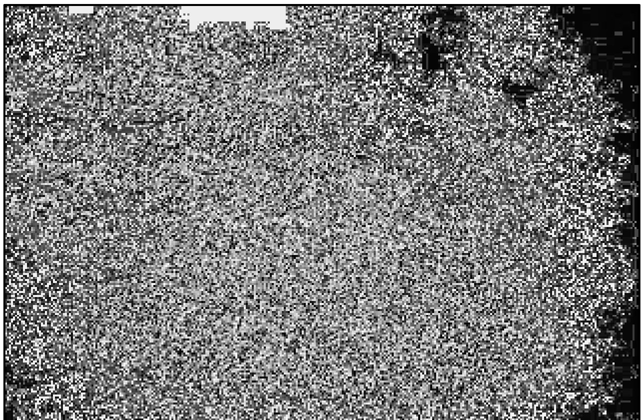
4.3.7 Infiltration Trench

General Application Stormwater BMP



Description: An infiltration trench is an excavated trench filled with stone aggregate used to capture and allow infiltration of stormwater runoff into the surrounding soils from the bottom and sides of the trench.

KEY CONSIDERATIONS

DESIGN GUIDELINES:

- Soil infiltration rate of 0.5 in/hr or greater required.
- Excavated trench (3 to 8 foot depth) filled with stone media (1.5- to 2.5-inch diameter); pea gravel and sand filter layers.
- A sediment forebay and grass channel, or equivalent upstream pretreatment, must be provided.
- Observation well to monitor percolation.
- Size of drainage area.

ADVANTAGES / BENEFITS:

- Provides for groundwater recharge.
- Good for small sites with porous soils.

DISADVANTAGES / LIMITATIONS:

- Potential for groundwater contamination.
- High clogging potential; should not be used on sites with fine-particled soils (clays or silts) in drainage area.
- Significant setback requirements.
- Restrictions in karst areas.
- Geotechnical testing required, two borings per facility.

MAINTENANCE REQUIREMENTS:

- Inspect for clogging.
- Remove sediment from forebay.
- Replace pea gravel layer as needed.

STORMWATER MANAGEMENT SUITABILITY

- [✓] **Water Quality**
- [✷] **Channel Protection**
- [ ] **Overbank Flood Protection**
- [ ] **Extreme Flood Protection**

Accepts Hotspot Runoff: *No*

✷ in certain situations

FEASABILITY CONSIDERATIONS

- [M] **Land Requirement**
- [H] **Capital Cost**
- [H] **Maintenance Burden**

Residential Subdivision Use: *Yes*

High Density/Ultra-Urban: *Yes*

Drainage Area: *5 acres max.*

Soils: *Pervious soils required (0.5 in/hr or greater)*

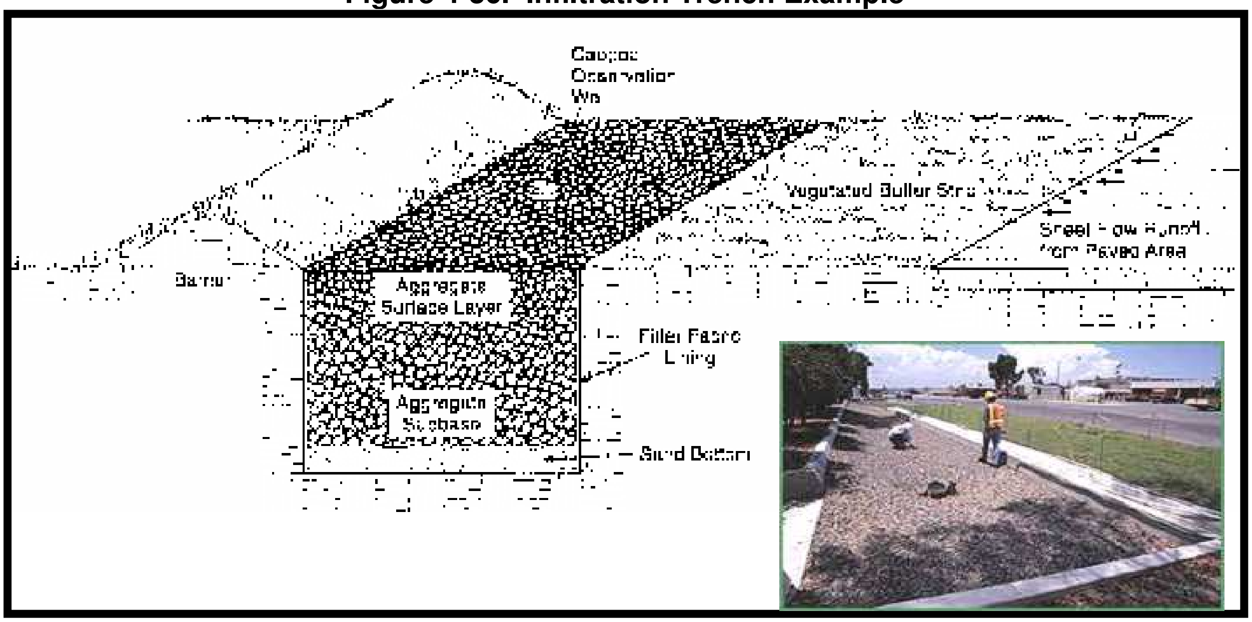
POLLUTANT REMOVAL		OTHER CONSIDERATIONS:
H	**Total Suspended Solids**	• Must not be placed under pavement or concrete
M	**Nutrients** - Total Phosphorus / Total Nitrogen	
H	**Metals** - Cadmium, Copper, Lead, and Zinc	**L**=Low **M**=Moderate **H**=High
H	**Pathogens** - Coliform, Streptococci, E.Coli	

