

## Top Ten Sustainability Benefits of Shotcrete

The United States Green Concrete Council's (USGCC) *The Sustainable Concrete Guide—Applications* includes a list of the top 10 sustainability benefits of shotcrete in its chapter on shotcrete. Over the next 10 issues of *Shotcrete* magazine, this Sustainability column will elaborate on each one of the following advantages:

1. Formwork savings of 50 to 100% over conventional cast-in-place construction.
2. Formwork does not have to be designed for internal pressures.
3. Complex shapes require very little—if any—formwork.
4. Crane and other equipment savings or elimination.
5. Labor savings of at least 50% in repair applications.
6. New construction speed savings of 33 to 50%.
7. Speed of repair reduces or eliminates downtime.
8. Better bonding to the substrate, which enhances durability.
9. Adaptability to repair surfaces that are not cost-effective with other processes.
10. Ability to access restricted space and difficult-to-reach areas, including overhead and underground.

## Formwork Savings of 50 to 100% over Conventional Cast-in-Place Construction

One of the most significant sustainability advantages of shotcrete is the substantial formwork material savings. With the shotcrete process, the material is shot into its final place, so forming is either completely eliminated or at least reduced by 50% when one-sided forms are necessary. This not only reduces or eliminates the amount of wood or other material used in forming, but also reduces or eliminates the environmental impact of milling the lumber and subsequent transportation to thousands upon thousands of construction sites. Furthermore, the transport and disposal of used

formwork is greatly reduced. Even in applications where one-sided forms are required, the formwork is greatly simplified, as less structural strength is needed, and thus the materials required are significantly reduced.

Projects where structural walls contained multiple blockouts have experienced a reduction of formwork to one-sixth of what would have been needed on a traditional placement.

In addition to the actual formwork material savings, ancillary formwork materials, such as walers, bracing, form ties, reinforcing bar standoffs, forming support structures, and release agents are also eliminated or substantially reduced.

Due to the natural consolidation of concrete when placed via shotcrete, consolidation operations are also eliminated.



Shotcrete sprayed in place against one-sided forms saves 50% of the forming required in cast-in-place installations



Panels are set in place on this high-rise to create one-sided backstop forms to gun shotcrete against

# Sustainability

In overhead work, not only is the formwork eliminated, but the scaffolding and shoring required to support overhead forms is also eliminated. This means less on-site labor and less on-site equipment is required to unload, move, and load for shipping the forming and shoring materials.



*In many cases, when there is a structure or substrate to gun against, shotcrete can be gunned in place without the use of forms, eliminating forming costs altogether*

A copy of the USGCC's *The Sustainable Concrete Guide—Applications* can be obtained by visiting the American Concrete Institute's online Bookstore at [www.concrete.org](http://www.concrete.org).



*Finishing touches are made to a freshly placed shotcrete wall*