# STATE OF MISSOURI

## DEPARTMENT OF NATURAL RESOURCES

MISSOURI CLEAN WATER COMMISSION

## CONSTRUCTION PERMIT

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

Hayti Wastewater Treatment Facility
0.5 miles N of Hwy P and CR266 Intersection
Hayti, MO 63851

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.

August 27, 2021
Effective Date

Edward B. Galbraith
**Edward B. Galbraith, Director, Division of Environmental Quality**

August 26, 2023
Expiration Date

Chris Wieberg
**Chris Wieberg, Director, Water Protection Program**

# CONSTRUCTION PERMIT

## I. CONSTRUCTION DESCRIPTION

The Hayti WWTF has a design average flow of 883,500 gpd and serves a hydraulic population equivalent of approximately 6,900 people. Collection system construction will include increased capacity at 2 lift stations, a new lift station, and an electromagnetic 6-inch flow meter shall measure the existing forcemain that enters the City from Hayti Heights. The treatment plant will have a 4 cell aerated lagoon, with a storage capacity of 11.97 MG with aeration of 750 scfm, followed by 2 MBBR tanks. The MBBR tanks have a volume of 110,794 gallons filled with HDPE media with a surface area of 4,500 $m^2/m^3$ and aeration providing 705 scfm. Following the MBBR flows go to the new disc filter providing 203.4 sq ft of filtration with 10 micron openings, with backwash being returned to lagoon cell 1.

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 permit contains no new conditions or requirements that convey a new cost to the facility.

## 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 Robert Summers with Horner Shifrin 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 Southeast Regional Office per 10 CSR 20-7.015(9)(G).

5. The wastewater treatment facility shall be located above the twenty-five (25)-year flood level.

6. The wastewater facility structures, electrical equipment, and mechanical equipment shall be protected from physical damage by not less than the one hundred- (100-) year flood elevation per 10 CSR 20-8.140(2)(B).The minimum distance between wastewater treatment facilities and all potable water sources shall be at least three hundred feet (300') per 10 CSR 20-8.140(2)(C)1.

7. In addition to the requirements for a construction permit, 10 CSR 20-6.200 requires land disturbance activities of 1 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.

8. 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.

9. All construction must adhere to applicable 10 CSR 20-8 (Chapter 8) requirements listed below.
    - Rain water from roofs, streets, and other areas and groundwater from foundation drains shall be excluded from all new sewers. 10 CSR 20-8.120 (2)
    - Service connections to the gravity sewer main shall be watertight and cannot protrude into the sewer. 10 CSR 20-8.120 (3) (C) 1.
    - Leakage tests shall be specified for gravity sewers except polyvinyl chloride (PVC) pipe with a diameter of twenty-seven inches (27") or less. 10 CSR 20-8.120 (3) (C) 2.
        - The leakage exfiltration or infiltration for gravity sewers shall not exceed one hundred (100) gallons per inch of pipe diameter per mile per day for any section between manholes of the system. An exfiltration or infiltration test shall be performed with a minimum positive head of two feet (2'). The exfiltration or infiltration test shall conform to the test procedure described 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, for precast concrete pipe. 10 CSR 20-8.120 (3) (C) 2. A.

- The air test for sewers shall, conform to the test procedure described in ASTM C1103 – 14 *Standard Practice for Joint Acceptance Testing of Installed Precast Concrete Pipe Sewer Lines*, as approved and published November 1, 2014, for concrete pipe twenty-seven inches (27") or greater in diameter, and ASTM F1417 – 11a(2015) *Standard Practice for Installation Acceptance of Plastic Non-pressure Sewer Lines Using Low-Pressure Air*, as approved and published August 1, 2015, for plastic, composite, and ductile iron pipe. 10 CSR 20-8.120 (3) (C) 2. B.

