




MEMORANDUM

TO: All Perspective Lift Station
and Force Main Designers

DATE: January 15, 1999

SUBJECT: Revised Pump Station
Design Guidelines

FROM: 
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Engineering and Planning

The following pump station design guidelines shall supersede all previously issued design guidelines:

1 - Wet Well Operating Capacity

Wet well operating capacity determination shall be based on pump cycling, not on a fixed determined wet well effective volume. The method of determination shall be as specified in Section 3.4.3 of "Supplemental Design Guidelines for Pump Stations and Force Mains".

2 - Wet Well Ventilation

When outside of the right-of-way, use the 6-inch gooseneck assembly with insect screen. When in public right-of-way, the vent should be piped underground from a high point on the side of the wet well and then raised aboveground near at the site of the control panel.

3 - Submersible Pump Size Limitation

Shall meet all three concurrent criteria:

- a) No more than 60 HP
- b) No more than 1,500 pounds
- c) No more than 1,800 RPM

4 - Valve vault dimensions, Hatches and Location of Pressure Gages

- a) Valve vault shall have minimum dimensions of 6 x 6 feet, with aluminum hatches when outside of the right-of-way and steel hatches when in public right-of-way. This criteria also applies to wet well hatches. In all cases, hatches shall be designed for H-20 loading and shall be bolted down.
- b) A pet cock shall be installed inside the valve vault, before each check valve, and one removable pressure gage shall be provided for each station. The pressure gage shall be all stainless steel with diaphragm type connection.

5 - Backflow preventer and hosebibb

- a) Backflow preventers shall be installed aboveground, as shown on Standard Detail WS 4.18. A lockable box type enclosure shall be placed over the backflow preventer to protect it from vandalism. Details of the enclosure are available on the standard pump station drawings.

- b) A 3/4-inch hosebibb shall be installed (connected downstream from the backflow preventer) near the wet well, or when the station is in public right-of-way, with the riser coming out through the same backflow preventer slab. The hosebibb shall have a lockable angle ball type valve meter type valve with hose connection, such as manufactured by Ford Meter Box Co. or equal.

6 - Suction and Discharge Piping Design Velocities

Desirable velocities in pump suction piping are 3 to 4 ft/sec and in discharge piping 5 to 6 ft/sec, at maximum pump discharge rate. Check velocities at suction flared inlet and provide adequate submergence depth.

7 - Isolation Valves

Shall be plug valves, unless otherwise approved by the Department. Plug valves 12-inch and larger shall have geared operators. Knife gate valves shall not be considered for use on neither discharge nor suction lines.

8 - Level Controller

Shall be microprocessor based controller with air bubbler, high and low backup float switches, Digital Control Corp., Models 11928-3 and 11946, or approved equal. Bubbler could be either 4-20 ma type or pressure switch type.

9 - Dead End Wet Wells

Shall never be used on new station designs and only on existing pump station improvements when there is no other way to avoid them. Department's approval shall be obtained in each case.

10 - Common Suction Header

Same as in Item 9, above.

11 - Wet Well Structural Design Standards

The use of prefabricated rings with joints between them sealed with "Ram-Nek" or an approved equal compound will be accepted by the Department.

12 - Force Main Discharge

The discharge of a force main into a gravity sewer manhole when there is not an existing force main nearby should be avoided unless no other solution is possible. Department's approval should be obtained in each case.

13 - Voltage (240/480) Service and Motor Horsepower

Preferred voltage for any size motor is 480V, 3 phase. Pumping stations up to 20 HP can be 240V, 3 phase. Approval from the Department shall be obtained when recommended service is not available and it will be too costly to bring it into the station.

14 - Aerial Crossings

The Department's preference is to use steel pipe for aerial crossings. Reasons are flexibility, longer unsupported spans and easiness to weld or cut to desired length. Supports are to be designed for each case.

15 - Restrained Joint Pipes

The Department's preference is to use the Locking Segment (US Pipe TRFLEX or approved equal) type of restrained joint. The field lock type of restrained joint shall be allowed only in emergency situations. The Department's approval shall be obtained in each case.

16 - Miscellaneous Topics

- a) Minimum speed for variable frequency drive pumps should be set at 60% of maximum speed, however, Department approval shall be obtained in each case
- b) Hazardous location classification for pump stations shall be Class I, Division II.