FORM W-1

Commonwealth of Kentucky
Energy and Environment Cabinet
Division of Water

CONSTRUCTION PERMIT APPLICATION for WASTEWATER TREATMENT PLANT

See the INSTRUCTIONS for more information about selected portions of this application.
Questions on completing this application? Contact the Water Infrastructure Branch at 502/564-3410 or visit our website at http://water.ky.gov for more information.

I. CONSTRUCTION PROJECT INFORMATION

Project Name: Henderson Co. Schools - WWTP Replacements

Project City/County: Henderson / Henderson

Name of WWTP: Niagara Elementary School

KPDES Number of WWTP, if known (for modifications to an existing plant): **KY** 0076295

Estimated cost of WWTP improvements and sewer line extension: $ 400,000

Project is: ☒ **WWTP Only** ☐ **WWTP with sewer lines**

☐ **Minor Modification to WWTP (Complete only Sections I, II, IV A, B, C, E3, H1, VII, VIII)**

II. APPLICANT INFORMATION

Applicant (Entity paying for construction): Henderson Co. Board of Education E-mail: ben.payne@henderson.kyschools.us

Street Address: 5704 Airline Road

City, State, Zip: Henderson, KY 42420

Will ownership be transferred? ☐ Yes. Name of new owner: _____ ☒ No

III. PRELIMINARY SUBMITTAL

Has a Preliminary Submittal been made with all the information in this section? [See 401 KAR 5:005, Section 3]

☐ Yes. Name of project: _____

County and Location of project, then skip to next section: _____

☒ No. Provide the information below that has not been previously submitted (use additional pages, as necessary). Place a **check (✓)** by the items included in the application or an **N/A** if the item is not applicable to the project.

ü A. A copy of a 7½ minute USGS topographic map, with the WWTP, any proposed sewer lines, service area, and discharge location identified.

N/A B. For a WWTP located within a planning area, a letter from the regional or facility planning agency stating the proposed WWTP is compatible with the regional facility plan or the water quality management plan.

N/A C. For a WWTP located within a planning area, a demonstration that a connection to the regional facility is not available.

N/A D. For a regional WWTP, a water quality management plan that is in compliance with **401 KAR 5:006**.

IV. DESIGN CONSIDERATIONS

A. PLANS AND SPECIFICATIONS.

Design plans and specifications shall comply with 401 KAR 5:005 and "Recommended Standards for Wastewater Facilities" ("Ten States' Standards") 2014 edition. If engineering practices, other than those contained in "Ten States' Standards", were used in the design, indicate the source and the corresponding portion of the design. **[See 401 KAR 5:005, Section 7]**

Plans and specifications submittals shall meet on of the following options:

☐ Submit at least one paper printed set of detailed plans (no larger than 24" x 36") and a PDF copy of the plans and specifications on a data storage device such as a USB flash drive. Both copies shall be dated with a stamp, signature of a licensed professional engineer in Kentucky which complies with the requirements of 201 KAR 18:104. The digital plans shall consist of a single pdf file and be in a folder called "Engineering Plans" and the specifications manual shall be in a folder called "Specifications".

4 Submit a PDF copy of the plans and specifications digitally via the electronic form on the KY One Stop Business Portal website. The PDF copy shall be dated with stamp and signature of a licensed engineer in Kentucky which complies with the requirements of 201 KAR 18:104 Section 3. The plans shall be submitted as a single pdf file.

B. DESIGN ENGINEER, if the WWTP design capacity is greater than 10,000 gpd or if the sewer lines associated with the WWTP will become part of a sewer system served by a regional facility. **[Section 6]**

P.E.'s Name: Kenneth D. McDaniel Firm: Bacon Farmer Workman Engineering & Testing, Inc.