4.3.7.1 General Description

Infiltration trenches are excavations typically filled with stone to create an underground reservoir for stormwater runoff (see Figure 4-36). This runoff volume gradually infiltrates through the bottom and sides of the trench into the subsoil over a 2-day period and eventually reaches the water table. By diverting runoff into the soil, an infiltration trench not only treats the water quality volume, but also helps to preserve the natural water balance on a site and can recharge groundwater and preserve baseflow. Due to this fact, infiltration systems are limited to areas with highly porous soils where the water table and/or bedrock are located well below the bottom of the trench. In addition, infiltration trenches must be carefully sited to avoid the potential of groundwater contamination.

Infiltration trenches are not intended to trap sediment and must always be designed with a sediment forebay and grass channel or filter strip, or other appropriate pretreatment measures to prevent clogging and failure. Due to their high potential for failure, these facilities must only be considered for sites where upstream sediment control can be ensured.

Figure 4-36. Infiltration Trench Example



4.3.7.2 Stormwater Management Suitability

Infiltration trenches are designed primarily for stormwater quality. However, they can provide limited runoff quantity control, particularly for smaller storm events. For some smaller sites, trenches can be designed to capture and infiltrate the channel protection volume (CPv) in addition to the water quality volume (WQv). An infiltration trench will need to be used in conjunction with another structural BMP to provide overbank and extreme flood protection, if required.

Water Quality (WQv)
Using the natural filtering properties of soil, infiltration trenches can remove a wide variety of pollutants from stormwater through sorption, percolation, filtering, and bacterial and chemical degradation. Sediment load and other suspended solids are removed from runoff by pretreatment measures in the facility that treat flows before they reach the trench surface.

Channel Protection (CPv)
For smaller sites, an infiltration trench may be designed to capture and infiltrate the entire CPv in either an off- or on-line configuration. For larger sites, or where only the WQv is diverted to the trench, another structural BMP must be used to provide CPv extended detention.

Overbank Flood Protection (up to Qp_{25}) and Extreme Flood Protection (Qp_{100})
Another structural BMP, such as a conventional detention pond, must be used in conjunction with an infiltration trench system to provide flood protection. All infiltration trench facilities must provide flow diversion and/or be designed to safely pass extreme storm flows and protect the filter bed and facility. The volume of runoff removed and treated by the infiltration trench may be considered in the calculations for overbank and extreme flood protection. Volume 2, Chapter 3 of this manual will provide additional information on the design and sizing calculations.

4.3.7.3 Pollutant Removal Capabilities

An infiltration trench is presumed to be able to remove 90% of the total suspended solids load in typical urban post-development runoff when sized, designed, constructed and maintained in accordance with the recommended specifications. The TSS removal performance is reduced for undersized, poorly designed, or unmaintained infiltration trenches.

Additionally, research has shown that use of enhanced swales will have benefits beyond the removal of TSS, such as the removal of other pollutants (i.e., phosphorous, nitrogen, fecal coliform and heavy metals), as well, which is useful information should the pollutant removal criteria change in the future. The following design pollutant removal rates are conservative average pollutant reduction percentages for design purposes derived from sampling data, modeling and professional judgment. In a situation where a removal rate is not deemed sufficient, additional controls may be put in place at the given site in a series or “treatment train” approach.

