INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
We Protect Hoosiers and Our Environment.
100 N. Senate Avenue • Indianapolis, IN 46204
(800) 451-6027 • (317) 232-8603 • www.idem.IN.gov

Eric J. Holcomb
Governor

Brian C. Rockensuess
Commissioner

December 15, 2021

VIA ELECTRONIC MAIL

Mr. Fred F. Buckingham, Chairman
Ben Davis Conservancy District
703 South Tibbs Avenue
Indianapolis, Indiana 46241

Dear Mr. Buckingham:

Re: 327 IAC 3 Construction Permit Application
Ben Davis Conservancy District Wastewater
Treatment Plant and Regional Lift Station
Permit Approval No. 24183
Indianapolis, Indiana
Marion County

The application, plans and specifications, and supporting documents for the above-referenced project have been reviewed and processed in accordance with rules adopted under 327 IAC 3. Enclosed is the Construction Permit (Approval No. 24183), which applies to the construction of the above-referenced proposed water pollution treatment/control facility to be located approximately 825 feet south and 275 feet west of the intersection of South Tibbs Avenue and Delmar Avenue in the City of Indianapolis.

Please review the enclosed permit carefully and become familiar with its terms and conditions. In addition, it is imperative that the applicant, consulting architect/engineer (A/E), inspector, and contractor are aware of these terms and conditions.

It should be noted that any person affected or aggrieved by the agency's decision in authorizing the construction of the above-referenced facility may, within fifteen (15) days from date of mailing, appeal by filing a request with the Office of Environmental Adjudication for an adjudicatory hearing in accordance with IC 4-21.5-3-7 and IC 13-15-6. The procedure for appeal is outlined in more detail in Part III of the attached construction permit.

Plans and specifications were prepared by Triad Associates, Inc., certified by Mr. Jonathan P. Moen, P.E., and submitted for review on December 6, 2021.

Any technical/engineering questions concerning this permit may be addressed to the undersigned at 317/234-8226.

Sincerely,

Kevin D. Czerniakowski

Kevin D. Czerniakowski, P.E.
Section Chief
Facility Construction and
Engineering Support Section
Office of Water Quality

Project No SRF-0668
Enclosures
cc: Marion County Health Department
Triad Associates, Inc.

INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
AUTHORIZATION FOR CONSTRUCTION OF
WATER POLLUTION TREATMENT/CONTROL FACILITY
UNDER 327 IAC 3

DECISION OF APPROVAL

The Ben Davis Conservancy District, in accordance with the provisions of IC 13-15 and 327 IAC Article 3 is hereby issued a permit to construct a water pollution treatment/control facility located approximately 825 feet south and 275 feet west of the intersection of South Tibbs Avenue and Delmar Avenue in the City of Indianapolis. The permittee is required to comply with requirements set forth in Parts I, II and III hereof. The permit is effective pursuant to IC 4-21.5-3-4(d). If a petition for review and a petition for stay of effectiveness are filed pursuant to IC 13-15-6, an Environmental Law Judge may be appointed for an adjudicatory hearing. The force and effect of any contested permit provision may be stayed at that time.

NOTICE OF EXPIRATION DATE

Authorization to initiate construction of this pollution treatment/control facility shall expire at midnight one year from the date of issuance of this construction permit. In order to receive authorization to initiate construction beyond this date, the permittee shall submit such information and forms as required by the Indiana Department of Environmental Management. It is requested that this information be submitted sixty (60) days prior to the expiration date to initiate construction. This permit shall be valid for a period of five (5) years from the date below for full construction completion.

Issued on December 15, 2021, for the Indiana Department of Environmental Management.

Kevin D. Czerniakowski

Kevin D. Czerniakowski, P.E.
Section Chief
Facility Construction and
Engineering Support Section
Office of Water Quality

WATER POLLUTION TREATMENT/CONTROL FACILITY DESCRIPTION

The Ben Davis Conservancy District is a special taxing district created for the sole purpose of collecting and transporting sanitary sewage. Wastewater is currently transported for treatment to the Belmont Wastewater Treatment Plant (WWTP), which is owned and operated by the CWA Authority (CWA) for Citizens Energy Group. Indianapolis is a combined sewer community and must implement a Long Term Control Plan under a consent decree with the USEPA and IDEM. This requires significant infrastructure investment which is often passed on to the customers as higher rates. However, Ben Davis Conservancy District is comprised of 100% separated sewers and does not contribute to the underlying and costly problems of CWA's system.

In 2015, the Indiana Utility Regulatory Commission ordered CWA to renegotiate contracts that were in place for treatment services with its satellite customers (which includes Ben Davis Conservancy District). Satellite customers were found to be paying below the full cost of sewage processing. The settlement agreement arranged to phase-in to the full satellite tariff treatment rate over a succeeding ten-year period (to avoid rate shock). However, the agreement also contained a statement that CWA would not object if the District wanted to pursue constructing its own treatment plant in the future.

The District Board commissioned a study to evaluate the feasibility of building and operating a dedicated treatment facility. The preliminary engineering report indicated that a new plant would be less costly than continuing to send wastewater to CWA for treatment. A new plant would also ensure District users were not subject to funding rising non-district sewer separation project costs. The Ben Davis Conservancy District is proposing the construction of a new wastewater treatment facility and discontinuing conveying flows to CWA. The proposed WWTP average and peak hourly flow capacities will be 4.0 MGD and 12.0 MGD, respectively.

The collection system proposed project will include but is not limited to the following: new regional lift station with four (4) pumps, mechanical fine screen with manual trash rack bypass, and a new 250 kW natural gas generator.

The wastewater treatment plant proposed project will include but is not limited to the following: four (4) aeration basins, two (2) secondary clarifiers, chemical phosphorus removal facilities, ultraviolet light (UV) disinfection, diffused air post-aeration, and new effluent piping and associated outfall structure. The WWTP will also have an influent electromagnetic flow meter and effluent ultrasonic flow meter. Solids will be treated in two (2) aerobic digesters, dewatered in a screw press, and disposed of by landfill via a licensed third party hauler.

CONDITIONS AND LIMITATIONS TO THE AUTHORIZATION FOR CONSTRUCTION OF WATER POLLUTION TREATMENT/CONTROL FACILITY

During the period beginning on the effective date of this permit and extending until the expiration date, the permittee is authorized to construct the above described water pollution treatment/control facility. Such construction shall conform to all provisions of State Rule 327 IAC 3 and the following specific provisions:

PART I

SPECIFIC CONDITIONS AND LIMITATIONS TO THE CONSTRUCTION PERMIT

Unless specific authorization is otherwise provided under the permit, the permittee shall comply with the following conditions:

1. Additional treatment facilities shall be installed if the proposed facilities prove to be inadequate or cannot meet applicable federal or state standards.

2. Any local permits required for this project, along with zoning or easement acquisition, shall be obtained before construction is initiated.

3. If pollution or nuisance conditions are created, immediate corrective action will be taken by the permittee.

4. Ben Davis Conservancy District shall notify the Department of Environmental Management of the date of start-up and completion of the proposed project.

5. If construction is located within a designated floodway, a permit may also be required from the Department of Natural Resources prior to start of construction. It is the permittee's responsibility to coordinate with that agency and obtain any required approvals if applicable. Questions may be directed to the Technical Services Section, Division of Water at 317/232-4160.

6. If this project includes a change in design flow, addition of new treatment unit(s), or modification/removal of existing treatment unit(s), an NPDES Permit modification will likely be required. This would include any CSO treatment addition/modification. Questions may be directed to the NPDES Permit Section, Office of Water Quality at 317/233-0469

7. Plans for the outfall structure shall be submitted to the Department of Natural Resources for consideration of approval prior to the start of construction.

Failure to meet guidelines as set forth in the above conditions could be subject to enforcement proceedings as provided by 327 IAC 3-5-3.

PART II

GENERAL CONDITIONS

1. No significant or material changes in the scope of the plans or construction of this project shall be made unless the following provisions are met:

   a. Request for permit modification is made 60 days in advance of the proposed significant or material changes in the scope of the plans or construction;

   b. Submit a detailed statement of such proposed changes;

   c. Submit revised plans and specifications including a revised design summary; and

   d. Obtain a revised construction permit from this agency.

2. This permit may be modified, suspended, or revoked for cause including, but not limited to the following:

   a. Violation of any term or conditions of this permit:

   b. Obtaining this permit by misrepresentation or failure to disclose fully all relevant facts.

3. Nothing herein shall be construed as guaranteeing that the proposed water pollution treatment/control facility shall meet standards, limitations or requirements of this or any other agency of state or federal government, as this agency has no direct control over the actual construction and/or operation of the proposed project.

PART III

NOTICE OF RIGHT TO ADMINISTRATIVE REVIEW

Anyone wishing to challenge this construction permit must do so by filing a Petition for Administrative Review with the Office of Environmental Adjudication (OEA), and serving a copy of the petition upon IDEM. The requirements for filing a Petition for Administrative Review are found in IC 4-21.5-3-7, IC 13-15-6-1 and 315 IAC 1-3-2. A summary of the requirements of these laws is provided below.

A Petition for Administrative Review must be filed with the Office of Environmental Adjudication (OEA) within fifteen (15) days of the issuance of this notice (eighteen (18) days if notice was received by U.S. Mail), and a copy must be served upon IDEM. Addresses are:

Director
Office of Environmental Adjudication
Indiana Government Center North
Room 103
100 North Senate Avenue
Indianapolis, Indiana 46204

Commissioner
Indiana Department of Environmental Management
Indiana Government Center North
Room 1301
100 North Senate Avenue
Indianapolis, Indiana 46204

The petition must contain the following information:

1. The name, address and telephone number of each petitioner.
2. A description of each petitioner's interest in the permit.
3. A statement of facts demonstrating that each petitioner is:
    a. a person to whom the order is directed;
    b. aggrieved or adversely affected by the permit; or
    c. entitled to administrative review under any law.
4. The reasons for the request for administrative review.
5. The particular legal issues proposed for review.
6. The alleged environmental concerns or technical deficiencies of the permit.
7. The permit terms and conditions that the petitioner believes would be appropriate and would comply with the law.
8. The identity of any persons represented by the petitioner.
9. The identity of the person against whom administrative review is sought.
10. A copy of the permit that is the basis of the petition.
11. A statement identifying petitioner's attorney or other representative, if any.

Failure to meet the requirements of the law with respect to a Petition for Administrative Review may result in a waiver of the Petitioner's right to seek administrative review of the permit. Examples are:

1. Failure to file a Petition by the applicable deadline;
2. Failure to serve a copy of the Petition upon IDEM when it is filed; or
3. Failure to include the information required by law.

If Petitioner seeks to have a permit stayed during the administrative review, he or she may need to file a Petition for a Stay of Effectiveness. The specific requirements for such a Petition can be found in 315 IAC 1-3-2 and 315 IAC 1-3-2.1.

Pursuant to IC 4-21.5-3-17, OEA will provide all parties with notice of any pre-hearing conferences, preliminary hearings, hearings, stays, or orders disposing of the review of this action. Those who are entitled to notice under IC 4-21.5-3-5(b) and would like to obtain notices of any pre-hearing conferences, preliminary hearings, hearings, stays, or orders disposing of the review of this action without intervening in the proceeding must submit a written request to OEA at the address above.

More information on the review process is available at the website for the Office of Environmental Adjudication at http://www.in.gov/oea.

Wastewater Treatment Facility Design Summary

I. GENERAL

1. Applicant: Ben Davis Conservancy District
2. Facility Name: Ben Davis Conservancy District Wastewater Treatment Plant
3. Project Type: New facility
4. Project Title: Ben Davis Conservancy District Wastewater Treatment Plant and Regional Lift Station
5. Project Location: 900 S Tibbs Ave, Indianapolis, IN 46241
6. Construction Permit Number: 24183
7. Design Engineer: Mr. Jonathan P. Moen, P.E.
8. Engineering Company: Triad Associates, Inc.
9. NPDES Permit Number: Pending
   A. Preliminary Effluent Limitations: October 28, 2020
   B. Anti-degradation Assessment: June 28, 2021
10. Project Scope
    A. Description of project needs: The Ben Davis Conservancy District is a special taxing district created for the sole purpose of collecting and transporting sanitary sewage. Wastewater is currently transported for treatment to the Belmont Wastewater Treatment Plant (WWTP), which is owned and operated by the CWA Authority (CWA) for Citizens Energy Group. Indianapolis is a combined sewer community and must implement a Long Term Control Plan under a consent decree with the USEPA and IDEM. This requires significant infrastructure investment which is often passed on to the customers as higher rates. However, Ben Davis Conservancy District is comprised of 100% separated sewers and does not contribute to the underlying and costly problems of CWA's system.

    In 2015, the Indiana Utility Regulatory Commission ordered CWA to renegotiate contracts that were in place for treatment services with its satellite customers (which includes Ben Davis Conservancy District). Satellite customers were found to be paying below the full cost of sewage processing. The settlement agreement arranged to phase-in to the full satellite tariff treatment rate over a succeeding ten-year period (to avoid rate shock). However, the agreement also contained a statement that CWA would not object if the District wanted to pursue constructing its own treatment plant in the future.

    The District Board commissioned a study to evaluate the feasibility of building and operating a dedicated treatment facility. The preliminary engineering report indicated that a new plant would be less costly than continuing to send wastewater to CWA for treatment. A new plant would also ensure District users were not subject to funding rising non-district sewer separation project costs. The

Ben Davis Conservancy District is proposing the construction of a new wastewater treatment facility and discontinuing conveying flows to CWA.

B. The collection system proposed project will include but is not limited to the following: new regional lift station with four (4) pumps, mechanical fine screen with manual trash rack bypass, and a new 250 kW natural gas generator.

   The wastewater treatment plant proposed project will include but is not limited to the following: four (4) aeration basins, two (2) secondary clarifiers, chemical phosphorus removal facilities, ultraviolet light (UV) disinfection, diffused air post-aeration, and new effluent piping and associated outfall structure. The WWTP will also have an influent electromagnetic flow meter and effluent ultrasonic flow meter. Solids will be treated in two (2) aerobic digesters, dewatered in a screw press, and disposed of by landfill via a licensed third party hauler. Is project part of an Agreed Order?: No

C. Is project part of an Agreed Order?: No

D. How facility will maintain treatment during construction: Will continue transporting to the Southport Advanced Wastewater Treatment Plant until the plant is ready

11. Source of Funding: Local Funds

12. Estimated Total Project Cost: $13,500,000

II. DESIGN DATA

1. Design Average Flow: 4.0 MGD
   A. Domestic: 2.0 MGD
   B. Industrial/Commercial: 0.5 MGD
   C. Infiltration/Inflow: 1.5 MGD
2. Design Peak Hourly Flow: 12 MGD (all 4 raw sewage pumps pumping)
3. Design Waste Strength
   A. CBOD: 170 mg/L
   B. TSS: 200 mg/L
   C. NH_3-N: 25 mg/L
   D. P: 5 mg/L

   Note: Sampling was conducted by the District from January 2018 to May 2020 and measured CBOD, TSS, and NH3-N four times a month. Since phosphorus was not required to be sampled at that time, a 7-day sampling was ordered for all parameters. This 7-day period also closely matched historical sampling data.
4. Design Population Equivalent: 33,360 (based on 0.17 lb CBOD/PE influent loading)
5. NPDES Permit Limitation on Effluent Quality

   Based on Preliminary Effluent Limitations letter dated October 28, 2020
   A. $CBOD_5$: 10 mg/L (monthly average)
   B. TSS: 12 mg/L (monthly average)
   C. NH_3-N: 1.1 mg/L summer and 1.6 mg/L winter (monthly average)

D. P: 1.0 mg/L (monthly average)
E. pH: 6.0 s.u. (daily min) and 9.0 s.u. (daily max)
F. DO: 6.0 mg/L (daily min)
G. Total Residual Chlorine: None, Ultraviolet (UV) light disinfection
H. *E. coli*: 125 count/100 mL (monthly average), 235 count/100 mL (daily max)

6. Sampling Method (Grab or Automatic Sampler) and Location
   A. Influent: Automatic sampler, regional lift station
   B. Effluent: Automatic sampler, post-aeration channel
7. Receiving Stream
   A. Name: Neeld Ditch
   B. Stream Uses: Full body contact recreational use and shall be capable of supporting a well-balanced warm water aquatic community
   C. 7-day, 1-in-10 year low flow: 0.0 CFS

III. PLANT DETAILS

1. Laboratory type (e.g., on site, third-party testing): On-site
2. Plant site fence provided: Yes
3. Handrail/grating provided where necessary: Yes
4. Flood hazard elevation at 100-year flood: 695.50 ft
5. Provisions for mechanical/electrical component protection at 100-year flood: Above 100-year flood elevation; FEMA Effective Zone X
6. Type and rating (kW) of standby power equipment: 1,000 kW natural gas generator
7. Provisions for removing heavy equipment: Yes, hoists and cranes
8. Septage/leachate receiving facilities: None

IV. TREATMENT UNITS

Activated Sludge (Proposed)

1. Conventional or extended aeration: Extended Aeration
2. Number and dimensions of unit: Four (4) tanks each 45 ft W x 140 ft L x 16.5 ft D
3. Side water depth and freeboard of unit: 15 ft SWD and 1.5 ft FB
4. Hydraulic detention time: 17 hours
5. Organic loading at design average flow: 15 lb CBOD/1000 ft^3
6. Design MLSS concentration: 3,000 mg/L
7. Design solids retention time: 17 days
8. Design F/M ratio: 0.1 lb CBOD/day/lb MLVSS
9. Type and efficiency of diffusers: Fine bubble diffusers and 2%/ft SOTE
10. Dedicated or shared plant blowers: Dedicated
11. Type and rated capacity of blowers: Three (3) @ 4,000 cfm, each
12. Constant or variable speed blowers: Variable

13. Oxygen requirement
    A. CBOD removal: 8,507 lb O_2/day
    B. NH_3-N removal: 3,836 lb O_2/day
14. Total air demand: 12,000 SCFM
15. Firm blower capacity: 12,000 SCFM (with one blower on standby)
16. Type of ventilation in blower room: Shed but in sound enclosure
17. Number and capacity of return sludge pumps: Two (2) and 2,100 gpm, each
18. Method of return sludge rate control: Mag meter, SCADA, and VFD
19. Return sludge rate as % of design average flow: 100 to 150%
20. Provisions for return rate metering
    A. Type and size: 12-inch electromagnetic
    B. Location: Discharge line from the RAS pumps (inside pump building)
21. Return sludge discharge location: Influent of aeration tank
22. Method of unit isolation: Motor operated gates
23. Method of flow split control: Motor operated gates

Secondary Clarification (Proposed)

1. Type of clarifier: Circular with center feed and rim collection
2. Number and dimensions of unit: Two (2) @ 100 ft diameter
3. Side water depth and freeboard of unit: 15.4 ft SWD and 1.5 ft FB
4. Surface overflow rate
    A. at design average flow: 255 gpd/ft^2
    B. at design peak hourly flow: 764 gpd/ft^2
5. Hydraulic detention time
    A. at design average flow: 10.9 hours
    B. at design peak hourly flow: 3.6 hours
6. Weir loading rate at design peak hourly flow: 10,000 gpd/lin·ft
7. Location of overflow weir: Dual weir trough on perimeter
8. Method of scum collection: Full radius scum beach
9. Method of scum disposal: Grinder pump station before pumped to digester
10. Type of sludge removal mechanism: Suction
11. Method of unit isolation: Yes, gates in secondary clarifier splitter box
12. Method of flow split control: Yes, gates in secondary clarifier splitter box

Chemical Phosphorus Removal (Proposed)

1. Chemical properties
    A. Chemical name: Sodium Aluminate ($Al_2Na_2O_4$)
    B. Weight concentration in solution: 43%
    C. Specific gravity: 1.52
2. Chemical storage container
    A. Type: Polyethylene tank
    B. Volume: 7,000 gallons
    C. Expected storage supply: 30+ days

3. Secondary containment
   A. Type: Double Walled Tank
   B. Dimensions or volume: N/A
4. Number and capacity of chemical feed pumps: Two (2) @ 21 GPH, each
5. Design chemical feed rate: 7 GPH
6. Location(s) of chemical injection: Secondary clarifier splitter box
7. Provisions for adequate mixing at injection point: Turbulent flow
8. Chemical building
   A. Method of ventilation control: Powered ventilator
   B. Method of temperature control: Heater with thermostat
   C. Safety shower/eyewash equipment: Provided

Ultraviolet Disinfection (Proposed)

1. Open channel or closed-vessel: Open channel
2. Vertical, horizontal, or diagonal lamp orientation: Vertical
3. Lamp type: Low pressure, high output
4. Number of banks: One (1)
5. Number of modules per bank: Six (6)
6. Number of lamps per module: 40
7. Dosage: 30,000 $\mu Ws/cm^2$ minimum
8. Transmittance: 65% minimum
9. Provisions for intensity monitoring: Yes, sensor
10. Type of level control provisions: Serpentine weir
11. Type of bypass provisions: Pipe and valved bypass
12. Type of safety equipment: Gloves, protective eye wear, face shield
13. Automatic or manual cleaning equipment: Automatic

Diffused Air Post-Aeration (Proposed)

1. Number and dimensions of unit: One (1) and 10 ft W x 32.5 ft L
2. Side water depth and freeboard of unit: 10.85 ft SWD and 2.65 ft FB
3. Type and efficiency of diffuser: Fine bubble diffusers and 2% SOTE
4. Dedicated or shared plant blowers: Dedicated
5. Type and rated capacity of blowers: Two (2) rotary lobe @ 120 cfm

Effluent Flow Meter (Proposed)

1. Type and size (in): Ultrasonic flowmeter
2. Location description: Mounted over the post-aeration tank (upstream of weir)
3. Indicating, recording and totalizing: Yes

Aerobic Digester (Proposed)

1. Number and dimensions of unit: Two (2) and 45 ft W x 140 ft L
2. Side water depth and freeboard of unit: 1 ft SWD and 1.5 ft FB
3. Volume: 1,400,000 gallons
4. Total design sludge loading: 5,671 lbs/day
5. Volatile solids percentage: 75%

6. Design solids retention time: 60 days
7. Type and efficiency of diffusers: Coarse bubble diffusers and 0.75% SOTE
8. Dedicated or shared plant blowers: Dedicated
9. Type and rated capacity of blowers: Two (2) rotary lobe @ 2,835 cfm, each
10. Decanting method: Telescoping valve
11. Discharge location of supernatant: Plant lift station

Mechanical Dewatering (Proposed)

1. Type of dewatering unit: Dewatering screw press
2. Number and dimensions of unit: One (1) unit 13' L x 6' W x 6' H
3. Hydraulic capacity: 44,100 gal/week (52 gpm)
4. Solids capacity: 1,000 lb/hr
5. Type of chemicals added: Polymer
6. Expected solids content of dewatered sludge: 18%
7. Discharge location of drainage: Plant lift station

Final Sludge Disposal (Proposed)

1. Ultimate disposal method of sludge: Landfill
2. Expected solids content of sludge (by the principal method of disposal): 18%
3. Location of disposal site: Southern Marion County
4. Ownership of the disposal site: Licensed third party hauler
5. Availability of sludge transport equipment: None, licensed third party hauler

V. SEWER COLLECTION SYSTEM

Regional Lift Station (Proposed)

1. Location description: Near 703 S Tibbs Ave, Indianapolis, IN 46241
2. Type of pump: Submersible
3. Number of pumps: Four (4)
4. Constant or variable speed: Variable
5. Design operating capacity and TDH: 8,333 gpm (12 MGD) and 86 ft TDH
6. Operating volume of the wet well: 5,800 gallons
7. Detention time in the wet well: 8.5 minutes
8. Shutoff valve and check valve in the discharge line: Yes
9. Shutoff valve on suction line: N/A
10. Type of ventilation: Forced air
11. Type of standby power: 250 kW natural gas generator
12. Type of alarm: Audio & Visual with SCADA
13. Type of bypass or overflow provisions: None

Screening at Regional Lift Station (Proposed)

1. Type of screening: Mechanical fine screen
2. Location description: Upstream of regional lift station pumps
3. Bypass bar screen provision: Yes, trash basket
4. Number and rated capacity: One (1) @ 16 MGD

5. Clear opening sizes, bar or perforations: ¼-inch
6. Slope of unit: 70°
7. Method of unit cleaning: Self-cleaning
8. Method of screening disposal: Compactor and dumpster
9. Method of unit isolation: Yes, stop gate
10. Method of flow split control: None, single train

Flow Meter at Regional Lift Station (Proposed)

1. Type and size: 16-inch electromagnetic
2. Location description: On the discharge line of regional pump station
3. Indicating, recording, and totalizing: Yes

Sewer (Proposed)

1. Gravity or vacuum sewer: Gravity
2. Type of pipe material: PVC influent sewer / PVC outfall sewer
3. ASTM/AWWA standard and SDR/DR: ASTM D2241 and SDR-21
4. Diameter and length of sewer: 36" dia. @ 267 ft long / 36" dia. @ 443 ft long
5. Number of manholes: One (1) on influent / One (1) on effluent

Force Main (Proposed)

1. Type of pipe material: PVC
2. ASTM/AWWA standard: ASTM D2241 and SDR-21
3. SDR/DR and pressure class: SDR-21, 200 psi minimum
4. Diameter and length of sewer: 16" dia. @ 18 ft long and 24" dia. @ 1,394 ft long

PROJECT NO.
SRF-0668X

INTRA-OFFICE MEMO

FROM: 327 IAC Construction Permit Coordinator
Engineering Plan Review Section
Office of Water Quality

TO: KDC

SUBJECT: **Project:** Ben Davis Conservancy District WWTP
Location: Indianapolis, Marion County
 # Units: New Wastewater Treatment Plant
Design Flow: 4.0 MGD
Received On: 12/6/2021
Wastewater Treatment By: Ben Davis Conservancy District WWTP

Maintenance Provided By: Ben Davis Conservancy District

WWTP Design Summary ----------	☑	Should be completely filled out, And match the Preliminary Limits
$ Check----------	☑	Not required for State or Federal projects
Signed Application ---------- need engineer name on first page	☐	Signed by applicant for SRF projects
Plans and Specifications ----------	☑	Each page must be signed or sealed by an Indiana P.E.
Potentially Affected Person List ----	☑	Names and addresses on signed and dated form, mailing list and mailing labels (Code 65-42FC)
Preliminary Limits from NPDES----	☑	New one needed if more than 1 year old - it may need to include information regarding BADCT and Phosphorus Limits
Anti-degradation Assessment------	☐	Verification from NPDES Section that a preliminary approval is complete
SRF Group----------	☑	Emailed Application November 29, 2021

APPLICATION FOR WASTEWATER TREATMENT PLANT CONSTRUCTION PERMIT PER 327 IAC 3

State Form 53160 (R8 / 6-20)

Indiana Department of Environmental Management
Office of Water Quality
Facility Construction and Engineering Support Section, Mail Code 65-42FC
100 North Senate Avenue, Room N1255
Indianapolis, IN 46204-2251

APPLICANT	APPLICANT'S ENGINEER
Name ☒ Mr. or ☐ Ms. Fred F. Buckingham	Name ☒ Mr. or ☐ Ms. JONATHAN MOEN P.E.
Name of Organization Ben Davis Conservancy District	Name of Company Triad Associates, Inc.
Address *(number and street, city, state, and ZIP)* 703 S. Tibbs Avenue Indianapolis, IN 46241	Address *(number and street, city, state, and ZIP)* 5835 Lawton Loop East Drive Indianapolis, IN 46216
Telephone Number (317) 241-2941	Telephone Number (317) 377-5230
E-Mail Address angela@bdconservancy.com (Board Secretary)	E-Mail Address kschuch@triadassoc.net

NAME AND LOCATION OF PROPOSED FACILITY	PROJECT DESCRIPTION
Name Ben Davis Conservancy District	Describe the scope and/or purpose of this project The project scope is construction of a 4 MGD wastewater treatment plant to serve the Ben Davis Conservancy District. The plant is being constructed to allow the District to provide treatment services at a reasonable cost to their constituents. The current treatment rate will result in an increase of 700% through 2025 at which time another rate increase will be implemented. The planned increases exceed the costs to build and operate a District owned plant.
Location or Project Boundaries West of Tibbs Ave., north of I-70 and South of CSX RR.	
City or Town Indianapolis	
County Marion	

FACILITY TYPE	PROJECT TYPE
☒ Municipal wastewater treatment facility ☐ Semipublic wastewater treatment facility	☒ New facility ☐ Expansion or modification of existing facility ☐ LTCP improvements

SOURCE OF FUNDING

☐ IFA's Wastewater State Revolving Fund Loan Program	☒ Local Funds
☐ OCRA's Community Development Block Grant	☐ Private Funds
☐ USDA's Rural Development Loan and Grant Assistance	☐ Other:

CERTIFICATION AND SIGNATURE

I swear or affirm, under penalty of perjury as specified by IC 35-44.1-2-1 and other penalties specified by IC 13-30-10 and IC 13-15-7-1(3), that the statements and representations in this application are true, accurate, and complete.

RECEIVED
DEC 06 2021
IDEM/OWQ

Printed Name of Person Signing	Title	Signature of Applicant	Date Signed *(month / day / year)*
Fred F. Buckingham	Chairman		11/22/21

(Please refer to IC 13-30-10 for penalties of submission of false information.)

Check # 33834
Triad Associates, Inc
@ 50.00 12/6/2021

SRF-D606BX

APPLICATION FOR WASTEWATER TREATMENT PLANT CONSTRUCTION PERMIT PER 327 IAC 3

State Form 53160 (R8 / 6-20)

Indiana Department of Environmental Management
Office of Water Quality
Facility Construction and Engineering Support Section,
Mail Code 65-42FC
100 North Senate Avenue, Room N1255
Indianapolis, IN 46204-2251

APPLICANT	APPLICANT'S ENGINEER
Name ☒ Mr. or ☐ Ms. Fred F. Buckingham	Name ☒ Mr. or ☐ Ms.
Name of Organization Ben Davis Conservancy District	Name of Company Triad Associates, Inc.
Address *(number and street, city, state, and ZIP)* 703 S. Tibbs Avenue Indianapolis, IN 46241	Address *(number and street, city, state, and ZIP)* 5835 Lawton Loop East Drive Indianapolis, IN 46216
Telephone Number (317) 241-2941	Telephone Number (317) 377-5230
E-Mail Address angela@bdconservancy.com (Board Secretary)	E-Mail Address kschuch@triadassoc.net

NAME AND LOCATION OF PROPOSED FACILITY	PROJECT DESCRIPTION
Name Ben Davis Conservancy District	Describe the scope and/or purpose of this project The project scope is construction of a 4 MGD wastewater treatment plant to serve the Ben Davis Conservancy District. The plant is being constructed to allow the District to provide treatment services at a reasonable cost to their constituents. The current treatment rate will result in an increase of 700% through 2025 at which time another rate increase will be implemented. The planned increases exceed the costs to build and operate a District owned plant.
Location or Project Boundaries West of Tibbs Ave., north of I-70 and South of CSX RR.	
City or Town Indianapolis	
County Marion	

FACILITY TYPE	PROJECT TYPE
☒ Municipal wastewater treatment facility ☐ Semipublic wastewater treatment facility	☒ New facility ☐ Expansion or modification of existing facility ☐ LTCP improvements

SOURCE OF FUNDING

☐ IFA's Wastewater State Revolving Fund Loan Program	☒ Local Funds
☐ OCRA's Community Development Block Grant	☐ Private Funds
☐ USDA's Rural Development Loan and Grant Assistance	☐ Other:

CERTIFICATION AND SIGNATURE

I swear or affirm, under penalty of perjury as specified by IC 35-44.1-2-1 and other penalties specified by IC 13-30-10 and IC 13-15-7-1(3), that the statements and representations in this application are true, accurate, and complete.

RECEIVED
DEC 06 2021
IDEM/OWQ

Printed Name of Person Signing
Fred F. Buckingham

Title
Chairman

Signature of Applicant

Date Signed *(month / day / year)*
11/22/21

(Please refer to IC 13-30-10 for penalties of submission of false information.)

Check # 33834
Triad Associates, INC
$50.00 12/6/2021

WASTEWATER TREATMENT PLANT CONSTRUCTION PERMIT FEES		
I. The applicants listed below must remit with each application a fee of fifty dollars ($50). These applications must be signed by an official of the entity. (*Check all that apply.*)		
☐	County, Municipality, or Township which is defined as a unit under IC 36-1-2-23	
☐	A Nonprofit Organization	
☒	A Conservancy District	
☐	A School Corporation that operates a sewage treatment facility	
☐	A Regional Water or Sewage District	
II. All other applications (including semi-public) will pay the following revised fees per project type:		
New Wastewater Treatment Plant (not including industrial)		
☐	A. Up to 500,000 gallons per day	$1,250.00
☐	B. Greater than 500,000 per day	$2,500.00
Wastewater Treatment Plant Expansion		
☐	A. Up to fifty percent (50%) design capacity:	
☐	1. Greater than 500,000 per day	$1,250.00
☐	2. Up to 500,000 per day	$625.00
☐	B. Greater than fifty percent (50%) design capacity	
☐	1. Greater than 500,000 gallons per day	$2,500.00
☐	2. Up to 500,000 gallons per day	$1,250.00
Wastewater Treatment Plant Modification		$625.00
Only one (1) of the fees will apply. Checks for the applicable fee shall be made payable to the **Indiana Department of Environmental Management**. Fees shall not be refundable once staff review and processing of the Permit Application has commenced.		

WASTEWATER TREATMENT PLANT DESIGN SUMMARY

I. General

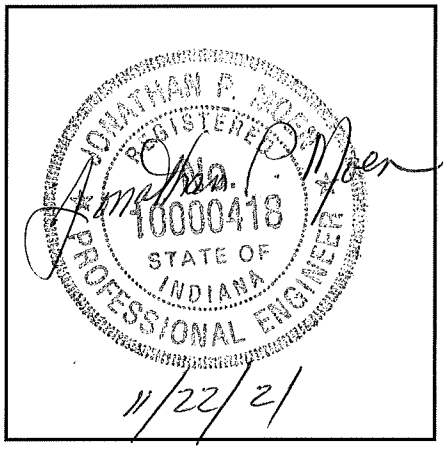
1. Applicant: Ben Davis Conservancy District
2. Facility Name: Ben Davis WWT Facility
3. Project Title: New Wastewater Treatment Facility
4. Project Location: 900 South Tibbs, Indianapolis, IN
5. Design Engineer: Jonathan Moen, P.E.
6. Engineering Company: Triad Associates, Inc.
7. NPDES Permit Number: TO BE APPLIED FOR
   - A. Effective date (*month / day / year*): / /
   - B. Expiration date (*month / day / year*): / /
8. Project Scope
   - A. Description of existing treatment facilities:
     Wastewater from the District is currently transported over 8 miles for treatment at the Southport AWT facility which is operated by Citizens Water Authority (CWA).
   - B. Description of project needs:
     The District is pursuing construction of their own WWTP to reduce costs to its users. CWA implemented significant rate increases to be phased in through 2025, at which time another rate increase will go into effect.Per a court approved Settlement Agreement, CWA will offer no objections to the District constructing their own plant and disconnecting from CWA's system.
   - C. Description of proposed facilities:
     The facilities include a raw sewage pump station with screening and flow metering, conventional aeration tanks, flow splitters, 2 clarifiers, digesters, ultraviolet disinfection, diffused air post aeration with flow metering and an outfall sewer to Neeld Ditch.
   - D. Is project part of an Agreed Order?: ☐ Yes ☒ No
   - E. How facility will maintain treatment during construction:
     N/A
9. Source of Funding: Local funding
10. Estimated Total Project Cost: 15.5 million

Certification Seal, Signature, and Date

Printed Name of Engineer
Jonathan Moen, P.E.

Signature Jonathan P. Moen

Date Signed *(month / day / year)*
November / 22 / 2021



II. Design Data

1. Design Average Flow (MGD): 4.0
   - A. Domestic: 2.0

B. Industrial/Commercial: .5
C. Infiltration/Inflow: 1.5
2. Design Peak Hourly Flow (MGD): 12.0
3. Maximum Flow Capacity (MGD): 16.0
A. Combination of treatment plant + EQ volume:
B. Other explanation:
4. Design Waste Strength
A. CBOD: 170 mg/L
B. TSS: 200 mg/L
C. NH_3-N: 25 mg/L
D. P: 5 mg/L
E. Other:
5. Design Population Equivalent (PE): 33,360 (based on 0.17 lb CBOD/PE influent loading)
6. NPDES Permit Limitation on Effluent Quality
A. $CBOD_5$: summer and winter is 10 mg/L
B. TSS: summer and winter is 12 mg/L
C. NH_3-N: summer is 1.1 mg/L and winter is 1.6 mg/L mg/L
D. P: summer and winter 1.0 mg/L
E. pH: 6-9 s.u.
F. DO: 6.0 mg/L
G. Total Residual Chlorine: .1 mg/L
H. *E.coli*: 125
I. Other:
7. Sampling Method (Grab or Automatic Sampler) and Location
A. Influent: Sampler
B. Effluent: Sampler
8. Receiving Stream
A. Name: Neeld Ditch
B. Stream Uses: Full body contact recreational use and shall be capable of supporting a well-balanced warm water aquatic community ☐ and designated as salmonid water and shall be capable of supporting a salmonid fishery ☐ and designated as an impaired water ☐ and classified as an outstanding state resource water (OSRW) ☐ and classified as an outstanding national resource water (ONRW)
C. 7-day, 1-in-10 year low flow: 0.0 CFS (0.0 MGD)
III. PLANT DETAILS
1. Laboratory type (e.g., on site, third-party testing): on-site
2. Plant site fence provided: fence provided
3. Handrail/grating provided where necessary: Yes
4. Flood hazard elevation (ft) at 100 year flood: 695.50
5. Provisions for mechanical/electrical component protection at 100 year flood: site is above 100 year fld
6. Type and rating (kW) of standby power equipment: natural gas 1000 KW unit
7. Provisions for removing heavy equipment: Yes, hoists and cranes are part of the installation
8. Septage/leachate receiving facilities
A. Type of preliminary treatment: N/A
B. Storage and controlled feed provisions:

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C. Location of discharge to treatment process:	
IV. Treatment Units	
Plant Site Lift Station	☐ Proposed ☐ Existing ☐ Modification ☒ N/A
1. Location description:	
2. Type of pump:	
3. Number of pumps:	
4. Constant or variable speed:	
5. Design operating capacity (gpm) and TDH (ft):	
6. Operating volume of the wet well (gal):	
7. Detention time in the wet well (min):	
8. Shutoff valve and check valve in the discharge line:	
9. Shutoff valve on suction line:	
10. Type of ventilation:	
11. Type of standby power:	
12. Type of alarm:	
13. Type of bypass or overflow provisions:	
14. Additional Information:	
Flow Equalization	☐ Proposed ☐ Existing ☐ Modification ☒ N/A
1. Type of structure:	
2. Number and dimensions (ft) of unit:	
3. Side water depth and freeboard (ft) of unit:	
4. Volume (gal):	
5. Type and size (HP) of mixing equipment:	
6. Type of aeration provisions (if applicable):	
7. Description of flow return methods and controls:	
8. Type of sludge removal provisions:	
9. Type and thickness of lagoon liner (if applicable):	
10. Additional information:	
√ **Influent Flow Meter**	☒ Proposed ☐ Existing ☐ Modification ☐ N/A
1. Type and size (in): 16" Mag Meter	
2. Location description: In a vault just past the valve vault	
3. Indicating, recording and totalizing: YES	
4. Additional information: to be connected to the SCADA control system	
Fat, Oil, and Grease Separation	☐ Proposed ☐ Existing ☐ Modification ☒ N/A
1. Type:	
2. Location description:	
3. Additional information:	
Grit Removal	☐ Proposed ☐ Existing ☐ Modification ☒ N/A
1. Type of grit removal system:	
2. Location description:	
3. Number and dimensions (ft) of unit:	
4. Side water depth and freeboard (ft) of unit:	

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5. Rated capacity (gpd):	
6. Type of bypass provisions:	
7. Type of aeration provisions (if applicable):	
8. Method of unit isolation:	
9. Method of flow split control:	
10. Additional information:	
Comminutor	☐ Proposed ☐ Existing ☐ Modification ☒ N/A
1. Type of comminutor:	
2. Location description:	
3. Rated capacity (gpd):	
4. Bypass bar screen provision:	
5. Additional information:	
Screening	☒ Proposed ☐ Existing ☐ Modification ☐ N/A
1. Type of screening: Duperon Mechanical Screen, self cleaning	
2. Location description: Inside the main lift station	
3. Bypass bar screen provision: YES	
4. Number and rated capacity (gpd): 1 rated for 16 MGD	
5. Clear opening sizes, bar or perforations (in): 1/4" bar spacing	
6. Slope of unit (°): 7°	
7. Method of unit cleaning: integral rake	
8. Method of screening disposal: unit includes compactor and discharge to dumpster	
9. Method of unit isolation: YES	
10. Method of flow split control: N/A	
11. Additional information:	
Primary Clarification	☐ Proposed ☐ Existing ☐ Modification ☒ N/A
1. Type of clarifier:	
2. Number and dimensions (ft) of unit:	
3. Side water depth and freeboard (ft) of unit:	
4. Surface overflow rate (gpd/ft^2)	
A. At design average flow:	
B. At design peak hourly flow:	
5. Hydraulic detention time (hrs)	
A. At design average flow:	
B. At design peak hourly flow:	
6. Weir loading rate at design peak hourly flow (gpd/lin·ft):	
7. Location of overflow weir:	
8. Method of scum collection:	
9. Method of scum disposal:	
10. Type of sludge removal mechanism:	
11. Method of unit isolation:	
12. Method of flow split control:	
13. Additional information:	

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Anoxic Component of Biological Nutrient Removal or Selector Tank	☐ Proposed ☐ Existing ☐ Modification ☒ N/A
1. Number and dimensions (ft) of anoxic unit/zone:	
2. Side water depth and freeboard (ft) of anoxic unit/zone:	
3. Hydraulic detention time (hrs):	
4. Number and capacity of mixed liquor recycle pumps (gpm):	
5. Method of mixed liquor recycle rate control:	
6. Mixed liquor recycle rate as % of design average flow:	
7. Provisions for mixed liquor recycle rate metering	
A. Type and size:	
B. Location:	
8. Mixed liquor recycle discharge location:	
9. Method of unit isolation:	
10. Method of flow split control:	
11. Additional information:	

Anaerobic Component of Biological Nutrient Removal or Selector Tank	☐ Proposed ☐ Existing ☐ Modification ☒ N/A
1. Number and dimensions (ft) of anaerobic unit/zone:	
2. Side water depth and freeboard (ft) of anaerobic unit/zone:	
3. Hydraulic detention time (hrs):	
4. CBOD/TP Ratio:	
5. Readily Biodegradable BOD/TP Ratio:	
6. Type and size (HP) of mixing equipment:	
7. Method of unit isolation:	
8. Method of flow split control:	
9. Additional information:	