Street Address: 500 South 17th Street

City, State, Zip: Paducah, KY 42003

Phone: (270)443-1995 Fax: E-mail: kmcdaniel@bfwengineers.com

C. CONFORMITY TO PLANS AND SPECIFICATIONS. Provide name of person who will inspect and certify that the constructed facility conforms to the approved plans and specifications. If the WWTP's design capacity is greater than 10,000 gpd, or if the sewer lines will become part of a sewer system served by a regional facility, this person must be a professional engineer (P.E.). **[Section 3]**

Name: Kenneth D. McDaniel Firm: Bacon Farmer Workman Engineering & Testing, Inc.

Street Address: 500 South 17th Street

City, State, Zip: Paducah, KY 42003

Phone: (270)443-1995 Fax: E-mail: kmcdaniel@bfwengineers.com

D. DESIGN CAPACITIES. Provide the following design capacities, in million gallons per day or pounds per day. **[Section 3]**

Average Daily Flow: 0.0014 MGD Influent BOD: 2.4 lb/day

Peak Daily Flow: 0.004 MGD Influent SS: 2.8 lb/day

Peak Hourly Flow: 0.016 MGD Influent NH_3-N: 0.28 lb/day

E. Design Criteria. Provide the following information (use additional pages, as necessary). Place a **check (✓)** by the items included in the application or an **N/A** if the item is not applicable to the project.

ü 1. A schematic drawing of the facility layout and explanation of the proposed facility and method of operation. **[Section 3]**

ü 2. WWTP's Reliability Category, Grade A, B, or C: B. Include a detailed description of the reliability measures that will be used for the WWTP. **[Sections 3 and 13]**

ü 3. A discussion of the design criteria used to size the unit processes. **[Section 3]**

F. LABORATORY SERVICES. Give name of laboratory that will provide services for self-monitoring and process control. **[Section 3]**

Firm Name: _____

Street Address: _____

City, State, Zip: _____

G. SITE LOCATION. Place a **check (✓)** by the items that are included in this application or an **N/A** if the item is not applicable to the project.

ü 1. Include a plat or survey clearly indicating the site's boundaries, position of proposed facility in reference to the boundaries, and position of dwellings within 200 feet of the WWTP. **[Section 3]**

N/A 2. If an open-top WWTP is closer than 200 feet to the closest dwelling, include what structure or other measures will be used for noise and odor control. **[Section 4]**

N/A 3. For a WWTP with a spray irrigation system, if the distance from the spray field to the property boundary is less than 20 feet, include what protective measures will be used to inhibit spray from crossing property boundary. **[Section 21]**

H. OTHER INFORMATION TO BE SUBMITTED WITH APPLICATION. Place a **check (✓)** by the items that are included in this application or an **N/A** if the item is not applicable to the project.

ü 1. If modifying or replacing an existing WWTP or sewer line, a closure plan indicating how the new facility will be constructed without a by-pass to a stream and the procedures that will be used for abandoning the existing facility. **[Section 3]**

ü 2. A Sludge Management Plan for WWTPs, including the sludge processing method and how sludge will be ultimately disposed. **[Section 3]**

N/A 3. If the discharge point does not coincide with a blue line on a USGS map, a copy of a recorded deed, recorded other right of ownership, or recorded right of easement for a corridor to the nearest blue line stream. **[Section 3]**

ü 4. A description of and detailed specifications for the flow measuring device. **[Section 7]**

N/A 5. If the WWTP discharges to a sinkhole or sinking stream, a plan for a groundwater tracer study (or a previously conducted groundwater tracer study). **[Section 4]**

V. SEWER LINES

Include the following items for projects that include sewer lines. If project is for only a WWTP, skip to next section. Place a **check (✓)** by the items that are included in this application or **N/A** if the item is not applicable to the project.