- Total Suspended Solids – 90%
- Total Phosphorus – 60%
- Total Nitrogen – 60%
- Pathogens – 90%
- Heavy Metals – 90%

For additional information and data on pollutant removal capabilities for infiltration trenches, see the National Pollutant Removal Performance Database (2nd Edition) available at www.cwp.org and the International Stormwater Best Management Practices (BMP) Database at www.bmpdatabase.org.

4.3.7.4 Application and Site Feasibility Criteria

Infiltration trenches are generally suited for medium-to-high density residential and commercial developments where the subsoil is sufficiently permeable to provide a reasonable infiltration rate and the water table is low enough to prevent groundwater contamination. They are applicable primarily for impervious areas where there are not high levels of fine particulates (clay/silt soils) in the runoff and should only be considered for sites where the sediment load is relatively low.

Infiltration trenches can either be used to capture sheet flow from a drainage area or function as an off-line device. Due to the relatively narrow shape, infiltration trenches can be adapted to many different types of sites and can be utilized in retrofit situations. Unlike some other structural stormwater BMPs, they can easily fit into the margin, perimeter, or other unused areas of developed sites.

To protect groundwater from potential contamination, infiltration trenches cannot be utilized to treat runoff from land uses that require a Special Pollution Abatement Permit without additional upstream best management practices (BMPs) that are designed to capture and/or treat the SPAP pollutants. Further, infiltration trenches will not be allowed for other pollutant hotspot land uses or activities, as identified by the Director of Engineering and Public Works (the Director). For example, infiltration trenches should not be used for manufacturing and industrial sites, where there is a potential for high concentrations of soluble pollutants and heavy metals, or for areas that may have a high pesticide concentration. Infiltration trenches are also not suitable in areas with karst geology without adequate geotechnical testing by qualified individuals.

The following criteria should be evaluated to ensure the suitability of an infiltration trench for meeting stormwater management objectives on a site or development.

General Feasibility

- Suitable for use in a residential subdivision
- Suitable for use in high density/ultra-urban areas
- Not suitable for use as a regional (i.e., off-site or treating more than one site) stormwater control

Physical Feasibility - Physical Constraints at Project Site

- Drainage Area – 5 acres maximum
- Space Required – Will vary depending on the depth of the facility
- Site Slope – No more than 6% slope (for pre-construction facility footprint) across the location of the infiltration trench
- Minimum Head – Elevation difference needed from the inflow of the infiltration trench to the outflow: 1 foot
- Minimum Depth to Water Table – 4 feet recommended between the bottom of the infiltration trench and the elevation of the seasonally high water table
- Soils – Infiltration rate greater than 0.5 inches per hour required (typically hydrologic group "A", some group "B" soils)

Other Constraints/Considerations

- Wellhead Protection – Reduce potential groundwater contamination (in required wellhead protection areas) by preventing infiltration of hotspot runoff. May require liner for type "A" and "B" soils; pretreat hotspots; provide 2 to 4 foot separation distance from water table.

4.3.7.5 Planning and Design Standards

The following standards are to be considered **minimum** standards for the design of an infiltration trench facility. Consult with Knox County Engineering to determine if there are any variations to these criteria or additional standards that must be followed.

A. CONSTRUCTION SEQUENCING

- Care should be taken during construction to minimize the risk of premature failure of the infiltration trench due to deposition of sediments from disturbed, unstabilized areas. This can be minimized or avoided by proper construction sequencing.
- Ideally, the construction of an infiltration trench should take place **after** the construction site has been stabilized. In the event that the trench is not constructed after site stabilization, diversion of site runoff around the trench and installation and maintenance of appropriate erosion prevention and sediment controls prior to site stabilization is required.
- Diversion berms shall be maintained around an infiltration trench during all phases of construction. No runoff shall enter the infiltration trench area prior to completion of construction and the complete stabilization of construction areas. Erosion prevention and sediment controls shall be maintained

around the infiltration trench to prevent runoff and sediment from entering the trench during construction.

- Infiltration trenches shall not be used as a temporary sediment trap for construction activities.
- During and after excavation of the infiltration trench, all excavated materials shall be placed downstream, away from the trench, to prevent redeposit of the material during runoff events.

