Armoring Units
Polinom Port - Haifa

Location	Product used	Duration
Polinom Port Haifa, Israel	Bio enhancing armoring units	2013-2016

In Short

As part of the construction of a new port in Haifa (Polinom Port), ECOncrete®'s armoring units were deployed and monitored in comparison to the standard Antifer units comprising the outer breakwater of the port. ECOncrete®'s environmentally sensitive technology, combining a bio-enhancing concrete admix, complex surface texture and species-specific design showed outstanding results. ECOncrete®'s armoring units supported double the species richness and biodiversity of invertebrates when compared to the standard Antifer units. In addition, ECOncrete®'s armoring units showed significantly greater fish diversity and reduction of dominance of nuisance and invasive species than standard Antifer units at the site.


Deployment of ECOncrete armoring units

Project Description

Coastal and marine infrastructure (CMI), often imposes much stress on fauna and flora of natural habitats. Concrete based CMI, provide poor substrates in terms of biological recruitment due to the combined effects of the concrete's chemistry, featureless surface texture and high inclination compared to natural habitats. Considering the recent growth of world populations and rural development around coastlines, the effect of CMI on the natural environment is catastrophic.


Standard Portland cement antifers comprising the Polinom breakwater

In 2012, a new port named "Polinom" was constructed at the bay of Haifa, Israel. The breakwater of the Polinom is comprised of standard, featureless, cube shaped Portland cement armor units called "Antifers". The construction of the Polinom provided an opportunity to compare the biological performance of standard Portland cement Antifers to ECOncrete®'s bio-enhanced armoring units. Both armoring units were monitored for biological performance over a period of 24 months (2013-2015).


Deployment of ECOncrete armoring units

ECOncrete®'s Approach

In the design of ECOncrete®'s armoring units, environmental and biological considerations were taken into account alongside constructive and engineering considerations. The environmentally sensitive design defers from standard concrete armoring units on three levels; concrete chemistry, surface complexity and macro-design. These three elements combined, mimic natural marine habitats and decrease the negative effect of coastal development. The mix is specially designed for the requirements of marine flora and fauna and the surface complexity mimics the one found in natural habitats. In addition, higher level surface elements offer refuge to larger marine life similar to natural habitats.

Conclusions

Monitoring results concluded that the ECOncrete® armoring units had more than twice the species richness and biodiversity of invertebrates compared to standard "gray" Antifer units. The taxa assemblage seen on ECOncrete®'s armoring units were extremely diverse including various species of oysters, sponges, Sabellidae, Serpulidae, tunicates, bryozoans and coralline algae. These communities contribute to water purification, increase habitat complexity, and attract a larger amount of native fish species. This trend was consistent throughout the entire monitoring period.

ECOncrete® armoring units had significantly greater fish diversity compared to the standard Antifer units, including the presence of key species completely absent from the standard Antifer units. ECOncrete®'s armoring units had post larval stages of transient fish (Sparidae) and reduced dominance of nuisance and invasive species. In the 24 months comparative study, as many as two-thirds of the species observed on ECOncrete® armoring units were local, with the remaining one-third of the species being considered invasive species, while on the standard antifers an opposite trend appeared, in which invasive species where significantly more dominant.

By integrating environmentally sensitive technologies into the design and construction of CMI, ECOncrete® is able to harness natural processes for ecological enhancement and reduce a structures' ecological footprint. The improved design of the armoring units has several implications on the marine environment; such as increased native species richness and biodiversity, reduced dominance of invasive species, water purification and more.

Apart from its clear ecological significance, biological enhancement also provides structural and socio-economic benefits. Biogenic growth of organisms like oysters, corals or barnacles provides bioprotection; acting to strengthen the structure and add to its stability and longevity. This form of bioprotection can reduce the magnitude and frequency of structural maintenance, which translates into improved ecological stability (reduced anthropogenic intervention), as well as a higher ROI (reduced maintenance costs).


