

CHAPTER 26

WATER

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PART 1

CONTROL OF BACKFLOW AND CROSS CONNECTIONS**§ 26-101. General Policy. [Ord. 5-1997, 10/6/1997, § 1]**

1. Purpose. The purpose of this Part is:
 - A. To protect the public water supply from contamination or pollution by isolating, within the consumer's water system, contaminants or pollutants which could backflow through the service connection into the public water supply system.
 - B. To promote the elimination or control of existing cross connections, actual or potential, between the public or consumer's water supply and nonpotable water systems, plumbing fixtures and sources or systems containing process fluids.
 - C. To provide for the maintenance and continuation of a cross connection control program which prevents the contamination or pollution of the public and consumer's water supply.
2. Application. The public water supplier and consumer have joint responsibility for protection of the public water supply from contamination or pollution due to backflow. If the public water supplier requires an approved backflow prevention device, the supplier shall give notice to the consumer to install such an approved backflow prevention device at each service connection to his premises. The consumer should immediately install such an approved device or devices at his/her own expense. Failure, refusal or inability on the part of the consumer to install such a device or devices shall constitute grounds for discontinuing water service to the premises until such device or devices have been installed.

§ 26-102. Definitions. [Ord. 5-1997, 10/6/1997, § 2]

AIR GAP SEPARATION — The unobstructed vertical distance through the free atmosphere between the lowest opening from any pipe or faucet supplying potable water to a tank, plumbing fixture or other device and the flood level rim of the receptacle. The differential distance shall be at least double the diameter (2 x D) of the supply pipe measured vertically above the top of the rim of the vessel. In no case, shall the air gap be less than one inch.

APPROVED — A backflow prevention device or method that has been accepted by the public water supplier as suitable for the proposed use.

ATMOSPHERIC VACUUM BREAKER (AVB) — A fixture outlet device containing an optional shutoff valve followed by a valve body containing a

soft-seated float check, a check seat and an air inlet port. If the shutoff valve is open, the flow of water causes the float to close the air inlet port. If the shutoff valve is closed, the float falls and forms a check valve against backsiphonage and at the same time opens the air inlet port. If no shutoff valve is provided, the flow of water will determine the opening and closing of the air inlet port.

AUXILIARY WATER SYSTEM — Any water source or system on the premises of, or available to, the customer except connections to other approved community water supply system.

BACKFLOW — A flow condition, induced by a differential in pressure, that causes the flow of water or mixtures of water and other substances into the distribution pipes of a potable water supply system from a source other than its intended source. Backflow can result from either backsiphonage or backpressure.

BACKFLOW PREVENTER — A device or other means which will prevent the backflow of water or any other substance into the public water supply system.

BACKPRESSURE — The backflow of water or a mixture of water and other substances from a plumbing fixture or other customer source, into a public water supply system to an increase of pressure in the fixture or customer source to a value that exceeds the system pressure.

BACKSIPHONAGE — The backflow of water or a mixture of water and other substances from a plumbing fixture or other customer source, into a public water supply due to a temporary negative or subatmospheric pressure within the public water supply system.

CONSUMER — The owner or person in control of any premises supplied by or in any manner connected to a public water supply system.

CONSUMER'S WATER SYSTEM — Any water system, located on the consumer's premises, supplied by or in any manner connected to a public water supply system. A household plumbing system is considered to be a consumer's water system.

CONTAINMENT — Cross connection control which isolates the customer's entire facility from the public water supply system so as to provide the protection necessary to prevent contamination of the public water supply in the event of backflow from the customer's facility. Though containment control prevents contamination of the public water supply, it offers no protection to the water distribution system within the facility. Reduced pressure zone devices are used for containment control.

CONTAMINATION — The degradation of the quality of the drinking water by wastewaters, processed fluids or any water of a quality less than accepted

drinking water quality to a degree which would create an actual hazard to the public health through poisoning or through the spread of disease.

CROSS-CONNECTION — An arrangement allowing either a direct or indirect connection through which backflow, including backsiphonage, can occur between the drinking water in a public water system and a system containing a source or potential source of contamination or allowing treated water to be removed from any public water system, used for any purpose or routed through any device or pipes outside the public water system and returned to the public water system. The term does not include connections to devices totally within the control of one or more public water systems and connections between water mains.

DEGREE OF HAZARD — An evaluation of the potential risk to health and the adverse effect upon the public water supply system.

DOUBLE CHECK VALVE ASSEMBLY (DCVA) — An assembly composed of two single independently acting, soft-seated, spring-loaded check valves including tightly closing shutoff valves located at each end of the assembly and suitable connections for testing the water tightness of each check valve.

FIXTURE OUTLET PROTECTION — Cross-connection control which isolates all free-flowing fixture outlets (i.e. faucets) from the water distribution system within a facility. Fixture outlet protection prevents backflow contamination of both the facility water system and the public water supply. Examples of fixture outlet protection devices include atmospheric vacuum breakers, hose-bibb vacuum breakers and pressure vacuum breakers.

HEALTH HAZARD — Any condition, device or practice in a water system or its operation that creates or may create a danger to the health and well-being of its users. The word "severe," as used to qualify "health hazard," means a hazard to the health of the user that could reasonably be expected to result in significant morbidity or death.

HOSE-BIBB VACUUM BREAKER (HBVB) — A fixture outlet device which contains a soft-seated, spring loaded, air inlet valve and is designed to be attached to an outlet having a hose connection thread.