Activated Sludge	☒ Proposed ☐ Existing ☐ Modification ☐ N/A
1. Conventional or extended aeration: Extended Aeration	
2. Number and dimensions (ft) of unit: 4 tanks each 45'w x 140'L x 16.5' D 378,000 cf	
3. Side water depth and freeboard (ft) of unit: SWD 15' with 1.5' freeboard 1,827,440 sf	
4. Hydraulic detention time (hrs): 16.97	
5. Organic loading at design average flow (lb CBOD/1000 ft^3): 15.0	
6. Design MLSS concentration (mg/L): 2500 - 3500	
7. Design solids retention time (days): 25 - 30	
8. Design F/M ratio (lb CBOD/day/lb MLVSS): 0.13	
9. Type and efficiency of diffusers (% per ft submergence): fine bubble diffuser 30% transfer efficiency	
10. Dedicated or shared plant blowers: dedicated	
11. Type and rated capacity of blowers (cfm): three @ 4000 scfm each (See Attached)	
12. Constant or variable speed blowers: variable speed	
13. Oxygen requirement (lb O_2/day)	
A. CBOD removal: 8507	
B. NH_3-N removal: 3836	
14. Total air demand (cfm): 12,070 SCFM @ 200% demand	
15. Firm blower capacity (cfm): 12,070 SCFM TOTAL	

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16. Type of ventilation in blower room: in a covered shed, blowers are in a sound enclosure
17. Number and capacity of return sludge pumps (gpm): Two pumps each 2,100 GPM
18. Method of return sludge rate control: thru the mag meter, scada, and variable speed control
19. Return sludge rate as % of design average flow: 100 to 150%
20. Provisions for return rate metering
A. Type and size: 12" mag meter
B. Location: on the discharge line from the RAS pumps in the pump building
21. Return sludge discharge location: to the head box on the aeration tank
22. Method of unit isolation: motor operated gates
23. Method of flow split control: motor operated gates
24. Additional information:
Oxidation Ditch ☐ Proposed ☐ Existing ☐ Modification ☒ N/A
1. Number and dimensions (ft) of unit:
2. Side water depth and freeboard (ft) of unit:
3. Hydraulic detention time (hrs):
4. Organic loading (design average flow, lb CBOD/1000 ft^3):
5. Design MLSS concentration (mg/L):
6. Design solids retention time (days):
7. Design F/M ratio (lb CBOD/day/lb MLVSS):
8. Aeration equipment
A. Type and number:
B. Efficiency (lb O_2/HP-hr):
9. Oxygen requirement (lb O_2/day)
A. CBOD removal:
B. NH_3-N removal:
10. Oxygen provided (lb O_2/day):
11. Flow velocity in ditch (ft/sec):
12. Number and capacity of return sludge pumps (gpm):
13. Method of return sludge rate control:
14. Return sludge rate as % of design average flow:
15. Provisions for return rate metering
A. Type and size:
B. Location:
16. Return sludge discharge location:
17. Method of unit isolation:
18. Method of flow split control:
19. Additional information:
Trickling Filter ☐ Proposed ☐ Existing ☐ Modification ☒ N/A
1. Number and dimensions (ft) of unit:
2. Freeboard (ft) of unit:
3. Type of media:
4. Media specific surface area (ft^2/ft^3):
5. Hydraulic loading (gpm/ft^2):
6. Organic loading (design average flow, lb CBOD/1000 ft^3):

7. Type of recirculation system:	
8. Type of ventilation system:	
9. Additional information:	
Rotating Biological Contactor	☐ Proposed ☐ Existing ☐ Modification ☒ N/A
1. Number and dimensions (ft) of unit:	
2. Freeboard (ft) of unit:	
3. Type of media:	
4. Hydraulic detention time (min):	
5. Hydraulic loading (gpm/ft^2):	
6. Organic loading (design average flow, lb CBOD/1000 ft^2):	
7. Method of shaft drive:	
8. Supplemental air:	
9. Method of unit isolation:	
10. Method of flow split control:	
11. Additional information:	
Sequential Batch Reactor	☐ Proposed ☐ Existing ☐ Modification ☒ N/A
1. Type of SBR process:	
2. Number and dimensions (ft) of unit:	
3. Side water depth and freeboard (ft) and volume (gal) of unit	
A. At low water level:	
B. At avg water level:	
C. At high water level:	
4. Cycle Time (min)	
A. Fill:	
B. React:	
C. Settle:	
D. Decant and idle:	
5. Hydraulic detention time (hrs)	
A. At low water level:	
B. At avg water level:	
C. At high water level:	
6. Organic loading (lb CBOD/1000 ft^3)	
A. At low water level:	
B. At avg water level:	
C. At high water level:	
7. Peak decant rate (gpm):	
8. Design MLSS concentration (mg/L):	
9. Design solids retention time (days):	
10. Design F/M ratio (lb CBOD/day/lb MLVSS):	
11. Type and efficiency of diffusers (% per ft submergence):	
12. Provisions for retrievable diffusers (when applicable):	
13. Number and rating of mixers (HP):	
14. Oxygen requirement (lb O_2/day)	
A. CBOD removal:	

B. NH_3-N removal:
15. Total air demand (cfm):
16. Dedicated or shared plant blowers:
17. Type and rated capacity of blowers (cfm):
18. Constant or variable speed blowers:
19. Firm blower capacity (cfm):
20. Type of ventilation in blower room:
21. Method of sludge transfer between tanks:
22. Number and capacity of waste sludge pumps (gpm):
23. Post-equalization or disinfection at peak decanter rate:
24. Method of unit isolation:
25. Method of flow split control:
26. Additional information:
Rotating Algal Reactor ☐ Proposed ☐ Existing ☐ Modification ☒ N/A
1. Process Description:
2. Number and dimensions (ft) of tanks:
3. Wheel and media characteristics
A. Wheel diameter (ft):
B. Wheel surface area (ft^2/wheel):
C. Internal wheel volume (ft^3):
D. Percent fill of wheel (%):
E. Media specific surface area (ft^2/ft^3):
F. Internal media surface area (ft^2/wheel):
4. First stage BOD removal
A. Number of wheels:
B. Total effective surface area (ft^2):
C. CBOD loading (lbs CBOD/1,000 ft^2):
5. Second stage NH_3-N removal
A. Number of wheels:
B. Total effective surface area (ft^2):
C. NH_3-N loading (lbs NH_3-N/1,000 ft^2):
6. Hydraulic detention time (hrs):
7. Hydraulic loading (gpd/ft^2):
8. Type and efficiency of diffusers (SOTE %):
9. Operational blowers
A. Air required to move wheel (cfm):
B. Number of blowers:
C. Type and rated capacity (cfm):
D. Constant or variable speed:
E. Firm blower capacity (cfm):
10. Scouring blower
A. Air required to scour (cfm):
B. Type and rated capacity (cfm):
C. Constant or variable speed:
11. Process building

A. Method of ventilation:
B. Method of temperature control:
12. Method of unit isolation:
13. Method of flow split control:
14. Additional information:
Facultative Lagoon ☐ Proposed ☐ Existing ☐ Modification ☒ N/A
1. Continuous or controlled discharge:
2. Treatment cells
A. Number:
B. Dimensions (ft):
C. Maximum water depth (ft):
D. Freeboard at maximum water depth (ft):
E. Volume (gal):
F. Hydraulic detention time (days):
G. Organic loading (lbs CBOD/acre/day):
3. Storage cell (controlled discharge only)
A. Dimensions (ft):
B. Maximum water depth (ft):
C. Freeboard at maximum water depth (ft):
D. Volume (gal):
E. Hydraulic storage time (days):
4. Influent pipe location:
5. Effluent pipe location:
6. Slope ratio of embankment (H:V) and top width (ft):
7. Type and thickness of lagoon liner:
8. Method of effluent flow control:
9. Method of stream flow measurement:
10. Type of facilities for multi-level lagoon discharge:
11. Type of mixing equipment (if applicable):
12. Additional information:
Aerated Lagoon ☐ Proposed ☐ Existing ☐ Modification ☒ N/A
1. Treatment cell
A. Number:
B. Dimensions (ft):
C. Maximum water depth (ft):
D. Freeboard at maximum water depth (ft):
E. Volume (gal):
F. Hydraulic detention time (day):
G. Organic loading (lbs CBOD/day):
H. Complete or partial mix:
I. Uncovered or covered/insulated:
2. Settling cell or settling zone within aeration cell
A. Dimensions (ft):
B. Maximum water depth (ft):

C. Freeboard at maximum water depth (ft):	
D. Volume (gal):	
E. Hydraulic detention time (day):	
F. Uncovered or covered/insulated:	
3. Aeration equipment	
A. Type and number:	
B. Rated capacity:	
4. Oxygen demand:	
5. Influent pipe location:	
6. Effluent pipe location:	
7. Slope ratio of embankment (H:V) and top width (ft):	
8. Type and thickness of lagoon liner:	
9. Type of facilities for multi-level lagoon discharge:	
10. Additional information:	
Secondary Clarification	☒ Proposed ☐ Existing ☐ Modification ☐ N/A
1. Type of clarifier: circular center feed, rim collection	
2. Number and dimensions (ft) of unit: two 100' diameter clarifiers	
3. Side water depth and freeboard (ft) of unit: SWD 15.4' and FB 1.5'	
4. Surface overflow rate (gpd/ft^2)	
A. at design average flow: 255 gpd/sf	
B. at design peak hourly flow: 764 gpd/sf	
5. Hydraulic detention time (hrs)	
A. at design average flow: 10.9	
B. at design peak hourly flow: 3.6	
6. Weir loading rate at design peak hourly flow (gpd/lin·ft): 10,000	
7. Location of overflow weir: dual weir trough on the perimeter.	
8. Method of scum collection: full radius scum beach	
9. Method of scum disposal: scum flows to grinder pump station and pumped to digester	
10. Type of sludge removal mechanism: pump suction from RAS/WAS pumps	
11. Method of unit isolation: yes	
12. Method of flow split control: yes	
13. Additional information:	
Submerged Biological Rock Bed Reactor	☐ Proposed ☐ Existing ☐ Modification ☒ N/A
1. Process description and seasonal operational procedure:	
2. Design unit influent quality (at highest monthly loading from lagoon)	
A. CBOD (mg/L):	
B. NH_3-N (mg/L):	
C. TSS (mg/L):	
3. Number and dimensions (ft) of units:	
4. Side water depth (ft):	
5. Media type, depth (ft), and size distribution (in):	
6. Media porosity (%):	
7. Insulation layer material and thickness (in):	
8. Liner type and thickness (mil):	

9. Effective wastewater (media pore) volume in reactor (ft^3):
10. Hydraulic detention time (hrs):
11. CBOD flux rate (lbs CBOD/100 ft^2 media cross-section):
12. NH_3-N loading rate (lbs NH_3-N/1,000 ft^3 media):
13. Type and efficiency of diffusers (SOTE %):
14. Oxygen requirement (lb O_2/day)
A. CBOD removal:
B. NH_3-N removal:
15. Total air demand (cfm):
16. Type and rated capacity of blowers (cfm):
17. Constant or variable speed blowers:
18. Firm blower capacity (cfm):
19. Type of ventilation in blower room:
20. Method of unit isolation:
21. Method of flow split control:
22. Additional information:

Fixed Media Polishing Reactor	☐ Proposed ☐ Existing ☐ Modification ☒ N/A

1. Process description and seasonal operational procedure:
2. Design unit influent quality (at highest monthly loading from upstream treatment unit)
A. CBOD (mg/L):
B. NH_3-N (mg/L):
C. TSS (mg/L):
3. Number and dimensions (ft) of tanks:
4. Side water depth (ft):
5. Insulation layer material and thickness (in):
6. Media specific surface area for BOD (ft^2/ft^3):
7. BOD loading rate (lbs CBOD/100 ft^2 media):
8. Number of BOD media modules:
9. Media specific surface area for NH_3-N (ft^2/ft^3):
10. NH_3-N loading rate (lbs NH_3-N/100 ft^2 media):
11. Number of NH_3-N media modules:
12. Type and efficiency of diffusers (SOTE %):
13. Oxygen requirement (lb O_2/day)
A. CBOD removal:
B. NH_3-N removal:
14. Total air demand (cfm):
15. Type and rated capacity of blowers (cfm):
16. Constant or variable speed blowers:
17. Firm blower capacity (cfm):
18. Type of ventilation in blower room:
19. Method of unit isolation:
20. Method of flow split control:
21. Additional information:

Rapid Sand Filtration	☐ Proposed ☐ Existing ☐ Modification ☒ N/A
1. Number and dimensions (ft) of unit:	
2. Freeboard (ft) of unit:	
3. Filtration rate (gpm/ft^2)	
A. at design average flow:	
B. at design peak hourly flow:	
4. Type, depth (inch), and size distribution (mm) of filter media:	
5. Backwash	
A. Type of backwash mechanism:	
B. Number and rated capacity of pumps (gpm):	
C. Constant or variable speed:	
D. Source of backwash water:	
E. Discharge location of backwash water:	
6. Air scour (cfm):	
7. Capability to chlorinate ahead of the filter:	
8. Method and provisions for solids removal:	
9. Method of unit isolation:	
10. Method of flow split control:	
11. Additional information:	

Rotating Disc Filter	☐ Proposed ☐ Existing ☐ Modification ☒ N/A
1. Process Description:	
2. Number and dimensions (ft) of cells:	
3. Outside-in or inside-out flow:	
4. Number of discs:	
5. Effective submerged filter area (ft^2) per disc:	
6. Total submerged filter area (ft^2):	
7. Type and filter media pore size (µm):	
8. Filtration rate (gpm/ft^2)	
A. at design average flow:	
B. at design peak hourly flow:	
9. Solids loading rate (lbs TSS/ft^2)	
A. at design average flow:	
B. at design peak hourly flow:	
10. Backwash	
A. Type of backwash mechanism:	
B. Number and rated capacity of pumps (gpm):	
C. Constant or variable speed:	
D. Source of backwash water:	
E. Discharge location of backwash water:	
11. Air scour (cfm):	
12. Method and provisions for cell bottom solids removal:	
13. Method of unit isolation:	
14. Method of flow split control:	
15. Additional information:	

Chemical Phosphorus Removal	☒ Proposed ☐ Existing ☐ Modification ☐ N/A
1. Chemical properties	
A. Chemical name: Aluminate	
B. Weight concentration in solution (%):1.37#/gal of 43% solution	
C. Specific gravity: 1.52	
2. Chemical storage container	
A. Type: Double walled plastic horizontal tank	
B. Volume (gal): 7,000	
C. Expected storage supply (days): 30+	
3. Secondary containment	
A. Type: storage tank is double walled	
B. Dimensions (ft) or volume (gal):	
4. Number and capacity of chemical feed pumps (gpm): dual feed pump .02 to .35 gpm	
5. Design chemical feed rate: 7 gph	
6. Location(s) of chemical injection: to be fed into the splitter box ahead of the clarifiers	
7. Provisions for adequate mixing at injection point: turbulence in the splitter box will mix	
8. Chemical building	
A. Method of ventilation control: power ventilator to provide 12 ACPH	
B. Method of temperature control: Heater will be on a thermostat	
C. Safety shower/eyewash equipment: has been provided	
9. Additional information:	
Two-Day Polishing Pond	☐ Proposed ☐ Existing ☐ Modification ☒ N/A
1. Number and dimensions (ft) of ponds:	
2. Hydraulic detention time (days):	
3. Type and thickness of pond liner:	
4. Type of scum control:	
5. Additional information:	
Chlorine Disinfection	☐ Proposed ☐ Existing ☐ Modification ☒ N/A
1. Chemical properties	
A. Gas, Liquid, or Tablet:	
B. Compound name:	
C. Weight concentration in solution (%):	
D. Specific gravity:	
2. Contact Tank	
A. Dimensions (ft):	
B. Freeboard (ft):	
C. Volume (gal):	
D. Contact time at design peak hourly flow (min):	
E. Type of scum control:	
F. Type of bypass provisions:	
3. Method of chemical feed	
A. Type:	
B. Location:	

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C. Design rate capacity (gpm):
D. Dosage (mg/L):
4. Source of the disinfectant feed water:
5. Breakwater tank for the feed water:
6. Chemical storage container
A. Type:
B. Volume (gal):
C. Expected storage supply (days):
7. Secondary containment (if applicable)
A. Type:
B. Dimensions (ft) or volume (gal):
8. Chemical building
A. Method of ventilation control:
B. Method of temperature control:
C. Safety shower/eyewash equipment:
9. Other safety equipment
A. Type:
B. Location:
10. Additional information:
Dechlorination ☐ Proposed ☐ Existing ☐ Modification ☒ N/A
1. Chemical properties
A. Gas, Liquid, or Tablet:
B. Compound name:
C. Weight concentration in solution (%):
D. Specific gravity:
2. Method of chemical feed
A. Type:
B. Location:
C. Design rate capacity (gpm):
D. Dosage (mg/L):
3. Chemical storage container
A. Type:
B. Volume (gal):
C. Expected storage supply (days):
4. Secondary containment (if applicable)
A. Type:
B. Dimensions (ft) or volume (gal):
5. Chemical building
A. Method of ventilation control:
B. Method of temperature control:
C. Safety shower/eyewash equipment:
6. Other safety equipment
A. Type:
B. Location:
7. Additional information:

Ultraviolet Disinfection	☒ Proposed ☐ Existing ☐ Modification ☐ N/A
1. Open channel or closed-vessel: Open channel	
2. Vertical, horizontal, or diagonal lamp orientation: vertical	
3. Lamp type: Low pressure High Output lamp	
4. Number of banks: 1	
5. Number of modules per bank: 6	
6. Number of lamps per module: 40	
7. Dosage (µWs/cm2): min 30mJ/cm2	
8. Transmittance (%):253 nm 65%	
9. Provisions for intensity monitoring: yes	
10. Type of level control provisions: serpentine weir	
11. Type of bypass provisions: pipe and valved bypass is provided	
12. Type of safety equipment: gloves and protective eve wear with face shield	
13. Automatic or manual cleaning equipment: automatic	
14. Additional information: the system will also be flow paced	
Cascade Post-Aeration	☐ Proposed ☐ Existing ☐ Modification ☒ N/A
1. Number of steps:	
2. Dimensions of steps (ft):	
3. Total fall (ft):	
4. Additional information:	
Diffused Air Post-Aeration	☒ Proposed ☐ Existing ☐ Modification ☐ N/A
1. Number and dimensions (ft) of unit: One tank10'w x 32.5' L	
2. Side water depth and freeboard (ft) of unit: SWD 10.85' and 2.65' FB	
3. Type and efficiency of diffusers (SOTE %):fine bubble diffusers	
4. Dedicated or shared plant blowers: dedicated blower	
5. Type and rated capacity of blowers (cfm): Rotary Lobe Blower, 120cfm@5psi	
6. Additional information: Blower in sound enclosure	
Effluent Flow Meter	☒ Proposed ☐ Existing ☐ Modification ☐ N/A
1. Type and size (in): Ultrasonic meter	
2. Location description: mounted over the post aeration tank upstream of the weir	
3. Indicating, recording and totalizing: yes it is provided	
4. Additional information:	
Sludge Thickening	☐ Proposed ☐ Existing ☐ Modification ☒ N/A
1. Type of sludge thickeners:	
2. Number and dimensions (ft) of unit:	
3. Hydraulic capacity (gpm):	
4. Solids capacity (lb/hr):	
5. Type of chemicals added:	
6. Expected solids content of sludge (%):	
7. Additional information:	

Anaerobic Digester	☐ Proposed ☐ Existing ☐ Modification ☒ N/A
1. Number and dimensions (ft) of unit:	
2. Side water depth and freeboard (ft) of unit:	
3. Volume (gal):	
4. Total design sludge loading (lbs/day):	
5. Volatile solids percentage (%):	
6. Design solids retention time (days):	
7. Type and size (HP) of mixing equipment:	
8. Internal or external heating:	
9. Decanting method:	
10. Discharge location of supernatant:	
11. Additional information:	

Aerobic Digester	☐ Proposed ☐ Existing ☐ Modification ☐ N/A
1. Number and dimensions (ft) of unit: two tanks, 45' w x 140'L	
2. Side water depth and freeboard (ft) of unit: SWD 15' and 1.5' FB	
3. Volume (gal): total 1,413,720 gallons	
4. Total design sludge loading (lbs/day): 5671	
5. Volatile solids percentage (%):75	
6. Design solids retention time (days): 50	
7. Type and efficiency of diffusers (SOTE %):27%	
8. Dedicated or shared plant blowers: Dedicated	
9. Type and rated capacity of blowers (cfm): rotory lobe blowers 2 each capacity of 2,835 cfm each	
10. Decanting method: motor operated telescoping valve in digester	
11. Discharge location of supernatant: plant pump station	
12. Additional information: variable speed control on blower motor	

Aerated Sludge Holding Tank	☐ Proposed ☐ Existing ☐ Modification ☒ N/A
1. Number and dimensions (ft) of unit:	
2. Side water depth and freeboard (ft) of unit:	
3. Volume (gal):	
4. Total design sludge loading (lbs/day):	
5. Sludge storage retention time (days):	
6. Type and efficiency of diffusers (SOTE %):	
7. Dedicated or shared plant blowers:	
8. Type and rated capacity of blowers (cfm):	
9. Decanting method:	
10. Discharge location of supernatant:	
11. Additional information:	

Sludge Drying Bed	☐ Proposed ☐ Existing ☐ Modification ☒ N/A
1. Number and dimensions (ft) of unit:	
2. Method of unit isolation:	
3. Concrete ramp and runway provisions:	
4. Discharge location of drainage:	

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5. Additional information:	
✓ **Mechanical Dewatering**	☒ Proposed ☐ Existing ☐ Modification ☐ N/A
1. Type of dewatering unit: screw press	
2. Number and dimensions (ft) of unit: one unit (13' L x 6' W x 6' H)	
3. Hydraulic capacity (gpm): 44,100 gallons per week (52 GPM)	
4. Solids capacity (lb/hr): 1,000 lb/hr	
5. Type of chemicals added: Polymer	
6. Expected solids content of dewatered sludge (%):18%	
7. Discharge location of drainage: precipate drains to floor drains that go to plant lift station	
8. Additional information:	
Sludge Dewatering Bag System	☐ Proposed ☐ Existing ☐ Modification ☒ N/A
1. Number and volume (yd^3) of unit:	
2. Type of chemicals added:	
3. Expected solids content of dewatered sludge (%):	
4. Drainage containment provisions:	
5. Discharge location of drainage:	
6. Additional information:	
✓ **Final Sludge Disposal**	☒ Proposed ☐ Existing ☐ Modification ☐ N/A
1. Ultimate disposal method of sludge: Landfill	
2. Expected solids content of sludge (by the principal method of disposal): 18%	
3. Location of disposal site: Southern Marion County	
4. Ownership of the disposal site: Private	
5. Availability of sludge transport equipment: by Contract hauler	
6. Additional information:	
V. SEWER COLLECTION SYSTEM	
✓ **Lift Station**	☒ Proposed ☐ Existing ☐ Modification ☐ N/A
1. Location: 703 South Tibbs Avenue	
2. Type of pump (example: submersible, dry pit): Submersible	
3. Number of pumps: 4	
4. Constant or variable speed: variable speed	
5. Design pump rate (gpm) and TDH (ft): 8,333 gpm @ 68 TDH	
6. Operating volume of the wet well (gal): 5800 gallons	
7. Average detention time in the wet well (min): 8.5 minutes	
8. Type of standby power/pump provisions: natural gas 250 KW gen set	
9. Type of alarm: audio visual with scada connection to Plant control panel	
10. Additional information:	
Low Pressure Sewer Grinder Pump Station	☐ Proposed ☐ Existing ☐ Modification ☒ N/A
1. Number of stations:	
2. Number of residential connections per simplex station (two maximum):	
3. Design pump rate (gpm) at maximum TDH (ft):	
4. Type of alarm:	
5. Privately or utility owned and maintained:	

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6. Additional information:	
Vacuum Pump Station	☐ Proposed ☐ Existing ☐ Modification ☒ N/A
1. Location:	
2. Total volume of vacuum tank (gal):	
3. Operating volume of the vacuum tank (gal):	
4. Number and size (HP) of vacuum pumps:	
5. Number and type of sewage pumps:	
6. Constant or variable speed:	
7. Design pump rate (gpm) and TDH (ft):	
8. Type of standby power/pump provisions:	
9. Type of alarm:	
10. Additional information:	
Sewer	☒ Proposed ☐ Existing ☐ Modification ☐ N/A
1. Gravity or vacuum sewer: Gravity	
2. Type of pipe material: PVC influent sewer, PVC outfall sewer (Effluent)	
3. ASTM/AWWA Standard and SDR/DR: ASTM D1784 SDR-21	
4. Diameter and length of sewer (indicate length for each size): 36" - 267 LF / 36" 443 LF (Effluent)	
5. Number of manholes: 1 on the influent to main lift station / 1 on the outfall	
6. Number of vacuum valve pits (if applicable): N/A	
7. Additional information:	
Force Main and Low Pressure Sewer	☒ Proposed ☐ Existing ☐ Modification ☐ N/A
1. Type of pipe material: PVC	
2. ASTM/AWWA Standard: ASTM D1784	
3. SDR/DR and pressure class (psi): SDR 21 200 psi	
4. Diameter and length of sewer (indicate length for each size): 18' @ 16"; 1,394' @ 24"	
5. Additional information:	

Revised September 27, 2021

IDENTIFICATION OF POTENTIALLY AFFECTED PERSONS

Please list any and all persons whom you have reason to believe have a substantial or proprietary interest in this matter, or could otherwise be considered to be potentially affected under law. Failure to notify a person who is later determined to be potentially affected could result in voiding IDEM's decision on procedural grounds. To ensure conformance with Administrative Orders and Procedures Act (AOPA) and to avoid reversal of a decision, please list all such parties. The letter on the opposite side of this form will further explain the requirements under the AOPA. Attach additional names and addresses on a separate sheet of paper, as needed.

Name SEE ATTACHED	
Address (*number and street)*	
City	
State	ZIP Code

Name	
Address (*number and street)*	
City	
State	ZIP Code

Name	
Address (*number and street)*	
City	
State	ZIP Code

Name	
Address (*number and street)*	
City	
State	ZIP Code

Name	
Address (*number and street)*	
City	
State	ZIP Code

Name	
Address (*number and street)*	
City	
State	ZIP Code

CERTIFICATION

I certify that to the best of my knowledge I have listed all potentially affected parties, as defined by IC 4-21.5-3-5.

Proposed Facility Name Ben Davis WWTP	City Indianapolis
Printed Name of Person Signing Jonathan P. Moen, P.E.	County Marion
Signature Jonathan P. Moen	Date Signed (*month / day / year*) 11 / 22 / 21

65-42FC
MAYOR HOGSETT
CITY-COUNTY BLDG., SUITE T-241
200 E. WASHINGTON ST.
INDIANAPOLIS, IN 46204

65-42FC
JARED EVANS
CITY-COUNTY BLDG., SUITE T-241
200 E. WASHINGTON ST.
INDIANAPOLIS, IN 46204

65-42FC
KRISTIN JONES
CITY-COUNTY BLDG., SUITE T-241
200 E. WASHINGTON ST.
INDIANAPOLIS, IN 46204

65-42FC
R & D RENTALS, LLC
817 S. TIBBS AVE.
INDIANAPOLIS, IN 46241

65-42FC
HOWARD MANAGEMENT CO., LLC
2916 KENTUCKY AVE.
INDIANAPOLIS, IN 46221

65-42FC
TIBBS REALTY, LLC
10151 HAGUE RD.
INDIANAPOLIS, IN 46256

65-42FC
PARK 65 TRANSPORTATION, LLC
4045 PARK 65 DRIVE
INDIANAPOLIS, IN 46254

65-42FC
GRADY BROTHERS REALTY, LLC
915 S. SOMERSET AVE.
INDIANAPOLIS, IN 46241

65-42FC
PEREZ, CARLOS DOMINGO BATEN
7447 E. 10TH ST.
INDIANAPOLIS, IN 46219

65-42FC
SMITH, MICHELLE
3499 DELMAR AVE.
INDIANAPOLIS, IN 46241

65-42FC
CASTORENO, CORNELIA M.
3493 DELMAR AVE.
INDIANAPOLIS, IN 46241

65-42FC
GIBSON, KENTON JOSEPH
3487 DELMAR AVE.
INDIANAPOLIS, IN 46241

65-42FC
DAVIS, JACKLYN H.
238 S. 4TH AVE.
BEECH GROVE, IN 46107

65-42FC
RYBOLT, SHAWN M.
3475 DELMAR AVE.
INDIANAPOLIS, IN 46241

65-42F
SILENCE, RONALD D. & PATRICIA A.
3469 DELMAR AVE.
INDIANAPOLIS, IN 46241

65-42FC
ROSNER, JASON E.
3463 DELMAR AVE.
INDIANAPOLIS, IN 46241

65-42FC
JENKINS, BECCA J.
3457 DELMAR AVE.
INDIANAPOLIS, IN 46241

65-42FC
POTTS, VICTORIA SUE
3451 DELMAR AVE.
INDIANAPOLIS, IN 46241

65-42FC
COUNTS, MARGARET & KEVIN W.
3445 DELMAR AVE.
INDIANAPOLIS, IN 46241

65-42FC
VEALE, KEITH W. JR., & LEAH G.
7656 MONTERAY CIRCLE
AVON, IN 46123

65-42FC
SCHNER, EDWIN A.
3433 DELMAR AVE.
INDIANAPOLIS, IN 46241

65-42FC
BURROWS, BRIAN D. & KATHLEEN M.
8206 ROCKVILLE RD., #198
INDIANAPOLIS, IN 46214

65-42FC
ARNOLD, CONNIE A.
3421 DELMAR AVE.
INDIANAPOLIS, IN 46241

65-42FC
SOWERS, ROBERT C. SR.
3415 DELMAR AVE.
INDIANAPOLIS, IN 46241

65-42FC
WLN HOLDINGS, LLC
3420 CANNONBALL TRL
YORKVILLE, IL 60560

65-42FC
WALLACE, TRACY A.
3403 DELMAR AVE.
INDIANAPOLIS, IN 46241

65-42FC
BEN DAVIS CONSERVANCY DISTRICT
703 S. TIBBS AVE.
INDIANAPOLIS, IN 46241

LETTER OF TRANSMITTAL

TRIAD ASSOCIATES, INC.
5835 Lawton Loop East Drive
Indianapolis, Indiana 46216-1064
(317) 377-5230
Fax (317) 377-5241

To:. IDEM – OWQ
Facility Construction & Engineering Support
MC 65-42FC
100 N. Senate Avenue, Room N1255
Indianapolis, IN 46204-2251

Date: December 2, 2021	Job No.: 202018A
Attention: MC 65-42FC	
Reference: Ben Davis Conservancy District	
WWTP Design RESUBMITTAL	

RECEIVED
DEC 06 2021
IDEM/OWQ

WE ARE SENDING YOU __ Attached __ Under separate cover via __ the following items:
__ Shop drawings __ Prints x Plans __ Samples x Specifications
__ Copy of letter __ Change order x Other: See Description Below

COPIES	DATE	NO.	DESCRIPTION
1	Dec 2021	IDEM SET	RESUBMITTAL: WWTP Construction Permit Application per 327 IAC 3:
			• Labels – potentially affected persons
			• Engineering Calcs
			• Supporting Documentation
			• Specs
			• Plans
			• Check no. 33834 for $50 application fee

THESE ARE TRANSMITTED as checked below:
X For approval __ Approved as submitted __ Resubmit __ copies for approval
__ For your use __ Approved as noted __ Submit __ copies for distribution
__ As requested __ Returned for corrections __ Return __ corrected prints
X For review and comment __ Other:
__ FOR BIDS DUE: __ PRINTS RETURNED AFTER LOAN TO US

REMARKS: RE-SUBMITTAL of Original application of July 2021 with revisions. Please Note:
Construction Application: Revised pages are dated in the lower right hand corner.
Plans: Revised pages are dated in the lower right hand corner.
Specifications: Green pages were revised in the previous submittal. Yellow are newly revised.
Engineering Calculations: Yellow pages are newly revised.
Supporting Documentation: Previous revisions dated upper right

COPY TO: file SIGNED: Dee Lerzak

If enclosures are not as noted, kindly notify us at once.

ENGINEERING CALCULATIONS

HYDRAULICS THRU THE PLANT

BEN DAVIS CD
WWT PLANT

HYDRAULIC PROFILE DATA

01/13/2021

	Elevations
Aeration 4 tanks Top of Wall (TOW)	718.50
Influent trough max water elevation 4 tanks	716.82
max water elevation 2 tanks	716.20
Set downward opening gates 5.5' wide at	716.20
Set bottom of notch opening in wall at 0.5 ft less	715.70
Set liquid level in aeration at the same level when max with 2 tanks	715.70
Set effluent weir height based on max with 2 tanks	715.43
Liquid level based on max flow with 4 tanks	715.59
Max flow in effluent trough shall be at or below the the notch at end of aeration	714.72
Bottom of effluent trough at drop box	712.33
Allow a 6" drop at drop box	711.83

Splitter Box TOW	715.50
36" pipe to splitter box requires 0.49 ft at max flow rate	713.70
The head over the 1 weir in series at peak flow is 1.54 ft	
Therefor set bottom of 6' weir at	712.16
Set bottom of wall opening at	711.66
Normal operation in parallel at max flow both gates open the elevation in the entrance box	713.12
Normal operation in parallel at max flow to clarifiers	711.67
Series operation peak flow to #1 clarifier and #2 closed	711.85

Clarifier #1 TOW	713.00
30" pipe feed to clarifier worst case is series peak flow with a loss of 0.40 ft	
Water elevation in clarifier will be	711.45
Set bottom of v notches at	711.32
Bottom of effluent trough at outlet then is	709.60
Normal operation at max flow parallel flows the level in the clarifier #1 should be	711.43

Clarifier #2 TOW	710.00
30" pipe feed to clarifier worst case is series and peak flow with a loss of 1.36 ft	
Water elevation in clarifier will be	708.20
Set bottom of v notches at	708.07
Bottom of effluent trough at outlet then is	706.35
Normal operation at max flow in parallel mode the level in clarifier #2 should be	708.18
Junction box #1 liquid elevation during series mode and peak flow	708.94
Junction box #2 liquid elevation during series mode and peak flow	706.01

HEAD BOX IN FRONT OF UV TOW	710.00

UV CHANNEL TOW	708.00
Head loss thru uv 0.15 ft	
Finger weir elevation	705.85

POST AERATION TOW	708.00
Max flow over a cipolletti 4' weir the height i 1.503 ft	
Set the max elevation .5' below the top of finger weirs or	705.35
Set the bottom of the weir at	703.85
Set the bottom of the notch at	703.60

OUTFALL SEWER	
36" pipe @ 0.143' per 100 ft carries 16 mgd invert at plant set at	696.04

Aeration influent

Downward opening weir gates

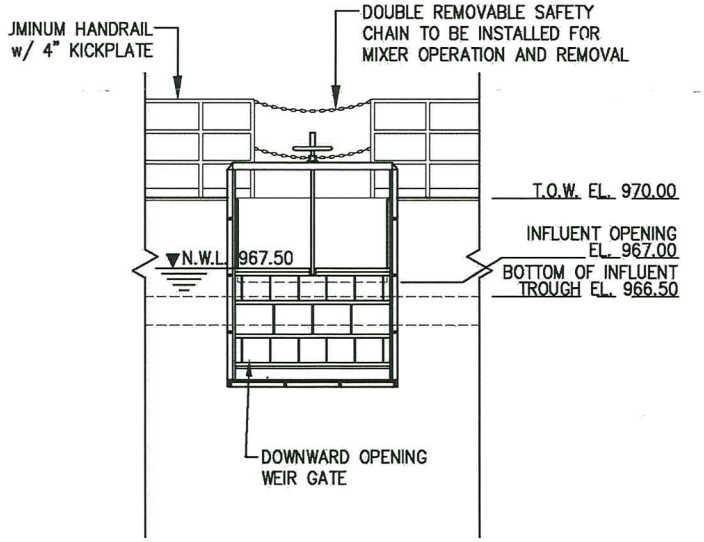
Width = 5 or more ft

Rectangular, Sharp Crested Weir fully contracted

Q = 3.33*(L-.2H)*H^(3/2)

Q =	CFS	B =	width of approach in FT
H =	FT	P =	depth of
L =	FT of weir		

Limits H/L < .33
B - L >4 H max
P > 2 H max



Top of Wall Elevation = 718.50
Bottom of Influent Channel = 712.5

Bottom of Influent Opening Notch = 715.70
Set top of weir plate at 716.20

aeration influent channel and head over 5' weir gate and all aeration tanks being used.

Q	H = ft	WL =
2778	0.22	716.42
8333	0.5	716.70
11111	0.62	716.82

aeration influent channel and head over 5' weir gate and half of the aeration tanks being used.

H = ft	WL =
0.00	716.20
0.00	716.20
0.00	716.20

Aeration influent

Inputs

Height of wier crest above channel invert, **P** =	3.75	ft
Width of channel, **B** =	12	ft
Length of weir, **L** =	5	ft
Measured head over the weir, **H** =	0.69	ft

Calculations

H/L =	0.14
H/L $\leq$ 0.33 ?	yes
B-L =	7.00
4H =	2.76
B-L > 4 H ?	yes
P > 2 H	yes
Flow Rate, **Q** =	6.909 cfs

If all answers are yes, flow is fully contracted.

GPM	CFS	1/4 CFS	H		
2778	6.190	1.547	0.22		
8333	18.567	4.642	0.5		
11111	24.757	6.189	0.62		
12500	27.852	6.963	0.69		

H	CFS	H	CFS	H	CFS
0.37	3.193	0.71	7.132	1.25	11.635
0.38	3.307	0.72	7.243	1.26	11.680
0.39	3.423	0.73	7.352	1.27	11.724
0.40	3.538	0.74	7.462	1.28	11.767
0.41	3.654	0.75	7.570	1.29	11.807
0.42	3.771	0.76	7.678	1.30	11.846
0.43	3.887	0.77	7.785	1.31	11.883
0.44	4.004	0.78	7.891	1.32	11.918
0.45	4.121	0.79	7.997	1.33	11.952
0.46	4.239	0.80	8.101	1.34	11.984
0.47	4.356	0.81	8.205	1.35	12.014
0.48	4.474	0.82	8.308	1.36	12.042
0.49	4.592	0.83	8.410	1.37	12.068
0.50	4.709	0.84	8.511	1.38	12.092
0.54	5.180	0.85	8.612	1.39	12.115
0.55	5.297	0.86	8.711	1.40	12.136
0.56	5.414	0.87	8.809	1.41	12.154
0.57	5.532	0.88	8.907	1.42	12.171
0.58	5.648	0.89	9.003	1.43	12.186
0.59	5.765	0.90	9.098	1.44	12.199
0.60	5.881	0.91	9.192	1.45	12.210
0.61	5.997	0.92	9.286	1.46	12.219
0.62	6.113	0.93	9.378	1.47	12.226
0.63	6.228	0.94	9.469	1.48	12.231
0.64	6.342	0.95	9.559	1.49	12.234
0.65	6.457	0.96	9.647	1.50	12.235
0.66	6.571	0.97	9.735	1.51	12.234
0.67	6.684	0.98	9.821	1.52	12.231
0.68	6.797	0.99	9.906	1.53	12.226
0.69	6.909	1.00	9.990	1.54	12.219
0.70	7.021	1.01	10.073	1.55	12.209

Elevation of Liquid in Aeration tank controlled by effluent contracted weir

Set effluent weir at elevation = 715.43

GPM	CFS	1/4 CFS	1/2 CFS
2778	6.190	715.49	715.43
8333	18.567	715.56	715.43
11111	24.757	715.59	715.43

Inputs

Height of wier crest above channel invert, **P** = 14 ft

Width of channel, **B** = 36 ft

Length of weir, **L** = 31 ft

Measured head over the weir, **H** = 0.16 ft

Calculations

H/L = 0.005

H/L ≤ 0.33 ? yes

B-L = 5.00

4H = 0.64

B-L > 4 H ? yes

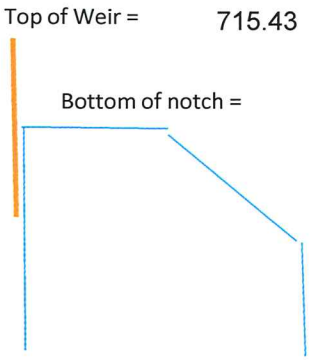
P > 2 H yes

Flow Rate, **Q** = 6.539 cfs

If all answers are yes, flow is fully contracted.

GPM	CFS	1/4 CFS	H		
2778	6.190	1.547	0.06		
8333	18.567	4.642	0.13		
11111	24.757	6.189	0.16		

H	Q
0.10	3.243
0.11	3.739
0.12	4.258
0.13	4.798
0.14	5.359
0.15	5.939
0.16	6.539
0.17	7.156
0.18	7.792
0.19	8.445
0.20	9.114
0.21	9.800
0.22	10.501
0.23	11.218
0.24	11.949
0.25	12.696
0.26	13.456
0.27	14.230
0.28	15.018
0.29	15.820



Headloss Calculations
Ben Davis Conservancy District WWTF
Aeration Tank Effluent Channnels
Manning's Equation

Flow gpm	Flow cfs	Act. Width (in.)	Act. Depth (in.)	Area sq ft.	Perimeter ft.	Rh	Vel. fps	Length	Equiv. Fitting Length	Total Length (ft)	Mannings S (ft/ft)	Hf
6944	15.472	48.000	18.500	6.1667	7.0833	0.8706	2.5090	150.00	0.00	150.00	0.0005765	0.086
8333	18.567	48.000	21.143	7.0477	7.5238	0.9367	2.6345	150.00	0.00	150.00	0.0005765	0.086
12500	27.852	48.000	28.683	9.5610	8.7805	1.0889	2.9131	150.00	0.00	150.00	0.0005766	0.086

Slope of channel is to be .0576% or .0576 ft per 100 feet
Over all channel length is 150' or 0.0864 feet of fall from upstream to downstream.

