

TOWN OF WINDSOR



MINIMUM DESIGN STANDARDS FOR NON-POTABLE IRRIGATION AND DISTRIBUTION SYSTEMS

TOWN OF WINDSOR

**GENERAL DESIGN CRITERIA FOR NON-POTABLE
WATER SYSTEMS**

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NON-POTABLE SYSTEM DESIGN

GENERAL

The purpose of this section is to provide information for the design and layout of a non-potable water distribution system acceptable to the Town of Windsor. All non-potable system designs shall be in accordance with the requirements of this section and the Town of Windsor Standard Specification and Construction Manual as they apply to water distribution construction. The design engineer shall be responsible for compliance with these design standards as well as other applicable design and construction standards in preparation of engineering studies, construction drawings, and specifications for Town review.

RELATIONSHIP TO OTHER STANDARDS

Whenever a provision of these criteria, and any other provision in any law, ordinance, resolution, rule, or regulation of any kind, contain any restrictions covering any of the same subject matter, the most restrictive standard shall apply. Adherence to these criteria does not remove the applicants responsibility to investigate and obtain any other regulatory permits or approvals, from either local, regional, state, or federal agencies that may be required for a particular project.

REVIEW AND ACCEPTANCE

All non-potable plans and specifications submitted to the Town of Windsor for review, comment, and acceptance shall be prepared by, or under the direct supervision of a professional engineer licensed by the State of Colorado. Said professional engineers shall be responsible for the design, preparation of construction drawings, material specifications, and field survey for accuracy.

RAW WATER

The amount of raw water for a non-potable system shall be a minimum of 3 acre-feet per acre of irrigated land.

PRELIMINARY REPORT

A report shall be submitted to the Town, in memo form prior to the plan submittal, describing the project as it relates to the development and the irrigation water Supply that will be utilized.

SYSTEM REQUIREMENTS

Design flow specifications shall be in the format listed below and designed to irrigate a given area at 80% operational efficiency during peak season (June, July, August) at 80 psi in 8 hours.

Format:	UNITS	VALUE
Operational Efficiency	%	#
Peak Season Requirements	in/day	#
Area of Irrigated Turf	Sq. ft.	#
Area	acres	#
Total Daily Application	Inches	#
Total Daily Application	Acre-ft	#
Irrigation Flow Requirements with 8 Hour irrigation window	gpm	#

PRESSURE REQUIREMENTS

The non-potable distribution system in all areas shall be designed to have a maximum static head of 100 psi and a minimum static head of 60 psi.

SYSTEM LAYOUT: (TYPICAL)

The non-potable water main shall be typically located 10 foot either side of the potable water main. The non-potable water main shall be no closer than three feet to the base of the gutter pan. If the Town determines it is not feasible for an installation to be made in a dedicated street, the installation shall be made in a dedicated easement, right-of-way or tract. The minimum width of right-of-way is a twenty-foot (20') exclusive easement; thirty-foot (30') easement shared with either water or sewer or a fifty-foot (50') exclusive shared with water and sewer. Right angle utility crossings shall be subject to Town approval as to methods of crossing.

No landscaping greater than three feet tall (mature growth) or permanent structures may be placed in the easement/right-of-ways. Valves shall be located at property lines extended, avoid placing valves in concrete gutter pans. A non-potable main serving one lot shall be extended all the way across the frontage for future service. Non-potable water main phasing if proposed must be shown on the overall water plan and shall maintain design integrity within the overall system. A valve and blow-off shall be located at the end of each phase for testing and connection to future mains. See attachments, No. 1 for Non-Potable main locations.

VALVE & SPACING

Valves used in Non-Potable water distribution shall be resilient sealed isolation gate valves conforming to AWWA C509 Standards. Valves shall be provided in the distribution system so that no single accident, break or repair will necessitate shutting down a length of pipe greater than 500 feet. Arterial feeders ("Distribution mains") valves may be spaced non greater than 1000 feet if not traversed by another transmission or distribution main.

HYDRAULIC DESIGN

All distribution mains shall be designed to have a maximum velocity of no greater than ten feet per second using a Hazen-Williams friction coefficient "c" equal to 100.

Friction Coefficient

Distribution mains shall be designed using a Hazen Williams Friction Coefficient "c" equal to 120. Transmission mains use "c" equal to 130.

Velocity

All pipes shall be sized for a maximum water velocity of no greater than ten (10) feet per second (fps).

PIPE MATERIALS

All pipe used in distribution or transmission main water lines shall be polyvinyl chloride (PVC) pressure pipe. AWWA C-900 class 150 (purple color) DR. Each pipe shall be marked with the weight and class of the pipe.

Joints shall be mechanical or push on or restrained in conformance with AWWA C-11.

PIPE RESTRAINTS AND REACTION BLOCKING

The design engineer shall determine the pipe restraints and reaction blocks required based on the available soil pressure and the greater of the anticipated working pressure plus water hammer or testing of the line. The use of thrust blocks and restraining glands is required when there is a change in direction or velocity.

TRENCHING, BACKFILLING AND COMPACTION

Construction procedures, materials and compaction testing is referenced under Windsor Standard Specifications and Construction Manual.

EASEMENTS

For Non-Potable water mains located in a dedicated street, the easement shall be dedicated at a width of twenty feet (20') outside and shall be for the exclusive use of the water mains.

For combined easement with water or combined with sewer the total width shall be thirty feet (30') for both utilities.

A non-exclusive fifty foot (50') easement if the water line is to share the easement with other utilities not under the control of the Town.

The Non-Potable water line shall be located a minimum three feet (3') from the edge of the gutter pan.

DEPTH OF BURY

The minimum and maximum depth of cover for Non-Potable water mains below the final surface grade shall be four feet (4') and six feet (6') respectively.