INTERCHANGEABLE CONNECTION — An arrangement or device that will allow alternate, but not simultaneous, use of two sources of water.

INTERNAL PROTECTION — Cross-connection control which isolates all nonoutlet, water-use appliances within a facility (e.g., kitchen appliances, air conditioners, boilers, process tanks, photo developing equipment) from the water distribution system within the facility. Internal protection prevents backflow contamination of both the water facility system and the public water supply. Reduced pressure zone devices and double check valve assemblies are used for internal protection.

NONHEALTH HAZARD — Any condition, device or practice in a water system or its operation that creates, or may create, an impairment of the quality of water to a degree which does not create a hazard to the public health, but which does adversely and unreasonably affect the aesthetic qualities of such water for domestic use.

NONPOTABLE WATER — Water not safe for drinking, personal, culinary or any other type of domestic use.

PERSON — Any individual, partnership, association, company, corporation, municipality, municipal authority, political subdivision or any agency of Federal or State government. The term includes the officers, employees and agents of any partnership, association, company, corporation, municipality, municipal authority, political subdivision or any agency of Federal or State government.

POLLUTION — The presence in water of any foreign substance that tends to degrade its quality so as to constitute a hazard or to impair the usefulness or quality of the water to a degree which does not create an actual hazard to the public health, but which does adversely and unreasonably affect such waters for domestic use.

POTABLE WATER — Water which is satisfactory for drinking, personal, culinary and domestic purposes and meets the requirements of the Department of Environmental Protection.

PRESSURE VACUUM BREAKER (PVB) — A fixture outlet device containing an independently operating, soft-seated, spring-loaded check valve and an independently operating, soft-seated, spring-loaded, air inlet valve on the discharge side of the check valve.

PROCESS FLUIDS — Any fluid or solution which may be chemically, biologically or otherwise contaminated or polluted in a form or concentration such as would constitute a health, pollutional or system hazard if introduced into the public or a consumer's water system. This includes, but is not limited to:

- A. Polluted or contaminated waters.
- B. Process waters.
- C. Used waters originating from the public water system which may have deteriorated in sanitary quality.
- D. Cooling waters.
- E. Contaminated natural waters taken from wells, lakes, streams or irrigation systems.
- F. Chemicals in solution or suspension.
- G. Oils, gases, acids, alkalis and other liquid or gaseous fluids used in industrial or other processes or for firefighting purposes.

H. Heating system waters from boilers or heat pumps.

PUBLIC WATER SUPPLIER — A person who owns or operates a public water system.

PUBLIC WATER SUPPLY SYSTEM — A system which provides water to the public for human consumption which has at least 15 service connections or regularly serves an average of at least 25 individuals daily at least 60 days out of the year. The term includes any collection, treatment, storage and distribution facilities under control of the operator of the system and used in connection with the system. The term includes collection of pretreatment storage facilities not under such control which are used in connection with the system. The term also includes a system which provides water for human consumption via bottling, vending machines, retail sales or bulk hauling methods.

REDUCED PRESSURE ZONE DEVICE (RPZD) — A device which contains two independently acting, soft-seated, spring-loaded check valves, together with a soft-seated, spring-loaded, diaphragm-activated, pressure differential relief valve located between the two check valves. During normal flow and at the cessation of normal flow, the pressure between these two check shall be less than the supply pressure. In case of leakage of either check valve, the differential relief valve, shall maintain the pressure between the checks at less than the supply pressure by opening to the atmosphere. The device must include tightly closing shutoff valves located at each end, and each device shall be fitted with properly located test cocks.

RESIDENTIAL DUAL CHECK VALVE (RDCV) — A nontestable backflow prevention device that is used for containment control of residential homes and consists of two independently operating, soft-seated, spring-loaded, consecutive check valves.

SERVICE CONNECTION — The terminal end of a service line from the public water supply system. If a meter is installed at the end of the service line, then the service connection means the downstream end of the meter.

SYSTEM HAZARD — A condition posing an actual or potential threat of damage to the physical properties of the public water system or to the consumer's water system.

§ 26-103. Water System. [Ord. 5-1997, 10/6/1997, § 3]

1. The water system shall be considered as made up of two parts: the public water supply system and the consumer's water system.
2. The public water supply system shall consist of the source facilities and the distribution system and shall include all those facilities of the public water supply system under the control of the public water supplier up to the point where the consumer's water system begins.

3. The source shall include all components of the facilities utilized in the production, treatment, storage and delivery of water to the public distribution system.
4. The public distribution system shall include the network of conduits used for delivery of water from the source to the consumer's water system.
5. The consumer's water system shall include all facilities beyond the service connection which are utilized in conveying water from the public distribution system to points of use.

§ 26-104. Cross Connections Prohibited. [Ord. 5-1997, 10/6/1997, § 4]

1. No water service connection shall be installed or maintained to any premises where actual or potential cross connections to the public water supply system or consumer's water system may exist, unless such cross connections are abated or controlled to the satisfaction of the public water supplier.
2. No connection shall be installed or maintained whereby water from an auxiliary water supply may enter a public or consumer's water system unless such auxiliary water supply, as well as the method of connection and use of such supply, has been approved.

§ 26-105. Surveys and Investigations. [Ord. 5-1997, 10/6/1997, § 5]

1. The consumer's premises shall be open at all times to the public water supplier or its authorized representative for the purposes of surveying for or investigating actual or potential cross connections.
2. On request by the public water supplier, the consumer shall furnish information on water use practices within his/her premises.
3. It shall be the responsibility of the water consumer to conduct periodic surveys of the water use practices on his/her premises to determine whether there are actual or potential cross connections to his/her water system.