N/A A. If the project includes a pump station, the pump performance curve. **[Section 8]**

N/A B. If the project includes gravity sewer lines or force mains, a plan view and profile view for each. **[Section 6]**

N/A C. A demonstration that the sewer system has adequate capacity to treat the current and the anticipated flow to the WWTP and that the sewer system is not subject to excessive infiltration or excessive inflow. **[Section 8]**

N/A D. A demonstration that the WWTP has adequate capacity to transport the anticipated flow to the WWTP and the WWTP is not subject to excessive infiltration or excessive inflow. **[Section 8]**

VI. OTHER REQUIRED APPLICATIONS

N/A A. If the WWTP has a discharge, complete and file with this application: KPDES Application (KPDES Form 1); and Form A, B, C, or Short Form C, as applicable. * SAME KPDES PERMIT WILL APPLY

N/A B. If the WWTP does not have a discharge, complete and file with this application the "No Discharge Operating Permit Application, Form ND."

VII. FEES

Fees. Check or money order must be made payable to "**Kentucky State Treasurer**" for the total amount. **Fees do not apply** for a municipality, sanitation district, or other publicly owned facility. **[Section 5]**

WWTP Category: SMALL Amount: $ _____

Sewer Line Category: N/A Amount: $ _____

Total Amount: $ _____

VIII. CERTIFICATION

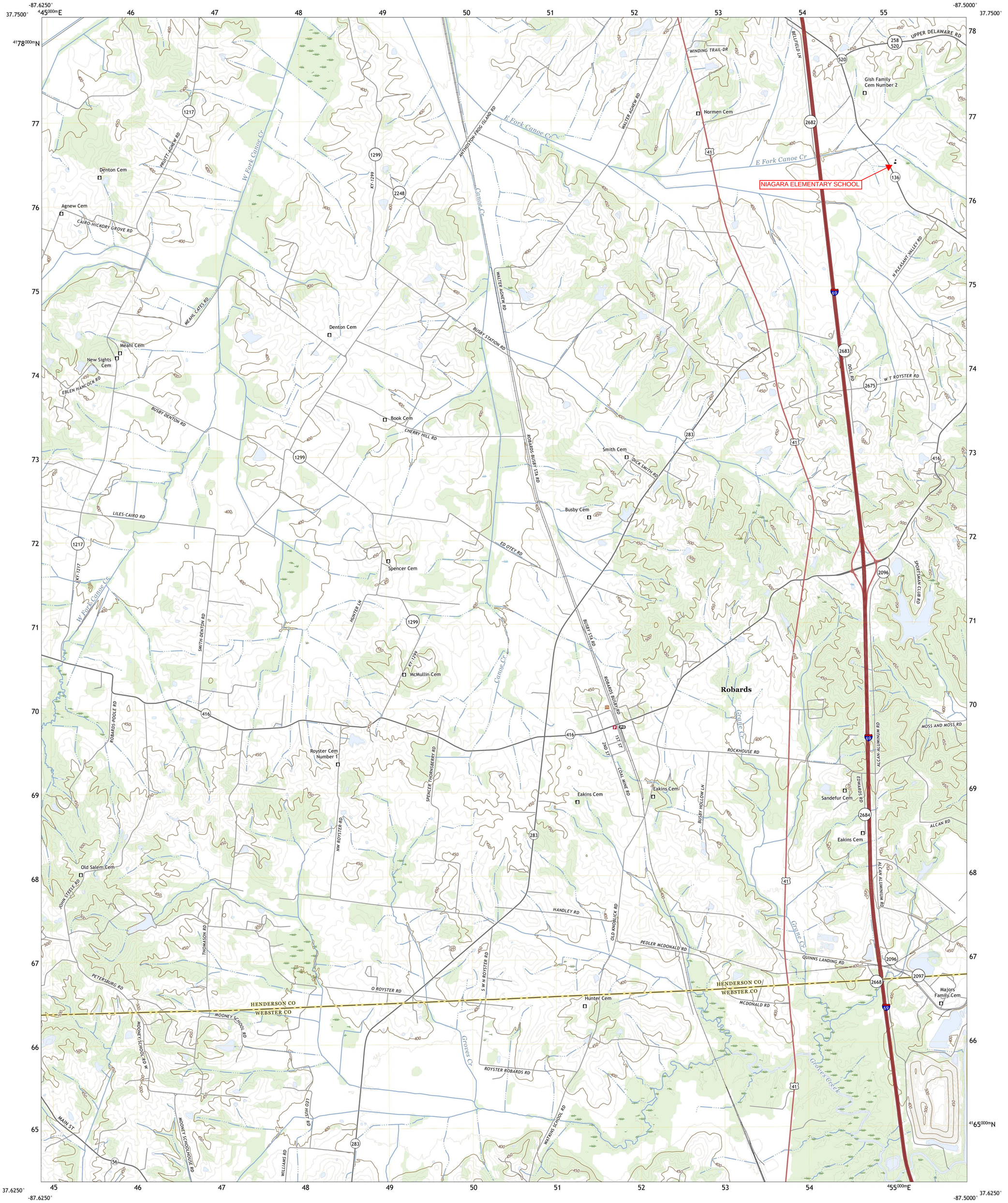
I, the applicant, certify under penalty of law that this document and all attachments were prepared under my direction or supervision. The information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine or imprisonment or both for known violations. **[Section 2]**

