Update effective January 1, 2015 - This manual may be used as a reference by a STS designer when specifying standards for construction, installation notes and certain aggregate materials for STS components. STS designers are not be required to use this manual. When used, if conflicts exist between this manual and Ohio Administrative Code 3701-29, the state code shall prevail. STS contactors shall follow the approved STS design.

24 Appendix 24.0 Forms
The following must be done BEFORE completing this work sheet.

a. All pressure pipes are properly glued, weep hole has been properly drilled, and no external water is entering the tank.
b. Supply mains and manifolds, then laterals were flushed. See Section 5.14. Observe water leaving clean-outs for:
   (i) Uniform Streams.
   (ii) Clear Flow With No Debris.

2. Make a drawing of laterals below and note the house location. Measure the full operating head of the system using clear tubes on the lateral clean outs. Measurements are taken from the top of the lateral, not the top of the clean out. Record the initial squirt heights on at least 25% (min. 2) of the laterals.

3. Set the operating head to 5ft. on each lateral using clear tubes on all of the lateral cleanouts (Check Every Lateral at the same time.) The "lowest" squirt height must be at 5ft. Record each individual lateral’s set squirt height on your drawing above.
   (a) If the squirt heights vary on different laterals, then check for blocks/breaks or other problems and make appropriate repairs. See Section 5.8.5 for allowable squirt height variation.
   (b) After repairs are made start over at step 1.

4. Perform a timed draw down test, Section 3.8.1. The volume of the tank/basin in gallons per inch will be needed. Consult the tank vendor for specific tank volumes. For best accuracy, draw down tests should be performed by running the pump for 2 – 4 minutes.

Dosing Tank Dimensions________________ Manufacturer___________________________________ Size_____________

(End measurement_____ - Start measurement______) x Volume of tank______ gal/inch + Run Time______min. = [Qset] gal/min

5. Divide Qset by Qdesign (Qdesign is 25.95 gal/min.)
   \[
   \frac{Q_{set}}{Q_{design}} = __________________________\]
   (a) If \(\frac{Q_{set}}{Q_{design}}\) is .85 or greater, but less than 1.15; then it is OK to proceed.
   (b) If \(\frac{Q_{set}}{Q_{design}}\) is less that .85 or greater than 1.15; then repairs must be made. Return to step 1.

6. Calculate any drain back volume in the piping network. (Includes discharge assemblies, force mains, and manifolds)
   
   Feet of 1" PVC Drain back x .045 gal/ft = ________ gallons.
   Feet of 1¼" PVC Drain back x .078 gal/ft = ________ gallons.
   Feet of 1½" PVC Drain back x .106 gal/ft = ________ gallons.
   Feet of 2" PVC Drain back x .174 gal/ft = ________ gallons.

   \[V_{Total\ Drain\ back} = \text{gallons}.\]

   \[17\text{gal/dose} + V_{Total\ Drain\ back}\text{ gal/dose} = [V_{Total\ Dose}] \text{gal/dose}\]

7. Calculate the timer settings required for the design
   On Setting = V_{Total\ Dose} \left(\begin{array}{c}
   \text{gal/dose} \\
   \text{On Setting}
   \end{array}\right) + Q_{set} \left(\begin{array}{c}
   \text{gal/ \text{min}} \\
   \text{On Setting}
   \end{array}\right) => \frac{\text{gal/dose} + Q_{set} \text{gal/ \text{min}}}{\text{On Setting min/dose}} = \text{On Setting min/dose}

   \text{On Setting} = \frac{\text{On Setting min}}{60} \text{ sec}

   \text{Override On Setting is the same as the On Setting} \\
   \text{Off Setting 2.84 hours/dose or Off Setting = 2 hrs 51 min per dose.}  \\
   \text{Override Off Setting 1.7 hours/dose or Override Off Setting = 1 hr 42 min per dose.
Flow Rate Calculations/Drainback/Timer Settings Worksheet For 10' x 30' ISF Using A Poly or Fiberglass Septic Tank

Address:________________________________________ Permit Number:__________________

1. The following must be done BEFORE completing this work sheet.
   a. All pressure pipes are properly glued, weep hole has been properly drilled, and no external water is entering the tank.
   b. Supply mains and manifolds, then laterals were flushed. See Section 5.14. Observe water leaving clean-outs for:
      (i) Uniform Streams.
      (ii) Clear Flow With No Debris.

2. Make a drawing of laterals below and note the house location. Measure the full operating head of the system using clear tubes on the lateral clean outs. Measurements are taken from the top of the lateral, not the top of the clean out. Record the initial squirt heights on at least 25% (min. 2) of the laterals.

3. Set the operating head to 5ft. on each lateral using clear tubes on all of the lateral cleanouts (Check Every Lateral at the same time.) The "lowest" squirt height must be at 5ft. Record each individual lateral's set squirt height on your drawing above.
   (a) If the squirt heights vary on different laterals, then check for blocks/breaks or other problems and make appropriate repairs. See Section 5.8.5 for allowable squirt height variation.
   (b) After repairs are made start over at step 1.

4. Perform a timed draw down test, Section 3.8.1. The septic tank volume chart will be needed. To properly perform a draw down test, a measurement must be made to determine the water level location within the tank in relation to the tank top. The tank volume chart must then be consulted after the draw down has been completed to determine specific volumes. For best accuracy, draw down tests should be performed by running the pump for 2-4 minutes. Start by measuring from a fixed point to the inside top of the tank. Record this distance in the space provided. Next measure from the fixed point to the surface of the water level. Record this distance in the space provided. Finally run the pump for an exact length of time and immediately measure from the fixed point to the "stop" liquid level. Record this measurement in the space provided. Note: The stop measurement should not include piping drainback. All Measurements must be to the nearest 1/8 inch.

   a. All pressure pipes are properly glued, weep hole has been properly drilled, and no external water is entering the tank.
   b. Supply mains and manifolds, then laterals were flushed. See Section 5.14. Observe water leaving clean-outs for:
      (i) Uniform Streams.
      (ii) Clear Flow With No Debris.

