STATE OF MISSOURI

DEPARTMENT OF NATURAL RESOURCES

MISSOURI CLEAN WATER COMMISSION

CONSTRUCTION PERMIT

The Missouri Department of Natural Resources hereby issues a permit to:

Saline County Commission
Highway 65/ I-70
Marshall Junction, MO 65340

for the construction of (described facilities):

See attached.

Permit Conditions:

See attached.

Construction of such proposed facilities shall be in accordance with the provisions of the Missouri Clean Water Law, Chapter 644, RSMo, and regulation promulgated thereunder, or this permit may be revoked by the Department of Natural Resources (department).

As the department does not examine structural features of design or the efficiency of mechanical equipment, the issuance of this permit does not include approval of these features.

A representative of the department may inspect the work covered by this permit during construction. Issuance of a permit to operate by the department will be contingent on the work substantially adhering to the approved plans and specifications.

This permit applies only to the construction of water pollution control components; it does not apply to other environmentally regulated areas.

July 18, 2025
Effective Date

July 17, 2027
Expiration Date

John Hoke, Director, Water Protection Program

CONSTRUCTION PERMIT

I. CONSTRUCTION DESCRIPTION

The proposed project includes the construction of a gravity sewer collection system, a pump station and force main located southeast of the Interstate 70 and U.S. Route 65 intersection, and a new wastewater treatment facility (WWTF) located 0.65 miles east from the intersection and south of I-70. Wastewater flow generated at the southeast quadrant will be directed to the proposed WWTF. The WWTF has a design average flow of 50,000 gallons per day (gpd), has a peak flow of 6,250 gallons per hour (gph), and serves a hydraulic population equivalent of approximately 500 people. The WWTF would include an influent bar screen, an aerated two-cell lagoon system, a submerged attached growth reactor (SAGR), a chlorination/dechlorination system, and an effluent headwall outfall. Sludge will be stored in the lagoon system.

This project will also include general site work appropriate to the scope and purpose of the project and all necessary appurtenances to make a complete and usable wastewater treatment facility.

II. COST ANALYSIS FOR COMPLIANCE

Pursuant to Section 644.145, RSMo, when issuing permits under this chapter that incorporate a new requirement for discharges from publicly owned combined or separate sanitary or storm sewer systems or publicly owned treatment works, or when enforcing provisions of this chapter or the Federal Water Pollution Control Act, 33 U.S.C. 1251 et seq., pertaining to any portion of a publicly owned combined or separate sanitary or storm sewer system or [publicly owned] treatment works, the Department of Natural Resources shall make a "finding of affordability" on the costs to be incurred and the impact of any rate changes on ratepayers upon which to base such permits and decisions, to the extent allowable under this chapter and the Federal Water Pollution Control Act. This process is completed through a cost analysis for compliance. Permits that do not include new requirements may be deemed affordable.

The department is not required to determine Cost Analysis for Compliance because the at the present time, there is no residential homes in the area, nor are planned for the near future.

III. CONSTRUCTION PERMIT CONDITIONS

The permittee is authorized to construct subject to the following conditions:

1. This construction permit does not authorize discharge.

2. All construction shall be consistent with plans and specifications signed and sealed by Andrew Novinger P.E., and Morgan Neal P.E., and as described in this permit.

3. The department must be contacted in writing prior to making any changes to the plans and specifications that would directly or indirectly have an impact on the capacity, flow, system layout, or reliability of the proposed wastewater treatment facilities or any design parameter that is addressed by 10 CSR 20-8, in accordance with 10 CSR 20-8.110(11).

4. State and federal law does not permit bypassing of raw wastewater; therefore, steps must be taken to ensure that raw wastewater does not discharge during construction. If a sanitary sewer overflow or bypass occurs, report the appropriate information to the department's Northeast Regional Office per 10 CSR 20-7.015(9)(G).

5. In addition to the requirements for a construction permit, 10 CSR 20-6.200 requires land disturbance activities of one acre or more to obtain a Missouri state operating permit to discharge stormwater. The permit requires best management practices sufficient to control runoff and sedimentation to protect waters of the state. Land disturbance permits will only be obtained by means of the department's ePermitting system available online at https://dnr.mo.gov/data-e-services/missouri-gateway-environmental-management-mogem. See https://dnr.mo.gov/data-e-services/water/electronic-permitting-epermitting for more information.

6. A United States Army Corps of Engineers (USACE) Clean Water Act Section 404 Department of the Army permit and a Section 401 Water Quality Certification issued by the department may be required for the activities described in this permit. This permit is not valid until these requirements are satisfied or notification is provided that no Section 404 permit is required by the USACE. You must contact your local USACE district since they determine what waters are jurisdictional and which permitting requirements may apply. You may call the department's Water Protection Program, Operating Permits Section at 573-522-4502 for more information. See https://dnr.mo.gov/water/business-industry-other-entities/permits-certification-engineering-fees/section-401-water-quality for more information.

