membrane liners shall be as recommended and certified by the manufacturer.

PROPERTY	TEST METHOD	TYPE
UV Resistance	a) Florida exposure	pass - 1 yr. exposure
	b) ASTM G25 Xenon arc method 63° C.	pass - 4000 hrs.
Stress Cracking Resistance (min. hours with no failure)	ASTM D-1693	Pass - 3000 hrs.
SEAM PROPERTIES:		
Bonded Seam strength, shear (lbs./width)	ASTM D-751, as modified in Appendix A, NSF 54	200
Peel Adhesion, minimum (lbs/inch)	ASTM D413, as modified in Appendix A., NSF 54	20

3.2.4 High Density Polyethylene. The membrane shall be a high quality formulation of high density polyethylene containing approximately 97.5 percent polymer and 2.5 percent carbon black, anti-oxidants, and heat stabilizers. The membrane shall be designed specifically for exposed conditions and contain no additives or fillers that can leach out and cause deterioration over time. The membrane shall have a rough textured surface on both sides. Roughness shall permit personnel to walk on it when wet on a 3:1 side slope. The product shall be equal to Hyperfriction Flex manufactured by GSE or equal. The liner shall be manufactured in seamless sheets with a minimum width of 22 feet. The seam area along the edge of the sheet for about 6 inches shall be smooth and not textured or rough. The friction surface shall be created by welding HDPE material to the surface of a HDPE sheet meeting the minimum requirements specified herein. Processes that roughen the surface in a way that produces a sheet with a minimum net thickness less than specified herein are not acceptable. The surface shall have an equivalent friction angle not less than 30 degrees for all soil materials. The liner shall have the following minimum characteristics:

PROPERTY	TEST METHOD	VALUE
Gauge (Nominal Mils)		60 mil
Minimum thickness at any point		54 mil
Density (g/cc) (Minimum)	ASTM D-1505	0.94
Melt Flow Index (g/10 min.) (Max.)	ASTM D-1238 Condition E (190°C., 2.16 kg)	0.28
Minimum Tensile Properties (Each Direction)	ASTM D 638 Type IV Dumb-bell at 2 ipm.	

PROPERTY	TEST METHOD	VALUE
Carbon Black Content (%)	ASTM D-1603	2
Carbon Black Dispersion	ASTM D-3015	Gauge (Nominal Mils)

3.2.4.1 Seams. Seams shall be hot wedge or extrusion welded. The finished seam shall be as strong as the membrane sheet. Seams bonded surface shall be 3 to 4 inches wide with a maximum of 5 inches and a minimum of 3 inches.

3.3 Factory Fabrication.

3.3.1 Testing of Roll Goods Prior to Factory Fabrication. Each 10,000 pounds of roll goods received from the material producer shall be tested for the following characteristics:

1. Thickness.
2. Breaking Strength.
3. Ply Adhesion.
4. Dimensional Stability.
5. Low Temperature Bend.

Certified test reports shall be furnished the Engineer prior to installation.

3.3.2 Inspection of Rolls Goods Prior to Fabrication. Prior to factory seaming, all roll goods shall be thoroughly inspected on both sides for unmixed or poorly disperse ingredients, exposed scrim, if applicable, pin holes, contaminants or other defects. Any and all impurities or defects will be removed or repaired before fabrication into panels. Thickness shall be measured in accordance with ASTM D1593 at the center and each end of roll material incorporated in this project. The fabricator shall maintain a log indicating roll identification, thickness measurements, defects discovered, defect resolution method employed, if applicable, and the date of inspection. Inspection reports shall be furnished to the Engineer upon request.

3.3.3 Factory Fabrication. Individual widths of calendared Hypalon or polypropylene liner shall be factory fabricated into large sheets to minimize field seams custom designed for this project. Factory seams shall be made using dielectric fusion welds for Hypalon or heat fusion welded for polypropylene. Factory seams shall have the same or better physical characteristics as specified under for factory seams of the material supplied. The welds shall be one hundred percent, visually inspected and shall provide at least continuous bond at least one inch wide. Loose edges shall not exceed one inch on the bottom side of the liner. There shall be no loose edges on the top side of the liner. The fabricator shall physically mark the weld at five foot centers as evidence of this inspection. Additionally, a four foot sample shall be taken from each factory seam welding unit at the beginning of each shift and every four hours of production thereafter. The four foot

A suitable soil sterilant equal to Primatol by Cenex shall be applied to all areas to be lined by the liner contractor. An authorized representative of the installation contractor shall certify in writing that the surface on which the lining is to be placed is acceptable. No installation of lining shall commence until this certification is furnished to the Engineer. It shall be the responsibility of the Contractor installing the membrane liner to keep the receiving surface in the accepted condition until complete installation of the lining is accomplished.

4.2 Installation of Liner. The lining manufacturer or his approved installation contractor shall provide the services of a competent field technical representative throughout the installation.

The liner shall be placed in accordance with the manufacturer's recommendations and the details shown on the plans.

