

**Pump Station and Force Main  
ATTACHMENT A  
(PSFM: 03-2021 Form)**

**Please submit the sealed pump station hydraulic calculations with the application.**

*(THIS FORM MAY BE PHOTOCOPIED FOR USE AS AN ORIGINAL)*

**Wastewater Pump Station (All Pump Station Application Packages):**

- Submit one digital copy of the sealed design drawings and design calculations with supporting documents in PDF format are to be uploaded to the Accela online portal in the applicable case at <https://accela1.cabarruscounty.us/CitizenAccess/> unless otherwise specified.
- Calculations must include the minimum items required by 15A NCAC 2T, the State of North Carolina's *Gravity Sewer Minimum Design Criteria and the City of Concord's ordinance and policies.*
  - **Total dynamic head/friction** calculations for all applicable pumping conditions shall be provided.
  - **The pump curve of each proposed pump shall be provided.** A pump curve/system curve analysis, plotting total dynamic head versus capacity, shall be used to determine the pump selection and the operating range. System curves for the following conditions shall also be provided: system at the point of initial service (new), system at the end of service (aged), at the pump-on condition, at the pump-off condition, one pump operating, and multiple pumps operating. The efficiency of the pump(s) shall be at least 40% throughout the operating range. Provide manufacturer's information, and recommended installation guidelines.
  - **The number of times that the pump is activated during average daily flow and peak flow conditions shall be evaluated. The pump run time shall also be evaluated.**
  - **Buoyancy protection calculations** shall be provided for wastewater pump stations. Flotation calculations shall assume that the elevation of the groundwater is equivalent to the ground elevation and shall not include the weight of the pumps, internal piping and appurtenances, or wastewater.
  - **Pump Stations serving a Single Development.** Wetwells and storage basins shall be designed and sized to accommodate wastewater flows expected to become tributary to the pump station for the entire project/development at build out.
  - **Pump Stations serving the Entire Drainage Basin.** For regional pump stations, the design shall take into consideration the tributary drainage basin area, potential growth (zoning) in the area, and expected service life of the pump station.
  - **Criteria for Calculating Wastewater Volume.** Wetwells and storage basins shall be designed with an emergency storage capacity that can accommodate 2-hours of peak flow in the event of pump failure. Peak flow shall include the diurnal peak, as well as inflow and infiltration from a 5-year storm.
  - **Criteria for Calculating Storage Volume.** The required storage volume shall be measured between the pump-off elevation and six inches below the elevation where wastewater could escape to daylight (i.e., six inches below the wetwell rim or six inches below the lowest upstream manhole, whichever is lower). Since this volume calculation includes almost the full depth of the wetwell, in reality wastewater will back up in the sanitary sewer system. However, the wastewater in the sanitary sewer system may not be included in the calculation for the 2-hour storage requirement.
  - **Deviations to Volume Calculations.** Deviation from this requirement shall be allowed only upon the prior approval of the City of Concord Engineering Department. The design engineer must provide in writing a detailed explanation of all extenuating circumstances and design constraints before any modifications will be considered.
  - **Phased Development.** Approval of staged storage based on phased development may be allowed, but provisions, requirements, facilities, and costs shall be delineated and accounted for in the initial design. If staged storage is under consideration, the design engineer shall furnish a development construction schedule that explains the construction sequence for the time when additional capacity is added. Staged volume projects shall not adversely affect the City of Concord's ability to operate the pump station.
  - **For connection to a pump station,** submit an evaluation of the existing pump station to pump peak flow from proposed project and peak flows already tributary to the existing pump station. Provide calculations and detail how existing peak flows were determined.
  - **For connection to a force main,** provide an evaluation of the existing force main based on peak flows from proposed project and peak flows already tributary to the existing force main. In addition, evaluate the ability of each pump station tributary to the existing force main to pump against additional head created by greater flows through the force main. Evaluation may include alternate designs such as telemetry to coordinate pumping between pump stations (provided sufficient storage is available). Also, include an evaluation of the discharge point of the existing force main as described above.
- Pump Station Reliability (All Pump Station Application Packages):**
  - The power reliability requirement, ensure that the plans and specifications detail the storage time available above the high-water alarm as well as how a telemetry device will interact with the pump station instrumentation and control, and submit at least three years of power outage data from the power supplier for the electrical source from which the pump station will be supplied.

