

Air Lift Pumps (Grit Pump)

ST-027

I. Grit removal facilities at Gilroy/Morgan Hill Plant.

- a. Aerated grit chambers and appurtenant equipment.
 1. 2 grit tanks
 2. Effective volume 47,713 Gal each.
 3. Aeration requirement, 3.6 CFM/linear ft.
 4. 4 Grit tank diffuser assy. with 4 diffusers per assy. coarse bubbler
- b. Air Lift Grit Pumps
 1. 6 grit removal airlift pumps with 4" riser
 2. Capacity is 120 GPM @ 25.5 CFM Air
 3. Air pressure 7.5-8 psig from A sutorbilt positive displacement rotary lobe blower 25hp
- c. Grit Classifier / Dumpster
 1. 1 Auger screw type
 2. Hydraulic capacity 720 GPM
 3. Grit capacity of 40 cubic feet per hr.

II. How it Works

The wastewater flows through the bar screen outlet channel into the two grit tanks via a distribution box with two stop gate openings, one into each tank. The grit tank distribution box also receives the waste backwash water from the tertiary filters and can receive the in-plant wastewater from the plant drainage pump station.

In each grit tank, two fixed air diffusion units using approximately 30 CFM induce a spiral-roll mixing motion as the wastewater passes through the tank. Aeration provides a method of velocity control that allows the heavy grit particles to drop into three hoppers at the bottom of each tank while keeping the lighter inert solids and most of the organic solids in suspension. A longitudinal redwood baffle and outer wall wing baffle enhance the performance of each tank.

Six air lift eductors, one in each grit tank hopper, continuously pump the settled grit as a slurry from the six grit tank hoppers for gravity flow through a 10 inch diameter pipe to a screw type grit classifier. A water piping connection to each eductor permits flushing when the assembly becomes restricted with grit. The classifier separates the transport water and tighter solids from the grit slurry and discharges the retained grit into a dumpster, same dumpster as for the screenings. The transport water spills over a weir in the classifier and flows by gravity through an 8-inch diameter pipe to the grit tank distribution box.