The installation contractor shall furnish shop drawings for the approval of the project engineer. Written approval of the Engineer shall be obtained before proceeding with the work. The drawings shall show extent, sizes and details of the lining, including recommendations for terminating the lining. Except for special requirements due to configuration and/or terminating the lining, maximum use of large size panels shall be made.

The manufacturer shall furnish complete written instructions for the storage, handling, installation, seaming and inspection of his material in compliance with this specification and conforming to the condition of his warranty.

The liner shall be installed by crews experienced in the placement of the particular type of liner to be installed on projects of similar size and type, according to the manufacturer's recommendations. Experience records of the liner manufacturer and installer shall be submitted to the Engineer for review. Approval of the manufacturer and installer shall be obtained from the engineer prior to purchase of material or mobilization of the installer.

The Contractor shall visually inspect all delivered liner materials on arrival at the job site for damage and identification. Any damage to the liner panels caused by shipment, handling and placement shall be rejected. Liner panel shall remain in the shipping containers or shall be covered and protected from the elements until ready for installation. Only liner panels for each days seaming shall be spread.

The liner panels shall be oriented in such a manner as to minimize stress on the factory and field seams. To this end, liner panels shall be placed with factory seams and long field seams oriented longitudinally with the slopes (positioned up and down slopes).

The liner panels shall be temporarily anchored and held in place with sand bags, piles of earth, or other approved methods until completion of field seaming. Anchoring at the edge of the liner shall be as shown on the Drawings. Care should be taken to ensure that the liner panels are positioned in a slackened condition so that they will conform to the subgrade without being taut

4.3 Quality Control/Field Seam Testing. The Contractor shall provide the Engineer with a copy of the manufacturer's quality control testing for each shipment or partial shipment of liner if the entire shipment is not covered by the testing.

The test data shall be referenced to a shipment number. Upon placement, the Contractor shall indicate by a plan the exact location at which the liner shipment is installed.

The Contractor shall be responsible for providing his own quality control personnel and testing equipment. The Engineer may perform his own testing independent of the Contractor's testing. At the end of each shift, the Contractor shall submit to the Engineer a written notice indicating the areas of installation completed during that shift.

Field quality control testing shall involve both non-destructive and destructive testing. The non-destructive testing shall determine "water tightness" of the seam. Destructive testing shall be based on the ASTM D-638 test method. Destructive testing shall be performed on dumb-bells cut with the seam centrally located within the test specimen. Both shear and peel testing shall be performed. Test shall be based on the type of field seams and seams being tested.

The Contractor shall provide a qualified quality control technician to inspect each seam. Any seams that appear to be defective shall be repaired or tested to demonstrate the seam is good. The Contractor shall provide a non-destructive vacuum testing apparatus to check seams for air and water tightness. Tests will be made at intervals not to exceed fifty feet and at random locations designated by the Engineer. If leaks are found, the entire seam shall be field tested. The vacuum test shall apply a vacuum up to 5 psi on the seam after it has been soaped. The tester will permit observation through a window to see if bubbles form on the seam while under vacuum. The apparatus shall test two to three feet of seam at a time. The apparatus is subject to approval by the Engineer. Any holes detected shall be repaired. Air lance testing may be utilized where suitable.

4.3.1 High Density Polyethylene Seam Tests. A test weld three (3) feet long from each welding machine shall be run each day prior to liner welding and under the same conditions as exist for the liner welding. The test weld shall be marked with date, ambient temperature, and welding machine number. Samples of weld ¼" to ½" wide shall be cut from the test weld and pulled by hand in peel. The weld should not peel. Seams should exhibit a film tear bond. The weld sample shall be kept for subsequent testing on laboratory tensiometer equipment in accordance with the applicable ASTM standards. Random weld samples may be removed from the installed welded sheeting at a frequency to be agreed (e.g. 1/500' of weld).

4.4 Patching. Minor cuts, rips or tears in panels must be repaired promptly to prevent further damage. Using roll material, patch pieces shall be a minimum of 6 inches larger (in any direction) than the damage panel area. Patches shall have rounded corners with no nicks around the edges. Seaming of patches shall be performed in accordance with paragraph 4.2.2 above.

CONSTRUCTION SPECIFICATIONS

DIVISION 2 - SITE WORK
SECTION 02756
SLIDE RAIL LIFT STATIONS

RECEIVED
JUN 22 1998
MT. DEPT. OF ENV. QUALITY
PERMITTING & COMPLIANCE DIV

1. GENERAL.

The Contractor shall furnish and install one slide rail lift station with concrete wet well and valve vault in accordance with the following specifications and drawings. The stations shall be complete with all needed equipment. The principal items of equipment in the lift station shall include the wet well; two slide rail vertical motor-driven, non-clog sewage pumps; valve vault; valves and internal piping; control panel, including motor starters; timers, automatic pumping control; and internal wiring. The wet well and valve vault shall be constructed in accordance with the drawings and specifications. The lift station equipment shall meet the requirements of the National Electrical Codes for Class I Group D, Division I.

2. APPLICABLE PUBLICATIONS.

The publications listed below form a part of these specifications to the extent referenced. The publications are referred to in the text by the basic designation only.

