

Shotcrete Illusions

by Marcus H. von der Hofen and John Fulford

Over the years, we have had the pleasure of being part of a number of shotcrete retaining wall projects that have used a carved shotcrete finish. Some of these were originally designed to be constructed with shotcrete and some have come to fruition only after the owner was presented with the option of an alternative carved shotcrete look. Simulated rock finishes can be surprisingly economical for retaining walls. When it comes to carved appearances, the big question is which appearance is right for the situation.

The First Step—The Theme: Natural or Man-Made

We think the type of carved finish is one of the hardest things to specify. These finishes are broken down into two basic categories: natural and man-

made. Probably the easiest way to explore these different alternatives is to examine pictures of different carved shotcrete finishes.

Figure 1 and 2 show examples of what could be referred to as natural finishes. These are creations of retaining walls that look like they are part of geological structures of the area. What is key is that the shotcrete contractor be capable of doing work that represents the geological structures found in the region. Think of it like fly fishing—someone might be able to tie a great fly, but if it's not representative of insects that naturally reside where you're fishing, it probably won't work. An understanding of the local geology coupled with the techniques of replicating it are crucial for a successful project. Qualified shotcrete contractors should be able to prepare a proposal that includes these concepts.

Then there are structures such as the one shown in Fig. 3 where natural materials have been created to form man-made walls. These can have many variations, including the basic stacked granite appearance.

Figure 4 shows a water-gathering structure for a housing development drainage system. This particular project was not originally designed as a carved structure but as a cast-in-place structure. Originally specified as a smooth form concrete finish, by using shotcrete, we were able to give the project this simulated rock appearance as a no-cost change order.



Fig. 1: Granite rock finish at retaining walls of a home built on Lake Washington, Seattle, WA. This type of finish is a good alternate to a stone veneer



Fig. 2: A creation for a private home in Coeur d'Alene, ID, made to look like a natural rock formation



Fig. 3: Carved granite stone rockery in Tacoma, WA

The Second Step—Tie in the Theme to the Big Picture

Trying to cover all the bases in design can be difficult. The authors believe that at this point, a good schematic or model of how the wall is going to interface with the other portions of the project is necessary. Drainage systems, structural elements, and other components of the project all play a part in the decision-making process. The artistic features need to transition smoothly or you will find yourself at a dead end. If your theme is to work artistically and structurally as a whole, make sure you explore all aspects of the design as fully as possible.

Figure 5 is an example of tying carved rock into a linear portion of a project. This wall is entirely made of shotcrete. Pilasters with the flat panels between were created, in which architectural shotcrete could be placed. This wall contains a structural pile cap and is a soldier-pile and tie-back design. Would you have guessed that?



Fig. 4: Artificial stream catch basin

The Third Step—Performance

If you have been working with the shotcrete contractor of your choice up to this point, you're ready to proceed. As all of us know the low price doesn't necessarily mean the best value for the project. When you are trying to choose a contractor, what do you look for?

Credentials

1. The shotcrete contractor should have a history of successful completion of this type of project. References of owners you can contact should be considered mandatory. It takes a communicative contractor, one who is willing to take the time to ask the right questions to ensure that you get the job you want.

2. The shotcrete contractor should employ ACI Certified Nozzlemen and should have completed



Fig. 5: Snohomish County Waste Transfer Station, Mountlake Terrace, WA. This wall was originally specified as cast in place

similar-size structural projects within the past 5 years.

3. Specify test sections, not just a test panel. With rock carving, it is necessary to look at the bigger picture to evaluate the work. If the job is not big enough to accommodate this, then you should pay more attention to the contractor's résumé and/or visit a job that has the same type of architectural detail as the work to be performed. A portfolio of projects should be made available by the contractor that gives you a reasonable comfort level with how the end product will look.

Finally, it should be noted that prices for this type of work can vary greatly from region to region, depending on the experience and skill sets of the selected contractor. In many cases, carved

shotcrete can be very competitive with other options without significant design changes. With just a few careful steps, you will be ready to “rock!”



Fig. 6: View from the lake



Fig. 7: Artificial basalt, Bend, OR



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John Fulford, Turnstone Construction, has worked exclusively in the zoo, aquarium, and water feature industry since 1989, overseeing projects throughout the country. He has built homes for elephants, gorillas, lemurs, grizzly bears, and many other animals, always searching for interpretive depth and geomorphic and biologic accuracy in his work. Fulford often works closely with the design team on projects, helping clients achieve efficient construction procedures, schedules, and accurate budgets. Specific project credits include the exhibitry work at the Bronx Zoo's Congo Rain Forest and Woodland Park's Northern Trail and Tropical Rain Forest exhibits. Fulford founded Turnstone Construction in 1997.



Fig. 8: Close-up of carved granite. SE 228th Street retaining wall, Sammish, WA, was the Washington Aggregate and Concrete Association Artistic Merit award winner



Fig. 9: Welcome to the Jungle, Tacoma, WA