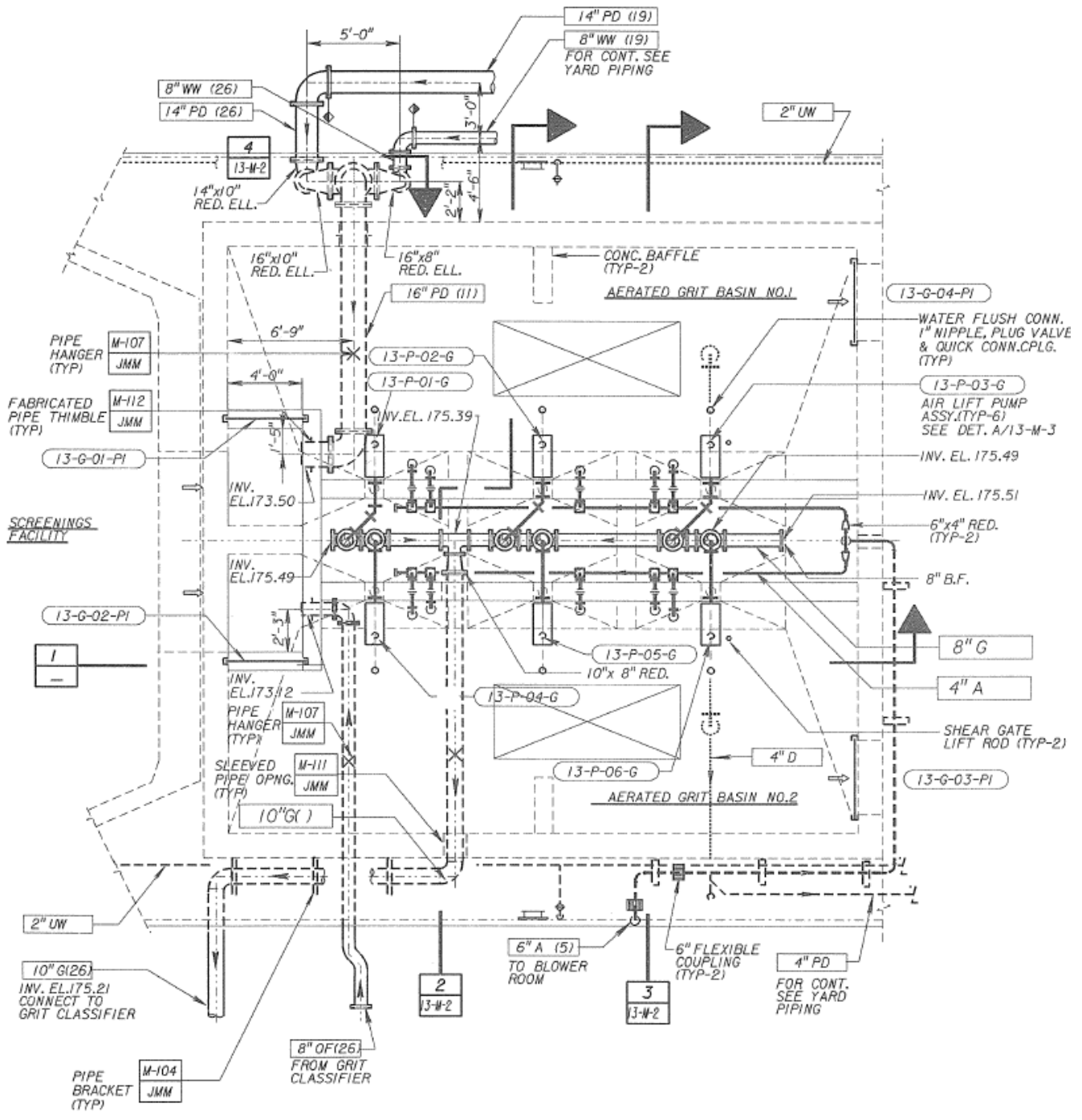
Three rotary-lobe, positive-displacement blowers (two are standby) provide the low pressure air required for agitation of the grit tanks and for operation of the grit air lift eductors. Rotameters in the air supply lines to the individual air lift eductors and air diffuser assemblies facilitate adjustment of the air flow rates. Each eductor (typical of six) requires about 8-12 cfm of air for operation and each grit tank diffuser unit (typical of four) requires about 30 cfm. Each blower has a rated capacity of 200 cfm.

