APPENDIX C.1

DISCONNECTED IMPERVIOUS AREA (DIA) AND WORKSHEET

When a regulated activity creates impervious areas between 1,000 sq. ft. and 5,000 sq. ft., or total earth disturbance between 5,000 and 10,000 sq. ft., the stormwater management requirements follow Appendix C.1 – Disconnected Impervious Areas (DIAs), of this Ordinance. If site conditions prevent the requirements of Appendix C.1 from being met, then the first 1 inch of runoff shall be captured and controlled in a manner consistent with Appendix E – Stormwater Management for Small Projects, of this Ordinance.

When rooftop or pavement runoff is directed to a pervious area that allows for infiltration, filtration, and increased time of concentration, the contributing rooftop or pavement area may qualify as a Disconnected Impervious Area (DIA). A rooftop or pavement area is considered to be a DIA if it meets the requirements listed below:

- The soil, in proximity of the discharge area, is not designated as hydrologic soil group "D" or equivalent (see Appendix F.2. Hydrologic Soil Group Map);
- The overland flow path (pervious area serving as BMP) from discharge area has a positive slope of 10% or less;
- The length of overland flow path (pervious area serving as BMP) is greater than or equal to the contributing rooftop or pavement length;
- The length of overland flow path (pervious area serving as BMP) is greater than 25 feet.

If the discharge is concentrated at one or more discrete points, no more than 1,000 square feet of impervious area may discharge to any one point. In addition, a gravel strip or other spreading device is required for concentrated discharges. For non-concentrated discharges along the edge of the pavement, this requirement is waived; however, there must be a provision for the establishment of vegetation along the pavement edge and temporary stabilization of the area until vegetation becomes stabilized.

If rainspouts are discharged underground to provide infiltration, the portion of the impervious area draining to those rainspouts is waived from the DIA discharge requirements. Rainspouts discharged underground which are directly connected to a storm sewer system are not waived from the DIA requirements.

Computations for DIA as a BMP must be submitted to the municipality. This worksheet is provided as an example, or may be used for the computations.

<table>
<tr><td>Applicant Address:</td><td colspan="5">Brief Description of Project:</td></tr>
<tr><td>Nearest waterbody:</td><td colspan="5">No more than 1,000 sq. ft. can discharge to one point on the surface.

Number of discharge points required:</td></tr>
<tr><td rowspan="2">Total Proposed Impervious Area (A):

Total Earth Disturbance:</td><td>Discharge Point 1</td><td>Discharge Point 2</td><td>Discharge Point 3</td><td>Discharge Point 4</td><td>Discharge Point 5</td></tr>
<tr><td>Area:</td><td>Area:</td><td>Area:</td><td>Area:</td><td>Area:</td></tr>
<tr><td rowspan="2">Are rainspouts discharged underground? (Y/N)

