ATL SYSTEM IN-GROUND

COMPONENT MANUAL

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This component manual was produced exclusively for use with ATL products. This manual is originally based upon the "In-Ground Soil Absorption Component Manual for Private Onsite Wastewater Treatment Systems" Ver. 2.0, October 2012, by the State of Wisconsin, Department of Safety and Professional Services, with periodic updates applied.

Infiltrator Water Technologies (Infiltrator) reserves the right to revise this component manual according to changes in regulations or ATL system installation instructions.

Preface

ATL SYSTEM APPLICATIONS INFORMATION

ATL System Type[1]	Infiltrator ATL System Design Document	1-ft Depth Credit Allowed	System Sand Depth (inches)	Effluent Distribution Method
Subsurface bed	ATL System In-Ground Component Manual	No	6	Gravity
Subsurface bed	ATL System In-Ground Component Manual	Yes	6	Pressure
Above-ground bed	ATL System Mound Component Manual	Yes	6	Pressure
Mound	ATL System Mound Component Manual	Yes	6	Pressure

[1] If any part of the ATL distribution cell is above grade then the ATL System Mound Component Manual shall be used.

I. INTRODUCTION AND SPECIFICATIONS

This Private Onsite Wastewater Treatment System (POWTS) component manual provides design, construction, inspection, operation, and maintenance specifications for an ATL System in-ground soil absorption component. However, these items must accompany a properly prepared and reviewed plan acceptable to the governing unit to help provide a system that can be installed and function properly. Violations of this manual constitute a violation of SPS 383 and 384, Wis. Adm. Code. The ATL System in-ground soil absorption component must receive influent flows and loads less than or equal to those specified in Table 1. When designed, installed, and maintained in accordance with this manual, the ATL System in-ground soil absorption component provides treatment and dispersal of domestic wastewater in conformance with SPS 383 of the Wis. Adm. Code. Final effluent characteristics will comply with SPS 383.41, Wis. Adm. Code when inputs are within the range specified in Tables 1 to 3.

Note: Detailed plans and specifications must be developed and submitted to be reviewed and approved by the governing unit having authority over the plan for the installation. Also, a Sanitary Permit must be obtained from the department or governmental unit having jurisdiction. See Section XII for more details.

Table 1
INFLUENT FLOWS AND LOADS

Design wastewater flow (DWF)	≤ 5,000 gal/day
Dosing of Effluent required when DWF	> 1,500 gal/day
Monthly average value of Fats, Oil and Grease (FOG)	≤ 30 mg/L
Monthly average value of five-day Biochemical Oxygen Demand (BOD_5)	≤ 220 mg/L
Monthly average value of Total Suspended Solids (TSS)	≤ 150 mg/L
Wastewater particle size	≤ 1/8 inch
Design loading rate of the basal area	= soil application rate of effluent with maximum monthly average values of BOD_5 and TSS of ≤ 30 mg/L as per SPS Table 383.44-1 or Table 383.44-2
Design wastewater flow (DWF) from one- or two-family dwellings	Based on SPS 383.43 (3), (4), or (5), Wis. Adm. Code
Design wastewater flow (DWF) from public facilities	≥ 150% of estimated daily wastewater flow in accordance with Table 4 of this manual or SPS 383.43 (6), Wis. Adm. Code
Volume of single dose when a pressure distribution system is utilized to disperse effluent [Use of pressure distribution is dictated by SPS 383.44(5)]	≥ 5 times the void volume of the distribution conduit(s) and ≤ 20% of the design wastewater flow
Volume of a single dose to soil absorption component when effluent is delivered to a non-pressure distribution system	≤ 20% of the design wastewater flow
Distribution cell area per orifice when pressure distribution is used	≤ 12 ft^2

Table 2a SIZE AND ORIENTATION	
Minimum area of distribution cell	≥ Design wastewater flow ÷ design loading rate of basal area for the in situ soil or a lower horizon if the lower horizon adversely affects the dispersal of wastewater in accordance with SPS 383.44 (4) (a) and (c), Wis. Adm. Code
Distribution cell width (A)[a]	≥ 3 feet and ≤ 11 feet
Distribution cell depth	Product height of 12 inches + system sand of 6 inches = 18 inches
Depth of cover over top of distribution cell	≥ 12 inches and ≤ 4 feet
Depth of cover over top of distribution cell measured from in situ soil surface	≥ 24 inches

Table 2b MINIMUM SYSTEM SAND FOOTPRINT DIMENSIONS AND AREA						
Minimum Length of Conduit (ft)	**3 Conduit Rows**		**4 Conduit Rows**		**5 Conduit Rows**	
	Dimensions (A' x B') [a]	**Area (ft^2)**	**Dimensions (A' x B') [a]**	**Area (ft^2)**	**Dimensions (A' x B') [a]**	**Area (ft^2)**
140	7 x 52	364	9 x 42	378	11 x 32	352
210	7 x 72	504	9 x 62	558	11 x 52	572
280	7 x 102	714	9 x 72	648	11 x 62	682
350	7 x 122	854	9 x 92	828	11 x 72	792

Table 2c MINIMUM TOTAL LENGTH OF CONDUIT	
Number of Bedrooms	**Minimum Conduit Length Required (ft)**
2	140
3	210
4	280
5	350
Each additional	70

NOTES:

a. The conduit rows must be extended to within 12 inches of each end of the bed. The dimensions above include 12 inches of system sand in between each of the conduit rows.
b. Table 2b provides examples of dimensions and area; other configurations are allowed.
c. The conduits are manufactured in 10-foot lengths; all conduit row length calculations in Table 2c are rounded up to the nearest 10 feet.
d. Multiple bed systems: where site conditions or other considerations require multiple beds, the row-specific length dimensions in Table 2b may be modified to account for the number of beds.

Table 3 **OTHER SPECIFICATIONS**	
Slope of in situ soil	≤ 25% in area of component
Vertical separation between distribution cell infiltrative surface and seasonal saturation defined by redoximorphic features, groundwater, or bedrock	≥ 3 ft measured to the bottom of the ATL system sand (gravity distribution) ≥ 2 ft measured to the bottom of the ATL system sand (pressure distribution)
Bottom of distribution cell	Level
Horizontal separation between ATL conduits	≥ 12 inches
Piping material in the pressure distribution system	Meets requirements of SPS 384.30 (2), Wis. Adm. Code
Piping material for observation pipes	Meets requirements of SPS 384.30 Table 384.30-1, Wis. Adm. Code
Slope of gravity flow ATL conduits	≤ 4 inches per 100 feet of conduit
Location of gravity flow perforated distribution pipe in distribution cell	Centered in the ATL conduit
Length of distribution pipe for components using gravity flow distribution	= length of ATL conduit
Distance between distribution pipe end orifice and end of distribution cell for components using gravity flow distribution	≤ 12 inches
Length of ATL	Multiply # of ATL conduits x 10 ft
Number of observation pipes per distribution cell	≥ 2
Location of observation pipes	At opposite ends of the distribution cell. Observation pipes must be located at the junction point between two products to not create separation of the bundles within a product.