2.1 American Association of State Highway and Transportation Officials (AASHTO).

AASHTO M-198	Joints for Circular Concrete Sewer and Culvert Pipe Using Flexible Watertight Gaskets
AASHTO T-180	Moisture-Density Relations of Soils Using a 10-16 rammer and an 18 inch drop

2.2 American Society for Testing and Material (ASTM).

ASTM A-36	Specification for Structural Steel
ASTM A-48	Specification for Gray Iron Castings
ASTM A-126	Specification for Gray Iron Casting for Valves, Flanges & Pipe Fittings
ASTM A-276	Specification for Stainless and Heat Resisting Steel Bars and Shapes

APPROVED
Montana Department of
Environmental Quality
Permitting and Compliance Division
M. Estelle 8/31/98
Reviewer Date

2.5 Federal Specification (Fed. Spec.)

Fed. WW-C-563	Conduit, Metal, Rigid; Electrical Thin Wall Steel Type (Electrical Metallic Tubing); Straight Lengths, Elbows and Bends
Fed. WW-C-566	Conduit, Metal, Flexible

2.6 National Electrical Code.

2.7 Occupational Safety and Health Administration (OSHA).

Manual 2206	General Industry

2.8 Underwriter's Laboratory (U.L.)

3. MATERIALS.

3.1 Pumps. The Contractor shall furnish and install in the lift station, two totally submersible, explosion-proof, non-clog sewage pumps. Pumps shall be of the slide rail type and shall operate at 1150 rpm on 480 volts, three phase, 60 cycle electrical power. All motors shall have a 1.15 service factor and shall meet NEC requirements for Division 1, Class 1, Group D hazardous locations. The pumps shall be complete with discharge elbow and connection, guide rails, hoist chains and electrical.

The pumps shall be capable of handling raw, unscreened sewage and shall pass a minimum 3 inch spherical solid without plugging. The design shall be such that the pumps will be automatically connected to the discharge piping when lowered into place. The pump shall be easily removable for inspection or service, requiring no bolts, nuts or other fastenings to be removed for this purpose, nor need personnel to enter pump well. Each pump shall be fitted with a stainless steel chain or cable, of adequate strength and length to permit raising the pump for inspection and removal.

3.1.1 Pump Performance Characteristics. Both pumps in the lift station shall have the following performance characteristics when mounted in place on the slide rail system. Leakage losses in the slide rail coupling shall be added to the net required flow specified herein and pump size and performance characteristics adjusted accordingly.

on both ends. The lower guide rail brackets shall be mounted on a cast iron or stainless steel base plate in alignment for proper operation of the system.

A non-sparking single rail system with cast iron type sliding bracket, machined faces and yoke to connect to the discharge is also satisfactory if it can be guided in place without turning or twisting.

A cast iron discharge elbow or connection on the floor of the raw water well will receive the pump when lowered into place. The pump discharge shall be fitted with a machined surface and a seal which shall provide a positive watertight seal for maximum pump system efficiency.

3.1.4 Spare Parts. One complete spare mechanical pump seal and oil for seal chamber shall be furnished for the pumps at each lift station.

3.2 Ductile Iron Pipe. Ductile iron pressure pipe shall conform to the requirements of AWWA C-151, Class 53. Flanged ductile iron pipe shall conform with AWWA C-115, Class 53. All pipe shall be cement lined in conformance with AWWA C-104.

3.2.1 Polyethylene Encasement. Polyethylene encasement for underground ductile iron pipe and fittings shall have minimum 8 mil thickness and shall conform with AWWA C-105.

3.3 Cast Iron and Ductile Iron Pipe Fittings. Cast iron and ductile iron pipe fittings shall conform to the requirements of AWWA C-110.

3.4 Plug Valves. Plug valves shall be threaded or flanged, lubricated semi-steel castings exceeding the requirements of ASTM A-126, Class B. The valves shall have handwheel gear operators. Flanges shall conform to ANSI B16.1-125 lb. The valves shall be equal to Homestead Ball-Centric, Dresser Style "800", or DeZurik Series 100 eccentric plug valves. The valves shall have welded nickel seats, lubricated or permanently lubricated, corrosion resistant bearings and replaceable and adjustable packing and an epoxy coated exterior even though these specific items may not be a standard of all manufacturer's listed above.

3.5 Check Valves. Swing check valves, 4 inch and larger, shall conform to AWWA C-508. Check valves shall be bronze trimmed with bronze seats and seating surfaces and stainless steel or bronze hinge pin ends shall be flanged, Class 125. The body and cap shall be cast iron conforming to ASTM A-126. The body shall be designed to provide ample flow area and not allow the disc to stick in the open position. Tapped openings in each of two bosses on the body shall be provided along with lever and weight. The unused tap shall be plugged.