Control 24 months post deployment


ECOncrete 24 months post deployment

Future implications

Following the success of the Polinom pilot study, ECOncrete® has further improved the unit's design for future deployments. ECOncrete®'s new armoring units have been designed as a multi-function unit, which can be fitted with different add-on elements for targeted ecosystem enhancement.
The unit can be placed as full armor, dispersed in-between rock armor, or left as stand-alone units (e.g., as an anchoring unit).

Fish Hubs:

Marine proof mesh for providing protected fish habitat

Oyster Hatchery Unit:

Concrete disks pre-seeded with oyster spat

Oyster Shell:

Marine proof mesh with pre-seeded oyster shell

Tidal Planter:

Gravel and soil filled for growth of intertidal vegetation

ECOncrete® armoring units were selected as the key constructive elements in a large scale federally funded project that won the rebuild by design competition. The project called "Living Breakwaters" proposed by SCAPE Team, is now undergoing detailed design.

ECOncrete's new armoring unit - 1 month post deployment

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, marina's and ports. ECOncrete® provides; bio-enhanced concrete admixtures suited for different aquatic environments; custom forms & form liners for creating complex textures and science based design features; as well as a unique line of precast ECOncrete® elements. All of ECOncrete® products serve to elevate the functionality of local ecosystems, while providing the structural performance required of urban, coastal, and marine infrastructure.

To date, ECOncrete®'s innovative technologies have been implemented towards the design and fabrication of precast seawalls, armoring units, tide pools, marine mattresses, terrestrial bio-active wall tiles, and on-site casting. ECOncrete®'s extensive and continuous R&D efforts, coupled with expert environmental and technical consulting allows for the creation of unique solutions for the development of all types of urban, coastal and marine infrastructure projects.

ECOncrete® personnel have the capability and expertise to tailor products and designs based not only on the project's specific needs, but also 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 and supply, as well as installation procedures 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

Tide Pools and Pile Encasements Brooklyn Bridge Park

Location	Product used	Duration
Brooklyn Bridge Park	Tide Pools and Pile Encasements	2013-2016

In Short

As part of the holistic environmental theme of Brooklyn Bridge Park, two different enhancement projects using ECOncrete® technologies were incorporated into two piers within the park's renovation plan. At pier 4, ECOncrete® provided precast tide pools which were integrated between the stones comprising the riprap to increase the biological productivity of the newly constructed beach. At Pier 6, ECOncrete® developed an innovative concrete encasement technology applied to restore the required structural properties of the aging wooden piles while increasing the availability of substrate capable of sustaining rich marine communities. At both locations, ECOncrete® exhibited rich and diverse live cover when compared to control units. With the tidepools at pier 4 presenting 89 to 100% live cover and higher biodiversity, in stark contrast to the very poor biological function of the surrounding riprap rock, and at pier 6, ECOncrete®'s encasements presented between 70 to 100% live cover and high biodiversity as opposed to only scattered colonization on the control piles.


ECOncrete's tide pool - Brooklyn Bridge Park

Project Description

Coastal and marine infrastructure (CMI), often imposes much stress on fauna and flora of natural habitats. Concrete based CMI, provide poor substrates in terms of biological recruitment due to the combined effects of the concrete's chemistry, featureless surface texture and high inclination compared to natural habitats. Considering the recent growth of world populations and rural development around coastlines, the effect of CMI on the natural environment is catastrophic.

Brookline Bridge Park, NYC is a popular recreational, environmental and cultural destination enjoyed by many. The Park is a post-industrial 85-acre open space on the Brooklyn side of the East River with a revitalized 1.3-mile (2.1 km) of waterfront.
As a part of the holistic environmental theme of the park, two different enhancement projects using ECOncrete® technologies were incorporated into the park's renovation plan. The first project features the integration of precast concrete tide pools as part of a newly constructed riprap beach at Pier 4. The tide pools provide shore stabilization of the beach portion of the new waterfront, as well as increase the ecological performance. The second project features a structural repair of aging pier piles supporting Pier 6. The project utilized ECOncrete®'s innovative encasement technology based on ecosystem specific concrete mixture and complex design. These physical and chemical alterations create a substrate suitable for valuable habitat and dramatically elevates ecosystem services when compared to standard methods of pile encasement. Standard jackets (Portland-based concrete with traditional fiber glass form), cast at the same time as ECOncrete®'s jackets, were used as a control and were monitored with the ECOncrete®'s jackets up to 14 months post-deployment.