- Location. Manholes shall be installed—10 CSR 20-8.120 (4) (A)
  - At the end of each line;
  - At all changes in grade, size, or alignment;
  - At all sewer pipe intersections; and
  - At distances appropriate to allow for sufficient cleaning and maintenance of sewer lines.
- 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.
- There shall be no physical connections between a public or private potable water supply system and a sewer or appurtenance that would permit the passage of any wastewater or polluted water into the potable supply. 10 CSR 20-8.120 (5) (A)
- Sewers shall be laid at least fifty feet (50') in a horizontal direction from any existing or proposed public water supply well or other water supply sources or structures. Sewers must also comply with 10 CSR 23-3.010. 10 CSR 20-8.120 (5) (B)
- 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 one hundred- (100-) year flood elevation. 10 CSR 20-8.140 (2) (B) and 10 CSR 20-8.130 (2) (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 three hundred feet (300'). 10 CSR 20-8.140 (2) (C) 1.
- Facilities shall be readily accessible by authorized personnel from a public right–of-way at all times. 10 CSR 20-8.140 (2) (D) and 10 CSR 20-8.130 (2) (B)
- All sampling points shall be designed so that a representative and discrete twenty-four (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.
- Electrical systems and components in raw wastewater or in enclosed or partially enclosed spaces where hazardous concentrations of flammable gases or vapors that are normally present, shall comply with the NFPA 70 *National Electric Code (NEC)* (2017 Edition), as approved and published August 24, 2016, requirements for Class I, Division 1, Group D locations. 10 CSR 20-8.140 (7) (B)
- An audiovisual alarm or a more advanced alert system, with a self-contained power supply, capable of monitoring the condition of equipment whose failure could result in a violation of the operating permit, shall be provided for all wastewater treatment facilities. 10 CSR 20-8.140 (7) (C)
- 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.
- 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)
- Effluent twenty-four (24) hour composite automatic sampling equipment shall be provided at all mechanical wastewater treatment facilities and at other facilities where necessary under provisions of the operating permit. 10 CSR 20-8.140 (7) (F)
- 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:
    - 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)
    - Portable blower and hose sufficient to ventilate accessed confined spaces; 10 CSR 20-8.140 (8) (F)
    - 10 CSR 20-8.140 (8) (G) Portable lighting equipment complying with NEC requirements. See subsection (7)(B) of this rule;
    - 10 CSR 20-8.140 (8) (H) Gas detectors listed and labeled for use in NEC Class I, Division 1, Group D locations. 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

  - Explosion-proof electrical equipment, non-sparking tools, gas detectors, and similar devices, in work areas where hazardous conditions may exist, such as digester vaults and other locations where potentially explosive atmospheres of flammable gas or vapor with air may accumulate.; 10 CSR 20-8.140 (8) (K)
  - 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 fifty feet (50') in accordance with 10 CSR 23-3.010(1)(B). 10 CSR 20-8.130 (2) (D)
- Dry wells, including their superstructure, shall be completely separated from the wet well with gas tight common walls. 10 CSR 20-8.130 (3) (A) 1.
- Suitable and safe means of access to dry wells and to wet wells shall be provided to persons wearing self-contained breathing apparatus. 10 CSR 20-8.130 (3) (A) 2.
- Multiple pumps shall be provided except for design average flows of less than fifteen hundred (1,500) gallons per day. 10 CSR 20-8.130 (3) (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 weather proof 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 (3) (C)
- Valves shall not be located in the wet well unless integral to a pump or its housing. 10 CSR 20-8.130 (3) (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 (3) (E)
- Interconnection between the wet well and dry well ventilation systems is not acceptable10 CSR 20-8.130 (3) (F)

