



# **KING COUNTY DRAINAGE MAINTENANCE STANDARDS** FOR COMMERCIAL AND MULTIFAMILY DRAINAGE FACILITIES



*Definitions, Defects & Maintenance Necessary to Bring to Standard*

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Water and Land Resources Division





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## **A. Type I Catch Basin (also referred to as Inlet) (See Figure A-1 in Appendix)**

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*Definition:* An underground concrete water receiving inlet, rectangular in shape (approximately 3' X 2' X 4' deep) with a slotted iron grate on top to inlet water or a solid rectangular cover. Water may also enter/exit through culverts visible in the side walls of basin.

### **Defect Number & Defect:**

- A-1 Trash & Debris (Including Sediment) Blocking Water From Entering Basin:** Trash or debris of more than 1/2 cubic foot that is covering the catch basin grate or is blocking inlet grate to basin by more than 10%.

*Maintenance Necessary to Bring to Standard:* Remove all trash and debris from the front of the catch basin inlet. If using a vendor, ensure that the vendor properly disposes of waste. If not using a vendor, call the King County Health Department Business Waste Line at 296-3976 for information on how to dispose of waste.

- A-2 Trash & Debris (Including Sediment):** Trash or debris (in the basin) that exceeds one-third the depth from the bottom of the basin to invert of the lowest pipe into or out of the basin. This is the most common maintenance requirement.

*Maintenance Necessary to Bring to Standard:* Remove all trash or debris from the catch basin. If using a vendor, ensure that the vendor properly disposes of waste. If not using a vendor, call the King County Health Department Business Waste Line at 296-3976 for information on how to dispose of waste.

- A-3 Trash & Debris (Including Sediment):** Trash or debris in any inlet or outlet pipe blocking more than one-third of its height.

*Maintenance Necessary to Bring to Standard:* Remove all trash and debris from inlet and outlet pipes. If using a vendor, ensure that the vendor properly disposes of waste. If not using a vendor, call the King County Health Department Business Waste Line at 296-3976 for information on how to dispose of waste.

- A-4 Structural Damage to Frame and/or Top Slab:** Top concrete slab has holes larger than 2 square inches or cracks wider than 1/4 inch (intent is to make sure all material is running into the basin through the grate).

*Maintenance Necessary to Bring to Standard:* Repair top slab so that it is free of holes and cracks.

- A-5 Frame not sitting flush on top slab, i.e., separation of more than 3/4 inch of the frame from the top slab.**

*Maintenance Necessary to Bring to Standard:* Repair so that frame is sitting flush on top slab.

- A-6 Cracks in Basin Walls/Bottom:** Cracks wider than 1/2 inch, any evidence of soil particles or water entering catch basin through cracks, or maintenance person judges that structure is unsound.

*Maintenance Necessary to Bring to Standard:* Replace or repair basin to design standards.

- A-7 Cracks in Basin Around Inletting Culverts:** Cracks wider than 1/2 inch at the joint of any inlet/outlet pipe or any evidence of soil particles or water entering catch basin through cracks.

*Maintenance Necessary to Bring to Standard:* Replace or repair basin to design standards.

**A-8 Settlement/Misalignment:** Basin has settled more than 1 inch or has rotated more than 2 inches out of alignment.

*Maintenance Necessary to Bring to Standard:* Replace or repair basin to design standards.

**A-9 Fire Hazard:** Presence of chemicals such as natural gas, oil, and gasoline.

*Maintenance Necessary to Bring to Standard:* Remove flammable chemicals so that there are none present.

**A-10 Pollution:** Presence of any chemical pollutants.

*Maintenance Necessary to Bring to Standard:* Remove contaminants so that none are present. Coordinate waste disposal with the King County Health Department by phoning their Business Waste Line (296-3976). Also, contact Water and Land Resources Business Services at 296-1900 for a site consultation to eliminate the source of the pollution.

**A-11 Catch Basin Cover Not in Place:** Cover is missing or only partially in place. Any open catch basin requires maintenance.

*Maintenance Necessary to Bring to Standard:* Repair catch basin cover so that it is closed.

**A-12 Metal Grates—Safety Hazard:** Grate with opening wider than 7/8 inch.

*Maintenance Necessary to Bring to Standard:* Repair grate openings so that they meet design standards.

**A-13 Metal Grates—Damaged or Missing:** Grate is missing or has broken members.

*Maintenance Necessary to Bring to Standard:* Repair or replace grate so that it is in place and meets design standards.

## **B. Type II Catch Basin (also referred to as Manhole or Control Manhole)** *(See Figure A-2 in Appendix)*

*Definition:* A round concrete underground basin (4'-8' in diameter; 6' deep or deeper); may contain FROP (Flow Restrictor/Oil Pollution control device). These basins are also required when larger diameter culverts are used.

### **Defect Number & Defect:**

**B-1 Trash & Debris (Including Sediment):** Trash or debris of more than 1/2 cubic foot that is covering the catch basin grate or is blocking inlet to basin by more than 10%.

*Maintenance Necessary to Bring to Standard:* Remove trash and debris so that none is located immediately in front of catch basin inlet. If using a vendor, ensure that the vendor properly disposes of waste. If not using a vendor, call the King County Health Department Business Waste Line at 296-3976 for information on how to dispose of waste.

**B-2 Trash & Debris (Including Sediment):** Trash or debris (in the basin) that exceeds one-third the depth from the bottom of the basin to invert of the lowest pipe into or out of the basin. This is the most common maintenance requirement.

*Maintenance Necessary to Bring to Standard:* Remove all trash and debris from the catch basin. If using a vendor, ensure that the vendor properly disposes of waste. If not using a vendor, call the King County Health Department Business Waste Line at 296-3976 for information on how to dispose of waste.

- B-3 Trash & Debris (Including Sediment):** Trash or debris in any inlet or outlet pipe blocking more than one-third of its height.  
*Maintenance Necessary to Bring to Standard:* Remove all trash and debris from inlet and outlet pipes. If using a vendor, ensure that the vendor properly disposes of waste. If not using a vendor, call the King County Health Department Business Waste Line at 296-3976 for information on how to dispose of waste.
- B-4 Structural Damage to Frame and/or Top Slab:** Top slab has holes larger than 2 square inches or cracks wider than 1/4 inch (intent is to make sure all material is running into the basin).  
*Maintenance Necessary to Bring to Standard:* Repair top slab so that it is free of holes and cracks.
- B-5 Frame not sitting flush on top slab, i.e., separation of more than 3/4 inch of the frame from the top slab.**  
*Maintenance Necessary to Bring to Standard:* Repair so that frame is sitting flush on top slab.
- B-6 Cracks in Basin Walls/Bottom:** Cracks wider than 1/2 inch and longer than 3 feet, any evidence of soil particles or water entering catch basin through cracks, or maintenance person judges that structure is unsound.  
*Maintenance Necessary to Bring to Standard:* Replace or repair basin to design standards.
- B-7 Cracks in Basin Walls/Bottom:** Cracks wider than 1/2 inch and longer than 1 foot at the joint of any inlet/outlet pipe or any evidence of soil particles or water entering catch basin through cracks.  
*Maintenance Necessary to Bring to Standard:* Replace or repair basin to design standards.
- B-8 Settlement/Misalignment:** Basin has settled more than 1 inch or has rotated more than 2 inches out of alignment.  
*Maintenance Necessary to Bring to Standard:* Replace or repair basin to design standards.
- B-9 Fire Hazard:** Presence of chemicals such as natural gas, oil, and gasoline.  
*Maintenance Necessary to Bring to Standard:* Remove flammable chemicals.
- B-10 Pollution:** Presence of any chemical pollutants.  
*Maintenance Necessary to Bring to Standard:* Remove contaminants so that none are present. Coordinate waste disposal with the King County Health Department by phoning their Business Waste Line (296-3976). Also, contact Water and Land Resources Business Services at 296-1900 for a site consultation to eliminate the source of the pollution.
- B-11 Catch Basin Cover Not in Place:** Cover is missing or only partially in place. Any open catch basin requires maintenance.  
*Maintenance Necessary to Bring to Standard:* Repair or replace catch basin cover so that it is closed.
- B-12 Metal Grates—Safety Hazard:** Grate with opening wider than 7/8 inch.  
*Maintenance Necessary to Bring to Standard:* Repair grate openings so that they meet design standards.

**B-13 Metal Grates—Trash & Debris:** Trash and debris that is blocking more than 20% of grate surface.

*Maintenance Necessary to Bring to Standard:* Remove all trash and debris from grate.

**B-14 Metal Grates—Damaged or Missing:** Grate is missing or has broken members.

*Maintenance Necessary to Bring to Standard:* Repair or replace grate so that it is in place and meets design standards.

**B-15 Ladder Rungs Unsafe:** Maintenance person judges that ladder is unsafe due to missing rungs, misalignment, rust, or cracks.

*Maintenance Necessary to Bring to Standard:* Repair ladder so that it meets design standards and allows maintenance person safe access.

## **Flow Restrictor** (See Figure A-3 in Appendix)

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*Definition:* A facility such as a Flow Restrictor Oil Pollution (FROP) control device or a T Section with a specifically sized orifice(s) to control release rates. Usually located in a Type II Catch Basin/Control Manhole; designated as “CS,” “CSCB,” or “CSMH” on your site plan. There may be a vertical culvert at the outlet (“T”) with additional elbow orifice inlets.

### **Defect Number & Defect:**

**C-1 Trash & Debris (Includes Sediment):** Distance between debris buildup and bottom of orifice plate is less than 1-1/2 feet (18 inches). Similar to **B-2**.

*Maintenance Necessary to Bring to Standard:* Remove all trash and debris. If using a vendor, ensure that the vendor properly disposes of waste. If not using a vendor, call the King County Health Department Business Waste Line at 296-3976 for information on how to dispose of waste.

**C-2 Structural Damage:** Structure is not securely attached to manhole wall (outlet pipe structure should support at least 1,000 pounds of up or down pressure); and/or structure is not in upright position (allow up to 10% from plumb). (Structure is usually secured with banding material.)

*Maintenance Necessary to Bring to Standard:* Repair structure to be securely attached to wall so that outlet pipe supports at least 1,000 pounds of up or down pressure; and ensure outlet pipe is in correct position.

**C-3 Structural Damage:** Connections to outlet pipe are not watertight and show signs of rust or deteriorated grout.

*Maintenance Necessary to Bring to Standard:* Repair connections to outlet pipe so that they are watertight; repair or replace structure so that it works as designed.

**C-4 Structural Damage:** Any holes—other than designed holes—in the structure.

*Maintenance Necessary to Bring to Standard:* Repair holes so that structure has no holes other than designed holes.

**C-5 Cleanout Gate:** Cleanout gate is not watertight or is missing.

*Maintenance Necessary to Bring to Standard:* Repair or replace gate so that it is watertight and works as designed.

- C-6 Cleanout Gate:** Gate cannot be moved up and down by one maintenance person.  
*Maintenance Necessary to Bring to Standard:* Repair gate so that it moves up and down easily and is watertight.
- C-7 Cleanout Gate:** Chain or rod leading to gate is missing or damaged (must be accessible from street level).  
*Maintenance Necessary to Bring to Standard:* Repair or replace chain or rod so that it is in place and works as designed.
- C-8 Cleanout Gate:** Gate is rusted over 50% of its surface area.  
*Maintenance Necessary to Bring to Standard:* Repair or replace gate to meet design standards.
- C-9 Orifice Plate:** Control device is not working properly due to missing, out of place, or bent orifice plate; or secondary orifice elbows have become loosened from structure.  
*Maintenance Necessary to Bring to Standard:* Repair or replace orificate plate so that it is in place and works as designed.
- C-10 Orifice Plate:** Any trash, debris, sediment, or vegetation blocking the plate  
*Maintenance Necessary to Bring to Standard:* Remove all obstructions so that orificate plate works as designed. If using a vendor, ensure that the vendor properly disposes of waste. If not using a vendor, call the King County Health Department Business Waste Line at 296-3976 for information on how to dispose of waste.
- C-11 Overflow Pipe:** Any trash or debris blocking (or having the potential of blocking) the overflow pipe. (Overflow pipe is at the top of FROP or “T” section device.)  
*Maintenance Necessary to Bring to Standard:* Remove trash and debris so that the overflow pipe is free of all obstructions and works as designed.