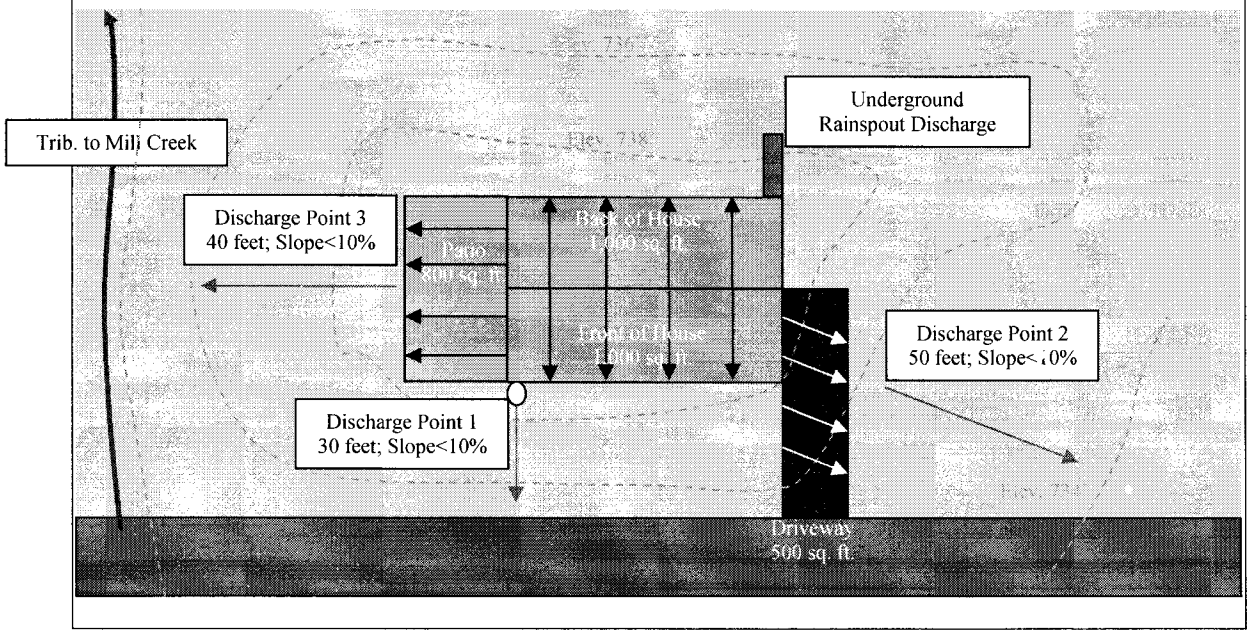
If yes, contributing impervious area (B):</td><td>Impervious Path Length:</td><td>Impervious Path Length:</td><td>Impervious Path Length:</td><td>Impervious Path Length:</td><td>Impervious Path Length:</td></tr>
<tr><td>Pervious Path Length:</td><td>Pervious Path Length:</td><td>Pervious Path Length:</td><td>Pervious Path Length:</td><td>Pervious Path Length:</td></tr>
<tr><td>Total Impervious Area Discharged on Surface (A) – (B):</td><td>Pervious Path Slope <10%? (Y/N)</td><td>Pervious Path Slope <10%? (Y/N)</td><td>Pervious Path Slope <10%? (Y/N)</td><td>Pervious Path Slope <10%? (Y/N)</td><td>Pervious Path Slope <10%? (Y/N)</td></tr>
<tr><td colspan="6">HSG Soil Group from Appendix F.2 Hydrologic Soils Group Map (Cannot be "D" Soils):</td></tr>
<tr><td colspan="6">Project sketch:</td></tr>
</table>

Example: Joe Homeowner would like to build a single-family home, with a driveway and backyard stone patio. The home is 2,000 sq. ft., the stone patio is 800 sq. ft., and the asphalt driveway is 500 square feet.

Applicant Address: Joe Homeowner 123 Site Street Anytown, PA 12345	**Brief Description of Project:** Construction of 2,000 sq. ft. (40' x 50') single-family home with 500 sq. ft. driveway (10' x 50') and 800 sq. ft. stone patio (20' x 40'). The back half of the house discharges to rainspouts underground.				
Nearest waterbody: Tributary to Mill Creek	**No more than 1,000 sq. ft. can discharge to one point on the surface.** **Number of surface discharge points required:** 3				
Total Proposed Impervious Area (A): 3,300 sq. ft. **Total Earth Disturbance:** 6,000 sq. ft.	**Discharge Point 1:** Front of Home	**Discharge Point 2:** Driveway	**Discharge Point 3:** Patio	**Discharge Point 4:** N/A	**Discharge Point 5:** N/A
	Area: 1,000 sq. ft.	**Area:** 500 sq. ft.	**Area:** 800 sq. ft.	**Area:** N/A	**Area:** N/A
Are rainspouts discharged underground? (Y/N) Yes **If yes, contributing impervious area (B):** 1,000 sq. ft.	**Impervious Path Length:** 20 ft	**Impervious Path Length:** 10 ft	**Impervious Path Length:** 20 ft	**Impervious Path Length:** N/A	**Impervious Path Length:** N/A
	Pervious Path Length: 30 ft	**Pervious Path Length:** 50 ft	**Pervious Path Length:** 40 ft	**Pervious Path Length:** N/A	**Pervious Path Length:** N/A
Total Impervious Area Discharged on Surface (A) – (B): 3,300 – 1,000 = 2,300 sq. ft.	**Pervious Path Slope <10%? (Y/N)** Yes	**Pervious Path Slope <10%? (Y/N)** Yes	**Pervious Path Slope <10%? (Y/N)** Yes	**Pervious Path Slope <10%? (Y/N)** N/A	**Pervious Path Slope <10%? (Y/N)** N/A

HSG Soil Group from Appendix F.2 Hydrologic Soils Group Map (Cannot be "D" Soils): HSG "C"