**A DIGITAL COPY OF THE COMPLETED APPLICATION PACKAGE, INCLUDING PLANS, SUPPORTING INFORMATION AND MATERIALS, SHOULD BE UPLOADED TO ACCELA ONLINE PORTAL IN THE APPLICABLE CASE AT <https://accela1.cabarruscounty.us/CitizenAccess/>, UNLESS OTHERWISE SPECIFIED.**

<p><u>For Accela Case Inquiries, Contact:</u></p> <p><b>CITY OF CONCORD</b>  <b>Planning &amp; Neighborhood Development-</b>  <b>Zoning Services</b>  <b>Post Office Box 308</b>  <b>Concord, North Carolina 28026-0308</b>  <b>Telephone Number: (704) 920-5152</b></p>	<p><u>For Engineering Design Inquiries, Contact:</u></p> <p><b>CITY OF CONCORD</b>  <b>Engineering Department</b>  <b>Post Office Box 308</b>  <b>Concord, North Carolina 28026-0308</b>  <b>Telephone Number: (704) 920-5425</b></p>
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**Please submit the sealed pump station hydraulic calculations with the application.**

TO BE COMPLETED BY THE CITY OF CONCORD	
DSD Case No:	
Project No:	
ATC No:	
Pump Station Name & City ID number	

1.)	<b>Project Title:</b>	(Project name of title as indicated on the drawings)				
3.)	Service Basin Area (acres)	6.)	100-year flood	elevation (ft)	or	N/A <input type="checkbox"/>
4.)	Average daily flow, ADF (GPD)	7.)	Peak Daily Flow, PDF (GPD)			
5.)	Average daily flow, ADF (GPM)	8.)	Peak Daily Flow, PDF (GPM)			

THE SEALED ENGINEERING DESIGN DOCUMENTS MUST BE COMPLETED PRIOR TO SUBMITTAL OF THIS APPLICATION. THE DOCUMENTS MUST INCLUDE THE SEALED WASTEWATER COLLECTION SYSTEM DRAWINGS, ELECTRICAL DRAWINGS, SHOP DRAWINGS, SEALED DESIGN CALCULATIONS AND OTHER RELATED DOCUMENTS IN ACCORDANCE WITH STATE AND CITY REGULATIONS, STANDARDS AND POLICIES. (REFER TO 15A NCAC 02T .0305)

**Pump Information**  
(Attach the specific pump curve or performance curve, and manufacture dimensional drawing sheets with this form.)  
\*Attach additional sheets as required.

9.)	Number of pumps	15.)	Pump Manufacturer	21.)	Pump Type
10.)	Operational point of the pump(s) (GPM)	16.)	Total Dynamic Head TDH (ft)	22.)	Pump Model
11.)	Horsepower (Hp)	17.)	Rotational speed (RPM)	23.)	Impeller size (inches)
12.)	Pump Efficiency % (at ADF)	18.)	Suction Elbow Dia. (inches)	24.)	Discharge Elbow Dia. (inches)
13.)	Manufacture's Min. Submergence (inches)	19.)	<input type="checkbox"/> Without Wet-jacket <input type="checkbox"/> With Wet-jacket	25.)	Net Weight of Pump & motor. (lbs.)
14.)	Pump Cycles per hour @ ADF	20.)	Discharge Velocity	26.)	Pump Frame model #

**Pump Station System, Wetwell, Valve Vault & Emergency Storage Information**  
(Shop drawings, material submittals and sealed calculations must be submitted with the application.)

Have the following been included in pump station design?		Indicate the sheet number where this information can be found on the design drawings:	
27.)	Telemetry with antenna pole		Drawing Sheet #
28.)	Permanent power generator		Drawing Sheet #
29.)	Auxiliary pump		Drawing Sheet #
30.)	Fuel Supply for generator		Drawing Sheet #
31.)	Hatches - (Wetwell, Emergency storage & Valve vault)		Drawing Sheet #
32.)	Wetwell vents - (Screened)		Drawing Sheet #
33.)	Alarms - (Beacon & horn)		Drawing Sheet #
34.)	Level Controls - (Transducer & high-water float)		Drawing Sheet #
35.)	Hoist & Jibs		Drawing Sheet #
36.)	Area Lighting		Drawing Sheet #
37.)	Auxiliary Power Connection		Drawing Sheet #
38.)	Restricted Access Elements (Fence, gates, wetwell locks, control panel locks)		Drawing Sheet #
39.)	Yard hydrant		Drawing Sheet #
40.)	Weatherproof signage (identification, confined space, no trespassing, City of Concord emergency contact information and electrical hazard signage: See technical specifications for details. )		Drawing Sheet #