Elevation of bottom of channel at the drop into the box = 712.33
Add grout to bottom of channel 1" at east end and slope up to 2" at the west end
Top of Grout at west end = 712.41
Top of Grout at east end = 712.33

Liquid level in Channel

gpm	Act. Depth (in.)	ELEV in Channel
6944	18.500	713.87
8333	21.143	714.09
12500	28.683	714.72

eration box to splitter box ahead of clarifiers

ATION FOR PRESSURE LOSS IN PIPES

$$V = 1.318 * C_H * R^{.63} * S^{.54}$$

$$Hf = \frac{(100/C)^{1.852} * (Q)^{1.85}}{(D)^{4.8655}} * .2083$$

zontal + 20 ft vertical + 2 90deg elbows

428 LF

	ADF	PEAK	MAX
Example	2778	8333	11111
200	428	428	428
140	140	140	140
100	2778	8333	11111
3	34.43	34.43	34.43

hness constant

iin)

c diameter (inches)

oss

t of water per 100 feet of pipe (ft H20 per

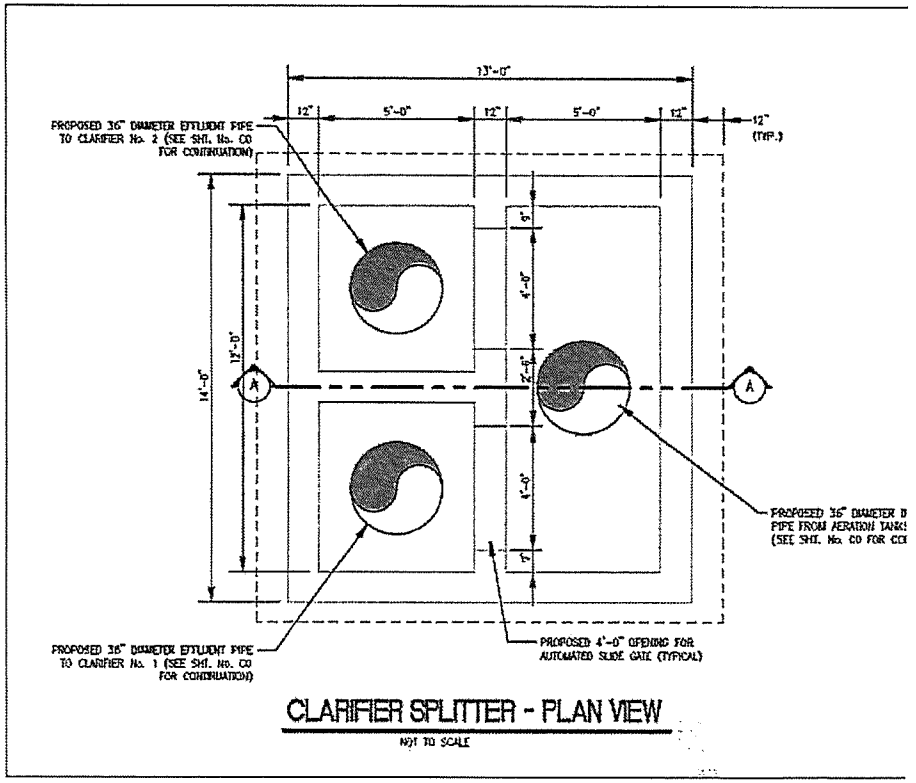
of water per 100 feet of pipe (psi per 100 ft

2.70	0.01	0.07	0.12
1.16	0.00	0.03	0.05
5.39	0.04	0.29	0.49
2.32	0.02	0.12	0.21

ity

4.54	0.96	2.87	3.83

sure Pipe has a ID of 34.43



CLARIFIER SPLITTER - PLAN VIEW

NOT TO SCALE

Calculations

		H/P <.33	0.02
5	ft		
		H/P <.33	yes
96.25	ft		

H/B <.33 | 0.00

0 ft | yes

0.12 ft

Flow Rate, Q = 13.323 cfs | 5,980 GPM

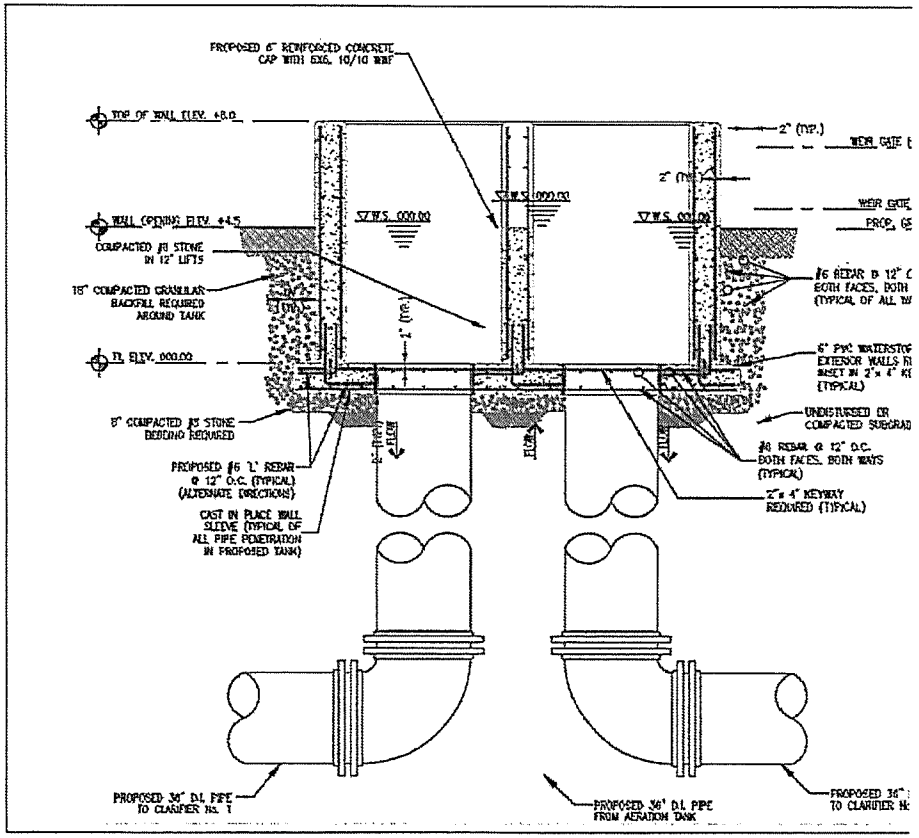
flow is fully contracted.

2 weirs		Elevation
GPM	H	
1389	0.38	712.54
4167	0.79	712.95
5556	0.96	713.12

1 weir		
GPM	H	
6944	1.18	713.34
8333	1.54	713.70

at max flow rate

T.O.W	715.50
Weir Elev	712.16
Wall Open	711.66



Feed from Splitter Box to Clarifiers

MODE 1 : Both clarifiers in operation in parallel

Clarifier #1 the closest to the splitter box

30" pipe

CC length	91	ft
Vertical	6	
Two 90 deg	150	EQ Length
TOTAL	247	FEET

	ADF	PEAK	MAX
Specified Data	3472	4166.5	6250
l = length of pipe (ft)	247	247	247
c = Hazen-Williams roughness constant	140	140	140
q = volume flow (gal/min)	3472	4166.5	6250
dh = inside or hydraulic diameter (inches)	28.77	28.77	28.77
Calculated Pressure Loss			
f = friction head loss in feet of water per 100 feet of pipe (ft H20 per 100 ft pipe)	0.03	0.05	0.10
f = friction head loss in psi of water per 100 feet of pipe (psi per 100 ft pipe)	0.01	0.02	0.04
Head loss (ft H20)	0.08	0.11	0.24
Head loss (psi)	0.03	0.05	0.10
Calculated Flow Velocity			
v = flow velocity (ft/s)	1.71	2.06	3.09

30" PVC SDR 21 Pressure Pipe has a ID of 28.77
36" PVC SDR 21 Pressure Pipe has a ID of 34.43

MODE 2 : Both clarifiers in operation in series

30" PVC SDR 21 Pressure Pipe has a ID of 28.77

	ADF	PEAK	MAX
Specified Data	6944	8333	12500
l = length of pipe (ft)	247	247	247
c = Hazen-Williams roughness constant	140	140	140
q = volume flow (gal/min)	6944	8333	12500
dh = inside or hydraulic diameter (inches)	28.77	28.77	28.77
Calculated Pressure Loss			
f = friction head loss in feet of water per 100 feet of pipe (ft H20 per 100 ft pipe)	0.12	0.16	0.34
f = friction head loss in psi of water per 100 feet of pipe (psi per 100 ft pipe)	0.05	0.07	0.15
Head loss (ft H20)	0.29	0.40	0.85
Head loss (psi)	0.12	0.17	0.37
Calculated Flow Velocity			
v = flow velocity (ft/s)	3.43	4.11	6.17

Clarifier #2 Splitter Box to Clarifier #2

MODE 1 : Both clarifiers in operation in parallel

30" pipe
30" PVC SDR 21 Pressure Pipe has a ID of 28.77

CC length	91	ft
Vertical	6	
Two 90 deg	150	EQ Length
1 Tee	20	
TOTAL	267	FEET

	ADF	PEAK	MAX
Specified Data	3472	4166.5	6250
l = length of pipe (ft)	267	267	267
c = Hazen-Williams roughness constant	140	140	140
q = volume flow (gal/min)	3472	4166.5	6250
dh = inside or hydraulic diameter (inches)	28.77	28.77	28.77
Calculated Pressure Loss			
f = friction head loss in feet of water per 100 feet of pipe (ft H20 per 100 ft pipe)	0.03	0.05	0.10
f = friction head loss in psi of water per 100 feet of pipe (psi per 100 ft pipe)	0.01	0.02	0.04
Head loss (ft H20)	0.09	0.12	0.25
Head loss (psi)	0.04	0.05	0.11
Calculated Flow Velocity			
v = flow velocity (ft/s)	1.71	2.06	3.09

MODE 1 : Both clarifiers in operation in parallel

	ADF	PEAK	MAX
Q gpm	1389	4166.5	5555.5
Q cfs	3.09	9.28	12.38
Q per V	0.003	0.008	0.010
H ft	0.06	0.10	0.11
H inches	0.75	1.17	1.31
ELEV	708.13	708.17	708.18

MODE 2 : Both clarifiers in operation in series

ADF	PEAK
6944	8333
15.47	18.57
0.013	0.015
0.12	0.13
1.44	1.55
708.19	708.20

These are liquid level in #2 Clarifier only

Top of Weir at splitter	712.16	
Leave 6" drop	711.66	
Head drop	708.20	elevation of water in clarifier at Peak in Series mode
Set bottom of v notch	708.07	bottom of v notch
Set bottom of trough	706.74	16" lower than bottom of v
Allow for fall	706.35	0.39 ft of fall around clarifier to outlet
Bottom of outbox	703.85	

Clarifier #2 to UV splitter box

MODE 1 : Both clarifiers in operation in parallel

MODE 2 : Both clarifiers in operation in series

30" pipe with 2 90 and a 22.5

	207	equivalent pipe length
horiz	26	
vert	6	
fittings	175	

	ADF	PEAK	MAX	PEAK	MAX
Specified Data	3472	4166.5	6250	8333	12500
l = length of pipe (ft)	207	207	207	207	207
c = Hazen-Williams roughness constant	140	140	140	140	140
q = volume flow (gal/min)	3472	4166.5	6250	8333	12500
dh = inside or hydraulic diameter (inches)	28.77	28.77	28.77	28.77	28.77
Calculated Pressure Loss					
f = friction head loss in feet of water per 100 feet of pipe (ft H20 per 100 ft pipe)	0.03	0.05	0.10	0.16	0.34
f = friction head loss in psi of water per 100 feet of pipe (psi per 100 ft pipe)	0.01	0.02	0.04	0.07	0.15
Head loss (ft H20)	0.07	0.09	0.20	0.34	0.71
Head loss (psi)	0.03	0.04	0.08	0.14	0.31
Calculated Flow Velocity					
v = flow velocity (ft/s)	1.71	2.06	3.09	4.11	6.17

MODE 2 : Both clarifiers in operation in series

30" pipe flow back to clarifier #2 from UV structure
fittings 2 -90s, 2 -45s, 1 tee

Total	427	equivalent pipe length
horiz	169	
vert	8	
90's	150	
45s	80	
tee	20	

	ADF	PEAK	MAX
Specified Data	6944	8333	12500
l = length of pipe (ft)	vert	vert	vert
c = Hazen-Williams roughness constant	140	140	140
q = volume flow (gal/min)	6944	8333	12500
dh = inside or hydraulic diameter (inches)	28.77	28.77	28.77
Calculated Pressure Loss			
f = friction head loss in feet of water per 100 feet of pipe (ft H20 per 100 ft pipe)	0.12	0.16	0.34
f = friction head loss in psi of water per 100 feet of pipe (psi per 100 ft pipe)	0.05	0.07	0.15
Head loss (ft H20)	0.50	0.69	1.47
Head loss (psi)	0.21	0.30	0.63
Calculated Flow Velocity			
v = flow velocity (ft/s)	3.43	4.11	6.17

Clarifiers are the same size and each are 100' diameter with a double weir trough
The v-notch weir is 1 foot from the outside wall so it has a 98' diameter
The notches are 90 degrees 6" on center and 2.5" deep.

The inside weir is a		46.5 radius	
The circumfrence is	2 x Pl x r	307.88 ft	615
The inside weir is		292.17	584
Number of notches		600	1199

Equation for a 90 degree v notch

$$Q = 2.49H^{2.48}$$

$$H = (Q/2.49)^{\wedge(1/2.48)}$$

MODE 1 : Both clarifiers in operation in parallel

	ADF	PEAK	MAX
Q gpm	1389	4166.5	5555.5
Q cfs	3.09	9.28	12.38
Q per V	0.002581	0.007743	0.010324
H ft	0.06	0.10	0.11
H inches	0.75	1.17	1.31
ELEV	711.38	711.42	711.43

MODE 2 : Both clarifiers in operation in series

ADF	PEAK	
6944	8333	
15.47	18.57	
0.012904	0.015486	
0.12	0.13	
1.44	1.55	
711.44	711.45	These are liquid level in #1 Clarifier only

Top of Weir at splitter	712.16	
Leave 6" drop	711.66	
Head drop	711.85	elevation of water in clarifier at Peak in Series mode
Set bottom of v notch	711.32	bottom of v notch
Set bottom of trough	709.99	16" lower than bottom of v
Allow for fall	709.60	0.39 ft of fall around clarifier to outlet
Bottom of outbox	707.10	

PROJECT NO.
SRF-0668

INTRA-OFFICE MEMO

FROM: 327 IAC Construction Permit Coordinator
Engineering Plan Review Section
Office of Water Quality

TO: AJO

permit 24183

SUBJECT: Project: Ben Davis Conservancy District (WWTP)
Location: Indianapolis, Marion County
Units: New WWTP
Design Flow: 4.0 MGD
Received On: 7/12/2021
Wastewater Treatment By: Ben Davis Conservancy District WWTP

Maintenance Provided By: Ben Davis Conservancy District

WWTP Design Summary ----------	☑	Should be completely filled out, And match the Preliminary Limits
$ Check----------	☑	Not required for State or Federal projects
Signed Application ----------	☑	Signed by applicant for SRF projects
Plans and Specifications ----------	☑	Each page must be signed or sealed by an Indiana P.E.
Potentially Affected Person List ----	☑	Names and addresses on signed and dated form, mailing list and mailing labels (Code 65-42FC)
Preliminary Limits from NPDES----	☑	New one needed if more than 1 year old - it may need to include information regarding BADCT and Phosphorus Limits
Anti-degradation Assessment-------	☐	Verification from NPDES Section that a preliminary approval is complete
Early Warning Sewer Ban----------	☐	Kim Rohr
State Revolving Fund----------	☑	SRF Group
Regional Sewer Districts----------	☑	Angela Bottom

APPLICATION FOR WASTEWATER TREATMENT PLANT CONSTRUCTION PERMIT PER 327 IAC 3

State Form 53160 (R8 / 6-20)

Indiana Department of Environmental Management
Office of Water Quality
Facility Construction and Engineering Support Section,
Mail Code 65-42FC
100 North Senate Avenue, Room N1255
Indianapolis, IN 46204-2251

APPLICANT	APPLICANT'S ENGINEER
Name ☒ Mr. or ☐ Ms. Fred F. Buckingham	Name ☒ Mr. or ☐ Ms. Kent Schuch
Name of Organization Ben Davis Conservancy District	Name of Company Triad Associates, Inc.
Address *(number and street, city, state, and ZIP)* 703 S. Tibbs Avenue Indianapolis, IN 46241	Address *(number and street, city, state, and ZIP)* 5835 Lawton Loop East Drive Indianapolis, IN 46216
Telephone Number (317) 241-2941	Telephone Number (317) 377-5230
E-Mail Address angela@bdconservancy.com (Board Secretary)	E-Mail Address kschuch@triadassoc.net

NAME AND LOCATION OF PROPOSED FACILITY	PROJECT DESCRIPTION
Name Ben Davis Conservancy District	Describe the scope and/or purpose of this project The project scope is construction of a 4 MGD wastewater treatment plant to serve the Ben Davis Conservancy District. The plant is being constructed to allow the District to provide treatment services at a reasonable cost to their constituents. The current treatment rate will result in an increase of 700% through 2025 at which time another rate increase will be implemented. The planned increases exceed the costs to build and operate a District owned plant.
Location or Project Boundaries West of Tibbs Ave., north of I-70 and South of CSX RR.	
City or Town Indianapolis	
County Marion	

FACILITY TYPE	PROJECT TYPE
☒ Municipal wastewater treatment facility ☐ Semipublic wastewater treatment facility	☒ New facility ☐ Expansion or modification of existing facility ☐ LTCP improvements

SOURCE OF FUNDING

☐ IFA's Wastewater State Revolving Fund Loan Program	☒ Local Funds
☐ OCRA's Community Development Block Grant	☐ Private Funds
☐ USDA's Rural Development Loan and Grant Assistance	☐ Other:

CERTIFICATION AND SIGNATURE

I swear or affirm, under penalty of perjury as specified by IC 35-44.1-2-1 and other penalties specified by IC 13-30-10 and IC 13-15-7-1(3), that the statements and representations in this application are true, accurate, and complete.

Printed Name of Person Signing Fred F. Buckingham Fred F. Buckingham	
Title Chairman	
Signature of Applicant	Date Signed *(month / day / year)* 1 / 21 / 2021

(Please refer to IC 13-30-10 for penalties of submission of false information.)

WASTEWATER TREATMENT PLANT CONSTRUCTION PERMIT FEES		
I. The applicants listed below must remit with each application a fee of fifty dollars ($50). These applications must be signed by an official of the entity. (*Check all that apply.*)		
☐	County, Municipality, or Township which is defined as a unit under IC 36-1-2-23	
☐	A Nonprofit Organization	
☒	A Conservancy District	
☐	A School Corporation that operates a sewage treatment facility	
☐	A Regional Water or Sewage District	
II. All other applications (including semi-public) will pay the following revised fees per project type:		
New Wastewater Treatment Plant (not including industrial)		
☐	A. Up to 500,000 gallons per day	$1,250.00
☐	B. Greater than 500,000 per day	$2,500.00
Wastewater Treatment Plant Expansion		
☐	A. Up to fifty percent (50%) design capacity:	
☐	1. Greater than 500,000 per day	$1,250.00
☐	2. Up to 500,000 per day	$625.00
☐	B. Greater than fifty percent (50%) design capacity	
☐	1. Greater than 500,000 gallons per day	$2,500.00
☐	2. Up to 500,000 gallons per day	$1,250.00
Wastewater Treatment Plant Modification		$625.00
Only one (1) of the fees will apply. Checks for the applicable fee shall be made payable to the **Indiana Department of Environmental Management**. Fees shall not be refundable once staff review and processing of the Permit Application has commenced.		

WASTEWATER TREATMENT PLANT DESIGN SUMMARY

I. General

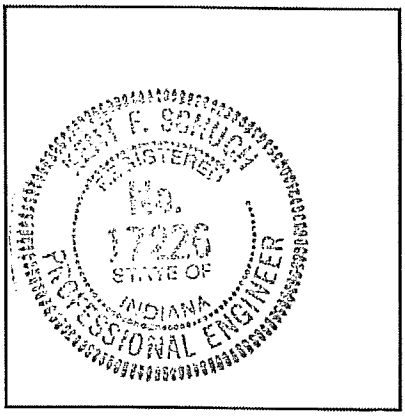
1. Applicant: Ben Davis Conservancy District
2. Facility Name: Ben Davis WWT Facility
3. Project Title: New Wastewater Treatment Facility
4. Project Location: 900 South Tibbs, Indianapolis, IN
5. Design Engineer: Kent F. Schuch, P.E.
6. Engineering Company: Triad Associates, Inc.
7. NPDES Permit Number: TO BE APPLIED FOR
   - A. Effective date (*month / day / year*): / /
   - B. Expiration date (*month / day / year*): / /
8. Project Scope
   - A. Description of existing treatment facilities:
     Wastewater from the District is currently transported over 8 miles for treatment at the Southport AWT facility which is operated by Citizens Water Authority (CWA).
   - B. Description of project needs:
     The District is pursuing construction of their own WWTP to reduce costs to its users. CWA implemented significant rate increases to be phased in through 2025, at which time another rate increase will go into effect.Per a court approved Settlement Agreement, CWA will offer no objections to the District constructing their own plant and disconnecting from CWA's system.
   - C. Description of proposed facilities:
     The facilities include a new raw sewage pump station with screening and flow metering, new conventional aeration tanks, a flow splitter, 2 new clarifiers, a new ultraviolet disinfection tank, a new diffused air post aeration tank with flow metering and an outfall sewer to Neeld Ditch.
   - D. Is project part of an Agreed Order?: ☐ Yes ☒ No
   - E. How facility will maintain treatment during construction:
     N/A
9. Source of Funding: Local funding
10. Estimated Total Project Cost: 13.5 million

Certification Seal, Signature, and Date

Printed Name of Engineer
Kent F. Schuch, P.E.

Signature Kent Schuch

Date Signed *(month / day / year)*
February / 01 / 2021



II. Design Data

1. Design Average Flow (MGD): 4.0
   - A. Domestic: 2.0

B. Industrial/Commercial: .5
C. Infiltration/Inflow: 1.5
2. Design Peak Hourly Flow (MGD): 12.0
3. Maximum Flow Capacity (MGD): 16.0
A. Combination of treatment plant + EQ volume:
B. Other explanation:
4. Design Waste Strength
A. CBOD: 170 mg/L
B. TSS: 200 mg/L
C. NH_3-N: 25 mg/L
D. P: 5 mg/L
E. Other:
5. Design Population Equivalent (PE): 33,360 (based on 0.17 lb CBOD/PE influent loading)
6. NPDES Permit Limitation on Effluent Quality
A. $CBOD_5$: summer and winter is 10 mg/L
B. TSS: summer and winter is 12 mg/L
C. NH_3-N: summer is 1.1 mg/L and winter is 1.6 mg/L mg/L
D. P: summer and winter 1.0 mg/L
E. pH: 6-9 s.u.
F. DO: 6.0 mg/L
G. Total Residual Chlorine: .1 mg/L
H. *E.coli*: 125
I. Other:
7. Sampling Method (Grab or Automatic Sampler) and Location
A. Influent: Sampler
B. Effluent: Sampler
8. Receiving Stream
A. Name: Neeld Ditch
B. Stream Uses: Full body contact recreational use and shall be capable of supporting a well-balanced warm water aquatic community ☐ and designated as salmonid water and shall be capable of supporting a salmonid fishery ☐ and designated as an impaired water ☐ and classified as an outstanding state resource water (OSRW) ☐ and classified as an outstanding national resource water (ONRW)
C. 7-day, 1-in-10 year low flow: 0.0 CFS (0.0 MGD)
III. PLANT DETAILS
1. Laboratory type (e.g., on site, third-party testing): on-site
2. Plant site fence provided: fence provided
3. Handrail/grating provided where necessary: Yes
4. Flood hazard elevation (ft) at 100 year flood: 695.50
5. Provisions for mechanical/electrical component protection at 100 year flood: site is above 100 year fld
6. Type and rating (kW) of standby power equipment: natural gas 600 KW unit
7. Provisions for removing heavy equipment: Yes, hoists and cranes are part of the installation
8. Septage/leachate receiving facilities
A. Type of preliminary treatment: N/A
B. Storage and controlled feed provisions:

Revised Sept 2021

C. Location of discharge to treatment process:	
IV. Treatment Units	
Plant Site Lift Station	☐ Proposed ☐ Existing ☐ Modification ☒ N/A
1. Location description:	
2. Type of pump:	
3. Number of pumps:	
4. Constant or variable speed:	
5. Design operating capacity (gpm) and TDH (ft):	
6. Operating volume of the wet well (gal):	
7. Detention time in the wet well (min):	
8. Shutoff valve and check valve in the discharge line:	
9. Shutoff valve on suction line:	
10. Type of ventilation:	
11. Type of standby power:	
12. Type of alarm:	
13. Type of bypass or overflow provisions:	
14. Additional Information:	
Flow Equalization	☐ Proposed ☐ Existing ☐ Modification ☒ N/A
1. Type of structure:	
2. Number and dimensions (ft) of unit:	
3. Side water depth and freeboard (ft) of unit:	
4. Volume (gal):	
5. Type and size (HP) of mixing equipment:	
6. Type of aeration provisions (if applicable):	
7. Description of flow return methods and controls:	
8. Type of sludge removal provisions:	
9. Type and thickness of lagoon liner (if applicable):	
10. Additional information:	
Influent Flow Meter	☒ Proposed ☐ Existing ☐ Modification ☐ N/A
1. Type and size (in): 16" Mag Meter	
2. Location description: In a vault just past the valve vault	
3. Indicating, recording and totalizing: YES	
4. Additional information: to be connected to the SCADA control system	
Fat, Oil, and Grease Separation	☐ Proposed ☐ Existing ☐ Modification ☒ N/A
1. Type:	
2. Location description:	
3. Additional information:	
Grit Removal	☐ Proposed ☐ Existing ☐ Modification ☒ N/A
1. Type of grit removal system:	
2. Location description:	
3. Number and dimensions (ft) of unit:	
4. Side water depth and freeboard (ft) of unit:	

Revised 9-16-21

5. Rated capacity (gpd):	
6. Type of bypass provisions:	
7. Type of aeration provisions (if applicable):	
8. Method of unit isolation:	
9. Method of flow split control:	
10. Additional information:	
Comminutor	☐ Proposed ☐ Existing ☐ Modification ☒ N/A
1. Type of comminutor:	
2. Location description:	
3. Rated capacity (gpd):	
4. Bypass bar screen provision:	
5. Additional information:	
Screening	☒ Proposed ☐ Existing ☐ Modification ☐ N/A
1. Type of screening: Duperon Mechanical Screen, self cleaning	
2. Location description: Inside the main lift station	
3. Bypass bar screen provision: YES	
4. Number and rated capacity (gpd): 1 rated for 16 MGD	
5. Clear opening sizes, bar or perforations (in): 1/4" bar spacing	
6. Slope of unit (°): 7°	
7. Method of unit cleaning: integral rake	
8. Method of screening disposal: unit includes compactor and discharge to dumpster	
9. Method of unit isolation: YES	
10. Method of flow split control: N/A	
11. Additional information:	
Primary Clarification	☐ Proposed ☐ Existing ☐ Modification ☒ N/A
1. Type of clarifier:	
2. Number and dimensions (ft) of unit:	
3. Side water depth and freeboard (ft) of unit:	
4. Surface overflow rate (gpd/ft^2)	
A. At design average flow:	
B. At design peak hourly flow:	
5. Hydraulic detention time (hrs)	
A. At design average flow:	
B. At design peak hourly flow:	
6. Weir loading rate at design peak hourly flow (gpd/lin·ft):	
7. Location of overflow weir:	
8. Method of scum collection:	
9. Method of scum disposal:	
10. Type of sludge removal mechanism:	
11. Method of unit isolation:	
12. Method of flow split control:	
13. Additional information:	

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Anoxic Component of Biological Nutrient Removal or Selector Tank	☐ Proposed ☐ Existing ☐ Modification ☒ N/A
1. Number and dimensions (ft) of anoxic unit/zone:	
2. Side water depth and freeboard (ft) of anoxic unit/zone:	
3. Hydraulic detention time (hrs):	
4. Number and capacity of mixed liquor recycle pumps (gpm):	
5. Method of mixed liquor recycle rate control:	
6. Mixed liquor recycle rate as % of design average flow:	
7. Provisions for mixed liquor recycle rate metering	
A. Type and size:	
B. Location:	
8. Mixed liquor recycle discharge location:	
9. Method of unit isolation:	
10. Method of flow split control:	
11. Additional information:	
Anaerobic Component of Biological Nutrient Removal or Selector Tank	☐ Proposed ☐ Existing ☐ Modification ☒ N/A
1. Number and dimensions (ft) of anaerobic unit/zone:	
2. Side water depth and freeboard (ft) of anaerobic unit/zone:	
3. Hydraulic detention time (hrs):	
4. CBOD/TP Ratio:	
5. Readily Biodegradable BOD/TP Ratio:	
6. Type and size (HP) of mixing equipment:	
7. Method of unit isolation:	
8. Method of flow split control:	
9. Additional information:	
Activated Sludge	☒ Proposed ☐ Existing ☐ Modification ☐ N/A
1. Conventional or extended aeration: Conventional	
2. Number and dimensions (ft) of unit: 4 tanks each 36'w x 70'L x 17' D	
3. Side water depth and freeboard (ft) of unit: SWD 14.2' with 2.8' freeboard	
4. Hydraulic detention time (hrs): 6.4	
5. Organic loading at design average flow (lb CBOD/1000 ft^3): 30.3	
6. Design MLSS concentration (mg/L): 2500	
7. Design solids retention time (days): 20	
8. Design F/M ratio (lb CBOD/day/lb MLVSS): .26	
9. Type and efficiency of diffusers (% per ft submergence): fine bubble diffuser 30% transfer efficiency	
10. Dedicated or shared plant blowers: dedicated	
11. Type and rated capacity of blowers (cfm): three 2120 cfm each	
12. Constant or variable speed blowers: variable speed	
13. Oxygen requirement (lb O_2/day)	
A. CBOD removal: 6805	
B. NH_3-N removal: 3836	
14. Total air demand (cfm): 4240 SCFM @ 200% demand	
15. Firm blower capacity (cfm): 2120 SCFM	

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16. Type of ventilation in blower room: in a covered shed, blowers are in a sound enclosure
17. Number and capacity of return sludge pumps (gpm): Two pumps each 2,100 GPM
18. Method of return sludge rate control: thru the mag meter, scada, and variable speed control
19. Return sludge rate as % of design average flow: 100 to 150%
20. Provisions for return rate metering
A. Type and size: 12" mag meter
B. Location: on the discharge line from the RAS pumps in the pump building
21. Return sludge discharge location: to the head box on the aeration tank
22. Method of unit isolation: motor operated gates
23. Method of flow split control: motor operated gates
24. Additional information:
Oxidation Ditch ☐ Proposed ☐ Existing ☐ Modification ☒ N/A
1. Number and dimensions (ft) of unit:
2. Side water depth and freeboard (ft) of unit:
3. Hydraulic detention time (hrs):
4. Organic loading (design average flow, lb CBOD/1000 ft^3):
5. Design MLSS concentration (mg/L):
6. Design solids retention time (days):
7. Design F/M ratio (lb CBOD/day/lb MLVSS):
8. Aeration equipment
A. Type and number:
B. Efficiency (lb O_2/HP-hr):
9. Oxygen requirement (lb O_2/day)
A. CBOD removal:
B. NH_3-N removal:
10. Oxygen provided (lb O_2/day):
11. Flow velocity in ditch (ft/sec):
12. Number and capacity of return sludge pumps (gpm):
13. Method of return sludge rate control:
14. Return sludge rate as % of design average flow:
15. Provisions for return rate metering
A. Type and size:
B. Location:
16. Return sludge discharge location:
17. Method of unit isolation:
18. Method of flow split control:
19. Additional information:
Trickling Filter ☐ Proposed ☐ Existing ☐ Modification ☒ N/A
1. Number and dimensions (ft) of unit:
2. Freeboard (ft) of unit:
3. Type of media:
4. Media specific surface area (ft^2/ft^3):
5. Hydraulic loading (gpm/ft^2):
6. Organic loading (design average flow, lb CBOD/1000 ft^3):

7. Type of recirculation system:	
8. Type of ventilation system:	
9. Additional information:	
Rotating Biological Contactor	☐ Proposed ☐ Existing ☐ Modification ☒ N/A
1. Number and dimensions (ft) of unit:	
2. Freeboard (ft) of unit:	
3. Type of media:	
4. Hydraulic detention time (min):	
5. Hydraulic loading (gpm/ft^2):	
6. Organic loading (design average flow, lb CBOD/1000 ft^2):	
7. Method of shaft drive:	
8. Supplemental air:	
9. Method of unit isolation:	
10. Method of flow split control:	
11. Additional information:	
Sequential Batch Reactor	☐ Proposed ☐ Existing ☐ Modification ☒ N/A
1. Type of SBR process:	
2. Number and dimensions (ft) of unit:	
3. Side water depth and freeboard (ft) and volume (gal) of unit	
A. At low water level:	
B. At avg water level:	
C. At high water level:	
4. Cycle Time (min)	
A. Fill:	
B. React:	
C. Settle:	
D. Decant and idle:	
5. Hydraulic detention time (hrs)	
A. At low water level:	
B. At avg water level:	
C. At high water level:	
6. Organic loading (lb CBOD/1000 ft^3)	
A. At low water level:	
B. At avg water level:	
C. At high water level:	
7. Peak decant rate (gpm):	
8. Design MLSS concentration (mg/L):	
9. Design solids retention time (days):	
10. Design F/M ratio (lb CBOD/day/lb MLVSS):	
11. Type and efficiency of diffusers (% per ft submergence):	
12. Provisions for retrievable diffusers (when applicable):	
13. Number and rating of mixers (HP):	
14. Oxygen requirement (lb O_2/day)	
A. CBOD removal:	

B. NH_3-N removal:
15. Total air demand (cfm):
16. Dedicated or shared plant blowers:
17. Type and rated capacity of blowers (cfm):
18. Constant or variable speed blowers:
19. Firm blower capacity (cfm):
20. Type of ventilation in blower room:
21. Method of sludge transfer between tanks:
22. Number and capacity of waste sludge pumps (gpm):
23. Post-equalization or disinfection at peak decanter rate:
24. Method of unit isolation:
25. Method of flow split control:
26. Additional information:
Rotating Algal Reactor ☐ Proposed ☐ Existing ☐ Modification ☒ N/A
1. Process Description:
2. Number and dimensions (ft) of tanks:
3. Wheel and media characteristics
A. Wheel diameter (ft):
B. Wheel surface area (ft^2/wheel):
C. Internal wheel volume (ft^3):
D. Percent fill of wheel (%):
E. Media specific surface area (ft^2/ft^3):
F. Internal media surface area (ft^2/wheel):
4. First stage BOD removal
A. Number of wheels:
B. Total effective surface area (ft^2):
C. CBOD loading (lbs CBOD/1,000 ft^2):
5. Second stage NH_3-N removal
A. Number of wheels:
B. Total effective surface area (ft^2):
C. NH_3-N loading (lbs NH_3-N/1,000 ft^2):
6. Hydraulic detention time (hrs):
7. Hydraulic loading (gpd/ft^2):
8. Type and efficiency of diffusers (SOTE %):
9. Operational blowers
A. Air required to move wheel (cfm):
B. Number of blowers:
C. Type and rated capacity (cfm):
D. Constant or variable speed:
E. Firm blower capacity (cfm):
10. Scouring blower
A. Air required to scour (cfm):
B. Type and rated capacity (cfm):
C. Constant or variable speed:
11. Process building

A. Method of ventilation:
B. Method of temperature control:
12. Method of unit isolation:
13. Method of flow split control:
14. Additional information:
Facultative Lagoon ☐ Proposed ☐ Existing ☐ Modification ☒ N/A
1. Continuous or controlled discharge:
2. Treatment cells
A. Number:
B. Dimensions (ft):
C. Maximum water depth (ft):
D. Freeboard at maximum water depth (ft):
E. Volume (gal):
F. Hydraulic detention time (days):
G. Organic loading (lbs CBOD/acre/day):
3. Storage cell (controlled discharge only)
A. Dimensions (ft):
B. Maximum water depth (ft):
C. Freeboard at maximum water depth (ft):
D. Volume (gal):
E. Hydraulic storage time (days):
4. Influent pipe location:
5. Effluent pipe location:
6. Slope ratio of embankment (H:V) and top width (ft):
7. Type and thickness of lagoon liner:
8. Method of effluent flow control:
9. Method of stream flow measurement:
10. Type of facilities for multi-level lagoon discharge:
11. Type of mixing equipment (if applicable):
12. Additional information:
Aerated Lagoon ☐ Proposed ☐ Existing ☐ Modification ☒ N/A
1. Treatment cell
A. Number:
B. Dimensions (ft):
C. Maximum water depth (ft):
D. Freeboard at maximum water depth (ft):
E. Volume (gal):
F. Hydraulic detention time (day):
G. Organic loading (lbs CBOD/day):
H. Complete or partial mix:
I. Uncovered or covered/insulated:
2. Settling cell or settling zone within aeration cell
A. Dimensions (ft):
B. Maximum water depth (ft):

C. Freeboard at maximum water depth (ft):
D. Volume (gal):
E. Hydraulic detention time (day):
F. Uncovered or covered/insulated:
3. Aeration equipment
A. Type and number:
B. Rated capacity:
4. Oxygen demand:
5. Influent pipe location:
6. Effluent pipe location:
7. Slope ratio of embankment (H:V) and top width (ft):
8. Type and thickness of lagoon liner:
9. Type of facilities for multi-level lagoon discharge:
10. Additional information:
Secondary Clarification ☒ Proposed ☐ Existing ☐ Modification ☐ N/A
1. Type of clarifier: circular center feed, rim collection
2. Number and dimensions (ft) of unit: two 100' diameter clarifiers
3. Side water depth and freeboard (ft) of unit: SWD 15.4' and FB 1.5'
4. Surface overflow rate (gpd/ft^2)
A. at design average flow: 255 gpd/sf
B. at design peak hourly flow: 764 gpd/sf
5. Hydraulic detention time (hrs)
A. at design average flow: 10.9
B. at design peak hourly flow: 3.6
6. Weir loading rate at design peak hourly flow (gpd/lin·ft): 10,000
7. Location of overflow weir: dual weir trough on the perimeter.
8. Method of scum collection: full radius scum beach
9. Method of scum disposal: scum flows to grinder pump station and pumped to digester
10. Type of sludge removal mechanism: pump suction from RAS/WAS pumps
11. Method of unit isolation: yes
12. Method of flow split control: yes
13. Additional information:
Submerged Biological Rock Bed Reactor ☐ Proposed ☐ Existing ☐ Modification ☒ N/A
1. Process description and seasonal operational procedure:
2. Design unit influent quality (at highest monthly loading from lagoon)
A. CBOD (mg/L):
B. NH_3-N (mg/L):
C. TSS (mg/L):
3. Number and dimensions (ft) of units:
4. Side water depth (ft):
5. Media type, depth (ft), and size distribution (in):
6. Media porosity (%):
7. Insulation layer material and thickness (in):
8. Liner type and thickness (mil):

9. Effective wastewater (media pore) volume in reactor (ft^3):
10. Hydraulic detention time (hrs):
11. CBOD flux rate (lbs CBOD/100 ft^2 media cross-section):
12. NH_3-N loading rate (lbs NH_3-N/1,000 ft^3 media):
13. Type and efficiency of diffusers (SOTE %):
14. Oxygen requirement (lb O_2/day)
A. CBOD removal:
B. NH_3-N removal:
15. Total air demand (cfm):
16. Type and rated capacity of blowers (cfm):
17. Constant or variable speed blowers:
18. Firm blower capacity (cfm):
19. Type of ventilation in blower room:
20. Method of unit isolation:
21. Method of flow split control:
22. Additional information:
Fixed Media Polishing Reactor ☐ Proposed ☐ Existing ☐ Modification ☒ N/A
1. Process description and seasonal operational procedure:
2. Design unit influent quality (at highest monthly loading from upstream treatment unit)
A. CBOD (mg/L):
B. NH_3-N (mg/L):
C. TSS (mg/L):
3. Number and dimensions (ft) of tanks:
4. Side water depth (ft):
5. Insulation layer material and thickness (in):
6. Media specific surface area for BOD (ft^2/ft^3):
7. BOD loading rate (lbs CBOD/100 ft^2 media):
8. Number of BOD media modules:
9. Media specific surface area for NH_3-N (ft^2/ft^3):
10. NH_3-N loading rate (lbs NH_3-N/100 ft^2 media):
11. Number of NH_3-N media modules:
12. Type and efficiency of diffusers (SOTE %):
13. Oxygen requirement (lb O_2/day)
A. CBOD removal:
B. NH_3-N removal:
14. Total air demand (cfm):
15. Type and rated capacity of blowers (cfm):
16. Constant or variable speed blowers:
17. Firm blower capacity (cfm):
18. Type of ventilation in blower room:
19. Method of unit isolation:
20. Method of flow split control:
21. Additional information:

Rapid Sand Filtration	☐ Proposed ☐ Existing ☐ Modification ☒ N/A
1. Number and dimensions (ft) of unit:	
2. Freeboard (ft) of unit:	
3. Filtration rate (gpm/ft^2)	
A. at design average flow:	
B. at design peak hourly flow:	
4. Type, depth (inch), and size distribution (mm) of filter media:	
5. Backwash	
A. Type of backwash mechanism:	
B. Number and rated capacity of pumps (gpm):	
C. Constant or variable speed:	
D. Source of backwash water:	
E. Discharge location of backwash water:	
6. Air scour (cfm):	
7. Capability to chlorinate ahead of the filter:	
8. Method and provisions for solids removal:	
9. Method of unit isolation:	
10. Method of flow split control:	
11. Additional information:	

Rotating Disc Filter	☐ Proposed ☐ Existing ☐ Modification ☒ N/A
1. Process Description:	
2. Number and dimensions (ft) of cells:	
3. Outside-in or inside-out flow:	
4. Number of discs:	
5. Effective submerged filter area (ft^2) per disc:	
6. Total submerged filter area (ft^2):	
7. Type and filter media pore size (µm):	
8. Filtration rate (gpm/ft^2)	
A. at design average flow:	
B. at design peak hourly flow:	
9. Solids loading rate (lbs TSS/ft^2)	
A. at design average flow:	
B. at design peak hourly flow:	
10. Backwash	
A. Type of backwash mechanism:	
B. Number and rated capacity of pumps (gpm):	
C. Constant or variable speed:	
D. Source of backwash water:	
E. Discharge location of backwash water:	
11. Air scour (cfm):	
12. Method and provisions for cell bottom solids removal:	
13. Method of unit isolation:	
14. Method of flow split control:	
15. Additional information:	

