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Title

City of Hesperia Lift Station Design

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<https://escholarship.org/uc/item/41n685bj>

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Publication Date

2015-03-30

Peer reviewed

City of Hesperia Lift Station Design

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Project Description

Aquae Motum Engineering and HDR Inc. are in joint efforts in designing a lift station for the City of Hesperia. The lift station will provide sewage transfer and a biofiltration system in order to convey sewage to the local wastewater treatment plant, while preventing accumulation of odor in the area. This is a two-phase project that will account for increasing flows as the community develops. The first phase of the project will provide sewage transport for the first half of the development and will double in the second phase as the second half is developed.

| Hesperia Lift Station Flow Parameters | | |
|---------------------------------------|--------------------|-----------------|
| | Average Flow (MGD) | Peak Flow (MGD) |
| Phase 1 | 1.0 | 1.5 |
| Phase 2 | 2.0 | 3.0 |

Design Parameters

Gravity Sewer Inlet:

- Designed to accommodate peak flows of phase 1 and 2
- Subcritical flow to avoid excess odor
- The pipe will have a slope of 0.5% and velocity less than 4 ft/s
- There will be 300' of inflow pipe

Wet Well:

- Designed based on the cycle time of 10 minutes and peak flow rate of phase 1
- Two identical wells will be cast-in-place to accommodate peak flow of both phases

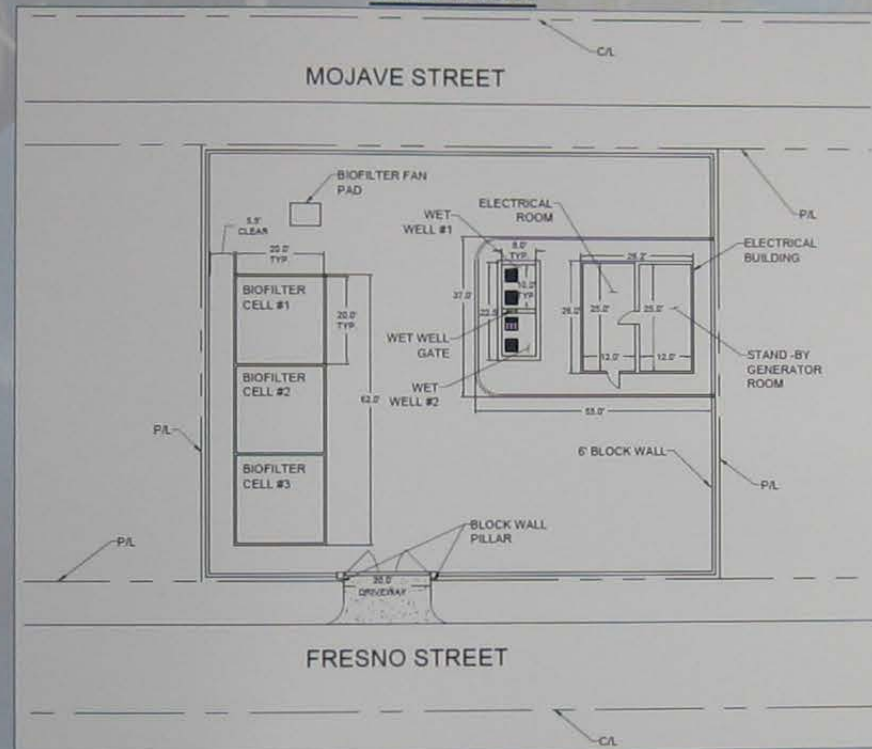
Pump and Forcemain Outlet:

- Four identical pumps will be used, two will be back-up pumps
- There will be 5000' of outflow pipe from the lift station

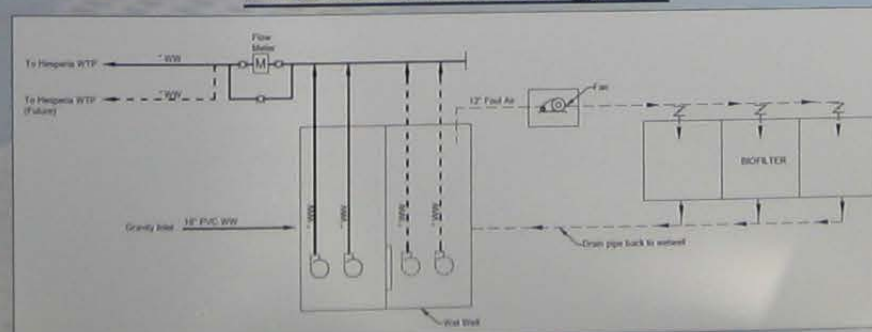
Odor Control System:

- The cells are designed based on 12 air changes/hour and a detention time of 45-60 seconds
- The air velocity in the duct must be 30 ft/s
- The volume of air treated will be 28,800 ft³

Site Plan



Process Flow Diagram



Design Results

Gravity Sewer Inlet:

- 18" PVC at a 0.5% slope

Wet Well:

- Two identical 10' x 8' x 18', each holding a volume of 350 ft³
- One well will be used during phase 1 and both will be used in phase 2

Pump and Forcemain:

- 2 pumps will serve each wet well during their operation
- The forcemain will be a 10" PVC with steel fittings and then increase to a 14" PVC after all the pipes have joined

Odor Control System:

- Three prefabricated biofilter cells will be used for odor control
- Each cell will be 10' x 15' with 3' of treatment media

Total Project Cost: \$3.7 Million

Project Alternatives

*** denotes optimal alternative

| | |
|----------------------|--------------------------------|
| Gravity Sewer Inlet: | Polyvinyl Chloride (PVC)*** |
| | Vitrified Clay Pipe |
| | Reinforced Concrete pipe (RCP) |
| Wet Well: | Cast-in-place*** |
| | Prefabricated |
| | Submerged Pump*** |
| | Turbine Pump |
| Odor Control: | Biofiltration System*** |
| | Carbon Tower |
| | Chemical Scrubber |

Future Design Tasks

- Equipment Instrumentation
- Back-up Generator Design
- Refine Wet Well Sizing
- Refine Biofilter Cell Sizing