7. All construction must adhere to applicable 10 CSR 20-8 (Chapter 8) requirements listed below.

- Vacuum testing, if specified for concrete sewer manholes, shall conform to the test procedures in ASTM C1244 – 11(2017) *Standard Test Method for Concrete Sewer Manholes by the Negative Air Pressure (Vacuum) Test Prior to Backfill*, as approved and published April 1, 2017, or the manufacturer's recommendation. 10 CSR 20-8.120(4)(F)1

- Exfiltration testing, if specified for concrete sewer manholes, shall conform to the test procedures in ASTM C969 – 17 *Standard Practice for Infiltration and Exfiltration Acceptance Testing of Installed Precast Concrete Pipe Sewer Lines*, as approved and published April 1, 2017. 10 CSR 20-8.120(4)(F)2

- Flood protection shall apply to new construction and to existing facilities undergoing major modification. The wastewater facility structures, electrical equipment, and mechanical equipment shall be protected from physical damage by not less than the 100-year flood elevation. 10 CSR 20-8.140(2)(B), 10 CSR 20-8.130(2)(A)

- Facilities shall be readily accessible by authorized personnel from a public right–of-way at all times. 10 CSR 20-8.140(2)(D), 10 CSR 20-8.130(2)(B)

- Adequate provisions shall be made to effectively protect facility personnel and visitors from hazards. The following shall be provided to fulfill the particular needs of each wastewater treatment facility: 10 CSR 20-8.130(2)(C)

    - Fencing. Enclose the facility site with a fence designed to discourage the entrance of unauthorized persons and animals; 10 CSR 20-8.140(8)(A)
    - Gratings over appropriate areas of treatment units where access for maintenance is necessary; 10 CSR 20-8.140(8)(B)
    - First aid equipment; 10 CSR 20-8.140(8)(C)
    - Posted "No Smoking" signs in hazardous areas; 10 CSR 20-8.140(8)(D)
    - Appropriate personal protective equipment (PPE); 10 CSR 20-8.140(8)(E)
    - 10 CSR 20-8.140(8)(G) Portable lighting equipment complying with NEC requirements. See subsection (7)(B) of this rule;
    - Appropriately-placed warning signs for slippery areas, non-potable water fixtures (see subparagraph (7)(D)3.B. of this rule), low head clearance areas, open service manholes, hazardous chemical storage areas, flammable fuel storage areas, high noise areas, etc.; 10 CSR 20-8.140(8)(I)
    - Provisions for local lockout/tagout on stop motor controls and other devices; 10 CSR 20-8.140(8)(L)
    - Provisions for an arc flash hazard analysis and determination of the flash protection boundary distance and type of PPE to reduce exposure to major electrical hazards shall be in accordance with NFPA 70E *Standard for Electrical Safety in the Workplace* (2018 Edition), as approved and published August 21, 2017. 10 CSR 20-8.140(8)(M)

- The distance between wastewater pumping stations and all potable water sources shall be at least 50 feet in accordance with 10 CSR 23-3.010(1)(B). 10 CSR 20-8.130(2)(D)

- Multiple pumps shall be provided for each pumping station except for design average flows of less than 1,500 gpd. 10 CSR 20-8.130(4)(B) 1

- Electrical equipment. Electrical equipment shall be provided with the following requirements:

    - 10 CSR 20-8.130(3)(B)2.A. Electrical equipment must comply with 10 CSR 20-8.140(7)(B);
    - Utilize corrosive resistant equipment located in the wet well; 10 CSR 20-8.130(3)(B)2.B.

  - Provide a watertight seal and separate strain relief for all flexible cable; 10 CSR 20-8.130(3)(B)2.C.
  - Install a fused disconnect switch located above ground for the main power feed for all pumping stations. 10 CSR 20-8.130(3)(B)2.D.
  - When such equipment is exposed to weather, it shall comply with the requirements of weatherproof equipment; enclosure NEMA 4; NEMA 4X where necessary; and *NEMA Standard 250-2014*, published December 15, 2014. 10 CSR 20-8.130(3)(B)2.E.
  - Install lightning and surge protection systems; 10 CSR 20-8.130(3)(B)2.F.
  - Install a one hundred ten volt (110 V) power receptacle inside the control panel located outdoors to facilitate maintenance; 10 CSR 20-8.130(3)(B)2.G.
  - Provide Ground Fault Circuit Interruption (GFCI) protection for all outdoor receptacles. 10 CSR 20-8.130(3)(B)2.H.