§ 26-106. Where Protection is Required. [Ord. 5-1997, 10/6/1997, § 6]

1. An approved backflow prevention device shall be installed prior to the first branch line leading off each service line to a consumer's water system where, in the judgment of the public water supplier, an actual or potential hazard to the public water supply systems exists.
2. An approved backflow prevention device shall be installed on each service line to a consumer's water system where the following conditions exist:
 - A. Systems having auxiliary water supply, unless such auxiliary supply is accepted as an additional source by the public water supplier and approved by the Department of Environmental Protection.

- B. Systems where any substance is handled in such a fashion as to create an actual or potential hazard to the public water supply system. This shall include systems having sources or auxiliary systems, which contain process fluids or wastes originating from the public water supply system, which are no longer under the sanitary control of the water purveyor.
 - C. Systems having internal cross connections that are not correctable or intricate plumbing arrangements which make it impractical to determine whether or not cross-connections exist.
 - D. Systems where, because of security requirements or restrictions, it is impossible or impractical to make a complete cross-connection survey.
 - E. Systems having a repeated history of cross-connections.
 - F. Others specified by the public water supplier.
3. An approved backflow prevention device shall be installed on each service line to a consumer's water system serving, but not necessarily limited to, the following types of facilities unless the public water supplier determines that no actual or potential hazards to the public water supply system exist:
- A. Hospitals, mortuaries, clinics, nursing homes.
 - B. Laboratories.
 - C. Piers, docks, waterfront facilities.
 - D. Sewage treatment plants, sewage pumping station or stormwater pumping station.
 - E. Food or beverage processing plants.
 - F. Chemical plants.
 - G. Metal plating industries.
 - H. Petroleum processing or storage plants.
 - I. Radioactive material processing plants.
 - J. Car wash or truck wash.
 - K. Others specified by the water purveyor.

§ 26-107. Type of Protection Required. [Ord. 5-1997, 10/6/1997, § 7]

The type of protection required under § 26-106(1), (2) and (3) of this Part shall depend on the degree of hazard which exists as follows:

- A. An approved air gap separation shall be installed where the public water supply system may be contaminated with substances that are dangerous to public health and could cause as severe health hazard and where such a device would be technically feasible and/or practical.
- B. An approved air gap separation or an approved reduced pressure zone device shall be installed where the public water supply system may be contaminated with a substance that could cause a system or health hazard.
- C. An approved air gap separation, an approved reduced pressure zone device or an approved double check valve assembly shall be installed where the public water supply system may be polluted with substances that would be objectionable but not dangerous to health.

§ 26-108. Backflow Prevention Devices. [Ord. 5-1997, 10/6/1997, § 8]

1. Any backflow prevention device required by this Part shall be of model or construction approved by the public water supplier and shall comply with the following:
 - A. Air gap separation to be approved shall be at least twice the diameter of the supply pipe, measured vertically above the top rim of the receiving vessel, but in no case than one inch.
 - B. A double check valve assembly or a reduced pressure zone device shall be approved by the public water supplier.
 - C. An interchangeable connection to be approved shall be either a swing type connector or a four way valve of the lubricated plug type that operates through a mechanism which unseats the plug, turns it 90° and reseats the plug. Four way valves shall not be used as stop valves but must have separate stop valves on each pipe connected to the valve. The telltale port on the four way valve shall have no piping connected and the threads or flange on this port shall be destroyed so that a connection cannot be made.
2. Existing backflow prevention devices approved by the public water supplier at the time of installation and properly maintained shall, except for inspection and maintenance requirements, be excluded from the requirements of Subsection (1) of this Section; provided, the public water supplier is assured that they will satisfactorily protect the public water supply system. Whenever the existing device is moved from the present location or requires more than minimum maintenance or when the public water supplier finds that the maintenance of the device constitutes a hazard

to health, the device shall be replaced by a backflow prevention device meeting the requirements of this Part.

§ 26-109. Installation. [Ord. 5-1997, 10/6/1997, § 9]

1. Backflow prevention devices required by this Part shall be installed at a location, and in a manner, approved by the public water supplier. The device(s) shall be installed by a person properly qualified. Installation of the devices shall be at the expense of the water consumer.
2. Backflow prevention devices installed on the service line to a consumer's water system shall be located on the consumer's side of the water meter, as close to the meter as is reasonably practical and prior to any other connection.
3. Pits or vaults shall be water-tight, flood-free and maintained free from standing water by means of either a sump and pump or a suitable drain. Such a pump or drain shall not connect to a sanitary sewer, nor permit flooding of the pit or vault by reverse flow from its point of discharge. An access ladder and adequate lighting, natural or artificial, shall be provided to permit maintenance, inspection and testing of the backflow prevention device.

§ 26-110. Inspection and Maintenance. [Ord. 5-1997, 10/6/1997, § 10]

1. It shall be the duty of the consumer at any premises on which backflow prevention devices are required by this Part to have inspections, tests and overhaul made in accordance with the following schedule or more often where inspections indicate a need.
 - A. Air separation shall be inspected at the time of installation and at least every 12 months thereafter.
 - B. Double check valve assemblies shall be inspected and tested for tightness at the time of installation and at least every 12 months thereafter. These devices shall be dismantled, inspected internally, cleaned and repaired whenever needed and at least every 30 months.
 - C. Reduced pressure zone devices shall be inspected and tested for tightness at the time of installation and at least every 12 months thereafter. These devices shall be dismantled, inspected internally, cleaned and repaired whenever needed and at least every five years.
 - D. Interchangeable connections shall be inspected at the time of installation and at least every 12 months thereafter.
2. Inspections, tests and overhaul of backflow prevention devices shall be made at the expense of the water consumer and shall be performed by the public

water supplier or a person certified to inspect, test and overhaul backflow prevention devices.

