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CASE STUDY

Gates Canyon Stormwater Improvement Project, Storm Prism System

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The recently installed underground stormwater storage system at Gates Canyon Park is part of an increasing number of innovative stormwater capture and treatment projects within Southern California. The



project, located adjacent to the City of Calabasas in the western reaches of unincorporated Los Angeles County, aims to capture, treat, infiltrate, and re-use local stormwater runoff. The cistern component of the project required up to 3.5 acre-feet of storage in an underground structure with up to 14 feet of fill above. Precast concrete has quickly become the preferred alternative for the construction of underground stormwater storage cisterns due to their quick construction time and high load capacity. The modular precast concrete system provided for the project by Precon Products utilizes a patent pending cantilevered column system to resist the high earth and seismic loading conditions.



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The Gates Canyon Park project is not the first to require the use of a modular precast concrete system for the underground stormwater storage requirements. There are many other examples within the Southern California area of completed and constructed projects utilizing modular precast concrete units to build underground stormwater storage structures of varying sizes and shapes. California Proposition 1 and the recently passed Los Angeles County Measure W will provide a large source of funding for regional and municipal stormwater quality improvement

projects going forward. It is expected that precast concrete will continue to be used on these future projects as a proven solution.

Several different competing precast manufacturers have been developing and providing various modular precast concrete systems, most utilizing wall systems for the structural support. These wall systems are often slender and have been observed on previous projects to have issues during transport

and installation. The slender walls have been observed to arrive on-site with large cracks at the base of



the walls where the vibrations and lateral forces from truck transport has overstressed the wall to slab connections. Also, fit up issues at the horizontal and vertical joints when stacking and laying multiple adjacent units creates issues that shimming and grouting cannot always overcome. Using wall elements also creates issues with increased seismic loading due to the large profile of the wall elements.





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The American Concrete Institute (ACI) has specific code requirements for environmental engineering concrete structures (ACI 350) and seismic design of liquid-containing concrete structures (ACI 350.3). The Gates Canyon Park project, along with other projects in the area, required that the underground structures be designed to accommodate the seismic loading from the ACI codes along with vehicle loading from the American Association of State Highway and Transportation Officials (AASHTO) specifications. The ACI code requires that column elements of walls be provided with confinement reinforcement, spiral or similar. In order to fit this required confinement reinforcement within the wall section requires a thicker wall section for concrete placement and cover requirements than would otherwise be needed.



The patent pending Storm Prism System provided by Precon Products utilizes a column system to support and resist the required loads. Utilizing the cantilevered column system allows for a more efficient vertical element section while also providing area for the required confinement steel in the vertical reinforced core of the column element. The column system utilizes a flared cross-section at the top and bottom of each respective modular unit to provide increased rigidity to handle the site transportation issues, and also exceed the required moments from the seismic loading conditions. As the profile of the column elements are much less than equivalent wall based modular units, the overall seismic loading from the sloshing of the stormwater is reduced on the interior elements of the structure resulting in less reinforcing



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steel and more efficient structural sections. The modular units are comprised of a top and bottom section that fit together at four column point locations. The fit-up at these four bearing points provides a much tighter overall fit and any required adjustments or shimming can easily be accounted for with thin bearing pads. The small lateral forces at the column connection points can easily be transferred from top unit to bottom unit through the integrally cast post and pocket system which is also grouted after installation.

The Storm Prism System by Precon Products provided the Gates Canyon Park project with a complete water-tight stormwater storage system. The speed of construction met the expectations associated with the use of precast concrete while also providing for quicker installation and fit-up times due to the efficient nature of the system. Utilizing the cantilevered column system allowed for the rigid frames to easily survive transport to the site and resulted in not a single unit being rejected once it arrived on-site. The Storm Prism System also has potential uses beyond the use in stormwater capture projects as the reduction in internal walls and increased open space allows it to be used for many other applications including underground storage, shelters, and agriculture.



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