- Water level controls must be accessible without entering the wet well. 10 CSR 20-8.130(4)(C)

- Valves shall not be located in the wet well unless integral to a pump or its housing. 10 CSR 20-8.130(4)(D)

- Covered wet wells shall have provisions for air displacement to the atmosphere, such as an inverted and screened "j" tube or other means. 10 CSR 20-8.130(4)(E)

- There shall be no physical connection between any potable water supply and a wastewater pumping station, which under any conditions, might cause contamination of the potable water supply. If a potable water supply is brought to the station, no piping or other connections shall exist in any part of the wastewater treatment facility that might cause the contamination of a potable water supply. 10 CSR 20-8.130(4)(G)

  - Where a potable water supply is to be used for any purpose in a wastewater treatment facility other than direct connections, a break tank, pressure pump, and pressure tank or a reduced pressure backflow preventer consistent with the department's Public Drinking Water Branch shall be provided. 10 CSR 20-8.140 (7)(D)3.A.
  - For indirect connections, a sign shall be permanently posted at every hose bib, faucet, hydrant, or sill cock located on the water system beyond the break tank or backflow preventer to indicate that the water is not safe for drinking. 10 CSR 20-8.140(7)(D)3.B
  - Where a separate non-potable water supply is to be provided, a break tank will not be necessary, but all system outlets shall be posted with a permanent sign indicating the water is not safe for drinking. 10 CSR 20-8.140(7)(D)4

- 10 CSR 20-8.130(5)(C) Wet well access shall not be through the equipment compartment.

- Flood protection shall apply to new construction and to existing facilities undergoing major modification. The wastewater facility structures, electrical equipment, and

mechanical equipment shall be protected from physical damage by not less than the 100-year flood elevation. 10 CSR 20-8.140(2)(B), 10 CSR 20-8.130 (3) (A)

- Facilities shall be readily accessible by authorized personnel from a public right–of-way at all times. 10 CSR 20-8.140(2)(D), 10 CSR 20-8.130(3)(B)

- Submersible pump stations shall meet the applicable requirements under section (3) of this rule, except as modified in this section. 10 CSR 20-8.130(6)
    - Pump Removal. Submersible pumps shall be readily removable and replaceable without personnel entering, dewatering, or disconnecting any piping in the wet well. 10 CSR 20-8.130(6)(A)
    - 10 CSR 20-8.130(6)(B) Valve Chamber and Valves. Valves required under subsection (4)(D) of this rule shall be located in a separate valve chamber.
    - A minimum access hatch dimensions of 24 inches by 36 inches shall be provided. 10 CSR 20-8.130(6)(B)1

- A portable pump connection on the discharge line with rapid connection capabilities shall be provided. 10 CSR 20-8.130(6)(B)2

- Alarm systems with an uninterrupted power source shall be provided for pumping stations. 10 CSR 20-8.130(7)

- Emergency Operation. Pumping stations shall be capable of operating during emergencies to prevent the discharge of raw wastewater. In addition to the required emergency means of operation and a storage/detention basin or tank, at least one of the following shall be provided. 10 CSR 20 8.130 (8)

    - For a pump station serving a wastewater treatment facility with a design average flow of 100,000 gpd or greater, a storage capacity for 2- hour retention of the peak hourly flow;

    - (B) For a pump station serving a wastewater treatment facility with a design average flow of less than 100,000 gallons per day, a storage capacity for 4- hour retention of the peak hourly flow; or

    - (C) With sufficient engineering justification, designers may propose an alternative method to address emergency operations. At a minimum, this includes a reasonable amount of retention along with a dedicated generator of sufficient capacity capable of automatic start-up during power outages.

  All emergency equipment must be designed such that its operations can be tested on a regular schedule. Where independent electrical feeds are used for emergency power, each separate electrical feed shall be capable of starting and operating the pump station at its rated capacity.

- Force main system shall be designed to withstand all pressures (including water hammer and associated cyclic reversal of stresses), and maintain a velocity of at least two feet per second. 10 CSR 20-8.130(9)(A)

- Unless another distance is determined by the Missouri Geological Survey or by the department's Public Drinking Water Branch, the minimum distance between wastewater treatment facilities and all potable water sources shall be at least 300 feet. 10 CSR 20-8.140(2)(C)1

- The outfall shall be so constructed and protected against the effects of flood water, ice, or other hazards as to reasonably ensure its structural stability and freedom from stoppage. 10 CSR 20-8.140(6)(A)

- All sampling points shall be designed so that a representative and discrete 24 hour automatic composite sample or grab sample of the effluent discharge can be obtained at a point after the final treatment process and before discharge to or mixing with the receiving waters. 10 CSR 20-8.140(6)(B)

- All outfalls shall be posted with a permanent sign indicating the outfall number (i.e., Outfall #001). 10 CSR 20-8.140(6)(C)

- All wastewater treatment facilities shall be provided with an alternate source of electric power or pumping capability to allow continuity of operation during power failures. 10 CSR 20-8.140(7)(A)1

- Disinfection and dechlorination, when used, shall be provided during all power outages. 10 CSR 20-8.140(7)(A)2

- No piping or other connections shall exist in any part of the wastewater treatment facility that might cause the contamination of a potable water supply. 10 CSR 20-8.140(7)(D)1