3. Whenever backflow prevention devices required by this Part are found to be defective they shall be repaired or replaced at the expense of the consumer without delay.
4. The water consumer must maintain a complete record of each backflow prevention device from purchase to retirement. This shall include a comprehensive listing that includes a record of all tests, inspections and repairs. Record of inspections, tests, repairs and overhaul shall be submitted to the public water supplier upon request.
5. Backflow prevention devices shall not be bypassed, made inoperative, removed or otherwise made ineffective without specific authorization by the water supplier.

§ 26-111. Booster Pumps. [Ord. 5-1997, 10/6/1997, § 11]

1. Where a booster pump has been installed on the service line to, or within, any premises, such a pump shall be equipped with a low pressure cut-off device designed to shutoff the booster pump when the pressure in the service line on the suction side of the pump drops to 10 pounds per square inch gauge or less for a period of 30 seconds or longer.
2. It shall be the duty of the water consumer to maintain the low pressure cut-off device in proper working order and to certify to the public water supplier, at least once a year, that the device is operating properly.

§ 26-112. Violations. [Ord. 5-1997, 10/6/1997, § 12]

1. The public water supplier may deny or discontinue, after issuing reasonable notice, the water service to any premises wherein any backflow prevention device required by this Part is not installed, tested and maintained in a manner acceptable to the public water supplier or if it is found that the backflow prevention device has been removed or by-passed or if an unprotected cross connection exists on the premises, or if a low pressure cut-off device required by this Part is not installed and maintained in working order.
2. Water service to such premises shall not be restored until the consumer has corrected or eliminated such conditions or defects in conformance with this Part and to the satisfaction of the public water supplier.



PART 2

Connection to Water System¹**§ 26-201. Definitions. [Ord. No. 2019-01, 5/6/2019]**

1. Unless the context specifically and clearly indicates otherwise, the meaning of the terms and phrases used in this Part shall be as follows:

AUTHORITY — The Western Heights Water Authority, a municipality authority of the Commonwealth.

PROPERTY — Any property within this Township upon which there is erected a structure intended for continuous or periodic habitation, occupancy or use by human beings.

OWNER — Any person vested with ownership, legal or equitable, sole or partial, of any improved property.

PERSON — Any individual, partnership, company, association, society, trust, corporation, municipality, municipality authority, or other group or entity, and the members of such partnership or association and the officers of such corporation.

TOWNSHIP — The Township of Earl, Lancaster County, Pennsylvania, a municipal subdivision of the commonwealth, acting by and through its Board of Supervisors or, in appropriate cases, acting by and through its authorized representatives.

WATER SYSTEM — All facilities, as of any particular time, for the production, transmission, storage or distribution of water in, to and for this Township and owned by the Authority.

§ 26-202. Mandatory Connection. [Ord. No. 2019-01, 5/6/2019]

1. Unless waived by the Authority under circumstances permitted under the Second Class Township Code,² the owner of a property whose principal building is located within 150 feet of the water system or any part or extension of the water system, or if the property owner's principal building has no supply of water which is safe for human consumption, shall connect with and use the water system.

1. Editor's Note: Former Part 2, Stormwater Management, was superseded by Ord. 04-2006. See now Chapter 17, Stormwater Management.

2. Editor's Note: See 53 P.S. § 65101 et seq.

2. Such connection shall be completed within 90 days after notice to such property owner by the Township to make a connection; subject, however, to such limitations and restrictions as shall be established by the Township and/or Authority from time to time.
3. Such notice shall be given or served upon the owner by personal service or certified mail to the owner's last known address.
4. Those industries and farms which have their own supply of water for uses other than human consumption may continue to use their own water for that purpose, but are required to use the water system to provide water for human consumption.

§ 26-203. Failure to Connect. [Ord. No. 2019-01, 5/6/2019]

1. If any property owner required under § 26-202 to connect with and use the public water system fails to do so within 90 days after notice to do so has been served by the Board of Supervisors, the Board of Supervisors or their authorized agents may enter the property and construct the connection and may collect from such owner the costs and expenses thereof in the manner permitted by law.
2. The Board of Supervisors shall send an itemized bill of the cost of construction of connection to the owner of the property to which connection has been made, which bill is payable immediately.

§ 26-204. Violations and Penalties. [Ord. No. 2019-01, 5/6/2019]

For each violation of the provisions of this Part, the owner, agent, lessee, or contractor, or any other person who commits, takes part in, or assists in any such violation, shall be liable upon conviction thereof in a summary proceeding to pay a fine of not less than \$200, nor more than \$1,000, for each offense, together with the costs of prosecution. Each day or portion thereof in which a violation exists shall be considered a separate violation of this Part, and each section of this Part which is violated shall be considered a separate violation. In default of payment of such fine, such person shall be liable to imprisonment for a period not exceeding 30 days.

§ 26-205. Declaration of Purpose. [Ord. No. 2019-01, 5/6/2019]

It is declared that the enactment of this Part is necessary for the protection, benefit and preservation of the health, safety and welfare of the inhabitants of the Township.

