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# FORCE MAIN DESIGN DATA CHECKLIST

To prevent the formation of hydrogen sulfide ($H_2S$), a positive dissolved oxygen (D.O.) level must be carried through the force main. The amount of oxygen needed is determined by multiplying the longest hydraulic retention time (HRT) of the force main by a theoretical ~10 mg/L/hr oxygen uptake rate. The critical HRT is the longest period of time that wastewater is in the force main. For a continuous flow system, the critical HRT will occur during low flow conditions. For a fill/draw system, the critical HRT will occur during the longest period of time between pumping cycles. Once the critical HRT is determined and the oxygen requirement is calculated, the oxygen requirement is checked against the pressure inside the force main. For every one (1) foot of head pressure, one (1) mg/L of dissolved oxygen can be dissolved. If there is sufficient pressure in the force main to dissolve the amount of oxygen required, there is a technical fit for the $ECO_2$ system.

Anticipated Project Implementation Date: _____

Requested Response Date: _____

| REQUIRED INFORMATION | | | | | ***Example*** | ***Example*** |
|---|---|---|---|---|---|---|
| Owner Information | | | | | *Fishers WWTP* | *Fishers WWTP* |
| Name of Pumping Station | | | | | *Hague Road* | *Hague Road* |
| Diameter of Force Main (in) | | | | | *18"* | *18"* |
| Length of Force Main (ft) | | | | | *5,200 ft* | *5,200 ft* |
| Total Dynamic Head on Pumps at Full Flow (ft of head) | | | | | *85 ft* | *85 ft* |
| Static Head on Pumps (ft of head) | | | | | *25 ft* | *25 ft* |
| Force Main Pump Operation (Fill Draw / Continuous) | | | | | *Fill Draw* | *Continuous* |
| Daily Average Flow (gpm) | | | | | *1,500 gpm* | *1,500 gpm* |
| Hydraulic Retention Time (hrs) | | | | | *4* | *4* |
| Anticipated Days Use Per Year | | | | | *365* | *365* |
| Cost of Power | | | | | *$0.08 / kwhr* | *$0.08 / kwhr* |
| Number of Pumps | | ***Example*** | | | ***Example*** | ***Example*** |
| ___ @ _____ | Horsepower | *2 @ 30 HP* | Flow Rate (gpm) | _____ | *1,000 gpm* | *1,000 gpm* |
| ___ @ _____ | Horsepower | *1 @ 50 HP* | Flow Rate (gpm) | _____ | *1,000 gpm* | *1,000 gpm* |

| ADDITIONAL REQUESTED INFORMATION - if available | | ***Example*** | ***Example*** |
|---|---|---|---|
| Force Main Pump Operation | | | |
| If Fill/Draw: Longest Pump Down Time (hrs) | | *4 hrs* | |
| OR If Fill/Draw: Pump Cycle Times and Number of Cycles | | *2 hrs/11 times* | |
| If Continuous: Longest Hydraulic Retention Time (hrs) | | | *4 hrs* |
| OR If Continuous: Low Flow (gpm) and Time of Low Flow (hrs) | | | *1000 gpm/ 3 hrs* |
| Elevation Above Sea Level (ft) | | *750 ft* | *750 ft* |
| Temperature of Sewage ($^oC$) | | *27$^o$ C* | *27$^o$ C* |
| BOD (mg/L) | | *200 mg/L* | *200 mg/L* |
| Existing Sulfides | | *1 mg/L* | *1 mg/L* |
| Salinity | | *0 mg/L* | *0 mg/L* |
| Desired Residual D.O. After Force Main Discharge | | *4 mg/L* | *4 mg/L* |