

# Information to complete Anti-Entrapment Compliance Plan for Public Swimming Pools

## Getting Started

Public swimming pool owners and agents are required to assess the entrapment risk in their facility and comply with the anti-entrapment requirements of the Pool Standards, July 2014 (amended 2017). Once you have completed the *Anti-Entrapment Plan for Public Swimming Pools*, the facility will be able to demonstrate compliance with Section 9.0 of the Pool Standards concerning anti-entrapment plans.

Before starting, read through the entire package to understand the process. A copy of the *Anti-Entrapment Compliance Plan for Public Swimming Pools* can be found here: <https://www.albertahealthservices.ca/frm-21243.pdf>.

The Pool Standards require all pools to be compliant by November 30, 2019. If your facility requires piping, plumbing, or circulation system changes, the anti-entrapment plan needs reassessment for compliance.

Due to the complexity and specialized knowledge needed to assess the equipment required for anti-entrapment, the owner or their agent may contract the services of a suitable professional or professional engineer to complete all or part of this document. Documentation provided by the service professional and/or engineer should be included with the anti-entrapment plan.

If you have any question, please feel free to contact your local public health inspector for assistance: <http://www.albertahealthservices.ca/info/service.aspx?id=1052203>

## Terms

**Anti-entrapment device:** means any device used for the purpose of preventing body entrapment, hair entrapment or entanglement, limb entrapment, mechanical entrapment, evisceration incidents and death including but not limited to: certified ANSI/APSP-16 2011 suction outlets, a Safety Vacuum Release System (SVRS), a suction-limiting vent system or an automatic pump shut off system.

**Maximum flow rate:** means the highest possible water flow through a fully submerged suction system (excluding the skimmer or gutter system) with the system's pump(s) operating at full speed with clean pump basket(s) and clean filter(s).

**Suction outlet:** means a fitting or fitting assembly and related components, including a cover or grate and sump, which provide a localized low-pressure area for the transfer of water from a public swimming pool (previously may have been referred to as drain cover).

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**System:** In this document, a system is defined as a pump or pumps and any suction outlets that are connected to those pumps. Refer to Figure 1, 2 and 3 below.

### Completing the *Anti-Entrapment Compliance Plan for Public Swimming Pools*

Obtain the following information before completing the plan. The flowchart in Appendix A provides an overview of the steps necessary to complete the anti-entrapment assessment.

1. Identify every point where water leaves the pool basin. These are called suction outlets. These include main drains, equalizer lines and vacuum ports in the pool.
2. Gather all relevant information about previous renovations or alterations that have occurred in the facility. This would include but is not limited to engineered stamped plans, invoices for purchase of suction outlets, manuals/certificate, compliance/specification sheets for suction outlets and/or anti-entrapment devices, assessments previously conducted.
3. For each system, determine how all outlets are connected to the pump(s). Using the original design plans are the easiest way. If you have any doubt about the plumbing or are unsure how to determine the plumbing, please contact a pool service professional.
4. Complete the *Anti-Entrapment Compliance Plan for Public Swimming Pools* for each system. In this document, a system is considered a pump and any connected suction outlets that are connected to those pumps. Examples
  - a) A pool with one pump (Figure 1) would complete one copy of the form.
  - b) A pool with multiple connected pumps (Figure 2 or 3) would complete one copy of the form.
  - c) Multiple pools with multiple pumps would complete Part II, III and IV for each system in each basin i.e., pool, whirlpool, wading pool etc.
  - d) Pool features such as waterslides, jets, lazy rivers and spray features, etc. may have separate pumps. It is important to review and consider these in your assessment.

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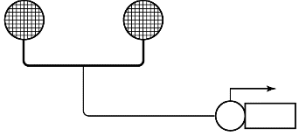
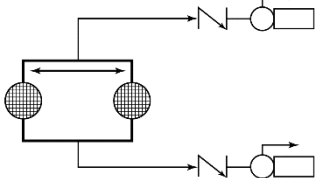
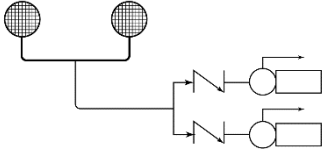
Figure 1. Suction outlets to one pump	Figure 2. Suction outlets to two pumps	Figure 3. Suction outlets to dual pumps
		