- Ventilation shall include the following:
  - Isolate all pumping stations and 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 (8) (J) 1.
  - Force fresh air into enclosed screening device areas or open pits more than four feet (4') deep. Interconnection between the wet well and dry well ventilation systems is not acceptable; 10 CSR 20-8.140 (8) (J) 2.
  - Dampers are not to be used on exhaust or fresh air ducts. Avoid the use of fine screens or other obstructions on exhaust or fresh air ducts to prevent clogging; 10 CSR 20-8.140 (8) (J) 3.
  - Where continuous ventilation is needed (e.g., housed facilities), provide at least twelve (12) complete air changes per hour. Where continuous ventilation would cause excessive heat loss, provide intermittent ventilation of at least thirty (30) complete air changes per hour when facility personnel enter the area. Base air change demands on one hundred percent (100%) fresh air; 10 CSR 20-8.140 (8) (J) 4.
  - Electrical controls. Mark and conveniently locate switches for operation of ventilation equipment outside of the wet well or building. Interconnect all intermittently operated ventilation equipment with the respective wet well, dry well, or building lighting system. The manual lighting/ventilation switch is expected to override the automatic controls. For a two (2) speed ventilation system with automatic switch over where gas detection equipment is installed, increase the ventilation rate automatically in response to the detection of hazardous concentrations of gases or vapors; 10 CSR 20-8.140 (8) (J) 5.
  - Fabricate the fan wheel from non-sparking material. Provide automatic heating and dehumidification equipment in all dry wells and buildings; 10 CSR 20-8.140 (8) (J) 6.
- 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 (3) (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 (4) (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 one hundred- (100-) year flood elevation. 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).
- 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 (5)
  - 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 (5) (A)
  - 10 CSR 20-8.130 (5) (B) Valve Chamber and Valves. Valves required under subsection (3)(D) of this rule shall be located in a separate valve chamber.
  - A minimum access hatch dimensions of twenty-four inches by thirty-six inches (24" x 36") shall be provided. 10 CSR 20-8.130 (5) (B) 1.
- A portable pump connection on the discharge line with rapid connection capabilities shall be provided. 10 CSR 20-8.130 (5) (B) 2.
- Alarm systems with an uninterrupted power source shall be provided for pumping stations. 10 CSR 20-8.130 (6)
- 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 (2') per second. 10 CSR 20-8.130 (8) (A)
- 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.
- Moving Bed Bioreactor (MBBR). A MBBR secondary treatment system shall provide upstream preliminary treatment units capable of—
  - Screening to reduce pass-through and suspended solids; 10 CSR 20-8.180 (8)(A)
  - Grit removal; 10 CSR 20-8.180 (8)(B) and
  - Oil and grease removal; 10 CSR 20-8.180 (8)(C)
- Minimum freeboard shall be two feet (2'). 10 CSR 20-200(4)(A)3.
- Seep collars shall be provided on drainpipes where they pass through the lagoon seal. 10 CSR 20-200(4)(C)4
- Emergency Power. Disinfection and dechlorination processes, when used, shall be provided during all power outages. 10 CSR 20-8.190 (2) (A)
- The UV dosage shall be based on the design peak hourly flow, maximum rate of pumpage, or peak batch flow. 10 CSR 20-8.190 (5) (A) 1.
- If no flow equalization is provided for a batch discharger, the UV dosage shall be based on the peak batch flow. 10 CSR 20-8.190 (5) (A) 2.
- The UV system shall deliver the target dosage based on equipment derating factors and, if needed, have the UV equipment manufacturer verify that the scale up or scale down factor utilized in the design is appropriate for the specific application under consideration. 10 CSR 20-8.190 (5) (A) 3.
- The UV system shall deliver a minimum UV dosage of thirty thousand microwatt seconds per centimeters squared (30,000 μW • s/cm2). 10 CSR 20-8.190 (5) (A) 4.

- The UV system must continuously monitor and display at the UV system control panel the following minimum conditions:
  - The relative intensity of each bank or closed vessel system; 10 CSR 20-8.190 (5) (C) 1. A.
  - The operational status and condition of each bank or closed vessel system; 10 CSR 20-8.190 (5) (C) 1. B.
  - The ON/OFF status of each lamp in the system; 10 CSR 20-8.190 (5) (C) 1. C. and
  - The total number of operating hours of each bank or each closed vessel system. 10 CSR 20-8.190 (5) (C) 1. D.
- The UV system shall include an alarm system. Alarm systems shall comply with 10 CSR 20-8.140(7)(C). 10 CSR 20-8.190 (5) (C) 2.
- The media for cloth/disc filters shall:
  - Follow the manufacturer's recommendations; 10 CSR 20-8.210 (3) (E) 1. B. and
  - Be chemical-resistant if the filter will be exposed to chemicals, such as chlorine or disinfectants. 10 CSR 20-8.210 (3) (E) 1. C.
- The microfabric used for microscreening shall be a material demonstrated to be durable through long-term performance data. 10 CSR 20-8.210 (4) (A)

10. Upon completion of construction:

A. The City of Hayti will become the continuing authority for operation and maintenance of these facilities;
B. Submit an electronic copy of the as builts if the project was not constructed in accordance with previously submitted plans and specifications; and
C. Submit the enclosed form Statement of Work Completed to the Department in accordance with 10 CSR 20-6.010(5)(N) with a request to have the permit modification issued.

## IV. REVIEW SUMMARY

### 1. CONSTRUCTION PURPOSE

The facility is undergoing construction to meet final ammonia effluent limits and to rehab parts of the collection system to eliminate inflow and infiltration within the system.