ECOncrete mold for pile encasement

ECOncrete®'s Approach

ECOncrete® supplies a range of modular, esthetic elements, which functionally integrate into coastal infrastructure. The elements can be used to retrofit existing structures or to provide fully structural and load bearing units for new construction. ECOncrete products increases the ability of species to utilize structures, and can be tailored for specific species of conservational value, without effecting their structural and functional properties.
ECOncrete®'s elements defer from standard concrete units on three levels; concrete chemistry, surface complexity and macro-design. These three elements combined, mimic natural marine environments and decrease the negative effects of concrete based coastal development. The mix is specially designed for the requirements of marine flora and fauna and the surface complexity mimics the one found in natural habitats. In addition, higher level surface elements offer refuge to

larger marine life similar to natural habitats.

ECOncrete®'s tide pools are designed to create well-defined water retaining elements that mimic natural rock pools typical to rocky shores. Even though rock armor is made of natural material, due to its low surface complexity and dense nature, it is not a surrogate to natural rocky marine habitats and often provides limited ecological value to the surrounding environment. ECOncrete®'s designed tide pools add valuable water retaining features completely absent from armored shorelines. The pools that can be easily integrated into breakwaters, revetments and riprap, help compensate for the loss of natural intertidal habitats by increasing biodiversity and biological productivity along the structure. The units take the place of standard armoring stones between mean low to mean high water lines, accommodating an array of diverse species that are absent from standard riprap. In this project, each tide pool retains a volume of 13 gallons (59 liters) and creates a submerged habitat that is disconnected from the open water at low tide.

ECOncrete® Pile Encasement uses an innovative concrete mix that enhances the growth of marine flora and fauna. In addition, textured forms are applied and stripped after casting, imprinting a rough texture onto the surface of the concrete jacket, which helps to further induce rich marine growth. The unique ecological pile encapsulation can be easily substituted for standard concrete pile encapsulation commonly applied to repair timber piles supporting piers.

Project Conclusion

Nine months after installation (August of 2014), and after a long harsh winter during which the pools were iced, monitoring of the pier 4 tide pools were conducted. Results showed live cover on the pools to be on the order of 89 to 100%. In contrast, the rocky area surrounding the pools was found to have very limited live cover and poor biological function. Apart from various algae that colonized the pools, different invertebrate taxa were identified including copepods, amphipods, isopods, as well as Sabellidae and Spirorbis worms. In addition, two individuals of the Harris mud crab (Rhithropanopeus harrisii) and 17 individuals of an identified juvenile/post-larval fish were noted.

Monitoring of the piles at Pier 6, three, ten and fourteen months post-deployment revealed live cover between 70 to 100% on ECOncrete®'s encasements with strong dominance of filter feeding organisms (barnacles, sessile polychaetes, sponges and bivalves), and habitat forming species (barnacles and sessile polychaetes) that contribute to biogenic build-up on the substrate by calcium carbonate deposition. In addition,

a number of blue crabs (Callinectes sapidus) were spotted mating on the bio-enhanced jackets indicating the addition of valuable nursing grounds. The control encasements comprised of concrete and fiberglass, exhibited only scattered colonization (20–50% live cover) with highly limited ecological value. Moreover, accumulated biomass on ECOncrete sampling units were more than tenfold compared to control fiberglass sampling units. Finally, it is important to note, that the above-mentioned biological assemblages that developed on the enhanced jackets did not interfere with the concrete encasement performance, and a hands-on (level II) inspection of the encasements conducted by CH2MHILL engineers a year post-deployment found hard and sound concrete.

By integrating environmentally sensitive technologies into the design and construction of CMI, ECOncrete® is able to harness natural processes for ecological enhancement and reduce a structure's ecological footprint. The improved design of the pile encasement and the addition of the designed tide pools to the otherwise almost barren riprap has several implications on the local marine environment; such as increased biodiversity and productivity, creation of sheltered habitats and nursing grounds, water purification and more.