5. Divide Q_set by Q_design (Q_design is 25.95 gal/min)

   Q_set/Q_design = _________
   (a) If Q_set/Q_design is .85 or greater, but less than 1.15; then it is OK to proceed.
   (b) If Q_set/Q_design is less that .85 or greater than 1.15; then repairs must be made. Return to step 1.

6. Calculate any drain back volume in the piping network. (Includes discharge assemblies, force mains, and manifolds)
   Feet of 1" PVC Drain back x .045 gal/hr = _______ gallons.
   Feet of 1½" PVC Drain back x .078 gal/hr = _______ gallons.
   Feet of 1½" PVC Drain back x .106 gal/hr = _______ gallons.
   Feet of 2" PVC Drain back x .174 gal/hr = _______ gallons

   Total Drain back = _______ gallons.

7. Calculate the timer settings required for the design

   On Setting = V_Total Dose (gal/dose) + Q_set (gal/min) =>
   On Setting (min) = _______ minutes run = [V_{Total Dose} + Q_{set} / Q_{design}]gal/dose

   Convert any fractional minutes to seconds. (1/10 minute = 6 seconds Ex. .67min x 60sec/min = 40 sec)

   On Setting = _______ seconds

   Override On Setting is the same as the On Setting

   Off Setting 2.84 hours/dose or
   Override Off Setting 1.7 hours/dose or

   Override Off Setting = 1 hr 42 min per dose.
The following must be done BEFORE completing this work sheet.

a. All pressure pipes are properly glued, weep hole has been properly drilled, and no external water is entering the tank.
b. Supply mains and manifolds, then laterals were flushed. See Section 5.14. Observe water leaving clean-outs for:
   (i) Uniform Streams.
   (ii) Clear Flow With No Debris.

2. Make a drawing of laterals below and note the house location. Measure the full operating head of the system using clear tubes on the lateral clean outs. Measurements are taken from the top of the lateral, not the top of the clean out. Record the initial squirt heights on at least 25% (min. 2) of the laterals.

3. Set the operating head to 5ft. on each lateral using clear tubes on all of the lateral cleanouts (Check Every Lateral at the same time.) The "lowest" squirt height must be at 5ft. Record each individual lateral's set squirt height on your drawing above.
   (a) If the squirt heights vary on different laterals, then check for blocks/breaks or other problems and make appropriate repairs. See Section 5.8.5 for allowable squirt height variation.
   (b) After repairs are made start over at step 1.

4. Perform a timed draw down test, Section 3.8.1. The volume of the tank/basin in gallons per inch will be needed. Consult the tank vendor for specific tank volumes. For best accuracy, draw down tests should be performed by running the pump for 2 - 4 minutes.

   Dosing Tank Dimensions________________ Manufacturer___________________________________ Size_____________
   (End measurement______ - Start measurement______) x Volume of tank______ gal/inch + Run Time______min. = [Qset] gal/min

5. Divide Qset by Qdesign (Qdesign is 31.14 gal/min)

   (a) If Qset/Qdesign is .85 or greater, but less than 1.15; then it is OK to proceed.
   (b) If Qset/Qdesign is less than .85 or greater than 1.15; then repairs must be made. Return to step 1.

6. Calculate any drain back volume in the piping network. (Includes discharge assemblies, force mains, and manifolds)

   Feet of 1" PVC Drain back x .045 gal/ft. = _______ gallons.
   Feet of 1¼" PVC Drain back x .078 gal/ft. = _______ gallons.
   Feet of 1½" PVC Drain back x .106 gal/ft. = _______ gallons.
   Feet of 2" PVC Drain back x .174 gal/ft. = _______ gallons

   + ____________________________

   [V Total Drain back] = _______ gallons.

   20 gal/dose + [V Total Drain back gal/dose = [V Total Dose] gal/dose

7. Calculate the timer settings required for the design

   On Setting = V Total Dose (gal/dose) + Qset (gal/min) >> ____________________________ gal/dose + _______ gal/min = On Setting _______ min/dose
   Convert any fractional minutes to seconds. (1/10 minute = 6 seconds Ex. .67min x 60sec/min = 40 sec)

   On Setting = _______ min _______ sec

   Override On Setting is the same as the On Setting

   Off Setting 2.23 hours/dose or
   Override Off Setting 1.34 hours/dose or

   Or Off Setting = 2 hrs 14 min per dose.

   Override Off Setting = 1 hr 21 min per dose.
Flow Rate Calculations/Drainback/Timer Settings Worksheet For 10’ x 36’ ISF Using A Poly or Fiberglass Septic Tank

Address: ________________________________  Permit Number: ________________

1. The following must be done BEFORE completing this work sheet.
   a. All pressure pipes are properly glued, weep hole has been properly drilled, and no external water is entering the tank.
   b. Supply mains and manifolds, then laterals were flushed. See Section 5.14. Observe water leaving clean-outs for:
      (i) Uniform Streams.
      (ii) Clear Flow With No Debris.

2. Make a drawing of laterals below and note the house location. Measure the full operating head of the system using clear tubes on the lateral clean outs. Measurements are taken from the top of the lateral, not the top of the clean out. Record the initial squirt heights on at least 25% (min. 2) of the laterals.