## **D. Debris Barrier**

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*Definition:* Metal trash rack.

### **Defect Number & Defect:**

- D-1 Trash & Debris:** Trash or debris that is plugging more than 20% of the openings in the barrier.  
*Maintenance Necessary to Bring to Standard:* Remove trash or debris so that barrier is clear to receive capacity flow.
- D-2 Damaged/Missing Bars:** Bars are bent out of shape more than 3 inches.  
*Maintenance Necessary to Bring to Standard:* Repair or replace bars so that they are in place with no bends more than 3/4 inch.
- D-3 Damaged/Missing Bars:** Bars are missing, or entire barrier is missing.  
*Maintenance Necessary to Bring to Standard:* Repair or replace bars according to design standards.

**D-4 Bars are loose and rust is causing 50% deterioration** to any part of barrier.

*Maintenance Necessary to Bring to Standard:* Repair or replace barrier according to design standards.

## **E. Energy Dissipater**

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*Definition:* A rock pad constructed at inlets/outlets to prevent erosion, or a constructed percolation trench to disperse outletting flows over a large area, or a catch basin used to slow fast flowing runoff. Catch basins may be a part of the dispersion trench; see Type I or Type II Catch Basins (Items A and B) for maintenance requirements.

### **Defect Number & Defect:**

**E-1 Rock Pad—Missing or Moved Rock:** Only one layer of rock exists above native soil in area five square feet or larger, or any exposure of native soil.

*Maintenance Necessary to Bring to Standard:* Replace rocks to design standard.

**E-2 Dispersion Trench—Pipe Plugged with Sediment:** Accumulated sediment that exceeds 20% of the design depth.

*Maintenance Necessary to Bring to Standard:* Clean/flush pipe so that it matches design.

**E-3 Dispersion Trench—Not Discharging Water Properly:** Visual evidence of water discharging at concentrated points along trench (normal condition is a “sheet flow” of water along trench). Intent is to prevent erosion damage.

*Maintenance Necessary to Bring to Standard:* Rebuild trench to design standards.

**E-4 Dispersion Trench—Perforations Plugged:** Over 1/2 of perforations in pipe are plugged with debris and sediment.

*Maintenance Necessary to Bring to Standard:* Clean or replace perforated pipe.

**E-5 Dispersion Trench—Water Flows Out Top of “Distributor” Catch Basin:** Maintenance person observes water flowing out during any storm less than the design storm, or it is causing or appears likely to cause damage.

*Maintenance Necessary to Bring to Standard:* Rebuild facility to design standards.

**E-6 Dispersion Trench—Receiving Area Oversaturated:** Water in receiving area is causing or has potential of causing landslide problems.

*Maintenance Necessary to Bring to Standard:* Ensure that engineer’s evaluation of outlet function and soil stability is satisfactory.

**E-7 Energy Dissipater—Needs Replacement:** Visible signs of pad erosion, or plugged dispersion trenches.

*Maintenance Necessary to Bring to Standard:* Replace energy dissipater.

## **F. Pipe/culvert**

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*Definition:* A conveyance culvert of varying diameter. May be constructed of concrete pipe (CP), corrugated metal pipe (CMP), or smooth wall high density polyethylene pipe (HDPP).

### **Defect Number & Defect:**

- F-1 Sediment & Debris:** Accumulated sediment that exceeds 20% of the diameter of the pipe.  
*Maintenance Necessary to Bring to Standard:* Clean pipe of all sediment and debris.
- F-2 Vegetation:** Vegetation that reduces free movement of water through pipes.  
*Maintenance Necessary to Bring to Standard:* Remove all vegetation so water flows freely through pipes.
- F-3 Protective coating is damaged;** rust is causing more than 50% deterioration to any part of the pipe.  
*Maintenance Necessary to Bring to Standard:* Repair or replace pipe.
- F-4 Joints are visibly misaligned, or culvert alignment is disrupted.**  
*Maintenance Necessary to Bring to Standard:* Realign/connect affected culvert.
- F-5 Damaged Pipe:** Any dent that decreases the cross section area of pipe by more than 20%.  
*Maintenance Necessary to Bring to Standard:* Repair or replace pipe.

## **G. Ditch** (See Figure A-4 in Appendix)

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*Definition:* Conveyance system. May be U-shaped or trapezoidal with flat bottom. May be rock lined.

### **Defect Number & Defect:**

- G-1 Trash & Debris:** Trash and debris exceeds 1 cubic foot per 1,000 square feet of ditch/bioswale and slopes.  
*Maintenance Necessary to Bring to Standard:* Clear trash and debris from ditch or bioswale.
- G-2 Sediment:** Accumulated sediment that exceeds 20% of the design depth.  
*Maintenance Necessary to Bring to Standard:* Clean/flush ditch or bioswale of all sediment and debris so that it matches design.
- G-3 Vegetation:** Vegetation that reduces free movement of water through ditch (vegetation taller than 8 inches or trees such as alders).  
*Maintenance Necessary to Bring to Standard:* Remove vegetation so that water flows freely through ditch or bioswale.
- G-4 Erosion Damage to Slopes:** Eroded damage over 2 inches deep where cause of damage is still present or where there is potential for continued erosion.  
*Maintenance Necessary to Bring to Standard:* Stabilize slopes by using appropriate erosion control measure(s): for example, rock reinforcement, planting of grass, or compaction.

**G-5 Check Dam Sedimentation:** Silt deposition causes standing water behind check dam.

*Maintenance Necessary to Bring to Standard:* Replace check dam; remove silt.

**G-6 Failure of Rock-Lined Ditch:** Erosion or failure of rock slopes of ditch line.

*Maintenance Necessary to Bring to Standard:* Replace/repair rock lining to reestablish ditch cross-section.

## **H. Fencing (Including Gate)**

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*Definition:* Six-foot-high cyclone fence, required by County if pond slopes are steeper than 3:1 to prohibit entry due to safety considerations in steep side slopes.

### **Defect Number & Defect:**

**H-1 Missing or Broken Parts:** Any defect in the fence that permits easy entry to a facility.

*Maintenance Necessary to Bring to Standard:* Repair or replace parts to provide adequate security.

**H-2 Missing or Broken Parts:** Parts broken or missing that can be seen by the public that are below the appearance standards of the neighborhood.

*Maintenance Necessary to Bring to Standard:* Repair or replace broken or missing parts to conform to the standards of the neighborhood.

**H-3 Erosion:** Erosion more than 4 inches high and 12-18 inches wide permitting an opening under a fence.

*Maintenance Necessary to Bring to Standard:* Fill in openings so that there are no openings under the fence that exceed 4 inches in height.

**H-4 Wire Fences—Damaged Parts:** Posts out of plumb more than 6 inches.

*Maintenance Necessary to Bring to Standard:* Correct position so that posts are plumb to within 1-1/2 inches.

**H-5 Wire Fences—Damaged Parts:** Top rails bent more than 6 inches.

*Maintenance Necessary to Bring to Standard:* Repair or replace top rails so that they are free of bends greater than 1 inch.

**H-6 Wire Fences—Damaged Parts:** Any part of fence (including posts, top rails, and fabric) more than 1 foot out of design alignment.

*Maintenance Necessary to Bring to Standard:* Align fence so that it meets design standards.

**H-7 Wire Fences—Damaged Parts:** Missing or loose tension wire.

*Maintenance Necessary to Bring to Standard:* Repair or replace tension wire so that it is in place and holding fabric.

**H-8 Wire Fences—Damaged Parts:** Missing or loose barbed wire that is sagging more than 2-1/2 inches between posts.

*Maintenance Necessary to Bring to Standard:* Repair or replace barbed wire so that it is in place with less than 3/4 inch sag between posts.

**H-9 Wire Fences—Damaged Parts:** Extension arm missing, broken, or bent out of shape more than 1-1/2 inches.

*Maintenance Necessary to Bring to Standard:* Repair or replace extension arm so that it is in place with no bends larger than 3/4 inch.

**H-10 Wire Fences—Deteriorated Paint or Protective Coating:** Part or parts have a rusting or scaling condition that has affected structural adequacy.

*Maintenance Necessary to Bring to Standard:* Repair posts or parts so that they are structurally adequate with a uniform protective coating.

**H-11 Wire Fences or Gates—Openings in Fabric:** Openings in fabric are such that an 8 inch diameter ball could fit through (intent is to prevent a small child from entering).

*Maintenance Necessary to Bring to Standard:* Repair fabric so that there are no openings in fence.

**H-12 Gates—Damaged or Missing Members:** Missing gate or locking devices.

*Maintenance Necessary to Bring to Standard:* Repair or replace gates and locking devices so that all are in place.

**H-13 Gates—Damaged or Missing Members:** Broken or missing hinges such that gate cannot be easily opened and closed by a maintenance person.

*Maintenance Necessary to Bring to Standard:* Repair or replace hinges so that they are intact and lubed, and gate is working freely.

**H-14 Gates—Damaged or Missing Members:** Gate is out of plumb more than 6 inches and more than 1 foot out of design alignment.

*Maintenance Necessary to Bring to Standard:* Align gate so that it is vertical.

**H-15 Gates—Damaged or Missing Members:** Missing stretcher bar, stretcher bands, and ties.

*Maintenance Necessary to Bring to Standard:* Repair or replace stretcher bar, bands, and ties so that all are in place.

## **I. Access Road**

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*Definition:* Minimum of 12 feet wide, may be constructed of class “B” road material, AC pavement or heavier fabric/spall sections. Used to access control structure and other facility components.

### **Defect Number & Defect:**

**I-1 Trash & Debris:** Trash and debris exceeds 1 cubic foot per 1,000 square feet; i.e., trash and debris would fill up one standard-sized garbage can.

*Maintenance Necessary to Bring to Standard:* Clear trash and debris from site.

- I-2 Blocked Roadway/Safety Hazard:** Debris that could damage vehicle tires (glass or metal).  
*Maintenance Necessary to Bring to Standard:* Remove debris so that roadway is free of debris that could damage tires.
  
- I-3 Blocked Roadway/Safety Hazard:** Any obstructions or vegetation that reduces clearance above road surface to less than 14 feet.  
*Maintenance Necessary to Bring to Standard:* Remove obstructions or vegetation so that roadway overhead is clear to 14 feet high.
  
- I-4 Blocked Roadway/Safety Hazard:** Any obstructions or vegetation restricting the access to a 10- to 12-foot width for a distance of more than 12 feet or at any point restricting access to less than a 10-foot width.  
*Maintenance Necessary to Bring to Standard:* Remove obstructions to allow at least a 12-foot access.
  
- I-5 Road Surface:** Settlement, Potholes, Mush Spots, or Ruts: Any surface defect that exceeds 6 inches in depth and 6 square feet in area. In general, any surface defect that hinders or prevents maintenance access.  
*Maintenance Necessary to Bring to Standard:* Repair road surface so that it is uniformly smooth with no evidence of settlement, potholes, mush spots, or ruts.
  
- I-6 Shoulders & Ditches—Erosion Damage:** Erosion within 1 foot of the roadway more than 8 inches wide and 6 inches deep.  
*Maintenance Necessary to Bring to Standard:* Repair shoulder so that it is free of erosion and matching the surrounding road.
  
- I-7 Shoulders & Ditches—Weeds & Brush:** Weeds and brush exceed 18 inches in height or hinder maintenance access.  
*Maintenance Necessary to Bring to Standard:* Cut weeds and brush to 2 inches in height, or clear in such a way as to allow maintenance access.

