

CREATIVE CONCRETE CONSTRUCTION

Creative Reuse of "Surplus" Girders

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Water is Arizona's most precious resource and the Colorado River satisfies much of the demand. The 335-mile-long Central Arizona Project (CAP) canal continually conveys Colorado River water to Maricopa, Pinal, and Pima counties in central Arizona. While delivering water is a core element of CAP's mission, CAP also ensures all of Arizona's entitlement is put to beneficial use in Arizona. Water that is not directly used can be stored underground to offset groundwater overdraft or stored to be recovered at a later date, according to Arizona's groundwater code.

CAP currently manages six direct recharge projects. The newest, the Superstition Mountains Recharge Project (SMRP), is located in Pinal County, just east of the Town of Queen Creek.

When planning the SMRP, CAP and Stanley Consultants conducted several design concept workshops to carefully examine key design, construction, and operational parameters to ensure that the CAP's needs were met or exceeded. The key question was, "What is the best way to withdraw water from the CAP canal?"

Other recharge projects used a pump turnout structure and a channel or culvert, to direct water to massive pumping stations. Gravity turnouts require a complex (and hydraulically disruptive) cofferdam to contain canal flows while the "live tap" is made. Part of the canal's reinforced concrete lining must be removed, a new turnout connection built, and the lining repaired. These efforts can take months.

Stanley Consultants proposed a unique bridge-mounted pumping station that spans the CAP canal. Six vertical, turbine pumps draw water directly from the canal like giant straws. This innovative concept allowed for bank-to-bank construction with no disruption to canal

Erecting girders weighing nearly 65 tons involved choreography at both ends and an "aerial bandoff" of one end across the canal.



Aerial view of the bridge-mounted pumping station. All photos: Central Arizona Project/Central Arizona Water Conservation District.

operations. This cost-effective configuration is more sustainable because vital components are deck-mounted above grade, with no submersed facilities.

After the design concept was adopted, the CAP and Stanley Consultants collaborated on another "green" idea. Seven precast, prestressed concrete AASHTO Type VI modified girders, produced for a highway bridge project, were cast about 3 ft too short, and might have been discarded. But the Arizona Department of Transportation procured replacement girders of the correct length and gave the "short" girders to the CAP (rather than discarding them), who stored them for several years. After confirming adequate length and strength, Stanley Consultants designed the pump station bridge to specifically match the "recycled" girders. The bridge is 112 ft 4 in. long at centerlines of bearings, 62 ft wide, and has an 8-in.-thick, composite cast-in-place concrete deck. The bridge supports the six pumps that each contribute a working load of 18 kips to the structure. In addition to providing for the pumps, the bridge provides an important vehicular crossing over the canal.

This project showcases the durability and versatility of precast, prestressed concrete AASHTO girders—essentially using salvage from a transportation project as key building blocks for a critical water resources project.



Aerial view of canal, recharge basins, and the pumping station.



All six pump cans extend below deck into the canal and three pump-motor assemblies are mounted above.

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