3. Set the operating head to 5ft. on each lateral using clear tubes on all of the lateral cleanouts (Check Every Lateral at the same time.) The “lowest” squirt height must be at 5ft. Record each individual lateral’s set squirt height on your drawing above.
   (a) If the squirt heights vary on different laterals, then check for blocks/breaks or other problems and make appropriate repairs. See Section 5.8.5 for allowable squirt height variation.
   (b) After repairs are made start over at step 1.

4. Perform a timed draw down test, Section 3.8.1. The septic tank volume chart will be needed. To properly perform a draw down test, a measurement must be made to determine the water level location within the tank in relation to the tank top. The tank volume chart must then be consulted after the draw down has been completed to determine specific volumes. For best accuracy, draw down tests should be performed by running the pump for 2-4 minutes. Start by measuring from a fixed point to the inside top of the tank. Record this distance in the space provided. Next measure from the fixed point to the surface of the water level. Record this distance in the space provided. Finally run the pump for an exact length of time and immediately measure from the fixed point to the “stop” liquid level. Record this measurement in the space provided. **Note:** The stop measurement should not include piping drainback. All Measurements must be to the nearest 1/8 inch.

   Dosing Tank Dimensions ______________________ Manufacturer ______________________ Size _______________

   Fixed Point to Inside Top of Tank ____________
   Fixed Point to Start Liquid Level ____________ - Fixed Point to Inside Top of Tank ____________ = ____________ Start Measurement
   Fixed Point to Stop Liquid Level ____________ - Fixed Point to Inside Top of Tank ____________ = ____________ Stop Measurement
   Volume In Tank at the Start Measurement __________ gallons
   Volume In Tank at the Stop Measurement __________ gallons
   = __________ gallons + __________ minutes run

5. Divide $Q_{set}$ by $Q_{design}$ ($Q_{design}$ is 31.14 gal/min)

   \[
   Q_{set} / Q_{design} = \frac{\text{Fixed Point to Inside Top of Tank}}{\text{Volume In Tank at the Start Measurement}}
   \]
   \[
   \frac{Q_{set}}{Q_{design}} = \frac{\text{Fixed Point to Stop Liquid Level}}{\text{Volume In Tank at the Stop Measurement}}
   \]

   (a) If $Q_{set}/Q_{design}$ is .85 or greater, but less than 1.15; then it is OK to proceed.
   (b) If $Q_{set}/Q_{design}$ is less that .85 or greater than 1.15; then repairs must be made. Return to step 1.

6. Calculate any drain back volume in the piping network. (Includes discharge assemblies, force mains, and manifolds)

   \[
   \text{Feet of } 1'' \text{ PVC Drain back} \times 0.45 \frac{\text{gal}}{\text{ft} \cdot \text{hr}} = \text{gallons.}
   \]
   \[
   \text{Feet of } 1\frac{1}{4''' \text{ PVC Drain back} \times 0.78 \frac{\text{gal}}{\text{ft} \cdot \text{hr}} = \text{gallons.}
   \]
   \[
   \text{Feet of } 1\frac{1}{2''' \text{ PVC Drain back} \times 1.06 \frac{\text{gal}}{\text{ft} \cdot \text{hr}} = \text{gallons.}
   \]
   \[
   \text{Feet of } 2''' \text{ PVC Drain back} \times 1.74 \frac{\text{gal}}{\text{ft} \cdot \text{hr}} = \text{gallons.}
   \]
   \[
   \text{Total Drain back} = \frac{V_{\text{Total Drain back}} = \text{gallons.}}{20 \frac{\text{gal}}{\text{dose}} + V_{\text{Total Drain back}} \text{ gal}} \frac{\text{gal}}{\text{dose}} = \frac{\text{gallons}}{\text{dose}}
   \]

7. Calculate the timer settings required for the design

   \[
   \text{On Setting} = \frac{V_{\text{Total Dose}} (\text{gal/dose}) + Q_{set} (\text{gal/min})}{Q_{design} (\text{gal/min})} = \frac{\text{gallons}}{\text{dose}} + \frac{\text{gallons}}{\text{min}}
   \]

   Convert any fractional minutes to seconds. \(1 \text{ minute} = 6 \text{ seconds} \) Ex. .67min x 60 = 40 sec

   \[
   \text{On Setting} = \frac{\text{dose}}{\text{min}} \times 60 \text{ seconds / min} = 40 \text{ seconds}
   \]

   \[
   \text{On Setting} = \frac{\text{dose}}{\text{min}} \times 60 \text{ seconds / min} = 40 \text{ seconds}
   \]

   \[
   \text{Override On Setting is the same as the On Setting}
   \]

   \[
   \text{Off Setting} = 2 \text{ hrs} 14 \text{ min per dose.}
   \]

   \[
   \text{Override Off Setting} = 1 \text{ hr} 21 \text{ min per dose.}
   \]
1. The following must be done BEFORE completing this work sheet.
   a. All pressure pipes are properly glued, weep hole has been properly drilled, and no external water is entering the tank.
   b. Supply mains and manifolds, then laterals were flushed. See Section 5.14. Observe water leaving clean-outs for:
      (i) Uniform Streams.
      (ii) Clear Flow With No Debris.

2. Make a drawing of laterals below and note the house location. Measure the full operating head of the system using clear tubes on the lateral clean outs. Measurements are taken from the top of the lateral, not the top of the clean out. Record the initial squirt heights on at least 25% (min. 2) of the laterals.

3. Set the operating head to 5ft. on each lateral using clear tubes on all of the lateral cleanouts (Check Every Lateral at the same time.) The “lowest” squirt height must be at 5ft. Record each individual lateral’s set squirt height on your drawing above.
   (a) If the squirt heights vary on different laterals, then check for blocks/breaks or other problems and make appropriate repairs. See Section 5.8.5 for allowable squirt height variation.
   (b) After repairs are made start over at step 1.

