

## **Con-Arch Reinforced Concrete Buried Arch System**

### **What the Innovation is:**

**Con-Arch** is an innovative cast-in-place buried arch construction methodology used in the construction of bridges, culvert, cut and cover tunnels, underpasses, and underground vaults and reservoirs. **Con-Arch** installations are completed through an integrated design-build process involving professional engineers and an experienced concrete contractor. Designs are prepared by engineers with expertise in structural and bridge design. Finite element methods are used to analyze the soil structure interaction. These techniques, applied to a soil structure interaction model are used to develop thin, efficient, cost competitive concrete arch structural sections. These sections work with surrounding soil to carry imposed loads. The rigid concrete arch provides the most structurally efficient section possible for a given amount of material.

### **Why it is innovative:**

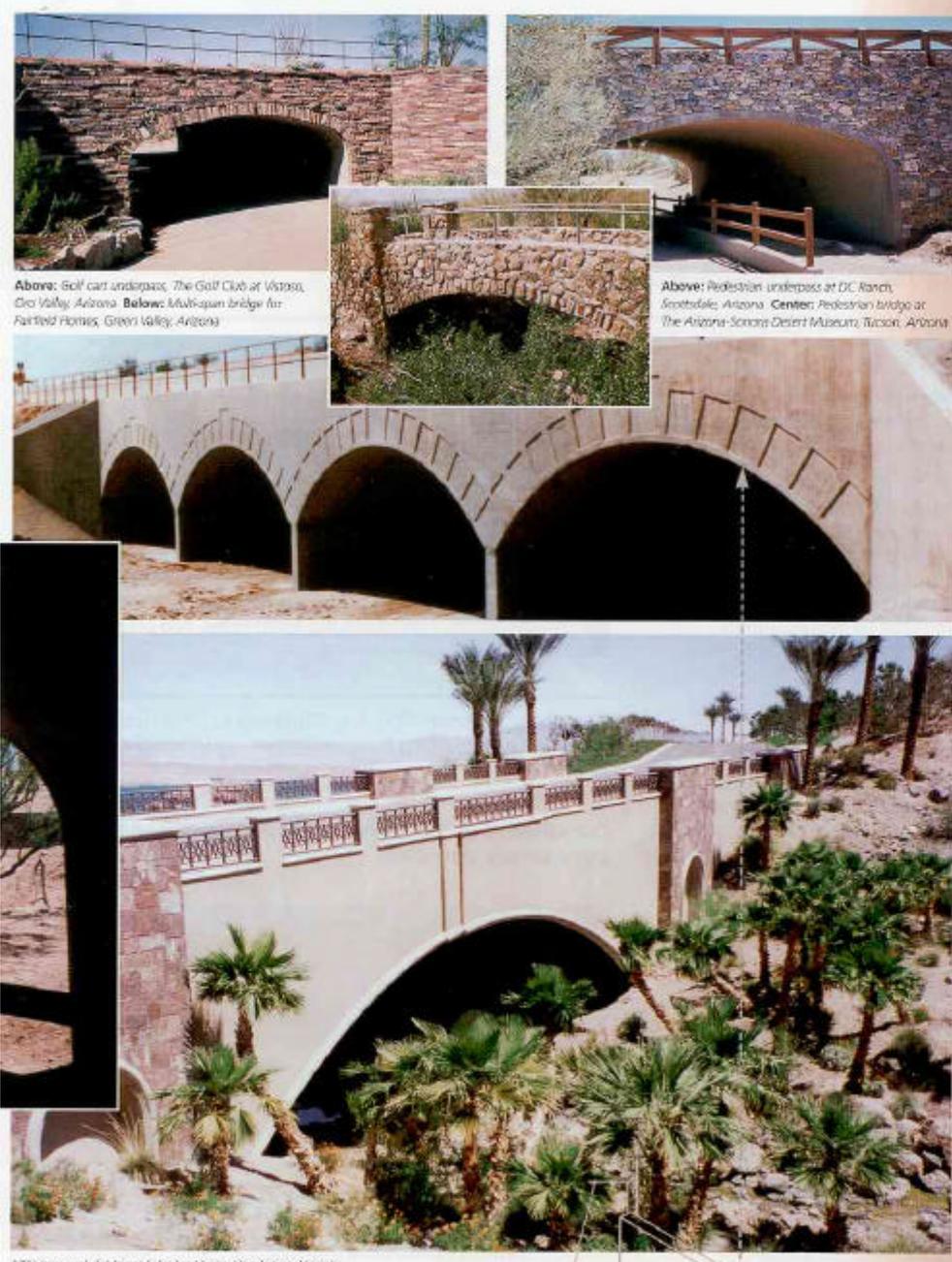
The **Con-Arch** system employs soil structure interaction and finite element analysis with improved wet mix shotcrete techniques to create a cost effective and aesthetically superior cast-in-place product that is faster to install than conventional methods typically found in the construction industry. The structures are formed with stock reusable steel forms over which reinforcing steel and shotcrete are applied. Due to the inherent strength of arch geometry, forms may be removed the day after shotcrete application. Backfilling typically begins the day after form removal. The adequacy of the **Con-Arch** system has been verified by repeated full-scale load tests in the field.

### **What it changed or replaced:**

The **Con-Arch** system typically substitutes for Reinforced Concrete Box Culvert, conventional flat deck bridge construction, and precast concrete culvert and pipe sections. The arch is an inherently strong engineering form used in construction since Roman times to create structures that are the most efficient for a given span.

### **Where and when it originated, has been used, and is expected to be used in the future:**

The **Con-Arch** system was first used in 1995. Since that time, over 400 **Con-Arch** structures have been built in four southwestern states. Clients include private master planned community developers, homebuilders, and public agencies. Future plans include national and international expansion through strategic partnering arrangements with contractors and design-build companies.



Above: Golf cart underpass, The Golf Club at Vistoso, Oro Valley, Arizona. Below: Multi-span bridge for Fairfield Homes, Green Valley, Arizona

Above: Pedestrian underpass at DC Ranch, Scottsdale, Arizona. Center: Pedestrian bridge at The Arizona-Sonoran Desert Museum, Tucson, Arizona

181' span arch bridge at Lake Las Vegas, Henderson, Nevada

**CON-ARCH—Design/build system—The best engineering, finest construction, and lowest costs combine to create structures of lasting beauty and serviceability.**

**A** primary benefit of using the Con-Arch system is cost savings. By using Con-Arch in place of box culverts or RCP, you will experience significant savings with the highest level of quality, structural integrity, and time savings. Cost savings ranging from 10% to 20% or more over other construction technologies are common.

**AESTHETICS**

The Con-Arch system employs an aesthetically pleasing arch design. The geometry of the arch, set by structural requirements, provides clean, elegant lines. In many design applications the graceful shape of the arch is preferable to the conventional rectangular box culvert. The use of decorative materials applied to the head and wing walls further enhances the aesthetic beauty of Con-Arch installations.

**TIME SAVINGS**

The high efficiency of the Con-Arch system of forming, placing concrete, and backfill within 24 hours, will translate into major savings in time over alternative methods of bridge and culvert construction.