Applicant's Name and Official Title (Type or Print)		**Phone Number (Include area code)**
Signature		**Date**

U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

The National Map US Topo

ROBARDS QUADRANGLE
KENTUCKY
7.5-MINUTE SERIES



Produced by the United States Geological Survey
North American Datum of 1983 (NAD83)
World Geodetic System of 1984 (WGS84). Projection and
1 000-meter grid:Universal Transverse Mercator, Zone 16S
This map is not a legal document. Boundaries may be generalized for this map scale. Private lands within government reservations may not be shown. Obtain permission before entering private lands.

Imagery.....NAIP, May 2020 - June 2020
Roads..... U.S. Census Bureau, 2015 - 2016
Names.....GNIS, 1990 - 2021
Hydrography.....National Hydrography Dataset, 2001 - 2022
Contours.....National Elevation Dataset, 2021
Boundaries.....Multiple sources; see metadata file 2019 - 2021

Wetlands.....FWS National Wetlands Inventory 1983

MN
J
GN
3°26'
61 MILS
0°21'
6 MILS
UTM GRID AND 2019 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

U.S. National Grid
100,000 - m Square ID
DG
Grid Zone Designation
16S

SCALE 1:24 000
1 0.5 0 KILOMETERS 1 2
1000 500 0 METERS 1000 2000
1 0.5 0 1
MILES
1000 0 1000 2000 3000 4000 5000 6000 7000 8000 9000 10000
FEET

CONTOUR INTERVAL 10 FEET
NORTH AMERICAN VERTICAL DATUM OF 1988

This map was produced to conform with the National Geospatial Program US Topo Product Standard.

QUADRANGLE LOCATION

1	2	3
4		5
6	7	8

ADJOINING QUADRANGLES
1 Wilson
2 Henderson
3 Spottsville
4 Poole
5 Delaware
6 Dixon
7 Sebree
8 Beech Grove

ROAD CLASSIFICATION
Expressway
Secondary Hwy
Ramp
Local Connector
Local Road
4WD
Interstate Route
US Route
State Route

ROBARDS, KY
2022

NSN. 7643016368515
NGA REF NO. USGSX24K38109

BACON | FARMER | WORKMAN
ENGINEERING & TESTING, INC.