Apart from its clear ecological significance, ECOncrete®'s enhancement also provides structural and socio-economic benefits. Biogenic growth of organisms like oysters, tube worms, or barnacles provides bioprotection; acting to strengthen the structure and add to its stability and longevity. This form of bioprotection can reduce the magnitude and frequency of structural maintenance, which translates into improved ecological stability (reduced anthropogenic intervention), as well as a higher ROI (reduced maintenance costs). The two pilot projects also facilitated Brooklyn Bridge Park's environmental permitting scheme and contributed to its community and education program.

6 month post deployment

14 month post deployment

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, marina's and ports. ECOncrete® provides; bio-enhanced concrete admixtures suited for different aquatic environments; custom forms & form liners for creating complex textures and science based design features; as well as a unique line of precast ECOncrete® elements. All of ECOncrete® products serve to elevate the functionality of local ecosystems, while providing the structural performance required of urban, coastal, and marine infrastructure.

To date, ECOncrete®'s innovative technologies have been implemented towards the design and fabrication of precast seawalls, armoring units, tide pools, marine mattresses, terrestrial bio-active wall tiles, and on-site casting. ECOncrete®'s extensive and continuous R&D efforts, coupled with expert environmental and technical consulting allows for the creation of unique solutions for the development of all types of urban, coastal and marine infrastructure projects.

ECOncrete® personnel have the capability and expertise to tailor products and designs based not only on the project's specific needs, but also 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 and supply, as well as installation procedures 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

Seawall Units
Herzliya Marina

Location	Product used	Duration
Herzliya Marina Israel	Seawall Units	November 2014- On going

In Short

Ports and marinas are an essential part of our coastlines, yet too often these replace rich natural habitats with non-productive concrete based infrastructure. Concrete seawalls are communally used in coastal construction and provide low quality habitat and often promote the dominance of nuisance and invasive species. For the purpose of elevating ecosystem function at Herzliya Marina, ECOncrete® has designed a high texture seawall unit with a bio-enhanced concrete mix that provides suitable environmental conditions for the development of a diverse assemblage of marine flora and fauna while compiling with all the standard seawall requirements for structural performance. Monitoring was performed up to 22 months post-deployment, at which point the ECOncrete® seawall units were covered with a variety of invertebrates, including sponges, oysters, bivalves, bryozoans, and coralline algae, while the control concrete seawall presented the low-diversity assemblage, commonly associated with ports and marinas.

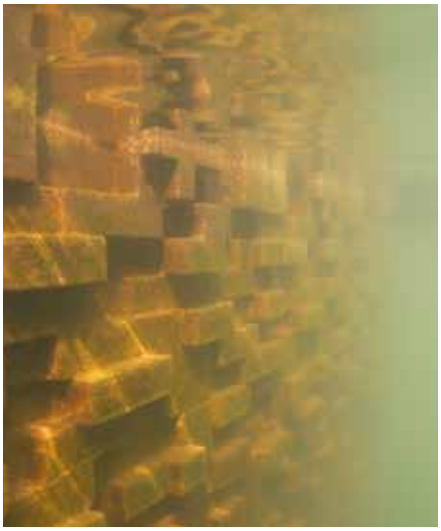
Project Description

Coastal and marine infrastructure (CMI), often imposes much stress on fauna and flora of natural habitats. Concrete based CMI, provide poor substrates in terms of biological recruitment due to the combined effects of the concrete's chemistry, featureless surface texture and high inclination compared to natural habitats. Considering the recent growth of world populations and rural development around coastlines, the effect of CMI on the natural environment is catastrophic.

Herzliya Marina, opened to the public in 1995, is the largest and one of the most innovative Marinas in the eastern Mediterranean Sea. The marina provides substantial public boating options for tens of thousands of visitors annually from all over the world. As one of the first marinas in Israel to receive the world renowned eco-label "Blue Flag", Herzliya Marina put a considerable emphasis on sustainability and elevating ecosystem functionality. For this reason, ECOncrete® has developed a high texture seawall unit composed of bio-enhanced concrete that provides suitable biological and environmental conditions for the development of a rich and diverse assemblage of marine flora and fauna.