4. Perform a timed draw down test, Section 3.8.1. The volume of the tank/basin in gallons per inch will be needed. Consult the tank vendor for specific tank volumes. For best accuracy, draw down tests should be performed by running the pump for 2 - 4 minutes.

Dosing Tank Dimensions________________ Manufacturer________________________ Size_____________
(End measurement_____ - Start measurement_____ x Volume of tank____ ga/ft + Run Time____ min. = __________ ga/min)

5. Divide $Q_{set}$ by $Q_{design}$ ($Q_{design}$ is 41.52 ga/min.)

$Q_{set}/Q_{design} = 
   (a) If $Q_{set}/Q_{design}$ is .85 or greater, but less than 1.15; then it is OK to proceed.
   (b) If $Q_{set}/Q_{design}$ is less that .85 or greater than 1.15; then repairs must be made. Return to step 1.

6. Calculate any drain back volume in the piping network. (Includes discharge assemblies, force mains, and manifolds)

   Feet of 1" PVC Drain back x .045 ga/ft = __________ gallons.
   Feet of 1½" PVC Drain back x .078 ga/ft = __________ gallons.
   Feet of 1½" PVC Drain back x .106 ga/ft = __________ gallons.
   Feet of 2" PVC Drain back x .174 ga/ft = __________ gallons

   + __________________________

   $V_{Total Drain back} = __________ gallons.

   $27^{ga/dose} + V_{Total Drain back}^{ga/dose} = V_{Total Dose}^{ga/dose}$

7. Calculate the timer settings required for the design

   $On\ Setting = V_{Total Dose}^{(ga/dose)} + Q_{set}^{(ga/min)} =$
   $On\ Setting = \min^{(min/dose)}$
   $On\ Setting = \sec^{(sec/dose)}$

   Override On Setting is the same as the On Setting

   $Off\ Setting = 2.25^{hours/dose}$ or $Off\ Setting = 2\ hrs\ 15\ min\ per\ dose.$
   $Override\ Off\ Setting = 1.35^{hours/dose}$ or $Override\ Off\ Setting = 1\ hr\ 21\ min\ per\ dose.$
Flow Rate Calculations/Drainback/Timer Settings Worksheet For 10' x 48' ISF Using A Poly or Fiberglass Septic Tank

Address:________________________________________ Permit Number:__________________

1. The following must be done BEFORE completing this work sheet.
   a. All pressure pipes are properly glued, weep hole has been properly drilled, and no external water is entering the tank.
   b. Supply mains and manifolds, then laterals were flushed. See Section 5.14. Observe water leaving clean-outs for:
      (i) Uniform Streams.
      (ii) Clear Flow With No Debris.

2. Make a drawing of laterals below and note the house location. Measure the full operating head of the system using clear tubes on the lateral clean outs. Measurements are taken from the top of the lateral, not the top of the clean out. Record the initial squirt heights on at least 25% (min. 2) of the laterals.

3. Set the operating head to 5ft. on each lateral using clear tubes on all of the lateral cleanouts (Check Every Lateral at the same time.) The “lowest” squirt height must be at 5ft. Record each individual lateral’s set squirt height on your drawing above.
   (a) If the squirt heights vary on different laterals, then check for blocks/breaks or other problems and make appropriate repairs. See Section 5.8.5 for allowable squirt height variation.
   (b) After repairs are made start over at step 1.

4. Perform a timed draw down test, Section 3.8.1. The septic tank volume chart will be needed. To properly perform a draw down test, a measurement must be made to determine the water level location within the tank in relation to the tank top. The tank volume chart must then be consulted after the draw down has been completed to determine specific volumes. For best accuracy, draw down tests should be performed by running the pump for 2-4 minutes. Start by measuring from a fixed point to the inside top of the tank. Record this distance in the space provided. Measure from the fixed point to the surface of the water level. Record this distance in the space provided. Finally run the pump for an exact length of time and immediately measure from the fixed point to the “stop” liquid level. Record this measurement in the space provided. **Note:** The stop measurement should not include piping drainback. All Measurements must be to the nearest 1/8 inch.
   
   Dosing Tank Dimensions
   Manufacturer
   Size
   
   Fixed Point to Inside Top of Tank
   Fixed Point to Start Liquid Level
   - Fixed Point to Inside Top of Tank
   Fixed Point to Stop Liquid Level
   - Fixed Point to Inside Top of Tank
   
   Volume In Tank at the Start Measurement
   Volume In Tank at the Stop Measurement
   
   = 
   
   gallons + 
   minutes run = 

5. Divide \( Q_{sett} \) by \( Q_{design} \). (\( Q_{design} \) is 41.52 \( \frac{gal}{min} \))

   \[ \frac{Q_{sett}}{Q_{design}} = \]

   (a) If \( \frac{Q_{sett}}{Q_{design}} \) is .85 or greater, but less than 1.15; then it is OK to proceed.
   (b) If \( \frac{Q_{sett}}{Q_{design}} \) is less that .85 or greater than 1.15; then repairs must be made. Return to step 1.