Package WWTP Replacement
Niagara Elementary School
13043 Highway 136 East
Henderson, KY 42420

for

Henderson County Board of Education
5704 Airline Road
Henderson, KY 42420

October, 2023

BFW Project No. 23228

Project Description:

Henderson County Board of Education proposes to replace an existing Package Wastewater Treatment Plant (WWTP) at Niagara Elementary School with a new Package WWTP. The existing facility is permitted under **KPDES Permit No. KY0076295**. The existing Package WWTP uses extended aeration with chlorine disinfection. The new Package WWTP is proposed as extended aeration with peracetic acid disinfection. The new Package WWTP will be designed for the same average flow and the same design capacity as the existing facility, with the same treatment technology, and will tie into the same outfall pipe; therefore, will be under the same KPDES Permit.

Design Calculations:

Design Calculations presented below represent the minimum sizing for a new facility. The Package WWTP manufacturer and contractor shall review the requirements and specifications (attached), and provide a system to treat the wastewater flows to the effluent limitations given in the KPDES Permit. If sizing of the actual Package WWTP differs from the minimums given, the WWTP manufacturer/contractor shall provide calculations demonstrating that the facility will meet all design standards governing this project.

Wastewater Flow Estimates:

Existing wastewater flows for the existing facility as given in the KPDES Permit are as follows:

Average Flow = 0.0014 MGD (1,400 GPD)
Design Capacity = 0.004 MGD (4,000 GPD)

Typical wastewater flows for a facility of this type were evaluated for design conditions:

Design Average Flow:

Schools:	10 gpd per student x 385 students	=	3,850 GPD

Typical Flows are within the range of actual flow and design capacity, therefore all design numbers shall be based on the permitted ***Design Capacity Flow of 4,000 GPD (0.004 MGD)***.

Peak Hourly Flow:

Recommended Standards for Wastewater Facilities estimates the peak hourly flow to the average daily flow by the calculation of a peaking factor based on a relationship to the population equivalent (P.E.) by the equation: [18 + SQRT(P.E. in thousands)] / [4 + SQRT(P.E. in thousands)]. The population equivalent for 4,000 GPD wastewater flow is 40. The associated peaking factor was calculated as 4.33; therefore, the peak hourly flow is 17,333 GPD (12.04 GPM).

Loading:

Recommended Standards for Wastewater Facilities (Section 11.253) estimates the loading rates based on Population Equivalent (P.E.) as BOD_5 = 0.17 lb per P.E. per Day and Total Suspended Solids (TSS) = 0.2 lb per P.E. per Day. Anticipated loadings to the WWTP are as follows:

Average Flow Loading:

1,400 GPD = 14 P.E. x 0.17 lb BOD_5 per P.E. per Day = 2.4 lb BOD_5 per Day
1,400 GPD = 14 P.E. x 0.20 lb TSS per P.E. per Day = 2.8 lb TSS per Day

Design Capacity Flow Loading:

4,000 GPD = 40 P.E. x 0.17 lb BOD_5 per P.E. per Day = 6.8 lb BOD_5 per Day
4,000 GPD = 40 P.E. x 0.20 lb TSS per P.E. per Day = 8.0 lb TSS per Day

Aeration Tanks:

Recommended Standards for Wastewater Facilities (Section 92.31) lists a permissible aeration tank capacity per loading of 15 lb of BOD_5 per Day per 1,000 cubic feet of Tank. For a design capacity loading of 6.8 lb it would require 3,500 GAL of aeration tank capacity. Additional stipulations of providing multiple units capable of independent operation, freeboard, arrangement of tanks to prevent short-circuiting, air requirements and checking other permissible loadings must be taken into consideration when the WWTP manufacturer/contractor designs the specific system. Consequently, the final number, size, and arrangement of the tanks of the must be designed and provided by the WWTP manufacturer/contractor.