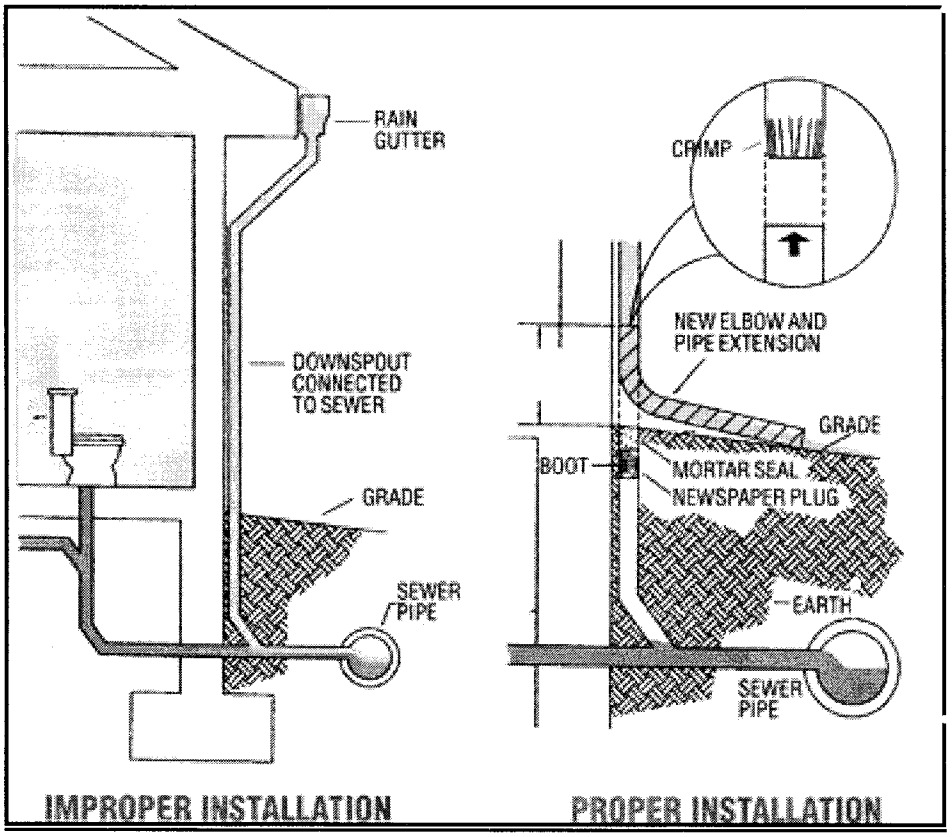
Project sketch:



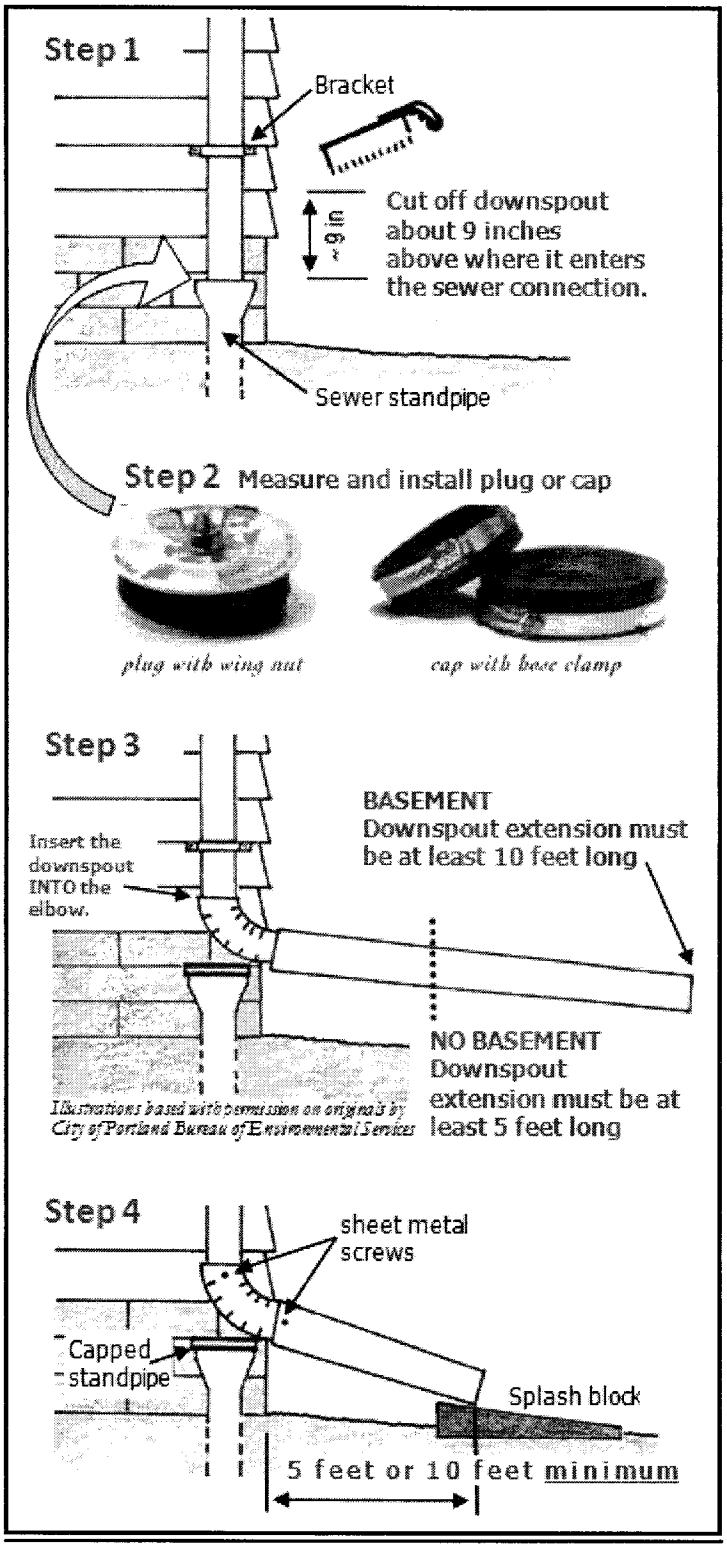
APPENDIX C.2

RAINSPOUT DISCONNECTION FROM SANITARY SEWER SYSTEMS OPTIONAL REQUIREMENT FOR MUNICIPALITIES

When roofs are being replaced, the municipality may require that rainspouts must be disconnected from sanitary sewer systems. The following guidance is provided should a municipality choose to enforce this requirement as part of this Ordinance, and is subject to the municipal engineer's discretion. When rainspouts are disconnected from sanitary sewer systems, it must be shown that adverse stormwater impacts are not created downstream. If the municipality opts to enforce this requirement, delete what is highlighted in gray on this page.



Source of image: www.munciesanitary.org/stormwater-managment



Source of image: rainwise.seattle.gov/solution_brochures

APPENDIX D

PROJECTS MEETING REQUIREMENTS IN SECTION 303 SUBSECTION B

When a regulated activity creates impervious areas between 5,000 sq. ft. and 10,000 sq. ft., or total earth disturbance between 10,000 and 20,000 sq. ft., the stormwater management requirements follow Section 303 Subsection B of this Ordinance.

Section 303 Subsection B is duplicated below:

B. When CG-1 guidelines are not used, the *Simplified Method* (CG-2 in the BMP Manual[1]) has been modified to accommodate 2" of permanently removed runoff volume. This method (provided below) is independent of site conditions and should be used if the *Design Storm Method* is not followed. For new impervious surfaces:

1. The first 2 inches of runoff from new impervious surfaces shall be permanently removed from the runoff flow (i.e., it shall not be released into the surface waters of this Commonwealth). Removal options include reuse, evaporation, transpiration, and infiltration.

2. Wherever possible, infiltration facilities should be designed to accommodate infiltration of the entire permanently removed runoff; however, in all cases at least the first 0.5 inch of the permanently removed runoff should be infiltrated.

5. Facilities, to the greatest extent possible and subject to the Municipal Engineer's discretion, shall be designed to drain the permanently removed runoff volume in a period no less than 24 hours and no greater than 72 hours.

6. Runoff volume in excess of 2 inches shall be safely conveyed to existing stormwater collection systems or streams, in the direction of the existing drainage course.

5. This method is exempt from the requirements of Section 304, Rate Controls.

Computations for all stormwater facilities must be submitted to the municipality. This worksheet is provided as an example, or may be used for the computations.