3.6 Controls. The control panel shall include the following equipment and control features. All provisions and requirements in Division 16 shall also apply. The Contractor shall provide a detailed control diagram with all devices, terminal strips, and wire color coding identified. This

3.6.6 Circuit Breakers. A thermal magnetic molded case industrial type circuit breaker shall be supplied as branch circuit protection for each pump motor. The circuit breaker must have a minimum ampere interrupting capacity of (10,000) symmetrical RMS amps.

3.6.7 Motor Starters. A NEMA rated full-voltage across the line magnetic motor starter with ambient-compensated, quick-trip Class 10 overload sensing in each phase to provide over current and running protection shall be provided for each pump motor. Over current protection shall be provided by accurately sized replaceable heater elements. Units requiring replacement of the complete overload block to match motor current are not acceptable. Inner door mounted overload reset pushbuttons shall be provided.

3.6.8 Ground Fault Interrupters. Three phase and single phase ground fault interrupters, as appropriate, shall be provided for each pump in accordance with NEC, UL, NEMA, IEEE and local codes and ordinances. The GFI unit shall operate an internal relay to lockout the pump until manually reset without the need for external control power. An indicator and test circuit shall be provided for each GFI unit.

3.6.9 Selector Switch. A 1-3/16" diameter "hand-off-auto" 3-position, rotary, oil tight, heavy duty type selector switch shall be furnished for each pump.

3.6.10 Switches and Running Lights. One inch diameter oil tight dim-glow type pilot light operated from a respective starter auxiliary contact, shall be provided to indicate a "pump running" condition for each pump. The pilot light shall have a replaceable screw-base bulb.

3.6.11 Control Circuit Breaker. A control power circuit breaker shall be provided and operable through the inner door of the control panel to provide a disconnect means and short circuit protection for any 120 VAC (or less) devices not powered from motor starter circuits.

3.6.12 Condensation Heater. A 100 watt screw base 120 VAC condensation heater/receptacle and adjustable thermoswitch shall be supplied in the control panel.

3.6.13 Running Time Meter. A running time meter measuring hours and tenths of hours of operation up to 99999.9 hours shall be furnished for each pump. This shall be a 120 volt AC device operating from the control voltage by an auxiliary contact of the motor starter.

3.6.14 Pump Controller/Alternator. The lead/lag pump shall automatically alternate with each pump cycle. The two pump controller/alternator shall have four three-position sensor operation simulation test switches (closed-open-auto) and float operation indicating LEDs, solid state alternation logic, lead pump alternation on successive starts, alternator override switch (auto, 2-1, 1-2) high alarm and pump control output load relays. The controller shall provide independent ON and OFF pump control with non-differential or optional differential alarm operation tying turn-off to bottom sensor. Sensor simulation switches, LEDs and alternator switch override to

f. Use of lag pump. Alarm circuit is activated when two pumps operate simultaneously.

3.6.16.2 Automatic Dialer. The automatic dialer shall be a Microtel Model MCS Automatic Dialing Alarm Monitor with eight alarm conditions or equal. The unit shall give a descriptive alarm message selected from a 100 word vocabulary common to wastewater pumping stations. The unit shall call up to eight (8) numbers sequentially if not answered. The unit shall have an internal speaker phone and an intercom mode. The operator shall be able to place telephone calls through the dialer system. The number of rings shall be programmable from 2 to 8 and the acknowledged intercall delay shall be programmable from one to 99 hours. The unit shall be in a NEMA fiberglass box having stainless steel hardware and gasketing. The unit shall be capable of being remotely programmed.

3.6.16.3 Emergency Power Supply. The alarm system shall normally be 120 volt AC power but the system shall include a standby power supply with 12 VDC sealed gel cell lead acid battery and trickle charger housed in a separate cabinet. It shall include volt meter power switch and power light. The emergency power supply shall be capable of operating all alarm components a minimum of six continuous hours during utility power failure without recharging.

3.6.16.4 Annunciator Panel. A point light emitting diode (LED) alarm/annunciation module shall be furnished for local indication of system alarm conditions. The module shall be completely solid-state and operate on a nominal voltage of 12 VDC. Individual L.E.D. indicators shall be provided for the specified alarm points.

The red alarm LEDs shall each be not less than ¼" in diameter and shall be viewable through the front identification mylar nameplate on the module.

The module shall be a NEMA 12 door mounted assembly. A computer generated removable legend strip describing each alarm point (with up to three lines of copy, 22 characters per line) shall be inserted behind the translucent mylar nameplate to provide alarm identification adjacent to each respective indicator.

Unpowered alarm input contacts shall be provided. The alarm annunciator module shall be programmable to accept unpowered normally open or closed input contacts.

Each alarm circuit shall be a self contained part of the solid-state alarm annunciation module. Upon the occurrence of an alarm, the appropriate alarm light will go from an unlit state to a flashing mode and the common audible alarm circuit will be energized. After the audible alarm has been silenced (acknowledged), the light shall go to full brilliance and remain there until the alarm condition has cleared. After the alarm has cleared, the alarm light will stay latched on until manually reset.

A 180 degree bend shall be installed on the top end so that the open end points down as shown on the drawings. All support brackets for the ducts or air vent piping shall be stainless steel. All piping above the wet well roof shall be painted as specified in the section for Exterior Metal in Section 09913 .