## **J. Other—Specific to R/D Ponds (Including Infiltration)** *(See Figures A-5 and A-6 in Appendix)*

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### **Defect Number & Defect:**

- J-1 Trash & Debris:** Trash and debris exceed 1 cubic foot per 1000 square feet, or there is visual evidence of dumping.  
*Maintenance Necessary to Bring to Standard:* Clear trash and debris from site.
  
- J-2 Pollution:** Oil, gasoline, or other contaminants of one gallon or more or any amount found that could: 1) cause damage to plant, animal, or marine life; 2) constitute a fire hazard; or 3) be flushed downstream during rain storms.  
*Maintenance Necessary to Bring to Standard:* Remove all contaminants so that none are present. Coordinate waste disposal with the King County Health Department by phoning their Business Waste Line at 296-3976. Also, contact Water and Land Resources Business Services at 296-1900 for a site consultation to eliminate the source of the pollution.

- J-3 Unmowed Grass/Ground Cover (Not Including Infiltration—See J-15):** If facility is located in private residential area, mowing is needed when grass exceeds 18 inches in height. In other areas, the general policy is to make the pond site match adjacent ground cover and terrain as long as there is no interference with the function of the facility.  
*Maintenance Necessary to Bring to Standard:* Mow grass/ground cover to 2 inches in height.
- J-4 Rodent Holes:** Any evidence of rodent holes if facility is acting as a dam or berm, or any evidence of water piping through dam or berm via rodent holes.  
*Maintenance Necessary to Bring to Standard:* Ensure that rodents are destroyed and dam or berm is repaired.
- J-5 Tree Growth:** Tree growth does not allow maintenance/inspection access or interferes with maintenance activity (i.e., slope mowing, silt removal, vactoring or equipment movements).  
*Maintenance Necessary to Bring to Standard:* Remove only trees that hinder maintenance activities. Trees should not be present on or adjacent to fill embankments that are designed to impound water more than 4 feet deep.
- J-6 Side Slopes of Pond—Erosion:** Eroded damage over 2 inches deep where cause of damage is still present or where there is potential for continued erosion.  
*Maintenance Necessary to Bring to Standard:* Stabilize slopes by using appropriate erosion control measure(s): for example, rock reinforcement, planting of grass, or compaction.
- J-7 Storage Area—Sediment (Except Infiltration—See J-12 and J-13):** Accumulated sediment exceeds 10% of the designed pond depth. Periodic sediment removal is critical to proper pond function.  
*Maintenance Necessary to Bring to Standard:* Clean out sediment to designed pond shape and depth; reseed pond if necessary to control erosion. If using a vendor, ensure that the vendor properly disposes of waste. If not using a vendor, call the King County Health Department Business Waste Line at 296-3976 for information on how to dispose of waste.
- J-8 Pond Dikes—Settlements:** Any part of dike has settled 4 inches lower than the design elevation, or water is visibly piping through berms.  
*Maintenance Necessary to Bring to Standard:* Build back dike to the design elevation.
- J-9 Emergency Overflow/Spillway—Rock Missing, Erosion, or Obstruction:** Only one layer of rock exists above native soil in area 5 square feet or larger; any exposure of native soil; or blockage by debris or vegetation.  
*Maintenance Necessary to Bring to Standard:* Replace rocks to design standards.
- J-10 Emergency Overflow/Spillway—Does Not Control Storm Flow:** Emergency overflow or spillway is not large enough to handle heavy rain storms.  
*Maintenance Necessary to Bring to Standard:* Increase capacity (size) of emergency overflow so that there is no danger of flood damage to County roads or private property.
- J-11 Rock Filters—Sediment & Debris:** By visual inspection, little or no water flows through filter during heavy rain storms.  
*Maintenance Necessary to Bring to Standard:* Replace gravel in rock filter.

**J-12 Storage Area—Sediment (Infiltration Only):** A percolation test of facility indicates facility is only working at 90% of its designed capabilities, or water remains in pond for more than 24 hours after rain has stopped. Frequent sediment removal in infiltration facilities is important to insure proper function.

*Maintenance Necessary to Bring to Standard:* Remove sediment and/or clean facility so that infiltration system works according to design. If using a vendor, ensure that the vendor properly disposes of waste. If not using a vendor, call the King County Health Department Business Waste Line at 296-3976 for information on how to dispose of waste.

*Note:* Sediment accumulation of more than .25 inches per year may indicate excessive erosion is occurring upstream of the facility or that conveyance systems are not being properly maintained. The contributing drainage area should be checked for erosion problems or inadequate maintenance of conveyance systems if excessive sedimentation is noted in an infiltration facility.

**J-13 Settling Ponds—Sediment (Infiltration Only):** Pond contains 6 inches or more of sediment.

*Maintenance Necessary to Bring to Standard:* Remove sediment completely. If using a vendor, ensure that the vendor properly disposes of waste. If not using a vendor, call the King County Health Department Business Waste Line at 296-3976 for information on how to dispose of waste.

**J-14 Vegetation (Infiltration Only):** Vegetation such as grass and weeds impedes infiltration function, generally when height exceeds 18 inches

*Maintenance Necessary to Bring to Standard:* Mow vegetation to 2 inches in height and remove clippings. Remove trees and bushes where they impact the infiltrating area of the pond.

**J-15 Inlet/Outlet Pipe (Infiltration Only):** Inlet/outlet pipe clogged with sediment and/or debris material.

*Maintenance Necessary to Bring to Standard:* Remove sediment and debris so that there is no clogging or blockage in the inlet and outlet piping. If using a vendor, ensure that the vendor properly disposes of waste. If not using a vendor, call the King County Health Department Business Waste Line at 296-3976 for information on how to dispose of waste.

**J-16 Settlement of Pond Dike/Berm (Infiltration Only):** Any part of these components has settled 4 inches or lower than the design elevation, or inspector determines dike/berm is unsound.

*Maintenance Necessary to Bring to Standard:* Repair dike/berm to specifications.

**J-17 Rock Window (Infiltration Only):** Rock Window is clogged with sediment.

*Maintenance Necessary to Bring to Standard:* Remove sediment and debris from rock window. Replace rock if clogged. If using a vendor, ensure that the vendor properly disposes of waste. If not using a vendor, call the King County Health Department Business Waste Line at 296-3976 for information on how to dispose of waste.

## **K. Other—Specific to R/D Tanks** (See Figure A-7 in Appendix)

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### **Defect Number & Defect:**

**K-1 Plugged Air Vents:** One-half of the end area of a vent is blocked at any point with debris and sediment. (Vents are at upstream of storage tank.)

*Maintenance Necessary to Bring to Standard:* Remove debris and sediment from vents.

**K-2 Debris & Sediment:** Accumulated sediment depth exceeds 10% of the diameter of the storage area for one-half the length of the storage tank, or any point depth exceeds 15% of diameter. Example: A 72-inch storage tank would require cleaning when sediment reaches a depth of 7 inches for more than one-half the length of the tank.

*Maintenance Necessary to Bring to Standard:* Remove all sediment and debris from storage area.

**K-3 Joints Between Tank/Pipe Section:** Any crack allowing material to be transported into facility.

*Maintenance Necessary to Bring to Standard:* Seal all joints between tank/pipe sections.

**K-4 Tank/Pipe Bent Out of Shape:** Any part of tank/pipe is bent out of shape more than 10% of its design shape.

*Maintenance Necessary to Bring to Standard:* Repair or replace tank/pipe to design.

## **L** **Other—Specific to Wet Vaults** (See Figure A-9 in Appendix)

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### **Defect Number & Defect:**

**L-1 Trash/debris accumulated in vault, pipe, or inlet/outlet.** Includes floatables and notfloatables.

*Maintenance Necessary to Bring to Standard:* Remove trash and debris from vault.

**L-2 Sediment Accumulation in vault bottom that exceeds the depth of the sediment zone plus 6 inches.**

*Maintenance Necessary to Bring to Standard:* Remove sediment from vault. If using a vendor, ensure that the vendor properly disposes of waste. If not using a vendor, call the King County Health Department Business Waste Line at 296-3976 for information on how to dispose of waste.

**L-3 Inlet/outlet piping damaged or broken and in need of repair.**

*Maintenance Necessary to Bring to Standard:* Repair and/or replace pipe.

**L-4 Access Cover:** Access cover cannot be opened or removed, especially by one person.

*Maintenance Necessary to Bring to Standard:* Loosen cover or remove objects hindering removal.

**L-5 Vault Structure Damaged:** Cracks wider than 1/2 inch and any evidence of soil particles entering the structure through the cracks. Major damages may warrant inspection by a qualified structural engineer.

*Maintenance Necessary to Bring to Standard:* Repair vault so that no cracks exist wider than 1/4 inch at the joint of the inlet/outlet pipe, and vault is determined to be structurally sound.

**L-6 Baffles:** Baffles corroding, cracking, warping, and/or showing signs of failure.

*Maintenance Necessary to Bring to Standard:* Repair or replace baffles to specifications.

**L-7 Access Ladder:** Access ladder is corroded or deteriorated, not functioning properly, missing rungs, has cracks, and/or is misaligned.

*Maintenance Necessary to Bring to Standard:* Repair or replace ladder to specifications so that it is safe to use.

## **M. Other—Specific to Bioswales** (See Figure A-10 in Appendix)

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### **Defect Number & Defect:**

**M-1 Sediment Accumulation on Grass Layer:** Sediment depth exceeds 2 inches.

*Maintenance Necessary to Bring to Standard:* Remove sediment so that no sediment deposits exist on grass layer of the bioswale, which would impede filtration of runoff. If using a vendor, ensure that the vendor properly disposes of waste. If not using a vendor, call the King County Health Department Business Waste Line at 296-3976 for information on how to dispose of waste.

**M-2 Vegetation:** Grass becomes excessively tall (greater than 10 inches); nuisance weeds and other vegetation start to take over; or grass has died.

*Maintenance Necessary to Bring to Standard:* Mow vegetation or eradicate nuisance vegetation such that flow is not impeded. Mow grass to a height of between 4 and 9 inches. If grass has died, replant/reestablish grass.

**M-3 Inlet/Outlet Pipe:** Inlet/outlet pipe clogged with sediment and/or debris.

*Maintenance Necessary to Bring to Standard:* Remove sediment and/or debris so that there is no clogging or blockage in the inlet and outlet piping. If using a vendor, ensure that the vendor properly disposes of waste. If not using a vendor, call the King County Health Department Business Waste Line at 296-3976 for information on how to dispose of waste.

**M-4 Trash and Debris Accumulation:** Trash and debris accumulated in the bioswale.

*Maintenance Necessary to Bring to Standard:* Remove trash and debris from bioswale.

**M-5 Erosion/Scouring:** The bioswale has eroded or scoured the bottom due to flow channelization, or higher flows.

*Maintenance Necessary to Bring to Standard:* Regrade and reseed bioswale to specification to eliminate channeled flow. Overseed when bare spots are evident.

**M-6 Ponding in Swale:** Water ponds in swale.

*Maintenance Necessary to Bring to Standard:* Remove blockage or regrade swale.

## **N. Other—Specific to Wet Ponds** (See Figure A-11 in Appendix)

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### **Defect Number & Defect:**

**N-1 Vegetation:** Vegetation such as grass and weeds needs to be mowed when it starts to impede aesthetics of pond. Mowing is generally required when height exceeds 18 inches. Mowed vegetation should be removed from areas where it could enter the pond, either when the pond level rises, or by rainfall runoff.

*Maintenance Necessary to Bring to Standard:* Mow vegetation to 4-5 inches in height. Remove trees and bushes where they are interfering with pond maintenance activities. Wetland species may require harvesting or special maintenance rather than mowing.

