Lithocrete®

Basic Description: *Architectural reinforced concrete with imbedded recycled materials mixed and installed using a patented system established by Shaw & Sons.*

Site Specifics:
The Lithocrete on site was designed and installed by TB Penick & Sons. Not all hard surfaces on the site are Lithocrete; the entry circle is not Lithocrete but pavers that also have a very high SRI value.

The Lithocrete process:
The Lithocrete process is different from the installation of other concretes because it follows a three step process:

1. *Subgrade Preparation:* This includes at least two inches of washed concrete sand base over the subgrade to provide a "slip plane" to allow for even concrete hydration which minimizes pavement discoloration, reviewing soil reports, and the placement of geotextile fabric or an aggregate base if needed.
2. *Framework and Reinforcement:* This includes polystyrene foam insulation joint material installation, placement of steel rebar, installation of form lumber, and speed dowels.
3. *Concrete placement and finishing:* This includes the actual installation of the concrete with the patented additives and a final seal coat that reduces the alkali-silica reaction and reduces surface staining.

Benefits: Lithocrete is a unique concrete system in that it is porous which helps to reduce the amount of storm water run-off. Due to the extremely small crush size of the aggregate that is used, the surface is nonabrasive and yet remains non-slip even when wet. The installation system and patented additives that are used to create Lithocrete also reduce the alkali silica reaction (ASR) that leads to cracking and the eventual failure of other concrete systems. The patented system allows for exact color matching should any piece of Lithocrete ever need to be replaced or if more was ever added. Lithocrete also has a very high SRI (Solar Reflective Index) value which helps to reduce the effects of the urban heat island effect. Lithocrete surfaces contribute to sites trying to achieve certification through environmental certification programs such as LEED.

Resources

Lithocrete (Lithocrete.com)
TB Penick & Sons, Inc. (tbpenicks.com)
Alkali-Silica Reaction (ASR) (transportation.nebraska.gov/docs/ASR-Poster.pdf)
Solar Reflectance Index-Lawrence Berkley National Laboratory (energy.lbl.gov/coolroof/ref_01.htm)
Basic Information-Heat Island Effect (epa.gov)

Glossary

Subgrade: Also known as the formation level and is the native material (soils) below the concrete *(wikipedia.com)*

Aggregate: pieces of materials used in construction and concrete. The materials that make up aggregates can vary greatly including, but not limited to sand, gravel, crushed stone, recycled concrete, and other recycled materials. *(wikipedia.com)*

Alkali silica reaction (ASR): This is a reaction in which two of the materials found in cement mixtures alkali (an ionic salt) and silica (a crystalline structure found often in quartz and sand). When moisture is present the silica is broken down by alkalis to form a gel. When the gel forms it expands which causes concrete to crack.

Solar Reflective Index (SRI): This is the measurement of a surface's ability to reflect or resist solar radiation which is demonstrated through temperature rise. "It is defined so that a standard black (reflectance 0.05, emittance 0.90) is 0 and a standard white (reflectance 0.80, emittance 0.90) is 100. For example, the standard black has a temperature rise of 90 deg. F (50 deg. C) in full sun, and the standard white has a temperature rise of 14.6 deg. F (8.1 deg. C). Once the maximum temperature rise of a given material has been computed, the SRI can be computed by interpolating between the values for white and black. (Lawrence Berkley National Laboratory)"

Heat Island Effect: This is an effect seen in developed urban areas. Traditional urban surfaces such as concrete and asphalt do not reflect the sun's radiation, but instead absorb it. These surfaces then release the heat that had been absorbed back into the atmosphere warming the ambient temperature. These urban areas have been found to be several degrees warmer than that of the rural areas surrounding them. The urban heat island effect can cause negative effects such as increased energy consumption, elevated emissions of air pollutants and greenhouse gases, compromised human health and comfort, and impaired water quality.