3.8 Precast Reinforced Concrete Manhole Sections. Precast reinforced concrete manhole sections utilized in wet well and valve vault construction shall conform to ASTM C-478 with rejection requirements strictly enforced. Cement used in construction shall be Type V. Joints shall be preformed rubber gaskets conforming to ASTM C-443 or flexible plastic gaskets conforming to AASHTO M-198. Completed joint assembly shall be watertight. Precast reinforced concrete sections may be square provided (1) the cross sectional interior area is the same as the circular wet well shown on the drawings; (2) the ASTM C-476 rejection requirements are strictly enforced; and (3) the joints are gasketed and water tight.

3.9 Wet Well Access Hatch. The wet well access hatch shall be an aluminum frame and cover assembly. The hatch shall be sized by the Contractor to permit installation and removal of the pumps furnished for this project. The aluminum cover shall be designed to support a weight of 300 pounds per square foot. The cover shall have hinged doors that are torsion bar or spring loaded for ease of lifting and have a safety locking handle to lock the hatch in the open position. Doors shall be checkered aluminum plate and shall have a locking mechanism with removable handle to prevent unauthorized entry. All components and fasteners shall be aluminum or stainless steel. Hatch shall be Bilco Type J or JD or approved equal.

3.10 Valve Vault Access Frame and Cover. The valve vault access frame and cover shall be a frost retardant cast iron ring and cover, Neenah R-1758-F or approved equal. Insulation shall be bonded to the inner cover as shown on the drawings.

3.11 Manhole Steps. Manhole steps for the wet well and valve vault shall be polypropylene encased steel and equal to those by M.A. Industries and shown in the construction standards. Steps shall be a minimum of 12 inches wide, project five inches out from the wall, and be equipped with a non-slip tread and side lugs to prevent slippage. Steps shall be polypropylene encased steel by M.A. Industries, or approved equal.

3.12 Concrete. Concrete for wet well and valve vault manhole bottom and top construction shall have 4000 psi compressive strength and be constructed with Type V cement. Reinforcing steel shall have a 60,000 psi yield strength. Concrete and reinforcing steel shall meet all other requirements as specified in the specification sections for structural concrete.

3.13 Valve Vault Drain Valve. The valve on the valve vault drain line shall be Mueller H-15154 - 2 inch diameter. Extension type curb box shall be Mueller H-10300 for Minneapolis pattern to match curb stop with lid and plug. Depth of bury shall match field requirements - approximately 96-108 inches.

4.5 Wet Well and Valve Vault Construction. The wet well and valve vault shall be constructed at the location shown on the drawings and in accordance with the details shown on the drawings. The completed wet well shall be water tight and shall pass the leakage test.

4.5.1 Wet Well Base. The wet well base shall be formed as shown on the drawings and shall be constructed in one monolithic pour.

4.5.2 Walls. Wet well walls shall be precast concrete manhole sections with manhole steps secured into place. The rubber rings or preformed plastic gaskets used for the manhole joints shall be placed as the wet well sections are being placed.

4.5.3 Covers and Rings. The cast iron ring shall be set in the concrete top as shown on the drawings.

4.5.4 Manhole Steps. Manhole steps shall be placed 12 inches on center beginning at a point 3 feet from the top of the valve vault cover and extend to a point 2 feet from the bottom of the wet well or 1'6" from the bottom of the valve vault. Steps for the wet well vault will begin 12 inches below the concrete cover as shown on the drawings. Steps shall be set plumb and in true alignment. Locate steps for convenient access from hatch.

4.5.5 Joints. Joints for precast concrete manhole sections shall be water tight.

4.5.6 Wet Well Access Hatch. The wet well access hatch frame shall be poured in the concrete slab. The hatch shall be set as recommended by the manufacturer.

4.5.7 Wet Well Leakage Test. The wet well shall be filled with water to a point 6 inches below the gravity sewer inlet pipe. the water level shall be carefully noted. After a 24 hour period without adding additional water, the water level shall again be checked. If the water level has dropped more than one quarter inch, the wet well shall be repaired and tested again for leakage. Repairs and testing will continue until the leakage is less than the maximum permissible amount specified. Repairs and testing will be done at no additional cost to the Owner.

4.6 Electrical Service and Electrical Work. The electrical service and electrical work shall conform to Division 16 of these specifications.

4.6.1 Wiring. Wiring of the station shall be in accordance with the National Electrical Code and the requirements of Division 16: Electrical. All wiring for the station outside the wet well shall be installed in conduit.

All wiring from the control panel to the junction boxes at wet well shall be in oversized conduit. Flexible, synthetic rubber covered, explosion-proof cable shall be utilized to connect the pumps to the motor control center. Double gas tight cord grip conduit seals shall be utilized as shown on the drawings. All conduit and wires shall be adequately sized for the maximum anticipated

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ARTICLE 6
CONSTRUCTION SPECIFICATIONS

6-B - MECHANICAL SEWERAGE TREATMENT

1. General. The contract for this work shall include the furnishing, installing, and placing in service of the plant equipment as is hereinafter specified.