B. LOCATION AND SITING

- To be suitable for infiltration, underlying soils should have an infiltration rate (f_c) of 0.5 inches per hour or greater, as initially determined from NRCS soil textural classification, and subsequently confirmed by field geotechnical tests. The minimum geotechnical testing is one test hole per 5,000 square feet, with a minimum of two borings per facility (taken within the proposed limits of the facility). Infiltration trenches cannot be used in fill soils.
- Heavy equipment shall not be utilized in the area where the infiltration trench will be located. Soil compaction will adversely affect the performance of the trench. Infiltration trench sites should be roped-off and flagged during construction.
- During excavation and trench construction, only light equipment such as backhoes or wheel and ladder type trenchers should be used to minimize compaction of surrounding soils.
- Infiltration trenches should have a contributing drainage area of 5 acres or less.
- Soils on the drainage area tributary to an infiltration trench should have a clay content of less than 20% and a silt/clay content of less than 40% to prevent clogging and failure.
- There should be at least 4 feet between the bottom of the infiltration trench and the elevation of the seasonally high water table.
- Clay lenses, bedrock or other restrictive layers below the bottom of the trench will reduce infiltration rates unless excavated.

Minimum setback requirements for infiltration trench facilities (when not specified by Knox County):

- ➢ From a building foundation – 25 feet
- ➢ From a private well – 100 feet
- ➢ From a public water supply well – 1,200 feet
- ➢ From a septic system tank/leach field – 100 feet
- ➢ From surface waters – 100 feet
- ➢ From surface drinking water sources – 400 feet (100 feet for a tributary)

- When used in an off-line configuration, the water quality volume (WQv) is diverted to the infiltration trench through the use of a flow splitter. Stormwater flows greater than the WQv are diverted to other controls or downstream using a diversion structure or flow splitter.
- To reduce the potential for costly maintenance and/or system reconstruction, it is strongly recommended that the trench be located in an open or lawn area, with the top of the structure as close to the ground surface as possible. Infiltration trenches shall not be located beneath paved surfaces, such as parking lots.
- Infiltration trenches are designed for intermittent flow and must be allowed to drain and allow reaeration of the surrounding soil between rainfall events. They must not be used on sites with a continuous flow from groundwater, sump pumps, or other sources.

C. GENERAL DESIGN

- A well-designed infiltration trench consists of:

  (1) Excavated shallow trench backfilled with sand, coarse stone, and pea gravel, and lined with a filter fabric;

(2) Appropriate pretreatment measures; and

(3) One or more observation wells to show how quickly the trench dewaters or to determine if the device is clogged.

Figure 4-37 provides a plan view and profile schematic for the design of an off-line infiltration trench facility. An example of an observation well is shown in Figure 4-38.

D. PHYSICAL SPECIFICATIONS / GEOMETRY

- The required trench storage volume is equal to the water quality volume (WQv). For smaller sites, an infiltration trench can be designed with a larger storage volume to include the channel protection volume (CPv).
- A trench must be designed to fully dewater the entire WQv within 24 to 48 hours after a rainfall event. The slowest infiltration rate obtained from tests performed at the site should be used in the design calculations.
- Trench depths should be between 3 and 8 feet, to provide for easier maintenance. The width of a trench must be less than 25 feet.
- Broad, shallow trenches reduce the risk of clogging by spreading the flow over a larger area for infiltration.
- The surface area required is calculated based on the trench depth, soil infiltration rate, aggregate void space, and fill time (assume a fill time of 2 hours for most designs).
- The bottom slope of a trench should be flat across its length and width to evenly distribute flows, encourage uniform infiltration through the bottom, and reduce the risk of clogging.
- The stone aggregate used in the trench should be washed, bank-run gravel, 1.5 to 2.5 inches in diameter with a void space of about 40%. Aggregate contaminated with soil shall not be used. A porosity value (void space/total volume) of 0.32 should be used in calculations, unless aggregate specific data exist.
- A 6-inch layer of clean, washed sand is placed on the bottom of the trench to encourage drainage and prevent compaction of the native soil while the stone aggregate is added.
- The infiltration trench is lined on the sides and top by an appropriate geotextile filter fabric that prevents soil piping but has greater permeability than the parent soil. The top layer of filter fabric is located 2 to 6 inches from the top of the trench and serves to prevent sediment from passing into the stone aggregate. Since this top layer serves as a sediment barrier, it will need to be replaced more frequently and must be readily separated from the side sections.
- The top surface of the infiltration trench above the filter fabric is typically covered with pea gravel. The pea gravel layer improves sediment filtering and maximizes the pollutant removal in the top of the trench. In addition, it can easily be removed and replaced should the device begin to clog. Alternatively, the trench can be covered with permeable topsoil and planted with grass in a landscaped area.
- An observation well must be installed in every infiltration trench and should consist of a perforated PVC pipe, 4 to 6 inches in diameter, extending to the bottom of the trench. The observation well will show the rate of dewatering after a storm, as well as provide a means of determining sediment levels at the bottom and when the filter fabric at the top is clogged and maintenance is needed. It should be installed along the centerline of the structure, flush with the ground elevation of the trench. A visible floating marker should be provided to indicate the water level. The top of the well should be capped and locked to discourage vandalism and tampering.
- The trench excavation should be limited to the width and depth specified in the design. Excavated material should be placed away from the open trench so as not to jeopardize the stability of the trench sidewalls. The bottom of the excavated trench shall not be loaded in a way that causes soil compaction, and should be scarified prior to placement of sand. The sides of the trench shall be

trimmed of all large roots. The sidewalls shall be uniform with no voids and scarified prior to backfilling. All infiltration trench facilities should be protected during site construction and should be constructed after upstream areas have been stabilized.