6. Calculate any drain back volume in the piping network. (Includes discharge assemblies, force mains, and manifolds)
   - Feet of 1" PVC Drain back
   - Feet of 1½" PVC Drain back
   - Feet of 1¾" PVC Drain back
   - Feet of 2" PVC Drain back
   
   \[ + \frac{27^{gal}}{dose} + \frac{V_{Total Drain back}^{gal}}{dose} = \frac{[V_{Total Dose}^{gal}]}{dose} \]

7. Calculate the timer settings required for the design

   \[ \frac{On Setting}{\frac{V_{Total Dose}^{gal}}{dose} + \frac{Q_{sett}^{gal}}{min}} \]

   Convert any fractional minutes to seconds. (1/10 minute = 6 seconds Ex .67 min \( \times 60^{min}/\text{min} = 40 \text{ sec} \))

   **Off Setting** = 2 hrs 15 min per dose.
   **Override Off Setting** = 1 hr 21 min per dose.
Flow Rate Calculations/Drainback/Timer Settings Worksheet For Intermittent Sand Filters and Mounds (Concrete Tank)

1. Number of bedrooms ________ x 120gal/day = [Q_peak] ________ gal/day x .60 = [Q_average] ________ gal/day

2. The following must be done BEFORE completing this work sheet.
   a. All pressure pipes are properly glued, weep hole has been properly drilled, and no external water is entering the tank.
   b. Supply mains and manifolds, then laterals were flushed. See Section 5.14. Observe water leaving clean-outs for:
      (i) Uniform Streams.
      (ii) Clear Flow With No Debris.
   c. A drawing of laterals below and note the house location. Measure the full operating head of the system using clear tubes on the lateral clean outs. Measurements are taken from the top of the lateral, not the top of the clean out. Record the initial squirt heights on at least 25% (min. 2) of the laterals.
   d. Supply mains and manifolds, then laterals were flushed. See Section 5.14. Observe water leaving clean-outs for:
      (i) Uniform Streams.
      (ii) Clear Flow With No Debris.

3. Calculate the timer settings required for the design. (Note: Laterals would only be calculated if orifices are in the up position)
   a. If the squirt heights vary on different laterals, then check for block/breaks or other problems and make appropriate repairs. See Section 5.8.5 for allowable squirt height variation.
   b. After repairs are made start over at step 2.

4. Set the operating head to 5ft. on each lateral using clear tubes on all of the lateral cleanouts (Check Every Lateral at the same time.) The "lowest" squirt height must be at 5ft. Record each individual lateral's set squirt height on your drawing above.

5. Perform a timed draw down test, Section 3.8.1. The volume of the tank/basin in gallons per inch will be needed. Consult the tank vendor for specific tank volumes. For best accuracy, draw down tests should be performed by running the pump for 2 - 4 minutes.

6. Divide Qset by Q_design (Q_design is given in the design or is calculated by the # of orifices in each zone multiplied by .4325)

    a. If Q_set/Q_design is .85 or greater, but less than 1.15; then it is OK to proceed.
    b. If Q_set/Q_design is less than .85 or greater than 1.15; then repairs must be made. Return to step 2.

7. Calculate any drain back volume in the piping network. (Includes discharge assemblies, force mains, sub mains, and manifolds)

8. Calculate the total dose volume required for the design.

9. Calculate the timer settings required for the design.

On Setting = \[D_{peak}\] ________ doses/day + \[D_{average}\] ________ doses/day = \[D_{set}\] ________ doses/day

Off Setting = \[D_{peak}\] ________ doses/day + \[D_{average}\] ________ doses/day = \[D_{set}\] ________ doses/day

Override Off Setting = \[D_{peak}\] ________ doses/day + \[D_{average}\] ________ doses/day = \[D_{set}\] ________ doses/day

On Setting = hours ________ per dose.

Off Setting = hours ________ per dose.

Override Off Setting = hours ________ per dose.
Flow Rate Calculations/Drainback/Timer Settings Worksheet For Intermittent Sand Filters and Mounds (Fiber or Poly Tank)

Address: ____________________________________________ Permit Number: ____________________

1. Number of bedrooms ________ x 120$^{\text{gals}/\text{day}}$ = $Q_{\text{peak}}$ $^{\text{gals}/\text{day}}$ x .60 = $Q_{\text{average}}$ $^{\text{gals}/\text{day}}$

2. The following must be DONE BEFORE completing this work sheet.
   a. All pressure pipes are properly glued, weep hole has been properly drilled, and no external water is entering the tank.
   b. Supply mains and manifolds, then laterals were flushed. See Section 5.14. Observe water leaving clean-outs for:
      (i) Uniform Streams.
      (ii) Clear Flow With No Debris.

3. Make a drawing of laterals below and note the house location. Measure the full operating head of the system using clear tubes on the lateral clean outs. Measurements are taken from the top of the lateral, not the top of the clean out. Record the initial squirt heights on at least 25% (min. 2) of the laterals.

4. Set the operating head to 5 ft. on each lateral using clear tubes on all of the lateral cleanouts (Check Every Lateral at the same time.) The "lowest" squirt height must be at 5 ft. Record each individual lateral's set squirt height on your drawing above.
   (a) If the squirt heights vary on different laterals, then check for blocks/breaks or other problems and make appropriate repairs. See Section 5.8.5 for allowable squirt height variation.
   (b) After repairs are made start over at step 2.

5. Perform a timed draw down test, Section 3.8.1. The septic tank volume chart will be needed. To properly perform a draw down test, a measurement must be made to determine the water level location within the tank in relation to the tank top. The tank volume chart must then be consulted after the draw down has been completed to determine specific volumes. For best accuracy, draw down tests should be performed by running the pump for 2-4 minutes. Start by measuring from a fixed point to the inside top of the tank. Record this distance in the space provided. Next measure from the fixed point to the surface of the water level. Record this distance in the space provided. Finally run the pump for an exact length of time and immediately measure from the fixed point to the "stop" liquid level. Record this measurement in the space provided. Note: The stop measurement should not include piping drainback. All Measurements must be to the nearest 1/8 inch.