- N-2 Trash and Debris:** Accumulation that exceeds 1 cubic foot per 1000 square feet of pond area.  
*Maintenance Necessary to Bring to Standard:* Remove trash and debris from pond.
- N-3 Inlet/Outlet Pipe:** Inlet/outlet pipe clogged with sediment and/or debris material.  
*Maintenance Necessary to Bring to Standard:* Remove sediment and/or debris so that there is no clogging or blockage in the inlet and outlet piping. If using a vendor, ensure that the vendor properly disposes of waste. If not using a vendor, call the King County Health Department Business Waste Line at 296-3976 for information on how to dispose of waste.
- N-4 Sediment Accumulation in Pond Bottom:** Sediment accumulation in pond bottom that exceeds the depth of sediment zone plus 6 inches, usually the first cell.  
*Maintenance Necessary to Bring to Standard:* Remove of sediment from pond bottom. If using a vendor, ensure that the vendor properly disposes of waste. If not using a vendor, call the King County Health Department Business Waste Line at 296-3976 for information on how to dispose of waste.
- N-5 Oil Sheen on Water:** Prevalent and visible oil sheen.  
*Maintenance Necessary to Bring to Standard:* Remove sediment from pond bottom if contaminated, and skim oil from water. Coordinate waste disposal with the King County Health Department by phoning their Business Waste Line (296-3976). Also, contact Water and Land Resources Business Services at 296-1900 for a site consultation to eliminate the source of the contamination.
- N-6 Erosion:** Erosion of the pond's side slopes and/or scouring of the pond bottom that exceeds 6 inches, or the presence of continued erosion.  
*Maintenance Necessary to Bring to Standard:* Stabilize slopes by using proper erosion control measures and repair methods.
- N-7 Settlement of Pond Dike/Berm:** Any part of these components that has settled 4 inches or lower than the design elevation, or inspector determines that dike/berm is unsound.  
*Maintenance Necessary to Bring to Standard:* Repair dike/berm to specifications.
- N-8 Rock Window:** Rock window is clogged with sediment.  
*Maintenance Necessary to Bring to Standard:* Remove sediment so that window is free of sediment and debris and water flows freely. If using a vendor, ensure that the vendor properly disposes of waste. If not using a vendor, call the King County Health Department Business Waste Line at 296-3976 for information on how to dispose of waste.
- N-9 Overflow Spillway:** Rock is missing and soil is exposed at top of spillway or outside slope.  
*Maintenance Necessary to Bring to Standard:* Replace rocks to specifications.

## **Other—Specific to Infiltration (Not Including Ponds)** (See Figures A-12, A-13, and A-14 in Appendix)

### **Defect Number & Defect:**

- O-1 Plugged Air Vents (Infiltration Tanks Only):** One-half of the end area of a vent is blocked at any point with debris and sediment. (Vents are at upstream end of storage tank.)

*Maintenance Necessary to Bring to Standard:* Remove all debris and sediment from vents. If using a vendor, ensure that the vendor properly disposes of waste. If not using a vendor, call the King County Health Department Business Waste Line at 296-3976 for information on how to dispose of waste.

- O-2 Storage Area—Sediment (Infiltration Tanks and Vaults Only):** Sediment depth exceeds 6 inches in depth.

*Maintenance Necessary to Bring to Standard:* Remove all sediment from tank or vault bottom. If using a vendor, ensure that the vendor properly disposes of waste. If not using a vendor, call the King County Health Department Business Waste Line at 296-3976 for information on how to dispose of waste.

- O-3 Joints Between Tank/Pipe Section (Infiltration Tanks Only):** Any crack allowing material to be transported into facility.

*Maintenance Necessary to Bring to Standard:* Seal all joints between tank/pipe sections.

- O-4 Tank/Pipe Bent out of Shape (Infiltration Tanks Only):** Any part of tank/pipe is bent out of shape more than 10 percent of its design shape.

*Maintenance Necessary to Bring to Standard:* Repair or replace tank/pipe to design.

**Note:** Sediment accumulation of more than .25 inches per year may indicate excessive erosion is occurring upstream of the facility or that conveyance systems are not being properly maintained. The contributing drainage area should be checked for erosion problems or inadequate maintenance of conveyance systems if excessive sedimentation is noted in an infiltration facility.



# Appendix: Facility Sketches



Figure A-1

# Type I Catch Basin

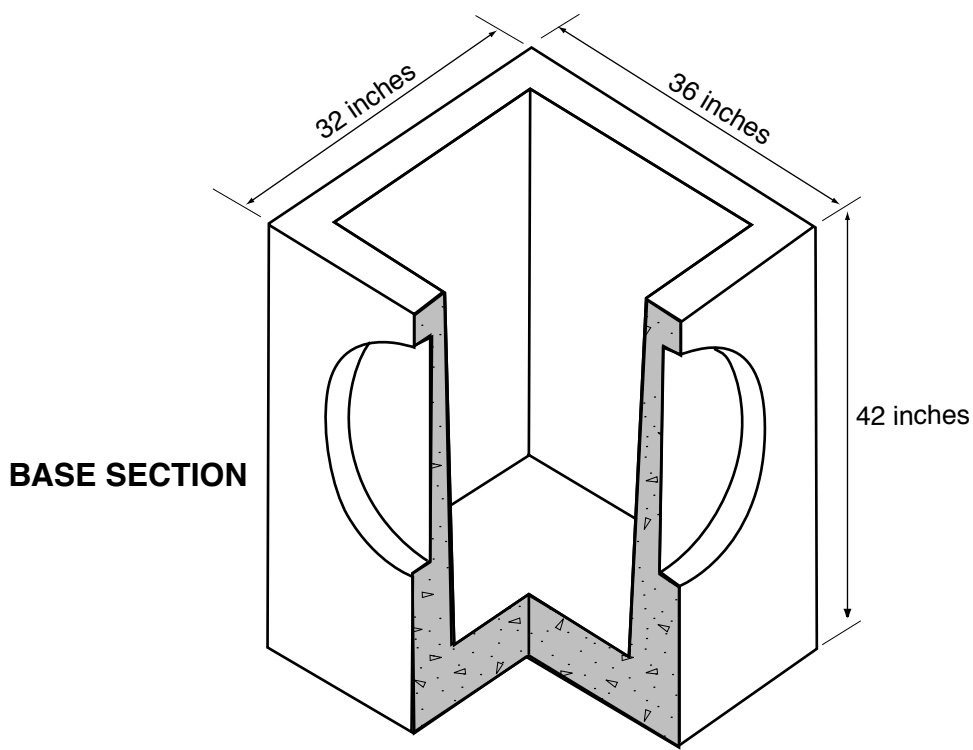
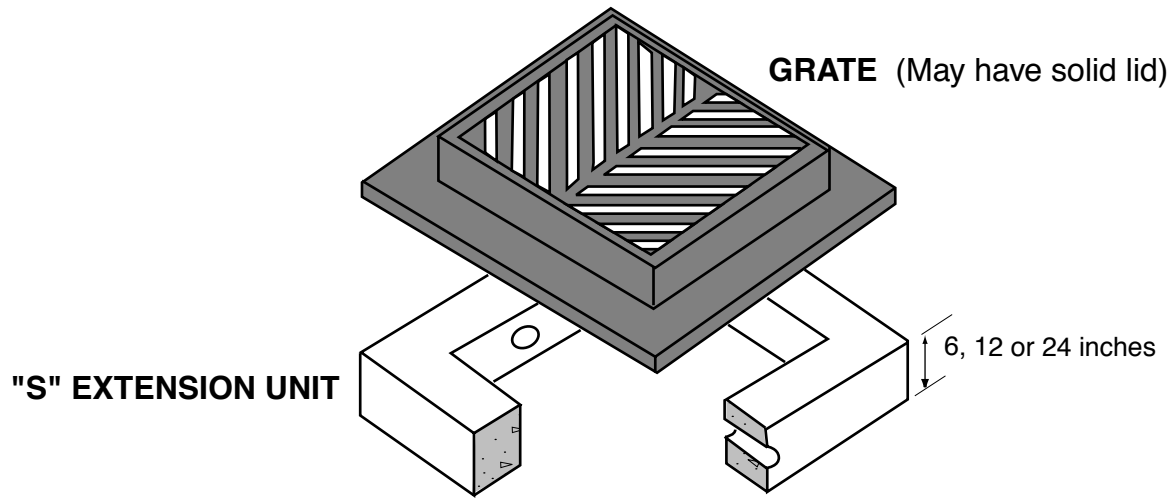


Figure A-2

# Type II Catch Basin

(Round concrete structure)

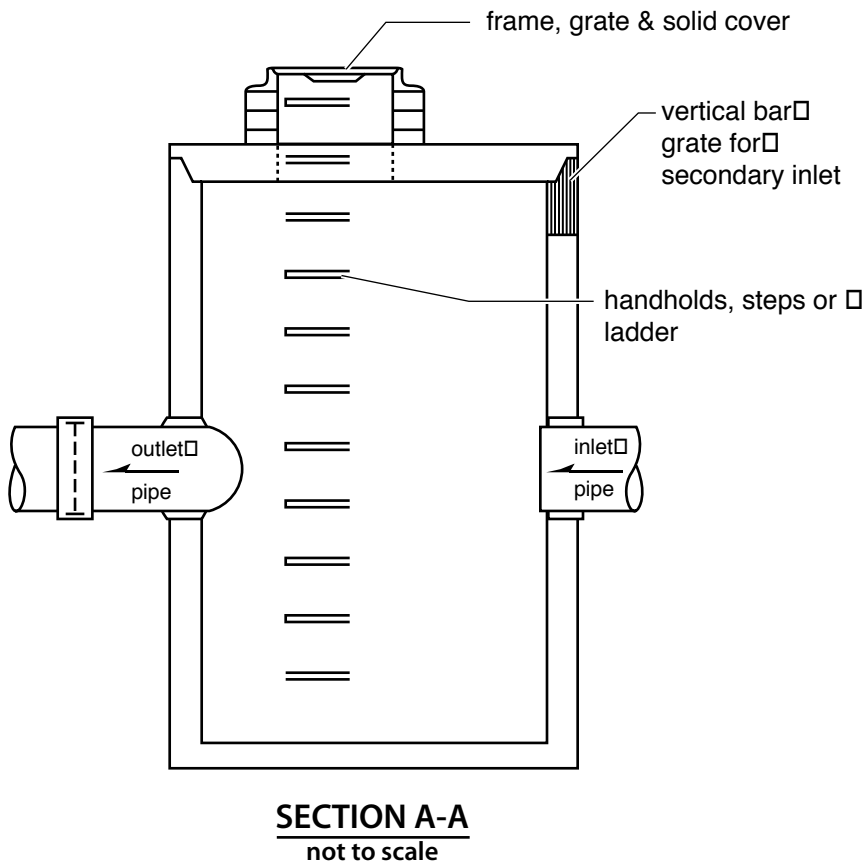
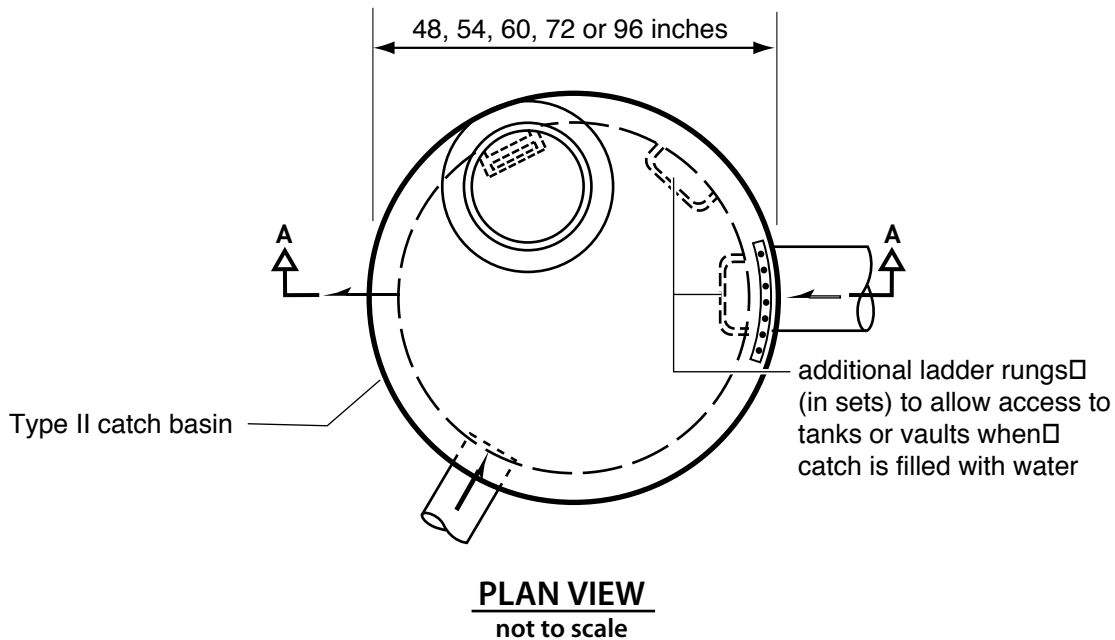