Table 3 **OTHER SPECIFICATIONS** (continued)	
Design and installation of observation pipes	1. Have an open bottom 2. Have a nominal pipe size of 4 inches 3. The lower 6 inches slotted 4. Slots are ≥ ¼ inch and ≤ ½ inch in width and located on opposite sides 5. Anchored in a manner that will prevent the pipe from being pulled out 6. Extend from the infiltrative surface up to or above finish grade 7. Terminate with removable watertight cap
Effluent application to ATL system	1. If DWF < 1,500 gpd: **(a) if a vertical separation credit is not being utilized,** effluent may be applied by gravity flow; or dosed to distribution cell or distribution box and then applied by gravity flow to the distribution cell; or **(b)** pressure distribution is required **if a vertical separation credit is being utilized** or pressure distribution is required in accordance with SPS 383.44 (5) (b), Wis. Adm. Code. 2. If DWF ≥ 1,500 gpd: (a) if a vertical separation credit is not being utilized, effluent must be dosed to distribution cell or distribution box and then applied by gravity flow to the distribution cell**;** o(b)pressure distribution is required **if a vertical separation credit is required** or pressure distribution is required in accordance with SPS 383.44 (5) (b), Wis. Adm. Code
Septic tank effluent pump system	Meets requirements of SPS 384.10, Wis. Adm. Code and this manual

Table 3 **OTHER SPECIFICATIONS** (continued)	
Dose tank or compartment volume employing one pump	≥ Volume of a single dose + reserve capacity[a] + drain back volume[b] + (6 inches x average gal/inch of tank)[c] Notes: a: Reserve capacity ≥ the estimated daily flow b: Drain back volume ≥ volume of wastewater that will drain into the dose tank from the distribution cell. c: Four inches of the dimension ≥ vertical distance from pump intake to bottom of tank. Two inches of the dimension ≥ vertical distance between pump on elevation and high water alarm activation elevation.
Dose tank or compartment volume employing duplex pumps	≥ Volume of a single dose + drain back volume[a] + (6 inches x average gal/inch of tank)[b] Notes: a: Drain back volume ≥ volume of wastewater that will drain into the dose tank from the force main b: Four inches of the dimension ≥ vertical distance from pump intake to the bottom of tank. Two inches of this dimension ≥ vertical distance between pump on elevation and high water alarm activation elevation.
Siphon tank or compartment volume	≥ What is required to accommodate volumes necessary to provide dosing as specified in this manual
Distribution network for pressurized distribution systems	By use of pressure distribution network conforming with the sizing methods of either Small Scale Waste Management Project publication 9.6, entitled "Design of Pressure Distribution Networks for Septic Tank – Soil Absorption Systems" or Dept. of Safety and Professional Services publications SBD-10573-P or SBD-10706-P, entitled Pressure Distribution Component Manual for Private Onsite Wastewater Treatment Systems".

Table 3 OTHER SPECIFICATIONS (continued)	
Observation pipes installed in an ATL System	Meets all the requirements of observation pipes with the following exceptions: 1. Have a minimum 4-inch pipe connection to a distribution conduit 2. Extend from the infiltrative surface ≥ 12 inches above finish grade
Cover material over the ATL System	Soil that will provide frost protection, prevent erosion and excess precipitation or runoff infiltration and allow air to enter the distribution cell
Installation inspection	In accordance with SPS 383, Wis. Adm. Code
Management	In accordance with SPS 383, Wis. Adm. Code and this manual

II. DEFINITIONS

Definitions not found in this section, are in SPS 381 of the Wisconsin Administrative Code or the terms use the standard dictionary definition.

A. "Basal Area" means the effective in-situ soil surface area available for infiltration of partially treated effluent from the fill material.

B. "Conduit" means Infiltrator ATL System component made up of 4-inch-diameter pipe, large-diameter synthetic aggregate, coarse geotextile, small-diameter synthetic aggregate, fine geotextile.

C. "Fill Material" means sand that meets specifications of ASTM Specification C33 for fine aggregate and is used along the sides of and could be under the distribution cell to provide treatment of effluent.

D. "Limiting Factor" means high groundwater elevation or bedrock.

E. "Product" means one ATL conduit manufactured by Infiltrator.

F. "Sand Extension" means additional system sand which is added to the system sand footprint to meet the minimum basal area requirement.

G. "System Sand" means the sand material that is used along the sides of an under the ATL System Conduits to provide treatment of effluent. Acceptable system sand shall meet ATSM Specification C33.

H. "Vertical Separation" means the total depth of unsaturated soil that exists between the infiltrative surface of a distribution cell and limiting factor (as indicated by redoximorphic features, groundwater, or bedrock).

III. DESCRIPTION AND PRINCIPLE OF OPERATION

The ATL System in-ground soil absorption component operation is a two-stage process involving both wastewater treatment and dispersal. Treatment is accomplished within the ATL System by physical and biochemical processes within the product, the fill material, and the in-situ soil. The fill material and in-situ soil also provide dispersal and separation distance to limiting conditions.

Cover material consisting of material that provides erosion protection, a barrier to excess precipitation infiltration, and allows gas exchange is added. See Figure 1 for a typical in-ground system.

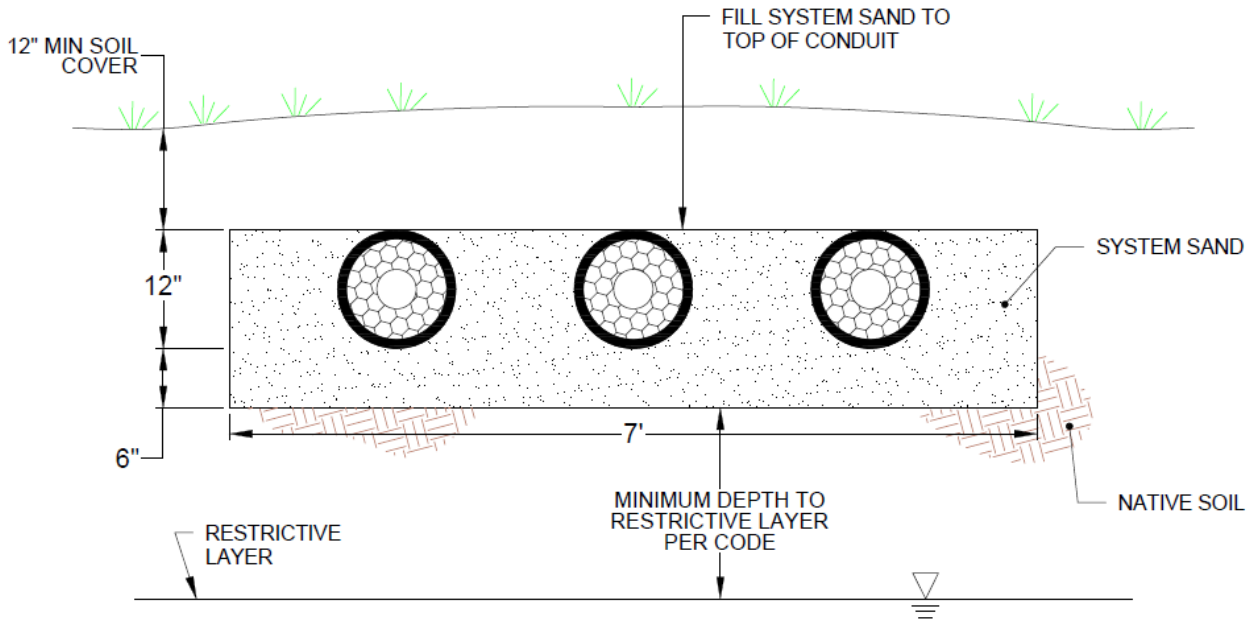

Figure 1. Example cross-section of ATL System in-ground soil absorption component for POWTS

IV. SOIL AND SITE REQUIREMENTS

Every ATL System in-ground soil absorption component design is ultimately matched to the given soil and site.