### 2. FACILITY DESCRIPTION

The Hayti WWTF is located 0.5 miles north of Highway P and CR 266 intersection, Hayti, in Pemiscot County, Missouri. The facility has a design average flow of 883,500 gpd and serves a hydraulic population equivalent of approximately 6,900 people. With construction, the facility will have: influent pump station, 4 aerated cell lagoon, heated moving bed biological reactor (MBBR), tertiary disc filtration, UV disinfection with the sludge retained in the lagoon.

## 3. COMPLIANCE PARAMETERS

The proposed project is required to meet final effluent limits for ammonia. As a result of construction, the facility no longer qualifies for equivalent to secondary effluent limits and the BOD and TSS effluent limits have changed. The limits following the completion of construction will be applicable to the facility:

| Parameter | Unit | Monthly Average |
|---|---|---|
| BOD | mg/L | 30 |
| TSS | mg/L | 30 |
| Ammonia-January | mg/L | 3.9 |
| Ammonia-February | mg/L | 3.9 |
| Ammonia-March | mg/L | 3.9 |
| Ammonia-April | mg/L | 2.8 |
| Ammonia-May | mg/L | 2.9 |
| Ammonia-June | mg/L | 1.7 |
| Ammonia-July | mg/L | 1.4 |
| Ammonia-August | mg/L | 1.2 |
| Ammonia-September | mg/L | 1.7 |
| Ammonia-October | mg/L | 2.0 |
| Ammonia-November | mg/L | 3.9 |
| Ammonia-December | mg/L | 3.5 |
| %BOD removal | % | 85 |
| %TSS removal | % | 85 |

## 4. REVIEW of MAJOR TREATMENT DESIGN CRITERIA

**Existing major components which will remain in use include the following:**

- The existing aerated lagoons were installed in 2003 and are being modified with this construction.
- The existing Parshall flume shall continue to measure the secondary treated wastewater prior to disinfection and discharge.
- The facility has an existing UV disinfection system, which is identified as Bid Alternative #1 for potential replacement.

**Construction will cover the following items:**

- Construction is divided into two contracts with 2 bid alternatives identified, disinfection system and blower building.
- Collection System Work - Collection system work will include rehab, replacement, resealing, regrouting, lining and additional work through the system, including, but not limited to:
  - Lift Station #11, Interstate - The existing lift station will be demolished and relocated. The new lift station will be a 16 by 16 ft square with 12 ft depth, providing wet well storage of 22,978 gallons, which is approximately 15.5 hrs of storage at average flow and 4 hrs of storage at peak flow. Centrifugal non-clog

pump with an operating point of 26 - gpm at 50 TDH. Pumping capacity remains the same. Forcemain velocity is expected to be 3 ft/sec.

- Lift Station #3, Plum Crazy-Pump capacity is being increased to 300 gpm at 46 ft TDH, with non-clogs pumps serving a 6 inch forcemain
- Lift Station #8, Bell- Pump capacity is being increased to 840 gpm at 55 ft TDH, with non-clog pumps serving a 10 inch forcemain. Additionally, the lid and top of the structure of the lift station wet well and valve vault will be raised by 2 ft to prevent inflow of stormwater.
- Pumps are being replaced, but capacity is remaining the same at
  - Pump Station #1, Madison with a capacity of 150 gpm at 20 ft TDH on 6 inch forcemain;
  - Pump Station #2, Lincoln, with a capacity of 260 gpm at 65 ft TDH on 6 inch forcemain;
  - Pump Station #4, Joy, with a capacity of 380 gpm at 46 ft TDH on 8 inch forcemain;
  - Pump Station #6, Poplar, with a capacity of 150 gpm at 20 ft TDH on 4 inch forcemain;
  - Pump Station #7, Grant, with a capacity of 175 gpm at 19 ft TDH on 6 inch forcemain;
  - Pump Station #9, Tomlin, with a capacity of 150 gpm at 18 ft TDH on 4 inch forcemain;
  - Pump Station # 12, R&P, with a capacity of 110 gpm at 28 ft TDH on 4 inch forcemain; and
  - Pump Station #13, Rick Hall, with a capacity of 170 gpm at 19 ft TDH on 6 inch forcemain.
- Replace approximately 600 lf of pipe and 56 wyes- 590 lf of 8 inch (52 wyes) and 10 lf of 10 inch (4 wyes).
- Approximately 16,140 lf of joint grouting, impacting 3,230 joints - 15,800 lf of 8 inch and 340 lf of 10 inch
- Approximately 29,120 lf of CIPP liner - 27,000 lf of 8 inch, 1,600 lf of 10 inch, and 520 lf of 12 inch.
- Manhole rehab include 130 manholes lined, 55 manholes grouting, 46 manholes raise to grade, 41 reset/reseal manhole frames, plus additional manholes that will have the manhole frame or cover replaced, and 30 new manholes.
- Electromagnetic Meter – An electromagnetic 6-inch flow meter shall measure the existing forcemain that enters the City from Hayti Heights and in the existing vault located near the corner of Lincoln and Pemiscot streets.

