

Design Life of Fabric Formed Concrete

Long term durability and design life of fabric formed concrete is ultimately the life expectancy of concrete (Industry Standard of ~100 years). The fabric is simply a construction tool that allows for the forming and curing of concrete, without the need for forms and finishing. Immediately after pumping with concrete, the fabric does not provide a long-term function. The fabric is a sacrificial form that becomes a part of the outer skin of the concrete lining. However, the fabric remains for years and as a result during curing the fabric layers top and bottom impart a tensile strength of 350 lb./in around the forms. The fabric allows for the bleed off of water in the pumped mix. This dramatically reduces the water: cement ratio. The reduction in water cement ratio to 0.50 to 0.55 is the result. Increased compressive strength on the order greater than 5,000 psi is a benefit as well. Fabric formed fine aggregate concrete possesses superior physical properties. This combined with a “case hardening” effect produces a concrete that is abrasion resistant, durable under freeze thaw action, resistant to “break up” caused by thermal cracking, highly impermeable, and resistant to acid, alkali, salt, organic solvents, biological organisms, and petrochemicals. It is equivalent to a rich conventional concrete mix placed at an extremely low water/cement ratio. The “case hardening” effect is a result of a higher percentage of the cement in the cement-rich, fine aggregate concrete mix being drawn to the surface of the fabric forms by the expelled excess mixing water.

Most concrete structures are demolished due to obsolescence rather than deterioration. In seawater environments, concrete has been used for decades with excellent performance. However, particular care in mix design and material selection is necessary for these environments. A structure exposed to seawater is most vulnerable in the tidal zone where there are repeated cycles of wetting and drying. Sulfates and chlorides in seawater require the use of low permeability concrete to minimize sulfate attack. Because of the nature of pumping the concrete under pressure within the fabric forms, a low permeability concrete is achieved. Also, durability issues such as voids, and “honeycombing” are naturally resolved. To increase concrete resistance to sulfate exposure, air entrainment within the concrete is helpful. Additional sulfate resistance can be achieved through the use of sulfate-resistant cements. Fabric form installations provide the low permeability and honeycomb-free concrete necessary in seawater environments, and additional measures such as air-entrainment and sulfate-resistant cements can be used to achieve a concrete that will perform for the necessary design life of the structure.