- Smearing of the soil at its interface with the trench bottom or sides must be avoided or corrected. Smearing can be corrected by raking or roto-tilling.

E. PRETREATMENT / INLETS

- Pretreatment facilities **must always** be used in conjunction with an infiltration trench to prevent clogging and failure.
- For a trench receiving sheet flow from an adjacent drainage area, the pretreatment system should consist of a vegetated filter strip with a minimum 25-foot length. A vegetated buffer strip around the entire trench is required if the facility is receiving runoff from both directions. If the infiltration rate for the underlying soils is greater than 2 inches per hour, 50% of the WQv should be pretreated by another method prior to reaching the infiltration trench.
- For an off-line configuration, pretreatment should consist of a sediment forebay, vault, plunge pool, or similar sedimentation chamber (with energy dissipaters) sized to 25% of the water quality volume (WQv). Exit velocities from the pretreatment chamber must be non-erosive for the 2-year design storm.

F. OUTLET STRUCTURES

- Outlet structures are not required for infiltration trenches.

G. EMERGENCY SPILLWAY

- Typically for off-line designs, there is no need for an emergency spillway. However, a non-erosive overflow channel should be provided to safely pass flows that exceed the storage capacity of the trench to a stabilized downstream area or watercourse.

H. MAINTENANCE ACCESS

- A minimum 20' wide maintenance right-of-way or drainage easement shall be provide for an infiltration trench, from a driveway, public or private road. The maintenance access easement shall have a maximum slope of no more than 15% and shall have a minimum unobstructed drive path having a width of 12 feet, appropriately stabilized to withstand maintenance equipment and vehicles. Adequate access must be provided to the grates to the filter bed for perimeter sand filter design. Facility designs must enable maintenance personnel to easily remove and replace upper layers of the infiltration media.

I. SAFETY FEATURES

- In general, infiltration trenches are not likely to pose a physical threat to the public and do not need to be fenced.

J. LANDSCAPING

- Vegetated filter strips and buffers should fit into and blend with surrounding area. Native grasses are preferable, if compatible. The trench may be covered with permeable topsoil and planted with grass in a landscaped area

K. ADDITIONAL SITE-SPECIFIC DESIGN CRITERIA AND ISSUES

There are a number of additional site specific design criteria and issues (listed below) that must be considered in the design of a infiltration trench.

Physiographic Factors - Local terrain design constraints

- High Relief – Maximum site slope of 6%
- Karst – Not suitable without adequate geotechnical testing

Special Downstream Watershed Considerations

- Wellhead Protection – Reduce potential groundwater contamination (in required wellhead protection areas) by preventing infiltration of hotspot runoff. May require liner for type "A" and "B" soils; Pretreat hotspots; provide 2 to 4 foot separation distance from water table.

4.3.7.6 Design Procedures

Step 1. Compute runoff control volumes

Calculate WQv, CPv, Qp_2, Qp_{10}, Qp_{25}, and Qp_{100}, in accordance with the guidance presented in Volume 2, Chapter 3.

Step 2. Determine if the development site and conditions are appropriate for the use of an infiltration trench.

Consider the Application and Site Feasibility Criteria in subsections 4.3.7.4 and 4.3.7.5-B (Location and Siting).

Step 3. Confirm design criteria and applicability

Consider any special site-specific design conditions/criteria from subsection 4.3.7.5-K (Additional Site-Specific Design Criteria and Issues).

Check with Knox County and other agencies to determine if there are any additional restrictions and/or surface water or watershed requirements that may apply.

Step 4. Compute WQv peak discharge (Q_{wq})

The peak rate of discharge for water quality design storm is needed for sizing of off-line diversion (see Volume 2, Chapter 3 for more information).

Step 5. Size flow diversion structure, if needed

A flow regulator (or flow splitter diversion structure) should be supplied to divert the WQv to the infiltration trench.

Size low flow orifice, weir, or other device to pass Q_{wq}.