- Aerated Lagoon - The overall volume of the lagoon provides storage of 11.97 MG, providing 13.5 days of storage and treatment at design average flow.
  - Cell #1 has a treatment volume of 3.04 MG with a side water depth of 15 ft
    - Cell #1 contains the return line from the disc filter sludge pump, that has the ability to return 150 gpm.
    - 12 fine bubble aerators in the cell providing 397 scfm of air.
  - Cell #2 has a treatment volume of 3.04 MG with a side water depth of 15 ft
    - 5 fine bubble aerators in the cell providing 179 scfm of air.
  - Cell #3 has a treatment volume of 3.04 MG with a side water depth of 15 ft
    - 3 fine bubble aerators in the cell providing 104 scfm of air.
  - Cell #4 has a treatment volume of 2.85 MG with a side water depth of 15 ft
    - 2 fine bubble aerators in the cell providing 69 scfm of air.

        - From Cell #4, flows go to the flow splitter and on to the MBBR system for additional treatment.
    - Aeration will be 2-50 hp positive displacement blowers, each with an air flow capacity of 750 scfm.
- Moving Bed Biofilm Reactor (MBBR) – The lagoon treated effluent will flow by gravity from the fourth lagoon cell to the 2 tanks, which contain the moving bed biofilm reactor, a Triplepoint Water Technologies, LLC NitrOx$^{TM}$. It is capable of treating a design average flow of 883,500 gpd and a peak daily flow of 1,214,813 gpd.
    - The system is composed of two tanks with each approximately 23 ft x 23 ft x 16 ft with a sidewater depth of 14 ft. Total volume of the two tanks is 110,794 gallons (55,397 gallons per tank).
    - The average flow hydraulic retention time is 3.0 hours and the peak flow hydraulic retention time is 2.19 hours.
    - A floating insulating cover shall be installed in each tank. An immersion tank heater will be installed to maintain a temperature of 5°C.
    - Each tank shall be filled with high surface area HDPE media. Each media piece shall be no more than 1.25 inches in diameter, with a total surface area of 4500 $m^2/m^3$ (1,371.6 $ft^2/ft^3$) protected surface area for bacteria growth, with a specific gravity of 0.93 to 1.05 to allow it to float freely in the water column.
    - There will be two blowers that are either tri-lobe or bi-lobe positive displacement blowers each capable of supplying 705 scfm, which meets the minimum airflow requirements in the airflow in the 2 tanks.
    - The effluent from the NitrOx$^{TM}$ will flow by gravity to the disc filter for polishing prior to disinfection and discharge
- Cloth Disc Tertiary Filtration – Installation of one microscreen disc filter, capable of treating a design average flow of 883,500 gpd and a peak hydraulic flow of 1.78 MGD. The disc filter has 10 discs per filter providing an active filtration area of 203.4 square feet and a total filtration area of 317.5 square feet. The filter media will have 10 micron openings.
    - The backwash cleaning sequence entails a water jet that rinses the system and push the debris into a sludge tank where it can be removed via sludge pump. The sludge pump capable of handling 150 gpm at 18 TDH and returns the solids back to Lagoon Cell #01.
- The facility has an existing UV disinfection system. Identified as Bid Alternative #1 is replacement of the UV disinfection system with a Trojan UV3000B or equivalent gravity flow, low pressure high intensity UV disinfection system capable of treating a peak flow of 1.325 MGD while delivering a minimum UV intensity of 30 $mJ/cm^2$ with an expected ultraviolet transmissivity of 65% or greater. The UV system consists of two banks in series with 4 modules per bank and 6 lamps per module. The disinfected effluent will flow by gravity to Outfall No. 001.