The purpose of the treatment plant shall be to aerate, store and dispose of the sewage by means of percolation into the ground. The system must meet all the requirements of the Montana State Department of Environmental Quality.

1.1 Builder's Responsibilities. The Builders shall furnish all labor, materials, equipment and incidentals necessary and required to install the sewage treatment equipment complete, ready for continuous operation whether or not any particular item is specifically indicated on the drawings or herein. All materials shall be new and both workmanship and materials shall be of good quality.

Mechanical units shall be guaranteed against defects. The manufacturer shall file with the Engineer a certified statement, for each mechanical unit, that in consideration of the purchase of said mechanical units that the manufacturer will, within one year from the date of initial operation of mechanical units, remove and replace at this expense and without charge to the Builder or to the Owner, or his or its assignee piece for piece each mechanical unit or part of unit which shall prove defective within the said year, upon submission or proof of such defect to the manufacturer.

Following the installation of the equipment, the Builder shall arrange to have the units inspected and placed into satisfactory initial operation by a representative of the manufacturer supplying such equipment. Said representative shall supervise the initial operation of the mechanical equipment for such time as required to place the equipment in satisfactory operation. The representative shall instruct the Builder in operation and maintenance of each unit furnished so the Builder will understand the operation in total and the sequence that each unit will perform in.

The Builder shall furnish all necessary oils and grease guns, and shall lubricate the mechanical equipment prior to initial operation. The grade of oil and grease furnished by the Builder shall be in accordance with the recommendation of the equipment manufacturer.

Shop drawings (5 each) shall be submitted for approval on all mechanical equipment including equipment layout where it differs from that specified or shown on the drawings. It is the Builder's responsibility to see that equipment with shop drawing approvals indicating mechanical changes be installed as per the shop drawing approval.

No less than 5 copies of final shop drawings and descriptive information for record shall be furnished to the Engineer for each type of equipment furnished in addition to the drawings

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furnished for approval and installation. Said drawings and information shall fully describe the type of construction materials used, and method of operation of the equipment. Said drawings shall also include any structural modifications required to carry loads if the loading is above those indicated on the plans. Such structural modifications shall be made at no additional cost to the Owner. For equipment being sized by the manufacturer, the manufacturer shall furnish all necessary computations to justify the unit selection.

1.2 Manufacturer's Responsibilities. The equipment manufacturer shall have experience in the design and building of the equipment he proposes to furnish and shall have sufficient qualified technical personnel on the staff to insure adequate servicing and operation control advice. No equipment of an experimental or untried nature will be acceptable.

All equipment to be furnished shall be designed in accordance with acceptable structural design practice and shall be durable. All materials shall be new and both workmanship and materials shall be of a good quality. All motors shall be sized to provide adequate power for the intended application and shall have a maximum of 60° C. rise. Minimum dimensions of structural members and size of motors to be furnished shall be subject to review by the Engineer at the time of submittal of the shop drawings.

1.2.1 Calculations. The manufacturer shall submit calculations with the shop drawings showing oxygen transfer, mixing, and pressure losses in the piping and air supply system. Calculations shall demonstrate that blowers are properly sized for the application.

2. Mixing and Aeration Equipment.

2.1 General. There shall be furnished and installed all materials as specified herein and in accordance with the Contract Documents. The work shall include, but not be limited to, the mixing and aeration devices, brackets, piping, pipe supports, blowers, silencers, air filters, valves and gauges.

2.2 Equipment. Equipment shall be, as shown on drawings, a submerged mixing and aeration system, consisting of fifty (50) mixing and aeration devices. The aeration and mixing devices shall be "Helixor" static tubes, similar to those by Polcon Corporation. Static tubes shall be of copolymer polyproplyene or high density polyethylene construction and shall be stabilized against ultraviolet deterioration with carbon black. The units shall be 12" diameter and approximately 5 feet in length with an interior baffle assembly. Minimum tube wall thickness shall be 0.25 inches. Each baffle shall consist of an elliptical plane molded in place for maximum stability and sloping upward to minimize the possibility of clogging. Baffles shall not be riveted or bolted in place. They must be molded with the exterior shell or fusion welded to the shell.

Air rising inside the vertically aligned static tube shall cause the water to flow upward. The mixture of air and water shall follow a tortuous passage which prolongs the interfacial contact between the air and water. Clean water oxygen transfer efficiency shall not be less than 2.1

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pounds of oxygen per hour per tube at 22 scfm under standard temperature and pressure conditions with a water depth of 10 feet.

Compressed air shall be introduced into the bottom opening of the tube through orifices in the air supply piping. The number and diameter of the orifices is to be determined by the aeration system manufacturer.

2.2.1 Static Tube Support and Base. The static tubes shall be supported with four stainless steel legs mounted to a concrete base as shown on the drawings. Leg thickness, width, and the number and size of fasteners shown on the drawing are the minimum acceptable. Stronger legs and fasteners shall be utilized if recommended by the manufacturer. All stainless steel shall be Type 304 conforming to ASTI A-167 for plate and strip and ASTI F-593 and F-594 for bolts and nuts.

