

# PUMP STATION/FORCE MAIN DESIGN CHECKLIST

## CITY OF MIRAMAR OFFICE OF OPERATIONAL SERVICES ENGINEERING SERVICES

### General:

APPROVED

DISAPPROVED

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1) Compliance with wastewater master plan.

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2) Re-pump stations are not acceptable. All pump stations shall pump into adequately sized force mains which transmit the sewage to the appropriate wastewater treatment facility.

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3) Developer shall make an adequate contribution to the City for the construction of a telemetry system and for an emergency generator or bypass pump.

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4) In general, no more than one (1) pump station per quarter section (160 acres) shall be allowed.

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5) If a proposed pump station is within 300 feet of an existing water body, a Geotechnical Engineers Report with recommendation for wet well construction shall be provided.

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6) Submit pump station, wet well and force main design reports including required pump curve(s). The report shall include the number of individual residential, commercial and/or industrial units served plus the size of basin area in acres. The operating pressures on the force main for 25%, 50%, 75% and 100% build-out.

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7) All pump stations shall be wet well type utilizing submersible pumps (minimum of two) with discharge piping to a below-grade valve pit. The wet well diameter will be 8'-0" minimum.

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- \_\_\_\_\_ 8) All required telemetry conduits shall be installed in the concrete slab for future telemetry construction.
- \_\_\_\_\_ 9) Shop drawings shall be submitted to the City and approved prior to purchase or fabrication of equipment and materials.

## Civil:

- \_\_\_\_\_ 10) Pump Station parcels shall be 30' x 30' elsewhere and shall not be located within 100' of the top of the bank of any water body.
- \_\_\_\_\_ 11) The entire pump station parcel is to have a 6" concrete pad on top of 12" compacted subgrade, compacted to 98% of the maximum density per AASHTO T-180 method. Subgrade is to have a minimum LBR of 40.
- \_\_\_\_\_ 12) A six (6) foot high chain length site perimeter fence with three strands of barbed wire shall be provided. The mesh shall be green vinyl fusion-bonded chain link with green aluminum slats each way, pursuant to City specifications. Alternate screening methodologies may be submitted for review.
- \_\_\_\_\_ 13) Fence gate into the site shall be 14 feet wide roll gate with locking hasp suitable for padlock. Driveway between Pump Station and road to be 16 feet wide.
- \_\_\_\_\_ 14) Pump station shall be provided with a 12" wide x 18" high identification sign with the following information and should resist fading:

City of Miramar (Navy Blue)  
Pump Station No. \_\_\_\_\_ (Red)  
Emergency Call: 967-1665 (Red); or  
704-4431

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## Mechanical:

- \_\_\_\_\_
- \_\_\_\_\_
- 15) In general, sewer force mains located within the rights-of-way and utility easements shall be a minimum of four (4) inches in diameter. Material and specification requirements shall be as follows:
- \_\_\_\_\_
- \_\_\_\_\_
- a) Fittings: Mechanical joint ductile iron only (unless otherwise noted) conforming to ANSI/AWWA C110/A21.10. Mechanical joints shall conform to ANSI/AWWA C111/A21.11. Neoprene gaskets shall be used. The lining shall be Protecto 401 Ceramic Epoxy with a minimum Dry Film Thickness (DFT) of 40 mils. An outside coating of either coal tar epoxy or asphalt on all fittings is to be applied. Polyethylene wrap shall be installed if required.
- \_\_\_\_\_
- \_\_\_\_\_
- b) Ductile Iron Pipe (DIP): Shall conform to ANSI/AWWA C151/A21.51. The wall thickness and outside diameter of the pipe shall conform to ANSI/AWWA C150.A21.50. Minimum thickness class shall be Class 51 Ductile Iron, or pressure class 350 may be substituted. Push-on joints shall conform to ANSI/AWWA C111/A21.11. Gaskets shall be neoprene. The lining shall be Protecto 401 Ceramic Epoxy with a minimum Dry Film Thickness (DFT) of 40 mils. An outside coating of either coal tar epoxy or asphalt shall be applied. Polyethylene wrap shall be installed if required.
- \_\_\_\_\_
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- c) Polyvinyl Chloride Pipe (PVC): Shall have a Dimension Ratio of 18 (DR-18). The dimension and pressure classes for Dimension Ratios with cast iron pipe O.D.'s shall conform to ANSI/AWWA C900 for 6 to 12 inches and ANSI/AWWA C905 for 14 inches and larger. Force

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main PVC shall be impregnated with green pigment.