26 Attachment 1

Township of Earl

**Appendix A
Sample Forms**

CERTIFICATE FOR APPROVAL BY THE SUPERVISORS

Approved by the Earl Township Board of Supervisors this _____ day of _____, 19____

CERTIFICATE FOR REVIEW BY THE PLANNING COMMISSION

Reviewed by the Earl Township Planning Commission this ____ day of _____, 19_____.

CERTIFICATE FOR REVIEW BY THE TOWNSHIP ENGINEER

(if required by the Township)

Reviewed by the Earl Township Engineer this ____ day of _____, 19_____.

STORMWATER MANAGEMENT CERTIFICATION

I hereby certify that, to the best of my knowledge, the stormwater management facilities shown and described hereon are designed in conformance with the Stormwater Management Ordinance of Earl Township. _____, 19_____.

*Signature of the registered professional responsible for the preparation of the plan.

**Seal of the individual.

(Ord. 7-1998, 10/1/1998)



26 Attachment 2

Township of Earl

Appendix B
Act 167 Stormwater Management

Exemption Criteria

This criteria applies to all existing lots in conservation zones and effective agriculture** areas (1 lot per 20 acres or larger). In addition, existing one and two family dwellings may be exempted for up to 1,000 square feet of additional impervious surface in all zones.

Total Parcel Size	Minimum Distance* (Feet)	Impervious Areas Exempt from Ordinance
<1 acres	10	500 sq. ft.
1-2 acres	100	10,000 sq. ft.
2-5 acres	250	15,000 sq. ft.
>5 acres	500	20,000 sq. ft.

* The minimum distance between the proposed impervious area and/or stormwater controls/structure discharge point to the downslope property line.

** All farms for which an exemption is requested shall have a Conservation Plan approved by the appropriate officials.

(Ord. 7-1998, 10/1/1998)



26 Attachment 3

Township of Earl

Appendix C
PA-DOT Region 5 Storm IDF Data Base
Rainfall Intensity (Inches/Hour)

Time (min.)	Storm Frequency (years)					
	2	5	10	25	50	100
5.0	4.63	5.40	6.02	6.70	7.51	8.19
6.0	4.34	5.15	5.70	6.39	7.22	7.90
7.0	4.12	4.95	5.42	6.10	6.95	7.62
8.0	3.92	4.70	5.17	5.85	6.70	7.36
9.0	3.75	4.50	4.95	5.62	6.47	7.12
10.0	3.59	4.30	4.75	5.41	6.26	6.90
11.0	3.45	4.15	4.58	5.22	6.07	6.70
12.0	3.32	4.00	4.42	5.05	5.88	6.50
13.0	3.21	3.85	4.27	4.89	5.71	6.33
14.0	3.10	3.70	4.16	4.74	5.56	6.16
15.0	3.00	3.55	4.00	4.60	5.40	6.00
20.0	2.60	3.10	3.50	4.03	4.78	5.34
25.0	2.31	2.65	3.15	3.61	4.30	4.83
30.0	2.09	2.45	2.82	3.27	3.92	4.41
40.0	1.76	2.05	2.39	2.78	3.34	3.79
50.0	1.53	1.77	2.08	2.42	2.92	3.33
60.0	1.35	1.60	1.85	2.15	2.60	2.98

(Ord. 7-1998, 10/1/1998)



26 Attachment 4

Township of Earl

Appendix D
Runoff Coefficients "C" for
Rational Formula

Runoff Coefficients "C" for Rational Formula

Soil Group	A				B				C				D					
	0-2%	2-6%	6%	6%+	0-2%	2-6%	6%+	6%+	0-2%	2-6%	2-6%	6%+	6%+	0-2%	2-6%	2-6%	6%+	
Land use																		
Cultivated Land																		
winter conditions	.14	.23	.34	.41	.21	.32	.41	.48	.27	.37	.45	.56	.34	.45	.56	.29	.38	
summer conditions	.10	.16	.22	.28	.14	.20	.28	.33	.19	.26	.29	.33	.23	.29	.33	.29	.38	
Fallowed Fields																		
poor conditions	.12	.19	.28	.34	.17	.25	.34	.40	.23	.33	.35	.45	.27	.35	.45	.27	.35	
good conditions	.08	.13	.16	.21	.11	.15	.21	.26	.14	.19	.23	.31	.18	.23	.31	.18	.23	
Forest/Woodland	.08	.11	.14	.18	.10	.14	.18	.20	.12	.16	.20	.25	.15	.20	.25	.15	.20	
Grass Areas																		
good conditions	.10	.16	.20	.26	.14	.19	.26	.30	.18	.22	.25	.35	.21	.25	.35	.21	.25	
average conditions	.12	.18	.22	.28	.16	.21	.28	.34	.20	.25	.29	.41	.24	.29	.41	.24	.41	
poor conditions	.14	.21	.30	.37	.18	.28	.37	.44	.25	.35	.40	.50	.30	.40	.50	.30	.40	