- Where a potable water supply is to be used for any purpose in a wastewater treatment facility other than direct connections, a break tank, pressure pump, and pressure tank or a reduced pressure backflow preventer consistent with the department's Public Drinking Water Branch shall be provided. 10 CSR 20-8.140(7)(D)3.A

- For indirect connections, a sign shall be permanently posted at every hose bib, faucet, hydrant, or sill cock located on the water system beyond the break tank or backflow preventer to indicate that the water is not safe for drinking. 10 CSR 20-8.140(7)(D)3.B

- Where a separate non-potable water supply is to be provided, a break tank will not be necessary, but all system outlets shall be posted with a permanent sign indicating the water is not safe for drinking. 10 CSR 20-8.140(7)(D)4.

- A means of flow measurement shall be provided at all wastewater treatment facilities. 10 CSR 20-8.140(7)(E)

- Isolate all wastewater treatment components installed in a building where other equipment or offices are located from the rest of the building by an air-tight partition, provide separate outside entrances, and provide separate and independent fresh air supply. 10 CSR 20-8.140(7)(G)

- The materials utilized for storage, piping, valves, pumping, metering, and splash guards, etc., for chemical handling, shall be specially selected considering the physical and chemical characteristics of each hazardous or corrosive chemical. 10 CSR 20-8.140(9)(A)1

- The following shall be provided to fulfill the particular needs of each chemical housing facility:
    - Provide storage for a minimum of 30 days' supply, unless local suppliers and conditions indicate that such storage can be reduced without limiting the supply: 10 CSR 20-8.140(9(B) 1
    - Construct the chemical storage room of fire and corrosion resistant material; 10 CSR 20-8.140(9)(B)2
    - Equip doors with panic hardware. To prevent unauthorized access, doors lock but do not need a key to exit the locked room using the panic hardware; 10 CSR 20-8.140(9)(B)3
    - Provide chemical storage areas with drains, sumps, finished water plumbing, and the hose bibs and hoses necessary to clean up spills and to wash equipment; 10 CSR 20-8.140(9)(B)4
    - Construct chemical storage area floors and walls of material that is suitable to the chemicals being stored and that is capable of being cleaned; 10 CSR 20-8.140(9)(B)5
    - Install floor surfaces to be smooth, chemical resistant, slip resistant, and well drained with three inches per ten feet (3"/10') minimum slope; 10 CSR 20-8.140(9)(B)6
    - Provide adequate lighting; 10 CSR 20-8.140(9)(B)7
    - Comply with the NEC recommendation for lighting and electrical equipment based on the chemicals stored. 10 CSR 20-8.140(9)(B)8
    - Store chemical containers in a cool, dry, and well-ventilated area; 10 CSR 20-8.140(9)(B)9
    - Design vents from feeders, storage facilities, and equipment exhaust to discharge to the outside atmosphere above grade and remote from air intakes; 10 CSR 20-8.140(9)(B)10
    - Locate storage area for chemical containers out of direct sunlight; 10 CSR 20-8.140(9)(B)11
    - Maintain storage temperatures in accordance with relevant Safety Data Sheets (SDS). 10 CSR 20-8.140(9)(B)12
    - Control humidity as necessary when storing dry chemicals; 10 CSR 20-8.140(9)(B)13
    - Design the storage area with designated areas for "full" and "empty" chemical containers; 10 CSR 20-8.140(9)(B)14
    - Store incompatible chemicals separately to ensure the safety of facility personnel and the wastewater treatment system. Store any two (2) chemicals that can react to form a toxic gas in separate housing facilities; 10 CSR 20-8.140(9)(B)16

- The following shall be provided, where applicable, for the design of chemical handling:
    - Provide a minimum of two chemical feeders for continuous operability. Provide a standby unit or combination of units of sufficient capacity to replace the largest unit out-of-service; 10 CSR 20-8.140(9)(C)5
    - Chemical feeders shall—
        - Be designed with chemical feed equipment to meet the maximum dosage requirements for the design average flow conditions; 10 CSR 20-8.140(9)(C)6.A.
        - Be able to supply, at all times, the necessary amounts of chemicals at an accurate rate throughout the range of feed; 10 CSR 20-8.140(9)(C)6.B.
        - Provide proportioning of chemical feed to the rate of flow where the flow rate is not constant; 10 CSR 20-8.140(9)(C)6.C.
        - Be designed to be readily accessible for servicing, repair, and observation; 10 CSR 20-8.140(9)(C)6.D
        - Protect the entire feeder system against freezing; 10 CSR 20-8.140(9)(C)6.E.
        - Be located adjacent to points of application to minimize length of feed lines; 10 CSR 20-8.140(9)(C)6.F
        - Provide for both automatic and manual operation for chemical feed control systems; 10 CSR 20-8.140(9)(C)6.G.