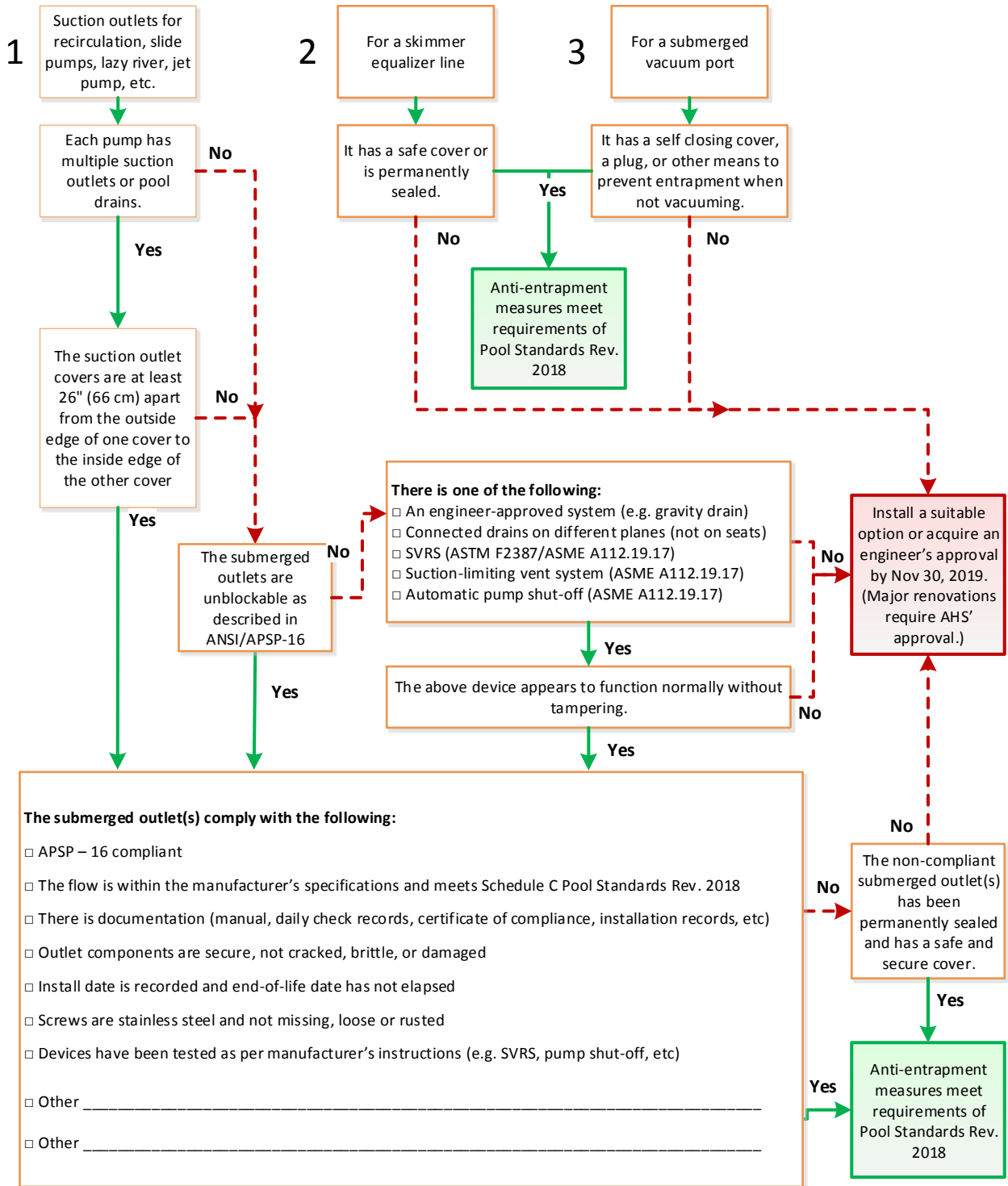
Figure 1 – Dual Outlets in Parallel to one pump. Page 6 ANSI/APSP -7 2006 Used with permission

Figure 2 – Parallel Dual Outlets to two pumps. Page 7 ANSI/APSP – 7 2006 Used with permission

Figure 3 – Dual Outlets in Parallel to Dual Pumps in Parallel. Page 6 ANSI/APSP – 7 2006 Used with permission

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## Appendix A – Flow Chart



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### Appendix B – Determining the Maximum Flow Rate

The maximum flow rate is the fastest possible flow in a worst-case scenario. It requires all system flow to move through the submerged suction outlet(s). A circulation system is not routinely operated this way, and the measured flow rate may be different from the normal flow rate.

To measure the maximum flow rate you may:

1. Read a conventional flow meter (easiest option)
2. Calculate flow using gauges and the pump performance curve.
3. Determine maximum pump performance using the pump performance curve.
4. Measure with a one-time measurement device such as an ultrasonic flow meter.
5. Consult a professional engineer.