Air Requirements:

Recommended Standards for Wastewater Facilities (Section 92.332) states the air requirements of Diffused Air Systems. Normal air requirement for the extended aeration process is given at 2,050 cubic feet per pound of BOD_5. Air requirements for ammonia and nitrogen, sludge returns, skimmers, sludge holding and post aeration must be added to the normal requirement. Basic air requirements were calculated as follows:

BOD_5 = 2,050 CF per pound of BOD_5 x 6.8 lb / 1,400 min/day =	9.7	CFM
Ammonia & Nitro. = 2,050 CF per pound BOD_5 x 17 lb / 1,400 min/day =	9.7	CFM
2 sludge returns x 7 CFM per sludge return =	14.0	CFM
1 skimmer x 7 CFM per skimmer =	7.0	CFM
sludge holding tank = 4 CFM per 1,000 GAL x 2,000 GAL =	8.0	CFM
post aeration = 4 CFM =	4.0	CFM
TOTAL BASIC AIR REQUIREMENTS =	**52.4**	**CFM**
SEPARATE SURGE TANK BLOWER:	**20.0**	**CFM**

Final Settling:

Recommended Standards for Wastewater Facilities (Section 72.232) states the minimum Final Settling Tank surface overflow rate at design peak hourly flow at 1,000 GPD per SQ FT for extended aeration with single stage nitrification. Additional capacity should be considered for uncertainties in operation and to adjust for various processes to minimize problems. If 600 GPD per SQ FT overflow rate at design peak hourly flow is used, a minimum 30 sq ft of settling is required. The final number, size, and arrangement of the clarifier tanks of the must be designed and provided by the WWTP manufacturer/contractor.

Peracetic Acid Contact Tank:

Contact time of the peracetic acid is based on the volume of the tank. A minimum 1,500 gallon contact tank is specified. Contact time is calculated for both average daily flow and peak hourly flow as follows:

Contact Time (min.) = Tank Volume (gal.) / Flow (gpm)

Average Daily Flow → Contact Time = 1,500 gal / 2.78 gpm = 540 minutes

Peak Hourly Flow → Contact Time = 1,500 gal / 12.04 gpm = 125 minutes

Other Equipment and Processes:
The Package WWTP shall also include other basic equipment and processes including trash trap for grease and other floatables, grit and other settleable wastes, surge tanks (flow equalization) with pumps, sludge holding/digester, and re-use of existing intermittent sand filter. See specifications. These particular units in part or whole shall be appropriately designed and sized by the WWTP manufacturer/contractor to meet effluent requirements and requirements of the *Recommended Standards for Wastewater Facilities*.

Closure Plan of the Existing Package WWTP (Section IV.H.1. of the KY Construction Permit Application):
The Existing WWTP will remain on-line during the construction of the new WWTP. The new WWTP will be tested and verified prior to taking the Existing WWTP off-line. The transition to the new Package WWTP system will be conducted while school is closed and wastewater flow can be temporarily halted. Once transitioned, the Existing WWTP will be demolished and removed from the site.

The following Sequence of Closure shall be followed:

1. Proposed package wastewater treatment plant will be brought on-line through manufacturer's startup direction.
2. Contractor shall flush existing lines to be removed to existing wastewater treatment plant while existing wastewater treatment plant is still operable.
3. Contractor shall properly remove sludge/sewage through existing wastewater treatment plant.
4. Contractor shall remove and salvage to owner all pumps, motors, electrical and mechanical items from the existing wastewater treatment plant.
5. Contractor shall excavate and dispose off-site all tanks of the existing wastewater treatment plant and fill with compacted soil.
6. All disturbed areas shall receive topsoil, fertilized, fine graded and seeded per specifications.

Sludge Management Plan (Section IV.H.2. of the KY Construction Permit Application):
The sewage treatment system shall be provided with a 2,000 gallon sludge holding tank. The sludge holding tank shall be separate from the main tankage and easily accessible for pumping. Pumping shall be by a licensed sanitary sewage disposal contractor.

Flow Measuring (Section IV.H.4. of the KY Construction Permit Application):
Flow from the sewage treatment system shall be measured with a weir plate at the outlet of the disinfection contact tank and a Pulsar OCF 6.1 ultrasonic level flow meter and transducer, or equivalent.