irrigation system pressure requirements

worst case operation/friction loss calculation

PROJECT NAME: Ft. Rosecrans National Cemetery Miramar Annex Wetland Restoration
PROJECT NUMBER: VAN-01
VALVE NO East-system Valve 4 *Highest volume/Highest head*

LATERAL PIPE
SECTION (Sch. 40)

	PIPE SIZE	SECTION LENGTH	SECTION GPM FLOW	SECTION MULT. FACTOR	PRESSURE FRICTION LOSS	
1.	2"	169	4.14	0.0002	0.03	
2.	3/4"	0	0.00	0	0.00	
3.	XT-700	18	0.07	0.0025	0.05	
4.	XQ-1/4"	5	0.23	0.00452	0.02	
TOTAL LATERAL LINE LOSS						*0.10*

MAINLINE PIPE
SECTION (CL.315)

	PIPE SIZE	SECTION LENGTH	SECTION GPM FLOW	SECTION MULT. FACTOR	PRESSURE FRICTION LOSS	
1.	2"	900	6.2	0.0003	0.27	
TOTAL MAINLINE LOSS						*0.27*

TOTAL IRRIGATION LINE LOSS **0.37**

SYSTEM PRESSURE LOSS CALCULATION

Water Tank	2,000 Gallon Water Tank (min.)	
Available Pressure Range	15 to 20 psi	
Elevation @ Tank (valve outlet) *	400.0	
Elevation @ Valves	365.0	
Elevation Difference Tank to Valve	35.0	
Mainline Loss	0.27	
Pressure Gain from Water Height in Tank (6 ft mark)	2.60	
Pressure at Valves**	17.4953	psi available at valve (tank water level above 6 ft mark)
Elevation @ Last Head	370.0	
Elevation difference valve to head	-5.0	
Pressure Gained:	-2.17	
Valve Pressure Loss	3.5	
Wye Filter Loss	0.0	
Lateral Line Loss	0.10	
Riser Loss	0.43	
Fittings Loss (10%)	0.04	
FRICTION LOSS SUBTOTAL =	**4.11**	

MINIMUM OPERATIONAL PSI	10.00	
Pressure at Head***		11.22

*Water tank elevation is 400 ft.; Water high line is 412 ft.; 406 ft. water level (tank one half full) is minimum for operation
**Valves requires 15 psi to open
*** Heads require 10 psi to operate. Water tank should be kept at least 1/2 full at all times to keep system operational

NOTE: Contractor is required to maintain adequate water level in the tank
in order to keep the irrigation system supplied with enough pressure for operation

Revised Calculation, assuming a 7ft high tank instead of a 12ft high tank
The minimum water level would still need to be maintained at 6 ft, pressure at head would be 11.22
With the 7 ft. tall tank, water tank would have to be kept at least 86% full (6 ft water level) at all times to keep the system operational
which would require very frequent refilling since the smaller tank will have almost no storage capacity

Even though the 7 ft tank can provide the pressure to operate the system, the limited storage of the 7 ft tall tank leaves little room for error
and will be dependent upon a substaintially more vigorous refill schedule over the course of a year