CHAPTER TITLE

Runoff Coefficients "C" for Rational Formula

Soil Group	A				B				C				D					
	0-2%	2-6%	6%	0-2%	2-6%	6%+	0-2%	2-6%	6%+	0-2%	2-6%	6%+	0-2%	2-6%	6%+	0-2%	2-6%	6%+
Impervious Areas	.90	.91	.92	.91	.92	.93	.93	.92	.93	.93	.94	.94	.93	.94	.94	.93	.94	.95
Weighted Residential																		
lot size 1/8 acre	.29	.33	.36	.31	.35	.40	.34	.34	.38	.44	.44	.44	.36	.41	.49	.36	.41	.49
lot size 1/4 acre	.26	.30	.34	.29	.33	.38	.32	.32	.36	.42	.42	.42	.34	.38	.46	.34	.38	.46
lot size 1/3 acre	.24	.28	.31	.26	.32	.35	.29	.29	.35	.40	.40	.40	.32	.36	.45	.32	.36	.45
lot size 1/2 acre	.21	.25	.28	.24	.27	.32	.27	.27	.31	.37	.37	.37	.30	.34	.43	.30	.34	.43
lot size 1 acre	.18	.23	.26	.21	.24	.30	.24	.24	.29	.36	.36	.36	.28	.32	.41	.28	.32	.41

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Appendix E
Runoff Curve Numbers "CN" for SCS Method

Runoff Curve Numbers "CN" for SCS Methods

Soil Group Land use	A		B		C		D	
	0-2%	2-6%	0-2%	2-6%	0-2%	2-6%	0-2%	2-6%
Cultivated Land								
winter conditions	48	60	62	73	68	78	77	88
summer conditions	35	51	48	55	57	65	64	69
Fallowed Fields								
poor conditions	45	54	56	63	64	74	69	77
good conditions	30	44	43	48	48	54	56	60
Forest/Woodland	30	40	42	46	45	50	50	56
Grass Areas								
good conditions	35	51	48	54	56	59	62	63
average conditions	45	53	52	55	60	63	65	69
poor conditions	48	55	56	67	66	74	73	81
Impervious Areas	96	97	96	97	96	97	96	97
			6%+	2-6%	0-2%	2-6%	0-2%	2-6%
			65	73	68	78	79	88
			61	70	57	65	77	69
			76	85	64	74	90	77
			74	83	48	54	88	60
			30	55	45	50	70	56
			39	61	56	59	74	63
			49	69	60	63	79	69
			68	79	66	74	86	81
			98	98	96	97	98	97
			6%+	2-6%	0-2%	2-6%	0-2%	2-6%
			6%+	6%+	0-2%	2-6%	6%+	6%+
			65	73	68	78	79	88
			61	70	57	65	77	69
			76	85	64	74	90	77
			74	83	48	54	88	60
			30	55	45	50	70	56
			39	61	56	59	74	63
			49	69	60	63	79	69
			68	79	66	74	86	81
			98	98	96	97	98	97

CHAPTER TITLE

Runoff Curve Numbers "CN" for SCS Methods

Soil Group	A				B				C				D						
	0-2%	2-6%	6%+	0-2%	2-6%	6%+	0-2%	2-6%	6%+	0-2%	2-6%	6%+	0-2%	2-6%	6%+	0-2%	2-6%	6%+	
Weighted Residential																			
lot size 1/8 acre	71	75	77	74	76	85	78	80	90	81	83	92							
lot size 1/4 acre	62	67	61	66	69	75	67	69	83	75	78	87							
lot size 1/3 acre	59	65	57	64	66	72	65	66	81	74	77	86							
lot size 1/2 acre	57	63	54	62	64	70	63	65	80	72	76	85							
lot size 1 acre	55	62	51	61	63	68	61	64	79	71	75	84							

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Township of Earl

Appendix F

Worksheet #1: Time of concentration (Tc) or travel time (Tt)

Project _____ By _____ Date _____

Location _____ Checked _____ Date _____

Circle one: Present Developed _____

Circle one: Tc Tt through subarea _____

NOTES: Space for as many as two segments per flow type can be used for each work-sheet.

Include a map, schematic, or description of flow segments.