## 5. OPERATING PERMIT

Operating permit MO-0057673 will require a modification to reflect the construction activities. The modified Hayti WWTF was successfully public noticed from June 18, 2021 to July 19, 2021 with no comments received. Submit the Statement of Work Completed to the Department in accordance with 10 CSR 20-6.010(5)(N) and request the operating permit modification be issued.

## V. NOTICE OF RIGHT TO APPEAL

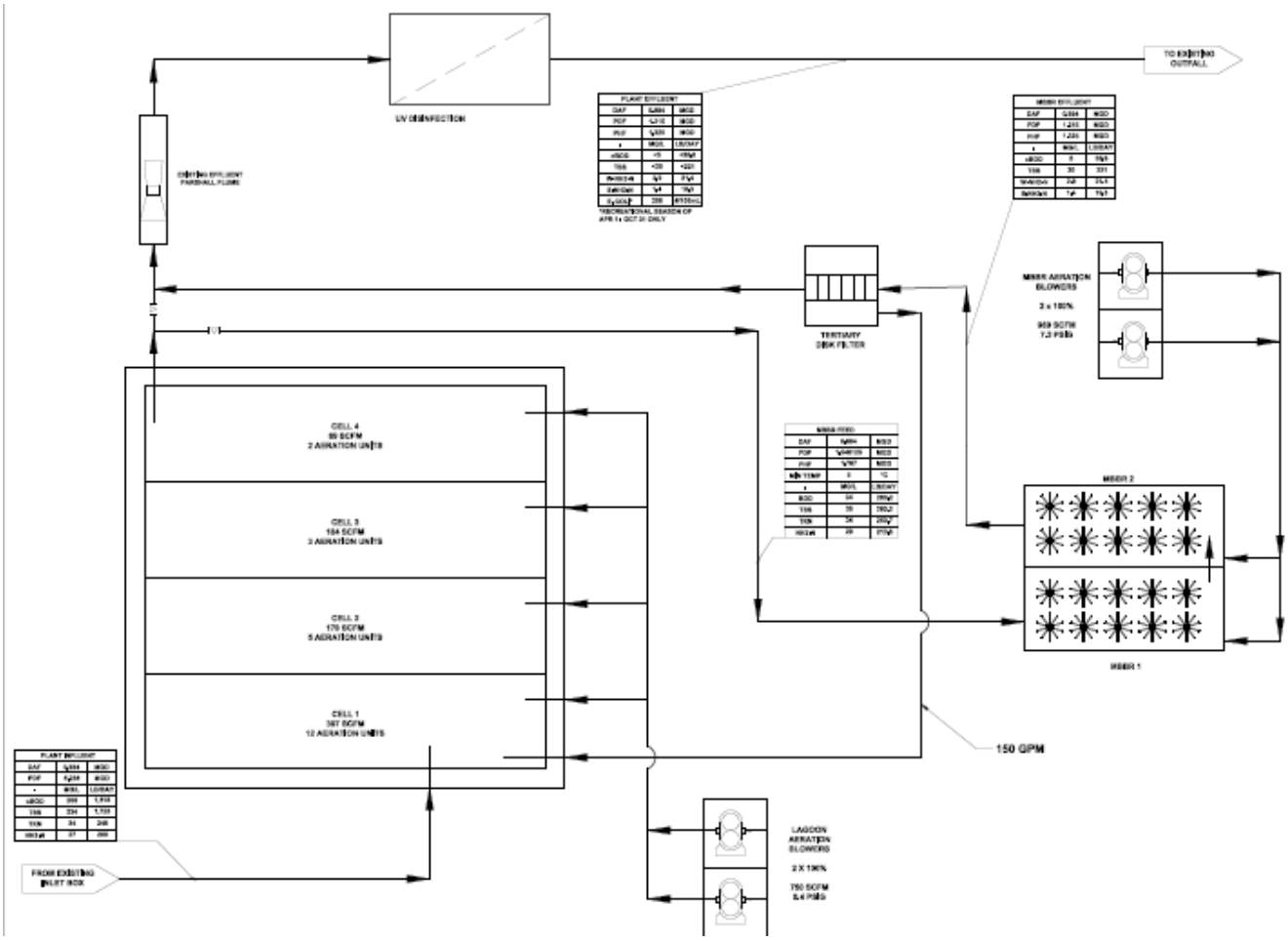
If you were adversely affected by this decision, you may be entitled to an appeal before the Administrative Hearing Commission (AHC) pursuant to Section 621.250 RSMo. To appeal, you must file a petition with the AHC within 30 days after the date this decision was mailed or the date it was delivered, 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