Step 6. Size infiltration trench

The area of the trench can be determined from the following equation:

$$A = \frac{WQv}{(nd + kT/12)}$$

where:

A = Surface Area
WQv = Water Quality Volume (or total volume to be infiltrated)
n = porosity
d = trench depth (feet)
k = percolation (inches/hour)
T = Fill Time (time for the practice to fill with water), in hours

A porosity value *n* = 0.32 should be used.

All infiltration systems should be designed to fully dewater the entire WQv within 24 to 48 hours after the rainfall event.

A fill time T=2 hours can be used for most designs.
See subsection 4.3.7.5-D (Physical Specifications/Geometry) for more specifications.

Step 7. Determine pretreatment volume and design pretreatment measures

Size pretreatment facility to treat 25% of the water quality volume (WQv) for off-line configurations. See subsection 4.3.7.5-E (Pretreatment / Inlets) for more details.

Step 8. Design spillway(s)

Adequate stormwater outfalls should be provided for the overflow exceeding the capacity of the trench, ensuring non-erosive velocities on the down-slope.

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4.3.7.7 Maintenance Requirements and Inspection Checklist

Note: Section 4.3.7.7 must be included in the Operations and Maintenance Plan that is recorded with the deed.

Regular inspection and maintenance is critical to the effective operation of an infiltration trench as designed. It is the responsibility of the property owner to maintain all stormwater BMPs in accordance with the minimum design standards and other guidance provided in this manual. The Director has the authority to impose additional maintenance requirements where deemed necessary.

This page provides guidance on maintenance activities that are typically required for infiltration trenches, along with a suggested frequency for each activity. Individual trenches may have more, or less, frequent maintenance needs, depending upon a variety of factors including the occurrence of large storm events, overly wet or dry (i.e.., drought) regional hydrologic conditions, and any changes or redevelopment in the upstream land use. Each property owner shall perform the activities identified below at the frequency needed to maintain the infiltration trench in proper operating condition at all times.

Inspection Activities	Suggested Schedule
• A record should be kept of the dewatering time (i.e., the time required to drain the infiltration trench completely after a storm event) of the trench to determine if maintenance is necessary. The trench should drain completely in about 24 hours after the end of the rainfall. Ponded water inside the trench (as visible from the observation well or on the surface) longer than 24 hours or several days after a storm event is an indication that the trench is clogged.	After Rain Events
• Check that the area draining to the trench, the trench and its inlets are clear of debris. • Check the area draining to the trench for evidence of erosion.	Monthly
• Check observation wells following 3 days of dry weather. Failure to percolate within this time period indicates clogging. • Inspect pretreatment devices and diversion structures for sediment build-up and structural damage.	Semi-annual Inspection
Maintenance Activities	**Suggested Schedule**
• Remove sediment and oil/grease from pretreatment devices, as well as overflow structures. • Mow grass filter strips as necessary. Remove grass clippings.	Monthly
• Remove trees that start to grow in the vicinity of the trench.	Semi-annual Inspection
• Replace pea gravel/topsoil and top surface filter fabric (when clogged). Removed sediment and media may usually be disposed of in a landfill. • Stabilize (i.e., vegetate or cover) areas of erosion in the area draining to the trench.	As needed
• Perform total rehabilitation of the trench to maintain design storage capacity. • Excavate trench walls to expose clean soil.	Upon Failure

Knox County encourages the use of the inspection checklist that is presented on the next page to guide the property owner in the inspection and maintenance of an infiltration trench. The Director can require the use of this checklist or other form(s) of maintenance documentation when and where deemed necessary in order to ensure the long-term proper operation of the trench. Questions regarding stormwater facility inspection and maintenance should be referred to the Knox County Department of Engineering and Public Works, Stormwater Management Division.

INSPECTION CHECKLIST AND MAINTENANCE GUIDANCE (continued)
INFILTRATION TRENCH INSPECTION CHECKLIST

Location: ____ Owner Change since last inspection? Y N

Owner Name, Address, Phone: ____

Date: ___________ Time: ______________ Site conditions:____

Inspection Items	Satisfactory (S) or Unsatisfactory (U)	Comments/Corrective Action
Inspection List		
Complete drainage of the filter in about 24 to 48 hours after a rain event?		
Clogging of trench surface?		
Clogging of inlet/outlet structures?		
Standing water in observation well when no water should be present?		
Trench clear of debris and functional?		
Evidence of leaks or seeps?		
Animal burrows in trench?		
Cracking, spalling, bulging or deterioration of concrete?		
Erosion in area draining to trench?		
Erosion around inlets, trench, or outlets?		
Pipes and other structures in good condition?		
Undesirable vegetation growth?		
Other (describe)?		
Hazards		
Have there been complaints from residents?		
Public hazards noted?		