- The following chemical safety items shall be provided in addition to the safety provisions in section (8) of this rule:
    - Appropriate personal protective equipment (PPE). 10 CSR 20-8.140(9)(D)1
    - Eye wash fountains and safety showers utilizing potable water shall be provided in the laboratory and on each level or work location involving hazardous or corrosive chemical storage, mixing (or slaking), pumping, metering, or transportation unloading. The design of eye wash fountains and safety showers shall include the following:
        - Eye wash fountains with water of moderate temperature, 50 degrees to 90 degrees Fahrenheit (°F), suitable to provide 15 to 30 minutes of continuous irrigation of the eyes; 10 CSR 20-8.140(9) (D)2.A
        - Eye wash fountains and emergency showers located no more than 25 feet from points of hazardous chemical exposure; CSR 20-8.140 (9)(D)2.C.
        - Eye wash fountains and showers that are to be fully operable during all weather conditions; 10 CSR 20-8.140(9)(D)2.D
    - Warning signs requiring use of goggles shall be located near chemical stations, pumps, and other points of frequent hazard. 10 CSR 20-8.140(9)(D)3

- The identification and hazard warning data included on chemical shipping containers, when received, shall appear on all containers (regardless of size or type) used to store, carry, or use a hazardous substance. 10 CSR 20-8.140(9)(E)

- All wastewater treatment facilities must have a screening device, comminutor, or septic tank for the purpose of removing debris and nuisance materials from the influent wastewater. 10 CSR 20-8.150(2)

- Grease interceptors shall be provided on kitchen drain lines from institutions, hospitals, hotels, restaurants, schools, bars, cafeterias, clubs, and other establishments from which relatively large amounts of grease may be discharged to a wastewater treatment facility owned by the grease producing entity. Grease interceptors are typically constructed from fiberglass reinforced polyester, high density polyethylene (HDPE), or concrete. For corrugated HDPE grease interceptors, follow ASTM F2649 – 14 *Standard Specification for Corrugated High Density Polyethylene (HDPE) Grease Interceptor Tanks*, as approved and published September 1, 2014. For precast concrete grease interceptor tanks, follow ASTM C1613 – 17 *Standard Specification for Precast Concrete Grease Interceptor Tanks*, as approved and published September 1, 2017. 10 CSR 20-8.150(3)

- All screening devices and screening storage areas shall be protected from freezing. 10 CSR 20-8.150(4)(A)1

- Provisions shall be made for isolating or removing screening devices from their location for servicing. 10 CSR 20-8.150(4)(A)2

- Manually cleaned screen channels shall be protected by guard railings and deck gratings with adequate provisions for removal or opening to facilitate raking. 10 CSR 20-8.150(4)(A)3.A.(I)

- Provisions for location and safety of comminutors shall be in accordance with screening devices,
    - Manually cleaned channels shall be protected by guard railings and deck gratings with adequate provisions for removal or opening to facilitate raking. 10 CSR 20-8.150(4)(A)3.A.(I)

- The media is any of a number of physical structures whose sole purpose is to provide a surface to support biological growth. Commonly used media includes rock, gravel, and sand of various sizes, textile media, and peat. Finely crushed limestone, dolomite, slag, any clay, limestone, or appreciable amounts of organic material is not acceptable. 10 CSR 20-8.180(3)(E)

- Emergency Power. Disinfection and dechlorination processes, when used, shall be provided during all power outages. 10 CSR 20-8.190(2)(A)

- Contact period for Chlorine Disinfection. A minimum contact period of 15 minutes at design peak hourly flow or maximum rate of pumpage shall be provided after thorough mixing. 10 CSR 20-8.190(3)(A)

- Solid dechlorination systems shall not be located in the chlorine contact tank. 10 CSR 20-8.190(4)(B)1

- Contact time. A minimum of 30 seconds for mixing and contact time of dechlorination systems shall be provided at the design peak hourly flow or maximum rate of pumpage. 10 CSR 20-8.190(4)(B)2

- Aerated lagoons shall be capable of maintaining the design level of dissolved oxygen within a particular cell with one unit in the cell out of service. 10 CSR 20-8.200(3)(A)2.A

- Aerated lagoons shall be capable of maintaining a minimum dissolved oxygen level of two milligrams per liter (2 mg/L) in the lagoon at all times. 10 CSR 20-8.200(3)(A)2.B

- Aerated lagoons shall be capable of delivering one and four tenths pounds of oxygen per pound of biochemical oxygen demand removed (1.4 lbs O_2/1 lb NH_3). 10 CSR 20-8.200(3)(A)2.C

- Aerated lagoons shall be capable of delivering an additional four and six tenths pounds of oxygen per pound of ammonia nitrogen removal (4.6 lbs O_2/1 lb NH_3). 10 CSR 20-8.200(3)(A)2.D

- Lagoon berms shall be constructed of relatively impervious material and compacted to at least 95 percent maximum dry density test method to form a stable structure. 10 CSR 20-8.200(4)(A)1