Leasue Meyers, EI
Engineering Section
leasue.meyers@dnr.mo.gov

Cailie Carlile, P.E.
Engineering Section
cailie.carlile@dnr.mo.gov

## APPENDIX-PROCESS FLOW DIAGRAM



MISSOURI DEPARTMENT OF NATURAL RESOURCES
WATER PROTECTION PROGRAM

# APPLICATION FOR CONSTRUCTION PERMIT – WASTEWATER TREATMENT FACILITY

| FOR DEPARTMENT USE ONLY | |
|---|---|
| APP NO. | CP NO. |
| FEE RECEIVED | CHECK NO. |
| DATE RECEIVED | |

## APPLICATION OVERVIEW

The Application for Construction Permit – Wastewater Treatment Facility form has been developed in a modular format and consists of Part A and B. **All applicants must complete Part A.** Part B should be completed for applicants who currently land-apply wastewater or propose land application for wastewater treatment. **Please read the accompanying instructions before completing this form. Submittal of an incomplete application may result in the application being returned.**

## PART A – BASIC INFORMATION

### 1.0 APPLICATION INFORMATION (Note – If any of the questions in this section are answered NO, this application may be considered incomplete and returned.)

1.1 Is this a Federal/State funded project? ☑ YES ☐ N/A Funding Agency: USDA-RD Project #: N/A

1.2 Has the Missouri Department of Natural Resources approved the proposed project's antidegradation review?
☐ YES Date of Approval: _____ ☑ N/A

1.3 Has the department approved the proposed project's facility plan*?
☑ YES Date of Approval: 12/4/18 ☐ NO (If No, complete No. 1.4.)

1.4 [Complete only if answered No on No. 1.3.] Is a copy of the facility plan* for wastewater treatment facilities included with this application?
☐ YES ☐ NO ☐ Exempt because _____

1.5 Is a copy of the appropriate plans* and specifications* included with this application?
☑ YES Denote which form is submitted: ☑ Hard copy ☑ Electronic copy (See instructions.) ☐ NO

1.6 Is a summary of design* included with this application? ☑ YES ☐ NO

1.7 Has the appropriate operating permit application (A, B, or B2) been submitted to the department?
☐ YES Date of submittal: _____
☑ Enclosed is the appropriate operating permit application and fee submittal. Denote which form: ☐ A ☐ B ☑ B2
☐ N/A: However, In the event the department believes that my operating permit requires revision to permit limitation such as changing equivalent to secondary limits to secondary limits or adding total residual chlorine limits, please share a draft copy prior to public notice? ☐ YES ☐ NO

1.8 Is the facility currently under enforcement with the department or the Environmental Protection Agency? ☐ YES ☑ NO

1.9 Is the appropriate fee or JetPay confirmation included with this application? ☑ YES ☐ NO
See Section 7.0

* Must be affixed with a Missouri registered professional engineer's seal, signature and date.

### 2.0 PROJECT INFORMATION

2.1 NAME OF PROJECT
Hayti, MO Wastewater Treatment Facility Rehabilitation

2.2 ESTIMATED PROJECT CONSTRUCTION COST
$ 3,097,700

2.3 PROJECT DESCRIPTION
Rehabilitation of the Hayti, MO wastewater treatment facility and construction of one new lift station with approximately 950 ft of new forcemain. See the Project Plans and Specifications for full details.

2.4 SLUDGE HANDLING, USE AND DISPOSAL DESCRIPTION
Sludge is stored in the lagoon

2.5 DESIGN INFORMATION

A. Current population: 2939 ; Design population: 6900

B. Actual Flow: 0.67m gpd; Design Average Flow: 0.88m gpd;
Actual Peak Daily Flow: _____ gpd; Design Maximum Daily Flow: _____ gpd; Design Wet Weather Event: _____

2.6 ADDITIONAL INFORMATION

A. Is a topographic map attached? ☑ YES ☐ NO

B. Is a process flow diagram attached? ☑ YES ☐ NO

## 3.0 WASTEWATER TREATMENT FACILITY

| NAME | TELEPHONE NUMBER WITH AREA CODE | E-MAIL ADDRESS |
|---|---|---|
| Hayti Wastewater Treatment Facility | (573) 359-0212 | hayticity@sbcglobal.net |

| ADDRESS (PHYSICAL) | CITY | STATE | ZIP CODE | COUNTY |
|---|---|---|---|---|
| 0.5mi N. of Hwy. P and CR 266 Intersection | Hayti | MO | 63851 | Pemiscot |

Wastewater Treatment Facility: Mo- 0057673 (Outfall 001 Of 001 )

3.1 Legal Description: _____ ¼, _____ ¼, _____ ¼, Sec. 27, T 19N, R 12E
(Use additional pages if construction of more than one outfall is proposed.)