Air Lift Pumps and Grit Removal

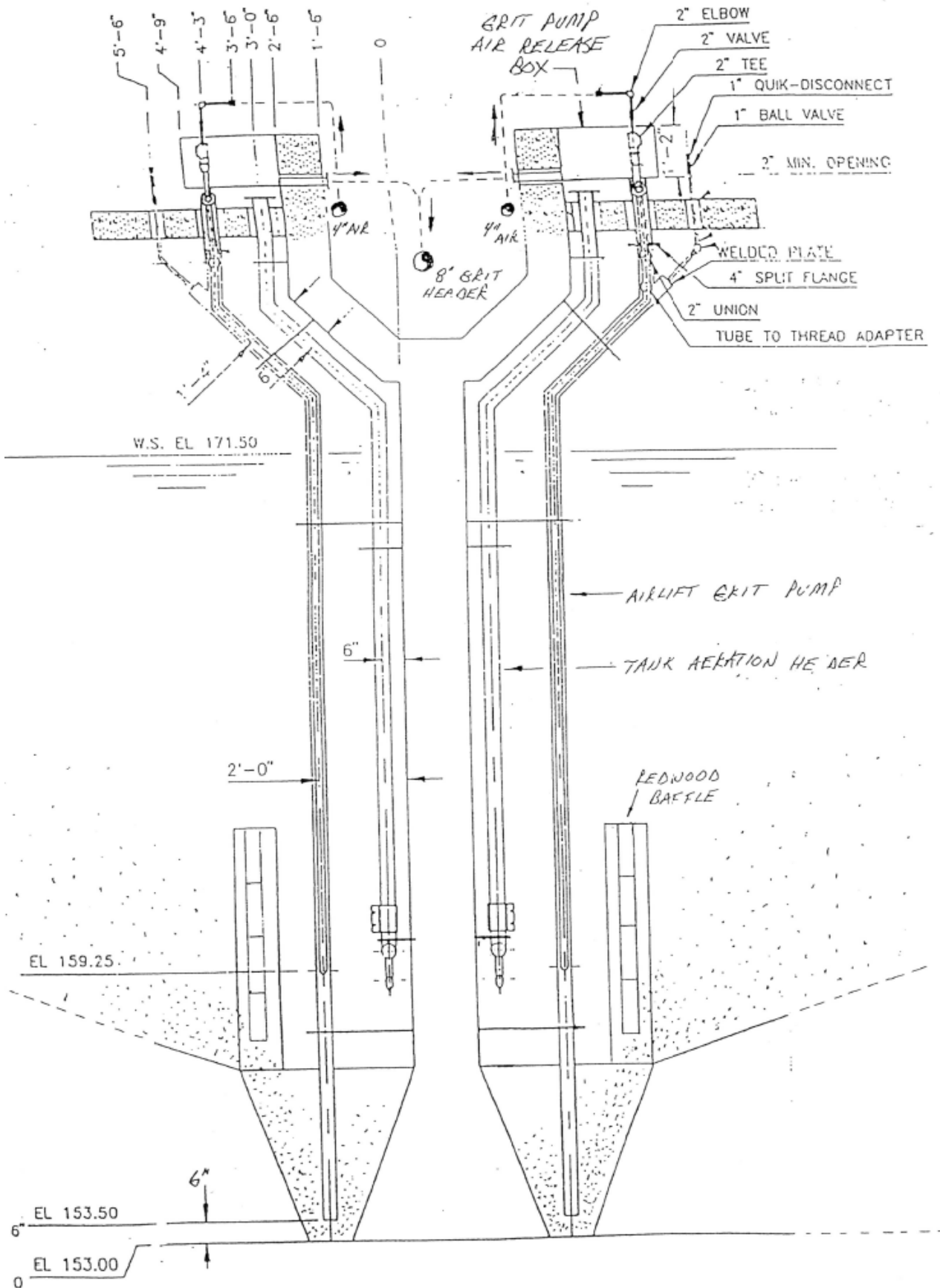
Air lift pumps are a special type of pump. This device consists of a vertical riser pipe submerged in the wastewater, sludge or grit to be pumped. Compressed air is injected into a tail piece at the bottom of the pipe. Fine air bubbles mix with the wastewater or sludge to form a mixture lighter than the surrounding water which causes the mixture to rise in the discharge pipe to the outlet. An air-lift pump works like the center stand in a percolator coffee pot.

Performance of the aerated grit tanks is based on the amount of inert grit removed versus organic materials removed. The visual appearance and odor of the grit material will also indicate the effectiveness of the aerated grit tank performance. An excessive amount of organic materials in the air lift eductor discharge may indicate that the aeration rates are too low to keep the organics in suspension. The more foul the odor, particularly after sitting in the dumpster for a period of time, is an indication that more non-grit material is being removed. Performance of the grit tanks is directly affected by the amount of aeration. The objective is to maximize the amount of grit removed with a minimal removal of organics. If necessary, increase the air flow rate to reduce the volatile portion of the materials removed by the grit tanks. Increasing the aeration rate will generally not only reduce the amount of volatile materials removed but also decrease the amount of fine grit removed. Therefore, some compromise may be necessary.

Plan View of Aerated Grit Chambers



Airlift Grit Pump Detail



Grit Classifier