6. Divide $Q_{\text{set}}$ by $Q_{\text{design}}$ ($Q_{\text{design}}$ is given in the design or is calculated by the # of orifices in each zone multiplied by .4325)

   a. $Q_{\text{design}}$ = $Q_{\text{set}}$ $^{\text{gals}/\text{min}}$
   b. If $Q_{\text{design}}$ is .85 or greater, but less than 1.15; then it is OK to proceed.
   c. If $Q_{\text{design}}$ is less that .85 or greater than 1.15; then repairs must be made. Return to step 2.

7. Calculate any drain back volume in the piping network. (Includes discharge assemblies, force mains, sub mains, and manifolds)
   
   Note: Laterals would only be calculated if orifices are in the up position
   
   Feet of ¾" PVC Drain back x 0.028 $^{\text{gals}/\text{ft}}$ = $^{\text{gallons}}$.
   
   Feet of 1" PVC Drain back x 0.045 $^{\text{gals}/\text{ft}}$ = $^{\text{gallons}}$.
   
   Feet of 1½" PVC Drain back x 0.078 $^{\text{gals}/\text{ft}}$ = $^{\text{gallons}}$.
   
   Feet of 1½"  PVC Drain back x 0.106 $^{\text{gals}/\text{ft}}$ = $^{\text{gallons}}$.
   
   Feet of 2" PVC Drain back x 0.174 $^{\text{gals}/\text{ft}}$ = $^{\text{gallons}}$

   \[ V_{\text{Total Drain back}} = \] $^{\text{gallons}}$

8. Calculate the total dose volume required for the design.

   \[ .028 \text{ gals/ft} \times \text{feet of lateral per zone} \times 5 = V_{\text{Net Dose}} \text{ gals/dose} + V_{\text{Total Drain back}} \text{ gals/dose} = \] $^{\text{gallons}}$

9. Calculate the timer settings required for the design

   On Setting = $V_{\text{Net Dose}}$ (gals/dose) + $Q_{\text{set}}$ (gals/min) >> gals/dose + gals/min = On Setting (gals/min)

   Convert any fractional minutes to seconds. (1/10 minute = 6 seconds Ex. .67 min x 60 $^{\text{sec}}$ = 40 sec)

   On Setting = $\frac{\text{min}}{\text{sec}}$

   Off Setting = $Q_{\text{average}}$ (gals/day) + $V_{\text{Net Dose}}$ (gals/day) >> gals/day + gals/day = $D_{\text{average}}$ (gals/day)

   Convert any fractional hours to minutes. (.10 hour = 6 minutes Ex. .20 hours x 60 $^{\text{min}}$ = 12 minutes.)

   Off Setting = $\frac{\text{hrs}}{\text{min}}$

   Override Off Setting = $Q_{\text{peak}}$ (gals/day) + $V_{\text{Net Dose}}$ (gals/day) >> gals/day + gals/day = $D_{\text{peak}}$ (gals/day)

   Convert any fractional hours to minutes. (.10 hour = 6 minutes Ex. .45 hours x 60 $^{\text{min}}$ = 27 minutes.)

   Override Off Setting = $\frac{\text{hrs}}{\text{min}}$
## Flow Rate Calculations/Drainback/Float Settings Worksheet For Pumped Secondary Systems (ex. Modified At-grades)

### Using A Dosing Basin/Tank With A Uniform Volume Throughout The Tank’s Depth

**Address:** __________________________ **Permit Number:** ________________________

1. The following must be done BEFORE completing this work sheet.
   a. All pressure pipes are properly glued, weep hole has been properly drilled, and no external water is entering the tank.
   b. Supply mains and manifolds, then laterals were flushed. See Section 5.14. Observe water leaving clean-outs for:
      (i) Uniform Streams.
      (ii) Clear Flow With No Debris.

2. Make a drawing of laterals below and note the house location. Measure the full operating head of the system using clear tubes on the lateral clean outs. Measurements are taken from the top of the lateral, not the top of the clean out. Record the initial squirt heights on at least 25% (min. 2) of the laterals.

3. Set the operating head to 5ft. on each lateral using clear tubes on all of the lateral cleanouts (Check Every Lateral at the same time.) The “lowest” squirt height must be at 5ft. Record each individual lateral’s set squirt height on your drawing above.
   a. If the squirt heights vary on different laterals, then check for blocks/breaks or other problems and make appropriate repairs. See Section 5.8.5 for allowable squirt height variation.
   b. After repairs are made start over at step 1.

4. Perform a timed draw down test, Section 3.8.1. The volume of the tank/basin in gallons per inch will be needed. Consult the tank vendor for specific tank volumes. For best accuracy, draw down tests should be performed by running the pump for 2 - 4 minutes.

   - **Dosing Tank Dimensions:** ______________________  **Manufacturer:** ______________________  **Size:** ______________
     - (End measurement _______ - Start measurement _______) x Volume of tank ______ gal/inch + Run Time ______ min. = ______ gal/min

5. Divided Qset by Qdesign (Qdesign is given in the design or is calculated by the # of orifices in each zone multiplied by .4325)
   - Number of orifices per zone in the system _______ x .4325 = [Qdesign] gal/min
   - Qset/Qdesign = _______
       (a) If Qset/Qdesign is .85 or greater, but less than 1.15; then it is OK to proceed.
       (b) If Qset/Qdesign is less that .85 or greater than 1.15; then repairs must be made. Return to step 2.