- d) Restraint: All fittings and specific pipe joints shall be restrained as outlined below (NO SUBSTITUTIONS):

<u>JOINT</u>	<u>RESTRAINT</u>
Push-On PVC	EBAA Iron Series 2800 Harness
Push-On DIPTR-Flex	by U.S. Pipe or Flex Ring by American; or EBAA Iron Series 1700 Megalug
Fittings with DIP	EBAA Iron Series 1100 Megalug
Fittings with PVC	EBAA Iron Series 2000 Megalug

- e) Deflection: PVC and DI pipe shall be deflected no more than one half of the manufacturer's recommendations. (Check against AWWA)

- 16) Detecto tape shall be laid 18 inches below finished grade or at least 12" above all force mains. A 14-gauge multi-strand wire shall be attached to all PVC force mains to facilitate location. This helps with location of piping and prevents accidental hitting of underground piping.

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| _____ | _____ | 17) An isolation valve shall be provided between the emergency bypass stand pipe and the valve pit. The valve shall be installed above ground. All valves for sewage force mains shall be gate valves. Gate valves shall be resilient type and shall meet the requirements of AWWA C-504 and C-507. The following are acceptable:<br>a) M&H<br>b) Muller<br>c) Dezurik   |
| _____ | _____ |  |
| _____ | _____ |  |
| _____ | _____ | 18) Emergency bypass shall be the same diameter as the receiving force main but not larger than six (6) inches. Connection shall be "Kamlock" plug and coupler (female end) with dust cover which includes a 316 stainless steel chain to attach cover pipe. Isolation valve shall be 24 inches above finished grade with a hand wheel actuator. The stand pipe shall have an 18" x 18" x 6" concrete collar and the overall height shall be no more than 36 inches above grade. |
| _____ | _____ | 19) Valve pits shall be drained to wet well with a two (2) inch PVC 1120 pipe with rubber ring compression joints. PVC shall be sloped with a "P" trap inside the wet well.  |
| _____ | _____ | 20) The last run of sewer main between the collection manhole and the wet well is to be PVC SDR-26.  |
| _____ | _____ | 21) Location of check valves and resilient gate valves inside the pit shall be staggered. Check levers shall be on the inside. Gate valves shall have hand wheels. Provide a minimum of one (1) foot horizontal/one (1) foot vertical distance from piping to bottom interior of pit walls. Install a 2-1/2 inch liquid-filled pressure gauge on each check valve with 1/2" 316 stainless steel isolation valve, diaphragm protection seal and NPT 316 S.S. fittings.            |

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- \_\_\_\_\_ 22) Check valves for sewage pump stations and force mains shall be one of the following:
- \_\_\_\_\_ a) M & H Swing  
\_\_\_\_\_ b) APCO Swing Check  
\_\_\_\_\_ c) Golden Anderson
- \_\_\_\_\_ 23) Wet well shall have a four (4) inch diameter SCH-80 vent. The top shall have a 180 degree bend with a 316 stainless steel mesh grill located 12 inches from the top of the wet well. The vent shall be located such that it does not impede maintenance and shall be shown on the plans.
- \_\_\_\_\_ 24) All pipe and fittings on the pump station site shall be ductile iron conforming to the same specifications as above for sewage force mains except that flanged ductile iron pipe and fittings shall be used inside the valve pits and wet wells. Flanged pipe and fittings shall conform to ANSI/AWWA C115/A21.15 and ANSI/AWWA C110/A21.10. The following thickness classes shall be adhered to:
1. 4-1/2 inches - Class 52  
2. 14 inches and larger - Class 51
- \_\_\_\_\_ 25) Pump stations shall be designed for ultimate conditions. If present conditions warrant different pumps, motor, and/or impellers, the ultimate condition equipment shall also be provided.

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- \_\_\_\_\_ 26) Pumps to be used in pump stations shall be of the submersible slide-rail type. The following are acceptable manufacturers:
- \_\_\_\_\_ a) Flygt only
- \_\_\_\_\_ b) Pump specifications:
1. Pump motors shall be 240 volts, 3-phase, 60 Hz below 30 HP. Above 30 HP pump motors shall 480 volts, 3-phase, 60 Hz.
  2. Minimum sphere size to pass shall be three (3) inches.
  3. Pump cycle time shall be fifteen (15) minutes minimum with no more than three (3) starts per hour.
  4. All pumps off setting for wet well shall be one (1) foot above the top of the motor.
  5. A peaking factor of 2.5 ADF shall be used for pump capacity.
  6. In general, the impeller diameter shall be in the middle of the family of pump curves, i.e., not the smallest or largest diameter impeller for the model in question.
  7. Five (5) extra feet of 316 S.S. chain, 10' pump power cable can be provided.
- \_\_\_\_\_ 27) Water service riser shall be one (1) inch diameter of polyethylene with the hose bib strapped to the fence post. An above-ground AMES RPZ 4000 backflow preventer shall be included with this service and installed in accordance with the South Florida Building Code.