An acceptable option to the four stainless steel legs is the Polcon co-polymer polypropylene mounting bracket that is welded to the tube by a minimum of 10 evenly spaced welds. The mounting bracket can be bolted to the concrete support base with a minimum of two 1/2" stainless steel bolts. Expansion anchors shall not be utilized. Anchor bolts shall be poured in the concrete. The manufacturer's standard polyethylene or polypropylene supports for the air piping can be utilized if the manufacturer can demonstrate to the satisfaction of the Engineer that the supports will not fail due to vibration or other forces.

2.2.1 Submerged Parts. Submerged parts other than mixing and aeration devices and brackets, shall consist of the following:

Piping - shall be polyethylene piping conforming to ASTM D-2239, SDR 17.

Pipe clamps - shall be gear type clamps, hex head screw, all stainless steel, having an appropriate range for various pipe diameters.

Terminal Plugs - shall be manufactured from polyethylene or PVC. They shall have a diameter of not less than 1.625 inches.

Pipe Sinkers - (for sinking and holding the polyethylene pipe in place), shall be pre-cast concrete, as per the detailed drawings, having a weight of not less than 25 lbs. A 3/16" diameter stainless steel rod shall be inserted, providing a U-shaped projection of not less than 1 1/2".

2.3 Installation. The mixing and aeration equipment shall be shipped as follows:

50 - Static tubes, each 6 feet in length, 18" diameter
50 - brackets, and all nuts and bolts required for installation
All necessary polyethylene pipe, all necessary pipe adaptors, pipe clamps, terminal plugs, couplings, and stainless steel inserts for concrete pipe sinkers.

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All mixing and aeration equipment shall be set in place in accordance with the layout drawings and the manufacturer's instructions. The polyethylene pipe shall be connected to the pipe adaptors and secured with two clamps in accordance with the manufacturer's instructions. Polyethylene pipe joints shall be fusion welded.

The Builder shall, after securing polyethylene pipe to laterals, blow-out all air header and laterals clean of any foreign materials or debris. The terminating end of the polyethylene pipe shall then be closed with a plug being secured with two pipe clamps in accordance with the manufacturer's instructions.

The concrete sinkers shall be attached to all polyethylene at 10 foot intervals and secured with one pipe clamp.

The Builder shall, after securing polyethylene pipe to static tube devices, drill orifices in the polyethylene pipe at the location of each static tube, in accordance with the manufacturer's instructions.

3. Aeration Blowers. Two identical blowers shall be furnished and installed to provide air supply for the aeration system. Provisions shall be made in the piping, electrical, and structural for the addition of a third blower in the future. Minimum blower performance characteristics are provided herein. The actual blower air flow and pressure capabilities shall be adjusted as necessary to meet the requirements of the approved aeration system.

3.1 Performance Characteristics. The blowers shall meet the following minimum performance characteristics at a maximum rotational speed of 2100 rpm:

Blower No. 1 . . . . . 660 SCFM at 7 psig
Blower No. 2 . . . . . 660 SCFM at 7 psig

The blowers shall be designed to meet these conditions at an elevation of 4460 feet above mean sea level with air temperatures ranging from -45 degrees to +100 degrees Fahrenheit. The blowers shall be capable of providing continuous operation under these conditions. Air flow production shall be essentially constant from 6.0 to 7.0 psig.

3.2 Construction. Blowers shall be of the positive displacement type with cast or ductile iron impellers, machined cast iron cases that are heavily ribbed to prevent distortion; headplates that are machined from cast iron and ground on the interior surface to exact tolerances; bearing shall be single or double row ball bearings; timing gears are to be accurately cut from alloy steel; gears shall be splash oil lubricated in an oiltight housing; seals shall prevent entrance of oil into the impeller chamber; and bearings shall be grease lubricated with external accessible grease fittings. Rotating elements shall be dynamically balanced.

The driver and blower shall be mounted on a common steel frame. Belts shall be conservatively

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sized to transmit the full motor horsepower with slippage. Steel guards shall enclose all operating shafts, belts, and pulleys. Blowers shall be Roots Whispair by Dresser Industries, Sutorbilt by Gardner Denver, or equal.

3.3 Motors. Motors for the blowers shall be of the part winding type suitable for part winding starting. Motors shall be 480 volt, 3 phase, 60 Hz. Motors shall be designed for continuous operation and sized adequately large to drive the blower at its rated capacity under air inlet temperature conditions ranging from -45 degrees to +100 degrees Fahrenheit. Motors shall be able to meet all load demands with an ambient air temperature around the motor of 120 degrees Fahrenheit. Motors shall be manufactured in the United States.

3.4 Tests. Each blower shall be factory tested to assure conformance to the specified conditions. The blowers shall not deviate more than 3% from the rated conditions. Certified test data shall be furnished to the Engineer and Owner prior to final acceptance of the blowers.

