1. For sanitary waste systems, avoid pumps with long shafts. Submersible bilge and sewer pumps are recommended. Provide stainless steel chain capable of lifting two times the pump’s weight for lifting the pump; or on pumps with motors greater than three horse power, provide a sliding rail system anchored to a concrete footing. In some cases the physical space limitations will force a different approach/application. In these application circumstances, surface mounted pumps would substitute as the preferred type.

2. Fire pumps are to be electric motor on emergency power or diesel engine driven in special cases. Pumping unit to be UL/ULC listed and shall meet all requirements of NFPA 20, NFPA 25 and the Office of Environmental Health & Safety.

3. Install pumps and motors allowing sufficient space for maintenance and removal of all components.

4. Use high efficiency electric motors. Motors shall be certified to be compatible with the VFD’s that are listed in the U of A VFD Specification and shall have motor insulation that will withstand voltage levels and transients/peaks associated with VFD service. Motors shall be of premium efficiency design, and have minimum and nominal full load efficiency which will meet or exceed the values NEMA MG1 – 12.55’s Table 12-6B when tested in accordance with NEMA test standard MG1-12.54; IEEE Test Procedure 112, Method B using accuracy improvement by segregated loss determination including stray loss load measurements. (Use latest editions of aforementioned documents). Minimum efficiency shall be guaranteed.

5. VFD’s for pumping systems at 18.6 kW (25Hp) and greater

6. When the domestic water system boosted to higher pressure, to accommodate building height or use, domestic water booster pumps, when required, shall have the following characteristics:
   
   a) Pumps shall function on emergency power.
   b) Pumps to be close coupled or split coupled vertical, or close coupled horizontal design, all bronze construction.
   c) Each system shall employ two pumps, each pump sized for not more than 125% of existing or projected peak flow and pressure demand. One of the two pumps shall be designated as 100% standby and shall be powered by separate VFD. (See U of A VFD Specifications for requirements.)
   d) Provide low pressure control to shut off pumps when incoming water pressure is zero (gauge pressure).
   e) Provide high pressure control to shut off pumps if adequate pressure is available from utility main such that the pumps are unnecessary.
   f) PROHIBITED – manual control of pumps. Unless a variance has been granted and it has been demonstrated that, across the line pump starts will not overpressure any portion of the piping system VFD systems with across the line bypass starting capability shall not be used.
g) Control the pump flow using a VFD. Each pump shall have a separate VFD. For tall buildings use multiple pumps rather than PRV’s.

h) Assembly; pumps and VFD control panel may be packaged or separate.

i) Pumps shall be set to run at a minimum of 30% flow through the VFD in order to avoid motor burn out.

7. Use VFD’s for pumps on variable flow hydronic systems. Where a duty/standby pump arrangement is used, provide automatic switching of duty pump.

8. Pumps should operate at the specific flow rate and head using an impeller that is smaller than the manufacturer’s maximum impeller size for the particular pump size. Pumps are to be selected at 75% of the maximum efficiency published by the manufacturer.

9. Use two primary circulation pumps, each sized for 100% stand-by duty. Pumps to be serviced on emergency power if available.

10. Pump motors should be selected to be non-overloading over the entire range of the pump curve and also for parallel or individual operation.

11. Do not use base mounted pumps. In-line vertical pumps are preferred. If an in-line vertical pump cannot be used, close-coupled horizontal pumps will be acceptable on vertical in line pumps larger than 15AP use split coupled pumps.

12. Use of inlet suction guides and combination balancing valves are acceptable. Use standard mechanical pump seals except for special applications where a packing gland or a special seat and face material may be required.

13. Provide a line size shut-off valve and a strainer on the suction side of all pumps. Provide a spring check valve and balancing valve on the discharge side of all pumps.

14. Use long radius reducing elbows or long reducers to reduce pipe sizes at the pump connections. The installation shall follow the recommendations of the Hydraulic Institute.

15. Support pipes adjacent to the pump such that no pipe weight is transferred to the pump casing. Provide supports at the pump suction and discharge elbows for piping 100 mm and over.

16. For pumps suction and discharge piping 75 mm and over that rises 1000 mm or more before being supported, use spring type supports for piping that conveys fluids that may operate at more than 50°C differential to ambient.

17. Avoid using pumps with 3500 rpm motors. Recommended motor speed is 1750 or 1200 rpm.
18. Flanged pump connections are preferred.

19. Provide a 100% standby main building chilled water pump for buildings that have animal facilities.

20. Chilled water pumps are not required to be on emergency power unless they serve a critical purpose.