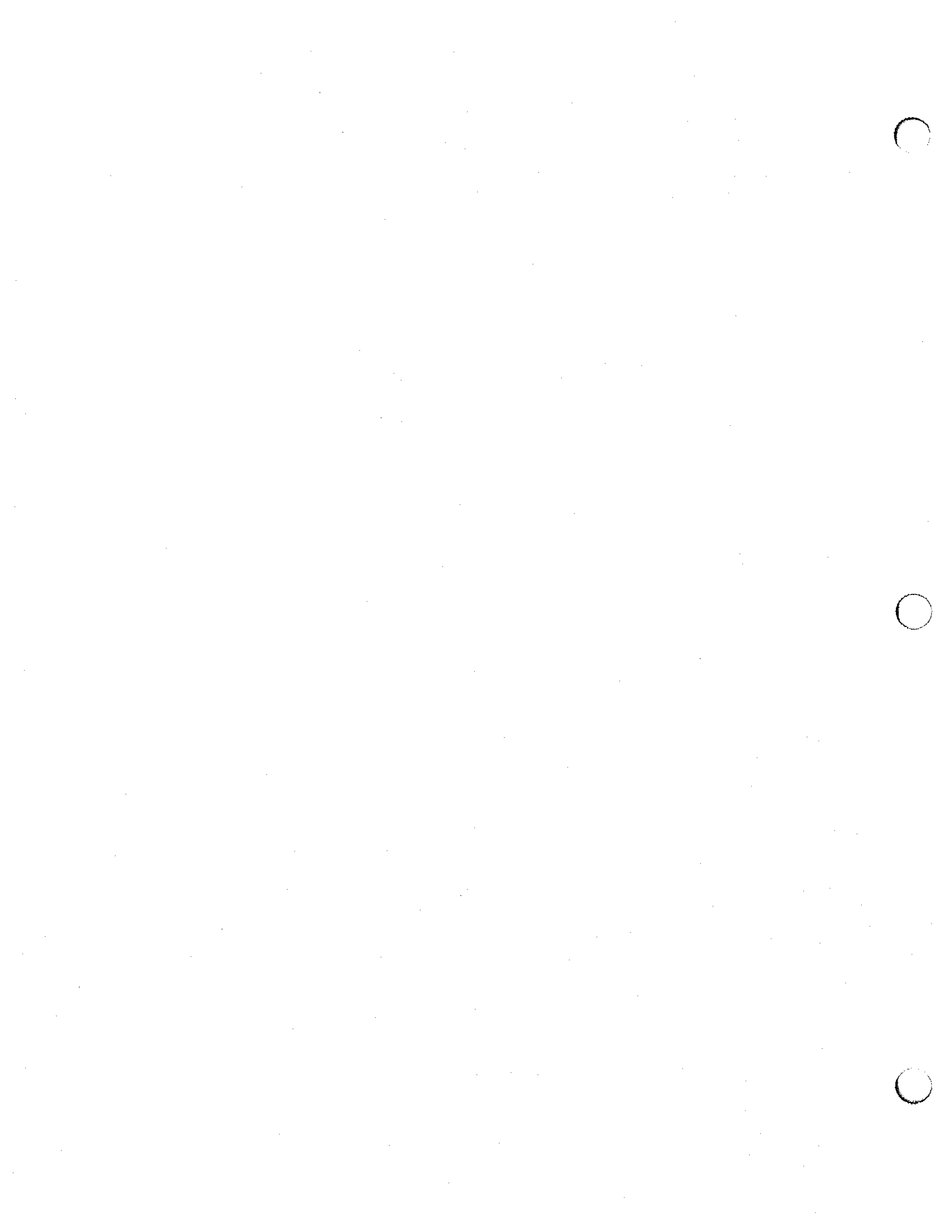
Sheet flow (Applicable to Tc only)	Segment ID	
1. Surface description (table 3-1)		
2. Manning's roughness coeff., n (table 3-1)		
3. Flow length, L (total L ≤ 150 ft)		
4. Two-yr 24-hr rainfall, P2		
5. Land slope, s		
6. $T_t = \frac{800P_2(s)^{0.4}}{n^{1.49}} \quad \text{Compute } T_t \dots \text{ hr}$		

Shallow concentrated flow	Segment ID	
7. Surface description (paved or unpaved)		
8. Flow length, L		
9. Watercourse slope, s		
10. Average velocity, V (figure 3-1)		
11. $T_t = \frac{L}{3600V} \quad \text{Compute } T_t \dots \text{ hr}$		

Channel flow	Segment ID	
12. Cross sectional flow area, a		
13. Wetted perimeter, Pw		
14. Hydraulic radius, $r = \frac{a}{P_w} \quad \text{Compute } r \dots \text{ ft}$		
15. Channel slope, s		
16. Manning's roughness coeff., n		
17. $V = \frac{1.49 r^{2/3} s^{1/2}}{n} \quad \text{Compute } V \dots \text{ ft/s}$		
18. Flow length, L		
19. $T_t = \frac{L}{3600V} \quad \text{Compute } T_t \dots \text{ hr}$		
20. Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19)		

*Table 3-1 per latest TR-55, Urban Hydrology for Small Watershed
**150' sheet flow length per latest TR-55 revision

(Ord. 7-1998, 10/1/1998)