Figure A-3

# Flow Restrictor (T-Section) (Found in Type 2 Catch Basins)

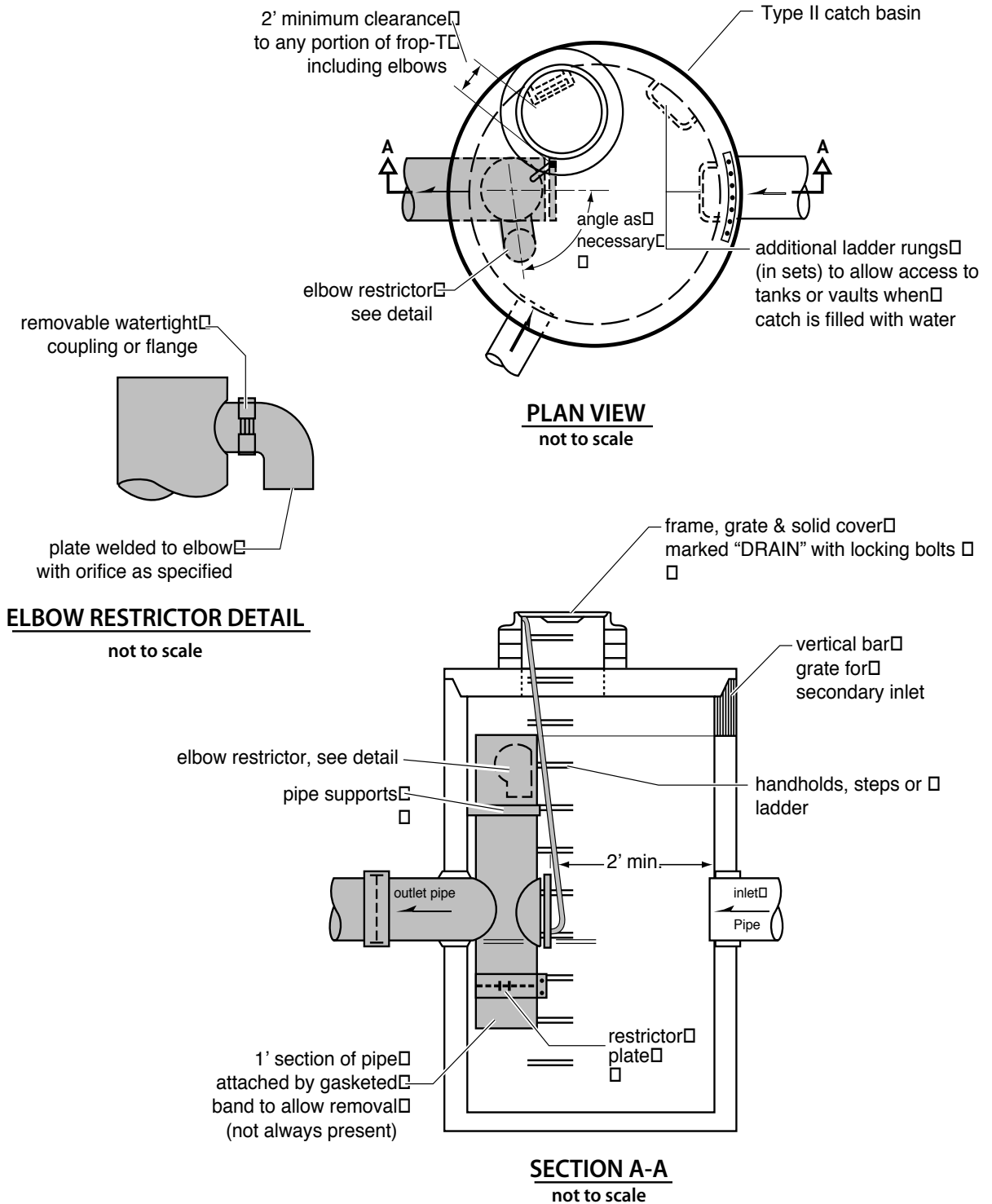
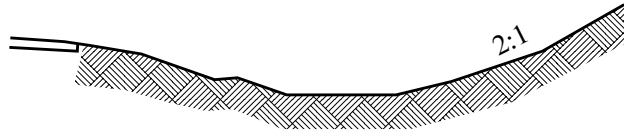
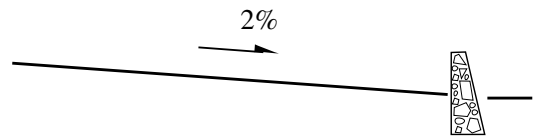


Figure A-4

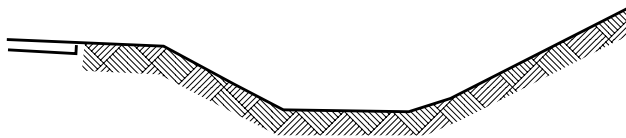
# Ditches - Common Sections



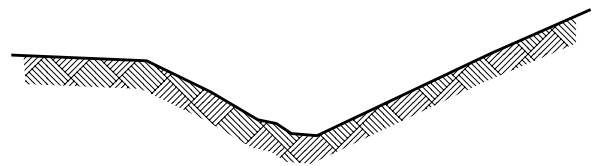
**Segmental (parabolic)**



**Curbed crowned street**



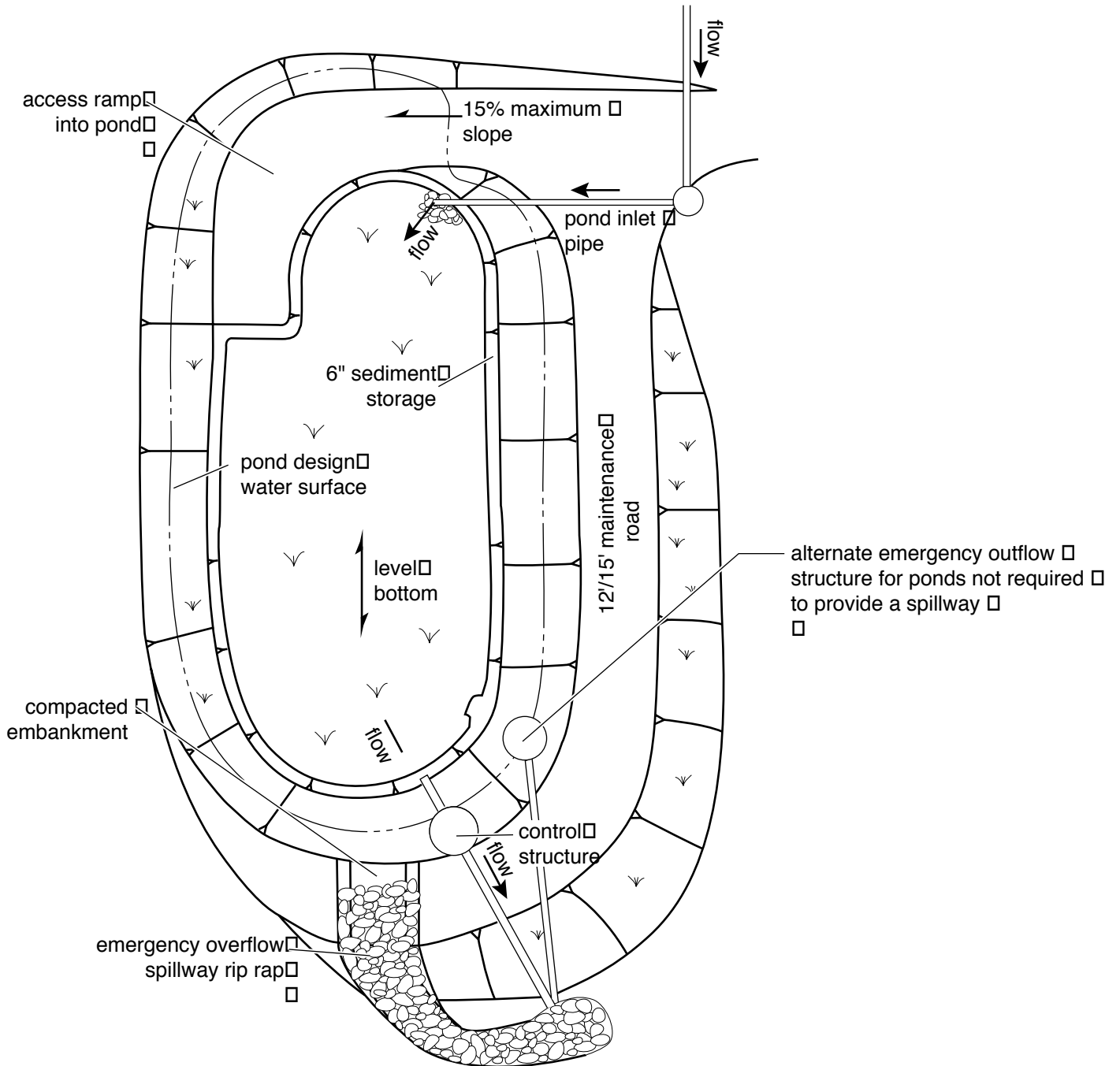
**Trapezoidal**



**Isosceles triangular**

Figure A-5

# Typical Detention Pond



□

**NOTE:** □

This detail is a schematic representation only. Actual configuration □ will vary depending on specific site constraints and applicable □ design criteria.

