

PROGRESS

PRODUCTS • TECHNOLOGY • INDUSTRY NEWS

POWER GEN & STATIONARY ENGINE TECHNOLOGY



- **New Power For Godwin**
- **Cleaning Up Power Plant Emissions**
- **Pumps Keep Roads Open**



**New Gen-Set From
Atlas Copco**

STATIONARY POWER /



Hidden unobtrusively near key highway underpasses in the Phoenix area, the Arizona Department of Transportation (ADOT) has a network of gas engine-powered pump sets to move water quickly during the region's rainy season.

PUMP SETS KEEP ARIZONA HIGHWAYS PASSABLE

Large 22,500 gpm pump sets operate like home sump pump; staying off the public's radar

Mention Phoenix and most people think of desert heat, not torrential rains. But Phoenix does have a rainy season, and when it rains in July and August it rains very hard. Unfortunately, most of the land in the area consists of a few inches of sandy soil over a layer of caliche, a form of soil in which the particles are cemented together by lime very much like concrete. So, when it rains, the water cannot soak into the ground and instead collects in low-lying areas like highway underpasses.

The Arizona Department of Transportation (ADOT) is responsible for the highways in Phoenix, as well as the rest of the state, and part of that responsibility is getting rid of all the water the annual "monsoons" dump. That task is done with a series of 66

pumping stations located strategically throughout the Phoenix metropolitan area and connected to the road network with a complex system of drains and underground pipes to collect the run-off.

Because much of the system is deep underground, most area motorists are not even aware that it exists, and that's the way ADOT wants to keep it. As John Stepins, ADOT roadway pump maintenance supervisor said, "we want to be off the radar screen of Phoenix motorists. Our systems work very well, and the driving public takes for granted that there will not be large amounts of water washing over our highways during monsoon season."

The Phoenix-area pumping system has evolved over the years from small installations servicing an individual

underpass to much larger stations that service a wide area. Most are housed in one-story brick and mortar buildings located adjacent to an underpass.

That's what a very observant motorist sees. What they don't see in the newer station is the three-story-deep reinforced concrete underground flood-water reservoir, or the huge pumps that lift the water 50 ft. or more above the pump station through pipes as large as 8 ft. in diameter.

"Actually," Stepins said, "these installations are like gigantic versions of the common sump-pump systems millions of homes have in their basements. They are unmanned, and each engine starts and stops automatically based on the position of a float located in the reservoir.

"When it rains, the reservoir fills,



The above-ground portion of an ADOT pump station has ports in the roof to allow the engine/pump packages to be lowered into place with a crane. The stations also have to be located near natural gas lines to fuel the engines, near sources of runoff water, and near a river, canal or open desert area that can accept the discharge water.

“safe zone pressurized” to give workers a safe place to escape from potentially flammable effluents.

“Designing and locating a pump station is not as simple as it sounds,” Stepins said, “and neither is getting rid of the water. Our goal is to someday be able to recycle this water for irrigation, but that’s in the future. The problem is contamination from the multitude of ‘stuff’ that gets deposited on a roadway. At this point we don’t have a complete solution, but we’re working on it.”

Reliability is a major requirement for ADOT’s pumping stations. The engines in each station are run monthly by ADOT crews, who also provide routine maintenance services. Heavy maintenance is supplied by Empire Power Systems as necessary.

ADOT’s newest station has five Cat-powered 22,500 gpm pump sets, and a battery back-up system to keep them running even in the event of a grid power failure. “That’s something relatively new,” Stepins said, “but we are constantly upgrading our capabilities and back-up electrical power is one of the key improvements we’re targeting.”

Although they are unmanned, each station is equipped with a sophisticated telemetry capability that allows its operation to be monitored and, if necessary, controlled by ADOT. The back-up power system also supports the remote control capability.

“These engines may only run 15 or 20 hours a year pumping runoff,” Lukas noted, “but they have to start and run every time they’re needed. In the 12 years we’ve been supplying them, the only significant change we’ve made is to upgrade the ignition system from a magneto to a modern electronic unit. Other than that, the technology in these engines just works and works.” **dp**