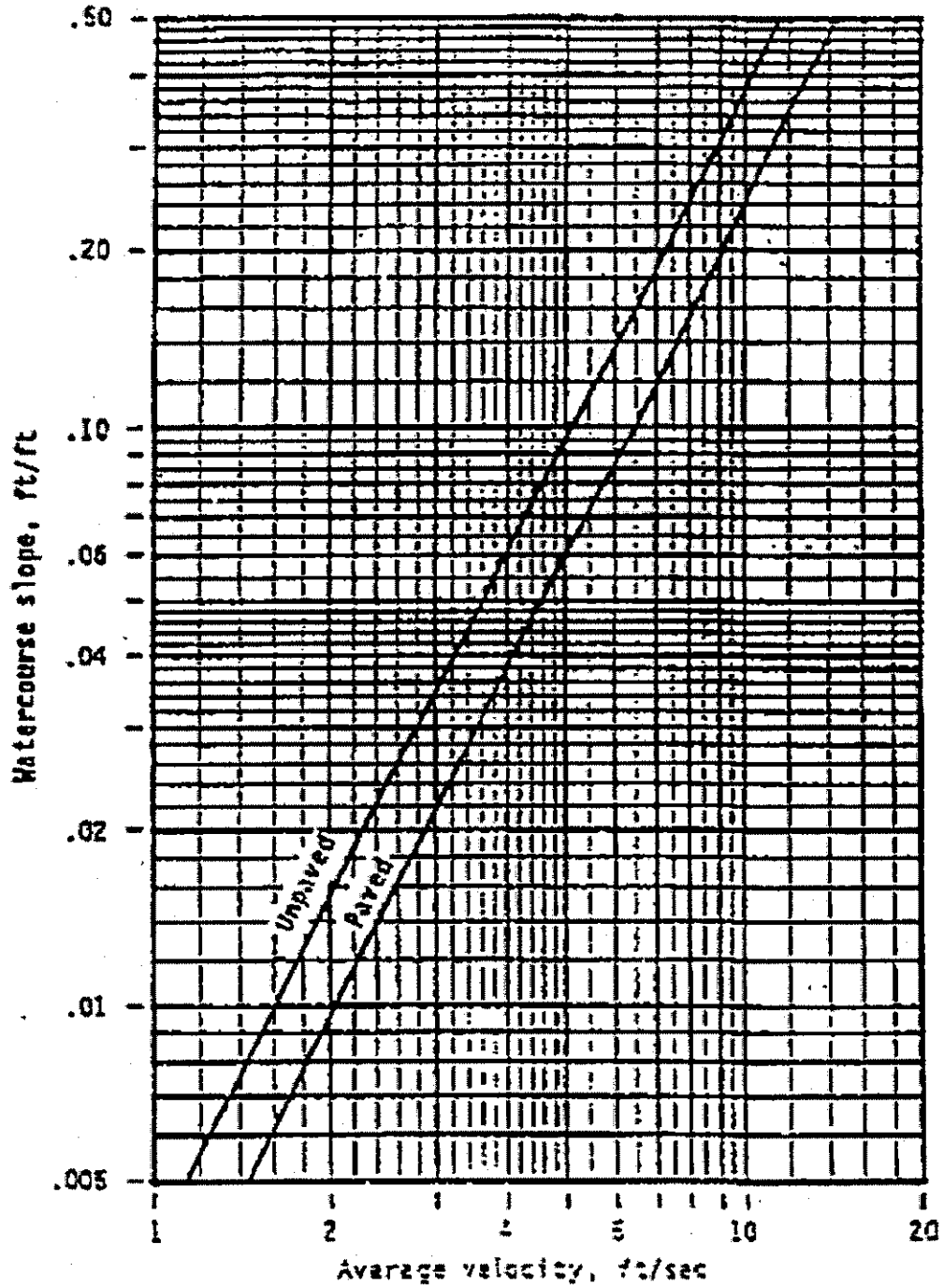


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Appendix G

Average Velocities for Estimating Travel Time for Shallow Concentrated Flow



(Ord. 7-1998, 10/1/1998)



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Township of Earl

Appendix H

Manning "n" Values for Pipes

PIPE MATERIAL	MANNING "n"
Helical corrugated steel/aluminum 2 2/3 x 1/2 corrugations diameter (inches)	
15	0.014
18	0.015
21	0.016
24	0.017
27	0.018
30	0.019
36	0.020
42	0.021
48	0.021
Reinforced Concrete All diameters	0.013
Corrugated polyethylene Smooth lining All diameters	0.012

Note: Arch pipe shall have the Manning "n" of an equal periphery of circular pipe.

(Ord. 7-1998, 10/1/1998)



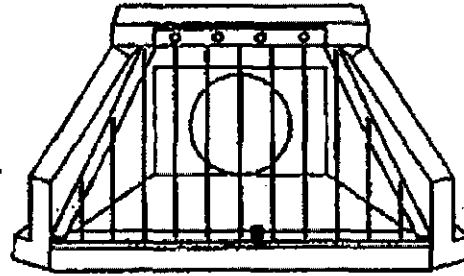
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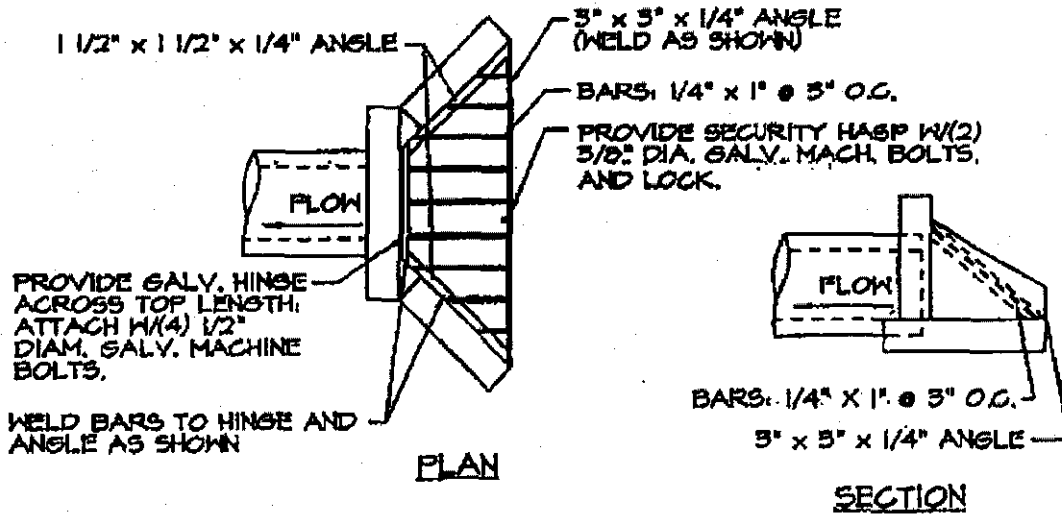
Appendix I
Trash Rack Detail (Type DW Headwalls Only)

NOTES:

1. MATERIAL TO BE GALVANIZED STEEL W/ RUST INHIBITOR OR ALUMINUM.
2. IF STEEL IS UTILIZED, THE UNIT SHALL BE FABRICATED, CLEANED AND THEN HOT DIP GALVANIZED AFTER FABRICATION.
3. DIMENSION APPROPRIATELY FOR HEADWALL UTILIZED.



ISOMETRIC



TRASH RACK DETAIL (TYPE DW HEADWALLS ONLY)

NO SCALE

(Ord. 7-1998, 10/1/1998)