If any of the above inspection items are **UNSATISFACTORY**, list corrective actions and the corresponding completion dates below:

Corrective Action Needed	Due Date

Inspector Signature:_________________________________ Inspector Name (printed)_____________________________

4.3.7.8 Example Schematics

Figure 4-37. Schematic of Infiltration Trench

(Source: Center for Watershed Protection)

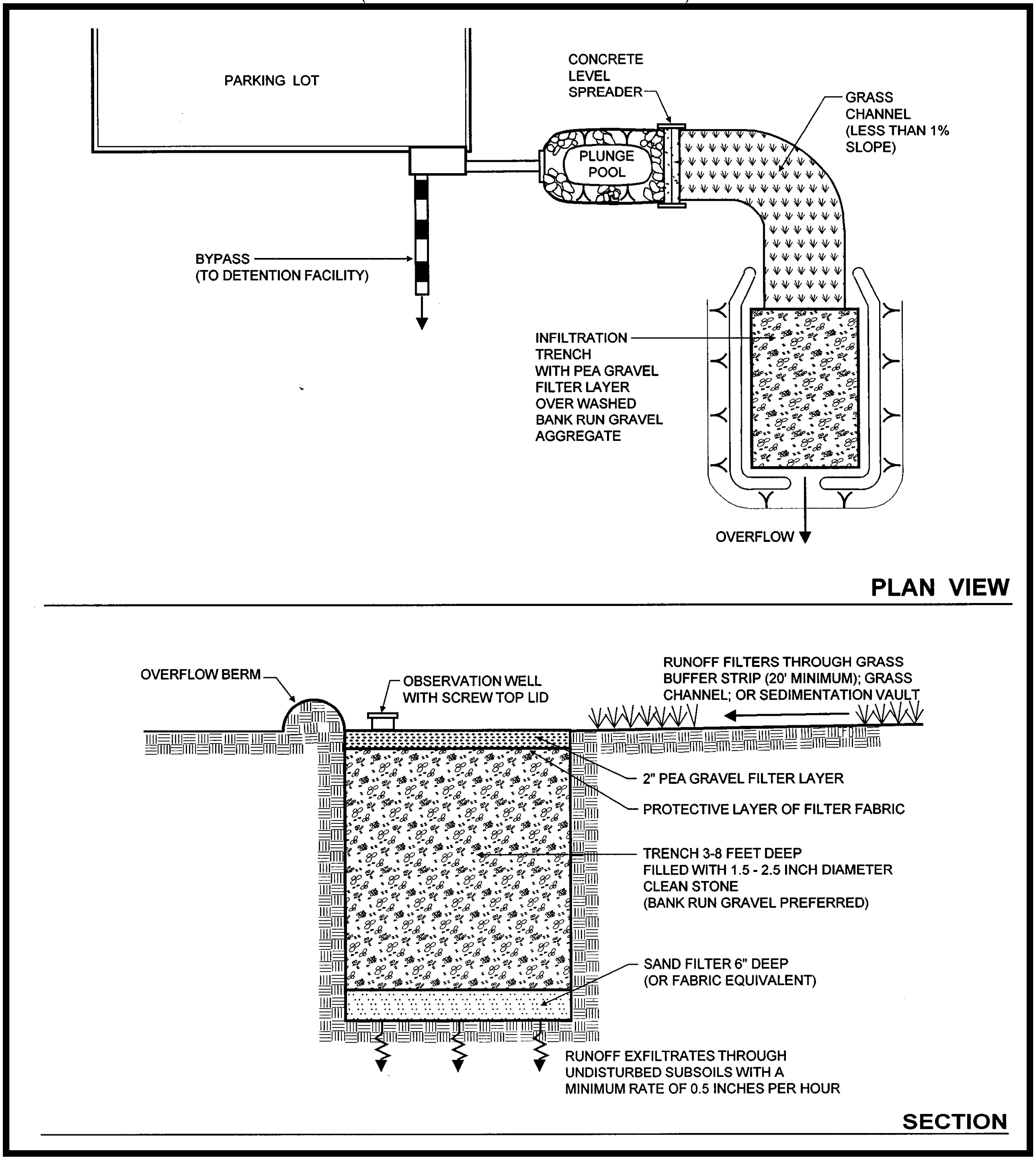
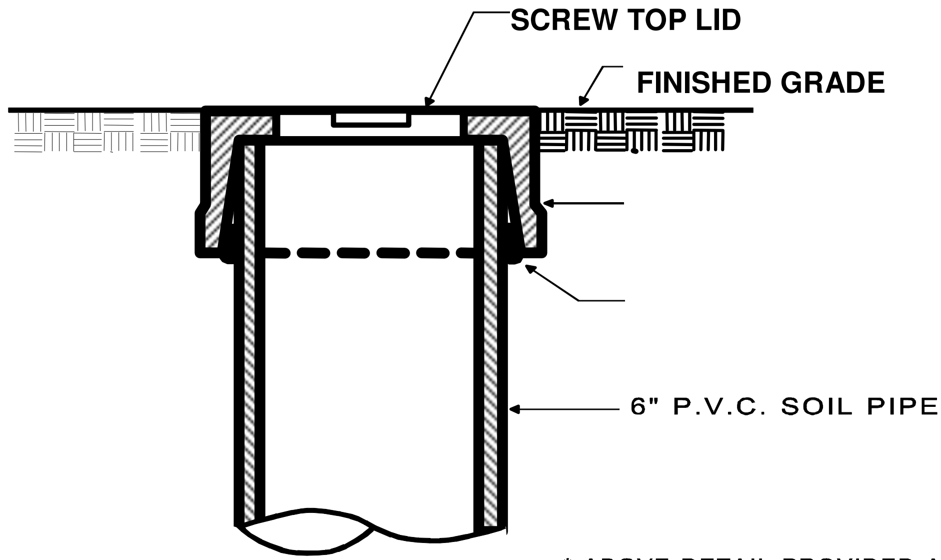