Chemical Phosphorus Removal	☒ Proposed ☐ Existing ☐ Modification ☐ N/A
1. Chemical properties	
A. Chemical name: Aluminate	
B. Weight concentration in solution (%):1.37#/gal of 43% solution	
C. Specific gravity: 1.52	
2. Chemical storage container	
A. Type: Double walled plastic horizontal tank	
B. Volume (gal): 7,000	
C. Expected storage supply (days): 30+	
3. Secondary containment	
A. Type: storage tank is double walled	
B. Dimensions (ft) or volume (gal):	
4. Number and capacity of chemical feed pumps (gpm): dual feed pump .02 to .35 gpm	
5. Design chemical feed rate: 7 gph	
6. Location(s) of chemical injection: to be fed into the splitter box ahead of the clarifiers	
7. Provisions for adequate mixing at injection point: turbulence in the splitter box will mix	
8. Chemical building	
A. Method of ventilation control: power ventilator to provide 12 ACPH	
B. Method of temperature control: Heater will be on a thermostat	
C. Safety shower/eyewash equipment: has been provided	
9. Additional information:	
Two-Day Polishing Pond	☐ Proposed ☐ Existing ☐ Modification ☒ N/A
1. Number and dimensions (ft) of ponds:	
2. Hydraulic detention time (days):	
3. Type and thickness of pond liner:	
4. Type of scum control:	
5. Additional information:	
Chlorine Disinfection	☐ Proposed ☐ Existing ☐ Modification ☒ N/A
1. Chemical properties	
A. Gas, Liquid, or Tablet:	
B. Compound name:	
C. Weight concentration in solution (%):	
D. Specific gravity:	
2. Contact Tank	
A. Dimensions (ft):	
B. Freeboard (ft):	
C. Volume (gal):	
D. Contact time at design peak hourly flow (min):	
E. Type of scum control:	
F. Type of bypass provisions:	
3. Method of chemical feed	
A. Type:	
B. Location:	

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C. Design rate capacity (gpm):
D. Dosage (mg/L):
4. Source of the disinfectant feed water:
5. Breakwater tank for the feed water:
6. Chemical storage container
A. Type:
B. Volume (gal):
C. Expected storage supply (days):
7. Secondary containment (if applicable)
A. Type:
B. Dimensions (ft) or volume (gal):
8. Chemical building
A. Method of ventilation control:
B. Method of temperature control:
C. Safety shower/eyewash equipment:
9. Other safety equipment
A. Type:
B. Location:
10. Additional information:
Dechlorination ☐ Proposed ☐ Existing ☐ Modification ☒ N/A
1. Chemical properties
A. Gas, Liquid, or Tablet:
B. Compound name:
C. Weight concentration in solution (%):
D. Specific gravity:
2. Method of chemical feed
A. Type:
B. Location:
C. Design rate capacity (gpm):
D. Dosage (mg/L):
3. Chemical storage container
A. Type:
B. Volume (gal):
C. Expected storage supply (days):
4. Secondary containment (if applicable)
A. Type:
B. Dimensions (ft) or volume (gal):
5. Chemical building
A. Method of ventilation control:
B. Method of temperature control:
C. Safety shower/eyewash equipment:
6. Other safety equipment
A. Type:
B. Location:
7. Additional information:

Ultraviolet Disinfection	☒ Proposed ☐ Existing ☐ Modification ☐ N/A
1. Open channel or closed-vessel: Open channel	
2. Vertical, horizontal, or diagonal lamp orientation: vertical	
3. Lamp type: Low pressure High Output lamp	
4. Number of banks: 1	
5. Number of modules per bank: 6	
6. Number of lamps per module: 40	
7. Dosage (µWs/cm2): min 30mJ/cm2	
8. Transmittance (%):253 nm 65%	
9. Provisions for intensity monitoring: yes	
10. Type of level control provisions: serpentine weir	
11. Type of bypass provisions: pipe and valved bypass is provided	
12. Type of safety equipment: gloves and protective eve wear with face shield	
13. Automatic or manual cleaning equipment: automatic	
14. Additional information: the system will also be flow paced	
Cascade Post-Aeration	☐ Proposed ☐ Existing ☐ Modification ☒ N/A
1. Number of steps:	
2. Dimensions of steps (ft):	
3. Total fall (ft):	
4. Additional information:	
Diffused Air Post-Aeration	☒ Proposed ☐ Existing ☐ Modification ☐ N/A
1. Number and dimensions (ft) of unit: One tank10'w x 32.5' L	
2. Side water depth and freeboard (ft) of unit: SWD 10.85' and 2.65' FB	
3. Type and efficiency of diffusers (SOTE %):fine bubble diffusers	
4. Dedicated or shared plant blowers: dedicated blower	
5. Type and rated capacity of blowers (cfm): Rotary Lobe Blower, 120cfm@5psi	
6. Additional information: Blower in sound enclosure	
Effluent Flow Meter	☒ Proposed ☐ Existing ☐ Modification ☐ N/A
1. Type and size (in): Ultrasonic meter	
2. Location description: mounted over the post aeration tank upstream of the weir	
3. Indicating, recording and totalizing: yes it is provided	
4. Additional information:	
Sludge Thickening	☐ Proposed ☐ Existing ☐ Modification ☒ N/A
1. Type of sludge thickeners:	
2. Number and dimensions (ft) of unit:	
3. Hydraulic capacity (gpm):	
4. Solids capacity (lb/hr):	
5. Type of chemicals added:	
6. Expected solids content of sludge (%):	
7. Additional information:	

Anaerobic Digester	☐ Proposed ☐ Existing ☐ Modification ☒ N/A
1. Number and dimensions (ft) of unit:	
2. Side water depth and freeboard (ft) of unit:	
3. Volume (gal):	
4. Total design sludge loading (lbs/day):	
5. Volatile solids percentage (%):	
6. Design solids retention time (days):	
7. Type and size (HP) of mixing equipment:	
8. Internal or external heating:	
9. Decanting method:	
10. Discharge location of supernatant:	
11. Additional information:	
Aerobic Digester	☒ Proposed ☐ Existing ☐ Modification ☐ N/A
1. Number and dimensions (ft) of unit: two tanks, 36' w x 90'L	
2. Side water depth and freeboard (ft) of unit: SWD 15.5' and 1.5' FB	
3. Volume (gal): total 751,291 gallons	
4. Total design sludge loading (lbs/day): 2600	
5. Volatile solids percentage (%):75	
6. Design solids retention time (days): 50	
7. Type and efficiency of diffusers (SOTE %):27%	
8. Dedicated or shared plant blowers: shared with aeration	
9. Type and rated capacity of blowers (cfm): rotory lobe blowers 2 each capacity of 1,500 cfm each	
10. Decanting method: motor operated telescoping valve in digester	
11. Discharge location of supernatant: plant pump station	
12. Additional information: variable speed control on blower motor	
Aerated Sludge Holding Tank	☐ Proposed ☐ Existing ☐ Modification ☒ N/A
1. Number and dimensions (ft) of unit:	
2. Side water depth and freeboard (ft) of unit:	
3. Volume (gal):	
4. Total design sludge loading (lbs/day):	
5. Sludge storage retention time (days):	
6. Type and efficiency of diffusers (SOTE %):	
7. Dedicated or shared plant blowers:	
8. Type and rated capacity of blowers (cfm):	
9. Decanting method:	
10. Discharge location of supernatant:	
11. Additional information:	
Sludge Drying Bed	☐ Proposed ☐ Existing ☐ Modification ☒ N/A
1. Number and dimensions (ft) of unit:	
2. Method of unit isolation:	
3. Concrete ramp and runway provisions:	
4. Discharge location of drainage:	

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5. Additional information:	
Mechanical Dewatering	☒ Proposed ☐ Existing ☐ Modification ☐ N/A
1. Type of dewatering unit: screw press	
2. Number and dimensions (ft) of unit: one unit (13' L x 6' W x 6' H)	
3. Hydraulic capacity (gpm): 44,100 gallons per week (52 GPM)	
4. Solids capacity (lb/hr): 1,000 lb/hr	
5. Type of chemicals added: Polymer	
6. Expected solids content of dewatered sludge (%):18%	
7. Discharge location of drainage: precipate drains to floor drains that go to plant lift station	
8. Additional information:	
Sludge Dewatering Bag System	☐ Proposed ☐ Existing ☐ Modification ☒ N/A
1. Number and volume (yd^3) of unit:	
2. Type of chemicals added:	
3. Expected solids content of dewatered sludge (%):	
4. Drainage containment provisions:	
5. Discharge location of drainage:	
6. Additional information:	
Final Sludge Disposal	☒ Proposed ☐ Existing ☐ Modification ☐ N/A
1. Ultimate disposal method of sludge: Landfill	
2. Expected solids content of sludge (by the principal method of disposal): 18%	
3. Location of disposal site: Southern Marion County	
4. Ownership of the disposal site: Private	
5. Availability of sludge transport equipment: by Contract hauler	
6. Additional information:	
V. SEWER COLLECTION SYSTEM	
Lift Station	☒ Proposed ☐ Existing ☐ Modification ☐ N/A
1. Location: 703 South Tibbs Avenue	
2. Type of pump (example: submersible, dry pit): Submersible	
3. Number of pumps: 4	
4. Constant or variable speed: variable speed	
5. Design pump rate (gpm) and TDH (ft): 8,333 gpm @ 68 TDH	
6. Operating volume of the wet well (gal): 5800 gallons	
7. Average detention time in the wet well (min): 8.5 minutes	
8. Type of standby power/pump provisions: natural gas 250 KW gen set	
9. Type of alarm: audio visual with scada connection to Plant control panel	
10. Additional information:	
Low Pressure Sewer Grinder Pump Station	☐ Proposed ☐ Existing ☐ Modification ☒ N/A
1. Number of stations:	
2. Number of residential connections per simplex station (two maximum):	
3. Design pump rate (gpm) at maximum TDH (ft):	
4. Type of alarm:	
5. Privately or utility owned and maintained:	

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6. Additional information:	
Vacuum Pump Station	☐ Proposed ☐ Existing ☐ Modification ☒ N/A
1. Location:	
2. Total volume of vacuum tank (gal):	
3. Operating volume of the vacuum tank (gal):	
4. Number and size (HP) of vacuum pumps:	
5. Number and type of sewage pumps:	
6. Constant or variable speed:	
7. Design pump rate (gpm) and TDH (ft):	
8. Type of standby power/pump provisions:	
9. Type of alarm:	
10. Additional information:	
Sewer	☒ Proposed ☐ Existing ☐ Modification ☐ N/A
1. Gravity or vacuum sewer: Gravity	
2. Type of pipe material: PVC influent sewer, PVC outfall sewer (Effluent)	
3. ASTM/AWWA Standard and SDR/DR: ASTM D1784 SDR-21	
4. Diameter and length of sewer (indicate length for each size): 36" - 267 LF / 36" 443 LF (Effluent)	
5. Number of manholes: 1 on the influent to main lift station / 1 on the outfall	
6. Number of vacuum valve pits (if applicable): N/A	
7. Additional information:	
Force Main and Low Pressure Sewer	☒ Proposed ☐ Existing ☐ Modification ☐ N/A
1. Type of pipe material: PVC	
2. ASTM/AWWA Standard: ASTM D1784	
3. SDR/DR and pressure class (psi): SDR 21 200 psi	
4. Diameter and length of sewer (indicate length for each size): 18' @ 16"; 1,394' @ 24"	
5. Additional information:	

IDENTIFICATION OF POTENTIALLY AFFECTED PERSONS

Please list any and all persons whom you have reason to believe have a substantial or proprietary interest in this matter, or could otherwise be considered to be potentially affected under law. Failure to notify a person who is later determined to be potentially affected could result in voiding IDEM's decision on procedural grounds. To ensure conformance with Administrative Orders and Procedures Act (AOPA) and to avoid reversal of a decision, please list all such parties. The letter on the opposite side of this form will further explain the requirements under the AOPA. Attach additional names and addresses on a separate sheet of paper, as needed.

Name SEE ATTACHED	
Address (*number and street)*	
City	
State	ZIP Code

Name	
Address (*number and street)*	
City	
State	ZIP Code

Name	
Address (*number and street)*	
City	
State	ZIP Code

Name	
Address (*number and street)*	
City	
State	ZIP Code

Name	
Address (*number and street)*	
City	
State	ZIP Code

Name	
Address (*number and street)*	
City	
State	ZIP Code

CERTIFICATION

I certify that to the best of my knowledge I have listed all potentially affected parties, as defined by IC 4-21.5-3-5.

Proposed Facility Name Ben Davis C.D. WWT Facility	City INDIANAPOLIS
Printed Name of Person Signing Kent F. Schuch	County MARION
Signature Kent F. Schuch	Date Signed (*month / day / year*) 1 / 27 / 2021

65-42FC
MAYOR HOGSETT
CITY-COUNTY BLDG., SUITE T-241
200 E. WASHINGTON ST.
INDIANAPOLIS, IN 46204

65-42FC
JARED EVANS
CITY-COUNTY BLDG., SUITE T-241
200 E. WASHINGTON ST.
INDIANAPOLIS, IN 46204

65-42FC
KRISTIN JONES
CITY-COUNTY BLDG., SUITE T-241
200 E. WASHINGTON ST.
INDIANAPOLIS, IN 46204

65-42FC
R & D RENTALS, LLC
817 S. TIBBS AVE.
INDIANAPOLIS, IN 46241

65-42FC
HOWARD MANAGEMENT CO., LLC
2916 KENTUCKY AVE.
INDIANAPOLIS, IN 46221

65-42FC
TIBBS REALTY, LLC
10151 HAGUE RD.
INDIANAPOLIS, IN 46256

65-42FC
PARK 65 TRANSPORTATION, LLC
4045 PARK 65 DRIVE
INDIANAPOLIS, IN 46254

65-42FC
GRADY BROTHERS REALTY, LLC
915 S. SOMERSET AVE.
INDIANAPOLIS, IN 46241

65-42FC
PEREZ, CARLOS DOMINGO BATEN
7447 E. 10TH ST.
INDIANAPOLIS, IN 46219

65-42FC
SMITH, MICHELLE
3499 DELMAR AVE.
INDIANAPOLIS, IN 46241

65-42FC
CASTORENO, CORNELIA M.
3493 DELMAR AVE.
INDIANAPOLIS, IN 46241

65-42FC
GIBSON, KENTON JOSEPH
3487 DELMAR AVE.
INDIANAPOLIS, IN 46241

65-42FC
DAVIS, JACKLYN H.
238 S. 4TH AVE.
BEECH GROVE, IN 46107

65-42FC
RYBOLT, SHAWN M.
3475 DELMAR AVE.
INDIANAPOLIS, IN 46241

65-42F
SILENCE, RONALD D. & PATRICIA A.
3469 DELMAR AVE.
INDIANAPOLIS, IN 46241

65-42FC
ROSNER, JASON E.
3463 DELMAR AVE.
INDIANAPOLIS, IN 46241

65-42FC
JENKINS, BECCA J.
3457 DELMAR AVE.
INDIANAPOLIS, IN 46241

65-42FC
POTTS, VICTORIA SUE
3451 DELMAR AVE.
INDIANAPOLIS, IN 46241

65-42FC
COUNTS, MARGARET & KEVIN W.
3445 DELMAR AVE.
INDIANAPOLIS, IN 46241

65-42FC
VEALE, KEITH W. JR., & LEAH G.
7656 MONTERAY CIRCLE
AVON, IN 46123

65-42FC
SCHNER, EDWIN A.
3433 DELMAR AVE.
INDIANAPOLIS, IN 46241

65-42FC
BURROWS, BRIAN D. & KATHLEEN M.
8206 ROCKVILLE RD., #198
INDIANAPOLIS, IN 46214

65-42FC
ARNOLD, CONNIE A.
3421 DELMAR AVE.
INDIANAPOLIS, IN 46241

65-42FC
SOWERS, ROBERT C. SR.
3415 DELMAR AVE.
INDIANAPOLIS, IN 46241

65-42FC
WLN HOLDINGS, LLC
3420 CANNONBALL TRL
YORKVILLE, IL 60560

65-42FC
WALLACE, TRACY A.
3403 DELMAR AVE.
INDIANAPOLIS, IN 46241

65-42FC
BEN DAVIS CONSERVANCY DISTRICT
703 S. TIBBS AVE.
INDIANAPOLIS, IN 46241

HYDRAULICS THRU THE PLANT

BEN DAVIS CD
WWT PLANT

HYDRAULIC PROFILE DATA

01/13/2021

	Elevations
Aeration 4 tanks Top of Wall (TOW)	718.50
Influent trough max water elevation 4 tanks	716.82
max water elevation 2 tanks	716.20
Set downward opening gates 5.5' wide at	716.20
Set bottom of notch opening in wall at 0.5 ft less	715.70
Set liquid level in aeration at the same level when max with 2 tanks	715.70
Set effluent weir height based on max with 2 tanks	715.43
Liquid level based on max flow with 4 tanks	715.59
Max flow in effluent trough shall be at or below the the notch at end of aeration	714.72
Bottom of effluent trough at drop box	712.33
Allow a 6" drop at drop box	711.83

Splitter Box TOW	715.50
36" pipe to splitter box requires 0.49 ft at max flow rate	713.70
The head over the 1 weir in series at peak flow is 1.54 ft	
Therefor set bottom of 6' weir at	712.16
Set bottom of wall opening at	711.66
Normal operation in parallel at max flow both gates open the elevation in the entrance box	713.12
Normal operation in parallel at max flow to clarifiers	711.67
Series operation peak flow to #1 clarifier and #2 closed	711.85

Clarifier #1 TOW	713.00
30" pipe feed to clarifier worst case is series peak flow with a loss of 0.40 ft	
Water elevation in clarifier will be	711.45
Set bottom of v notches at	711.32
Bottom of effluent trough at outlet then is	709.60
Normal operation at max flow parallel flows the level in the clarifier #1 should be	711.43

Clarifier #2 TOW		710.00
30" pipe feed to clarifier worst case is series and peak flow with a loss of	1.36 ft	
Water elevation in clarifier will be		708.20
Set bottom of v notches at		708.07
Bottom of effluent trough at outlet then is		706.35
Normal operation at max flow in parallel mode the level in clarifier #2 should be		708.18
Junction box #1 liquid elevation during series mode and peak flow		708.94
Junction box #2 liquid elevation during series mode and peak flow		706.01

HEAD BOX IN FRONT OF UV TOW	710.00

UV CHANNEL TOW		708.00
Head loss thru uv	0.15 ft	
Finger weir elevation		705.85

POST AERATION TOW		708.00
Max flow over a cipolletti 4' weir the height i	1.503 ft	
Set the max elevation .5' below the top of finger weirs or		705.35
Set the bottom of the weir at		703.85
Set the bottom of the notch at		703.60

OUTFALL SEWER	
36" pipe @ 0.143' per 100 ft carries 16 mgd invert at plant set at	696.04

Headloss Calculations
Ben Davis Conservancy District WWTF
Aeration Tank Inlet Channnels
Manning's Equation

Flow cfs	Act. Width (in.)	Act. Depth (in.)	Area sq ft.	Perimeter ft.	Rh	Vel. fps	Length	Equiv. Fitting Length	Total Length (ft)	Mannings S (ft/ft)	Hf
.1894	48.000	48.000	16.0000	12.0000	1.3333	0.3868	45.00	0.00	45.00	7.761E-06	0.000
3.5673	48.000	48.000	16.0000	12.0000	1.3333	1.1605	45.00	0.00	45.00	6.984E-05	0.003
4.7571	48.000	48.000	16.0000	12.0000	1.3333	1.5473	45.00	0.00	45.00	1.242E-04	0.006

Channel Headloss = 0.006 at MAX with 150% return
0.003 at Peak with 150% return
0.000 at ADF with 150% return

ıning's *n* = 0.013 for concrete channel

ık flow = Peak + 150% ADF for RAS= 12 +6 = 18 mgd = 12500 gpm

ing Chamber is centered on aeration tanks.

= 4 mgd = 2,778 GPM

= + RAS = 10 mgd = 6,944 GPM

‹ Hourly Q = 16 mgd = 11,111 GPM

ık flow = 12 mgd = 8333 gpm

ent

ening weir gates

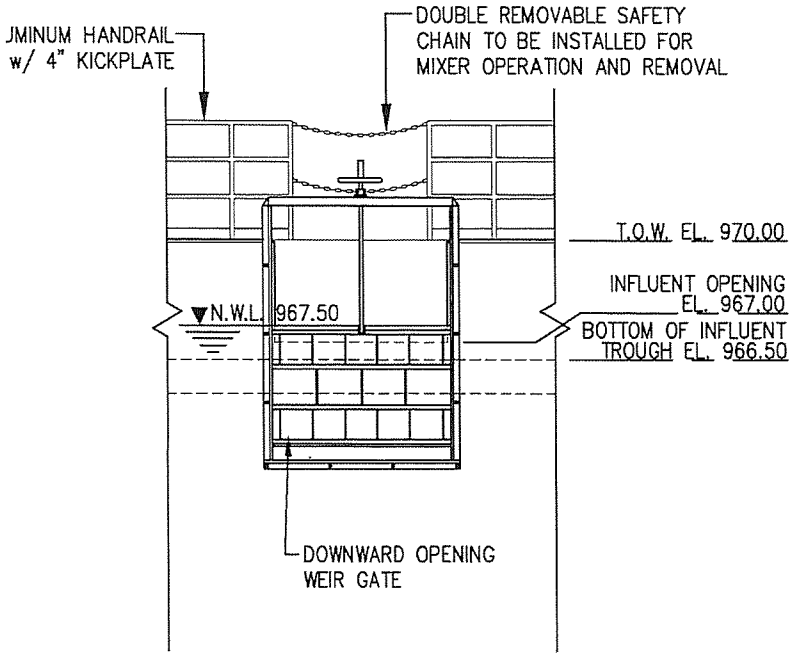
dth = 5 or more ft

ctangular, Sharp Crested Weir fully contracted

= 3.33*(L-.2H)*H^(3/2)

= CFS B = width of approach in FT
= FT P = depth of
FT of weir

nits H/L < .33
B - L >4 H max
P > 2 H max



evation = 718.50 Bottom of Influent Opening Notch 715.70
ient Channel = 712.5 Set top of weir plate at 716.20

nt channel and head over 5' weir gate
n tanks being used.

H = ft	WL =
0.22	716.42
0.5	716.70
0.62	716.82

aeration influent channel and head over 5' weir gate
and half of the aeration tanks being used.

H = ft	WL =
0.00	716.20
0.00	716.20
0.00	716.20

ent

st above
P = 3.75 ft

, B = 12 ft

= 5 ft

over
0.69 ft

Calculations

H/L =	0.14
H/L ≤ 0.33 ?	yes
B-L =	7.00
4H =	2.76
B-L > 4 H ?	yes
P > 2 H	yes
Flow Rate, Q =	6.909 cfs

are yes, flow is fully contracted.

S	1/4 CFS	H		
6.190	1.547	0.22		
8.567	4.642	0.5		
4.757	6.189	0.62		
7.852	6.963	0.69		

H	CFS	H	CFS	H	CFS
0.37	3.193	0.71	7.132	1.25	11.635
0.38	3.307	0.72	7.243	1.26	11.680
0.39	3.423	0.73	7.352	1.27	11.724
0.40	3.538	0.74	7.462	1.28	11.767
0.41	3.654	0.75	7.570	1.29	11.807
0.42	3.771	0.76	7.678	1.30	11.846
0.43	3.887	0.77	7.785	1.31	11.883
0.44	4.004	0.78	7.891	1.32	11.918
0.45	4.121	0.79	7.997	1.33	11.952
0.46	4.239	0.80	8.101	1.34	11.984
0.47	4.356	0.81	8.205	1.35	12.014
0.48	4.474	0.82	8.308	1.36	12.042
0.49	4.592	0.83	8.410	1.37	12.068
0.50	4.709	0.84	8.511	1.38	12.092
0.54	5.180	0.85	8.612	1.39	12.115
0.55	5.297	0.86	8.711	1.40	12.136
0.56	5.414	0.87	8.809	1.41	12.154
0.57	5.532	0.88	8.907	1.42	12.171
0.58	5.648	0.89	9.003	1.43	12.186
0.59	5.765	0.90	9.098	1.44	12.199
0.60	5.881	0.91	9.192	1.45	12.210
0.61	5.997	0.92	9.286	1.46	12.219
0.62	6.113	0.93	9.378	1.47	12.226
0.63	6.228	0.94	9.469	1.48	12.231
0.64	6.342	0.95	9.559	1.49	12.234
0.65	6.457	0.96	9.647	1.50	12.235
0.66	6.571	0.97	9.735	1.51	12.234
0.67	6.684	0.98	9.821	1.52	12.231
0.68	6.797	0.99	9.906	1.53	12.226
0.69	6.909	1.00	9.990	1.54	12.219
0.70	7.021	1.01	10.073	1.55	12.209

.iquid in Aeration tank controlled by effluent contracted weir

Set effluent weir at elevation = 715.43

GPM	CFS	1/4 CFS	1/2 CFS
2778	6.190	715.49	715.43
8333	18.567	715.56	715.43
11111	24.757	715.59	715.43

Calculations

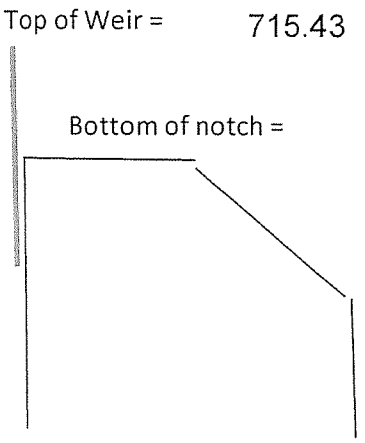
ɜst above			H/L =	0.005
ɔ =	14	ft		
			H/L ≤ 0.33 ?	yes
, B =	36	ft		
			B-L =	5.00
=	31	ft	4H =	0.64
			B-L > 4 H ?	yes
ɔver				
	0.16	ft	P > 2 H	yes

Flow Rate, Q = 6.539 cfs

are yes, flow is fully contracted.

ʿS	1/4 CFS	H		
6.190	1.547	0.06		
8.567	4.642	0.13		
?4.757	6.189	0.16		

H	Q
0.10	3.243
0.11	3.739
0.12	4.258
0.13	4.798
0.14	5.359
0.15	5.939
0.16	6.539
0.17	7.156
0.18	7.792
0.19	8.445
0.20	9.114
0.21	9.800
0.22	10.501
0.23	11.218
0.24	11.949
0.25	12.696
0.26	13.456
0.27	14.230
0.28	15.018
0.29	15.820



Headloss Calculations
Ben Davis Conservancy District WWTF
Aeration Tank Effluent Channnels
Manning's Equation

Flow cfs	Act. Width (in.)	Act. Depth (in.)	Area sq ft.	Perimeter ft.	Rh	Vel. fps	Length	Equiv. Fitting Length	Total Length (ft)	Mannings S (ft/ft)	Hf
5.472	48.000	18.500	6.1667	7.0833	0.8706	2.5090	150.00	0.00	150.00	0.0005765	0.086
3.567	48.000	21.143	7.0477	7.5238	0.9367	2.6345	150.00	0.00	150.00	0.0005765	0.086
7.852	48.000	28.683	9.5610	8.7805	1.0889	2.9131	150.00	0.00	150.00	0.0005766	0.086

ıel is to be .0576% or .0576 ft per 100 feet
el length is 150' or 0.0864 feet of fall from upstream to downstream.

ɔttom of channel at the drop into the box = 712.33
ɔttom of channel 1" at east end and slope up to 2" at the west end
t west end = 712.41
t east end = 712.33

Channel

Act. Depth (in.)	ELEV in Channel
18.500	713.87
21.143	714.09
28.683	714.72

eration box to splitter box ahead of clarifiers

ATION FOR PRESSURE LOSS IN PIPES

$$V = 1.318 * C_H * R^{.63} * S^{.54}$$

$$Hf = \frac{(100/C)^{1.852} * (Q)^{1.85}}{(D)^{4.8655}} * .2083$$

zontal + 20 ft vertical + 2 90deg elbows

428 LF

	ADF	PEAK	MAX
Example	2778	8333	11111
200	428	428	428
hness constant 140	140	140	140
iin) 100	2778	8333	11111
c diameter (inches) 3	34.43	34.43	34.43

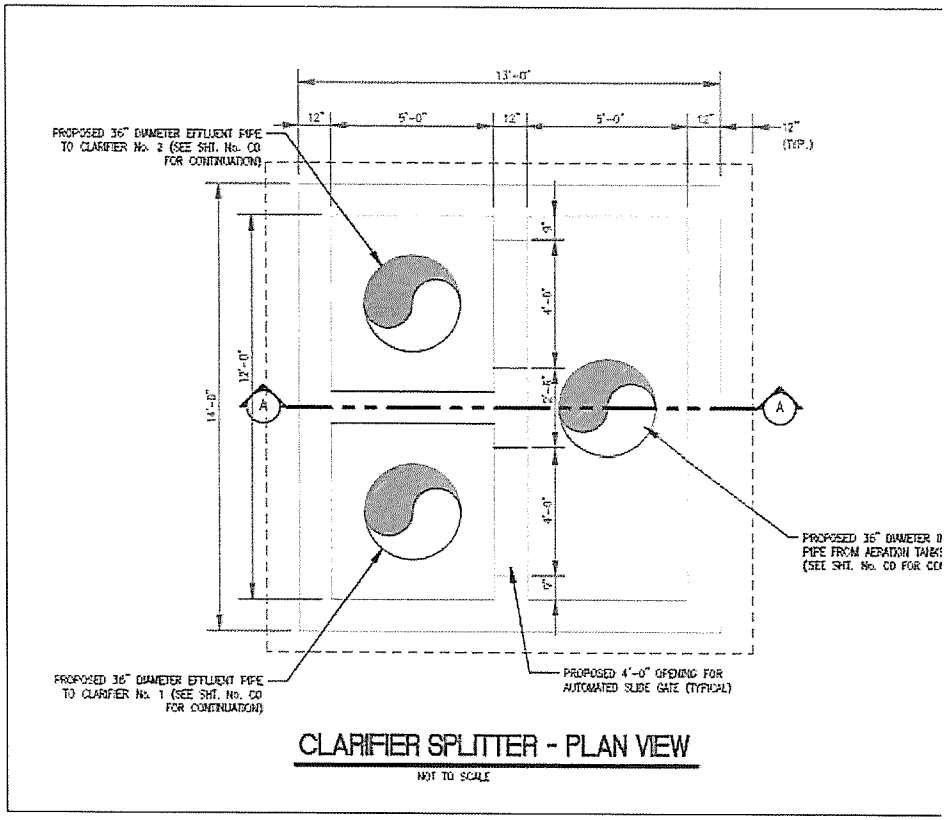
oss

t of water per 100 feet of pipe (ft H20 per 2.70	0.01	0.07	0.12
of water per 100 feet of pipe (psi per 100 ft 1.16	0.00	0.03	0.05
5.39	0.04	0.29	0.49
2.32	0.02	0.12	0.21

ity

4.54	0.96	2.87	3.83

sure Pipe has a ID of 34.43



CLARIFIER SPLITTER - PLAN VIEW

NOT TO SCALE

Calculations

		H/P <.33	0.02
5	ft		
		H/P <.33	yes
96.25	ft		

H/B <.33

0	ft	0.00
		yes
0.12	ft	

Flow Rate, Q =

13.323	cfs
5,980	GPM

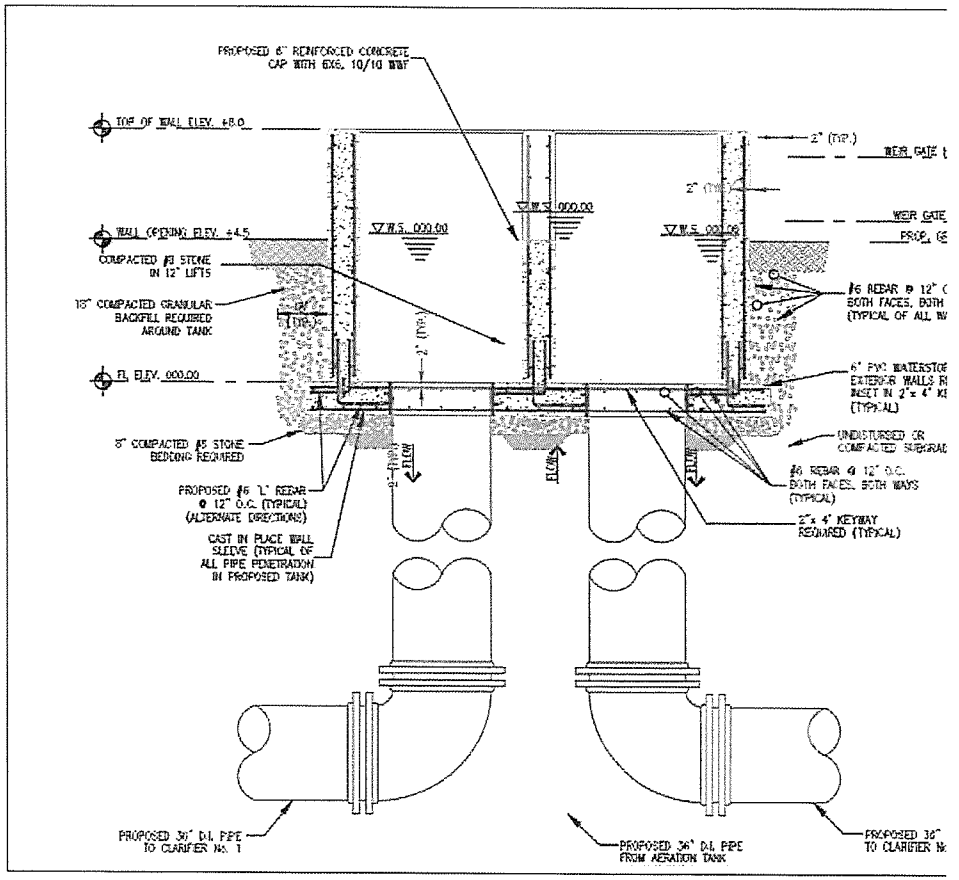
flow is fully contracted.

2 weirs		Elevation
GPM	H	
1389	0.38	712.54
4167	0.79	712.95
5556	0.96	713.12

1 weir		
GPM	H	
6944	1.18	713.34
8333	1.54	713.70

at max flow rate

T.O.W	715.50
Weir Elev	712.16
Wall Open	711.66



Feed from Splitter Box to Clarifiers

MODE 1 : Both clarifiers in operation in parallel

Clarifier #1 the closest to the splitter box

30" pipe

CC length	91	ft
Vertical	6	
Two 90 deg	150	EQ Length
TOTAL	247	FEET

	ADF	PEAK	MAX
Specified Data	3472	4166.5	6250
l = length of pipe (ft)	247	247	247
c = Hazen-Williams roughness constant	140	140	140
q = volume flow (gal/min)	3472	4166.5	6250
dh = inside or hydraulic diameter (inches)	28.77	28.77	28.77
Calculated Pressure Loss			
f = friction head loss in feet of water per 100 feet of pipe (ft H20 per 100 ft pipe)	0.03	0.05	0.10
f = friction head loss in psi of water per 100 feet of pipe (psi per 100 ft pipe)	0.01	0.02	0.04
Head loss (ft H20)	0.08	0.11	0.24
Head loss (psi)	0.03	0.05	0.10
Calculated Flow Velocity			
v = flow velocity (ft/s)	1.71	2.06	3.09

30" PVC SDR 21 Pressure Pipe has a ID of 28.77
36" PVC SDR 21 Pressure Pipe has a ID of 34.43

MODE 2 : Both clarifiers in operation in series

30" PVC SDR 21 Pressure Pipe has a ID of 28.77

	ADF	PEAK	MAX
Specified Data	6944	8333	12500
l = length of pipe (ft)	247	247	247
c = Hazen-Williams roughness constant	140	140	140
q = volume flow (gal/min)	6944	8333	12500
dh = inside or hydraulic diameter (inches)	28.77	28.77	28.77
Calculated Pressure Loss			
f = friction head loss in feet of water per 100 feet of pipe (ft H20 per 100 ft pipe)	0.12	0.16	0.34
f = friction head loss in psi of water per 100 feet of pipe (psi per 100 ft pipe)	0.05	0.07	0.15
Head loss (ft H20)	0.29	0.40	0.85
Head loss (psi)	0.12	0.17	0.37
Calculated Flow Velocity			
v = flow velocity (ft/s)	3.43	4.11	6.17

Clarifier #2 Splitter Box to Clarifier #2

MODE 1 : Both clarifiers in operation in parallel

30" pipe
30" PVC SDR 21 Pressure Pipe has a ID of 28.77

CC length	91	ft
Vertical	6	
Two 90 deg	150	EQ Length
1 Tee	20	
TOTAL	267	FEET

	ADF	PEAK	MAX
	3472	4166.5	6250
Specified Data			
l = length of pipe (ft)	267	267	267
c = Hazen-Williams roughness constant	140	140	140
q = volume flow (gal/min)	3472	4166.5	6250
dh = inside or hydraulic diameter (inches)	28.77	28.77	28.77
Calculated Pressure Loss			
f = friction head loss in feet of water per 100 feet of pipe (ft H20 per 100 ft pipe)	0.03	0.05	0.10
f = friction head loss in psi of water per 100 feet of pipe (psi per 100 ft pipe)	0.01	0.02	0.04
Head loss (ft H20)	0.09	0.12	0.25
Head loss (psi)	0.04	0.05	0.11
Calculated Flow Velocity			
v = flow velocity (ft/s)	1.71	2.06	3.09

MODE 1 : Both clarifiers in operation in parallel

	ADF	PEAK	MAX
Q gpm	1389	4166.5	5555.5
Q cfs	3.09	9.28	12.38
Q per V	0.003	0.008	0.010
H ft	0.06	0.10	0.11
H inches	0.75	1.17	1.31
ELEV	708.13	708.17	708.18

MODE 2 : Both clarifiers in operation in series

ADF	PEAK
6944	8333
15.47	18.57
0.013	0.015
0.12	0.13
1.44	1.55
708.19	708.20

These are liquid level in #2 Clarifier only

Top of Weir at splitter	712.16	
Leave 6" drop	711.66	
Head drop	708.20	elevation of water in clarifier at Peak in Series mode
Set bottom of v notch	708.07	bottom of v notch
Set bottom of trough	706.74	16" lower than bottom of v
Allow for fall	706.35	0.39 ft of fall around clarifier to outlet
Bottom of outbox	703.85	

Clarifier #2 to UV splitter box

MODE 1 : Both clarifiers in operation in parallel

MODE 2 : Both clarifiers in operation in series

30" pipe with 2 90 and a 22.5

	207	equivalent pipe length
horiz	26	
vert	6	
fittings	175	

	ADF	PEAK	MAX	PEAK	MAX
Specified Data	3472	4166.5	6250	8333	12500
l = length of pipe (ft)	207	207	207	207	207
c = Hazen-Williams roughness constant	140	140	140	140	140
q = volume flow (gal/min)	3472	4166.5	6250	8333	12500
dh = inside or hydraulic diameter (inches)	28.77	28.77	28.77	28.77	28.77
Calculated Pressure Loss					
f = friction head loss in feet of water per 100 feet of pipe (ft H20 per 100 ft pipe)	0.03	0.05	0.10	0.16	0.34
f = friction head loss in psi of water per 100 feet of pipe (psi per 100 ft pipe)	0.01	0.02	0.04	0.07	0.15
Head loss (ft H20)	0.07	0.09	0.20	0.34	0.71
Head loss (psi)	0.03	0.04	0.08	0.14	0.31
Calculated Flow Velocity					
v = flow velocity (ft/s)	1.71	2.06	3.09	4.11	6.17

MODE 2 : Both clarifiers in operation in series

30" pipe flow back to clarifier #2 from UV structure
fittings 2 -90s, 2 -45s, 1 tee

Total	427	equivalent pipe length
horiz	169	
vert	8	
90's	150	
45s	80	
tee	20	

Specified Data

l = length of pipe (ft)
c = Hazen-Williams roughness constant
q = volume flow (gal/min)
dh = inside or hydraulic diameter (inches)

	ADF 6944	PEAK 8333	MAX 12500
	vert	vert	vert
c = Hazen-Williams roughness constant	140	140	140
q = volume flow (gal/min)	6944	8333	12500
dh = inside or hydraulic diameter (inches)	28.77	28.77	28.77

Calculated Pressure Loss

f = friction head loss in feet of water per 100 feet of pipe (ft H20 per 100 ft pipe)	0.12	0.16	0.34
f = friction head loss in psi of water per 100 feet of pipe (psi per 100 ft pipe)	0.05	0.07	0.15
Head loss (ft H20)	0.50	0.69	1.47
Head loss (psi)	0.21	0.30	0.63

Calculated Flow Velocity

v = flow velocity (ft/s)	3.43	4.11	6.17

Clarifiers are the same size and each are 100' diameter with a double weir trough
The v-notch weir is 1 foot from the outside wall so it has a 98' diameter
The notches are 90 degrees 6" on center and 2.5" deep.