6. Calculate any drain back volume in the piping network. (Includes discharge assemblies, force mains, sub mains, and manifolds)
   - **Note:** Laterals would only be calculated if orifices are in the up position
   - Feet of ¾” PVC Drain back x .028 gal/ft = ______ gallons.
   - Feet of 1” PVC Drain back x .045 gal/ft = ______ gallons.
   - Feet of 1½” PVC Drain back x .078 gal/ft = ______ gallons.
   - Feet of 1¼” PVC Drain back x .106 gal/ft = ______ gallons.
   - Feet of 2” PVC Drain back x .174 gal/ft = ______ gallons

   Verify this calculated estimate by measuring the liquid levels directly in dosing tank after the pump turns off following a full dosing event and after drain back ceases. This will yield the drain back volume. The volume of the dose tank in gallons per inch will be needed to calculate using this method. Consult the tank vendor for specific tank volumes.
   - (Start measurement _______ - End measurement _______) x Volume of tank ______ gal/inch = [V Total Drain back] ______ gal

7. Calculate the total dose volume required for the design.
   - .028 gal/ft x ______ feet of lateral per zone x 5 = [V Net Dose] gal/dose
   - [V Net Dose] gal/dose + [V Total Drain back] ______ gal/dose = [V Total Dose] ______ gal/dose

   **Note:** The greater of these two volumes will be used for future calculations.

8. Use the space below to calculate the float settings required for the design. These float settings must take into account any delay which the control panel may have after the “OFF” float drops. In these situations the installer will have to adjust the float settings accordingly.

Using A Dosing Basin/Tank With A Variable Volume Throughout The Tank’s Depth

Address: __________________________  Permit Number: ________________

1. The following must be done BEFORE completing this work sheet.
   a. All pressure pipes are properly glued, weep hole has been properly drilled, and no external water is entering the tank.
   b. Supply mains and manifolds, then laterals were flushed. See Section 5.14. Observe water leaving clean-outs for:
      (i) Uniform Streams.
      (ii) Clear Flow With No Debris.

2. Make a drawing of laterals below and note the house location. Measure the full operating head of the system using clear tubes on the lateral clean outs. Measurements are taken from the top of the lateral, not the top of the clean out. Record the initial squirt heights on at least 25% (min. 2) of the laterals.

3. Set the operating head to 5ft. on each lateral using clear tubes on all of the lateral cleanouts (Check Every Lateral at the same time.) The "lowest" squirt height must be at 5ft. Record each individual lateral’s set squirt height on your drawing above.
   (a) If the squirt heights vary on different laterals, then check for blocks/breaks or other problems and make appropriate repairs. See Section 5.8.5 for allowable squirt height variation.
   (b) After repairs are made start over at step 1.

4. Perform a timed draw down test, Section 3.8.1. The dosing tank volume chart will be needed. To properly perform a draw down test, a measurement must be made to determine the water level location within the tank in relation to the tank top. The tank volume chart must then be consulted after the draw down has been completed to determine specific volumes. For best accuracy, draw down tests should be performed by running the pump for 2-4 minutes. Start by measuring from a fixed point to the inside top of the tank. Record this distance in the space provided. Next measure from the same fixed point to the surface of the water level. Record this distance in the space provided. Finally run the pump for an exact length of time and immediately measure from the fixed point to the "stop" liquid level. Record this measurement in the space provided. Note: The stop measurement should not include piping drainback. All Measurements must be to the nearest 1/8 inch.

   Dosing Tank Dimensions __________________________ Manufacturer __________________________ Size __________________________
   Fixed Point to Inside Top of Tank
   Fixed Point to Start Liquid Level ________ - Fixed Point to Inside Top of Tank ________ = Start Measurement
   Fixed Point to Stop Liquid Level ________ - Fixed Point to Stop Liquid Level ________ = Stop Measurement
   Volume In Tank at the Start Measurement ________gallons
   Volume In Tank at the Stop Measurement ________gallons
   = ________gallons + ________ minutes run = \( \frac{Q_{\text{set}}}{min} \) 

5. Divided \( Q_{\text{set}} \) by \( Q_{\text{design}} \) (\( Q_{\text{design}} \) is given in the design or is calculated by the # of orifices in each zone multiplied by .4325)
   Number of orifices per zone in the system ________ x .4325 = \( Q_{\text{design}} \) /min
   \( \frac{Q_{\text{set}}}{Q_{\text{design}}} \) = ________
   (a) If \( Q_{\text{set}}/Q_{\text{design}} \) is .85 or greater, but less than 1.15; then it is OK to proceed.
   (b) If \( Q_{\text{set}}/Q_{\text{design}} \) is less that .85 or greater than 1.15; then repairs must be made. Return to step 2.

6. Calculate any drain back volume in the piping network. (Includes discharge assemblies, force mains, sub mains, and manifolds) 
   Note: Laterals would only be calculated if orifices are in the up position
   ___________ Feet of ¾” PVC Drain back x .028 gal/ft = ________ gallons.
   ___________ Feet of 1” PVC Drain back x .045 gal/ft = ________ gallons.
   ___________ Feet of 1¼” PVC Drain back x .078 gal/ft = ________ gallons.
   ___________ Feet of 1½” PVC Drain back x .106 gal/ft = ________ gallons.
   ___________ Feet of 2” PVC Drain back x .174 gal/ft = ________ gallons.
   ___________ Feet of 1½” PVC Drain back x .106 gal/ft = ________ gallons.
   ___________ Feet of 2” PVC Drain back x .174 gal/ft = ________ gallons.
   Note: The greater of these two volumes will be used for future calculations.

   \[ V_{\text{Total Drain back}} = \text{gallons} \]

   Verify this calculated estimate by measuring the liquid levels directly in dosing tank after the pump turns off following a full dosing event and after drainback ceases. This will yield the drainback volume. The tank volume chart must be consulted to determine specific volumes. Use a method similar to Step 4 to derive volumes at specific tank depths.