3.2 UTM Coordinates Easting (X): 792039 Northing (Y): 4017182
*For Universal Transverse Mercator (UTM), Zone 15 North referenced to North American Datum 1983 (NAD83)*

3.3 Name of receiving streams: Ditch #22

## 4.0 PROJECT OWNER

| NAME | TELEPHONE NUMBER WITH AREA CODE | E-MAIL ADDRESS |
|---|---|---|
| City of Hayti | (573) 359-0212 | hayticity@sbcglobal.net |

| ADDRESS | CITY | STATE | ZIP CODE |
|---|---|---|---|
| P.O. Box 552 | Hayti | MO | 63851 |

## 5.0 CONTINUING AUTHORITY: A continuing authority is a company, business, entity or person(s) that will be operating the facility and/or ensuring compliance with the permit requirements.

| NAME | TELEPHONE NUMBER WITH AREA CODE | E-MAIL ADDRESS |
|---|---|---|
| City of Hayti | (573) 359-0212 | hayticity@sbcglobal.net |

| ADDRESS | CITY | STATE | ZIP CODE |
|---|---|---|---|
| P.O. Box 552 | Hayti | MO | 63851 |

5.1 A letter from the continuing authority, if different than the owner, is included with this application. ☐ YES ☐ NO ☑ N/A

5.2 COMPLETE THE FOLLOWING IF THE CONTINUING AUTHORITY IS A MISSOURI PUBLIC SERVICE COMMISSION REGULATED ENTITY.

A. Is a copy of the certificate of convenience and necessity included with this application? ☐ YES ☐ NO

5.3 COMPLETE THE FOLLOWING IF THE CONTINUING AUTHORITY IS A PROPERTY OWNERS ASSOCIATION.

A. Is a copy of the as-filed restrictions and covenants included with this application? ☐ YES ☐ NO

B. Is a copy of the as-filed warranty deed, quitclaim deed or other legal instrument which transfers ownership of the land for the wastewater treatment facility to the association included with this application? ☐ YES ☐ NO

C. Is a copy of the as-filed legal instrument (typically the plat) that provides the association with valid easements for all sewers included with this application? ☐ YES ☐ NO

D. Is a copy of the Missouri Secretary of State's nonprofit corporation certificate included with this application? ☐ YES ☐ NO

## 6.0 ENGINEER

| ENGINEER NAME / COMPANY NAME | TELEPHONE NUMBER WITH AREA CODE | E-MAIL ADDRESS |
|---|---|---|
| Bob Summers / Horner & Shifrin, Inc. | (573) 772-4201 | rcsummers@hornershifrin.com |

| ADDRESS | CITY | STATE | ZIP CODE |
|---|---|---|---|
| 4061 Hwy. PP Ste. 1 | Poplar Bluff | MO | 63901 |

## 7.0 APPLICATION FEE

☐ CHECK NUMBER ☑ JETPAY CONFIRMATION NUMBER 20022853

**8.0 PROJECT OWNER:** I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

PROJECT OWNER SIGNATURE Lisa Green

| PRINTED NAME | DATE |
|---|---|
| Lisa Green | 03/25/2020 |

| TITLE OR CORPORATE POSITION | TELEPHONE NUMBER WITH AREA CODE | E-MAIL ADDRESS |
|---|---|---|
| Mayor | (573) 359-0212 | LGreen@mfa-inc.com |

Mail completed copy to: MISSOURI DEPARTMENT OF NATURAL RESOURCES
WATER PROTECTION PROGRAM
P.O. BOX 176
JEFFERSON CITY, MO 65102-0176

**END OF PART A.**
**REFER TO THE APPLICATION OVERVIEW TO DETERMINE WHETHER PART B NEEDS TO BE COMPLETE.**