The inside weir is a		46.5 radius	
The circumfrence is	2 x PI x r	307.88 ft	615
The inside weir is		292.17	584
Number of notches		600	1199

Equation for a 90 degree v notch

$$Q = 2.49H^{2.48}$$

$$H = (Q/2.49)^{(1/2.48)}$$

MODE 1 : Both clarifiers in operation in parallel

	ADF	PEAK	MAX
Q gpm	1389	4166.5	5555.5
Q cfs	3.09	9.28	12.38
Q per V	0.002581	0.007743	0.010324
H ft	0.06	0.10	0.11
H inches	0.75	1.17	1.31
ELEV	711.38	711.42	711.43

MODE 2 : Both clarifiers in operation in series

ADF	PEAK	
6944	8333	
15.47	18.57	
0.012904	0.015486	
0.12	0.13	
1.44	1.55	
711.44	711.45	These are liquid level in #1 Clarifier only

Top of Weir at splitter	712.16	
Leave 6" drop	711.66	
Head drop	711.85	elevation of water in clarifier at Peak in Series mode
Set bottom of v notch	711.32	bottom of v notch
Set bottom of trough	709.99	16" lower than bottom of v
Allow for fall	709.60	0.39 ft of fall around clarifier to outlet
Bottom of outbox	707.10	

Clarifier # 1 effluent pipe to splitter ahead of UV

30" pipe 407 ft of equiv. pipe

MODE 1 : Both clarifiers in operation in parallel

Hazen Williams

	ADF	PEAK	MAX
Specified Data	3472	4166.5	6250
l = length of pipe (ft)	407	407	407
c = Hazen-Williams roughness constant	140	140	140
q = volume flow (gal/min)	3472	4166.5	6250
dh = inside or hydraulic diameter (inches)	28.77	28.77	28.77
Calculated Pressure Loss			
f = friction head loss in feet of water per 100 feet of pipe (ft H20 per 100 ft pipe)	0.03	0.05	0.10
f = friction head loss in psi of water per 100 feet of pipe (psi per 100 ft pipe)	0.01	0.02	0.04
Head loss (ft H20)	0.13	0.18	0.39
Head loss (psi)	0.06	0.08	0.17
Calculated Flow Velocity			
v = flow velocity (ft/s)	1.71	2.06	3.09

MODE 2 : Both clarifiers in operation in series

ADF	PEAK	MAX
6944	8333	12500
407	407	407
140	140	140
6944	8333	12500
28.8	28.77	28.77
0.12	0.16	0.34
0.05	0.07	0.15
0.47	0.66	1.40
0.20	0.28	0.60
3.43	4.11	6.17

Pipe length	Horiz	142
	Vert	10
90's	2 @ 75 ea	150
45's	2 @ 40 ea	80
22.5	1 @25	25
		407 ft of equiv pipe

UV

use manufacturer's headloss at .15 ft thru the unit

Top of Wall	708.00
Top of Weir from UV	705.85
Allow .5' drop at Max	705.35
Set bottom of weir so max elev	705.35
Bottom of weir	703.85

Post aeration

Cipolletti weir $Q = 3.367\ L\ H^{3/2}$

Max

L = 4 ft

H = 1.503 ft

Q = 24.817 cfs

16.031 MGD

H> .2 ft

P/H >2

b/H >2

ADF 4.0 MGD

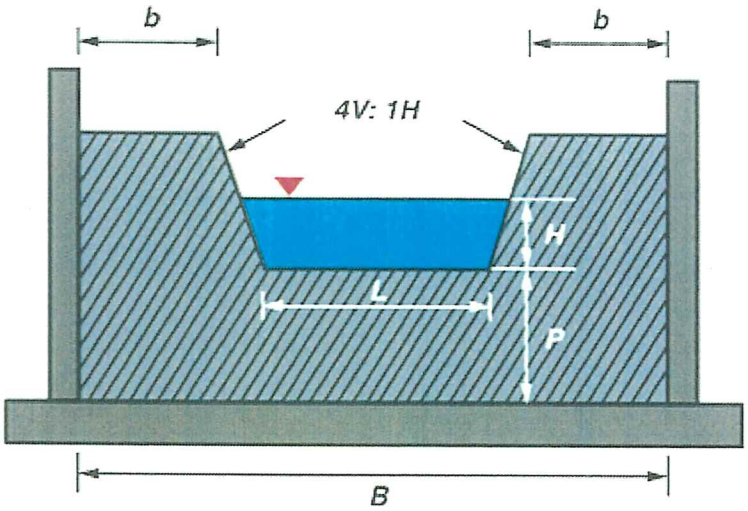
6.2 CFS

H = 0.60 ft

Peak 12 MGD

18.58 CFS

H = 1.24 ft



HISTORICAL LOADINGS

ATTACHMENT 1

BEN DAVIS CONSERVANCY
2019 - 2020 FLOWS/LOADINGS

		Flow	Rain	BOD	TSS	Ammonia	Phos	LBS BOD
Sat	3/30/2019	7.508		85	109	6.4		5,316
Sun	4/28/2019	7.714		25	26	3.6		1,608
Mon	6/17/2019	9.257		8	15	1.4		633
Mon	7/29/2019	2.319		166	274	20.2		3,211
Thu	8/15/2019	1.656		127	157	32.7		1,754
Fri	9/20/2019	1.479		142	388	29.2		1,752
Wed	10/2/2019	1.446		130	174	28.7		1,568
Tue	10/15/2019	1.331		197	412	30.6		2,187
Tue	11/5/2019	1.677		109	169	21.4		1,524
Tue	12/3/2019	2.725		94	175	10.6		2,127
Thu	1/9/2020	2.779		89	162	12.4		2,067
Tue	2/11/2020	9.055		15	21	1.8		1,110
Tue	3/3/2020	6.300		74	109	5.9		3,872
Tue	4/7/2020	3.002		170	270	11.1		4,256
Tue	5/5/2020	2.454		74	95	12.4		1,523
Tue	6/2/2020	3.022		76	116	8.1		1,918
Wed	7/8/2020	3.384		78	198	7.8		2,199
Tue	8/4/2020	2.489		84	202	19.0		1,735
Wed	9/9/2020	1.587		122	328	26.8		1,615
	AVERAGE	**3.747**		**98**	**179**	**15.3**		**2,209**
		Flow	**Rain**	**BOD**	**TSS**	**Ammonia**	**Phos**	
Tue	15-Sep	1.521	0	168	175	24.6	4.66	2,131
Wed	16-Sep	1.454	0	184	257	23.2	5.35	2,231
Thur	17-Sep	1.432	0	155	223	25.0	5.22	1,851
Fri	18-Sep	1.448	0	135	171	26.8	5.18	1,630
Sat	19-Sep	1.438	0	159	148	26.2	4.42	1,907
Sun	20-Sep	1.437	0	135	227	27.4	5.50	1,618
Mon	21-Sep	1.453	0	133	215	24.0	5.85	1,612
	AVERAGE	**1.455**	**-**	**153**	**202**	**25.3**	**5.17**	**1,854**

ATTACHMENT 2

TAI, PER — ATTACHMENT — February 2021

HISTORICAL FLOWS & WASTELOADS
Ben Davis Conservancy District

INFLUENT	Average Daily Flows (MGD)	Monthly Flow	CBOD (mg/l)	TSS (mg/l)	NH3-N (mg/l)
2016					
January	3.57	110.80	151.2	140.0	14.1
February	2.84	79.50	34.8	141.8	11.0
March	3.98	123.30	61.5	245.8	6.7
April	4.22	126.60	22.8	473.8	7.8
May	4.77	148.00	28.9	135.5	11.9
June	3.06	91.70	45.0	138.8	12.9
July	3.18	98.50	118.8	254.5	15.0
August	3.79	117.60	52.7	136.3	11.0
September	3.49	104.80	42.7	100.1	11.0
October	2.37	73.40	109.0	246.0	18.0
November	1.68	50.30	45.2	166.9	27.8
Dec2016	1.95	60.30	144.6	175.0	12.1
2017					
January	3.85	119.32	96.8	205.3	11.8
February	2.15	60.24	144.0	211.8	17.0
March	3.12	96.68	113.2	160.0	7.6
April	2.94	88.23	22.2	85.0	9.6
May	5.17	160.30	24.7	49.1	6.9
June	2.72	81.60	67.5	155.8	8.2
July	3.75	116.20	35.6	93.9	12.7
August	1.62	50.20	104.7	218.0	21.8
September	1.10	33.00	109.8	162.3	28.9
October	1.36	42.20	97.2	143.3	22.7
November	2.11	63.40	78.7	148.5	24.7
December	2.37	73.40	92.0	177.0	25.5
2019					
January	4.21	130.47	0.0	0.0	0.0
February	5.05	141.53	0.0	0.0	0.0
March	3.30	102.38	84.9	109.0	6.4
April	5.15	154.56	25.0	26.0	3.6
May	3.77	116.87	25.0	26.0	3.6
June	3.67	109.99	8.2	26.0	3.6
July	2.56	79.29	166.0	274.0	20.2
August	1.72	53.27	127.0	157.0	32.7
September	1.43	42.92	142.0	388.0	29.7
October	1.53	47.38	130.0	174.0	28.7
November	1.41	42.41	109.0	169.0	21.4
December	2.69	83.44	93.6	175.0	10.6
2020					
January	4.71	146.05	89.2	162.0	12.4
February	3.04	88.21	14.7	21.2	1.8
March	3.96	122.64	73.7	109.0	5.9
April	2.25	67.54	170.0	270.0	11.1
May	2.91	90.08	74.4	95.0	12.4
June	2.07	61.95	76.1	116.0	8.1
July	2.08	64.44	77.9	198.0	7.8
August	2.29	71.06	83.6	202.0	19.0
September	1.48	44.37	184.0	257.0	23.2
October	1.47	45.48	106.0	299.0	34.2
November	2.34	72.52	115.0	154.0	17.7
December	1.76	54.46	198.0	157.0	11.5
Daily Avg	2.87	87.56	83.7	161.0	14.2
Limit	4.00		250.0	300.0	20.0

DESIGN OF TREATMENT PROCESS

TRIAD ASSOCIATES, INC.			DESIGN CALCULATIONS
PROJECT NAME:	Ben Davis CD	PROJECT ID: **202018A**	DATE: 20-Jan
DESCRIPTION:	Clarifiers		Page ___ of
PREPARED BY:	Kent Schuch		

CLARIFIER DESIGN

Flow rate ADF = 4 mgd
PEAK = 12
MAX = 16

Criteria to meet

SWD > 12'
SOR < 1,000 gpd/sf
SLR < 40 #/day/sf
WLR < 30,000 gpd/LF of weir

Choose circular center feed perimeter collection

Radius =	50	ft
Area =	7,854	sf
Total area	15,708	sf

SWD =	15.4	ft
Volume, ea tank	120,951	cf
Volume, total	241,903	cf
	1,809,432	gallons
Detention time =	0.45	days @ ADF
	10.9	hours
	0.15	days @ PEAK
	3.6	hours

Surface Overflow Rate (SOR)		
at ADF	255	gpd/sf
at PEAK	764	

Solids Loading Rate (SLR)

based on peak flow plus ras flow and MLSS design under aeration

Q peak	12	mgd
Q ras	6	mgd
MLSS low	2500	ppm
MLSS high	4200	ppm

TRIAD ASSOCIATES, INC.			DESIGN CALCULATIONS
PROJECT NAME:	Ben Davis CD	PROJECT ID: **202018A**	DATE: 20-Jan
DESCRIPTION:	Clarifiers		Page ____ of
PREPARED BY:	Kent Schuch		

Solids, # Low	375,300	lbs
Solids, # High	630,504	lbs

SLR, low	23.9	lbs/sf
SLR, high	40.1	lbs/sf

Weir Loading Rate (WLR)

Clarifier radius	50	ft
Effluent weir radius 1	49	ft
Effluent weir radius 2	46.5	ft
Perimeter r1	308	lf per tank
Perimeter r2	292	lf
TOTAL	1,200	LF of weir

WLR		
ADF	3,333	gpd/LF
PEAK	9,999	
PEAK RS	14,999	

TRIAD ASSOCIATES, INC.				DESIGN CALCULATIONS	
PROJECT NAME:	Ben Davis CD	PROJECT ID:	202018A	DATE:	25-Jan
DESCRIPTION:	Post Aeration			Page 1 of 1	
PREPARED BY:	Kent Schuch				

POST AERATION

ADF		
	4.0	mgd
	4,000,000	gallons/day
	534,759	cf/day
	371.36	cfm

Detention time 10 minutes

Volume 3,714 cf

Proposed tank dimensions W = 10 L = 36 D = 10.5

Proposed volume 3,780 cf

Proposed air demand is 30 cfm/1,000 cf

Proposed air supplied 113 cfm

Single blower rated 120 cfm at 4.5 psi

Kaeser BB69C
7.5 HP

REVISED AERATION DESIGN CALCULATIONS

TRIAD ASSOCIATES, INC.

DESIGN CALCULATIONS

PROJECT NAME:	Ben Davis CD	PROJECT ID:	202018A	DATE:	9/1/2021
DESCRIPTION:	Aeration Tank Sizing			Page ___ of	
PREPARED BY:	Kent Schuch				

Flow rates	ADF	4	MGD							
	Peak	12								
	Max	16								
BOD		170	ppm							
TSS		200	ppm							
Ammonia		25								
P		5								

Conventional activated sludge design would require a loading not to exceed 40#bod/1000 cf of tank volume

ADF loading is	4 x 130 x 8.34 =		5,671	pounds					
Aeration volume	5671.2	/40 =	141,780	cf or	1,060,514	gallons	total capacity		
If there are 4 tanks then			35,445	cf ea	265,129	gallons ea			
Dimensions									
SWD =	14.2		2,496	sf area					
W/L ratio	ge of 3/1 to 2/1			Width	36	ft			
				Length	69.34	ft			
Final adjustments for dimensions									
	WD =	14.2	ft		Width	36		Length	70

Detention time @ ADF				
V/Q	=	6.42	hrs	
Organic Loading	=	39.6	lbs/1000cf	
Volume in aeration		143,136	CF	
		1,070,657	Gallons	
ADF Load of BOD		5,671	lbs.	

AIR REQUIREMENTS

	#	multiplier	# O2
CBOD	5671	1.2	6,805
NH4	834	4.6	3,836
	TOTAL		10,642

SCFM= oxygen required/cwf efficiency*1440*density of air*#O2/#air

#O2/# air	0.235		
std density	0.075	#/cf	
cwt eff	30%	%	
AOR/SOR	0.5		
scfm =	2,795	scfm	

TRIAD ASSOCIATES, INC.			DESIGN CALCULATIONS		
PROJECT NAME:	Ben Davis CD	PROJECT ID:	202018A	DATE:	9/1/2021
DESCRIPTION:	Aeration Tank Sizing			Page ___ of	
PREPARED BY:	Kent Schuch				

SCFM air		2,795	scfm							
Max air 200%		5,591	scfm							
Furnish 3 blowers 2120 cfm each										
F:M ratio										
	Food is the influent CBOD in pounds				5,671	lbs of CBOD				
	Volume of tank				1,070,657	gallons in aeration				
	MLSS				2500				3500	
	MLVSS				1875	assumes 75% volatile			2625	
	Mass in aeration				16,742	lbs of MLVSS			23,439	
			F/M ratio =		0.34				0.24	
Solids retention time										
	Mass of solids in aeration				22,323	lbs of MLSS in aeration			31,252.49	
	Mass of solids in effluent				334	lbs of solids in effluent @10 ppm			334	
	Mass of solids in waste			Hi	1,800	lbs of solids in WAS stream			2,700	
				Lo	1,200				1,800	
			SRT =		10	days			10	days
					15				15	days
	Volume wasted at 1.0 % solids			Hi	21,583	gallons			32,374	gallons
				Lo	14,388	gallons			21,583	

TRIAD ASSOCIATES, INC. | DESIGN CALCULATIONS

PROJECT NAME:	Ben Davis CD	PROJECT ID:	**202018A**	DATE:	9/1/2021
DESCRIPTION:	Aereobic Digesters			Page 1 of 1	
PREPARED BY:	Kent Schuch				

AEROBIC DIGESTER

ADF=	4.0	mgd	4,000,000	gpd
CBOD=	170	ppm		
Total lbs	5,671	lbs/day		

Proposed tanks are	W	L	D	Volume,ea		Total	
2 tanks each	36	90	15.5	50,220	cf	100,440	cf
				375,646	gallons	751,291	cf

AIR REQUIREMENT

30 cfm/1,000 cf of tank volume results in		3,013	cfm total air	
	2 blowers each	1,507	cfm	

Solids Loading

From the aeration design the solids being wasted =			1800	lbs		
additional chemical sludge for phos removal			650	lbs		
when running	2500	ppm	for the MLSS			
the SRT is	10	days				
it was assumed that the % volatile solids is =			75%			
So the design solids loading to the digester is			2,450	lbs/day	3,350	
at 1.0% solids is then			29,376	gpd	40,168	
Total solids that are inert is 25% of the solids or			613	lbs/day	838	

		Assume 40% reduction of VSS or				1,103	lbs/day	1,508		
		Total lbs of solids remaining				1,715	lbs/day	2,345		
		Decanted to a 2% sludge is				10,282	gpd	14,059	gpd	
				1.50%		13,709	gpd	18,745		
		Two stage digestion								
		First stage								
		WAS sludge introduced, aerated, decanted to 2% solids, then transferred to the 2nd stage								
		Detention time in Stage 1				13	days			
		Detention time in Stage 2				37	days			
MOP FD-9 1985 WPCF				for WAS no primary sludge						
		$V = \frac{Q^*X_i}{X^*(K_d^*P_v + 1/SRT)}$								
								SRT		
							days	10	15	20
		V= volume of digester in cf					Volume, cf	83,933	103,682	117506
		Xi = influent SS in mg/l				10,000	gallons	627,818	775,540	878,945
		Q = influent average flow rate in cf/day				29,376				
		X = digester SS in mg/l				20000				
		Kd= reaction rate constant d-1				0.1				
		Pv = volatile fraction of digester SS as %				75%				
		SRT =	solids retention time in days							
1	AVERAGE DAILY WAS FLOW, MGD						0.08	Assum waste is 2% ADF		
2	AVERAGE TSS in WAS, mg/l						10,000			
3	AVERAGE TSS, lb/day plus 650 lbs for phos						7,322			
6	Assume 75% Volatile Solids =VSS, lb/day						5,492			
7	Assume 40% VSS destruction = removed, lb/day						2,197			
8	Total Solids out of Digester, lb/day (line 3 - line 7)						5,125			
9	Assume 2.0% Solids out of Digester = Solids, gal/day						19,889			

10	Detention time required in digester, days						30			
11	Volume required in digester, gallons						596,657			
12	Per 10 States Standards, add 25% extra capacity for supernatant						149,164			
13	Total Digester volume required, gallons						745,821			
14	Total Digester volume required, CF						99,709			
15	Aeration required for mixing at 30 CFM/1,000 CF						2,991			
	Check VSS loading to digester						0.06	lbs VSS/cf of digester		
		expected loading range 0.1 to 0.3								
	Metcalf & Eddy 3rd edition page 837									
16	Actual volume of digester						100,440	cf		
							751,291	gallons		

PHOSPHORUS CALCULATIONS

Chemical Phosphorus Removal Calculations
Ben Davis Conservancy District WWTP

Existing Loading Data (September 15th to September 21st)

Flow (Q)	1.455 MGD
PO4:	5.169 mg/L
PO4:	62.71 lbs/day

Assumptions/Input:

* Ave influent is 5.169 mg/L PO4 @ 1.455 MGD = 62.71 lbs/day Phosphorus

* Effluent limit is 1.0 mg/L, no mass limitation.
* Use 0.5 mg/L in effluent for calculation purposes.
* 0.421 lbs Al3+/gal in a 48% solution of aluminum sulfate
* 1.37 lbs Al3+/gal in a 43% solution of sodium aluminate
* 0.991 lbs Al3+/gal in a light HyperIon 1997 solution (1.048 lbs/gal in a heavy solution)
*??? 5.4 lbs alum per gallon solution delivered
*??? Density 48% strength chemical solution = 11.1 lbs/gal

	Alum	Aluminate	PAlCl low	PAlCl high
lbs Al3+/gal solu	0.421	1.37	0.991	1.048
SG	1.335	1.535	1.35	1.39
Density, lb/gal	11.14151	12.81065	11.2667	11.60052
Cost Estimates				
$/lb solution	0.115	0.27	0.2	0.2

Parameter	Unit	Value
ADF	MGD	4.00
PDF	MGD	12.00
P Influent (Xi)	mg/L	5.169
P Influent (Xi)	lb/day	**173**
P Effluent (Xe)	mg/L	1.00
P Effluent (Xe)	lb/day	**33.38**
Storage	days	30

Stoichiometry:

	Atomic #	Atomic Weight
P	15	30.974
Al	13	26.982
S	16	32.06
O	8	16
H	1	1.008
Al2(SO4)3 - 14H2O		594.368
Dry Alum		342.144
NaAlO2		81.971

$$Al^{3+} + (PO_4)^{3-} \rightarrow AlPO_4$$

$$Al^{3+} + 3OH^- \rightarrow Al(OH)_3$$

$$Al_2(SO_4)_3 \bullet 14H_2O + 2PO_4^{3-} \rightarrow 2AlPO_4(\downarrow) + 3SO_4^{2-} + 14H_2O$$

EPA (625/1-76-001a, pg 3-3) Method:

P Reduction Required	Al:P Mole Ratio	Al:P Weight Ratio	Alum:P Weight Ratio	Aluminate:P Weight Ratio	PAlCl Low Weight Ratio	PAlCl High Weight Ratio
75%	1.38:1	1.2:1	13:1	3.65:1		
80%	1.55:1	1.35:1	14.9:1	4.10:1		
85%	1.72:1	1.5:1	16:1	4.55:1		
90%	2:1	1.74:1	19.2:1	5.29:1		
95%	2.3:1	2.0:1	22:1	6.09:1		

Parameter	Unit	Value
Reduction	lb/day	**139**
Reduction	%	**80.7%**

Gal Solution/day = (lbs P/day removed x Al3+:P weight ratio)/(lbs Al3+/gal Solution)

% Removal	Mass Ratio	Removal, lbs/day		Alum	Aluminate	PAlCl Low	PAlCl High
75%	1.2	129	Feed Rate, gal/day	368.84	113.34	156.69	148.17
			Feed Rate, gph	15.37	4.72	6.53	6.17
			Storage Req'd, gal	11065	3400	4701	4445
			Cost Estimate, $/day	473	392	353	344
80%	1.35	138	Feed Rate, gal/day	443	136	188	178
			Feed Rate, gph	18	6	8	7
			Storage Req'd, gal	13278	4080	5641	5334
			Cost Estimate, $/day	567	470	424	413
85%	1.5	147	Feed Rate, gal/day	522.52	160.57	221.98	209.91
			Feed Rate, gph	21.77	6.69	9.25	8.75
			Storage Req'd, gal	15676	4817	6659	6297
			Cost Estimate, $/day	669	555	500	487
90%	1.74	155	Feed Rate, gal/day	641.78	197.22	272.64	257.81
			Feed Rate, gph	26.74	8.22	11.36	10.74
			Storage Req'd, gal	19253	5917	8179	7734
			Cost Estimate, $/day	822	682	614	598
95%	2.0	164	Feed Rate, gal/day	778.66	239.28	330.79	312.80
			Feed Rate, gph	32.44	9.97	13.78	13.03
			Storage Req'd, gal	23360	7178	9924	9384
			Cost Estimate, $/day	998	828	745	726

*based on Design Average Flow

RAW PUMPING

RAW PUMPING STATION

PROJECT:	Ben Davis	DESIGNED BY	KFS
LOCATION:	Headworks	DATE:	12/17/2020
TAI #:	202018A	CHECKED BY:	kfs
DESCRIPTION:	PUMP TDH CALCULATIONS	DATE:	12/17/2020

GENERAL LIFT STATION INFORMATION:

Controlling Elevations

Forcemain Discharge =	717.45	ft
Forcemain High Point =	717.45	ft
Pump ON =	677.00	ft
Pump OFF =	673.83	ft

Flow Rate & Pump Rate

Peak Inflow Rate =	1,390	gpm
Pumping Rate =	2780	gpm
Pumping Rate =	6.19	cfs
Pumping Rate =	4,003,200	gpd

FRICTION LOSSES:

	LS Discharge Piping	LS Discharge Piping	Forcemain	
Nominal Pipe Diameter, Pipe Type =	10" DI Class 350	16" DI Class 250	24" HDPE DR17	
Pipe Inside Diameter (inches) =	10.58	16.8	22.6	
C value =	120	120	140	
Average velocity in pipe (ft/s) =	10.15	4.02	2.22	
Total length of FM =	19	20	1610	
$V = 1.318\ C\ R^{0.63}\ S^{0.54}$, therefore, S (ft/ft) =	0.0361	0.0038	0.0007	Friction
$S = h_l / L$				
therefore, **h(friction)(ft) =**	**0.69**	**0.08**	**1.08**	**1.77**

MINOR LOSSES (PIPE FITTINGS):

Reference: Chicago Pumps, Hydraulics & Useful Information

Fittings Description	K-value	No.	Total	No.	Total	No.	Total
Entrance Loss	0.50	1	0.50	0	0.00	0	0.00
Outlet Loss	1.00	0	0.00	0	0.00	1	1.00
90 degree bend	0.30	2	0.60	1	0.30	3	0.90
45 degree bend	0.23	0	0.00	0	0.00	6	1.38
22.5 degree bend	0.15	0	0.00	0	0.00	2	0.30
11.25 degree bend	0.09	0	0.00	0	0.00	0	0.00
Plug Valve	0.77	1	0.77	0	0.00	1	0.77
Check Valve	2.50	1	2.50	0	0.00	0	0.00
Tee (through)	0.60	0	0.00	3	1.80	0	0.00
Tee (side flow)	1.8	0	0.00	0	0.00	0	0.00
Wye (thru)	1.00	0	0.00	0	0.00	0	0.00
Reducer/Expander	0.19	1	0.19	0	0.00	0	0.00
		Total K Values:	4.56		2.10		4.35

Head Loss from fittings = $h_m = KV^2 / (2g)$

therefore, **h(fittings)(ft) =**	**7.29**	**0.53**	**0.33**

STATIC LOSSES:

	Maximum	Minimum	
Elevation of highest point (discharge)(ft)=	717.45	717.45	
Low water level in LS (Pump OFF)(ft) =	673.83	677.00	**Total Static Head (Max)**
Static head losses = high point - LS level			
therefore, **h(static)(ft)=**	**43.62**	40.45	**43.62**

TOTAL DYNAMIC HEAD (TDH) = h(friction) + h(fittings) + h(static) = 53.5 ft

Pressure (psi): 23

FLOW RATE (gpm)	LS DISCHARGE PIPING VELOCITY (ft/s)	LS DISCHARGE PIPING FRICTION LOSS (ft)	LS DISCHARGE PIPING MINOR LOSS (ft)	FORCEMAIN PIPING VELOCITY (ft/s)	FORCEMAIN PIPING FRICTION LOSS (ft)	FORCEMAIN PIPING MINOR LOSS (ft)	TDH (ft)
1500	5.47	0.22	2.12	1.20	0.35	0.10	**46.4**
1750	6.39	0.29	2.89	1.40	0.46	0.13	**47.4**
2780	10.15	0.69	7.82	2.22	1.08	0.33	**53.5**
3700	13.50	1.16	12.91	2.96	1.84	0.59	**60.1**
4000	14.60	1.34	15.09	3.20	2.12	0.69	**62.9**
5000	18.25	2.03	23.58	4.00	3.21	1.08	**73.5**

NET POSITIVE SUCTION HEAD AVAILABLE

Absolute Pressure on surface (ha-ft)	33.96	@ sea level
Vapor Pressure of liqued (hvpa-ft)	0.78	@ 68°F
Static Height above impeller (hst-ft)		(pump off - impeller)
Suction line losses (hfs-ft)	0.00	(submersible)

NPSHA = ha - hvpa + hst - hfs 33.2 ft

NPSHR must be 5' less than NPSHA (safety factor)

RAW PUMPING @ PEAK

PROJECT:	Ben Davis	DESIGNED BY	KFS
LOCATION:	Headworks	DATE:	12/17/2020
TAI #:	202018A	CHECKED BY	kfs
DESCRIPTION:	PUMP TDH CALCULATIONS	DATE:	12/17/2020

GENERAL LIFT STATION INFORMATION:

Controlling Elevations			Flow Rate & Pump Rate		
Forcemain Discharge =	717.45	ft	Peak Inflow Rate =	4,167	gpm
Forcemain High Point =	717.45	ft	Pumping Rate =	8333	gpm
Pump ON =	677.00	ft	Pumping Rate =	18.57	cfs
Pump OFF =	673.83	ft	Pumping Rate =	11,999,520	gpd

FRICTION LOSSES:		LS Discharge Piping	LS Discharge Piping	Forcemain	
Nominal Pipe Diameter, Pipe Type =		10" DI Class 350	16" DI Class 250	24" HDPE DR17	
Pipe Inside Diameter (inches) =		10.58	16.8	22.6	
C value =		120	120	140	
Average velocity in pipe (ft/s) =	Q/3	10.14	12.06	6.67	
Total length of FM =		19	20	1610	
$V = 1.318\ C\ R^{0.63}\ S^{0.54}$, therefore, S (ft/ft) =		0.0360	0.0290	0.0051	Friction
$S = h_f / L$					
therefore, **h(friction)(ft)** =		**0.68**	**0.58**	**8.27**	**9.53**

MINOR LOSSES (PIPE FITTINGS):

Reference: Chicago Pumps, Hydraulics & Useful Information

Fittings Description	K-value	No.	Total	No.	Total	No.	Total	
Entrance Loss	0.50	1	0.50	0	0.00	0	0.00	
Outlet Loss	1.00	0	0.00	0	0.00	1	1.00	
90 degree bend	0.30	2	0.60	1	0.30	3	0.90	
45 degree bend	0.23	0	0.00	0	0.00	6	1.38	
22.5 degree bend	0.15	0	0.00	0	0.00	2	0.30	
11.25 degree bend	0.09	0	0.00	0	0.00	0	0.00	
Plug Valve	0.77	1	0.77	0	0.00	1	0.77	
Check Valve	2.50	1	2.50	0	0.00	0	0.00	
Tee (through)	0.60	0	0.00	3	1.80	0	0.00	
Tee (side flow)	1.8	0	0.00	0	0.00	0	0.00	
Wye (thru)	1.00	0	0.00	0	0.00	0	0.00	
Reducer/Expander	0.19	1	0.19	0	0.00	0	0.00	
		Total K Values:	4.56		2.10		4.35	
Head Loss from fittings = $h_m = KV^2 / (2g)$								Total Minor Losses
therefore, **h(fittings)(ft)** =			**7.28**		**4.74**		**3.00**	**15.02**

STATIC LOSSES:	Maximum	Minimum	
Elevation of highest point (discharge)(ft)=	717.45	717.45	
Low water level in LS (Pump OFF)(ft) =	673.83	677.00	Total Static Head (Max)
Static head losses = high point - LS level			
therefore, **h(static)(ft)**=	**43.62**	40.45	**43.62**

TOTAL DYNAMIC HEAD (TDH) = h(friction) + h(fittings) + h(static) = 68.2 ft

Pressure (psi): 30

FLOW RATE (gpm)	LS DISCHARGE PIPING 10" VELOCITY (ft/s)	LS DISCHARGE PIPING 10" FRICTION LOSS (ft)	LS DISCHARGE PIPING 10" MINOR LOSS (ft)	LS DISCHARGE PIPING 16" VELOCITY (ft/s)	LS DISCHARGE PIPING 16" FRICTION LOSS (ft)	LS DISCHARGE PIPING 16" MINOR LOSS (ft)	FORCEMAIN PIPING VELOCITY (ft/s)	FORCEMAIN PIPING FRICTION LOSS (ft)	FORCEMAIN PIPING MINOR LOSS (ft)	TDH (ft)
1500	1.82	0.03	0.24	2.17	0.02	0.15	1.20	0.35	0.10	**44.5**
3000	3.65	0.10	0.94	4.34	0.09	0.61	2.40	1.25	0.39	**47.0**
6000	7.30	0.37	3.77	8.68	0.32	2.46	4.80	4.50	1.56	**56.6**
8333	10.14	0.68	7.28	12.06	0.58	4.74	6.67	8.27	3.00	**68.2**
10000	12.17	0.96	10.48	14.47	0.81	6.83	8.00	11.59	4.32	**78.6**
12000	14.60	1.34	15.09	17.37	1.14	9.84	9.60	16.25	6.22	**93.5**

NET POSITIVE SUCTION HEAD AVAILABLE

Absolute Pressure on surface (ha-ft)	33.96	@ sea level
Vapor Pressure of liqued (hvpa-ft)	0.78	@ 68°F
Static Height above impeller (hst-ft)		(pump off - impeller)
Suction line losses (hfs-ft)	0.00	(submersible)

NPSHA = ha - hvpa + hst - hfs 33.2 ft

NPSHR must be 5' less than NPSHA (safety factor)

RAW PUMPING @ MAX

PROJECT:	Ben Davis	DESIGNED BY	KFS
LOCATION:	Headworks	DATE:	12/17/2020
TAI #:	202018A	CHECKED BY	kfs
DESCRIPTION:	PUMP TDH CALCULATIONS	DATE:	12/17/2020

GENERAL LIFT STATION INFORMATION:

Controlling Elevations			Flow Rate & Pump Rate		
Forcemain Discharge =	717.45	ft	Peak Inflow Rate =	5,556	gpm
Forcemain High Point =	717.45	ft	Pumping Rate =	11111	gpm
Pump ON =	677.00	ft	Pumping Rate =	24.76	cfs
Pump OFF =	673.83	ft	Pumping Rate =	15,999,840	gpd

FRICTION LOSSES:

		LS Discharge Piping	LS Discharge Piping	Forcemain	
Nominal Pipe Diameter, Pipe Type =		10" DI Class 350	16" DI Class 250	24" HDPE DR17	
Pipe Inside Diameter (inches) =		10.58	16.8	22.6	
C value =		120	120	140	
Average velocity in pipe (ft/s) =	Q/4	10.14	16.08	8.89	
Total length of FM =		19	20	1610	
$V = 1.318\ C\ R^{0.63}\ S^{0.54}$, therefore, S (ft/ft) =		0.0360	0.0494	0.0088	Friction
$S = h_f / L$					
therefore, **h(friction)(ft)** =		**0.68**	**0.99**	**14.09**	**15.76**

MINOR LOSSES (PIPE FITTINGS):

Reference: Chicago Pumps, Hydraulics & Useful Information

Fittings Description	K-value	No.	Total	No.	Total	No.	Total
Entrance Loss	0.50	1	0.50	0	0.00	0	0.00
Outlet Loss	1.00	0	0.00	0	0.00	1	1.00
90 degree bend	0.30	2	0.60	1	0.30	3	0.90
45 degree bend	0.23	0	0.00	0	0.00	6	1.38
22.5 degree bend	0.15	0	0.00	0	0.00	2	0.30
11.25 degree bend	0.09	0	0.00	0	0.00	0	0.00
Plug Valve	0.77	1	0.77	0	0.00	1	0.77
Check Valve	2.50	1	2.50	0	0.00	0	0.00
Tee (through)	0.60	0	0.00	3	1.80	0	0.00
Tee (side flow)	1.8	0	0.00	0	0.00	0	0.00
Wye (thru)	1.00	0	0.00	0	0.00	0	0.00
Reducer/Expander	0.19	1	0.19	0	0.00	0	0.00
		Total K Values:	4.56		2.10		4.35

Head Loss from fittings = $h_m = KV^2 / (2g)$

				Total Minor Losses
therefore, **h(fittings)(ft)** =	**7.28**	**8.43**	**5.33**	**21.05**

STATIC LOSSES:

	Maximum	Minimum	
Elevation of highest point (discharge)(ft)=	717.45	717.45	
Low water level in LS (Pump OFF)(ft) =	673.83	677.00	**Total Static Head (Max)**
Static head losses = high point - LS level			
therefore, **h(static)(ft)**=	**43.62**	40.45	**43.62**

TOTAL DYNAMIC HEAD (TDH) = h(friction) + h(fittings) + h(static) = 80.4 ft

Pressure (psi): 35

FLOW RATE	LS DISCHARGE PIPING 10"			LS DISCHARGE PIPING 16"			FORCEMAIN PIPING			TDH
(gpm)	VELOCITY (ft/s)	FRICTION LOSS (ft)	MINOR LOSS (ft)	VELOCITY (ft/s)	FRICTION LOSS (ft)	MINOR LOSS (ft)	VELOCITY (ft/s)	FRICTION LOSS (ft)	MINOR LOSS (ft)	(ft)
2000	1.82	0.03	0.24	2.89	0.04	0.27	1.60	0.59	0.17	**45.0**
4000	3.65	0.10	0.94	5.79	0.15	1.09	3.20	2.12	0.69	**48.7**
6000	5.47	0.22	2.12	8.68	0.32	2.46	4.80	4.50	1.56	**54.8**
8000	7.30	0.37	3.77	11.58	0.54	4.37	6.40	7.67	2.77	**63.1**
11111	10.14	0.68	7.28	16.08	0.99	8.43	8.89	14.09	5.33	**80.4**
13000	11.86	0.92	9.96	18.82	1.32	11.55	10.40	18.84	7.30	**93.5**

NET POSITIVE SUCTION HEAD AVAILABLE

Absolute Pressure on surface (ha-ft)	33.96	@ sea level
Vapor Pressure of liqued (hvpa-ft)	0.78	@ 68°F
Static Height above impeller (hst-ft)		(pump off - impeller)
Suction line losses (hfs-ft)	0.00	(submersible)

NPSHA = ha - hvpa + hst - hfs 33.2 ft

NPSHR must be 5' less than NPSHA (safety factor)

RAS / WAS PUMPING

Pump Head Loss Calculations

c = 120

Pump Use: RAS/WAS pumping

Pump Model Specified: _____

Date: Jan 4,2021

Project #: 201610A

Calc by: JPO

Reviewed by: KFS

Elevations:

Clarifier #1	711.45	NWL at Discharge	717.45
Clarifier #2	708.20	CL of pump	705.5

ADF 4.00 MGD

2778 GPM

Flow range:

50%	1389
####	2778
####	4167

C factor 120

C factor on new pipe 120

Suction is split into 2 parts

Part 1 from clarifier to header

Part 2 from header to pump

6"area 0.2

Part 1 Clarifier 2 to RAS/WAS Building

Pipe size 12 inch DI Area: 0.87

Length 71 ft 127 ft

Inside Dia 1.05 ft 8.45" class 51

Fittings

	Q	K	Total
Entrance	1	0.50	0.5
Tee thru	0	0.28	0
90	2	0.42	0.8
PV	0	0.25	0
Tee side	0	0.84	0
increaser	0	0.19	0
45	0	0.22	0
			1.3

Target Flow Rates:

# Pumps	1	1	1	1	1	1	2		2
GPM	600	700	900	1050	1400	1800	2100	3200	4200
CFS	1.34	1.56	2.01	2.34	3.12	4.01	4.68	7.13	9.36
6" vel									
12" Vel	1.54	1.80	2.32	2.70	3.60	4.63	5.40	8.23	10.81
50% Q Ve	0.77	0.90	1.16	1.35	1.80	2.32	2.70	4.12	5.40
Velocity H	0.01	0.01	0.02	0.03	0.05	0.08	0.11	0.26	0.45
S =	0.0002	0.0003	0.0005	0.0007	0.0012	0.0019	0.0025	0.0055	0.0092
cl#1 Hf = S x L	0.0177	0.024	0.038	0.05	0.085	0.135	0.18	0.393	0.6504
cl #2	0.03167	0.042	0.067	0.089	0.152	0.242	0.322	0.703	1.163
Minor	0.0124	0.017	0.028	0.038	0.068	0.112	0.152	0.353	0.6075
TOTAL	0.0301	0.04	0.065	0.088	0.153	0.247	0.332	0.746	1.2579
(Minor + Hf)	0.044	0.059	0.095	0.127	0.220	0.354	0.474	1.056	1.771
cl #2	0.04	0.06	0.09	0.13	0.22	0.35	0.47	1.06	1.77
TOTAL PART 1	**0.03**	**0.04**	**0.07**	**0.09**	**0.15**	**0.25**	**0.33**	**0.75**	**1.26**

Pump Head Loss Calculations

c = 120

Part 2 RAS/WAS Building to Pump			
Pipe size	12	inch DI	Area: 0.87
Length	20	ft	
Inside Dia	1.05	ft	12.5 in ID

Fittings

	Q	K	Total
Entrance	0	0.50	0
Tee thru	1	0.26	0.3
90	1	0.39	0.4
PV	4	0.23	0.9
Tee side	2	0.78	1.6
Increaser	1	0.19	0.2
45	0	0.21	0
			3.3

# Pumps	1	1	1	1	1	2	2		2
GPM	600	700	900	1050	1400	1800	2100	3200	4200
CFS	1.34	1.56	2.01	2.34	3.12	4.01	4.68	7.13	9.36
12" velocit	1.54	1.80	2.32	2.70	3.60	4.63	5.40	8.23	10.81
V head	0.04	0.05	0.08	0.11	0.20	0.33	0.45	1.05	1.81
S =	0.0009	0.0012	0.0019	0.0025	0.0043	0.0069	0.0092	0.0200	0.0331
Hf = S x L	0.01755	0.023	0.037	0.049	0.084	0.134	0.179	0.39	0.6448
Minor	0.12287	0.167	0.276	0.376	0.669	1.106	1.505	3.495	6.0207
TOTAL (Minor + Hf)	0.14042	0.191	0.314	0.426	0.753	1.24	1.684	3.885	6.6656

TOTAL PART 2	**0.1404**	**0.19**	**0.31**	**0.43**	**0.75**	**1.24**	**1.68**	**3.88**	**6.666**
TOTAL PIPE/FITTINGS LOSSES GRAND TOTAL	**0.17**	**0.23**	**0.38**	**0.51**	**0.91**	**1.49**	**2.02**	**4.63**	**7.92**
	0.18	0.25	0.41	0.55	0.97	1.59	2.16	4.94	8.44

Net Positive Suction Head Available = NPSHa = Ha - Hv - Hf ± Hs Hs = Static Head Hf = friction head Hv=vapor pressure= .78@68deg

Ha = atmospheric pressure = 33 @ 705' above sea level

Hs = 6.0 ft clarifier #1 and 2,7' clarifier #2

at Clarifier #1	**NPSHa =**	**38.05**	**37.99**	**37.84**	**37.71**	**37.31**	**36.73**	**36.20**
At clarifier #2	NPSHa =	**34.74**	**34.67**	**34.51**	**34.37**	**33.95**	**33.33**	**32.76**

Pump Head Loss Calculations
c = 120

DISCHARGE HEAD

2 parts, header and RAS Pipe

Pipe size 12 inch DI Area: 0.87
Length 29 ft
Inside Dia 1.05 ft 12.64"

Fittings

	Q	K	Total
Tee side	1	0.84	0.8
Tee thru	2	0.28	0.6
45		0.22	0
PV	4	0.25	1
CV	1	2.50	2.5
90	1	0.42	0.4
Increaser	1	0.19	0.2
			5.5

# Pumps	1	1	1	1	1	2	2		2
GPM	600	700	900	1050	1400	1800	2100	3200	4200
CFS	1.34	1.56	2.01	2.34	3.12	4.01	4.68	7.13	9.36
12" velocit	1.53	1.79	2.30	2.68	3.58	4.60	5.37	8.18	10.74
V head	0.04	0.05	0.08	0.11	0.20	0.33	0.45	1.04	1.79
S =	0.0009	0.0012	0.0019	0.0025	0.0043	0.0068	0.0090	0.0197	0.0326
Hf = S x L	0.02526	0.034	0.054	0.071	0.121	0.193	0.257	0.561	0.928
Minor	0.20135	0.274	0.453	0.617	1.096	1.812	2.467	5.727	9.8664
TOTAL (Minor + Hf)	0.22661	0.308	0.507	0.688	1.218	2.005	2.724	6.288	10.794

Discharge header losses	**0.23**	**0.31**	**0.51**	**0.69**	**1.22**	**2.01**	**2.72**	**6.29**	**10.79**

Pump Head Loss Calculations

c = 120

RAS Pipe to Aeration

Pipe size 12 inch DI Area: 0.87

Length 118 ft

Inside Dia 1.1 ft 12.6

Fittings

	Q	K	Total
Tee side	0	0.78	0
Tee thru	0	0.26	0
45	2	0.22	0.4
90	2	0.39	0.8
PV	0	0.23	0
exit	1	0.30	0.3
Increaser	0	0.19	0
			1.5

# Pumps	1	1	1	1	1	2	2		2
GPM	600	700	900	1050	1400	1800	2100	3200	4200
CFS	1.34	1.56	2.01	2.34	3.12	4.01	4.68	7.13	9.36
12" velocii	1.54	1.80	2.32	2.70	3.60	4.63	5.40	8.23	10.81
V head	0.04	0.05	0.08	0.11	0.20	0.33	0.45	1.05	1.81
S =	0.0009	0.0012	0.0019	0.0025	0.0043	0.0069	0.0092	0.0200	0.0331
Hf = S x L	0.106	0.141	0.225	0.299	0.510	0.812	1.081	2.358	3.902
Minor	0.056	0.077	0.127	0.172	0.306	0.506	0.689	1.600	2.756
TOTAL (Minor + Hf)	0.162	0.218	0.352	0.472	0.816	1.319	1.770	3.958	6.659

RAS pipe to aeration	**0.162**	**0.22**	**0.352**	**0.472**	**0.816**	**1.319**	**1.770**	**3.958**	**6.659**
Discharge Hf =	**0.39**	**0.53**	**0.86**	**1.16**	**2.03**	**3.32**	**4.49**	**10.25**	**17.45**

Static Head at NWL = 6.00 ft Clarifier #1

9.25 Clarifier #2

Clarifier #1 **Suction Hf =**	**0.17**	**0.23**	**0.38**	**0.51**	**0.91**	**1.49**	**2.02**	**4.63**	**7.92**
Clarifier #2	0.18	0.25	0.41	0.55	0.97	1.59	2.16	4.94	8.44

TDH = Discharge Hf + Suction Hf + Static H

	1	1	1	1	1	2	2		2
	600	700	900	1050	1400	1800	2100	3200	4200
Clarifier #1 TDH =	**6.56**	**6.76**	**7.24**	**7.67**	**8.94**	**10.81**	**12.51**	**20.88**	**31.38**
Clarifier #2 TDH =	**9.82**	**10.03**	**10.52**	**10.96**	**12.26**	**14.17**	**15.90**	**24.44**	**35.14**

UV MANUFACTURER'S TECHNICAL DATA SHEETS

Aquaray® 3X Vertical Lamp
UV Disinfection Equipment

Budget Proposal
Ben Davis Conservancy District WWTP
Indiana

October 27, 2020

Contact information:

Prepared By:

SUEZ TREATMENT SOLUTIONS, INC
George Vrachimis
Applications Engineer
Tel: 201-676-2227
Email: george.vrachimis@suez.com

Local Sales Representative:

FACO WaterWorks LLC
Ken Sobbe
Tel: 317-694-1896
Email: Ken@facollc.com

October 27, 2020

To: Kent Schuch, P.E.
Triad Associates, Inc.