Figure A-6

# Typical Infiltration Pond

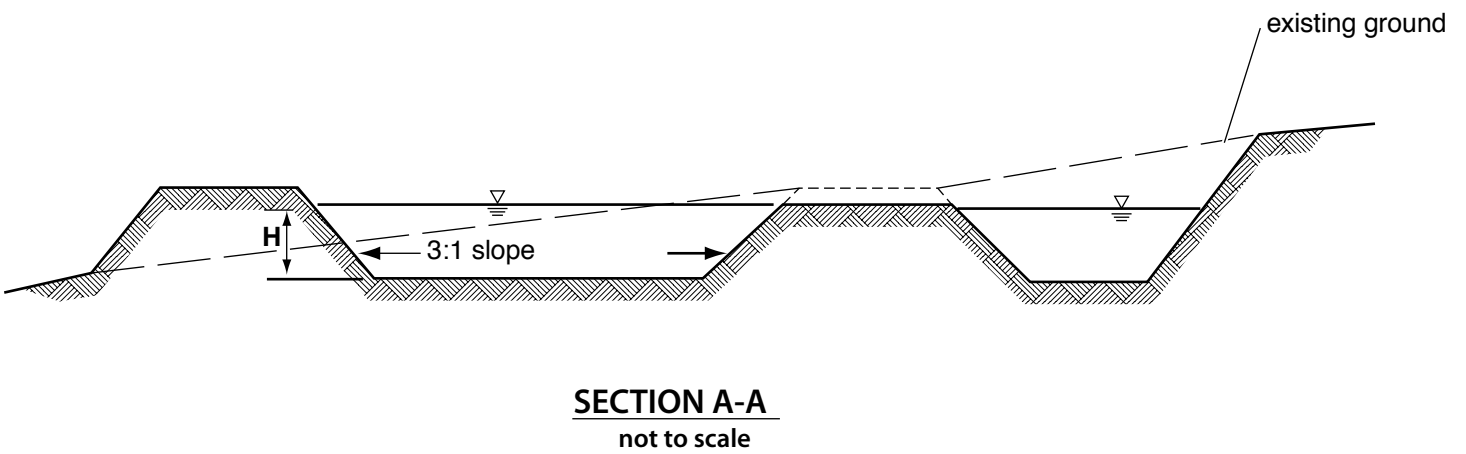
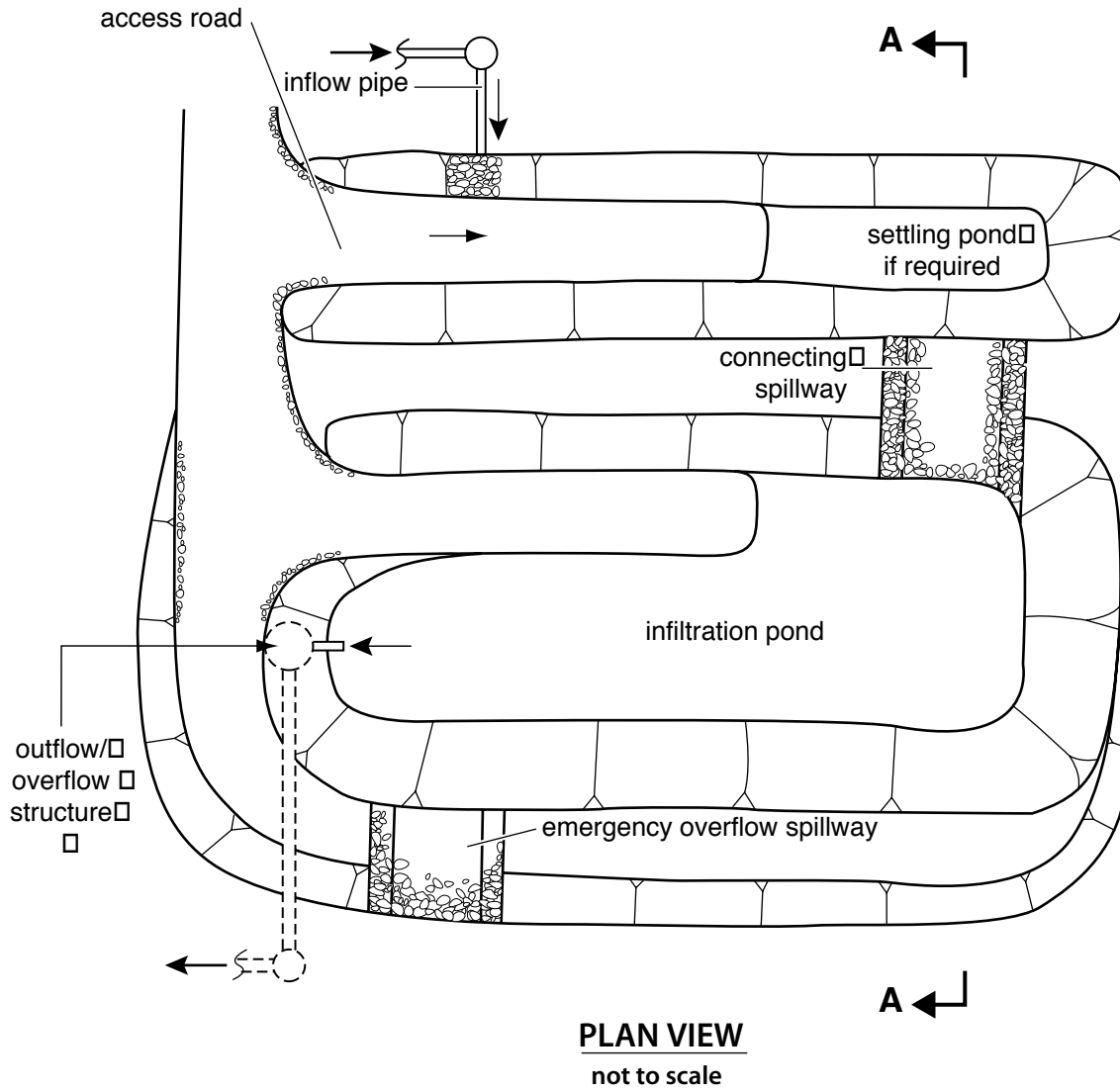
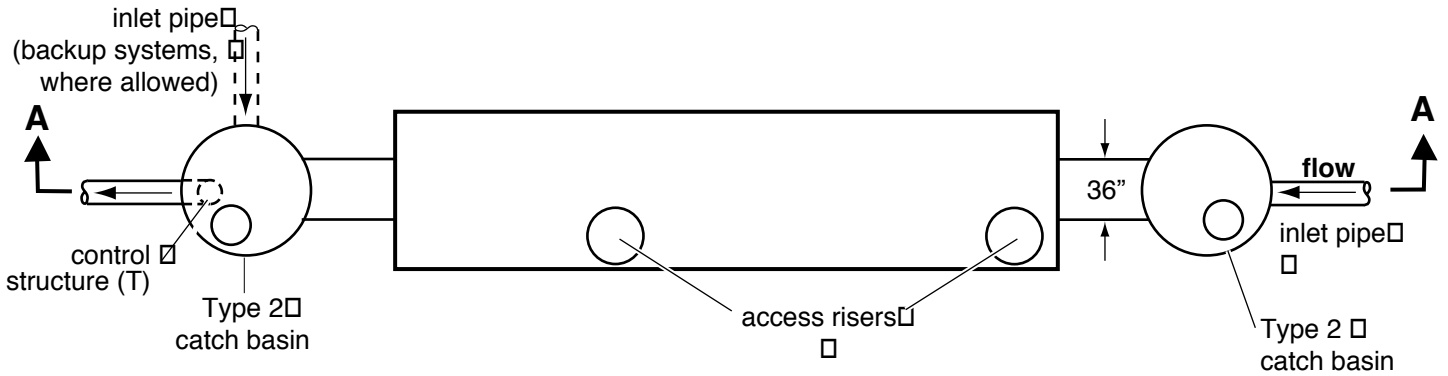


Figure A-7

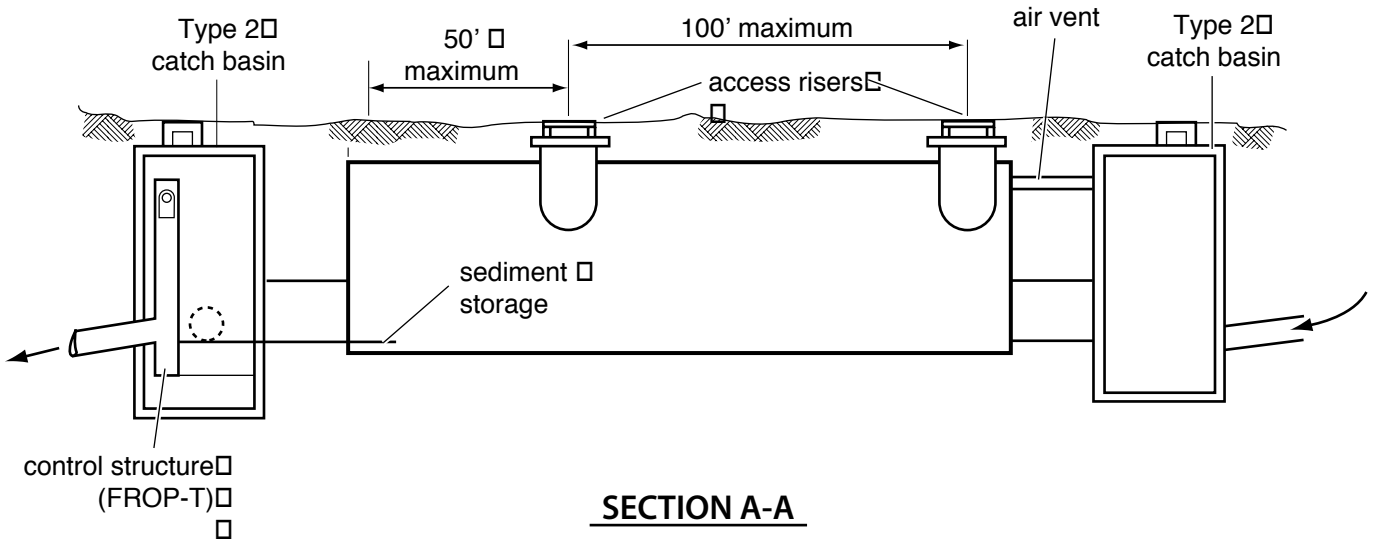
# Typical Detention Tank



## PLAN VIEW

not to scale

“Flow through” system shown solid. □  
Designs for “flow backup” system and □  
parallel tanks shown dashed



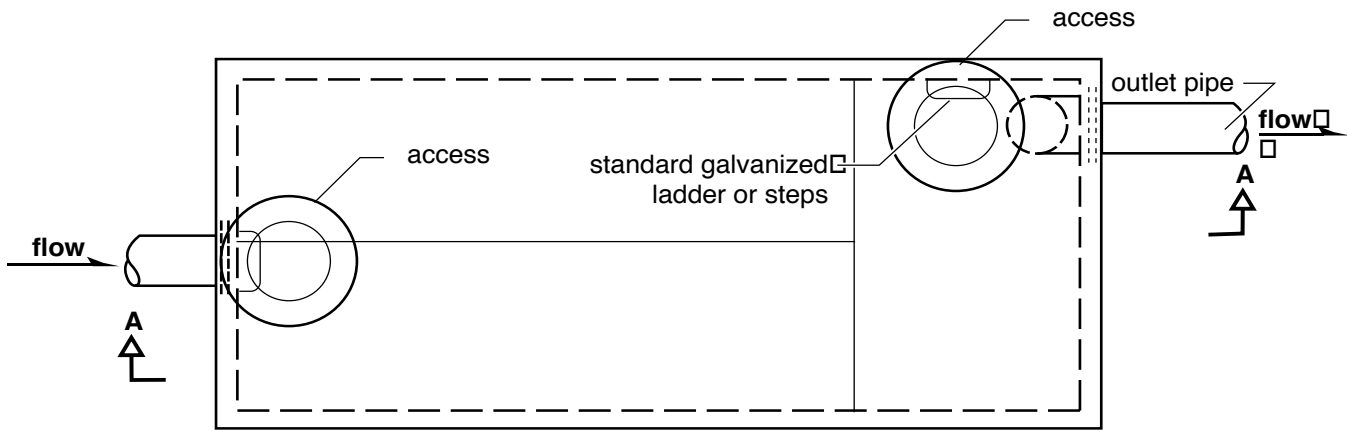
## SECTION A-A

not to scale

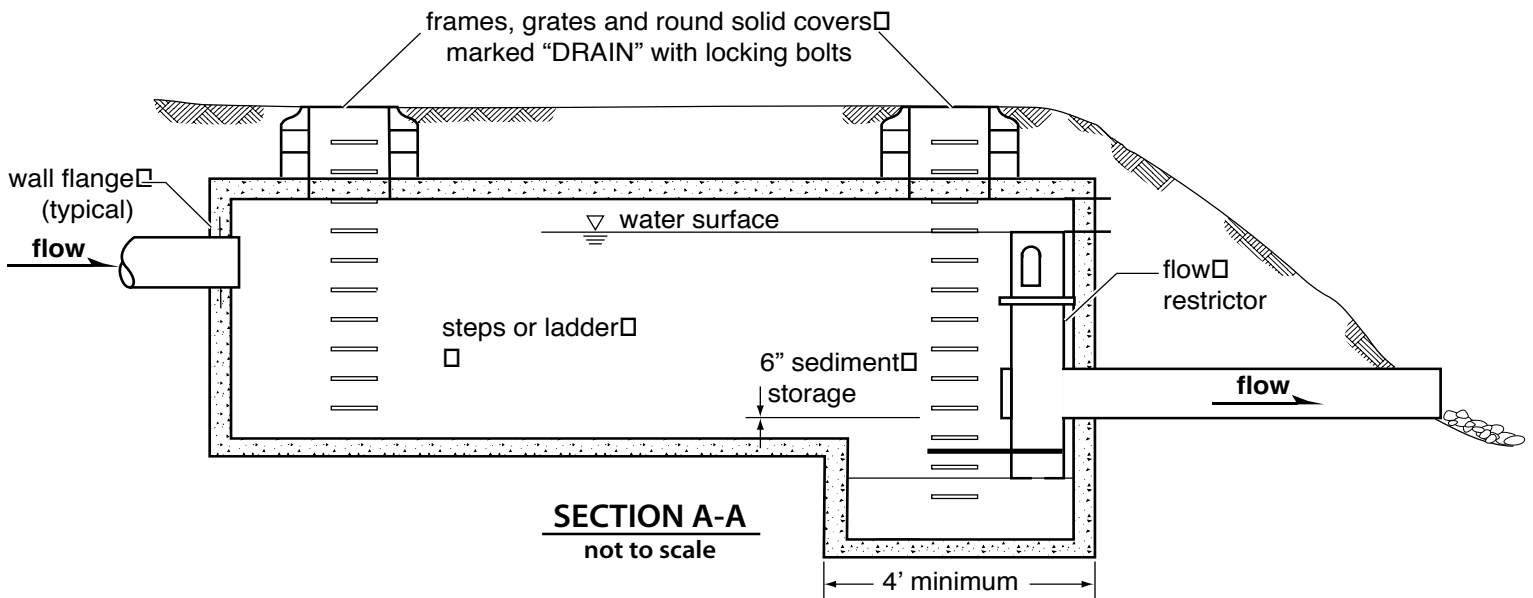
“flow through” system shown solid. □  
□