- The minimum berm width shall be eight feet to permit access of maintenance vehicles. 10 CSR 20-8.200(4)(A)2

- Minimum freeboard shall be two feet. 10 CSR 20-8.200(4)(A)3

- An emergency spillway shall be provided that—
    - Prevents the overtopping and cutting of berms; 10 CSR 20-8.200(4)(A)4.A.
    - Is compacted and vegetated or otherwise constructed to prevent erosion; 10 CSR 20-8.200(4)(A)4.B. and
    - Has the ability for a representative sample to be collected, if discharging. 10 CSR 20-8.200(4)(A)4.C

- The soil of the lagoon bottom shall be compacted with the moisture content between 2 percent below and 4 percent above the optimum water content and compacted to at least 95 percent maximum dry density test method. 10 CSR 20-8.200(4)(B)

- The lagoon shall be sealed to ensure that seepage loss is as low as possible and has a design permeability not exceeding 1.0 x 10^{-7} cm/sec. 10 CSR 20-8.200(4)(C)1

- The minimum thickness of the compacted clay liner must be 12 inches. For permeability coefficients greater than 1.0×10^{-7} cm/sec or for heads over 5 feet such as an aerated lagoon system, the following formula shall be used to determine minimum seal thickness, Equation 200-1 per 10 CSR 20-8.200(4)(C)2.:

    Equation 200-1

$$t = \frac{H \times K}{5.4 \times 10^{-7\ \text{cm/sec}}}$$

    where:
    K = the permeability coefficient of the soil in question;
    H = the head of water in the lagoon; and
    t = the thickness of the soil seal.

- Seep collars shall be provided on drainpipes where they pass through the lagoon seal. 10 CSR 20-8.200(4)(C)4

- Unlined corrugated metal pipe shall not be used for influent lines due to corrosion problems. 10 CSR 20-8.200(4)(D)1

- A manhole shall be installed with its invert at least six inches above the maximum operating level of the lagoon, prior to the entrance into the primary cell, and provide sufficient hydraulic head without surcharging the manhole. 10 CSR 20-8.200(4)(D)2

- The influent line(s) shall be located along the bottom of the lagoon so that the top of the pipe is just below the average elevation of the lagoon seal; however, there shall be an adequate seal below the pipe. 10 CSR 20-8.200(4)(D)3

8. Upon completion of construction:

A. Marshall Municipal Utilitieswill become the continuing authority for operation and maintenance of these facilities.

B. Submit an electronic copy of the as-built plans if the project was not constructed in accordance with previously submitted plans and specifications; and

C. Submit the Statement of Work Completed form to the department in accordance with 10 CSR 20-6.010(5)(N) (https://dnr.mo.gov/document-search/wastewater-construction-statement-work-completed-mo-780-2155); and

D. An operating permit fee of $3,000 to the Engineering Section of the Water Protection Program at least 60 days prior to operation.

IV. REVIEW SUMMARY

1. CONSTRUCTION PURPOSE

The Marshall Junction is an unincorporated community located at the intersection of US Highway 65 and Interstate I-70 in Saline County. Currently there is no collection system or wastewater treatment facility at the proposed location. It is intended that potential developers will be attracted to this location due to the existence of water and wastewater infrastructure. The area is undeveloped but is a prime location for commercial development. In order to attract business to the area, Saline County Commission proposed to construct the needed infrastructure to provide wastewater collection and treatment and attract investors.

2. FACILITY DESCRIPTION

Location for the project is the intersection of Highway (Hwy) 65 and Interstate 70 in Saline County, Missouri. The proposed construction is for a new wastewater collection system and a treatment facility. Construction includes a gravity sewer, a pump station and a force main located on the southeast quadrant of the highway intersection, and a wastewater treatment facility located 0.65 miles to the east of the highway crossing and south of I-70.

Generated wastewater flow will be directed to the proposed wastewater treatment facility (WWTF). The collection system will consist of approximately 2,488 lf of 8-inch pipe, approximately 1,280 lf of 4-inch force main, nine manholes, and one duplex pump station.

The WWTF has a design average flow of 50,000 gpd, a peak flow of 6,250 gph and will serve a hydraulic population equivalent of approximately 500 people. The proposed WWTF includes an influent bar screen, an aerated two-cell lagoon system, a submerged attached growth reactor (SAGR) with a grinder pump, a chlorination/dechlorination basin, and an effluent headwall outfall. Sludge will be stored in the lagoon system.