The design approach presented in this manual is based on criteria that all applied wastewater is successfully transported away from the system, that it will not affect subsequent wastewater additions, and that the effluent is ultimately treated.

A. Minimum Soil Depth Requirements - The minimum soil factors required for successful ATL System in-ground soil absorption component performance are listed in the introduction and specification section of this manual.

Soil evaluations must be in accordance with SPS 385 of the Wis. Adm. Code. In addition, soil application rates must be in accordance with SPS 383 of the Wis. Adm. Code.

B. Other Site Considerations -

1. ATL System in-ground soil absorption component location - In open areas, exposure to sun and wind increases the assistance of evaporation and transpiration in the dispersal of the wastewater.

2. Sites with trees and large boulders - Generally, sites with large trees, numerous smaller trees or large boulders are less desirable for installing an ATL System in-ground soil absorption component because of difficulty in preparing the surface and the reduced infiltration area beneath the ATL System in-ground soil absorption component. Areas that are occupied with rock fragments, tree roots, stumps and boulders reduce the amount of soil available for proper treatment. If no other site is available, trees in the basal area of the ATL System in-ground soil absorption component must be cut off at ground level. A larger fill area is necessary when any of the above conditions are encountered, to provide sufficient infiltrative area.

3. Setback distances - The setbacks specified in SPS 383, Wis. Adm. Code for soil subsurface treatment/dispersal component apply to ATL System in-ground soil absorption components. The distances are measured from the edge of the ATL System in-ground soil absorption component.

V. COVER MATERIAL

A. Cover material - The cover material is a soil that will allow air exchange while promoting plant growth. The gas exchange will increase the treatment performance of the system by providing oxygen to the wastewater to help ensure aerobic conditions in the ATL System in-ground soil absorption component. The plant growth will provide frost protection in the winter season. Clays may not be used for cover material, as they will restrict oxygen transfer. Often, excavated soil from the site can be used. Seeding or other means must be done to prevent erosion of the ATL System soil cover material.

VI. DESIGN

A. Location, Size and Shape - Placement, sizing and shaping of the ATL System in-ground soil absorption component and the distribution cell within the ATL System in-ground soil absorption component must be in accordance with this manual. The means of pressurizing the distribution network must provide equal distribution of the wastewater. A pressurized distribution network using a method of sizing as described in either Small Scale Waste Management Project publication 9.6, entitled "Design of Pressure Distribution Networks for Septic Tank – Soil Absorption System" or Dept. of Safety and Professional Services publications SBD-10573-P or SBD-10706-P, entitled "Pressure Distribution Component Manual for Private Onsite Wastewater Treatment Systems" is acceptable.

B. Component Design - Design of the ATL System in-ground soil absorption component is based upon whether vertical separation credit is being utilized, the design wastewater flow and the soil characteristics. **The distribution system must be pressurized if vertical separation distance is less than three feet from the bottom of the component to a limiting factor.** It must be sized such that it can accept the design wastewater flow without causing surface seepage or groundwater pollution. Consequently, the basal area, which is the in-situ soil area beneath the fill, must be sufficiently large enough to absorb the effluent

into the underlying soil. The system must also be designed to avoid encroachment of the water table into the required minimum unsaturated zone.

Design of the ATL System in-ground soil absorption component includes the following three steps: (A) calculating design wastewater flow, (B) design of the ATL System distribution cell within the fill, (C) design of the entire ATL System in-ground soil absorption component. This includes calculating total width, total length, system height, distribution lateral location and observation pipes. Each step is discussed. A design example is provided in Section XI, page 26, of this manual.

Step A. Design Wastewater Flow Calculations

One and two-family dwellings. Distribution cell size for one and two-family dwelling application is determined by calculating the design wastewater flow (DWF). To calculate DWF use, Formulas 1, 2 or 3. Formula 1 is for combined wastewater flows, which consist of blackwater, clearwater and graywater. Formula 2 is for only clearwater and graywater. Formula 3 is blackwater only.

Formula 1	Formula 2	Formula 3
Combined wastewater	Clearwater & Graywater	Blackwater
DWF = 150 gal/day/bedroom	DWF = 90 gal/day/bedroom	DWF = 60 gal/day/bedroom

Public Facilities. Distribution cell size for public facilities application is determined by calculating the DWF using Formula 4. Only facilities identified in Table 4 are included in this manual. Estimated daily wastewater flows are determined in accordance with Table 4 or SPS 383.43(6), Wis. Adm. Code. Many commercial facilities have high BOD_5, TSS and FOG (fats, oils and grease), which must be pretreated in order to bring their values down to an acceptable range before entering into the ATL System in-ground soil absorption component described in this manual.

Formula 4

DWF = Sum of each estimated wastewater flow per source per day x 1.5

Where 1.5 = Conversion factor to convert estimated wastewater flow to design wastewater flow

Table 4 Public Facility Wastewater Flows		
Source	**Unit**	**Estimated Wastewater Flow (gpd)**
Apartment or Condominium	Bedroom	100
Assembly hall (no kitchen)	Person (10 sq. ft./person)	1.3
Bar or cocktail lounge [a] (no meals served)	Patron (10 sq. ft./patron)	4
Bar or cocktail lounge [a] (w/meals – all paper service)	Patron (10 sq. ft./patron)	8
Beauty salon	Station	90
Bowling alley	Bowling lane	80
Bowling alley [a] (with bar)	Bowling lane	150
Camp, day and night	Person	25
Camp, day use only (no meals served)	Person	10
Campground or Camping Resort	Space, with sewer connection and/or service building	30
Campground sanitary dump station [a]	Camping unit or RV served	25
Catch basin	Basin	65
Church (no kitchen)	Person	2
Church [b] (with kitchen)	Person	5
Dance hall	Person (10 sq. ft./person)	2
Day care facility (no meals prepared)	Child	12
Day care facility [b] (with meal preparation)	Child	16
Dining hall [a] (kitchen waste only without dishwasher and/or food waste grinder)	Meal served	2
Dining hall [a] (toilet and kitchen waste without dishwasher and/or food waste grinder)	Meal served	5
Dining hall [a] (toilet and kitchen waste with dishwasher and/or food waste grinder)	Meal served	7
Drive-in restaurant [a] (all paper service with inside seating)	Patron seating space	10
Drive-in restaurant [a] (all paper service without inside seating)	Vehicle space	10
Drive-in theater	Vehicle space	3
Employees (total all shifts)	Employee	13
Floor drain (not discharging to catch basin)	Drain	25
Gas station / convenience store	Patron	3
Hospital [a]	Bed space	135
Hotel, motel or tourist rooming house	Room	65
Manufactured home (served by its own POWTS)	Bedroom	100
Manufactured home community	Manufactured home site	200
Medical office building Doctors, nurses, medical staff Office personnel Patients	 Person Person Person	 50 13 6.5
Migrant labor camp (central bathhouse)	Employee	20
Nursing, Rest Home, Community Based Residential Facility [b]	Bed space	65
Outdoor sport facility (toilet waste only)	Patron	3.5
Parks (toilets waste only)	Patron (75 patrons/acre)	3.5
Parks (toilets and showers)	Patron (75 patrons/acre)	6.5