<table>
<tr><td>Applicant Address:</td><td colspan="3">Brief Description of Project:</td></tr>
<tr><td>Nearest waterbody:</td><td colspan="3">Permanently Removed Volume = (2 inches / 12) x (Impervious Area)
=</td></tr>
<tr><td>Total Proposed Impervious Area:</td><td colspan="3">A Factor of Safety of 2 is applied to the Tested Infiltration Rate.
Design Infiltration Rate = Tested Infiltration Rate / 2
=</td></tr>
<tr><td>Total Earth Disturbance:</td><td colspan="3">Components of the project may be directed to multiple facilities.
Number of facilities used:</td></tr>
<tr><td rowspan="5">Soil Testing Method:</td><td>Facility #1</td><td>Facility #2</td><td>Facility #3</td></tr>
<tr><td>Component of Project:
Volume Collected:</td><td>Component of Project:
Volume Collected:</td><td>Component of Project:
Volume Collected:</td></tr>
<tr><td>Tested Infiltration Rate (in/hr):</td><td>Type of Facility:
Volume of Facility*:
Area of Facility:
Depth of Facility:</td><td>Type of Facility:
Volume of Facility*:
Area of Facility:
Depth of Facility:</td><td>Type of Facility:
Volume of Facility*:
Area of Facility:
Depth of Facility:</td></tr>
<tr><td rowspan="4">Additional Calcs/Notes:</td><td>Drawdown Time = Depth of Facility / Design Infiltration Rate =</td><td>Drawdown Time = Depth of Facility / Design Infiltration Rate =</td><td>Drawdown Time = Depth of Facility / Design Infiltration Rate =</td></tr>
<tr><td>Loading Ratio = Impervious Area Controlled : Area of Facility =</td><td>Loading Ratio = Impervious Area Controlled : Area of Facility =</td><td>Loading Ratio = Impervious Area Controlled : Area of Facility =</td></tr>
<tr><td>Existing Discharge Point (Inlet/Sewer/Stream):</td><td>Existing Discharge Point (Inlet/Sewer/Stream):</td><td>Existing Discharge Point (Inlet/Sewer/Stream):</td></tr>
<tr><td>Discharge Method for Runoff in Excess of 2":
Capacity**:</td><td>Discharge Method for Runoff in Excess of 2":
Capacity**:</td><td>Discharge Method for Runoff in Excess of 2":
Capacity**:</td></tr>
<tr><td colspan="4">*Infiltration facilities with stone beds: 40% void space, multiply volume in stone portion by 0.4. Calculations:</td></tr>
<tr><td colspan="4">**If a grass spillway is used: Capacity (cfs) = 2.5 x Length x Freeboard$^{1.5}$
<b>**If an orifice structure is used: Capacity (cfs) = 0.6 x Orifice Area x (2 x 32.2 x Flow Depth Above Orifice)$^{0.5}$
Capacity Calculations:</td></tr>
</table>

Example: A doctor's office is proposed for a site. The building is 5,000 sq. ft. and the parking lot is 3,000 sq. ft.

<table>
<tr><td>Applicant Address:
Dr. Office
123 Site Street
Anytown, PA 12345</td><td colspan="3">Brief Description of Project: A proposed doctor's office consisting of 5,000 sq. ft. building (50' x 100') and 3,000 sq. ft. parking lot (30' x 100'). The building drains to the back of the property to an infiltration facility, and the parking lot drains to an infiltration facility adjacent the parking lot.</td></tr>
<tr><td>Nearest waterbody:

Trib. to Mill Creek</td><td colspan="3">Permanently Removed Volume = (2 inches / 12) x (Impervious Area)
= (2 inches / 12) x (8,000 sq. ft.)
= 1,333 cu. ft.</td></tr>
<tr><td rowspan="2">Total Proposed Impervious Area:
8,000 sq. ft.

Total Earth Disturbance:
12,000 sq. ft.</td><td colspan="3">A Factor of Safety of 2 is applied to the Tested Infiltration Rate.
Design Infiltration Rate = Tested Infiltration Rate / 2
= 1 in/hr / 2
= 0.5 in/hr</td></tr>
<tr><td colspan="3">Components of the project may be directed to multiple facilities.