Re: Aquaray® 3X Ultraviolet Disinfection Equipment
Ben Davis Conservancy District WWTP

SUEZ Treatment Solutions is pleased to submit our preliminary budget proposal for the Aquaray® 3X High Output Vertical Lamp ultraviolet disinfection system for the above referenced project. The proposed design is based on our latest Aquaray® 3X System which features vertically mounted high output amalgam lamps with variable output for greater power conservation. Some of the proposed Aquaray® 3X Vertical Lamp UV System's features include:

- Third-Party validated per 2012 NWRI guidelines
- Easy maintenance without the need to remove equipment from channel for lamp and ballast replacement.
- Automatic dose control is achieved by turning on/off lamps in combination with dimming in relation to a flow signal, ensuring that the plant is operated economically while still providing the required performance.

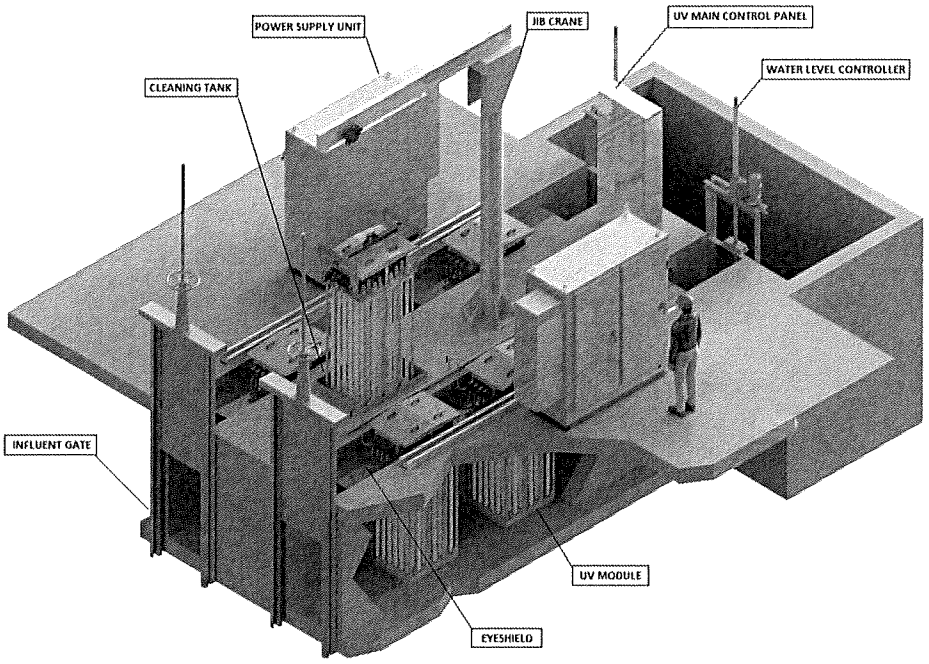
For a max disinfection flow of 16 MGD and a minimum UVT of 65%, SUEZ proposes to furnish two (2) UV disinfection channels. The proposed UV system will have UV modules mounted one (1) across by two (2) UV banks in series per channel. The UV system will deliver a minimum UV dose of 33,300 $\mu WS/cm^2$ (33.3 mJ/cm^2) at the peak flow with all UV modules in service.

If you have any questions or require any additional information, please don't hesitate to contact our local representative or the undersigned.

Sincerely,

For SUEZ Treatment Solutions Inc.
George Vrachimis
Applications Engineer

I. AQUARAY® 3X VERTICAL LAMP SYSTEM DESCRIPTION



- The UV lamps are mounted vertically and perpendicular to the flow, where all electrical connections are made out of the water. All the lamps are easily accessed through the lid of the top enclosure. This makes routine service such as lamp changes, performed without having to remove the lamp modules from the channel.

- Electronics, such as ballasts and communication cards, are all located in a remote enclosure away from the UV channel

- The UV lamps are mounted in a uniform staggered array. This ensures a semi-tortuous path for the effluent that avoids discharge of undisinfected wastewater.

- Flow pacing is achieved by a combination of dimming each row of lamps from 100% to 62% output and turning lamp rows on and off in relation to a plant flow signal. Each UV module has six (6) rows of lamps.

- Each UV module has a dedicated electric motor that powers a mechanical wiper. No failure of one wiping system component will result in the loss of wiping capability for the entire UV system.

- All UV modules are completely removable from the UV channel, allowing for regularly scheduled channel cleaning to remove algae or debris.

II. DESIGN BRIEF:

Parameter	Value	Unit
Max Disinfection Flow	16	MGD
Peak Flow	12	MGD
Average Daily Flow	4.0	MGD
Design UV Transmittance	65%	% UVT
TSS, 30 day geometric mean	<30	mg/L
TSS, Single sample maximum	<45	mg/L
E. Coli, 1-day maximum of daily samples	<235	CFU/100 mL
Minimum UV dose	33,300	μWS/cm²

III. PROPOSED AQUARAY® 3X UV SYSTEM DESIGN:

Description	Value
System Designation	Aquaray® 3X
Number of Channels	2
Number of Modules Across (Modules per Bank)	1
Number of Modules in Series (Number of Banks)	2
Aquaray® Modules/Channel	2
Total Number of Modules	4
Number of Lamps/Module	36
Total Number of Lamps	144
Headloss across UV modules at 16 MGD, in.	1.71 inches
Power Consumption per Lamp, W	400 watts
Power Consumption at 16 MGD, kW *Through 2 Channels*	53.5 kW
Power Consumption at 12 MGD, kW *Through 2 Channels*	42.8 kW
Power Consumption at 4 MGD, kW *Through 1 Channel*	18.2 kW
Max Operating Power, kW	58.4 kW

Proposed Channel Dimensions	Value
Channel Length, ft.	19'
Channel Width, in.	29.5"
Nominal Water Depth, in.	61" - 69"
Minimum Channel Depth, in.	77"

IV. SCOPE OF SUPPLY:

UV System Component	Value
Number of Aquaray® 3X Modules	4
Number of UV Lamps (Excluding Spares)	144
Number of UV Intensity Sensors (One per bank)	4
Number of Power Supply Units (PSUs)	2
Number of UV Main Control Panels (UMCPs)	1
Number of Power Cables	12
Number of Data Cables	8
Number of Cable Trays	2
Number of Stepdown Transformers	2
Number of Mounting Rails/Eye Shields	6
Level Control Weirs	1 set
Number of Conductivity Level Switches	2
Number of Cleaning Tanks	1
Spare Parts	Included
Field Service	Five (5) days in one (1) trip
Freight to job site	Included

V. SPARE PARTS REPLACMENT COST

PART/SERVICE	COST
UV Lamps (16,000 hour warranty)	$175 / lamp
Sleeves (10 year warranty)	$75 / sleeve
Ballasts (5 year warranty)	$400 / ballast
Wipers (2,000 wipes)	$8 / wiper
Additional 8-hours field service on site	$ 1,390 per day + expenses (hotel, rental car, flight, etc)

VI. ITEMS PROVIDED BY OTHERS

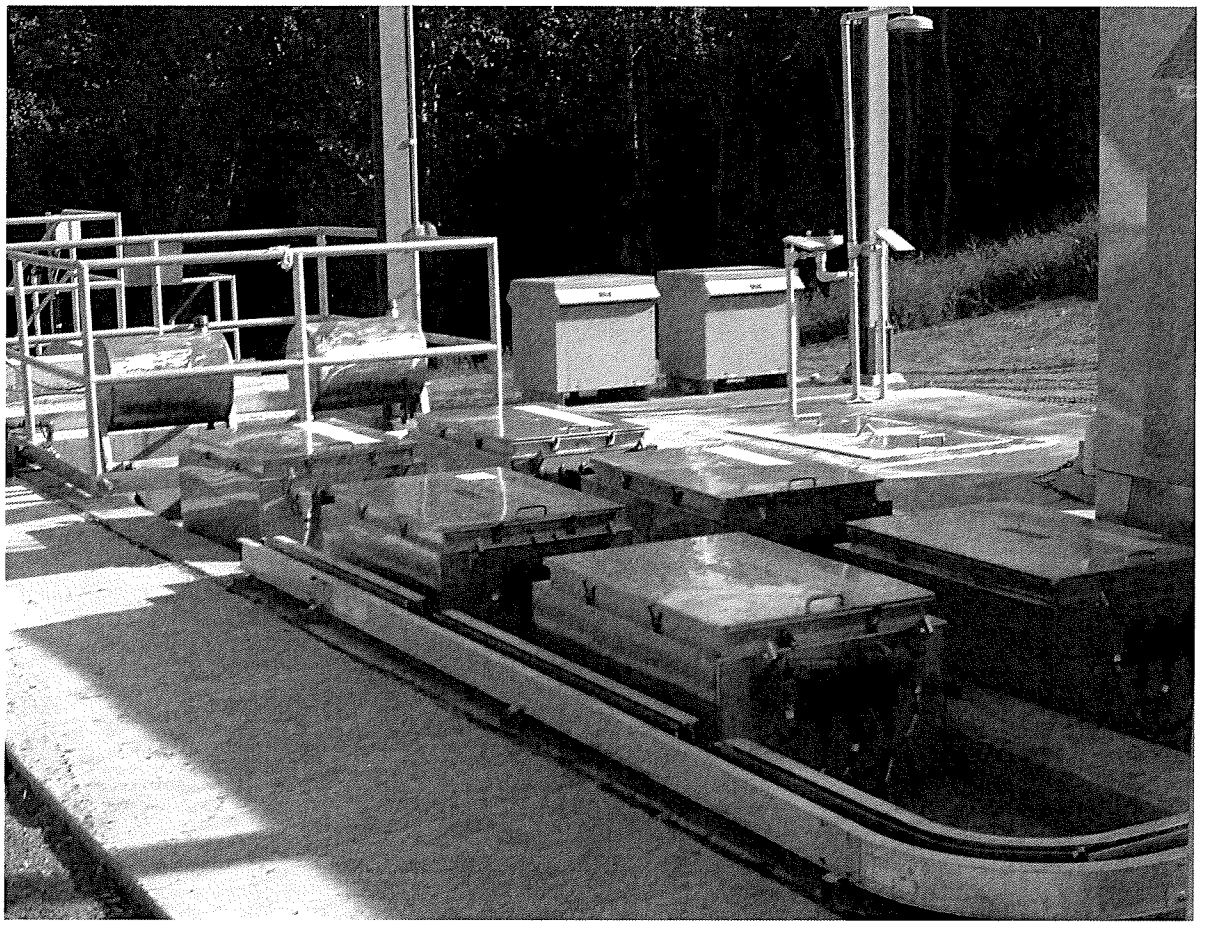
Note that the following items are to be provided by others (unless indicated otherwise above):

- UV channel construction/modification
- Channel grating
- Influent/Isolation gates
- Piping and valves
- Remote computer system
- Installation
- Embedded conduits
- Sample collection and laboratory analysis during performance testing
- Online UVT analyzer
- ½ Ton Jib or Overhead Crane

VII. PRICING, TERMS AND CONDITIONS

Budget Price	**To be provided by local SUEZ Representative**
Taxes	Not included
Payment Terms	• 10% Net Cash, Payable in thirty (30) days from date of submittal of initial drawings for approval; • 85% Net Cash, Payable in progress payments thirty (30) days from dates of respective shipments of the Products; • 5% Net Cash, Payable in thirty (30) days from Product installation and acceptance or Ninety (90)
Submittals	6-8 weeks
Equipment Delivery	18-20 weeks after submittal approval
Freight	FOB jobsite
Warranty	1 year after start-up or 18 months after delivery, whichever occurs first

Typical Aquaray® Vertical Lamp Ultraviolet Disinfection System Installations



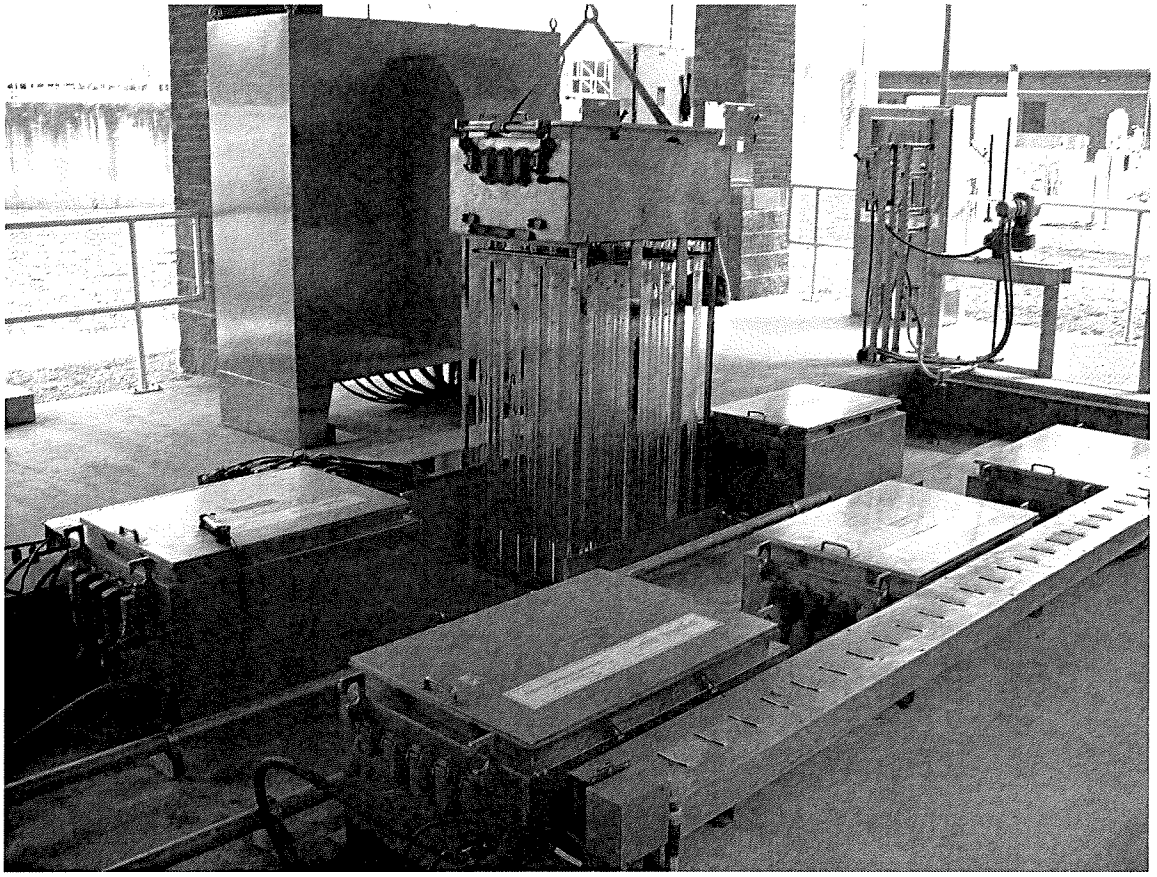
Plant Location: Harnett County, NC

Peak Flow: 20 MGD

Number of Channels: 2

Number of Modules: 3 per channel (6 total)

Typical Aquaray® Vertical Lamp Ultraviolet Disinfection System Installations



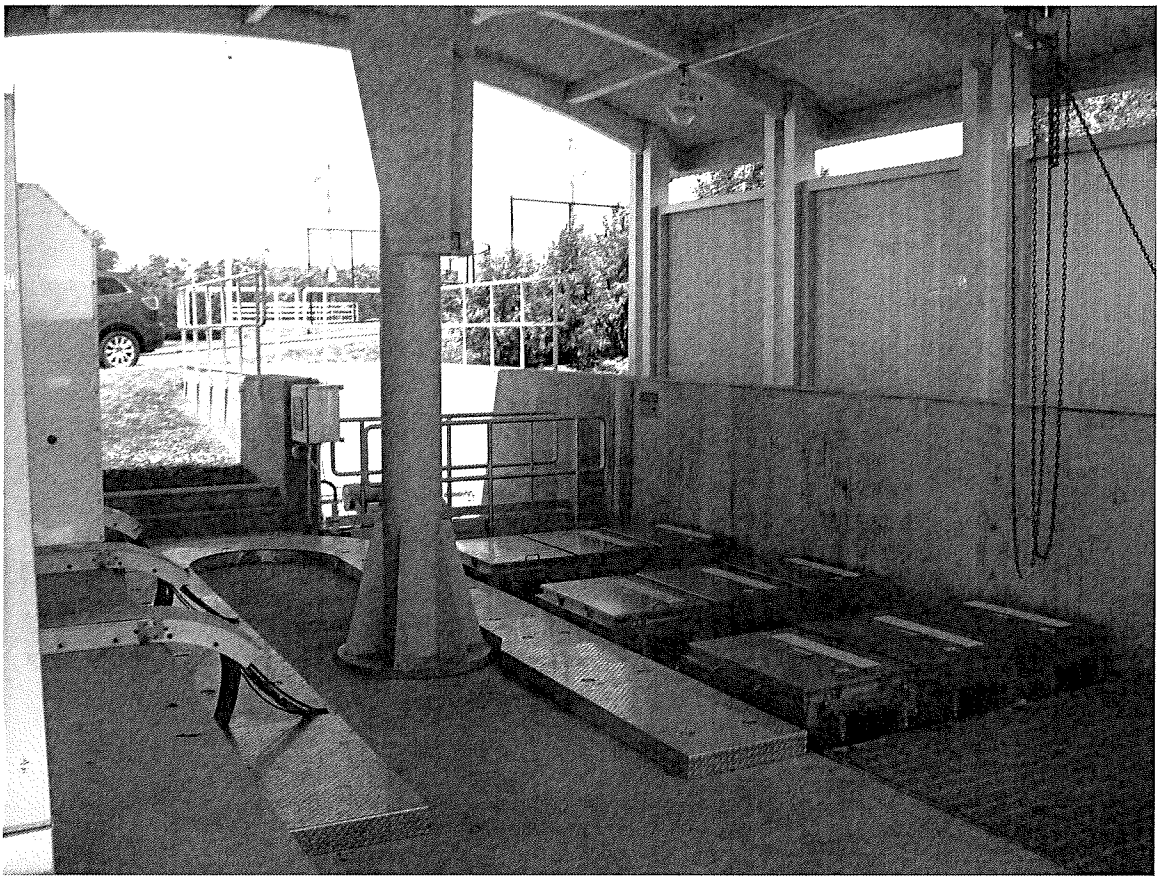
Plant Location: Madison, AL

Peak Flow: 34 MGD

Number of Channels: 1

Number of Modules: 3 per channel (6 total)

Typical Aquaray® Vertical Lamp Ultraviolet Disinfection System Installations



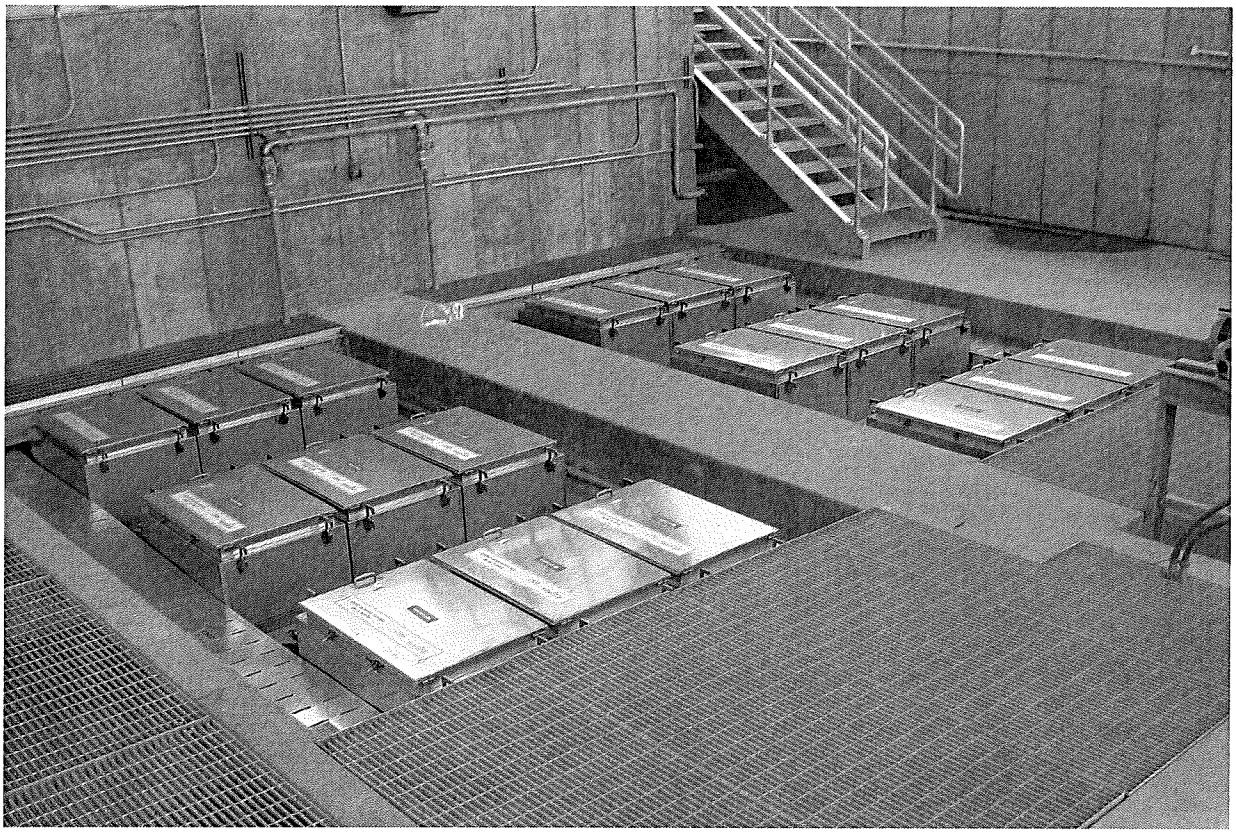
Plant Location: Stratford, CT

Peak Flow: 39 MGD

Number of Channels: 1

Number of Modules: 9 per channel (9 total)

Typical Aquaray® Vertical Lamp Ultraviolet Disinfection System Installations



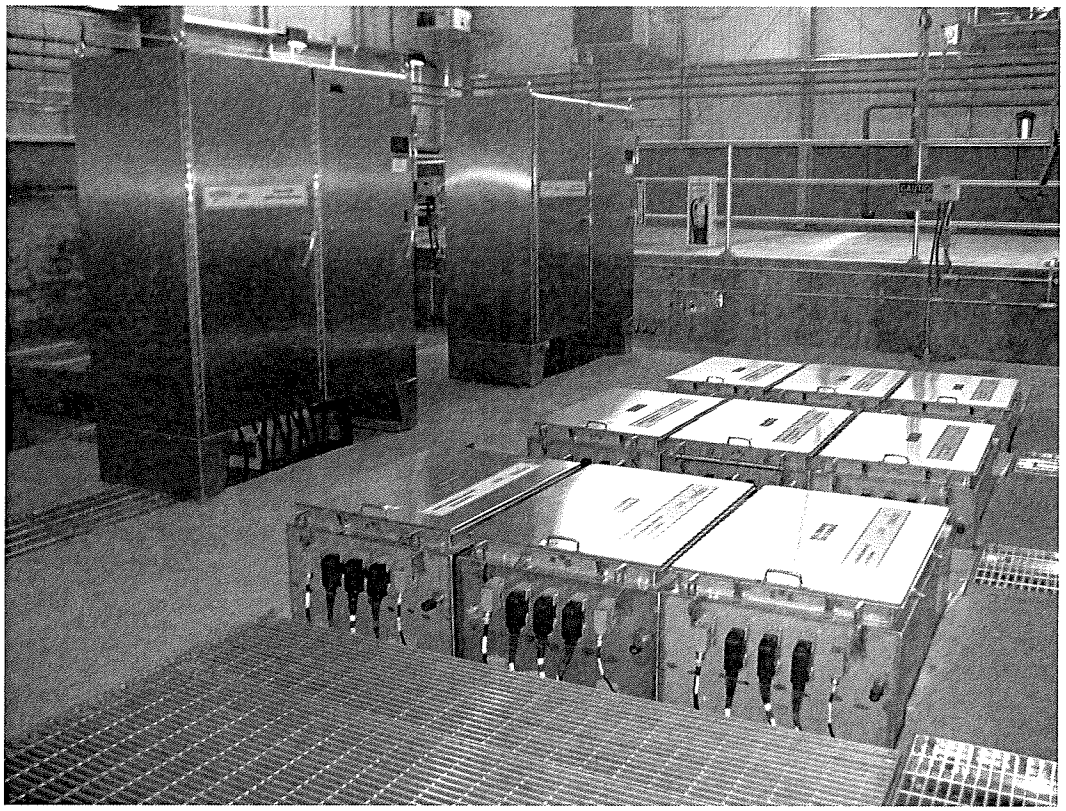
Plant Location: Jefferson City, MO

Peak Flow: 66.6 MGD

Number of Channels: 2

Number of Modules: 9 per channel (18 total)

Typical Aquaray® Vertical Lamp Ultraviolet Disinfection System Installations



Plant Location: Colorado Springs, CO

Peak Flow: 135 MGD

Number of Channels: 3

Number of Modules: 9 per channel (27 total)

LETTER OF TRANSMITTAL

TRIAD ASSOCIATES, INC.
5835 Lawton Loop East Drive
Indianapolis, Indiana 46216-1064
(317) 377-5230
Fax (317) 377-5241

Date: July 6, 2021	Job No.: 202018A
Attention: MC 65-42FC	
Reference: Ben Davis Conservancy District	
WWTP Design	

To:. IDEM – OWQ
Facility Construction & Engineering Support
MC 65-42FC
100 N. Senate Avenue, Room N1255
Indianapolis, IN 46204-2251

WE ARE SENDING YOU __ Attached __ Under separate cover via __ the following items:
__ Shop drawings __ Prints x Plans __ Samples x Specifications
__ Copy of letter __ Change order x Other: See Description Below

COPIES	DATE	NO.	DESCRIPTION
1	07/06/2021	IDEM SET	WWTP Construction Permit Application per 327 IAC 3 including: • Labels – potentially affected persons • Engineering Calcs • Specs • Plans • Check no. 33243 for $50 application fee.

RECEIVED
JUL 12 2021
IDEM/OWQ

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REMARKS: _____

COPY TO: file SIGNED: RB

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LETTER OF TRANSMITTAL

TRIAD ASSOCIATES, INC.
5835 Lawton Loop East Drive
Indianapolis, Indiana 46216-1064
(317) 377-5230
Fax (317) 377-5241

To:. IDEM – OWQ
Facility Construction & Engineering Support

100 N. Senate Avenue, Room N1255
Indianapolis, IN 46204-2251

Date: September 3, 2021	Job No.: 202018A
Attention: Ms. Alissa O'Donnell, Project Engineer	
Reference: Ben Davis Conservancy District	
WWTP Design and Construction Permit App	
Response to Deficiency Notice	
Project SRF-0668	

WE ARE SENDING YOU __ Attached __ Under separate cover via __ the following items:
__ Shop drawings __ Prints x Plans __ Samples x Specifications
__ Copy of letter __ Change order x Other: See Description Below

COPIES	DATE	NO.	DESCRIPTION
1	Sept 2021		Revised WWTP Construction Permit Application
2	Sept 2021		Response 1 to Deficiency Notice with Attachments
3	Sept 2021		Revised Plan Sheets; G2,G3,C1,C3-C5,C8,C9,P1-P4,P7,P14,P17,A1-A2, E200

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__ FOR BIDS DUE: __ PRINTS RETURNED AFTER LOAN TO US

REMARKS: Attached is the response to the Deficiency Notice for the Construction Permit Application for The Ben Davis Conservancy District along with applicable revisions. Please let us know if Additional information is needed. Thank-you.

COPY TO: Angela Wirth, BDCD SIGNED:

If enclosures are not as noted, kindly notify us at once.

Ben Davis Conservancy District
Proposed Wastewater Treatment Plant
Response to IDEM Comments of August 19, 2021

TECHNICAL REVIEW

1. Please revise the design summary sheet as it appears to contain incorrect or incomplete information. Please send a revised design summary and ensure that it is signed, dated, and stamped. Otherwise provide justification for the following:

A. Design Data, Design Peak Hourly Flow and Maximum Flow Capacity. Please explain what the average design peak flow of 4.0 MGD and the maximum plant flow capacity of 16.0 MGD reflects (e.g., maximum influent pumping rate) and explain the difference.

Response:

The design average flow (ADF) rate for the plant is 4.0 MGD

The design peak hourly flow rate is 12.0 MGD

The maximum flow capacity is 16.0 MGD

The plant is being designed for an average daily flow of 4.0 MGD

The peak hourly flow rate is the daily diurnal peak flow that it can handle.

The maximum flow is the hydraulic capacity that can be handled without overflows and is also the flow rate with all 4 raw sewage pumps pumping.

B. Design Data, Design Waste Strength. The proposed design summary states the design waste strengths for CBOD, TSS, NH3-N, and P are 170, 200, 25 and 5 mg/L, respectively. Since this will be a new wastewater treatment facility, please provide data to support the proposed design waste strengths. One justification could be a summarization of at least three (3) recent years' worth of monthly reports of operation (MRO) data if sampling was conducted on the flows that are currently being conveyed to Belmont WWTP.

Response:

Backup documentation confirming the design strengths are enclosed with this submittal as ***Attachment 1.*** *In the past, the District sampled 4 times monthly for CBOD, TSS, NH3-N. Three years worth of this data is provided. Since phosphorus was not required to be sampled, as part of the preliminary design, a 7 day sampling was ordered for all parameters including phosphorus in order to confirm past averages and to determine an approximate value for design.*

- Calculations in the "design of treatment process" use an influent NH_3-N concentration of 30 mg/L. Please ensure the influent design strengths are the same across the application packet and supporting calculations.

Response:

The influent design strengths have been checked and changes were made where needed to assure that all values are consistent. A revised Design Summary is provided.

Ben Davis Conservancy District
Proposed Wastewater Treatment Plant
Response to IDEM Comments of August 19, 2021

C. Design Data, Sampling Method and Location. Please specify the locations of where the automatic samplers will be placed within the treatment train. This information will be used to clarify any concerns with future MRO data.

Response:
The samplers will be located in the Main Lift Station and at the Post Aeration channel. This has been added to the Preliminary Design Summary.

2. The proposed headworks structure for the wastewater treatment plant is well within 500 feet of multiple nearby residential dwellings near the intersection of South Tibbs Avenue and Delmar Avenue.

• 327 IAC 3-2-6 (a) states the setback distances requirements for new wastewater treatment sites. It states that "no less than five hundred (500) feet shall separate a water pollution treatment/control facility from a dwelling … as measured from the outside edge of the equipment involved with the treatment/control of water pollution to the outside edge of the dwelling." There are several factors that went into how this distance was chosen including property value, noise, smell, aesthetics, safety, and security reasons. Please revise the location of the headworks structure that meets this requirement.

• 327 IAC 3-2-6 (b) states the separation distances may be modified if "the affected dwelling owners agree to a shortened separation distance and record such agreement as easements and deed restrictions with the county recorder's office for the affected property." Please provide copies of these waiver records for the affected properties if this avenue has been pursued.

Response:
The north site contains the main lift station which was mis-labeled as a headworks. All references have been changed to denote it as the Main Lift Station site. The lift station will be equipped with a mechanically cleaned influent screen. The site previously contained a lift station. (Main lift station = Regional lift station)

3. Ten State Standards 61.22 states that two (2) fine screens shall be provided with each unit capably of independent operation and the capacity shall "treat design peak instantaneous flow with one unit out of service." With a proposed design average flow of 4.0 MGD, this plant would be designated as "Major" NPDES facility. Please explain why only one mechanical fine screen was proposed for this new facility and how the plant will continue operate with the trash basket if the mechanical screen needs to be taken out of service for a longer period.

Response:
The lift station will be equipped with a mechanically cleaned influent bar screen, not a fine screen. All references to a fine screen have been removed.

¼-inch spacing is a fine screen...
Doesn't explain why not using two screens...

Ben Davis Conservancy District
Proposed Wastewater Treatment Plant
Response to IDEM Comments of August 19, 2021

4. There does not appear to be any specifications on the mechanical screen bypass screen. Specification 11362 (Influent Screen) section 2.01 only states that there should be a "coarse screen bypass" provided. Please provide the trash basket specifications that are proposed on the construction drawings.

✓ *Response:*
The specifications for the trash basket have been added to the Influent Section 11362 and the revision is included with this submittal as ***Attachment 2****.*

5. It appears the selector tank calculations were not included in the provided supporting calculations titled "design of treatment process." Please provide design basis calculations regarding this treatment unit.

✓ *Response:*
There is no selector tank in the plant design. The design includes first stage aeration to provide greater flexibility for the operator. The design summary has been revised accordingly. (was removed)

6. The design summary states that the oxygen requirement for CBOD and NH_3-N removal is 4,770 lb O_2/day and 3,836 lb O_2/day, respectively. While my calculations agree with the NH_3-N oxygen requirement, the CBOD value listed is lower than my calculations which shows it should be ~6,238 O_2/day using 1.1 lb O_2/day for every lb CBOD removed. Please clarify the discrepancies.

✓ *Response:*
The calculations were reviewed and it was found that there was a date entry error. The design summary has been corrected. (listed 6,805 which is 1.2 lb O_2/day per lb CBOD)

7. It appears the chemical phosphorus removal calculations were not included in the provided supporting calculations titled "design of treatment process." Please provide design basis calculations regarding this treatment unit.

A. Demonstrate how a chemical dose was established and that it will be adequate to bring the effluent phosphorus concentration to under 1.0 mg/L. Stoichiometric calculations will be needed to support the design basis.

Response:
Please see the attached spreadsheet which is included with this submittal as ***Attachment 3****. The chemical dose was based on stoichiometry. The phosphorus removal level was increased to 85% to ensure an effluent value below 1.0 mg/L. The pump design flow is now 6.69 GPH or 160.57 GPD.*

Alum requires 279 gal/day [49% 1.34]
Sodium Aluminate 35 gal/day [43% 1.52]
PACl 131 gal/day [30% 1.35]

B. Demonstrate how the chemical feed pump rate was established, that the proposed 6 GPH chemical feed pump rate will be adequate.

Response:
*Please see attached spreadsheet, **Attachment 3**. The chemical feed rate is based on the design flow rate and its accompanying mass flow rate for phosphorus. The specification section 11290 for Phosphorus Removal Facilities has been updated to specify a larger pump. This is provided as **Attachment 4**.*

C. Demonstrate that the proposed 7,000 gallon storage tank will have at 10+ days of chemical storage. Also demonstrate the chemical's shelf life and ensure the expected storage supply will not degrade in concentration.

Response:
At the 160.57 GPD flow rate, the 10 day storage requirement is 1,610 gallons. The 7,000 gallon storage tank will hold 43.6 days worth of sodium aluminate. From suppliers, the 43% solution sodium aluminate has a minimum month-long shelf life but can be stored longer. The 7,000 gallon tank is sized to be larger than needed for sodium aluminate; a month's supply of sodium aluminate would be about 5,000 gallons which is about the amount that would be brought in by tanker truck. The larger tank allows for using other chemicals that require more volume for a 10 day supply (alum) as may be dictated by economic/supply chain considerations. It also allows for slightly less than a month's supply at the 95% removal level.

D. Provide calculations to demonstrate how much additional secondary chemical sludge is expected to be produced. The aerobic digester calculations provided do not appear to mention or demonstrate the chemical sludge. Please note that approximately 15 to 20% additional chemical sludge (by weight) is generated due to phosphorous removal by chemical precipitation.

Response:
It is estimated that there will be 2.1 to 7.5 mg of chemical sludge produced for every 1 mg of phosphorus removed. Therefore, additional sludge produced ranges from 300 to 1,300 pounds based on the design flow rate and loading along with removal to the 1.0 mg/L limit and total removal.

8. Construction drawing sheet P14 shows a bar screen that will be fabricated and placed over the clarifier effluent. Please explain what purpose this bar screen serves as the purpose of any screening in this location is unclear to IDEM.

Response:
*The screening shown on **Sheet P14** is safety grating to prevent persons or debris from falling into the drop box. It also serves as an access for maintenance purposes. The plan sheet has been revised to more clearly indicate this.*

Ben Davis Conservancy District
Proposed Wastewater Treatment Plant
Response to IDEM Comments of August 19, 2021

9. Construction drawing sheet P17 shows an outgoing pipe labeled "30-inch effluent to clarifier No. 2" ahead of the proposed disinfection bypass piping. However, both 30-inch influent from clarifier No. 1 and No. 2 are going into this structure. Please explain what purpose the 30-inch effluent to clarifier No. 2 serves.

Response:
The additional 30" pipe is intended to allow the clarifiers to be operated in series or in parallel. ***Sheet P17*** *has been revised to more clearly show this.*

10. Please provide the ultraviolet (UV) disinfection manufacturer's technical data sheet for the proposed UV disinfection system so that it can be verified that the system is being sized appropriately for the peak hydraulic flow.

Response:
The UV manufacturer's technical data sheet is attached as ***Attachment 5****.*

11. The design only proposes 1 blower with the capacity of 120 cfm for the post-aeration tank. Please explain how the plant continue to operate and meet the minimum D.O. effluent limitations if the blower needs to be taken out of service for a longer period since it is dedicated and not shared with other units.

Response:
An additional blower will be purchased and stored as a spare in case the installed unit needs to be taken out of service.

12. The aerobic digester calculations provided states the total air demand as 3,013 cfm. However, the design only proposes 2 blowers each with the capacity of 1,500 cfm. Please explain why the blowers only meet half of the required air and/or why a third blower is not provided. How will the plant continue to operate if one of the blowers needs to be taken out of service for a longer period since they are dedicated and not shared with other units?

Response:
The blowers will be shared with the aeration. The Design Summary was incorrect but has been corrected. In addition, please note that the digester calculations were modified to accommodate the additional sludge created from chemical phosphorus removal. The revised calculations are included in this submittal as ***Attachment 6****.*

13. There does not appear to be generator specifications. The electrical specification division states "to be provided by engineer." However, there were no electrical specifications as part of the original submittal. Please provide the generator specifications so their capacities can be verified. Otherwise, please include the capacity and specific information on the electrical construction drawings and ensure that they are signed, stamped, and dated by a professional engineer.

Response:
Enclosed as ***Attachment 7*** *are the generator specifications, Section 16211.*

LETTER OF TRANSMITTAL

TRIAD ASSOCIATES, INC.
5835 Lawton Loop East Drive
Indianapolis, Indiana 46216-1064
(317) 377-5230
Fax (317) 377-5241

To:. IDEM – OWQ
Facility Construction & Engineering Support

100 N. Senate Avenue, Room N1255
Indianapolis, IN 46204-2251

Date: September 16, 2021	Job No.: 202018A
Attention: Ms. Alissa O'Donnell, Project Engineer	
Reference: Ben Davis Conservancy District	
WWTP Design and Construction Permit App	
Response 2 to Deficiency Notice	
Project SRF-0668	

WE ARE SENDING YOU __ Attached __ Under separate cover via __ the following items:
__ Shop drawings __ Prints x Plans __ Samples x Specifications
__ Copy of letter __ Change order x Other: See Description Below

COPIES	DATE	NO.	DESCRIPTION
1	Sept 2021		Revised WWTP Construction Permit Application
2	Sept 2021		Response 2 to 9-15-21 Comments with Attachments
3	Sept 2021		Revised Plan Sheet C4

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REMARKS: Attached is response 2 to IDEM's comments regarding the Construction Permit Application for The Ben Davis Conservancy District along with applicable revisions. Please let us know if Additional information is needed. Thank-you.

COPY TO: Angela Wirth, BDCD SIGNED: Dee Bengal

If enclosures are not as noted, kindly notify us at once.

Response to 9/15/2021 IDEM Comments
Ben Davis Conservancy District Proposed WWTP

1. Response states that that District sampled 4 times monthly for CBOD, NH3-N, and TSS. However, TSS was not included in the submitted data from January 2018 to May 2020. Was this information not included by accident or was never recorded and listed by accident?