Figure A-8

# Typical Detention Vault



**PLAN VIEW**  
not to scale



**SECTION A-A**  
not to scale

Figure A-9

# Typical Wet Vault

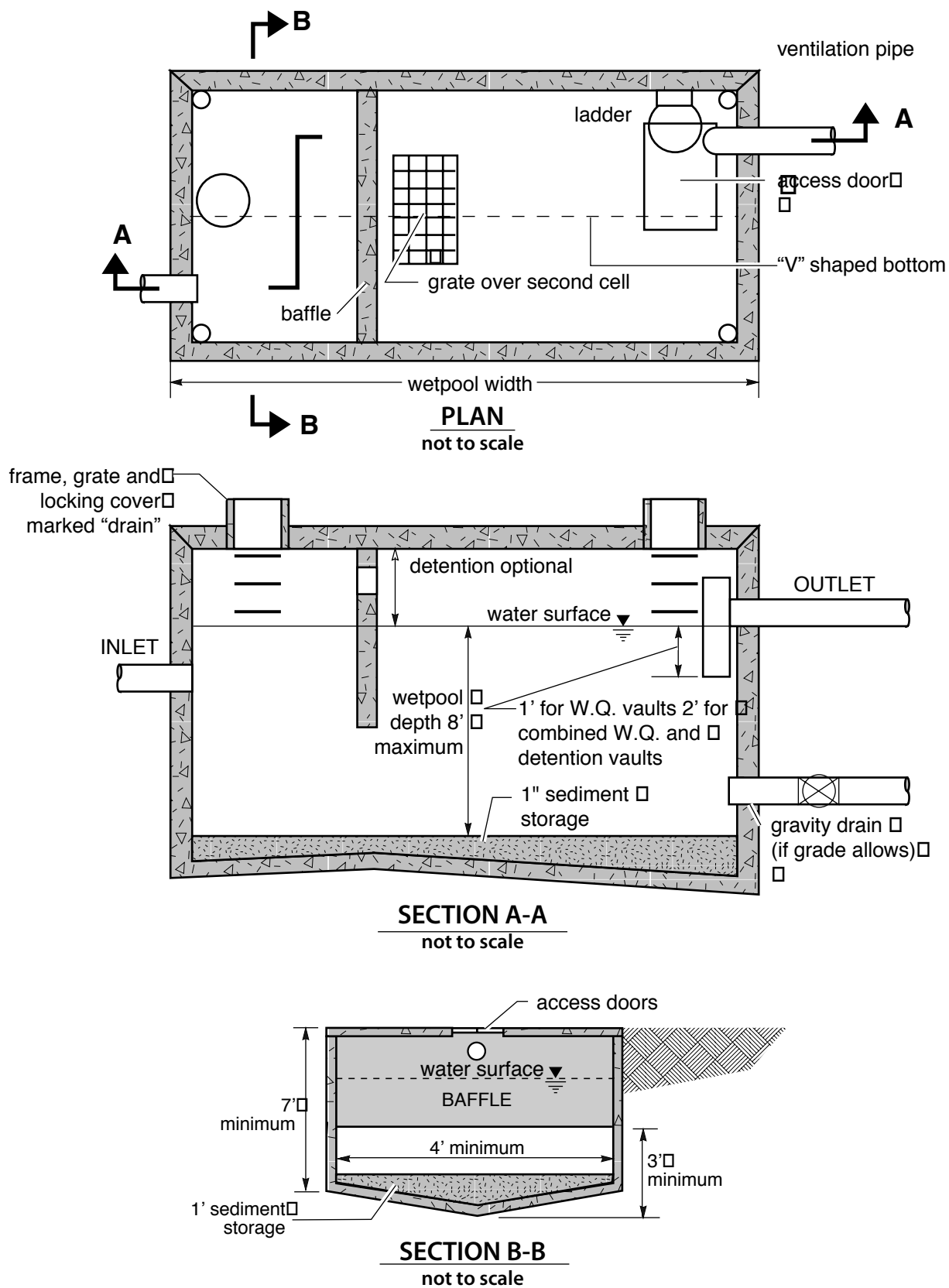
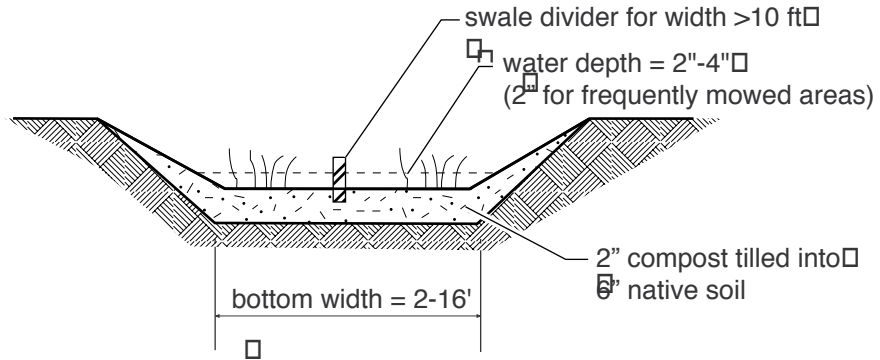


Figure A-10

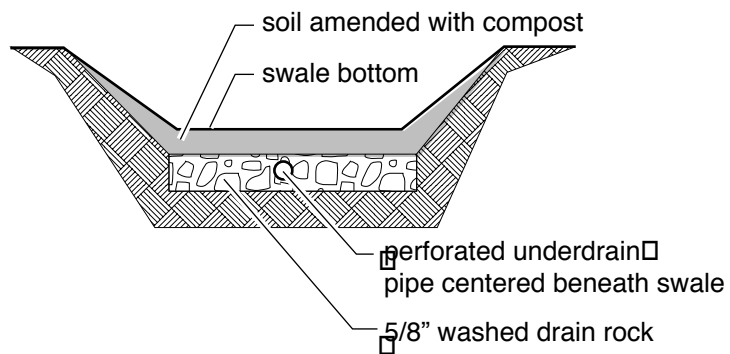
# Typical Bioswale



## BIOSWALE SECTION

not to scale

Underdrain for Slopes < 1.5%



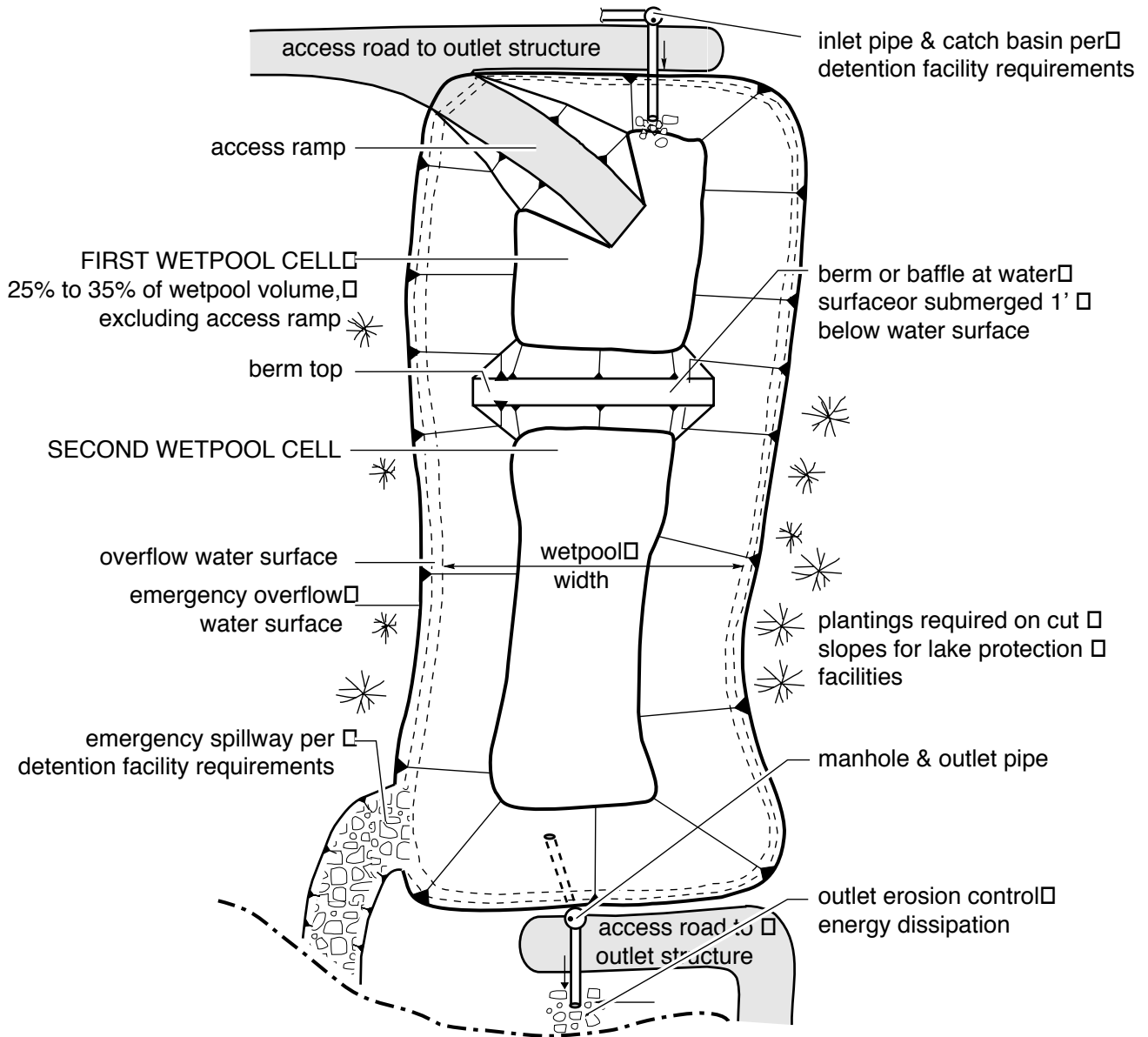
**NOTE:** Underdrain must infiltrate or drain freely to an acceptable discharge point.