Under no condition shall the main have less than 4.0 feet of cover below the final surface grade.

WATER SERVICES

Each customer shall be served by a separate service line and meter. No pressure booster shall be allowed on the system. Services (2") two-inch and smaller to be type "K" copper. Service three inch (3") and larger to be PVC C900 class 150. There shall be no physical connection between potable water service line, inside or outside the property.

Service lines may not be installed in trenches with other utilities. A service line shall be separated from other conduits a minimum of ten feet (10') horizontally.

Service line connections to the main shall be shown on the drawings with the appropriate water line corresponding station.

METERS

The contractor shall set meter pits to the horizontal grade of the sidewalk. They shall mark the location of the Non-Potable water service with a stamped "NP" four- inches (4") high into the face of the curb and gutter.

Reference Non-Potable meter drawings attachment Numbers 2 and 3 for complete installation and parts list.

SURFACE WATER STORAGE FACILITY

Storage shall be designed to accommodate four days supply during peak irrigation periods.

If a PVC liner is chosen as a sealant, the liner minimum thickness will be 20 mil.

8 oz. Geotextile liner must be installed on all slopes of 3:1 or more. Overlap Geotextile rolls a minimum of 12 inches. Reference - Water Saver Geotextile specification SPPOF 8308, or product number GT-80.

Subbase should be a minimum of 6 inches and contain no rock or materials of jagged edges larger than One-inch.

There should be an earthen cover on all PVC liners of not less than 12-inches, no more than 18-inches and must be free of any debris. Material for earthen covers shall be approved by the city's Water and Sewer Department.

If the design includes a bentonite liner, the material to be used is a high swelling sodium montmorillonite clay. High swelling defined as the ability of 2 grams of bentonite, when mechanically reduced to a 100 mesh, to swell in water to an apparent volume of 16 ccs, or more when added a little at a time to 100 ccs of distilled water. The colloid content of the bentonite shall exceed 70%. Bentonite application rates shall be determined by the manufacturer, in consultation with a soils laboratory.

Testing for water tightness shall be completed prior to filling by using a Permeability Test. Those results shall be forwarded to the Town for approval, prior to filling of the facility.

WATER WELLS

Water wells used to supply irrigation water must adhere to the following:

All non-potable water wells must be adjudicated for irrigation of the properties they are to irrigate.

No wells will be accepted that are in the process of being adjudicated.

The Contractor or Developer shall furnish along with other plans and specifications:

1. Location, to include a legal description of the well.
2. Well depth and diameter.

3. Description of materials encountered and depths.
4. Results of Water Well Pump Test by accredited Water Well Drilling firm.
5. Copy of the well permit.
6. Copy of Colorado Water Rights Decree.

IRRIGATION PUMP SYSTEMS

Pump system shall be prefabricated type.

Prefabricated pumping station shall have a capacity of not less than 150% of the projected demand of 90 psi at the station discharge.

Air/Vacuum release valve must be a continuous-acting combination air release/vacuum valve to release excess air from the discharge manifold. The valve must be capable of releasing air during filling and pump operation.

Check valve shall be silent operating, non-slam type. The valve design shall incorporate a center guided, spring loaded poppet, guided at both ends. Valves shall meet AWWA standard C-508. They shall be sized to permit full pump capacity to discharge through them without exceeding a pressure drop of 2.5psi. Furnish check valves on the discharge side of the pump.

Isolation valves (Gate Valves) shall be designated for a minimum working pressure of 200 psi and shall meet or exceed AWWA specification C-1500. Isolation valves should be installed on the discharge side of each pump and downstream of the station discharge valve.

All buried valves shall be provided with a valve box. Valve boxes shall be Cast Iron Buffalo Type, two piece box with round base and a 5 1/4 inch screw type shaft suitable for depth of cover as required. Lids are to be printed purple and/or marked non-potable.

ELECTRICAL

SUPPLY-power supply to the station shall be three phase 460 Volt 60 Hertz. (No exceptions)

All electrical components should be U. L. listed, including the panel.

OPERATION

During non-irrigation times, the pressure maintenance pump (PM) will cycle on and off as required to maintain irrigation system pressure. The cycling pressures can be either user selected or can be set substantially below set point pressures if desired. If the PM cannot maintain the desired pressure, then the VFD will

automatically start the first pump and will 'gradually ramp up to the desired system pressure.

The pump speed will be modulated to hold a constant discharge pressure regardless of flow. As the flow rate increases and the VFD can no longer maintain pressure while at maximum speed, the next sequential pump will be started and the VFD driven pump will accordingly reduce its speed and modulate.

An algorithm shall be included for accurately reducing the VFD pump speed as the next sequential pump is started so that no pressure surges are generated during transition.

As the flows continue to increase, pumps will sequentially be started until all pumps are operating. As the flows begin to decrease, pumps will be sequentially turned off to meet the declining pressures.

MISCELLANEOUS ELECTRICAL REQUIREMENTS

Pumping unit must contain an insertion type flow sensor with nylon or equal impeller (non-magnetic).

Pumping unit must contain an automatic screen filter with minimum 200 micron screen, or an approved equal.

AERATION SYSTEMS

Each surface water storage facility shall contain an aeration system.

All components of the aeration system including compressors, ozone generators, electrical controls, valves, prefabricated pipe manifolds, flow meters, gauges, lake aeration tubing and all other items necessary for the proper assembly and operation of the system must be provided by a single supplier as a "knock down" aeration system.

MISCELLANEOUS

Trenching, Backfilling, and Compacting, including drainage, preparation of subgrades, pipe bedding, backfilling and finish grading for underground pipelines and appurtenances are covered under Standard Specifications and Construction Manual.