   Response:
   TSS should have been included but it was not included in the previous submittal by accident. Attached is the 2019 and 2020 data that was used for design (Attachment 1) along with several years of historical data (Attachment 2). Sampling data is not available for 2018.

2. Sheet C1 does not show an existing lift station anywhere. Your response states "the site previously contained a lift station." Also, google maps street view (photos taken May 2019) does not show any structures or concrete in the proposed location. Please revise the drawings to show the existing lift station location or explain what is meant by the above statement.

   Response:
   The existing site previously contained a lift station which has long been removed (probably late 1970s) and covered up because it was no longer necessary. The lift station was located on the site but not in the exact location of the lift station being proposed for this project. The purpose of the statement was only to note that the site was used for a lift station in the past.

3. Based on the above information, it would appear this lift station is new. Filling out the plant lift station information under wastewater treatment plant unit implies this is part of a headworks structure and would need to meet the 500 ft separation distance requirement. However, I believe you meant to state this proposed lift station is a regional lift station (not a plant lift station) and the IV sewer collection system portion should be filled out instead.

   Response:
   Yes, the proposed lift station is a regional lift station. The Design Summary has been revised and the lift station information is now shown in Section IV.

4. Sheet C4 still labels the main lift station as headworks. Please check all documents and ensure that all references to "headworks" has been changed to "regional lift station" if the above comment is correct in my assumption. Please send any revisions.

   Response:
   Sheet C4 has been corrected and the rest of the set has been checked. Revised sheet C4 is included with this submittal.

5. The sewer section of the design summary lists the gravity sewer as 36 **feet** diameter and made of ductile iron pipe. Sheet C4 does show a proposed 36 **inch** diameter gravity sewer but it also references ASTM F679 which is for polyvinyl chloride piping. Please clarify the differences and change any drawings, design summary sections, or specifications as needed.

   Response:
   The design summary and Sheet C4 have been revised to show a 36 inch diameter SDR 21 PVC pipe. The ASTM designation has been changed to D1784 to reflect the higher rated pipe.

6. For reference, the force main section of the design summary states the ASTM/AWWA standard is ASTM D3350. However, that ASTM is for the resin classification specification not the pipe material itself. This is a common occurrence we have been seeing lately and just wanted to inform you that it should be ASTM D3035 that is specified instead.

   Response:
   The ASTM designation has been changed to ASTM 3035 as noted.

7. The response states that the lift station will not be equipped with a fine screen. However, the proposed screen on the design summary is listed as having ¼-inch spacing, which is a fine screen. The issue wasn't that it was a fine screen, but why was only one being provided (which was not answered). However, if this is a regional lift station, there would not be a requirement for two screens as there is a bypass (trash screen) to prevent water from backing up into the system.

   Response:
   Thank-you for the clarification on your previous comment. This is a regional lift station and the design summary has been changed to indicate this. The lift station information was moved to Section IV.

8. The chemical phosphorus removal section in the design summary is only filled out for sodium aluminate. However, the provided calculations appear to show that Alum and PACl (Hyper+Ion® 1997) are also being considered. Please verify that only sodium aluminate is being considered as part of the final design. Otherwise, my calculations show that the proposed pumps would not be adequate for the amount of alum needed per hour.

   Response:
   The calculations included Alum and PACl for internal comparison purposes only. Only sodium aluminate is being considered in the final design.

Response to 9/15/2021 IDEM Comments
Ben Davis Conservancy District Proposed WWTP

1. Response states that that District sampled 4 times monthly for CBOD, NH3-N, and TSS. However, TSS was not included in the submitted data from January 2018 to May 2020. Was this information not included by accident or was never recorded and listed by accident?

   Response:
   TSS should have been included but it was not included in the previous submittal by accident. Attached is the 2019 and 2020 data that was used for design (Attachment 1) along with several years of historical data (Attachment 2). Sampling data is not available for 2018.

2. Sheet C1 does not show an existing lift station anywhere. Your response states "the site previously contained a lift station." Also, google maps street view (photos taken May 2019) does not show any structures or concrete in the proposed location. Please revise. the drawings to show the existing lift station location or explain what is meant by the above statement.

   Response:
   The existing site previously contained a lift station which has long been removed (probably late 1970s) and covered up because it was no longer necessary. The lift station was located on the site but not in the exact location of the lift station being proposed for this project. The purpose of the statement was only to note that the site was used for a lift station in the past.

3. Based on the above information, it would appear this lift station is new. Filling out the plant lift station information under wastewater treatment plant unit implies this is part of a headworks structure and would need to meet the 500 ft separation distance requirement. However, I believe you meant to state this proposed lift station is a regional lift station (not a plant lift station) and the IV sewer collection system portion should be filled out instead.

   Response:
   Yes, the proposed lift station is a regional lift station. The Design Summary has been revised and the lift station information is now shown in Section IV.

4. Sheet C4 still labels the main lift station as headworks. Please check all documents and ensure that all references to "headworks" has been changed to "regional lift station" if the above comment is correct in my assumption. Please send any revisions.

   Response:
   Sheet C4 has been corrected and the rest of the set has been checked. Revised sheet C4 is included with this submittal.

5. The sewer section of the design summary lists the gravity sewer as 36 feet diameter and made of ductile iron pipe. Sheet C4 does show a proposed 36 inch diameter gravity sewer but it also references ASTM F679 which is for polyvinyl chloride piping. Please clarify the differences and change any drawings, design summary sections, or specifications as needed.

   Response:
   The design summary and Sheet C4 have been revised to show a 36 inch diameter SDR 21 PVC pipe. The ASTM designation has been changed to D1784 to reflect the higher rated pipe.

6. For reference, the force main section of the design summary states the ASTM/AWWA standard is ASTM D3350. However, that ASTM is for the resin classification specification not the pipe material itself. This is a common occurrence we have been seeing lately and just wanted to inform you that it should be ASTM D3035 that is specified instead.

   Response:
   The ASTM designation has been changed to ASTM 3035 as noted.

7. The response states that the lift station will not be equipped with a fine screen. However, the proposed screen on the design summary is listed as having ¼-inch spacing, which is a fine screen. The issue wasn't that it was a fine screen, but why was only one being provided (which was not answered). However, if this is a regional lift station, there would not be a requirement for two screens as there is a bypass (trash screen) to prevent water from backing up into the system.

   Response:
   Thank-you for the clarification on your previous comment. This is a regional lift station and the design summary has been changed to indicate this. The lift station information was moved to Section IV.

8. The chemical phosphorus removal section in the design summary is only filled out for sodium aluminate. However, the provided calculations appear to show that Alum and PACl (Hyper+Ion® 1997) are also being considered. Please verify that only sodium aluminate is being considered as part of the final design. Otherwise, my calculations show that the proposed pumps would not be adequate for the amount of alum needed per hour.

   Response:
   The calculations included Alum and PACl for internal comparison purposes only. Only sodium aluminate is being considered in the final design.

LETTER OF TRANSMITTAL

TRIAD ASSOCIATES, INC.
5835 Lawton Loop East Drive
Indianapolis, Indiana 46216-1064
(317) 377-5230
Fax (317) 377-5241

To:. IDEM – OWQ
Facility Construction & Engineering Support

100 N. Senate Avenue, Room N1255
Indianapolis, IN 46204-2251

Date: September 28, 2021	Job No.: 202018A
Attention: Ms. Alissa O'Donnell, Project Engineer	
Reference: Ben Davis Conservancy District	
WWTP Design and Construction Permit App	
Response to Deficiency Notice	
Project SRF-0668	

WE ARE SENDING YOU __ Attached __ Under separate cover via __ the following items:
__ Shop drawings __ Prints x Plans __ Samples x Specifications
__ Copy of letter __ Change order x Other: See Description Below

COPIES	DATE	NO.	DESCRIPTION
1	Sept 2021		Revised WWTP Construction Permit Application
2	Sept 2021		Response 3 to Comments of 9/23/21
3	Sept 2021		Revised Plan Sheets; C4 through C7, P18
4	Sept 2021		Revised Specification Sections 02650 (Piping); 02731 (Gravity, Effluent, Force Main)

THESE ARE TRANSMITTED as checked below:
X For approval __ Approved as submitted __ Resubmit __ copies for approval
__ For your use __ Approved as noted __ Submit __ copies for distribution
X As requested __ Returned for corrections __ Return __ corrected prints
__ For review and comment __ Other:
__ FOR BIDS DUE: __ PRINTS RETURNED AFTER LOAN TO US

REMARKS: Attached is the response to IDEM's comments of 9/23/21 for the Permit Application for The Ben Davis Conservancy District along with applicable revisions. Please let us know if Additional information is needed. Thank-you.

COPY TO: Angela Wirth, BDCD SIGNED: Lee Burgel

If enclosures are not as noted, kindly notify us at once.

Response to 9/15/2021 IDEM Comments
Ben Davis Conservancy District Proposed WWTP

1. Gravity, Influent, 36-inch diameter, PVC Pipe (located on Sheet C4)

- D1784 is for rigid PVC compounds. Need to change.
- Need a standard that is listed under 327 IAC 3-6-8 (a, 5):
    - (D) ASTM 679 is acceptable for the large diameter PVC gravity application.
- Section 02650 (Piping) includes ASTM 679 / only applies up to 27-inch diameter
    - Proposed pipe is 36-inch in diameter
- State DR-21 but for ASTM F679 it should be either PS 46 or PS 115

Response:

All off-site piping (gravity influent to lift station, force main, effluent) have been changed to SDR-21. The gravity influent is now contained in revised section 02731, Gravity Main, Effluent, and Force Mains. Sheet C4, specification section 02650 and the design summary have been revised accordingly. The revised plan sheet C4 and updated specification sections 02650 and 02731 are included with this submittal.

2. Force Main, Influent, 18-inch/24-inch diameter, HDPE Pipe (located on C4, C5, C6, and C7)

- List ASTM C906 in design summary which is "test method for T-Peel Strength of Hot Applied Sealants). Should be AWWA C906.
- Drawing C4 only shows 16-inch and 24-inch HDPE force mains.
- Design summary states 125 psi pressure, DR-17. IDEM requires 160 psi minimum for HDPE and 200 psi minimum for PVC.
- Section 02650 (Piping) states HDPE shall meet the requirements of AASHTO.
    - We don't allow AASHTO standards; needs to be ASTM or AWWA standards

Response:

All off-site piping has been changed to SDR-21. The Design Summary has been revised accordingly. *The plans and the design summary both now indicate 16" and 24" force main. The pressure class has been changed to 200 psi to coincide with PVC.* ***Revised plan sheets C4 through C7 are included with this submittal.***

3. Gravity, Effluent, 42-inch diameter, HDPE Pipe (located on Sheet P18)

- Any reason why using HDPE pipe for gravity application?
- ASTM F714 is for force mains as stated in 327 IAC 3-6-8 (a, 6, C)
- If continuing, need a standard that is listed under 327 IAC 3-6-8 (a, 5) or variance to the technical standards request + supporting information.
    - (F) ASTM F894 is the only one for polyethylene (PE) gravity application and goes up to the proposed diameter

Response to 9/15/2021 IDEM Comments
Ben Davis Conservancy District Proposed WWTP

- Section 02650 (Piping) states HDPE shall meet the requirements of AASHTO.
    - We don't allow AASHTO standards; needs to be ASTM or AWWA standards

Response:
All off-site piping has been changed to SDR-21. The gravity effluent has been revised to 36 inch diameter SDR-21. The Design Summary has been revised accordingly. Specification sections 02650 and 02731 have been revised. Revised plan sheets P18 and C4 through C7 are included with this submittal.

Comment:

Section 02650 (Piping) was never updated, and the ductile iron pipe (2.02) is still listed. New specifications are needed.

Response:

Section 02650 has been updated to coincide with IDEM's comments and our responses. However, the ductile iron pipe section 2.02 has remained since there are other areas in the project that require ductile iron such as the RAS/WAS interior/exterior piping. Section 1.02, item 1, has been modified to note that ductile iron will be used in the plant yard. The effluent piping is now covered under section 02731. Updated sections 02650 and 02731 are included with this submittal.

Comment:

No horizontal directional drilling proposed on drawings, but is listed in Section 02610. Wanting to make sure that nothing besides the force main would be installed via horizontal directional drilling. Different standards may also be needed such as thermal butt fused joints. Gravity sewer HDD installations are usually not granted.

Response:

Horizontal directional drilling would only be considered for a portion of the effluent line that is upstream of the jack and bore pit for the railroad crossing. As an alternate this portion would be open cut. Both the force main and effluent pipe will be Jack and Bored under the railroad.

Clarifier # 1 effluent pipe to splitter ahead of UV

30" pipe 407 ft of equiv. pipe

MODE 1 : Both clarifiers in operation in parallel

Hazen Williams

	ADF	PEAK	MAX
Specified Data	3472	4166.5	6250
l = length of pipe (ft)	407	407	407
c = Hazen-Williams roughness constant	140	140	140
q = volume flow (gal/min)	3472	4166.5	6250
dh = inside or hydraulic diameter (inches)	28.77	28.77	28.77
Calculated Pressure Loss			
f = friction head loss in feet of water per 100 feet of pipe (ft H20 per 100 ft pipe)	0.03	0.05	0.10
f = friction head loss in psi of water per 100 feet of pipe (psi per 100 ft pipe)	0.01	0.02	0.04
Head loss (ft H20)	0.13	0.18	0.39
Head loss (psi)	0.06	0.08	0.17
Calculated Flow Velocity			
v = flow velocity (ft/s)	1.71	2.06	3.09

MODE 2 : Both clarifiers in operation in series

	ADF	PEAK	MAX
	6944	8333	12500
	407	407	407
	140	140	140
	6944	8333	12500
	28.8	28.77	28.77
	0.12	0.16	0.34
	0.05	0.07	0.15
	0.47	0.66	1.40
	0.20	0.28	0.60
	3.43	4.11	6.17

Pipe length	Horiz	142
	Vert	10
90's	2 @ 75 ea	150
45's	2 @ 40 ea	80
22.5	1 @25	25
		407 ft of equiv pipe

UV

use manufacturer's headloss at .15 ft thru the unit

Top of Wall	708.00
Top of Weir from UV	705.85
Allow .5' drop at Max	705.35
Set bottom of weir so max elev	705.35
Bottom of weir	703.85

Post aeration

Cipolletti weir $Q = 3.367\ L\ H^{3/2}$

Max

L = 4 ft

H = 1.503 ft

Q = 24.817 cfs

16.031 MGD

H> .2 ft

P/H >2

b/H >2

ADF 4.0 MGD

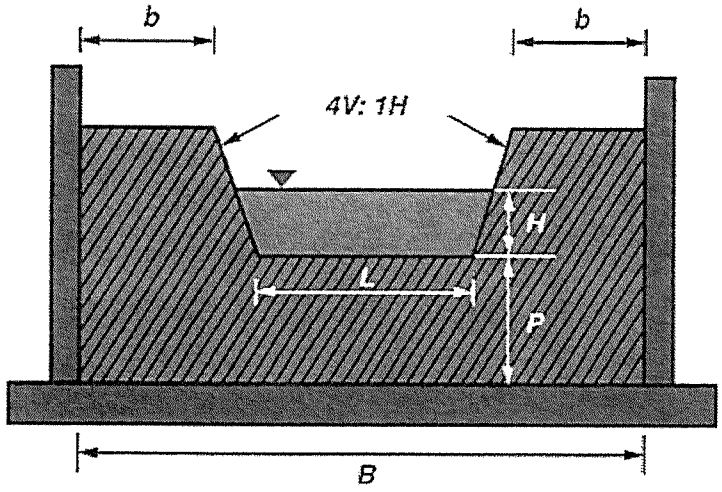
6.2 CFS

H = 0.60 ft

Peak 12 MGD

18.58 CFS

H = 1.24 ft



DESIGN OF TREATMENT PROCESS

TRIAD ASSOCIATES, INC. DESIGN CALCULATIONS

PROJECT NAME:	Ben Davis CD	PROJECT ID:	202018A	DATE:	11/1/2021
DESCRIPTION:	Aeration Tank Sizing for Extended Aeration			Page 1 of 2	
PREPARED BY:					

Flow rates	ADF	4	MGD							
	Peak	12								
	Max	16								
BOD		170	ppm							
TSS		200	ppm							
Ammonia		25								
P		5								

Conventional activated sludge design would require a loading not to exceed 40#bod/1000 cf of tank volume

ADF loading is	4 x 170 x 8.34 =			5,671	pounds				
Aeration volume	5,671	/15 =		378,080	cf or	2,828,038	gallons	total capacity	
If there are 4 tanks then				94,520	cf ea	707,010	gallons ea		
Dimensions									
SWD =	15			6,301	sf area				
W/L ratio =	range of 3/1 to 2/1				Width	45	ft		
					Length	140	ft		

Final adjustments for dimensions									
	WD =	15	ft		Width	45		Length	140

Detention time @ ADF				
V/Q	=	16.97	hrs	
Organic Loading	=	15.0	lbs/1000cf	
Volume in aeration		378,080	CF	
		2,828,038	Gallons	
ADF Load of BOD		5,671	lbs.	

AIR REQUIREMENTS

	#	multiplier	# O2		
CBOD	5671	1.5	8,507		
NH4	834	4.6	3,836		
		TOTAL	12,343		#/O2/Day

SCFM= oxygen required/cwf efficiency*1440*density of air*#O2/#air

Stoichiometric Air Requirements				
#O2/# air		0.235		
std density		0.075	#/cf	
cwt eff		30%	%	
AOR/SOR		0.5		
scfm	=	3,242	scfm	

10 State Standards Minimum Air for EA					
SCFM air		8,074	scfm	2050 cfm/pd	BOD/day
	#/O2/Day	CuFt/Air/Day			
NH4	3,836	1500	3,996	scfm	
Total Air			12,070	scfm	

Furnish 3 blowers 4000 scfm each with 1 Standby — 4 Blowers Total

TRIAD ASSOCIATES, INC.					DESIGN CALCULATIONS				
PROJECT NAME:	Ben Davis CD			PROJECT ID:	202018A			DATE:	11/1/2021
DESCRIPTION:	Aeration Tank Sizing for Extended Aeration							Page 1 of 2	
PREPARED BY:									
F:M ratio									
	Food is the influent CBOD in pounds			5,671	lbs of CBOD				
	Volume of tank			2,828,038	gallons in aeration				
	MLSS			2500				3500	
	MLVSS			1875	assumes 75% volatile			2625	
	Mass in aeration			44,223	lbs of MLVSS			61,913	
		F/M ratio =		0.13				0.09	
Solids retention time									
	Mass of solids in aeration			58,965	lbs of MLSS in aeration			82,550.44	
	Mass of solids in effluent			334	lbs of solids in effluent @10 ppm			334	
	Mass of solids in waste		Hi	1,800	lbs of solids in WAS stream			2,700	
			Lo	1,200				1,800	
		SRT =		28	days			27	days
				38				39	days
	Volume wasted at 1.0 % solids		Hi	21,583	gallons			32,374	gallons
			Lo	14,388	gallons			21,583	

TRIAD ASSOCIATES, INC.			DESIGN CALCULATIONS	
PROJECT NAME:	Ben Davis CD	PROJECT ID:	202018A	DATE: 20-Jan
DESCRIPTION:	Clarifiers			Page ___ of
PREPARED BY:	Kent Schuch			

CLARIFIER DESIGN

Flow rate ADF = 4 mgd
PEAK = 12
MAX = 16

Criteria to meet
SWD > 12'
SOR < 1,000 gpd/sf
SLR < 40 #/day/sf
WLR < 30,000 gpd/LF of weir

Choose circular center feed perimeter collection

Radius =	50	ft
Area =	7,854	sf
Total area	15,708	sf

SWD =	15.4	ft
Volume, ea tank	120,951	cf
Volume, total	241,903	cf
	1,809,432	gallons
Detention time =	0.45	days @ ADF
	10.9	hours
	0.15	days @ PEAK
	3.6	hours

Surface Overflow Rate (SOR)		
at ADF	255	gpd/sf
at PEAK	764	

Solids Loading Rate (SLR)
based on peak flow plus ras flow and MLSS design under aeration

Q peak	12	mgd
Q ras	6	mgd
MLSS low	2500	ppm
MLSS high	4200	ppm

TRIAD ASSOCIATES, INC.		DESIGN CALCULATIONS	
PROJECT NAME:	Ben Davis CD	PROJECT ID: 202018A	DATE: 20-Jan
DESCRIPTION:	Clarifiers		Page ____ of
PREPARED BY:	Kent Schuch		

Solids, # Low	375,300	lbs
Solids, # High	630,504	lbs

SLR, low	23.9	lbs/sf
SLR, high	40.1	lbs/sf

Weir Loading Rate (WLR)

Clarifier radius	50	ft
Effluent weir radius 1	49	ft
Effluent weir radius 2	46.5	ft
Perimeter r1	308	lf per tank
Perimeter r2	292	lf
TOTAL	1,200	LF of weir

WLR		
ADF	3,333	gpd/LF
PEAK	9,999	
PEAK RS	14,999	

TRIAD ASSOCIATES, INC. DESIGN CALCULATIONS

PROJECT NAME: Ben Davis CD | PROJECT ID: 202018A | DATE: 11/14/2021

DESCRIPTION: Aereobic Digesters | Page 1 of 1

PREPARED BY: Jonathan Moen

AEROBIC DIGESTER

ADF=	4.0	mgd	4,000,000	gpd
CBOD=	170	ppm		
Total lbs	5,671	lbs/day		

Proposed tanks are	W	L	D	Volume,ea		Total	
2 tanks each	45	140	15	94,500	cf	189,000	cf
				706,860	gallons	1,413,720	gals

AIR REQUIREMENT

30 cfm/1,000 cf of tank volume results in 5,670 cfm total air

2 blowers each 2,835 cfm

Digester Requirements Ten State Standards (Section 85.31)

		P.E.		
Volume	3.0 cu.ft x P.E. x 1.25	33,360	125,100	cu.ft
	Cu.ft x 7.48		935,748	gals
Sludge Storage				
	0.13 cu.ft/day x P.E.		4,337	cu.ft./day
	Cu.ft x 7.48		32,439	gals/day
	15 days x gals/day		486,589	gals
Total Sludge Digester & Liquid Storage			1,422,337	
Additional Dewatered Sludge Storage Provided			45	days

TRIAD ASSOCIATES, INC.				DESIGN CALCULATIONS	
PROJECT NAME:	Ben Davis CD	PROJECT ID:	202018A	DATE:	25-Jan
DESCRIPTION:	Post Aeration			Page 1 of 1	
PREPARED BY:	Kent Schuch				

POST AERATION

ADF	4.0	mgd
	4,000,000	gallons/day
	534,759	cf/day
	371.36	cfm

Detention time 10 minutes

Volume 3,714 cf

Proposed tank dimensions W = 10 L = 36 D = 10.5

Proposed volume 3,780 cf

Proposed air demand is 30 cfm/1,000 cf

Proposed air supplied 113 cfm

Single blower rated 120 cfm at 4.5 psi

Kaeser BB69C
7.5 HP

RAW PUMPING

RAW PUMPING STATION

1/27/2021

PROJECT:	Ben Davis	DESIGNED BY	KFS
LOCATION:	Headworks	DATE:	12/17/2020
TAI #:	202018A	CHECKED BY:	kfs
DESCRIPTION:	PUMP TDH CALCULATIONS	DATE:	12/17/2020

GENERAL LIFT STATION INFORMATION:

Controlling Elevations			Flow Rate & Pump Rate		
Forcemain Discharge =	717.45	ft	Peak Inflow Rate =	1,390	gpm
Forcemain High Point =	717.45	ft	Pumping Rate =	2780	gpm
Pump ON =	677.00	ft	Pumping Rate =	6.19	cfs
Pump OFF =	673.83	ft	Pumping Rate =	4,003,200	gpd

FRICTION LOSSES:	LS Discharge Piping	LS Discharge Piping	Forcemain	
Nominal Pipe Diameter, Pipe Type =	10" DI Class 350	16" DI Class 250	24" HDPE DR17	
Pipe Inside Diameter (inches) =	10.58	16.8	22.6	
C value =	120	120	140	
Average velocity in pipe (ft/s) =	10.15	4.02	2.22	
Total length of FM =	19	20	1610	
$V = 1.318\ C\ R^{0.63}\ S^{0.54}$, therefore, S (ft/ft) =	0.0361	0.0038	0.0007	Friction
$S = h_f / L$				
therefore, h(friction)(ft) =	0.69	0.08	1.08	1.77

MINOR LOSSES (PIPE FITTINGS):

Reference: Chicago Pumps, Hydraulics & Useful Information

Fittings Description	K-value	No.	Total	No.	Total	No.	Total
Entrance Loss	0.50	1	0.50	0	0.00	0	0.00
Outlet Loss	1.00	0	0.00	0	0.00	1	1.00
90 degree bend	0.30	2	0.60	1	0.30	3	0.90
45 degree bend	0.23	0	0.00	0	0.00	6	1.38
22.5 degree bend	0.15	0	0.00	0	0.00	2	0.30
11.25 degree bend	0.09	0	0.00	0	0.00	0	0.00
Plug Valve	0.77	1	0.77	0	0.00	1	0.77
Check Valve	2.50	1	2.50	0	0.00	0	0.00
Tee (through)	0.60	0	0.00	3	1.80	0	0.00
Tee (side flow)	1.8	0	0.00	0	0.00	0	0.00
Wye (thru)	1.00	0	0.00	0	0.00	0	0.00
Reducer/Expander	0.19	1	0.19	0	0.00	0	0.00
		Total K Values:	4.56		2.10		4.35

Head Loss from fittings = $h_m = KV^2 / (2g)$

therefore, h(fittings)(ft) =	7.29	0.53	0.33

STATIC LOSSES:	Maximum	Minimum	
Elevation of highest point (discharge)(ft)=	717.45	717.45	
Low water level in LS (Pump OFF)(ft) =	673.83	677.00	Total Static Head (Max)
Static head losses = high point - LS level			
therefore, h(static)(ft)=	43.62	40.45	43.62

TOTAL DYNAMIC HEAD (TDH) = h(friction) + h(fittings) + h(static) = 53.5 ft

Pressure (psi): 23

FLOW RATE	LS DISCHARGE PIPING			FORCEMAIN PIPING			TDH
	VELOCITY	FRICTION LOSS	MINOR LOSS	VELOCITY	FRICTION LOSS	MINOR LOSS	
(gpm)	(ft/s)	(ft)	(ft)	(ft/s)	(ft)	(ft)	(ft)
1500	5.47	0.22	2.12	1.20	0.35	0.10	46.4
1750	6.39	0.29	2.89	1.40	0.46	0.13	47.4
2780	10.15	0.69	7.82	2.22	1.08	0.33	53.5
3700	13.50	1.16	12.91	2.96	1.84	0.59	60.1
4000	14.60	1.34	15.09	3.20	2.12	0.69	62.9
5000	18.25	2.03	23.58	4.00	3.21	1.08	73.5

NET POSITIVE SUCTION HEAD AVAILABLE

Absolute Pressure on surface (ha-ft)	33.96	@ sea level
Vapor Pressure of liqued (hvpa-ft)	0.78	@ 68°F
Static Height above impeller (hst-ft)		(pump off - impeller)
Suction line losses (hfs-ft)	0.00	(submersible)

NPSHA = ha - hvpa + hst - hfs 33.2 ft NPSHR must be 5' less than NPSHA (safety factor)

RAW PUMPING @ PEAK

1/27/2021

PROJECT:	Ben Davis	DESIGNED BY	KFS
LOCATION:	Headworks	DATE:	12/17/2020
TAI #:	202018A	CHECKED BY	kfs
DESCRIPTION:	PUMP TDH CALCULATIONS	DATE:	12/17/2020

GENERAL LIFT STATION INFORMATION:

Controlling Elevations			Flow Rate & Pump Rate		
Forcemain Discharge =	717.45	ft	Peak Inflow Rate =	4,167	gpm
Forcemain High Point =	717.45	ft	Pumping Rate =	8333	gpm
Pump ON =	677.00	ft	Pumping Rate =	18.57	cfs
Pump OFF =	673.83	ft	Pumping Rate =	11,999,520	gpd

FRICTION LOSSES:		LS Discharge Piping	LS Discharge Piping	Forcemain	
Nominal Pipe Diameter, Pipe Type =		10" DI Class 350	16" DI Class 250	24" HDPE DR17	
Pipe Inside Diameter (inches) =		10.58	16.8	22.6	
C value =		120	120	140	
Average velocity in pipe (ft/s) =	Q/3	10.14	12.06	6.67	
Total length of FM =		19	20	1610	
$V = 1.318\ C\ R^{0.63}\ S^{0.54}$, therefore, S (ft/ft) =		0.0360	0.0290	0.0051	Friction
$S = h_f / L$					
therefore, h(friction)(ft) =		0.68	0.58	8.27	9.53

MINOR LOSSES (PIPE FITTINGS):

Reference: Chicago Pumps, Hydraulics & Useful Information

Fittings Description	K-value	No.	Total	No.	Total	No.	Total
Entrance Loss	0.50	1	0.50	0	0.00	0	0.00
Outlet Loss	1.00	0	0.00	0	0.00	1	1.00
90 degree bend	0.30	2	0.60	1	0.30	3	0.90
45 degree bend	0.23	0	0.00	0	0.00	6	1.38
22.5 degree bend	0.15	0	0.00	0	0.00	2	0.30
11.25 degree bend	0.09	0	0.00	0	0.00	0	0.00
Plug Valve	0.77	1	0.77	0	0.00	1	0.77
Check Valve	2.50	1	2.50	0	0.00	0	0.00
Tee (through)	0.60	0	0.00	3	1.80	0	0.00
Tee (side flow)	1.8	0	0.00	0	0.00	0	0.00
Wye (thru)	1.00	0	0.00	0	0.00	0	0.00
Reducer/Expander	0.19	1	0.19	0	0.00	0	0.00
		Total K Values:	4.56		2.10		4.35
Head Loss from fittings = $h_m = KV^2 / (2g)$							Total Minor Losses
therefore, h(fittings)(ft) =			7.28		4.74		3.00 15.02

STATIC LOSSES:	Maximum	Minimum	
Elevation of highest point (discharge)(ft)=	717.45	717.45	
Low water level in LS (Pump OFF)(ft) =	673.83	677.00	Total Static Head (Max)
Static head losses = high point - LS level			
therefore, h(static)(ft)=	43.62	40.45	43.62

TOTAL DYNAMIC HEAD (TDH) = h(friction) + h(fittings) + h(static) = 68.2 ft

Pressure (psi): 30

FLOW RATE	LS DISCHARGE PIPING 10"			LS DISCHARGE PIPING 16"			FORCEMAIN PIPING			TDH
(gpm)	VELOCITY (ft/s)	FRICTION LOSS (ft)	MINOR LOSS (ft)	VELOCITY (ft/s)	FRICTION LOSS (ft)	MINOR LOSS (ft)	VELOCITY (ft/s)	FRICTION LOSS (ft)	MINOR LOSS (ft)	(ft)
1500	1.82	0.03	0.24	2.17	0.02	0.15	1.20	0.35	0.10	44.5
3000	3.65	0.10	0.94	4.34	0.09	0.61	2.40	1.25	0.39	47.0
6000	7.30	0.37	3.77	8.68	0.32	2.46	4.80	4.50	1.56	56.6
8333	10.14	0.68	7.28	12.06	0.58	4.74	6.67	8.27	3.00	68.2
10000	12.17	0.96	10.48	14.47	0.81	6.83	8.00	11.59	4.32	78.6
12000	14.60	1.34	15.09	17.37	1.14	9.84	9.60	16.25	6.22	93.5

NET POSITIVE SUCTION HEAD AVAILABLE

Absolute Pressure on surface (ha-ft)	33.96	@ sea level
Vapor Pressure of liqued (hvpa-ft)	0.78	@ 68°F
Static Height above impeller (hst-ft)		(pump off - impeller)
Suction line losses (hfs-ft)	0.00	(submersible)

NPSHA = ha - hvpa + hst - hfs 33.2 ft NPSHR must be 5' less than NPSHA (safety factor)

RAW PUMPING @ MAX

PROJECT:	Ben Davis	DESIGNED BY	KFS
LOCATION:	Headworks	DATE:	12/17/2020
TAI #:	202018A	CHECKED BY	kfs
DESCRIPTION:	PUMP TDH CALCULATIONS	DATE:	12/17/2020

GENERAL LIFT STATION INFORMATION:

Controlling Elevations			Flow Rate & Pump Rate		
Forcemain Discharge =	717.45	ft	Peak Inflow Rate =	5,556	gpm
Forcemain High Point =	717.45	ft	Pumping Rate =	11111	gpm
Pump ON =	677.00	ft	Pumping Rate =	24.76	cfs
Pump OFF =	673.83	ft	Pumping Rate =	15,999,840	gpd

FRICTION LOSSES:		LS Discharge Piping	LS Discharge Piping	Forcemain	
Nominal Pipe Diameter, Pipe Type =		10" DI Class 350	16" DI Class 250	24" HDPE DR17	
Pipe Inside Diameter (inches) =		10.56	16.8	22.6	
C value =		120	120	140	
Average velocity in pipe (ft/s) =	Q/4	10.14	16.08	8.89	
Total length of FM =		19	20	1610	
$V = 1.318\ C\ R^{0.63}\ S^{0.54}$, therefore, S (ft/ft) =		0.0360	0.0494	0.0088	Friction
$S = h_f / L$					
therefore, **h(friction)(ft) =**		**0.68**	**0.99**	**14.09**	**15.76**

MINOR LOSSES (PIPE FITTINGS):

Reference: Chicago Pumps, Hydraulics & Useful Information

Fittings Description	K-value	No.	Total	No.	Total	No.	Total
Entrance Loss	0.50	1	0.50	0	0.00	0	0.00
Outlet Loss	1.00	0	0.00	0	0.00	1	1.00
90 degree bend	0.30	2	0.60	1	0.30	3	0.90
45 degree bend	0.23	0	0.00	0	0.00	6	1.38
22.5 degree bend	0.15	0	0.00	0	0.00	2	0.30
11.25 degree bend	0.09	0	0.00	0	0.00	0	0.00
Plug Valve	0.77	1	0.77	0	0.00	1	0.77
Check Valve	2.50	1	2.50	0	0.00	0	0.00
Tee (through)	0.60	0	0.00	3	1.80	0	0.00
Tee (side flow)	1.8	0	0.00	0	0.00	0	0.00
Wye (thru)	1.00	0	0.00	0	0.00	0	0.00
Reducer/Expander	0.19	1	0.19	0	0.00	0	0.00
		Total K Values:	4.56		2.10		4.35
Head Loss from fittings = $h_m = KV^2 / (2g)$							**Total Minor Losses**
therefore, **h(fittings)(ft) =**			**7.28**		**8.43**	**5.33**	**21.05**

STATIC LOSSES:	Maximum	Minimum	
Elevation of highest point (discharge)(ft)=	717.45	717.45	
Low water level in LS (Pump OFF)(ft) =	673.83	677.00	**Total Static Head (Max)**
Static head losses = high point - LS level			
therefore, **h(static)(ft)=**	**43.62**	40.45	**43.62**

TOTAL DYNAMIC HEAD (TDH) = h(friction) + h(fittings) + h(static) = 80.4 ft

Pressure (psi): 35

FLOW RATE	LS DISCHARGE PIPING 10"			LS DISCHARGE PIPING 16"			FORCEMAIN PIPING			TDH
(gpm)	VELOCITY (ft/s)	FRICTION LOSS (ft)	MINOR LOSS (ft)	VELOCITY (ft/s)	FRICTION LOSS (ft)	MINOR LOSS (ft)	VELOCITY (ft/s)	FRICTION LOSS (ft)	MINOR LOSS (ft)	(ft)
2000	1.82	0.03	0.24	2.89	0.04	0.27	1.60	0.59	0.17	**45.0**
4000	3.65	0.10	0.94	5.79	0.15	1.09	3.20	2.12	0.69	**48.7**
6000	5.47	0.22	2.12	8.68	0.32	2.46	4.80	4.50	1.56	**54.8**
8000	7.30	0.37	3.77	11.58	0.54	4.37	6.40	7.67	2.77	**63.1**
11111	10.14	0.68	7.28	16.08	0.99	8.43	8.89	14.09	5.33	**80.4**
13000	11.86	0.92	9.96	18.82	1.32	11.55	10.40	18.84	7.30	**93.5**

NET POSITIVE SUCTION HEAD AVAILABLE

Absolute Pressure on surface (ha-ft)	33.96	@ sea level
Vapor Pressure of liqued (hvpa-ft)	0.78	@ 68°F
Static Height above impeller (hst-ft)		(pump off - impeller)
Suction line losses (hfs-ft)	0.00	(submersible)

NPSHA = ha - hvpa + hst - hfs 33.2 ft NPSHR must be 5' less than NPSHA (safety factor)

RAS / WAS PUMPING

Pump Head Loss Calculations

c = 120

Pump Use: RAS/WAS pumping

Pump Model Specified: _____

Date: Jan 4,2021

Project #: 201610A

Calc by: JPO

Reviewed by: KFS

Elevations:

Clarifier #1	711.45	NWL at Discharge	717.45
Clarifier #2	708.20	CL of pump	705.5

ADF 4.00 MGD

2778 GPM

Flow range:

50%	1389
####	2778
####	4167

C factor 120

C factor on new pipe 120

Suction is split into 2 parts

Part 1 from clarifier to header

Part 2 from header to pump

6"area 0.2

Part 1 Clarifier 2 to RAS/WAS Building

Pipe size 12 inch DI Area: 0.87

Length 71 ft 127 ft

Inside Dia 1.05 ft 8.45" class 51

Fittings

	Q	K	Total
Entrance	1	0.50	0.5
Tee thru	0	0.28	0
90	2	0.42	0.8
PV	0	0.25	0
Tee side	0	0.84	0
increaser	0	0.19	0
45	0	0.22	0
			1.3

Target Flow Rates:

	# Pumps	1	1	1	1	1	1	2		2
	GPM	600	700	900	1050	1400	1800	2100	3200	4200
	CFS	1.34	1.56	2.01	2.34	3.12	4.01	4.68	7.13	9.36
	6" vel									
	12" Vel	1.54	1.80	2.32	2.70	3.60	4.63	5.40	8.23	10.81
	50% Q Ve	0.77	0.90	1.16	1.35	1.80	2.32	2.70	4.12	5.40
	Velocity H	0.01	0.01	0.02	0.03	0.05	0.08	0.11	0.26	0.45
	S =	0.0002	0.0003	0.0005	0.0007	0.0012	0.0019	0.0025	0.0055	0.0092
cl#1	Hf = S x L	0.0177	0.024	0.038	0.05	0.085	0.135	0.18	0.393	0.6504
	cl #2	0.03167	0.042	0.067	0.089	0.152	0.242	0.322	0.703	1.163
	Minor	0.0124	0.017	0.028	0.038	0.068	0.112	0.152	0.353	0.6075
	TOTAL	0.0301	0.04	0.065	0.088	0.153	0.247	0.332	0.746	1.2579
	(Minor + Hf)	0.044	0.059	0.095	0.127	0.220	0.354	0.474	1.056	1.771
	cl #2	0.04	0.06	0.09	0.13	0.22	0.35	0.47	1.06	1.77
	TOTAL PART 1	**0.03**	**0.04**	**0.07**	**0.09**	**0.15**	**0.25**	**0.33**	**0.75**	**1.26**

Pump Head Loss Calculations
c = 120

Part 2 RAS/WAS Building to Pump				# Pumps	1	1	1	1	1	2	2		2
Pipe size	12 inch DI	Area:	0.87	GPM	600	700	900	1050	1400	1800	2100	3200	4200
Length	20 ft			CFS	1.34	1.56	2.01	2.34	3.12	4.01	4.68	7.13	9.36
Inside Dia	1.05 ft	12.5 in ID											
				12" velocil	1.54	1.80	2.32	2.70	3.60	4.63	5.40	8.23	10.81
Fittings													
	Q	K	Total	V head	0.04	0.05	0.08	0.11	0.20	0.33	0.45	1.05	1.81
Entrance	0	0.50	0										
Tee thru	1	0.26	0.3	S =	0.0009	0.0012	0.0019	0.0025	0.0043	0.0069	0.0092	0.0200	0.0331
90	1	0.39	0.4										
PV	4	0.23	0.9	Hf = S x L	0.01755	0.023	0.037	0.049	0.084	0.134	0.179	0.39	0.6448
Tee side	2	0.78	1.6										
Increaser	1	0.19	0.2	Minor	0.12287	0.167	0.276	0.376	0.669	1.106	1.505	3.495	6.0207
45	0	0.21	0										
			3.3	TOTAL (Minor + Hf)	0.14042	0.191	0.314	0.426	0.753	1.24	1.684	3.885	6.6656
				TOTAL PART 2	**0.1404**	**0.19**	**0.31**	**0.43**	**0.75**	**1.24**	**1.68**	**3.88**	**6.666**
TOTAL PIPE/FITTINGS LOSSES				**GRAND TOTAL**	**0.17**	**0.23**	**0.38**	**0.51**	**0.91**	**1.49**	**2.02**	**4.63**	**7.92**
					0.18	0.25	0.41	0.55	0.97	1.59	2.16	4.94	8.44

Net Positive Suction Head Available = NPSHa = Ha - Hv - Hf ± Hs Hs = Static Head Hf = friction head Hv=vapor pressure= .78@68deg
Ha = atmospheric pressure = 33 @ 705' above sea level
Hs = 6.0 ft clarifier #1 and 2,7' clarifier #2

at Clarifier #1	NPSHa =	**38.05**	**37.99**	**37.84**	**37.71**	**37.31**	**36.73**	**36.20**
At clarifier #2	NPSHa =	**34.74**	**34.67**	**34.51**	**34.37**	**33.95**	**33.33**	**32.76**

Pump Head Loss Calculations
c = 120

DISCHARGE HEAD

2 parts, header and RAS Pipe

Pipe size 12 inch DI Area: 0.87
Length 29 ft
Inside Dia 1.05 ft 12.64"

Fittings

	Q	K	Total
Tee side	1	0.84	0.8
Tee thru	2	0.28	0.6
45		0.22	0
PV	4	0.25	1
CV	1	2.50	2.5
90	1	0.42	0.4
Increaser	1	0.19	0.2
			5.5