Number of facilities used: 2</td></tr>
<tr><td rowspan="5">Soil Testing Method:

Percolation Test</td><td>Facility #1</td><td>Facility #2</td><td>Facility #3</td></tr>
<tr><td>Component of Project:
Building
Volume Collected:
5,000 x 2/12 = 833 cu. ft.</td><td>Component of Project:
Parking Lot
Volume Collected:
3,000 x 2/12 = 500 cu. ft.</td><td>Component of Project:
N/A
Volume Collected:
N/A</td></tr>
<tr><td>Tested Infiltration Rate (in/hr):

1 in/hr</td><td>Type of Facility:
Infiltration
Volume of Facility*:
1,133 cu. ft.
Area of Facility:
50' x 10' = 500 sq. ft.
Depth of Facility:
1 ft. stone + 1.3 ft. = 2.3 ft.</td><td>Type of Facility:
Infiltration
Volume of Facility*:
590 cu. ft.
Area of Facility:
30' x 10' = 300 sq. ft.
Depth of Facility:
½ ft. stone + 1.3 ft. = 1.8 ft.</td><td>Type of Facility:
N/A
Volume of Facility*:
N/A
Area of Facility:
N/A
Depth of Facility:
N/A</td></tr>
<tr><td rowspan="4">Additional Calcs/Notes:

Facilities have 2:1 horizontal:vertical side slopes. Therefore, actual volumes are greater which provides some additional storage for larger events.

Both facilities have 1 foot of freeboard. This volume is additional to the volume provided in the calculations.</td><td>Drawdown Time = Depth of Facility / Design Infiltration Rate =
2.3 ft. x 12 in. / 0.5 in/hr = 55.2 hrs</td><td>Drawdown Time = Depth of Facility / Design Infiltration Rate =
1.8 ft. x 12 in. / 0.5 in/hr = 43.2 hrs</td><td>Drawdown Time = Depth of Facility / Design Infiltration Rate =
N/A</td></tr>
<tr><td>Loading Ratio = Impervious Area Controlled : Area of Facility =
5,000 sq. ft. : 500 sq. ft. = 10:1</td><td>Loading Ratio = Impervious Area Controlled : Area of Facility =
3,000 sq. ft. : 300 sq. ft. = 10:1</td><td>Loading Ratio = Impervious Area Controlled : Area of Facility =
N/A</td></tr>
<tr><td>Existing Discharge Point (Inlet/Sewer/Stream):
Stream</td><td>Existing Discharge Point (Inlet/Sewer/Stream):
Inlet/Sewer System</td><td>Existing Discharge Point (Inlet/Sewer/Stream):
N/A</td></tr>
<tr><td>Discharge Method for Runoff in Excess of 2":
Spillway
Capacity**:
50 cfs</td><td>Discharge Method for Runoff in Excess of 2":
Orifice Outlet
Capacity**:
77 cfs</td><td>Discharge Method for Runoff in Excess of 2":
N/A
Capacity**:
N/A</td></tr>
<tr><td colspan="4">*Infiltration facilities with stone beds: 40% void space, multiply volume in stone portion by 0.4. Calculations:
Facility #1 has 1 ft. of stone: 500 ft^2 x 1 ft. stone x 0.4 = 200 ft^3 in stone portion; Volume = 500 ft^3 stone + (833 – 200) = 1,133 cu. ft.
Depth = 1 ft. stone + (833 – 200) / 500 ft^2 = 1 ft. + 1.3 ft = 2.3 ft.
Facility #2 has ½ ft. of stone: 300 ft^2 x ½ ft. stone x 0.4 = 60 ft^3 in stone portion; Volume = 150 ft^3 stone + (500 – 60) = 590 cu. ft.
Depth = ½ ft. stone + (500 – 60) / 300 sq. ft. = ½ ft. + 1.3 ft. = 1.8 ft.</td></tr>
<tr><td colspan="4">**If a grass spillway is used: Capacity (cfs) = 2.5 x Length x Freeboard$^{1.5}$
**If an orifice structure is used: Capacity (cfs) = 0.6 x Orifice Area x (2 x 32.2 x Flow Depth Above Orifice)$^{0.5}$
Capacity Calculations:
Facility #1 spillway: Capacity = 2.5 x (20 ft.) x (1 ft.)$^{1.5}$ = 50 cfs
Facility #2 orifice outlet: Use 1 ft. high by 2 ft. wide orifice; Capacity = 0.6 x (2 ft^2) x (2 x 32.2 x 1)$^{0.5}$ = 77 cfs</td></tr>
</table>

Project Sketch