**Wetwell**

(Include sealed buoyancy calculations, sealed pump station calculations, shop drawings, and materials submittals with application.)

41.)	Number of Wetwells		50.)	<b>Wetwell Dimension</b>			
42.)	Wetwell Depth (ft)			<b>Round</b>		<b>Rectangular</b>	
43.)	Rim Elevation, (ft)			<b>Diameter (ft)</b>		<b>Length(ft)</b>	<b>Width (ft)</b>
44.)	Floor Elevation, (ft)						
45.)	Pump-Off Elevation, (ft)						
46.)	High Water Alarm Elevation, (ft)		51.)	Pump-On Elevation, (ft)		54.)	Pump-lag Elevation, (ft)
47.)	Force Main Invert-out Elevation, (ft) (Valve-Vault)		52.)	Gravity Sewer Main Invert-In Elevation, (ft)		55.)	Active Wetwell Volume, (gal)
48.)	Force Main Invert-in Elevation, (ft) (Manhole tie-in)		53.)	Valve Vault Drain Invert-In Elevation, (ft)		56.)	Emergency Storage Invert-In Elevation, (ft)
49.)	<input type="checkbox"/> Comminutor (complete section 58-62.)			57.)	<input type="checkbox"/> Trashbasket (Complete section 63-64.)		

**Comminutor or Grinder**

(Include electrical drawings, technical specifications, shop drawings, and materials submittals with application.)

58.)	Maximum Flow Rate		59.)	Horsepower (Hp)		60.)	Rotational speed (RPM)
61.)	Net Weight of Comminutor (lbs.)		62.)	Manufacture of Comminutor			

**Trash-Basket with Lift Out Assembly**

63.)	Net Weight of Trash-basket (lbs.)		64.)	Manufacture of Trash-basket Assembly			
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**Emergency Storage Well**

(Include sealed buoyancy calculations, sealed emergency storage calculations, shop drawings, and materials submittals with application.)

	Emergency storage volume (gal)			<b>Dimension</b>			
				<b>Round</b>		<b>Rectangular</b>	
65.)				<b>Diameter (ft)</b>		<b>Length(ft)</b>	<b>Width (ft)</b>
66.)	Rim Elevation, (ft)		69.)				
67.)	Floor Elevation, (ft)		70.)	Gravity Sewer Main Invert-out Elevation (ft)			
68.)	Gravity Sewer Main Length (Lin. ft.)		71.)	Gravity Sewer Main Slope (%)			

**Valve Vault**

(Include sealed buoyancy calculation, shop drawings, and materials submittals with application.)

	Rim Elevation, (ft)			<b>Dimension</b>			
				<b>Length(ft)</b>	<b>Width (ft)</b>	<b>Depth (ft)</b>	
72.)			74.)				
73.)	Floor Elevation, (ft)		75.)	Valve Vault Drain Invert-out Elevation, (ft)		76.)	Drain Pipe length, lin. ft.

**Other Appurtenances**

Indicate the sheet number where this information can be found on the design drawings:

77.)	Swing check valve		Drawing Sheet #	
78.)	Plug valve		Drawing Sheet #	
79.)	Auxiliary Pumping Port with eccentric plug valve and blind cap		Drawing Sheet #	
80.)	Pressure gauge assembly with seals		Drawing Sheet #	
81.)	Surge relief valve & plug valve		Drawing Sheet #	

**Electrical**

(Include the electrical drawing and schematic, shop drawing, and materials with application.)