# Pumps	1	1	1	1	1	2	2		2
GPM	600	700	900	1050	1400	1800	2100	3200	4200
CFS	1.34	1.56	2.01	2.34	3.12	4.01	4.68	7.13	9.36
12" velocit	1.53	1.79	2.30	2.68	3.58	4.60	5.37	8.18	10.74
V head	0.04	0.05	0.08	0.11	0.20	0.33	0.45	1.04	1.79
S =	0.0009	0.0012	0.0019	0.0025	0.0043	0.0068	0.0090	0.0197	0.0326
Hf = S x L	0.02526	0.034	0.054	0.071	0.121	0.193	0.257	0.561	0.928
Minor	0.20135	0.274	0.453	0.617	1.096	1.812	2.467	5.727	9.8664
TOTAL	0.22661	0.308	0.507	0.688	1.218	2.005	2.724	6.288	10.794
(Minor + Hf)									

Discharge header losses	**0.23**	**0.31**	**0.51**	**0.69**	**1.22**	**2.01**	**2.72**	**6.29**	**10.79**

Pump Head Loss Calculations
c = 120

RAS Pipe to Aeration

Pipe size 12 inch DI Area: 0.87
Length 118 ft
Inside Dia 1.1 ft 12.6

Fittings

	Q	K	Total
Tee side	0	0.78	0
Tee thru	0	0.26	0
45	2	0.22	0.4
90	2	0.39	0.8
PV	0	0.23	0
exit	1	0.30	0.3
Increaser	0	0.19	0
			1.5

# Pumps	1	1	1	1	1	2	2		2
GPM	600	700	900	1050	1400	1800	2100	3200	4200
CFS	1.34	1.56	2.01	2.34	3.12	4.01	4.68	7.13	9.36
12" velocit	1.54	1.80	2.32	2.70	3.60	4.63	5.40	8.23	10.81
V head	0.04	0.05	0.08	0.11	0.20	0.33	0.45	1.05	1.81
S =	0.0009	0.0012	0.0019	0.0025	0.0043	0.0069	0.0092	0.0200	0.0331
Hf = S x L	0.106	0.141	0.225	0.299	0.510	0.812	1.081	2.358	3.902
Minor	0.056	0.077	0.127	0.172	0.306	0.506	0.689	1.600	2.756
TOTAL (Minor + Hf)	0.162	0.218	0.352	0.472	0.816	1.319	1.770	3.958	6.659

RAS pipe to aeration	**0.162**	**0.22**	**0.352**	**0.472**	**0.816**	**1.319**	**1.770**	**3.958**	**6.659**
Discharge Hf =	**0.39**	**0.53**	**0.86**	**1.16**	**2.03**	**3.32**	**4.49**	**10.25**	**17.45**

Static Head at NWL = 6.00 ft Clarifier #1
9.25 Clarifier #2

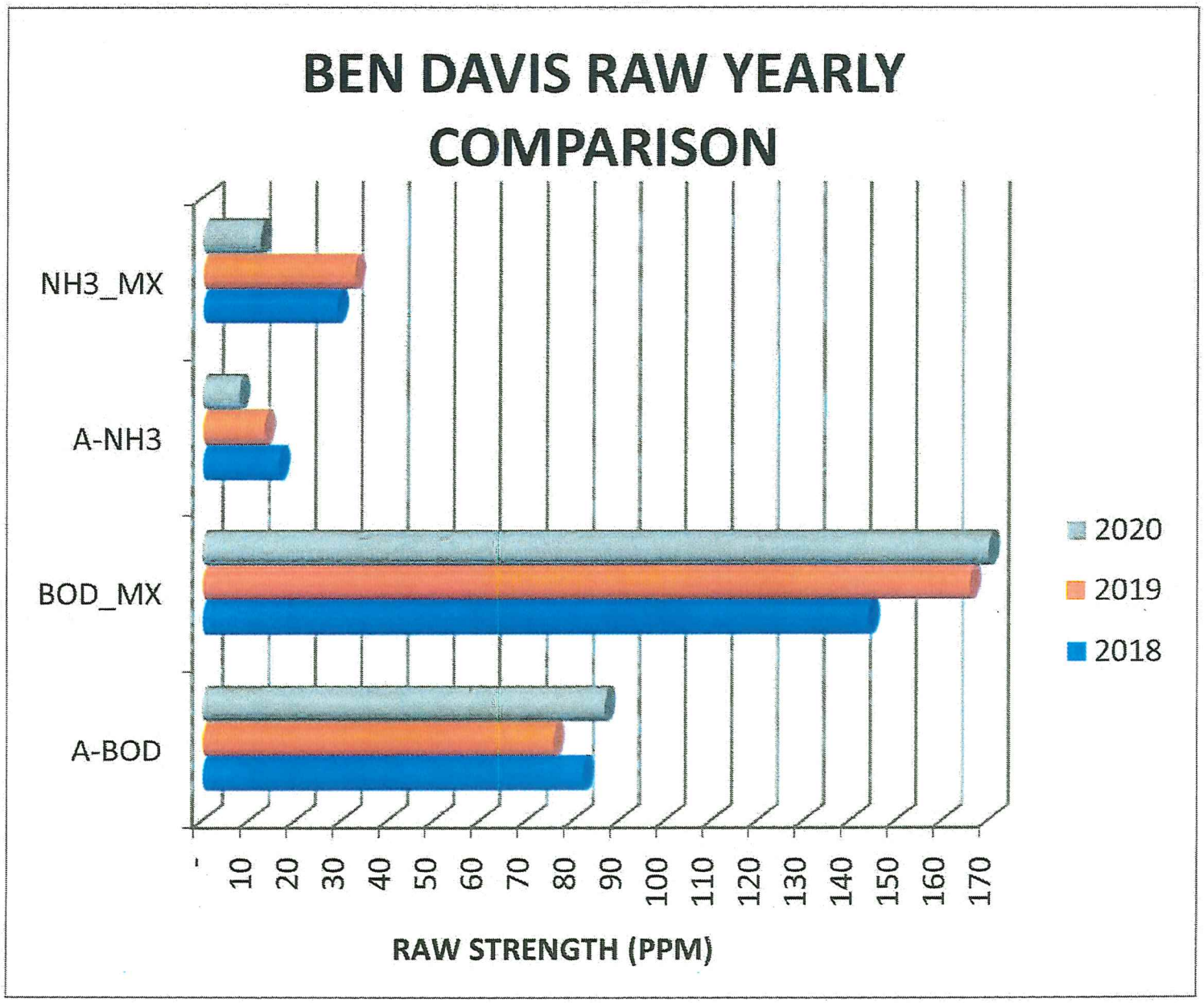
Clarifier #1 **Suction Hf =**	**0.17**	**0.23**	**0.38**	**0.51**	**0.91**	**1.49**	**2.02**	**4.63**	**7.92**
Clarifier #2	0.18	0.25	0.41	0.55	0.97	1.59	2.16	4.94	8.44
TDH = Discharge Hf + Suction Hf + Static H	1	1	1	1	1	2	2		2
	600	700	900	1050	1400	1800	2100	3200	4200
Clarifier #1 TDH =	**6.56**	**6.76**	**7.24**	**7.67**	**8.94**	**10.81**	**12.51**	**20.88**	**31.38**
Clarifier #2 TDH =	**9.82**	**10.03**	**10.52**	**10.96**	**12.26**	**14.17**	**15.90**	**24.44**	**35.14**

AUG 2021

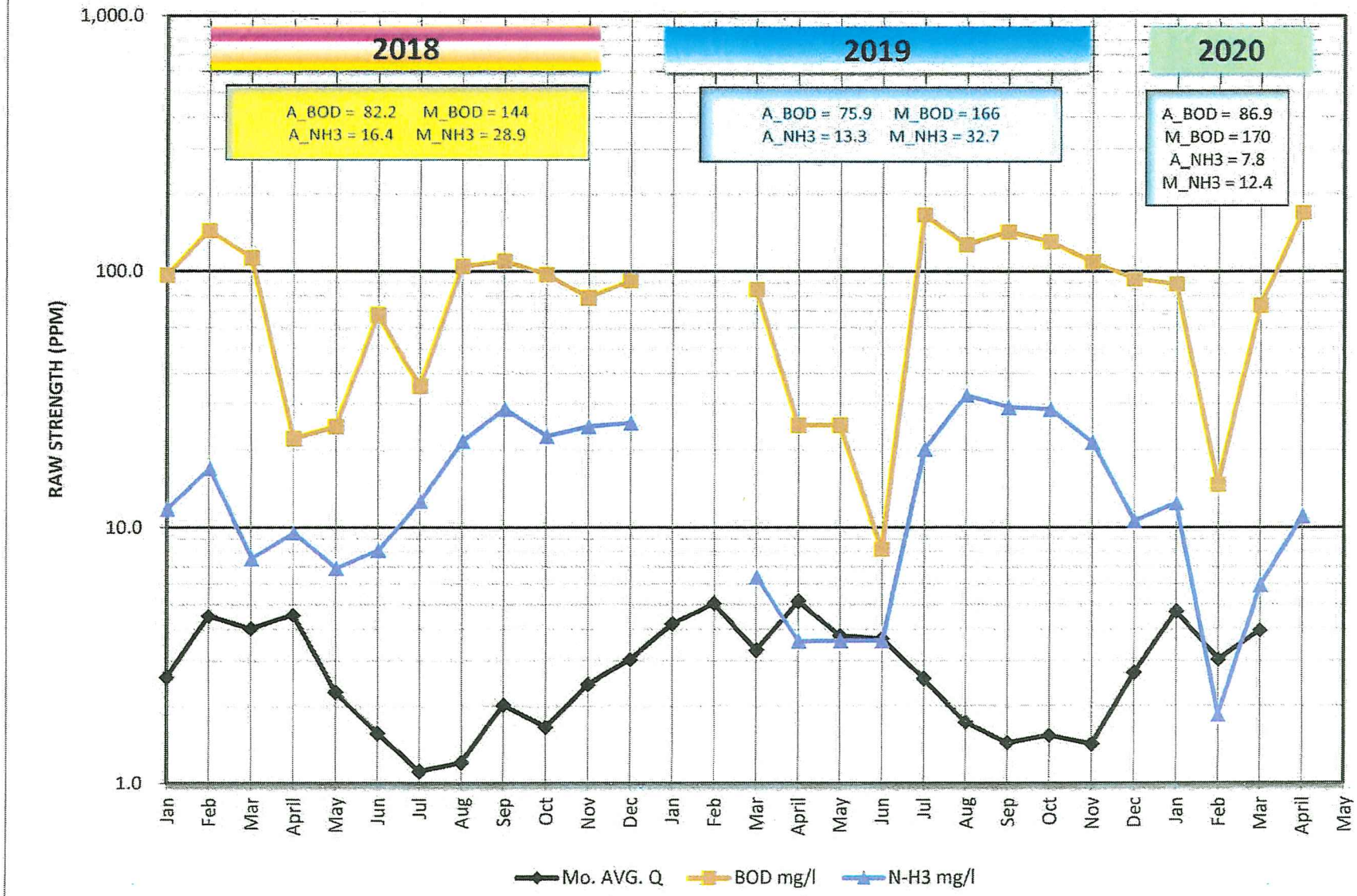
ATTACHMENT 1

WWTP Construction Plans
Ben Davis Conservancy District

HISTORICAL LOADINGS


BEN DAVIS RAW YEARLY COMPARISON
NH3_MX
A-NH3
BOD_MX
A-BOD
2020
2019
2018
-
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170
RAW STRENGTH (PPM)

BEN DAVIS INFLUENT BOD & AMMONIA



		Flow	Rain	BOD	TSS	Ammonia	Phos
Tue	15-Sep	1.521	0	168	175	24.6	4.66
Wed	16-Sep	1.454	0	184	257	23.2	5.35
Thur	17-Sep	1.432	0	155	223	25.0	5.22
Fri	18-Sep	1.448	0	135	171	26.8	5.18
Sat	19-Sep	1.438	0	159	148	26.2	4.42
Sun	20-Sep	1.437	0	135	227	27.4	5.50
Mon	21-Sep	1.453	0	133	215	24.0	5.85
	AVERAGE	1.455	-	153	202	25.3	5.17

AUG 2021

ATTACHMENT 2

WWTP Construction Plans
Ben Davis Conservancy District

INCORPORATED INTO SPECIFICATIONS

REVISED INFLUENT SCREEN 11362 SPECIFICATIONS

TO ADD TRASH BASKET

AUGUST 2021

ATTACHMENT 3

WWTP Construction Plans
Ben Davis Conservancy District

PHOSPHORUS CALCULATIONS

Chemical Phosphorus Removal Calculations
Ben Davis Conservancy District WWTP

Existing Loading Data (September 15th to September 21st)

Flow (Q_I)	1.455 MGD
PO4:	5.169 mg/L
PO4:	62.71 lbs/day

Assumptions/Input:

* Ave influent is 5.169 mg/L PO4 @ 1.455 MGD = 62.71 lbs/day Phosphorus
* Effluent limit is 1.0 mg/L, no mass limitation.
* Use 0.5 mg/L in effluent for calculation purposes.
* 0.421 lbs Al3+/gal in a 48% solution of aluminum sulfate
* 1.37 lbs Al3+/gal in a 43% solution of sodium aluminate
* 0.991 lbs Al3+/gal in a light Hyperlon 1997 solution (1.048 lbs/gal in a heavy solution)
*??? 5.4 lbs alum per gallon solution delivered
*??? Density 48% strength chemical solution = 11.1 lbs/gal

	Alum	Aluminate	PAlCl low	PAlCl high
lbs Al3+/gal solu	0.421	1.37	0.991	1.048
SG	1.335	1.535	1.35	1.39
Density, lb/gal	11.14151	12.81065	11.2667	11.60052
Cost Estimates				
$/lb solution	0.115	0.27	0.2	0.2

Parameter	Unit	Value
ADF	MGD	4.00
PDF	MGD	12.00
P Influent (Xi)	mg/L	5.169
P Influent (Xi)	lb/day	**173**
P Effluent (Xe)	mg/L	1.00
P Effluent (Xe)	lb/day	**33.38**
Storage	days	30

Stoichiometry:

	Atomic #	Atomic Weight
P	15	30.974
Al	13	26.982
S	16	32.06
O	8	16
H	1	1.008
Al2(SO4)3 - 14H2O		594.368
Dry Alum		342.144
NaAlO2		81.971

$$Al^{3+} + (PO_4)^{3-} \rightarrow AlPO_4$$

$$Al^{3+} + 3OH^- \rightarrow Al(OH)_3$$

$$Al_2(SO_4)_3 \bullet 14H_2O + 2PO_4^{3-} \rightarrow 2AlPO_4(\downarrow) + 3SO_4^{2-} + 14H_2O$$

EPA (625/1-76-001a, pg 3-3) Method:

P Reduction Required	Al:P Mole Ratio	Al:P Weight Ratio	Alum:P Weight Ratio	Aluminate:P Weight Ratio	PAlCl Low Weight Ratio	PAlCl High Weight Ratio
75%	1.38:1	1.2:1	13:1	3.65:1		
80%	1.55:1	1.35:1	14.9:1	4.10:1		
85%	1.72:1	1.5:1	16:1	4.55:1		
90%	2:1	1.74:1	19.2:1	5.29:1		
95%	2.3:1	2.0:1	22:1	6.09:1		

Parameter	Unit	Value
Reduction	lb/day	**139**
Reduction	%	**80.7%**

Gal Solution/day = (lbs P/day removed x Al3+:P weight ratio)/(lbs Al3+/gal Solution)

% Removal	Mass Ratio	Removal, lbs/day		Alum	Aluminate	PAlCl Low	PAlCl High
75%	1.2	129	Feed Rate, gal/day	368.84	113.34	156.69	148.17
			Feed Rate, gph	15.37	4.72	6.53	6.17
			Storage Req'd, gal	11065	3400	4701	4445
			Cost Estimate, $/day	473	392	353	344
80%	1.35	138	Feed Rate, gal/day	443	136	188	178
			Feed Rate, gph	18	6	8	7
			Storage Req'd, gal	13278	4080	5641	5334
			Cost Estimate, $/day	567	470	424	413
85%	1.5	147	Feed Rate, gal/day	522.52	160.57	221.98	209.91
			Feed Rate, gph	21.77	6.69	9.25	8.75
			Storage Req'd, gal	15676	4817	6659	6297
			Cost Estimate, $/day	669	555	500	487
90%	1.74	155	Feed Rate, gal/day	641.78	197.22	272.64	257.81
			Feed Rate, gph	26.74	8.22	11.36	10.74
			Storage Req'd, gal	19253	5917	8179	7734
			Cost Estimate, $/day	822	682	614	598
95%	2.0	164	Feed Rate, gal/day	778.66	239.28	330.79	312.80
			Feed Rate, gph	32.44	9.97	13.78	13.03
			Storage Req'd, gal	23360	7178	9924	9384
			Cost Estimate, $/day	998	828	745	726

*based on Design Average Flow

AUGUST 2021

ATTACHMENT 4 – INCORPORATED INTO SPECIFICATIONS

WWTP Construction Plans
Ben Davis Conservancy District

REVISED PHOSPHORUS SPECIFICATION SECTION 11290

AUGUST 2021

ATTACHMENT 5

WWTP Construction Plans
Ben Davis Conservancy District

UV MANUFACTURER'S TECHNICAL DATA SHEETS

Aquaray® 3X Vertical Lamp
UV Disinfection Equipment

Budget Proposal
Ben Davis Conservancy District WWTP
Indiana

October 27, 2020

Contact information:

Prepared By:

SUEZ TREATMENT SOLUTIONS, INC
George Vrachimis
Applications Engineer
Tel: 201-676-2227
Email: george.vrachimis@suez.com

Local Sales Representative:

FACO WaterWorks LLC
Ken Sobbe
Tel: 317-694-1896
Email: Ken@facollc.com

October 27, 2020

To: Kent Schuch, P.E.
Triad Associates, Inc.

Re: Aquaray® 3X Ultraviolet Disinfection Equipment
Ben Davis Conservancy District WWTP

SUEZ Treatment Solutions is pleased to submit our preliminary budget proposal for the Aquaray® 3X High Output Vertical Lamp ultraviolet disinfection system for the above referenced project. The proposed design is based on our latest Aquaray® 3X System which features vertically mounted high output amalgam lamps with variable output for greater power conservation. Some of the proposed Aquaray® 3X Vertical Lamp UV System's features include:

- Third-Party validated per 2012 NWRI guidelines
- Easy maintenance without the need to remove equipment from channel for lamp and ballast replacement.
- Automatic dose control is achieved by turning on/off lamps in combination with dimming in relation to a flow signal, ensuring that the plant is operated economically while still providing the required performance.

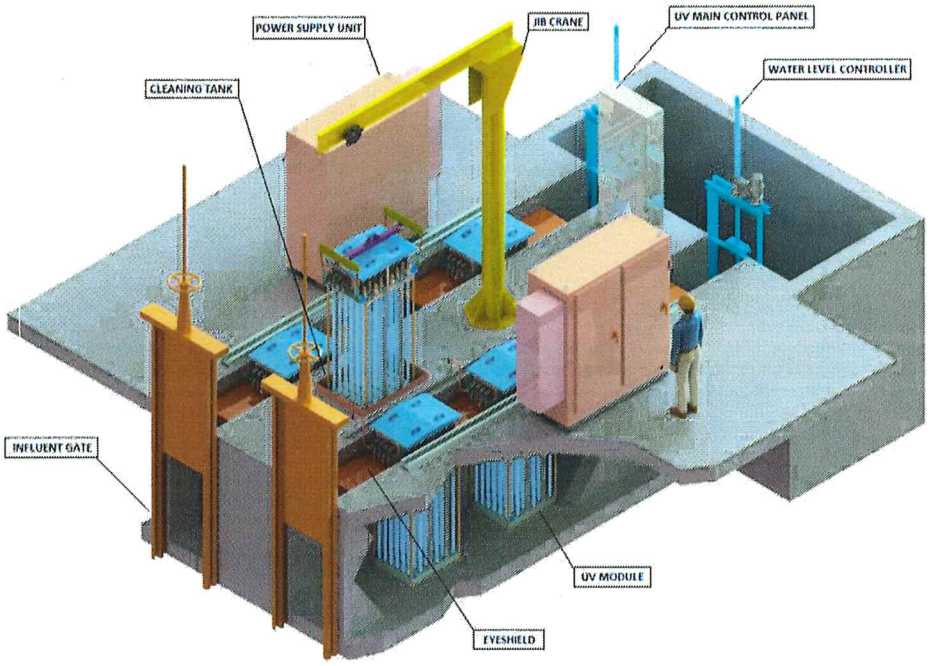
For a max disinfection flow of 16 MGD and a minimum UVT of 65%, SUEZ proposes to furnish two (2) UV disinfection channels. The proposed UV system will have UV modules mounted one (1) across by two (2) UV banks in series per channel. The UV system will deliver a minimum UV dose of 33,300 µWS/cm² (33.3 mJ/cm²) at the peak flow with all UV modules in service.

If you have any questions or require any additional information, please don't hesitate to contact our local representative or the undersigned.

Sincerely,

For SUEZ Treatment Solutions Inc.
George Vrachimis
Applications Engineer

I. AQUARAY® 3X VERTICAL LAMP SYSTEM DESCRIPTION



- The UV lamps are mounted vertically and perpendicular to the flow, where all electrical connections are made out of the water. All the lamps are easily accessed through the lid of the top enclosure. This makes routine service such as lamp changes, performed without having to remove the lamp modules from the channel.

- Electronics, such as ballasts and communication cards, are all located in a remote enclosure away from the UV channel

- The UV lamps are mounted in a uniform staggered array. This ensures a semi-tortuous path for the effluent that avoids discharge of undisinfected wastewater.

- Flow pacing is achieved by a combination of dimming each row of lamps from 100% to 62% output and turning lamp rows on and off in relation to a plant flow signal. Each UV module has six (6) rows of lamps.

- Each UV module has a dedicated electric motor that powers a mechanical wiper. No failure of one wiping system component will result in the loss of wiping capability for the entire UV system.

- All UV modules are completely removable from the UV channel, allowing for regularly scheduled channel cleaning to remove algae or debris.

II. DESIGN BRIEF:

Parameter	Value	Unit
Max Disinfection Flow	16	MGD
Peak Flow	12	MGD
Average Daily Flow	4.0	MGD
Design UV Transmittance	65%	% UVT
TSS, 30 day geometric mean	<30	mg/L
TSS, Single sample maximum	<45	mg/L
E. Coli, 1-day maximum of daily samples	<235	CFU/100 mL
Minimum UV dose	33,300	μWS/cm²

III. PROPOSED AQUARAY® 3X UV SYSTEM DESIGN:

Description	Value
System Designation	Aquaray® 3X
Number of Channels	2
Number of Modules Across (Modules per Bank)	1
Number of Modules in Series (Number of Banks)	2
Aquaray® Modules/Channel	2
Total Number of Modules	4
Number of Lamps/Module	36
Total Number of Lamps	144
Headloss across UV modules at 16 MGD, in.	1.71 inches
Power Consumption per Lamp, W	400 watts
Power Consumption at 16 MGD, kW *Through 2 Channels*	53.5 kW
Power Consumption at 12 MGD, kW *Through 2 Channels*	42.8 kW
Power Consumption at 4 MGD, kW *Through 1 Channel*	18.2 kW
Max Operating Power, kW	58.4 kW

Proposed Channel Dimensions	Value
Channel Length, ft.	19'
Channel Width, in.	29.5"
Nominal Water Depth, in.	61" - 69"
Minimum Channel Depth, in.	77"

IV. SCOPE OF SUPPLY:

UV System Component	Value
Number of Aquaray® 3X Modules	4
Number of UV Lamps (Excluding Spares)	144
Number of UV Intensity Sensors (One per bank)	4
Number of Power Supply Units (PSUs)	2
Number of UV Main Control Panels (UMCPs)	1
Number of Power Cables	12
Number of Data Cables	8
Number of Cable Trays	2
Number of Stepdown Transformers	2
Number of Mounting Rails/Eye Shields	6
Level Control Weirs	1 set
Number of Conductivity Level Switches	2
Number of Cleaning Tanks	1
Spare Parts	Included
Field Service	Five (5) days in one (1) trip
Freight to job site	Included

V. SPARE PARTS REPLACMENT COST

PART/SERVICE	COST
UV Lamps (16,000 hour warranty)	$175 / lamp
Sleeves (10 year warranty)	$75 / sleeve
Ballasts (5 year warranty)	$400 / ballast
Wipers (2,000 wipes)	$8 / wiper
Additional 8-hours field service on site	$ 1,390 per day + expenses (hotel, rental car, flight, etc)

VI. ITEMS PROVIDED BY OTHERS

Note that the following items are to be provided by others (unless indicated otherwise above):

- UV channel construction/modification
- Channel grating
- Influent/Isolation gates
- Piping and valves
- Remote computer system
- Installation
- Embedded conduits
- Sample collection and laboratory analysis during performance testing
- Online UVT analyzer
- ½ Ton Jib or Overhead Crane

VII. PRICING, TERMS AND CONDITIONS

Budget Price	**To be provided by local SUEZ Representative**
Taxes	Not included
Payment Terms	• 10% Net Cash, Payable in thirty (30) days from date of submittal of initial drawings for approval; • 85% Net Cash, Payable in progress payments thirty (30) days from dates of respective shipments of the Products; • 5% Net Cash, Payable in thirty (30) days from Product installation and acceptance or Ninety (90)
Submittals	6-8 weeks
Equipment Delivery	18-20 weeks after submittal approval
Freight	FOB jobsite
Warranty	1 year after start-up or 18 months after delivery, whichever occurs first

Typical Aquaray® Vertical Lamp Ultraviolet Disinfection System Installations

Plant Location: Harnett County, NC

Peak Flow: 20 MGD

Number of Channels: 2

Number of Modules: 3 per channel (6 total)

Typical Aquaray® Vertical Lamp Ultraviolet Disinfection System Installations

Plant Location: Madison, AL

Peak Flow: 34 MGD

Number of Channels: 1

Number of Modules: 3 per channel (6 total)

Typical Aquaray® Vertical Lamp Ultraviolet Disinfection System Installations

Plant Location: Stratford, CT

Peak Flow: 39 MGD

Number of Channels: 1

Number of Modules: 9 per channel (9 total)

Typical Aquaray® Vertical Lamp Ultraviolet Disinfection System Installations

Plant Location: Jefferson City, MO

Peak Flow: 66.6 MGD

Number of Channels: 2

Number of Modules: 9 per channel (18 total)

Typical Aquaray® Vertical Lamp Ultraviolet Disinfection System Installations

Plant Location: Colorado Springs, CO

Peak Flow: 135 MGD

Number of Channels: 3

Number of Modules: 9 per channel (27 total)

ATTACHMENT 1
SEPT 2021

BEN DAVIS CONSERVANCY
2019 - 2020 FLOWS/LOADINGS

		Flow	Rain	BOD	TSS	Ammonia	Phos	LBS BOD
Sat	3/30/2019	7.508		85	109	6.4		5,316
Sun	4/28/2019	7.714		25	26	3.6		1,608
Mon	6/17/2019	9.257		8	15	1.4		633
Mon	7/29/2019	2.319		166	274	20.2		3,211
Thu	8/15/2019	1.656		127	157	32.7		1,754
Fri	9/20/2019	1.479		142	388	29.2		1,752
Wed	10/2/2019	1.446		130	174	28.7		1,568
Tue	10/15/2019	1.331		197	412	30.6		2,187
Tue	11/5/2019	1.677		109	169	21.4		1,524
Tue	12/3/2019	2.725		94	175	10.6		2,127
Thu	1/9/2020	2.779		89	162	12.4		2,067
Tue	2/11/2020	9.055		15	21	1.8		1,110
Tue	3/3/2020	6.300		74	109	5.9		3,872
Tue	4/7/2020	3.002		170	270	11.1		4,256
Tue	5/5/2020	2.454		74	95	12.4		1,523
Tue	6/2/2020	3.022		76	116	8.1		1,918
Wed	7/8/2020	3.384		78	198	7.8		2,199
Tue	8/4/2020	2.489		84	202	19.0		1,735
Wed	9/9/2020	1.587		122	328	26.8		1,615
	AVERAGE	3.747		98	179	15.3		2,209
		Flow	Rain	BOD	TSS	Ammonia	Phos	
Tue	15-Sep	1.521	0	168	175	24.6	4.66	2,131
Wed	16-Sep	1.454	0	184	257	23.2	5.35	2,231
Thur	17-Sep	1.432	0	155	223	25.0	5.22	1,851
Fri	18-Sep	1.448	0	135	171	26.8	5.18	1,630
Sat	19-Sep	1.438	0	159	148	26.2	4.42	1,907
Sun	20-Sep	1.437	0	135	227	27.4	5.50	1,618
Mon	21-Sep	1.453	0	133	215	24.0	5.85	1,612
	AVERAGE	1.455	-	153	202	25.3	5.17	1,854

ATTACHMENT 2
SEPTEMBER 2021

TAI: PER

ATTACHMENT
HISTORICAL FLOWS & WASTELOADS
Ben Davis Conservancy District

February 2021

INFLUENT	Average Daily Flows (MGD)	Monthly Flow	CBOD (mg/l)	TSS (mg/l)	NH3-N (mg/l)
2016					
January	3.57	110.80	151.2	140.0	14.1
February	2.84	79.50	34.8	141.8	11.0
March	3.98	123.30	61.5	245.8	6.7
April	4.22	126.60	22.8	473.8	7.8
May	4.77	148.00	28.9	135.5	11.9
June	3.06	91.70	45.0	138.8	12.9
July	3.18	98.50	118.8	254.5	15.0
August	3.79	117.60	52.7	136.3	11.0
September	3.49	104.80	42.7	100.1	11.0
October	2.37	73.40	109.0	246.0	18.0
November	1.68	50.30	45.2	166.9	27.8
Dec2016	1.95	60.30	144.6	175.0	12.1
2017					
January	3.85	119.32	96.8	205.3	11.8
February	2.15	60.24	144.0	211.8	17.0
March	3.12	96.68	113.2	160.0	7.6
April	2.94	88.23	22.2	85.0	9.6
May	5.17	160.30	24.7	49.1	6.9
June	2.72	81.60	67.5	155.8	8.2
July	3.75	116.20	35.6	93.9	12.7
August	1.62	50.20	104.7	218.0	21.8
September	1.10	33.00	109.8	162.3	28.9
October	1.36	42.20	97.2	143.3	22.7
November	2.11	63.40	78.7	148.5	24.7
December	2.37	73.40	92.0	177.0	25.5
2019					
January	4.21	130.47	0.0	0.0	0.0
February	5.05	141.53	0.0	0.0	0.0
March	3.30	102.38	84.9	109.0	6.4
April	5.15	154.56	25.0	26.0	3.6
May	3.77	116.87	25.0	26.0	3.6
June	3.67	109.99	8.2	26.0	3.6
July	2.56	79.29	166.0	274.0	20.2
August	1.72	53.27	127.0	157.0	32.7
September	1.43	42.92	142.0	388.0	29.7
October	1.53	47.38	130.0	174.0	28.7
November	1.41	42.41	109.0	169.0	21.4
December	2.69	83.44	93.6	175.0	10.6
2020					
January	4.71	146.05	89.2	162.0	12.4
February	3.04	88.21	14.7	21.2	1.8
March	3.96	122.64	73.7	109.0	5.9
April	2.25	67.54	170.0	270.0	11.1
May	2.91	90.08	74.4	95.0	12.4
June	2.07	61.95	76.1	116.0	8.1
July	2.08	64.44	77.9	198.0	7.8
August	2.29	71.06	83.6	202.0	19.0
September	1.48	44.37	184.0	257.0	23.2
October	1.47	45.48	106.0	299.0	34.2
November	2.34	72.52	115.0	154.0	17.7
December	1.76	54.46	198.0	157.0	11.5
Daily Avg	2.87	87.56	83.7	161.0	14.2
Limit	4.00		250.0	300.0	20.0

INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
We Protect Hoosiers and Our Environment.
100 N. Senate Avenue • Indianapolis, IN 46204
(800) 451-6027 • (317) 232-8603 • www.idem.IN.gov

Eric J. Holcomb
Governor

Bruno Pigott
Commissioner

October 28, 2020

VIA ELECTRONIC MAIL

Mr. James W. Frazell, Engineer
Triad Associates, Inc.
5835 Lawton Loop East Drive
Indianapolis, IN 46216

Dear Mr. Frazell:

Re: Preliminary Effluent Limitations
Proposed Ben Davis Conservancy District
Wastewater Treatment Plant (Option 1)
Marion County

This letter is in response to your request for preliminary effluent limitations for a proposed Ben Davis Conservancy District Wastewater Treatment Plant (WWTP). As indicated in your request, the average design flow of the WWTP will be 4.0 MGD. The proposed discharge location will be to Neeld Ditch. The Q7,10 low-flow of the receiving stream at the point of discharge is considered to be zero cfs.

This letter also serves as notification that supplemental information is required to fully evaluate the proposed discharge. Construction and NPDES permitting may not proceed until the supplemental information specified herein has been submitted to, and been preliminarily approved by, this Office.

Preliminary effluent limitations are impacted by numeric and narrative water quality criteria as well as antidegradation requirements. Current Indiana Antidegradation Standards at 327 IAC 2-1.3-3 contain a provision for all surface waters of the State. The existing uses and the level of water quality necessary to protect existing uses shall be maintained and protected. The antidegradation rules for Indiana are found in 327 IAC 2-1.3.

Before approving a new discharge of treated wastewater, alternatives to the proposed discharge must be evaluated to satisfy antidegradation requirements. If this office makes a preliminary determination that the new discharge is necessary on the basis of economic or social factors, the effluent limitations contained herein (developed to minimize the potential lowering of water quality) may be utilized for construction and NPDES permitting. If this office determines the discharge is not necessary on the basis of economic or social factors, the proposed new discharge will not be allowed, and construction and NPDES permits will not be issued.

ANTIDEGRADATION DEMONSTRATION REQUIREMENTS FOR AMMONIA-NITROGEN

327 IAC 2-1.3-5(a) requires every antidegradation demonstration shall include the following basic information:

(1) The regulated pollutants known or believed to be present in the wastewater and proposed to be discharged.
(2) The estimated concentration and mass loading of all regulated pollutants proposed to be discharged.
(3) The location of the proposed discharge and a map of the area of the proposed discharge that shows the receiving water or waters that would be affected by the new or increased loading, including the area downstream of the proposed discharge.

Every antidegradation demonstration shall include the following necessary information:

(1) The availability, reliability, cost-effectiveness, and technical feasibility of the following:
    (A) No degradation.
    (B) Minimal degradation.
    (C) Degradation mitigation techniques or alternatives.
(2) An analysis of the effluent reduction benefits and water quality benefits associated with the degradation mitigation techniques or alternatives required to be assessed under subdivision (1)(C), including the following:
    (A) A review of pollution prevention alternatives and techniques that includes the following:
        (i) A listing of alternatives and techniques, including new and innovative technologies.
        (ii) A description of how the alternatives and techniques available to the applicant would minimize or prevent the proposed significant lowering of water quality.
        (iii) The effluent concentrations attainable by employing the alternatives and techniques.
        (iv) The costs associated with employing the alternatives and techniques.
        (v) An identification of the pollution prevention alternatives and techniques selected to be employed and an explanation of why those selections were made.
    (B) An evaluation of the feasibility and costs of connecting to an existing POTW or privately owned treatment works, within the vicinity of the proposed new or increased loading, that:
        (i) will effectively treat the proposed discharge; and
        (ii) is willing to accept wastewater from other entities.
    (C) For POTWs, if the proposed significant lowering of water quality is a result of a proposed new or increased loading from one (1) or more indirect dischargers, the analysis shall also include the following:
        (i) The requirements of clause (A) shall be completed for the

indirect discharger or dischargers as well as for the POTW. The POTW may require the indirect dischargers to prepare this information.
(ii) If one (1) or more of the indirect dischargers proposes or does discharge to a combined sewer or sanitary sewer that is connected to a combined sewer, all combined sewer overflows (CSOs) between the point of discharge to the sewer and the POTW shall be identified.

(3) The availability, cost-effectiveness, and technical feasibility of central or regional sewage collection and treatment facilities, including long-range plans for discharges outlined in:
(A) state or local water quality management planning documents; and
(B) applicable facility planning documents.

(4) The availability, cost-effectiveness, and technical feasibility of discharging to another waterbody that:
(A) is not an OSRW; or
(B) has a higher assimilative capacity for the regulated pollutant.

327 IAC 2-1.3-5(g) requires the antidegradation demonstration include the following social and economic analysis information:(g) For each regulated pollutant in the proposed new or increased loading associated with activities in subsection (f), each antidegradation demonstration shall include the following social and economic analysis information:

(1) The anticipated impact on aquatic life and wildlife, considering the following:
(A) Endangered or threatened species.
(B) Important commercial or recreational sport fish species.
(C) Other individual species.
(D) The overall aquatic community structure and function.

(2) The anticipated impact on human health.

(3) The degree to which water quality may be lowered in waters located within the following:
(A) National, state, or local parks.
(B) Preserves or wildlife areas.
(C) OSRWs or ONRWs.

(4) The extent to which the resources or characteristics adversely impacted by the lowered water quality are unique or rare within the locality or state.

(5) Where relevant, the anticipated impact on economic and social factors, including the following:
(A) Creation, expansion, or maintenance of employment.
(B) The unemployment rate.
(C) The median household income.
(D) The number of households below the poverty level.
(E) Community housing needs.
(F) Change in population.
(G) The impact on the community tax base.
(H) Provision of fire departments, schools, infrastructure, and other necessary public services.
(I) Correction of a public health, safety, or environmental problem.

(J) Production of goods and services that protect, enhance, or improve the overall quality of life and related research and development.
(K) The impact on the quality of life for residents in the area.
(L) The impact on the fishing, recreation, and tourism industries.
(M) The impact on endangered or threatened species.
(N) The impact on economic competitiveness.
(O) Demonstration by the applicant that the factors identified and reviewed under clauses (A) through (N) are necessary to accommodate important social or economic development despite the proposed significant lowering of water quality.
(P) Inclusion by the applicant of additional factors that may enhance the social or economic importance associated with the proposed discharge, such as an approval that recognizes social or economic importance and is given to the applicant by:
(i) a legislative body; or
(ii) other government officials.

In determining whether a proposed discharge is necessary to accommodate important economic or social development in the area in which the waters are located under antidegradation standards and implementation procedures, the commissioner will give substantial weight to any applicable determinations by governmental entities.

Once an antidegradation demonstration has been received by this Office and determined complete, the antidegradation demonstration will be public noticed for a thirty day period requesting comment in accordance with 327 IAC 5-2-11.2. If this office makes a tentative determination to approve the submitted antidegradation demonstration, then construction and NPDES permitting may proceed with the understanding that a final determination will not be made until public input on the tentative decision has been considered. This office will seek public input on the tentative decision during the public participation process for the issuance of the NPDES permit. **It should be noted that the public participation process and/or permit appeal process included in the rules for the issuance of NPDES permits could alter (and possibly make more stringent) the limits that are established in the final NPDES permit, or result in the denial of the request.** Should the tentative decision be to deny the antidegradation demonstration, the tentative decision for denial will be public noticed for a thirty day period requesting comment in accordance with 327 IAC 5-2-11.2. The public process for an antidegration demonstration can be found at 327 IAC 2-1.3-6.

Preliminary Effluent Limitations for Sanitary-Type Wastewater

Table 1

Parameter	Summer		Winter		Units
	Monthly Average	Weekly Average	Monthly Average	Weekly Average	
CBOD5	10	15	10	15	mg/l
TSS	12	18	12	18	mg/l
Ammonia-N	1.1	1.6	1.6	2.4	mg/l
Phosphorus	1.0	----	1.0	----	mg/l

Table 2

Parameter	Daily Minimum	Monthly Average	Daily Maximum	Units
pH	6.0	----	9.0	s.u
Dissolved Oxygen	6.0	----	----	mg/l
E. coli	----	125	235	count/100mL

The effluent flow must be measured. The mass limits for $CBOD_5$, NH_3-N, and TSS are calculated by multiplying the average design flow (in MGD) by the concentration value and by 8.345. Summer effluent limits apply from May 1 through November 30 of each year. Winter effluent limits apply December 1 through April 30 of each year.

*The effluent limitations for *E. coli* are 125 colonies/100 ml as a monthly average calculated as a geometric mean and 235 colonies/100 ml as a daily maximum. **Ultraviolet light disinfection or disinfection by other non-halogen compounds is required as a consideration in antidegradation. Disinfection by chlorination or other halogen compounds will require the applicant to demonstrate that disinfection by ultraviolet light is either not technically feasible or that it is not affordable.**

If the preliminary effluent limitations specified above are not acceptable to the discharger, then alternate limitations may be pursued. To pursue alternate limitations, an assessment of alternative feasible treatment technologies comparing the expected effluent concentrations with the expected capital and maintenance costs for each alternative, and the corresponding expected new or increased loading above the level generated by the effluent limits specified above must be submitted for review. The assessment must also include an affordability analysis and justification for selecting the most cost-effective treatment plant design that is affordable. In no case will limitations be approved which will result in exceedances of State water quality standards.

Please be advised that although we are providing you with preliminary effluent limitations, there are rules that may not allow IDEM to issue an NPDES permit for this facility. 327 IAC 5-2-7(e) states that no permit shall be issued for any discharge from a point source substantially inconsistent with a plan or plan amendment approved under

section 208(b) of the Clean Water Act. Section 208(b) of the CWA established Areawide Regional Planning Commissions. The **Hoosier Heartland Planning Commission was established in the 1970s for Marion County and all of the counties contiguous to Marion County**. Although that Commission is now defunct, a recent federal court ruling determined that this provision of the NPDES rules is still applicable, regardless of whether the administrative entity is still in existence. The 208(b) plan will need to be reviewed to determine its applicability.

In addition, Indiana Code 13-18-26 requires the permit applicant to certify that the following documents have been prepared and completed for new facilities and/or facility expansions with a design capacity above 0.10 MGD:

· A Life Cycle Cost-Benefit Analysis, as described in IC 13-18-26-3;
· A Capital Asset Management Plan, as described in IC 13-18-26-4; and
· A Cybersecurity Plan, as described in IC 13-18-26-5.

The certification of completion must be submitted to IDEM along with the permit application, and must be notarized. IDEM will not issue a permit to an applicant that is subject to IC 13-18-26 if the required certification is not included with the application packet, as required by IC 13-18-26-1(b).

The plans and analyses must be reviewed and revised (as necessary) at least once every five years. A new certification must be submitted to IDEM (with the NPDES renewal application) if any plan or analysis is revised during the five-year review.

If there are any questions regarding design requirements of the construction permit, please contact Ms. Missy Nunnery at 317/232-5579. The NPDES permit will not be issued until the construction permit is finalized.

If there are any questions regarding the antidegradation requirements or NPDES permit requirements, please feel free to contact Nicholas Eilerman at neilerma@idem.in.gov or 317/232-8619.

Sincerely,

Leigh Voss

Leigh Voss, Chief
Municipal NPDES Permits Section
Office of Water Quality