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\_\_\_\_\_ 28) City to supply water meter, MXU, and complete meter box and cover. The Contractor will install the meter box and meter, and active the account with the City's Finance Department. Contractor to provide tie-in to the nearest water main.

## Structural:

\_\_\_\_\_ 29) Wet well structural design shall be signed and sealed by a structural engineer registered in the State of Florida. All joints shall have Ram-Nek seals.

\_\_\_\_\_ 30) All concrete associated with the pump station shall be 4000 psi or greater.

\_\_\_\_\_ 31) A debris cage with a slide rail shall be provided within the wet well with its own access hatch.

\_\_\_\_\_ 32) Wet well to be a minimum of eight (8) feet in diameter and conform to ASTM C-478 for precast concrete manholes with eight (8) inch walls (minimum). Use 316 stainless steel inside in the valve pit.

\_\_\_\_\_ 33) All associated hardware including miscellaneous nuts, bolts, anchors, plates, brackets, pipes, etc. shall be stainless steel.

\_\_\_\_\_ 34) Interior of wet well shall be lined with a gas impervious Agru Suregrip Polypropylenl (PR-P), or GU manhole liner, or the wet well shall be manufactured fiberglass/concrete composite wet well utilizing two layers of 20-25 mils gel coat of contrasting colors and two (2) layers of 20-30 mils fiberglass reinforced resin in contrasting colors to be integrated with all interior surfaces and interior of all joints and boot openings. Paint valve box with two (2) coats of Koppers Bitumastic No. 300M and one (1) coat on wet well outside walls. (Dry thickness of sixteen (16) mils per coat.)



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\_\_\_\_\_ 35) The chamber at the bottom of the wet well shall be sloped at a 60 degree angle to channel the solids to the pump intake. The chamfer shall be within six (6) inches of the pump intake in order to prevent accumulation of solids.

\_\_\_\_\_ 36) Access covers for valve pits and wet wells (hatches) shall be double leaf aluminum with pad lock hasple for City's Master lock; sized nominally 54" x 48" opening, spring-loaded hinges, a stay-open latch and recessed handles. It shall be designed for 300 psf live-loading and furnished with vapor proof door seals. Access hatches to be precast with valve pit and wet well tops. U.S. Foundry type TPD with trough frame to prevent water from entering pit is acceptable.

\_\_\_\_\_ 37) Valve pit shall be provided with an eight (8) inch base and six (6) inch precast walls and sealed to prevent water from entering through seams or the hatch.

## Electrical:

\_\_\_\_\_ 38) Underground electrical service from FP&L shall be 480 volt, 3-phase 60 Hz. Included shall be a step-down transformer for 120 volts single phase.

\_\_\_\_\_ 39) The emergency power receptacle shall be 100 amp 3 PHW Meltric 37-99043 for stations with 100 amp or less main breaker, and 200 amp 3 PHW Meltric 37-29043 for stations with main breaker greater than 100 amp. Locate the receptacle facing toward the gate for easy access.

\_\_\_\_\_ 40) One (1) inch PVC conduit shall be provided between the valve box and the electrical panel in the concrete slab.

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\_\_\_\_\_ 41) Security light shall be on a ten (10) foot pole with a red alarm light on top. Mounted on the pole shall be a switch enclosed in a Nema 4X enclosure located 42 inches above grade.

\_\_\_\_\_ 42) Conduit shall have sweep elbows and all facilities shall conform to the latest version of NEC and UL listed.

## Instrumentation:

\_\_\_\_\_ 43) The pump station control center shall be housed in a NEMA 3R 316 stainless steel enclosure, 48" x 36" x 12" deep.

\_\_\_\_\_ 44) A dual air bubbler shall be used for pump control and alarm indication. Pumps shall alternate between starts, and a mercury switch in a hanging float shall be provided for a high-level alarm. The dual air bubbler system shall be controlled by the digital pump control system per City Standard Fig. No. 305.3.

\_\_\_\_\_ 45) Schematic control layout and piping diagram shall be in accordance with the City's specifications.

\_\_\_\_\_ 46) Flygt pumps shall be provided with a submegger system.

\_\_\_\_\_ 47) A lightning arrester shall be installed at the exterior instrumentation.