<b>Electrical Drawing and Schematic Sht. #(s):</b>				
82.)	<b>Cabinet or Building</b>		83.)	Elevation of Electrical Conduit Splicebox Floor (ft)
	<b>Dimension</b>			
	<b>Width (ft)</b>	<b>Length/Height (ft)</b>	<b>Depth (ft)</b>	
				84.)
				Electric Cabinet Floor Elevation, or Electrical Control Building Finished Floor Elevation (ft)

Other Appurtenances		Indicate the sheet number where this information can be found on the design drawings:	
85.)	Auxiliary Power Connection Port.	Drawing Sheet #	
86.)	Detection Alarms (Pumps, Level Control, Power Generator & Comminutor)	Drawing Sheet #	
87.)	Moisture and flood protection	Drawing Sheet #	

**Force Main Summary**

88.) Summary of **Sanitary Force Mains** to be constructed (Attach additional sheets if necessary.)

Diameter (inches)	Length (Linear feet)	Material	Air-relief manholes	
		(Primary material type)	Number	Diameter
		<input type="checkbox"/> PVC or <input type="checkbox"/> DI		4-ft
		Or Other		5-ft
		<input type="checkbox"/> PVC or <input type="checkbox"/> DI		4-ft
		Or Other		5-ft
		<input type="checkbox"/> PVC or <input type="checkbox"/> DI		-ft
		Or Other		-ft

**Air-relief Valve Summary**

89.) Summary of **Air-relief valves** to be constructed (Attach additional sheets if necessary.)

Station Location	Elevation	Manufacturer	Indicate the sheet number where this information can be found on the design drawings:	
			Drawing Sheet #	
			Drawing Sheet #	
			Drawing Sheet #	
			Drawing Sheet #	
			Drawing Sheet #	
			Drawing Sheet #	

**Professional Engineer's Certification:**

As a duly registered Professional Engineer in the State of North Carolina, I certify that this application has been reviewed by me and is accurate, complete and consistent with the information supplied in the engineering plans, calculations, and all other supporting documentation to the best of my knowledge. I further attest that to the best of my knowledge the proposed design and supporting documentation has been prepared in accordance with and subject to the applicable regulations; NCDEQ Gravity Sewer Minimum Design Criteria for Gravity Sewers adopted February 12, 1996; NCDEQ the Minimum Design Criteria for Fast-Track Permitting of Pump Stations and Force mains adopted June 1, 2000; the watershed classification in accordance with the Division Guidance; the Water and Sewer Authority of Cabarrus County's standard specifications and technical details; the City of Concord's ordinances, policies, details and standard specifications; and the North Carolina Administrative Code 15A NCAC 2T for wastewater collection systems. In the event of conflict between the Water and Sewer Authority of Cabarrus County's standard specifications; the City of Concord's ordinances, policies, and standard specifications, or the North Carolina Administrative Code, the more restrictive requirements shall apply. Although other professionals may have developed certain portions of this submittal package, inclusion of these materials under my signature and seal signifies that I have reviewed this material and have judged it to be consistent with the proposed design. Note: In accordance with NC General Statutes 143-215.6A and 143-215.6B, any person who knowingly makes any false statement, representation, or certification in any application shall be guilty of a Class 2 misdemeanor which may include a fine not to exceed \$10,000 as well as civil penalties up to \$25,000 per violation, and referral to the State Board of Registered Professional Engineers and Surveyors.

\_\_\_\_\_  
(North Carolina Professional Engineer's Typed Name)

\_\_\_\_\_  
(NCPE Registration Number)

\_\_\_\_\_  
(Company Name)

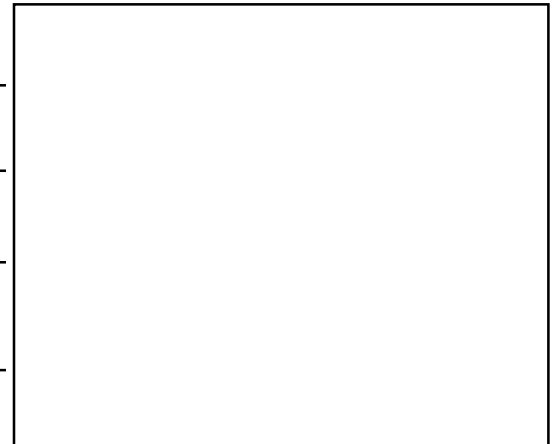
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(Facsimile Numbers)



(Engineer's seal & signature)