Bio-Active Wall Tiles
Lev Levontin, Tel Aviv

Location	Product used	Duration
Lev Levontin Tel Aviv, Israel	Bio-Active Wall Tiles	2016

In Short

Urban sprawl calls for innovative green solutions that reduce the ecological footprint of concrete based infrastructure like buildings, retaining walls, and acoustic barriers. As opposed to typical green roofs and green wall systems that usually demand elaborate soil and watering system, ECOncrete® has developed a Bio-Active concrete tile that doubles as a highly aesthetic decorative façade and a bio-enhanced substrate that supports the growth of mosses, lichens, and climbing vegetation.

ECOncrete®'s Bio-Active wall tiles have exceptional physical and chemical properties capable of supporting and enhancing the epi and endolithic flora as well as clinging plants. The product was chosen to be installed on a high end, mixed-use commercial/residential project at the heart of Tel Aviv called Lev Levontin. The Bio-Active wall tiles and planter tiles were installed on an east facing wall of the building's luxurious patio. ECOncrete®'s Bio-Active wall is designed to create a highly aesthetic green façade capable of reducing the overall ecological foot print of concrete walls by increasing plants diversity, improving air quality and energy efficiency, and reducing both noise and heat urban pollution.

Figure 1 - Lev Levontin building's entrance patio

Project Description

The ecological footprint associated with accelerated urban growth is growing rapidly. As a result, in recent years there is a growing demand from developers to incorporate innovative green technologies into their designs. Technologies for green roofs and walls are in demand as they offer an opportunity to provide an environmental uplift to dense urban areas.

ECOncrete® has developed the Bio-Active concrete tile to enhance the growth of mosses, lichens, and climbing vegetation. The cumulative effect of a unique chemical composition, increased surface rugosity, and complex 3D design make the Bio-Active tiles significantly superior to standard Portland cement based concrete tiles commonly used as building façade.

The Bio-Active Wall and planter tiles (Figures 2 & 3) have been installed in a high-end, mixed-use commercial/ residential project at the heart of Tel Aviv, called Lev Levontin. This exclusive six-story building, was constructed following green building principles, and utilized the latest construction technologies.

The building's entrance patio which provides a peaceful and green transition from the busy street, includes a 1,100 ft^2 (ca. 100 m^2) ECOncrete Bio-Active Wall compose of 1 ft^2 (ca. 930 cm^2) wall tiles and planters (Figure 1). This south facing Bio-Active wall is predominantly shaded, and supported by drip based irrigation to the planter tiles. The drip provides moister to its surrounding and drains onto the tiles below them, keeping much of the wall surface moist. The planters have the same design as the wall tiles thus integrate perfectly into the wall façade, while enabling integration of a wide variety of plants. Depending on the architectural design, the pocket tile can also double as a base for lighting systems. The pockets can be applied in any desired density helping to control the amount of plant life covering the wall. The wall vegetation includes naturally recruited mosses and lichens, and planted with wall clinging species like *Hedera* sp. *Ficus pumila, Viola hederacea*.

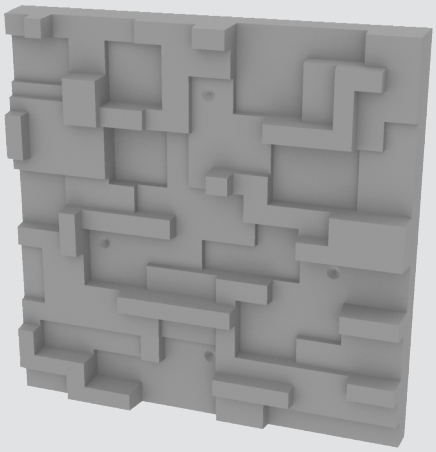

Figure 2

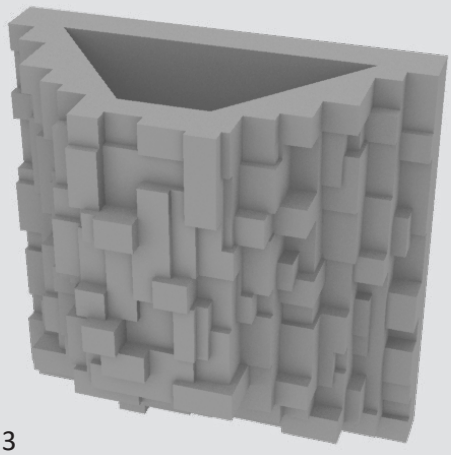

Figure 3

ECOncrete®'s Approach

The design of ECOncrete®'s Bio-Active Wall Tiles incorporated environmental and structural considerations. The innovative tiles defer from standard concrete units on three levels; concrete chemistry, surface rugosity, and 3D macro-complexity. These three elements work in synergy to mimic features of natural surfaces thus enhancing the wall's ability to support rich flora of predominantly plants that require little or no soil. With the proper levels of light, moisture, and nutrients these plants can thrive directly on the Bio-Active Wall surface.