3.5 Air Intake Filters. A separate air intake filter shall be provided with each filter. Each intake filter shall be adequately sized to provide 850 cfm of dust free process air at a maximum pressure loss of 1.5 inches of water column through the clean filter. The dust size removal efficiency shall match the requirement of the blower manufacturer. The filter can utilize either washable re-usable filter elements or disposable elements. If disposable element filters are supplied, forty spare filter elements must be supplied with the units. Six spare washable filter elements must be supplied with a re-useable filter system. The filter enclosures must be mounted on the intake pipe flanges as shown on the drawings. A weather proof housing must protect the air intake and filter against wind driven rain and snow when operating at 850 cfm. The housings shall be galvanized or painted steel construction and shall permit easy removal and replacement of the filter element.

3.6 Intake and Discharge Silencers. Each blower shall be equipped with a steel-bodied silencer or mute on the intake and the discharge sides of the blower. The configuration of the mutes shall be as shown on the drawings and shall be sized appropriately for the air flow and sound reduction. Each mute shall provide a 31 decibel insertion loss per octave band centered on a frequency of 1000 Hz. The manufacturer shall certify this sound reduction. The mutes shall be designed to withstand 15 psig internal pressure.

3.7 Pressure Relief and Unloading Valves. The discharge of each blower shall be equipped with a pressure relief and unloading valve. The valve shall use a weight system that can be changed to adjust the relief pressure. The system shall be initially set for 8.0 psig.

3.8 Air System Control Valves. Air system control valves shall be bubble tight in the closed position at the rated pressure and shall be satisfactory for modulation on-off and/or throttling service. Valves shall be butterfly valves with flanged ends. Butterfly valve bodies shall be cast iron. Discs shall be cast iron with nickel chrome edge. Valve shafts shall be 316 stainless steel with self-adjusting packing or seals. Valve seats shall be EPDM or equal rated for 250 degree Fahrenheit and be molded in, vulcanized and bonded to the body. Valve bearings shall be sleeve-

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type, corrosion resistant and self-lubricating.

Manual operators shall have a minimum 10-position lock feature designed to hold the valve in any intermediate position without creeping or fluttering. Stop limiting devices shall prevent over-travel of the disc in the open and closed position.

Valves shall have a minimum pressure rating of 150 psi. Valves shall be equal to Henry Pratt Company, Model 2FII.

3.9 Aeration System Check Valves. Double door check valves similar to APCO or VALMATIC with cast iron body, aluminum bronze discs, 316 stainless steel light torsion spring, hinge pin, and thrust bearing and steel hinge retainers shall be installed. Seat shall be BUNA-N molded to body and suitable for temperatures to 225 degrees Fahrenheit.

3.10 Pressure Gauges. Pressure gauges shall be of the bourdon tube type and shall be equipped with snubbers. All gauges shall read in both feet of water and psi and shall have a minimum dial size of 3.0 inches in diameter. Gauge scales shall match the actual application pressure range.

3.11 Installation.

3.11.1 Blowers. Blowers shall be installed in strict accordance with the manufacturer's recommendations. The blower steel bases shall be securely bolted to concrete bases and grouted to provide uniform support. The blowers shall operate without excessive vibration. Piping connections to the blowers shall be made of flexible rubber couplings as indicated on the drawings. Couplings shall be designed for the temperature and pressure at the blower discharge.

2.11.2 Aeration Equipment. All static tubes, piping, valves, filters and silencers shall be installed as shown on the drawings and as recommended by the manufacturer.

Static tube aerators and aeration piping supports shall be carefully placed on the liner. An extra layer of liner shall be placed between the liner and the concrete support base. No construction equipment shall be allowed on the liner that might puncture or damage it in any manner. Workman shall utilize great care at all times not to damage the liner. If damage does occur, it shall be immediately repaired as recommended by the liner manufacturer. Static tubes and air line support bases shall bear uniformly on the support material and have no sharp edges or points that may damage the liner. Static tubes and pipe supports shall be set true and plumb.

All penetrations of the liner shall be made and sealed as detailed on the drawings and recommended by the liner manufacturer.

3.11.3 Aeration Piping. Piping shall be run true and straight and shall be either vertical or horizontal as shown on the drawings. Pipe supports shall be fabricated and placed beneath the piping where indicated on the drawings and at all additional points necessary to adequately support

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the pipe and prevent movement from all possible internal and external forces. All bolts, nuts, gaskets, and other appurtenances necessary to complete all connections shall be provided and installed. All portions of the steel piping and all valves, pipe supports, and other appurtenances shall be painted in accordance with Article 7-B. All piping shall be blown clean of all internal debris and dirt before end plugs or seals are installed on the lines. Each line shall be approved by the Engineers representative before the lines are sealed.

3.12 Pressure Testing Air Piping. All air piping shall be pressure tested and approved. Air laterals to static tubes in the aeration basin shall be pressure tested before holes are drilled to supply air to the static tubes. The pressure test shall be done as follows.

- Leave all joints exposed
- Pressurize the line to 30 psig
- Soap all joints and observe for air leaks
- Seal leaks and retest as necessary until no leaks exist

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