For all measurements:

- a) Open all circulation valves to their fully open position.
- b) Clean skimmers and pump baskets. Turn off skimmer to isolate outlet, if possible.
- c) Backwash or clean sand filter DE grids, or cartridge filters.
- d) Set the pump to the highest speed.

#### **Method 1: Read a Conventional Flow Meter**

The flow meter must be installed according to the manufacturer's specifications, so the reading is accurate. This usually includes:

- The straight pipe length required before and after the flow meter
- The pipe diameter the flow meter can be installed in
- The pipe thickness or material that the flow meter can be installed on (schedule 80 or schedule 40 pipe).

If the flow meter cannot be installed properly, it may be easiest to install a different model with fewer installation restrictions.

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### **Method 2: Calculate flow using gauges and the pump performance curve**

Resistance to water flow, called head, can be used to calculate the flow rate. Special gauges measure the total dynamic head (TDH) which is used to determine the flow rate. If a pump has been modified, such as trimming the impeller, the manufacturer's stock pump curve may not be valid, and an alternative pump curve or verification may be needed.

#### Gauge Installation:

There must be a vacuum gauge and pressure gauge on the pump to use this method.

Vacuum gauge: located on the suction side of the pump, probably on the pump or pump strainer basket, it will read inches of mercury (Hg)

Pressure gauge: located on the discharge side of the pump, maybe on the pump or filter, it will read pounds per square inch (PSI).

TDH gauge: A total dynamic head (TDH) gauge reads TDH directly. Tubing from both the pressure and vacuum ports is hooked into one TDH gauge eliminating the calculations below.

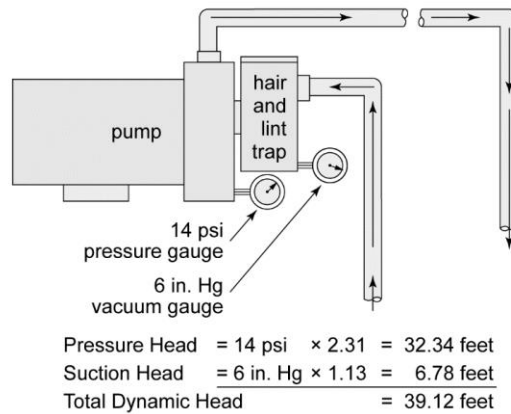
The gauges may be installed on a piece of tubing if there is not enough room to thread them directly onto the pump.

#### Calculation

1. Vacuum gauge reading x 1.13 (inches Hg).
2. Pressure gauge reading x 2.31 (PSI).
3. Pressure head + suction head (steps 1 and 2) = TDH in feet of head.
4. Using the pump curve from the manufacturer's website, find the TDH on the vertical axis, and read the flow rate on the horizontal axis.
5. This will give you the flow rate +/- 10%

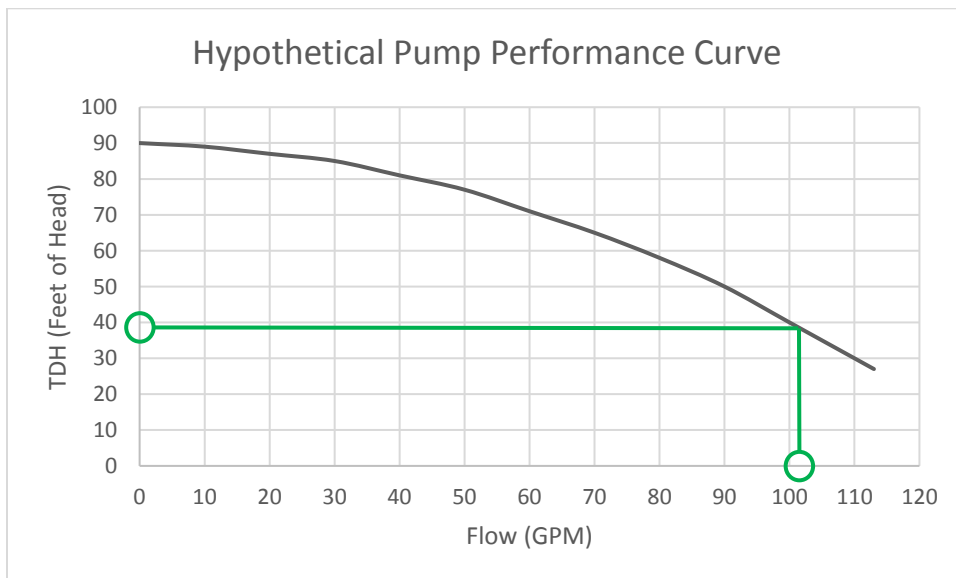
Example: If the pressure gauge reads 14 psi and the vacuum gauge reads 6 inches of mercury (Hg), the approximate Total Dynamic Head (TDH) of the system would be 39.12 feet.