ECOncrete®'s unique Bio-Active Wall mix was tailored to keep the low pH of water encountering the surface as opposed to the highly alkaline pH of water accumulated on standard concrete. As a result, mosses, lichens as well as climbing plants can effectively utilize the water retained on the wall. The high surface rugosity, and the unique 3D design which includes micro pores, rugged textures, varying elevations, and ample of edges, increase the wall's ability to capture water and moisture, thus further contributing to floral growth as well as increase their ability to effectively latch onto the wall surface.


Figure 3 - Three month post deployment


Figure 4 - Plant coverage surrounding a pocket tile

Key Findings

Approximately a month after planting, the wall started developing noticeable plant coverage surrounding the pockets. As little as three months post planting mosses started colonizing the wall, covering from few centimeters up to over half a tile in certain cases (Figure 3). As the project will continue to develop, ECOncrete® will perform prolonged monitoring aimed at quantifying the percent cover of different plants on the wall, as well as measure the foliage's contribution in reducing diurnal temperature changes on the wall. In addition, the potential cooling effect of the vegetation, and their contribution to air quality via oxygen production and capture of polluting particles will be evaluated. Furthermore, the diminishing of noise pollution will be evaluated as studies have demonstrated that plants are able to exhibit high values of acoustic absorption.

Based upon prior installations, ECOncrete®'s Bio-Active wall helps decrease the ecological footprint of urban development by:

- Promoting high plant diversity and coverage on the structures' façade.
- Contributing to air quality through oxygen production of enhanced plant coverage.
- Increasing energy efficiency of the structure's envelope
- Absorption and reduction of atmospheric CO_2
- Acting as a passive acoustic insulation
- Enhanced foliage cover serves to absorb solar radiation
- High foliage cover captures pollutants from the air
- Increasing the overall aesthetics of the structure

Facilitating Green Certifications:

ECOncrete®'s Bio-Active Wall installation at the Azouri Eco-Tower (Tel Aviv, Israel) contributed LEED innovation points to the building, which was the first Israeli office building to receive a Gold LEED certificate.

Bringing concrete to life:

ECOncrete®'s Bio-Active tiles were used for the construction of a biological pond and fountain at BIG commercial center (Ashdod, Israel). This installation demonstrated the ability of the tiles to receive rich and diverse foliage, mimicking natural waterfall/spring plant life in an urban setting.

Secret Sunken Garden:

In a closed to the public governmental building, a 250 m^2 installation of ECOncrete®'s Bio-Active Wall Tiles transformed the building's library, confined one floor below the street level and surrounded by featureless gray concrete into a vertical sunken garden. This allowed readers and users to enjoy a beautiful, low maintenance green space.

ECOncrete® Company Profile

ECOncrete® offers a suite of environmentally sensitive concrete solutions designed to encourage biological productivity on urban and coastal marine infrastructure, such as coastal and riverine erosion control structures, urban waterfront developments, marinas and ports. ECOncrete® provides; ecologically active enhanced concrete admixtures suited for different aquatic environments; custom forms & form liners for creating complex textures and design features; as well as various unique precast ECOncrete® elements, that serve to elevate the functionality of local ecosystems, while providing the structural performance required of urban and coastal marine infrastructure.

To date, ECOncrete®'s technologies have been implemented towards the design and fabrication of precast seawalls, armoring units, tide pools, articulated concrete mattresses, concrete encapsulation for retrofitting pier piles as well as terrestrial bio-active wall tiles. The company's extensive and continuous research & development efforts, coupled with expert environmental and technical consulting allows for the creation of unique solutions for all types of concrete based urban and coastal infrastructure.

ECOncrete® personnel have the capability and expertise to tailor products and designs for optimal ecological performance in different marine environments. As such, ECOncrete® provides complete project services, from initial planning and site assessment, through detailed design and product fabrication, to installation supervision and post installation monitoring.

ECOncrete® Services

PR services

- Assistance with and development of project ecological collaterals
- Community outreach and education
- Publications (scientific/ popular)

Project Specific Product Development

- Product Customization following structural and biological requirements
- Schematic design and full product specifications

Consulting and Design

- Preliminary environmental assessment
- Conceptual design for ecological enhancement
- Support in working with regulators and permit facilitation

Supply of Materials and Products

- Precast units
- Form and form liners
- Admixtures

Installation supervision

- Guidance and installation coordination with contractors
- Quality assurance of fabricated units, and site placing

Post Installation Monitoring

- Biological monitoring of flora and fauna
- Scientific project reports