   (Vol. In Tank at the Stop Measurement ________ - Vol. In Tank After Drainback Measurement ________) = \[ V_{\text{Total Drain back}} \] gal

7. Calculate the total dose volume required for the design.
   \[ 0.028 \text{ gal/ft} \times \text{feet of lateral per zone} \times 5 = \frac{V_{\text{Net Dose}}}{\text{gal/dose}} \]
   \[ V_{\text{Net Dose}} \text{ gal/dose} + V_{\text{Total Drain back}} \text{ gal} = \frac{V_{\text{Total Dose}}}{\text{gal/dose}} \]

8. Use the space below to calculate the float settings required for the design. These float settings must take into account any delay which the control panel may have after the "OFF" float drops. In these situations the installer will have to adjust the float settings accordingly.
**Pump#1 (First Pump in Treatment Train)**

<table>
<thead>
<tr>
<th>Dosing Application</th>
<th>Timed</th>
<th>Demand</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tank Make/Model</td>
<td></td>
<td>(gal/in)</td>
</tr>
<tr>
<td>Pump Make/Model</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Timed Dosing**

- **Surge Capacity** (0.80 x DDF)***
  - Minimum
  - Set At
  - gal

- **Timed Drawdown Flow Rate** (gal/min)
  - Q=
  - gal/min

- **Timer Setting Pump Run** (min)
  - T=
  - min

- **Dose Volume Delivered by Pump** (Q x T)
  - gal

**Demand Dosing**

- **Dose Volume Delivered (Based on float settings)**
  - gal

**Timed Dose Application**

- **Reserve**
- **High Water Alarm**
- **Surge**
- **Timer Enable**
- **MOC**
- **Low Water Cutoff**
- **Float Tree**

**Demand Dose Application**

- **Reserve**
- **High Water Alarm**
- **Surge**
- **Timer Enable**
- **MOC**
- **Low Water Cutoff**
- **Float Tree**

*Water level MUST be within this capacity for 1) Pump drawdown test; 2) Gate valve adjustment; 3) Squirt height check

**Pump#2 (Second Pump in Treatment Train)**

<table>
<thead>
<tr>
<th>Dosing Application</th>
<th>Timed</th>
<th>Demand</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tank Make/Model</td>
<td></td>
<td>(gal/in)</td>
</tr>
<tr>
<td>Pump Make/Model</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Timed Dosing**

- **Surge Capacity** (0.80 x DDF)***
  - Minimum
  - Set At
  - gal

- **Timed Drawdown Flow Rate** (gal/min)
  - Q=
  - gal/min

- **Timer Setting Pump Run** (min)
  - T=
  - min

- **Dose Volume Delivered by Pump** (Q x T)
  - gal

**Demand Dosing**

- **Dose Volume Delivered (Based on float settings)**
  - gal

**Timed Dose Application**

- **Reserve**
- **High Water Alarm**
- **Surge**
- **Timer Enable**
- **MOC**
- **Low Water Cutoff**
- **Float Tree**

**Demand Dose Application**

- **Reserve**
- **High Water Alarm**
- **Surge**
- **Timer Enable**
- **MOC**
- **Low Water Cutoff**
- **Float Tree**

*Water level MUST be within this capacity for 1) Pump drawdown test; 2) Gate valve adjustment; 3) Squirt height check

***Volumes may be reduced according to Section 3.4.4

Update effective January 1, 2015 - This manual may be used as a reference by a STS designer when specifying standards for construction, installation notes and certain aggregate materials for STS components. STS designers are not be required to use this manual. When used, if conflicts exist between this manual and Ohio Administrative Code 3701-29, the state code shall prevail. STS contactors shall follow the approved STS design.
Owner/Installer Replacement System Interview and Sign Off Form

The following problems have come up on previous repairs or replacements of Household Sewage Treatment Systems (HSTS) throughout the County. These situations have created unnecessary call-backs, nuisance alarms, and very costly newly installed system replacements. As a result, the Health District requires that the installer must interview the homeowner before the replacement system is given final approval. The following list includes situations that must be identified and eliminated by the homeowner. Your installer, or other qualified professional, may help you in this process. Once all of the items on the list have been addressed, you and your installer must sign the bottom of this form, acknowledging that the appropriate corrective actions have been taken. This form must then be given back to the Health District. The intent of this exercise is to ensure that your new HSTS will not be unnecessarily overloaded, creating premature system failure or nuisance conditions.

☐ I/we have identified and fixed, if present, any leaking pipes in the building sewer, allowing groundwater infiltration into the house drain and ultimately the HSTS.
☐ I/we have verified and have taken corrective actions, if necessary, ensuring that all piping tied into the HSTS is from household wastewater sources.
☐ I/we have verified and have taken corrective actions, if necessary, to ensure that all sources of wastewater are routed to the HSTS. (applicable permits obtained, for example a plumbing permit)
☐ I/we have verified and have taken corrective actions, if necessary, to ensure no downspouts, foundation drains, clear water sumps, and/or other non-wastewater sources are routed to the HSTS.
☐ I/we have verified and have taken corrective actions, if necessary, to reroute downspouts, foundation drains, and/or other non-wastewater source outlets away from the new sewage system.
☐ I/we will have the building sewer line replaced, back to the exit of the house, or as close as practically possible.
☐ I/we have verified and have taken corrective actions, if necessary, to fix any leaking plumbing fixtures in the dwelling. (Faucets, toilets, etc.)
☐ I/we have verified that any watersoftners within the dwelling are set so that the backwash waters will not make the household’s wastewater volume exceed the average design flow rate of the sewage system.

Installer’s Signature            Date            Homeowner’s Signature            Date

Printed Name

Printed Name
25 Appendix 25.0 References


Advanced Drainage Systems, Inc. *N-12 Sanitary Pipe Products*. Columbus, Ohio.