Table 4

Public Facility Wastewater Flows

(continued)

Source	Unit	Estimated Wastewater Flow (gpd)
Public shower facility	Shower taken	10
Restaurant [a], 24-hr. (dishwasher and/or food waste grinder only)	Patron seating space	4
Restaurant [a], 24-hr. (kitchen waste only without dishwasher and/or food waste grinder)	Patron seating space	12
Restaurant, 24-hr. (toilet waste)	Patron seating space	28
Restaurant [a], 24-hr. (toilet and kitchen waste without dishwasher and/or food waste grinder)	Patron seating space	40
Restaurant [a], 24-hr. (toilet and kitchen waste with dishwasher and/or food waste grinder)	Patron seating space	44
Restaurant [a] (dishwasher and/or food waste grinder only)	Patron seating space	2
Restaurant [a] (kitchen waste only without dishwasher and/or food waste grinder)	Patron seating space	6
Restaurant (toilet waste)	Patron seating space	14
Restaurant [a] (toilet and kitchen waste without dishwasher and/or food waste grinder)	Patron seating space	20
Restaurant [a] (toilet and kitchen waste with dishwasher and/or food waste grinder)	Patron seating space	22
Retail store	Patron (70% of total retail area ÷ 30 sq. ft. per patron)	1
School [a] (with meals and showers)	Classroom (25 students/classroom)	500
School [a] (with meals or showers)	Classroom (25 students/classroom)	400
School (without meals or showers)	Classroom (25 students/classroom)	300
Self-service laundry (toilet waste only)	Clothes washer	33
Self-service laundry (with only residential clothes washers)	Clothes washer	400
Swimming pool bathhouse	Patron	6.5

[a] = Expected to be high in biochemical oxygen demand (BOD), total suspended solids (TSS), or fats, oils, and grease (FOG).

[b] = At-risk system (potentially high in BOD, TSS, and FOG).

Step B. Design of the ATL System Distribution Cell - This section determines the required infiltrative surface area of the distribution cell/fill interface, as well as the dimensions of the distribution network within the fill.

a. Design of the ATL System distribution cell is a four-step process:

1. Determine the minimum total conduit length
2. Design the system sand configuration
3. Calculate the minimum basal area required
4. Make basal area adjustments as necessary

Step 1: Determine the minimum total conduit length

The minimum length of conduit per bedroom is 70 feet. Determine the minimum total length of conduit from Table 5 below, based on the number of bedrooms.

Table 5
MINIMUM TOTAL LENGTH OF CONDUIT

Number of Bedrooms	Minimum Conduit Length Required (ft)
2	140
3	210
4	280
5	350
Each additional	70

Step 2: Design the system sand configuration

Use Table 6 below to determine the minimum system sand footprint using the minimum length of conduit (determined using Table 5 above) and the number of rows into which the total length of conduit will be divided. The system should be designed as long and narrow as site conditions allow.

Table 6
MINIMUM SYSTEM SAND FOOTPRINT DIMENSIONS AND AREA

Minimum Length of Conduit (ft)	3 Conduit Rows		4 Conduit Rows		5 Conduit Rows	
	Dimensions (A' x B')	Area (ft^2)	Dimensions (A' x B')	Area (ft^2)	Dimensions (A' x B')	Area (ft^2)
140	7 x 52	364	9 x 42	378	11 x 32	352
210	7 x 72	504	9 x 62	558	11 x 52	572
280	7 x 102	714	9 x 72	648	11 x 62	682
350	7 x 122	854	9 x 92	828	11 x 72	792

NOTES:

1. The conduits are manufactured in 10-foot lengths; all conduit row length calculations in Table 5 are rounded up to the nearest 10 feet.
2. The conduit rows must be extended to within 12 inches of each end of the bed. The dimensions above include 12 inches of system sand in between each of the conduit rows.
3. Multiple bed systems: where site conditions or other considerations require multiple beds, the row-specific length dimensions in Table 6 may be modified to account for the number of beds.
4. Table 6 provides examples of dimensions and area; other configurations are allowed.

Step 3: Calculate the minimum basal area required

Investigate the site in accordance with the Wisconsin Administrative Code to determine the design loading rate of the basal area. Calculate the minimum basal area required by dividing the daily design flow by this design loading rate.

Step 4: Make basal area adjustments as necessary

The minimum basal area required in Step 3 cannot be reduced. This area must be maintained to ensure adequate infiltration of treated effluent into the native soil.

Sand extensions are necessary as follows:

- If the minimum basal area determined in Step 3 is smaller than the area of the system sand footprint determined in Step 2, no sand extensions are necessary.
- If the minimum basal area determined in Step 3 is larger than the area of the system sand footprint determined in Step 2, sand extensions must be added to meet the minimum basal area footprint requirements. When adding sand extensions in level system applications, additional width shall be evenly divided on each side of the ATL System;

The length of the bed area may be altered by extending the conduit rows. This method may be preferred over increasing the width of the system under certain site and system design considerations.

VII. SITE PREPARATION AND CONSTRUCTION

Procedures used in the construction of an in-ground ATL system are just as critical as the design of the component. A good design with poor construction results in system failure. It is emphasized that the soil only be worked with it is not frozen and the moisture content is low to avoid compaction and smearing. Consequently, installations are to be made only when the soil is dry enough to prevent compaction and smearing of the infiltrative surface. The construction plan to be followed includes:

A. Equipment – Proper equipment is essential. Track type equipment that will not compact the infiltrative surface. Minimize foot traffic and avoid equipment traffic over the infiltrative surface.

B. Sanitary Permit – Prior to the construction of the system, a sanitary permit, obtained for the installation must be posted in a clearly visible location on the site. Arrangements for inspection(ss) must also be made with the department or governmental unit issuing the sanitary permit.

C. Construction Procedures

1. Check the moisture content and conditions of the soil. If the soil at the infiltrative surface can be rolled into a ¼ inch wire, the site is too wet, smearing and compaction will result, thus reducing the infiltrative capacity of the soil. If the site is too wet, do not proceed until it dries out. If the soil at or below the infiltrative surface is frozen, do not proceed.

2. Set up a construction level or similar device and determine all relative elevations in relationship to the bench mark. It is necessary to determine the bottom elevation of the distribution cell, land surface contour lines, and approximate component elevations critical to the installation.

3. Lay out the absorption area within the designated area. Where possible lay out the absorption area(s) on the site so that the distribution cell runs parallel with the land surface contours. Reference states offset from the corner stakes are recommended in case corner stakes are disturbed during construction.