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*Total Dynamic Head Figure. Page A-5 ANSI/APSP/ICC – 7 2013 Used with permission*

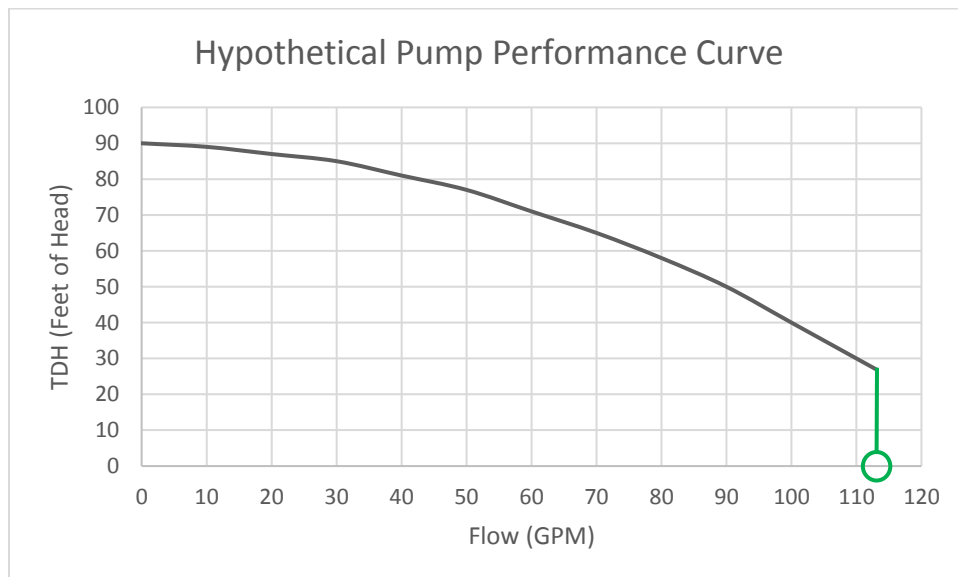
The TDH of 39.12 feet would then be used to read the flow rate on the horizontal axis of the manufacturer's certified pump curve. The measured flow at 39.12 feet is 102 GPM



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### Method 3: Determine maximum pump performance using the pump performance curve.

The maximum flow possible for a pump can be found at the end of the manufacturer's certified pump curve. First, locate the manufacturer's information on which pump curve to use. Look for the "end of curve" or "pump run out." The "end of curve" or "pump run out" is the maximum flow rate that can be developed by a centrifugal pump without damaging it. Operating a pump on the far right end of the pump curve may cause premature wear to the pump and be very inefficient. If a pump has been modified, such as trimming the impeller, the manufacturer's stock pump curve may not be valid and an alternative pump curve or verification may be needed.



### Method 4: Measure with a one-time measurement device such as an ultrasonic flow meter.

For systems where additional accuracy is required such as large systems, an ultrasonic flow meter may be used. Since these devices are not permanently installed on the system photographs and information about the assessment with an ultrasonic should be documented. These devices are temporarily attached to the pipes, as per the manufacturer's instruction.

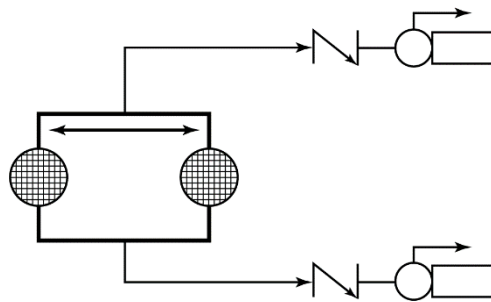


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### Appendix C – Determining Flow Through Suction Outlets:

The cover flow rate must at least meet the maximum system flow rate. For example, if the maximum system flow rate is 100 GPM, the cover must be rated for 100 GPM or greater.

If multiple pumps draw water from the same outlet, the cover rating must meet or exceed the flow of all pumps combined. (see Figure 4 Multiple pump configuration) For example, a whirlpool with two interconnected drains has a maximum flow rate of 50 GPM for the circulation system and 100 GPM for the jet system. Each cover must be rated to handle all of the total flow, which in this example is 150 GPM. Outlets rated below 150 GPM would be unsafe.



*Figure 11. Dual parallel outlets to two pumps. Page 7 ANSI/APSP/ICC – 7 2013 Used with permission*

Figure 4. Dual Parallel Outlet to Two Pumps

If there are three or more outlets, the flow may be divided among them. If one outlet is blocked, the other outlets must be able to handle the entire water flow. Using a 1 suction outlet blocked scenario, the table below allows one to calculate the safe flow per outlet.