## BIOSWALE WITH UNDERDRAIN SECTION

not to scale

Figure A-11

# Typical Wetpond



## PLAN VIEW

not to scale

Figure A-12

# Typical Downspout Infiltration System

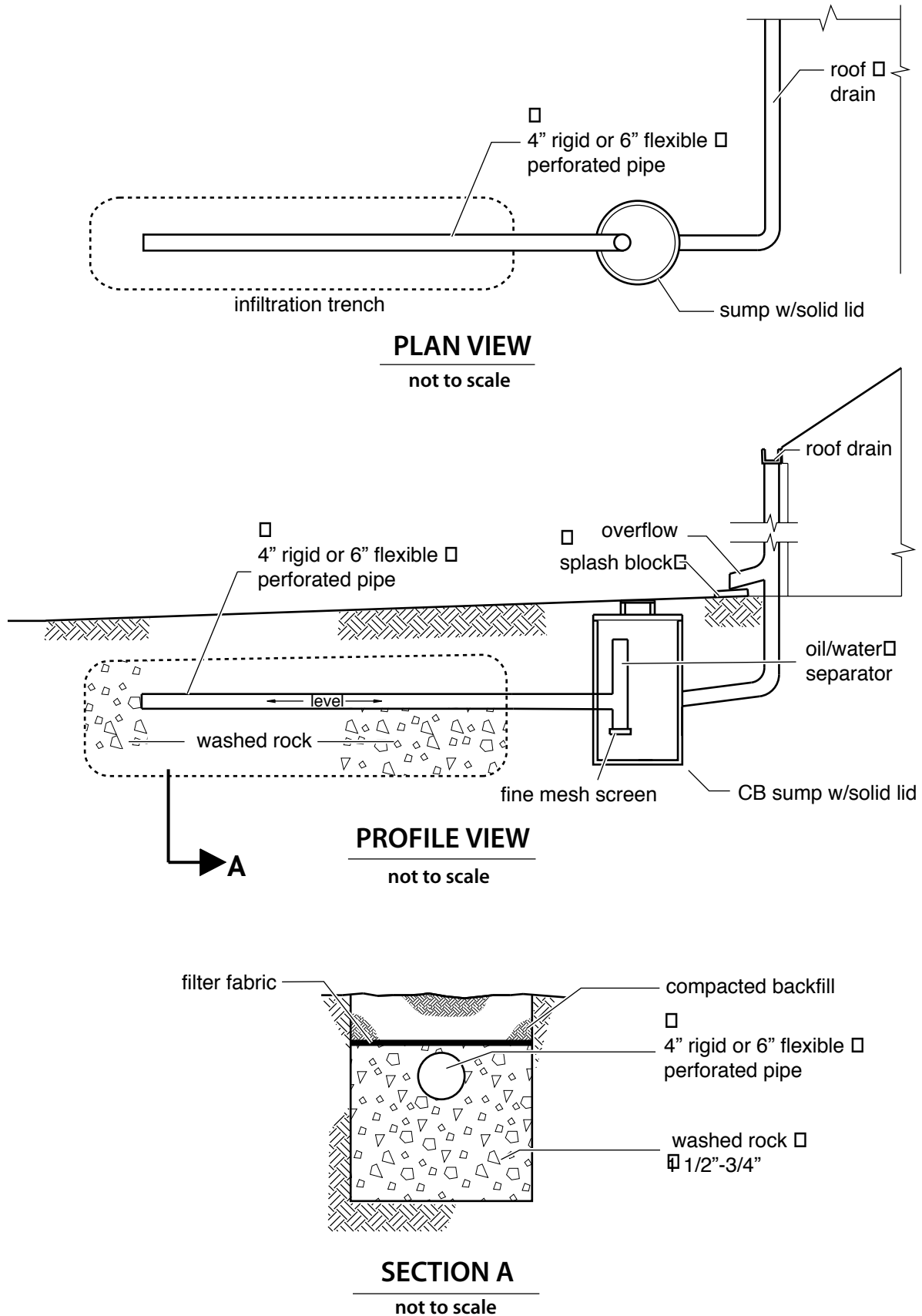


Figure A-13

# Typical Small Infiltration Basin

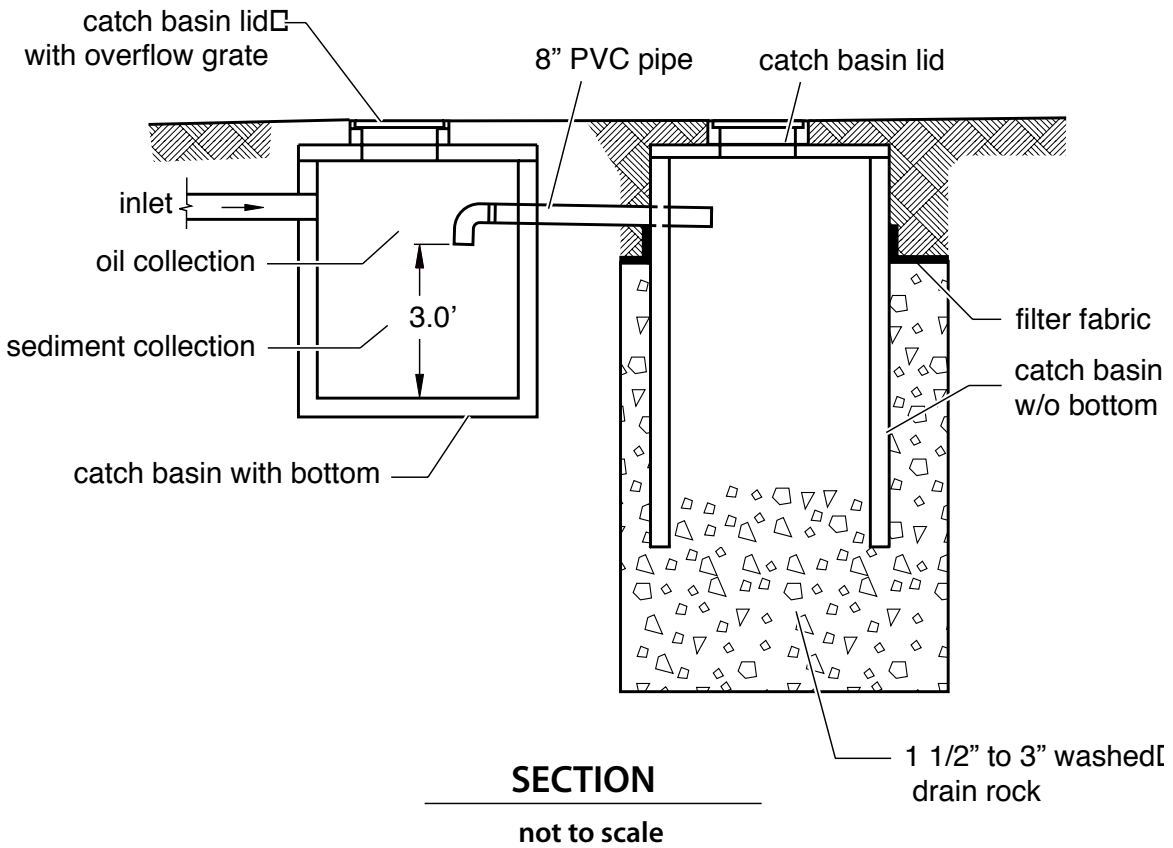
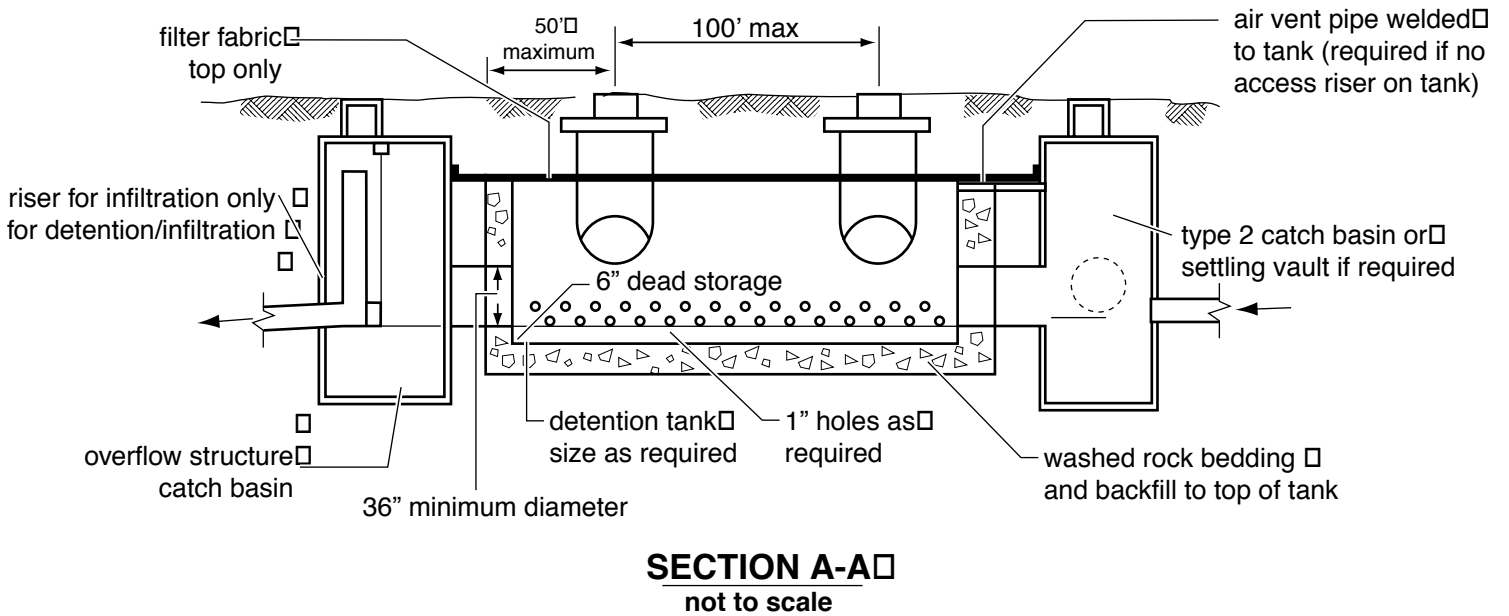
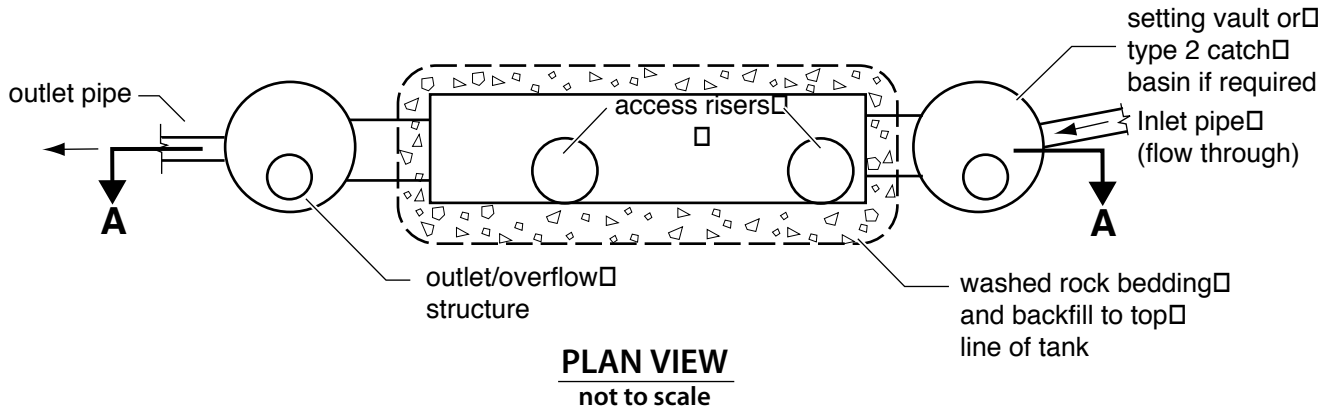


Figure A-14

# Typical Infiltration Tank



Produced by GIS/Cartography/Graphics Unit

9704 CommDrain Graphics/Comm.Drain Booklet 6.5