4. Excavate the distribution cell(s) to the correct bottom elevation(s) making sure not to smear the infiltrative surface. If the infiltrative surface or sidewalls are smeared, loosen it with the use of a rake or similar device.

5. Install the system sand over the entire ATL System area as per design. System sand should be leveled and stabilized prior to introduction of the conduits.

6. Remove plastic wrap from the ATL conduits and place the conduits on the surface of the system sand with the white stripe/seam in the 12 o'clock position, arranged in the configuration shown on the system design. Using approved 4-inch-diameter internal pipe couplings, connect the conduits end-to-end to create rows of the required length.

7. In gravity serial distribution applications, where a vertical separation credit is not required, use of a raised connection at the distal end of each lateral-containing conduit row is recommended. One example of a raised connection is shown below in Figure 2:

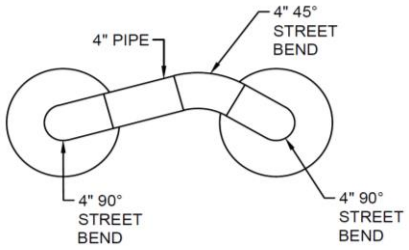

Figure 2

8. In pressure distribution applications, **where a vertical separation credit is required**, install the ATL conduits and pressure distribution piping per instructions, pressure distribution design and applicable sections of SPS 382, 383, and 384, Wis. Adm. Code. Pressure distribution piping should be sleeved through the 4-inch corrugated pipe located in the ATL conduit. One out of every five orifices in each distribution pipe shall be installed at the 6 o'clock position to allow for thorough drainage of the distribution pipe following each dose. The remaining four orifices shall be installed in the 12 o' clock position. All pipes must drain after dosing.

9. At the distal end of the pressure lateral, place a 90° long sweep with a capped piece of pipe pointing up through the soil surface. Cover the capped pipe with a valve box and lid of an adequate size. The cover of the valve box shall be located above the final grade of the ATL System in-ground soil absorption component (Figure 3).

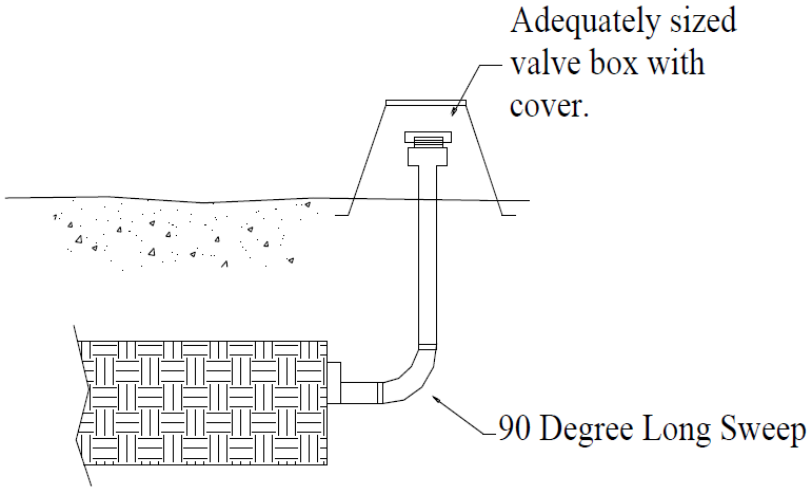

Figure 3

10. Once the ATL conduit is in place on the surface of the system sand and distribution piping is connected to the conduits per design, additional system sand shall be ladled beside and between, and to the top of each of the conduit rows. System sand

shall also be installed on each side and at each end of the backfilled conduit rows, per the design.

11. Install an observation pipe in each row of ATL products with the bottom 6 inches of the observation pipe slotted. It is recommended to wrap geotextile around the slots. Installations of all observation pipes include a suitable means of anchoring (Figures 4 and 5).

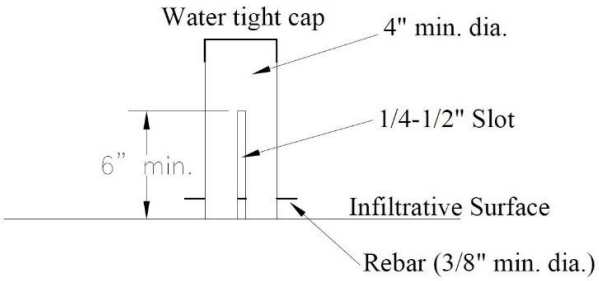

Figure 4

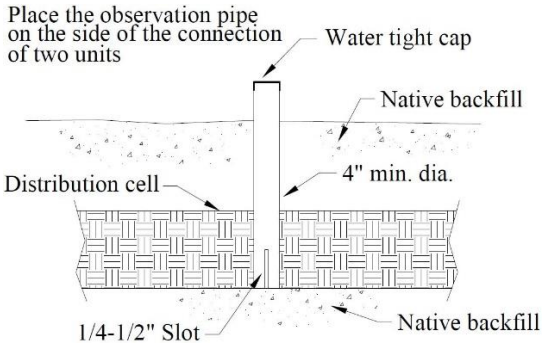

Figure 5

12. Be sure to keep the required 12-inch minimum compacted cover over the system.

13. Complete final grading to divert surface water drainage away from the ATL System. Sod or seed and mulch the entire ATL System in-ground soil absorption component.

VIII. OPERATION, MAINTENANCE AND PERFORMANCE MONITORING

A. The ATL system in-ground soil absorption component owner is responsible for the operation and maintenance of the component. The county, department or POWTS service contractor may make periodic inspections of the components, checking for surface discharge, treated effluent levels, etc.

   The owner or owner's agent is required to submit necessary maintenance reports to the appropriate jurisdiction and/or the department.

B. Design approval and site inspections before, during, and after the construction are accomplished by the county or other appropriate jurisdictions in accordance to SPS 383 of the Wis. Adm. Code.

C. Routine and preventative maintenance aspects:

   1. Treatment and distribution tanks are to be inspected routinely and maintained when necessary in accordance with their approvals.

   2. Inspections of the ATL System in-ground soil absorption component performance are required at least once every three years. These inspections include checking the liquid levels in the observation pipes and examination for any seepage around the ATL System in-ground soil absorption component.

   3. Winter traffic on the ATL System in-ground soil absorption component is not advised to avoid frost penetration and to minimize compaction.

4. A good water conservation plan within the house or establishment will help assure that the ATL System in-ground soil absorption component will not be overloaded.

D. User's Manual: A user's manual is to accompany the component. The manual is to contain the following as a minimum:

1. Diagrams of all components and their location. This should include the location of the reserve area, if one is provided.
2. Names and phone numbers of local health authority, component manufacturer or POWTS service contractor to be contacted in the event of component failure or malfunction.
3. Information on periodic maintenance of the component, including electrical/mechanical components.
4. Information on limited activities on reserve area if provided.

E. Performance monitoring must be performed on ATL System in-ground soil absorption components installed under this manual.