3. COMPLIANCE PARAMETERS

The proposed project is required to meet conditions from MOGDS Table C and E and condition #6 from the Permit Requirements with an expiration date of June 30, 2029. The limits following the completion of construction will be applicable to the facility:

Parameter	Units	Monthly average limit
Biochemical Oxygen Demand$_5$	mg/L	10
Total Suspended Solids	mg/L	10
Ammonia as N-summer	mg/L	0.6
Ammonia as N-winter	mg/L	2.1
pH	SU	6.5-9.0
Total Residual Chlorine	µg/L	8
E. coli	#/100mL	126
Dissolved Oxygen	mg/L	*

*- monitoring requirement only

4. ANTIDEGRADATION

The department has reviewed the antidegradation report for this facility and issued the Water Quality and Antidegradation Review dated August 23, 2019, due to construction proposal for a new wastewater treatment facility. See **APPENDIX – ANTIDEGRADATION**.

5. REVIEW of MAJOR TREATMENT DESIGN CRITERIA

Location for construction is the vicinity of Hwy 65 and Interstate 70 intersection in Saline County, Missouri. The southeast quadrant will be retail developed in the near future, and, for this reason, a sewer collection system consisting of a gravity sewer main and a pumping station with force main will be constructed to move collected wastewater to the proposed new WWTF located on the southeast quadrant and 0.64 miles from the highway's intersection.

COLLECTION SYSTEM

The southeast (SE) quadrant gravity main consists of approximately 2,488 linear feet of 8-inch SDR 35 PVC pipe and 9 manholes, connecting to the wet well of the SE-lift station.

The SE quadrant lift station consists of a wet well with a diameter of 8 ft and a usable depth of 12.33 ft equipped with duplex submersible grinder pumps, rated at 180 gpm at 85 ft TDH and an emergency volume capacity of approximately 4,633 gallons. An emergency storage tank with a 24 ft diameter and a depth of 8 ft will be constructed with an approximate capacity of approximate 27,057 gallons. A total emergency storage capacity of more than 4 hours at peak flow is obtained with a total emergency storage capacity of approximately 32,478 gallons.

The SE quadrant force main A is 4 inches in diameter, 1,280 ft long, schedule 40 PVC pipe, starting at the SE lift station, moving in a general west direction, and connecting to the WWTF entry manhole, located approximately 0.64 miles to the west from the intersection of the two highways. A magnetic flow meter will be installed in the force main approximately 10 ft after the valve vault for flow measurement. The estimated flow contribution from this quadrant is expected to be 25,000 gpd when fully retail developed.

Lift station wet well will be furnished with:

- a duplicate wastewater level system, based on transducers, and on floats,
- an audiovisual alarm for: pump malfunctioning, overflow and power failure,
- a vent pipe,
- an emergency suction pipe,
- an aluminum lid with an access hatch,
- rails for pump removal from the surface,
- an emergency overflow line to emergency well, and
- an emergency overflow drain line from emergency well.

Lift station valve vault will be furnished with:

- a check valve,
- a plug valve and,
- a quick connect coupling.

Lift station will be constructed with an emergency storage capacity in excess of 4 hours at its peak flow. A propane emergency generator and a 500 gallons tank are proposed as part of the construction for the SE lift station.

WASTEWATER TREATMENT FACILITY

Influent is gravity fed from the entrance manhole to the screening structure through an 8-in pipe.

Screening structure has approximate dimensions of 12 ft, 1 in. x 6 ft x 4 ft, is made from concrete, and includes a 45-degree inclined trash rack with approximate dimensions of 2 ft by 11 ft with vertical bars spaced at 2 in. An 8 in pipe connects the screening structure to lagoon No. 1.

Lagoon No.1 and No.2 surfaces are rectangular with rounded corners, with its longest dimensions being approximately 70 ft by 35 ft at the bottom (154 by 119 at the top of berm). Total depth is 14 feet, with a 3:1 inner-berm side slope. The lagoon seal is compacted clay.

Lagoon No. 1 is aerated and has a surface area of 0.42 acres and a total volume of 128,968 ft^3 (top of the berm). This lagoon has 2 ft of freeboard, 10 ft of operating depth, a 2 ft of sludge depth, and a clay liner. This provides approximately 14.3 days of retention at the proposed design flow. Lagoon aeration will be conducted using a total of 6 diffusers model H3-4 fine bubble diffuser, capable of introducing 72 scfm of air by a shared 7.5 hp air blower.

Lagoon No. 1 will have 3 floating air distribution laterals, each feeding 2 diffusers, for a total of 6 diffusers. Laterals will run across the lagoon surface toward the center and submerge in a vertical direction within the central lagoon area to connect with the submerged diffuser at a depth of approximately 11.4 feet.

Lagoon No. 2 is aerated and has a surface area of 0.42 acres and a wastewater volume of 128,968 ft^3 (top of the berm). This cell has 2 ft of freeboard, 10 ft of operating depth, a 2 ft of sludge depth, and a clay liner. This provides approximately 14.3 days of retention at the proposed design flow. Lagoon aeration will be conducted using a total of 2 diffusers model H3-4 fine bubble diffuser, capable of introducing 24 scfm of air by a shared 7.5 hp air blower. Lagoon No. 2 will have 1 floating air distribution lateral, feeding 2 diffusers. Laterals will run across the lagoon surface toward the center and submerge in a vertical direction within the central lagoon area to connect with the submerged diffuser at a depth of approximately 11.4 feet.