Figure 4-38. Observation Well Detail



* ABOVE DETAIL PROVIDED AS SCHEMATIC
SCREW TOP P.V.C. WELL CAP ONLY

EACH OBSERVATION WELL / CLEANOUT SHALL INCLUDE THE FOLLOWING:

1. FOR AN UNDERGROUND FLUSH MOUNTED OBSERVATION WELL / CLEANOUT, PROVIDE A TUBE MADE OF NON-CORROSIVE MATERIAL, SCHEDULE 40 OR EQUAL, AT LEAST THREE FEET LONG WITH AN INSIDE DIAMETER OF AT LEAST 6 INCHES.

2. THE TUBE SHALL HAVE A FACTORY ATTACHED CAST IRON OR HIGH IMPACT PLASTIC COLLAR WITH RIBS TO PREVENT ROTATION WHEN REMOVING SCREW TOP LID. THE SCREW TOP LID SHALL BE CAST IRON OR HIGH IMPACT PLASTIC THAT WILL WITHSTAND ULTRA-VIOLET RAYS.

4.3.7.9 Design Form

Knox County recommends the use of the following design procedure forms when designing infiltration trenches. Proper use and completion of the form may allow a faster review of the Stormwater Management Plan by Knox County Engineering.

Design Procedure Form: Infiltration Trench

PRELIMINARY HYDROLOGIC CALCULATIONS	
1a. Compute WQv volume requirements	
Compute Runoff Coefficient, R_v	Rv = ________
Compute WQv	WQv = ________ acre-ft
1b. Compute CPv	CPv = ________ acre-ft
Compute average release rate	release rate = ________ cfs
Compute storage volume required for 2-year storm	2-year storage = ________ acre-ft
Compute storage volume required for 10-year storm	10-year storage = ________ acre-ft
Compute storage volume required for 25-year storm	25-year storage = ________ acre-ft
Compute storage volume required for 100-year storm	100-year storage = ________ acre-ft
INFILTRATION TRENCH DESIGN	
2. Is the use of an infiltration trench appropriate?	***See subsections 4.3.7.4 and 4.3.7.5 - B***
3. Confirm local design criteria and applicability.	***See subsection 4.3.7.5 - K***
4. Compute WQv peak discharge (Q_{wq})	
Compute Curve Number	CN = ________
Compute Time of Concentration t_c	t_c = ________ hour
Compute Q_{wq}	Q_{wq} = ________ cfs
5. Size infiltration trench	Area = ________ ft^2
Width must be less than 25 ft	Width = ________ ft
	Length = ________ ft
6. Size the flow diversion structures	
Low flow orifice from orifice equation	
$Q = CA(2gh)^{0.5}$	A = ________ ft^2
C varies with orifice condition	diam. = ________ inch
Overflow weir from weir equation	
$Q = CLH^{3/2}$	Length = ________ ft
7. Pretreatment volume (for offine designs)	
$Vol_{pre} = 0.25(WQv)$	Vol_{pre} = ________ ft^3
8. Design spillway(s)	

4.3.7.10 References

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4.3.7.11 Suggested Reading

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