1. The frequency of monitoring must be:
   a. At least once every three years following installation and,
   b. At time of problem, complaint, or failure.
2. The minimum criteria addressed in performance monitoring of ATL System in-ground soil absorption components are:
   a. Type of use.
   b. Age of system.
   c. Nuisance factors, such as odors or user complaints.
   d. Mechanical malfunction within the system including problems with valves or other mechanical or plumbing components.
   e. Material fatigue or failure, including durability or corrosion as related to construction or structural design.
   f. Neglect or improper use, such as exceeding the design rate, poor maintenance of vegetative cover, inappropriate cover over the ATL in-ground soil absorption component, or inappropriate activity over the ATL in-ground soil absorption component.
   g. Installation problems such as compaction or displacement of soil, improper orientation or location.
   h. Pretreatment component maintenance, including dosing frequency, structural integrity, groundwater intrusion or improper sizing.
   i. Dose chamber maintenance, including improper maintenance, infiltration, structural problems, or improper sizing.
   j. Distribution piping network, including improper maintenance or improper sizing.
   k. Ponding in distribution cell, prior to the pump cycle, is evidence of development of a clogging mat or reduced infiltration rates.

l. Siphon or pump malfunction including dosing volume problems, pressurization problems, breakdown, burnout, or cycling problems.

m. Overflow/seepage problems, as shown by evident or confirmed sewage effluent, including backup if due to clogging.

3. Reports are to be submitted in accordance with SPS 383, Wis. Adm. Code.

IX. REFERENCES

R.J. Otis, G.D. Plews and D.H. Patterson. "Design of Conventional Soil Absorption Trenches and Beds." In: Home Sewage Treatment, Proceeding of the Second National Home Sewage Treatment Symposium, ASAE Publication 5-77.

United States EPA, EPA 625/1-80-012, October 1980. "Design Manual – Onsite Wastewater Treatment and Disposal Systems."

X. ATL SYSTEM IN-GROUND WORKSHEET

A. SITE CONDITIONS

Evaluate the site and soils report for the following:

- Surface water movement.
- Measure elevations and distances on the site so that slope, contours, and available areas can be determined.
- Description of several soil profiles where the component will be located.
- Determine the limiting conditions such as bedrock, high groundwater level, soil permeability, and setbacks.

Slope - ___%

Occupancy – One or Two-Family Dwelling - ___(# of bedrooms)

Public Facility - _____ gal/day (Estimated wastewater flow)

Depth to limiting factor - _____inches

Minimum depth of unsaturated soil required by Table 383.44-3, Wis. Adm. Code - ____ inches

In-situ soil application rate used - _____ gal/ft^2/day

FOG value of effluent applied to component - _____ mg/L

BOD_5 value of effluent applied to component - <30 mg/L

TSS value of effluent applied to component - <30 mg/L

Fecal Coliform monthly geometric mean value of effluent applied to component > 10^4 CFU/100ml __Yes X No

Product(s) to be installed in one laying length of distribution cell - _____

B. DESIGN WASTEWATER FLOW (DWF)

One or Two-family Dwelling.

Combined wastewater flow:

DWF = 150 gal/day/bedroom x # of bedrooms

= 150 gal/day/bedroom x ___# of bedrooms

= _____ gal/day

Clearwater and graywater only:

DWF = 90 gal/day/bedroom x # of bedrooms

= 90 gal/day/bedroom x _____# of bedrooms

= _____ gal/day

Blackwater only:

DWF = 60 gal/day/bedroom x # of bedrooms

= 60 gal/day/bedroom x _____# of bedrooms

= _____ gal/day

Public Facilities.

DWF = Estimated wastewater flow x 1.5

= _____ gal/day x 1.5

= _____ gal/day

C. DESIGN OF THE ATL SYSTEM DISTRIBUTION CELL

a. Determine the minimum total conduit length

The minimum length of conduit per bedroom is 70 feet. Determine the minimum total length of conduit from Table 5, based on the number of bedrooms.

Table 5
MINIMUM TOTAL LENGTH OF CONDUIT

Number of Bedrooms	Minimum Conduit Length Required (ft)
2	140
3	210
4	280
5	350
Each additional	70

b. Design the system sand configuration

Use Table 6 below to determine the minimum system sand footprint using the minimum length of conduit (determined using Table 5) and the number of rows into which the total length of conduit will be divided. The system should be designed as long and narrow as site conditions allow.

Table 6
MINIMUM SYSTEM SAND FOOTPRINT DIMENSIONS AND AREA

Minimum Length of Conduit (ft)	3 Conduit Rows		4 Conduit Rows		5 Conduit Rows	
	Dimensions (A' x B')	Area (ft^2)	Dimensions (A' x B')	Area (ft^2)	Dimensions (A' x B')	Area (ft^2)
140	7 x 52	364	9 x 42	378	11 x 32	352
210	7 x 72	504	9 x 62	558	11 x 52	572
280	7 x 102	714	9 x 72	648	11 x 62	682
350	7 x 122	854	9 x 92	828	11 x 72	792

NOTES:

1. The conduits are manufactured in 10-foot lengths; all conduit row length calculations in Table 6 are rounded up to the nearest 10 feet.
2. The conduit rows must be extended to within 12 inches of each end of the bed. The dimensions above include 12 inches of system sand on each end of the conduit rows.
3. Multiple bed systems: where site conditions or other considerations require multiple beds, the row-specific length dimensions in Table 6 may be modified to account for the number of beds.
4. Table 6 provides examples of dimensions and area; other configurations are allowed.

D. CALCULATE THE MINIMUM BASAL AREA REQUIRED

Calculate the basal area by dividing the daily design wastewater flow (DWF) by the design loading rate (DLR). Verify the 300 ft^2 minimum basal area is satisfied.

Basal area = DWF ÷ DLR

Basal area = _____ gpd ÷ _____ gpd/ft^2

Basal area = _____ ft^2

E. MAKE AREA AND WIDTH ADJUSTMENTS AS NECESSARY

First, verify the minimum ATL conduit length (140 ft) and minimum basal area required (300 ft^2) have been met.

The minimum areas required in Step C (system sand configuration) and Step D (basal area) cannot be reduced. These areas must be maintained to ensure adequate area for placement of the conduits and infiltration of treated effluent into the native soil.

Sand extensions are necessary as follows:

- If the minimum basal area determined in Step 3 is smaller than the area of the system sand footprint determined in Step 2, no sand extensions are necessary.
- If the minimum basal area determined in Step 3 is larger than the area of the system sand footprint determined in Step 2, sand extensions must be added to meet the minimum basal area footprint requirements. When adding sand extensions in level system applications, additional width shall be evenly divided on each side of the ATL System; and
- In sloped applications, additional width shall be placed entirely on the downslope side of the ATL system. For elevated or mound systems, this manual does not apply. See the Infiltrator ATL System Mound Component Manual.

Note: *The length of the bed area may be altered, but only by extending the conduit rows. This method may be preferred over increasing the width of the system under certain site and system design considerations.*

XI. EXAMPLE ATL SYSTEM IN-GROUND WORKSHEET

A. SITE CONDITIONS

Evaluate the site and soils report for the following:

- Surface water movement.
- Measure elevations and distances on the site so that slope, contours and available areas can be determined.
- Description of several soil profiles where the component will be located.
- Determine the limiting conditions such as bedrock, high groundwater level, soil permeability, and setbacks.