Lagoon aeration will be conducted using a total of 8 diffusers model H3-4 fine bubble diffuser, (6 diffusers in lagoon no.1, and 2 diffusers in lagoon no.2), capable of introducing 72 and 24 scfm of air to lagoon cells 1 and 2, respectively, for a total of 96 scfm.

The aeration system was designed to provide the required oxygen with one diffuser out of service or on standby. Lagoon cells are designed each with an emergency spillway, a minimum berm width of 8 feet, a free board of 2 feet, a slope of 3 to 1 for the internal walls, a 2 feet storage capacity for solids and a 3 ft clay seal having a permeability of less than $1x10^{-7}$ cm/sec, complying with the requirements for seal thickness when using formula 200-1 from 10 CSR 20-8. Connecting pipes crossing the berm will have seep collars to reduce water infiltration.

Nexom Submerged Aerated Growth Reactors (SAGR) – The lagoon treated effluent will flow by gravity to a flow splitter structure within the SAGR unit that will separate the flow equally between the two parallel SAGR reactors. The SAGR system is capable of treating a design average flow of 50,000 gpd (189 m^3/day) and a peak flow of 6,250 gph. Each reactor will be 44 ft x 34 ft x 7.5 ft, and concrete constructed with a wet volume of 10,472 ft^3 (78,336 gallons). The average retention time is 30.1 hours. Each reactor is split by the influent piping into two zones. The reactors are layered with 0.5 ft of top insulating mulch for heat retention, a protective non-woven geotextile fabric acting as a barrier, and 7.5 ft of granular media. The bottom layer contains the 2-inch HDPE air distribution laterals. The granular media layer contains the two influent 4-inch PVC SDR-35 pipes with drilled orifices surrounded by a chamber to provide clear flow of wastewater, the drop down 4-inch HDPE air distribution diffusers, and the effluent collection chamber. Aeration is accomplished by means of one positive displacement blower capable of supplying 98 scfm by a 7.5 HP motor. The effluent from the reactors will be collected in a common effluent structure where flow measurement can be accomplished by a V notch plate and continue to flow by gravity to the disinfection system.

Disinfection – Disinfection is the process of removal, deactivation, or killing of pathogenic microorganisms.

- Tablet Chlorinator – Installation of a tablet chlorination chamber receiving clarified effluent and prior to the chlorine contact tank. The tablet chlorinator shall have a design flow of 50,000 gpd and a maximum flow of 150,000 gpd. The system will dispense hypochlorite as the wastewater comes into contact with the tablets.
- Chlorine Contact Tank – Installation of a pre-cast concrete tank approximately 6 ft x 14.8 ft x 5.6 ft with 8 end-around baffles allowing for a 40:1 length to width ratio. This tank will allow for a 15-minute contact time during a peak flow of 150,000 gpd. The chlorine contact chamber also includes a sump pit to allow dewatering and maintenance of the tank.
- Tablet Dechlorinator – Installation of a tablet dechlorination chamber receiving the chlorinated effluent and prior to Outfall No. 001. The tablet dechlorinator shall have a design flow of 50,000 gpd and a maximum flow of 150,000 gpd. The system will dispense sodium sulfite as the wastewater comes into contact with the tablets. This chamber will allow a 30 seconds or more contact time during peak flow.

Effluent from the dechlorination basin will flow by gravity and connect with the effluent headwall via a 6 inch PVC pipe that is located 160 feet to the north from the dechlorination unit.

The receiving stream for this facility is a tributary to Dry Creek.

Emergency Power – A 60-kW standby liquid propane generator and automatic transfer switch will be provided to operate the wastewater treatment facility in event of power failure.

After completion of construction project, submit statement of work completed and as-builts if the project was not constructed in accordance with previously submitted plans and specifications, and ensure that Application Form B and the operating permit fee of $3,000 has been submitted. Missouri State Operating Permit, General Permit MOGDS-0223 will be issued after receipt of the above documents.

V. NOTICE OF RIGHT TO APPEAL

If you were adversely affected by this decision, you may be entitled to an appeal before the Administrative Hearing Commission (AHC) pursuant to Section 621.250 RSMo. To appeal, you must file a petition with the AHC within 30 days after the date this decision was mailed or the date it was delivered, whichever date was earlier. If any such petition is sent by registered mail or certified mail, it will be deemed filed on the date it is mailed; if it is sent by any method other than registered mail or certified mail, it will be deemed filed on the date it is received by the AHC. Any appeal should be directed to:

Administrative Hearing Commission
U.S. Post Office Building, Third Floor
131 West High Street, P.O. Box 1557
Jefferson City, MO 65102-1557
Phone: 573-751-2422
Fax: 573-751-5018
Website: https://ahc.mo.gov

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