	2 (outlets in total)	3	4	5	6	>6 outlets in total
Percent of flow through each unblocked outlet.	100%	50%	33%	25%	20%	100% / (# of open suction outlets (i.e. # of suction outlets - 1))

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### Example 1: Two Blockable Outlet System

A pool has 2 outlets, and the maximum system flow rate is 100 GPM. Therefore each outlet must be sized to accommodate at least 100% of the flow which is 100 GPM.

### Example 2: Four Blockable Outlet System

A pool with 4 connected outlets has a maximum system flow rate of 300 GPM; each outlet must be sized to accommodate at least 33% of the flow which is 100 GPM.

### Example 3: Multiple **Un**blockable Outlet

For **unblockable** submerged suction outlets (that meet the definition as found in the Pool Standards, July 2014 (amended 2017) one outlet being blocked does not impact these outlets as they are so large they cannot be blocked.

If a pool has 2 unblockable outlets rated for 100 GPM each. The total flow allowed through the outlets is 200 GPM.

## Appendix D – Outlet Sumps

Sumps are the vessel between the suction outlet cover or grate and the suction outlet piping. Sumps may be manufactured or field built. The outlet pipe must be a certain distance below the cover to ensure the water flow is equal across the outlets surface.

For each outlet, the manufacturer's installation specifications must be followed. Most covers or drains require a measurement from the bottom of the frame to the pipe that is **1.5 times the diameter of the pipe** ( $1.5D$ ), but this requirement will be specified in the manufacturer's instructions.

If a cover or grate is a "sumplless" design, then no sump is required under the cover or grate.

If a cover or grate is installed over the opening where the existing frame is abandoned, and the cover or grate is secured directly to the pool basin, then the cover must be installed so that it is centered over the sump opening.

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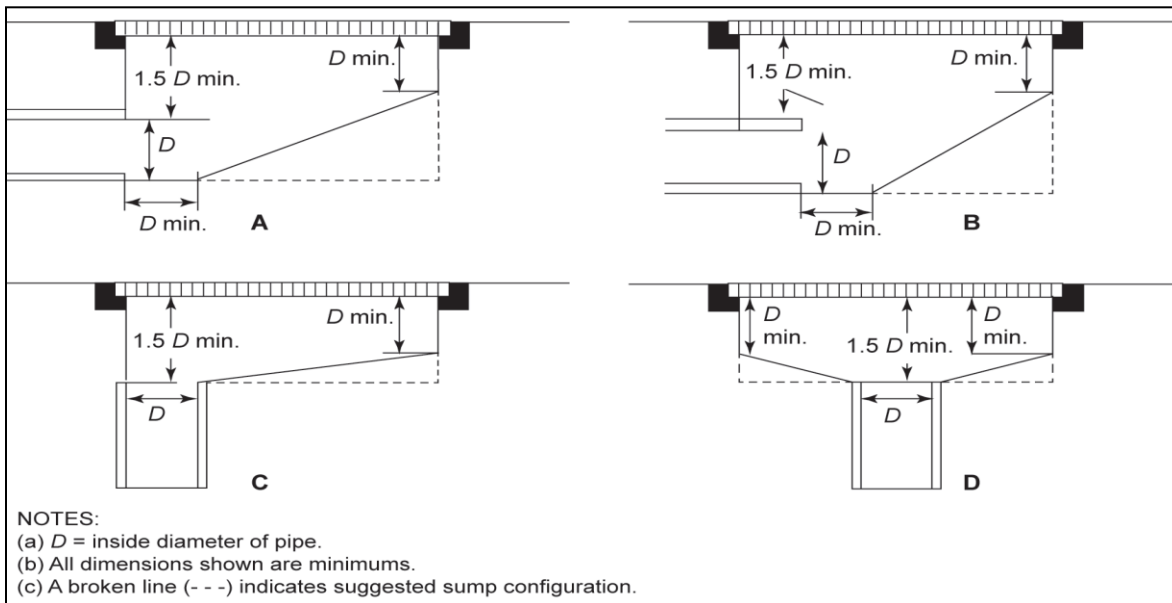


Figure 2 – Field Built Sump. Page 5, ANSI/APSP 16 – 2011 Used with permission  
 Figure 5. Sump diagram with suction pipe location

**For more information, please contact your nearest Environmental Public Health office.**

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 Calgary Main Office  
 Lethbridge Main Office

780-735-1800 Grande Prairie Main Office  
 403-943-2288 Red Deer Main Office  
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