Slope - 0 %

Occupancy – One or Two-Family Dwelling - 4 (# of bedrooms)

Public Facility - _____ gal/day (Estimated wastewater flow)

Depth to limiting factor - 60 inches

Minimum depth of unsaturated soil required by Table 383.44-3, Wis. Adm. Code - 24 inches

In-situ soil application rate used - 0.6 gal/ft^2/day

FOG value of effluent applied to component - < 30 mg/L

BOD_5 value of effluent applied to component - ≤ 30 mg/L

TSS value of effluent applied to component - ≤ 30 mg/L

Fecal Coliform monthly geometric mean value of effluent applied to component > 10^4 CFU/100ml __ Yes X No

B. DESIGN WASTEWATER FLOW (DWF)

One or Two-family Dwelling.

Combined wastewater flow:

DWF = 150 gal/day/bedroom x # of bedrooms

= 150 gal/day/bedroom x 4 # of bedrooms

= 600 gal/day

Clearwater and graywater only:

DWF = 90 gal/day/bedroom x # of bedrooms

= 90 gal/day/bedroom x _____# of bedrooms

= _____ gal/day

Blackwater only:

DWF = 60 gal/day/bedroom x # of bedrooms

= 60 gal/day/bedroom x _____# of bedrooms

= _____ gal/day

Public Facilities.

DWF = Estimated wastewater flow x 1.5

= _____ gal/day x 1.5

= _____ gal/day

C. DESIGN OF THE ATL SYSTEM DISTRIBUTION CELL

a. Determine the minimum total conduit length

The minimum length of conduit per bedroom is 70 feet. Determine the minimum total length of conduit from Table 5, based on the number of bedrooms.

Table 5
MINIMUM TOTAL LENGTH OF CONDUIT

Number of Bedrooms	Minimum Conduit Length Required (ft)
2	140
3	210
4 →	280
5	350
Each additional	70

b. Design the system sand configuration

Use Table 6 below to determine the minimum system sand footprint using the minimum length of conduit (determined using Table 5 above) and the number of rows into which the total length of conduit will be divided. The system should be designed as long and narrow as site conditions allow.

Table 6 MINIMUM SYSTEM SAND FOOTPRINT DIMENSIONS AND AREA							
Minimum Length of Conduit (ft)	**3 Conduit Rows**		**4 Conduit Rows**		**5 Conduit Rows**		
	Dimensions (A' x B')	**Area (ft^2)**	**Dimensions (A' x B')**	**Area (ft^2)**	**Dimensions (A' x B')**	**Area (ft^2)**	
140	7 x 52	364	9 x 42	378	11 x 32	352	
210	7 x 72	504	9 x 62	558	11 x 52	572	
280 →	7 x 102	714	9 x 72	648	11 x 62	682	
350	7 x 122	854	9 x 92	828	11 x 72	792	

D. CALCULATE THE MINIMUM BASAL AREA REQUIRED

Calculate the basal area by dividing the daily design wastewater flow (DWF) by the design loading rate (DLR). Verify the 300 ft^2 minimum basal area is satisfied.

Basal area = DWF ÷ DLR

Basal area = 600 gpd ÷ 0.6 gpd/ft^2

Basal area = 1,000 ft^2

E. MAKE AREA AND WIDTH ADJUSTMENTS AS NECESSARY

The minimum ATL conduit length required (140 ft) is met by the 280 lf of ATL conduit in this system design (Step C a). The minimum basal area required (300 ft^2) has been met by the 714 ft^2 basal area in the system design (Step C b)

As determined in Step C b, the minimum length of the system is 102 feet and the minimum width of the system is 7 feet, creating a system sand footprint of 714 ft^2. Since the 1,000 ft^2 minimum basal area (Step D) is larger than the 714 ft^2 system sand footprint (Step C b), sand extensions must be added.

- *Divide the minimum basal area required by the length of the system sand footprint as designed.* — *1,000 ft^2 ÷ 102 ft = 9.8 ft*
- *Subtract the design system sand footprint width from the above adjusted system sand footprint width to determine the width of the sand extension required.* — *9.8 ft - 7 ft = 2.8 ft*
- *Divide the total width of the sand extension required as calculated above by 2 to determine the minimum width of the sand extension required on each side of the system.* — *2.8 ft ÷ 2 = 1.4 ft (1 ft 5 in)*

NOTE: *Round up and convert to feet/inches for ease of installation.*

- *The system sand width must be widened by 2.8 ft. On a level site, this is accomplished by adding a 1-ft 5-in-wide sand extension to the entire length of each side of the system. This results in a total basal area footprint width of 9.8 ft.*

$$9.8\ ft\ x\ 102\ ft\ =\ 1{,}000\ ft^2$$

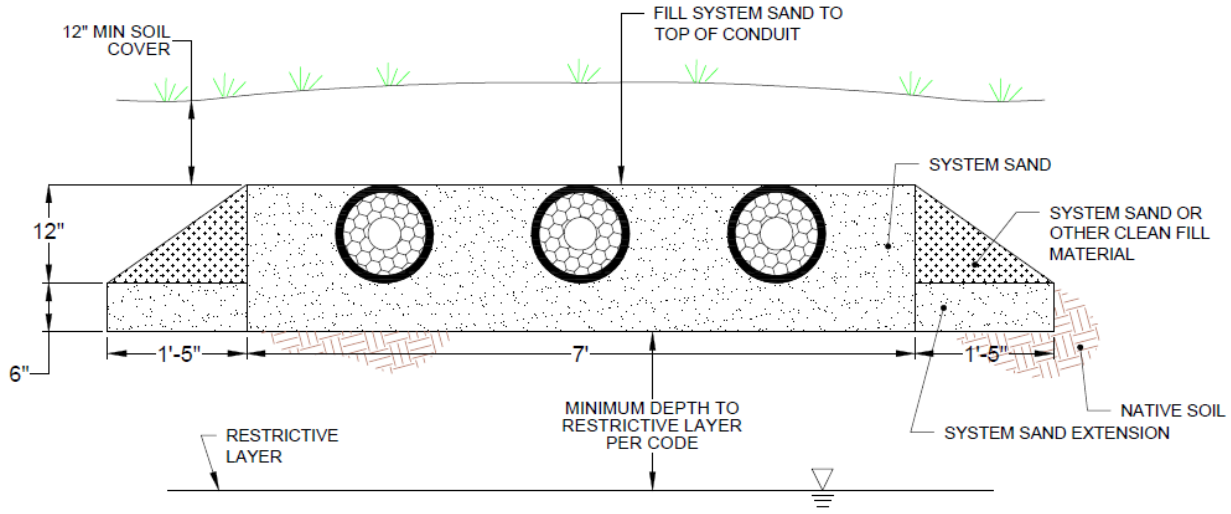

Figure 6. Detailed cross-section of an example in-ground ATL System

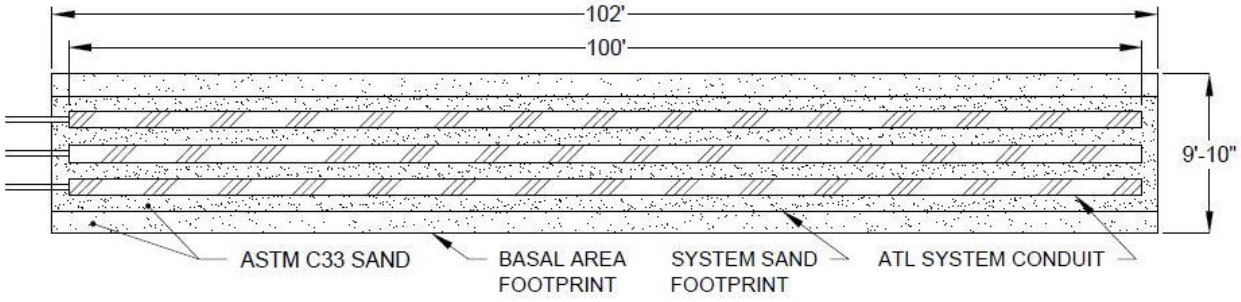

Figure 7. Detailed plan-view of an example in-ground ATL System

XII. PLAN SUBMITTAL AND INSTALLATION INSPECTION

A. Plan Submittal

To install a system correctly, it is important to develop plans that will be used to install the system correctly the first time. The following checklist may be used when preparing plans for review. The checklist is intended to be a **general guide**. Not all needed information may be included in this list. Some of the information may not be required to be submitted due to the design of the system. Conformance to the list is not a guarantee of plan approval. Additional information may be needed or requested to address unusual or unique characteristics of a project. Contact the reviewing agent for specific plan submittal requirements, which the agency may require that are different than the list included in this manual.

General Submittal Information

- Photocopies of soil report forms, plans, and other documents are acceptable. However, an original signature is required on certain documents.
- Submittal of additional information requested during plan review or questions concerning a specific plan must be referenced to the Plan Identification indicator assigned to that plan by the reviewing agency.
- Plans or documents must be permanent copies or originals.

Forms and Fees

- Application form for submittal, provided by reviewing agency along with proper fees set by reviewing agent.

Soils Information

- Complete Soils and Site Evaluation Report (form # SBD-8330) for each soil boring described; signed and dated by a certified soil tester, with license number.
- Separate sheet showing the location of all borings. The location of all borings and backhoe pits must be able to be identified on the plot plan.

Documentation

- Architects, engineers or designers must sign, seal and date each page of the submittal or provide an index page, which is signed, sealed and dated.
- Master Plumbers must sign, date and include their license number on each page of the submittal or provide an index page, which is signed, sealed and dated.
- Three completed sets of plans and specifications (clear, permanent and legible); submittals must be on paper measuring at least 8-1/2 by 11 inches.
- Designs that are based on department approved component manual(s) must include reference to the manual by name, publication number and published date.

Plot Plan

- Dimensioned plans or plans drawn to scale (scale indicated on plans) with parcel size or all property boundaries clearly marked.
- Slope directions and percent in system area.
- Bench mark and north arrow.
- Setbacks indicated as per appropriate code.
- Two-foot contours or other appropriate contour interval within the system area.
- Location information; legal description of parcel must be noted.
- Location of any nearby existing system or well.

Plan View

- Dimensions for distribution cell(s).
- Location of observation pipes.
- Dimensions of ATL System in-ground soil absorption component.
- Pipe lateral layout, which must include the number of laterals, pipe material, diameter and length; and number, location and size of orifices.

- Manifold and force main locations, with materials, length and diameter of each.

Cross Section of System

- Include tilling requirement, distribution cell details, percent slope, side slope, and cover material.
- Lateral elevation, position of observation pipes, dimensions of distribution cell, and type of cover material such as geotextile fabric, if applicable.

System Sizing

- For one and two-family dwellings, the number of bedrooms must be included.
- For public buildings, the sizing calculations must be included.

Tank and Pump or Siphon Information

- All construction details for site-constructed tanks.
- Size and manufacturer information for prefabricated tanks.
- Notation of pump or siphon model, pump performance curve, friction loss for force main and calculation for total dynamic head.
- Notation of high water alarm manufacturer and model number.
- Cross section of dose tank / chamber to include storage volumes; connections for piping, and power; pump "off" setting; dosing cycle and volume, high water alarm setting, and storage volume above the highwater alarm; and location of manhole.
- Cross section of two compartments tanks or tanks installed in a series must include information listed above.

B. Inspections

Inspection shall be made in accordance with ch. 145.20, Wis. Stats. and SPS 383.26, Wis. Adm. Code. The inspection form on the following two pages may be used. The inspection of the system installation and/or plans is to verify that the system at least conforms to specifications listed in Tables 1 - 3 of this manual.

XIII. POWTS INSPECTION REPORT

(ATTACH TO PERMIT)

GENERAL INFORMATION

Permit Holder's Name	☐ City ☐ Village ☐ Town of	County	Sanitary Permit No.
State Plan ID No.	Tax Parcel No.	Property Address if Available	

TREATMENT COMPONENT INFORMATION			**SETBACKS (FT)**				
TYPE	MANUFACTURER AND MODEL NUMBER	CAPACITY	P/L	WELL	WATER LINE	BLDG.	VENT
SEPTIC							
DOSING							
AERATION							
HOLDING							
FILTER							

PUMP / SIPHON INFORMATION

Manufacturer:	Model No.	Demand in GPM	TDH - Design

FORCE MAIN INFORMATION			**FRICTION LOSS (FT)**			
Length	Diameter	Dist. To Well	Component Head	Force Main Losses	Vert. Lift	TDH - As Built

SOIL ABSORPTION COMPONENT

TYPE OF COMPONENT:			COVER MATERIAL:			
Cell Width	Cell Length	Cell Depth	Cell Spacing	No. of Cells		
UNIT		Manufacturer: ATL L.P.			Model No.	
SETBACK INFO. (FT)	Property Line	Bldg.	Well		Water Line	OHWM

DISTRIBUTION COMPONENT

Elevation data on back of form

Header / Manifold		Distribution Lateral(s)			Orifice size	Orifice Spacing	Obs. Pipes Inst. & No.
Length	Dia.	Length	Dia.	Spacing			

SOIL COVER

Depth over center of cell:	Depth over edge of cell:	Depth of Cover material	Texture	Seeded / Sodded	Mulched

DEVIATIONS FROM APPROVED PLAN

DATE OF INST. DIRECTIVE:	DATE OF ENFORCEMENT ORDER:
DATE OF REFERRAL TO LEGAL COUNSEL:	

COMMENTS (Persons present, discrepancies, etc.)

COMPONENTS NOT INSPECTED

Plan Revision Required ☐ Yes ☐ No	Date:	Signature of Inspector:	Cert. Number

Sketch on other side

ELEVATION DATA

Point	Back sight	Height of instrument	Foresight	Elevation	Comments
Bench mark					
Bldg. Sewer					
Tank inlet					
Tank outlet					
Tank inlet					
Tank outlet					
Dose tank inlet					
Bottom of dose tank					
Dist. lateral 1					
System elev. 1					
Dist. lateral 2					
System elev. 2					
Dist. lateral 3					
System elev. 3					
Grade elev. 1					
Grade elev. 2					
Grade elev. 3					

SKETCH OF COMPONENT & ADDITIONAL COMMENTS