ECOncrete®'s Approach

ECOncrete® supplies a range of modular, esthetic seawall elements, which functionally integrate into coastal infrastructure. The units can be used to retrofit an existing wall or to provide a fully structural and load bearing wall for new construction. ECOncrete seawalls increase the ability of species to utilize the structure, and can be tailored for specific species of conservational value, without effecting their structural and functional properties. ECOncrete®'s Seawall defers from standard concrete walls on three levels; concrete chemistry, surface complexity and macro-design. These three elements combined, mimic natural marine environments and decrease the negative effects of concrete based coastal development. The mix is specially designed for the requirements of marine flora and fauna and the surface complexity mimics the one found in natural habitats. In addition, higher level surface elements offer refuge to larger marine life similar to natural habitats.




18 month post deployment

Project conclusion

A direct comparison was made between the ECOncrete® Seawall units and the standard Portland cement comprising the existing seawall infrastructure. Immediately after installation, a baseline survey of the existing conditions on the marina seawall was conducted using a 30x30 cm stainless steel frame (quadrat) to identify the species present. After which, the quadrat area was scraped clean to serve as control for the ECOncrete seawall unit. 22 months post-deployment, the ECOncrete®

seawall units were covered with a variety of invertebrates: sponges, oysters, bivalves, bryozoans, sessile tube worms, as well as colonial tunicates and coralline algae. In contrast, the control original marina seawall presented a low-diversity assemblage, which was even lower than the baseline, meaning that in less than two years, the ECOncrete® seawall panels were able to recruit a more diverse and abundant assemblage in comparison to the control and the baseline. The majority of the dominant organisms on the ECOncrete® units were structurally beneficial species that cement their calcitic skeletons onto the structure; thus, contributing to the structural stability and operational life span of the seawall units through the process of biogenic build-up providing bio-protection. In addition, a major part of these species are filter feeders which potentially contribute to the local water quality.

By integrating environmentally sensitive technologies into the design and construction of CMI, ECOncrete® is able to harness natural processes for ecological enhancement and reduce a structure's ecological footprint. The improved design of the Seawall Units has several implications on the marine environment; such as lowering the ratio between invasive and native species, water purification by filter feeding organisms (e.g. oysters) and more. Apart from its clear ecological significance, biological enhancement also provides structural and socio-economic benefits. Biogenic growth of organisms like oysters, corals or barnacles provides bioprotection; acting to strengthen the structure and add to its stability and longevity. This form of bioprotection can reduce the magnitude and frequency of structural maintenance, which translates into improved ecological stability (reduced anthropogenic intervention), as well as a higher ROI (reduced maintenance costs).


12 month post deployment

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- Admixtures

Installation supervision

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- Quality assurance of fabricated units, and site placing

Post Installation Monitoring

- Biological monitoring of flora and fauna
- Scientific project reports

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, highly maintained systems, 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.
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 composed of tiles and planter units was installed on a south facing wall of the building's luxurious patio. ECOncrete®'s Bio-Active wall Tile create a highly aesthetic green façade capable of reducing the overall ecological foot print of concrete walls by increasing plant diversity, improving air quality and energy efficiency, and reducing both noise and urban heat 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 a 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 Tiles and planter units (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 Standards in Israel,

URBANOF STUDIO LANDSCAPE ARCHITECTURE

and utilized the latest construction technologies.

The building's entrance patio, planned by Studio Urbanof, 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 composed of 1 ft^2 (ca. 930 cm^2) wall tiles and planter units (Figure 1). This south facing Bio-Active Wall is predominantly shaded, and supported by drip based irrigation to the planters and along the entire wall top. The planters present the same complex 3D design as the wall tiles, thus integrate perfectly into the wall façade, while enabling integration of a wide variety of plants. They can be applied in any desired density helping to control the amount of plant life covering the wall, and can be used in architectural design to double as a lighting fixture. In the Lev Levontin project, the wall vegetation includes naturally recruited mosses and lichens, and planted with the following species:

Ficus pumila, Hedera helix, Viola hederasea, Sutera bacopa, and Parthenocissus quinquefolia.

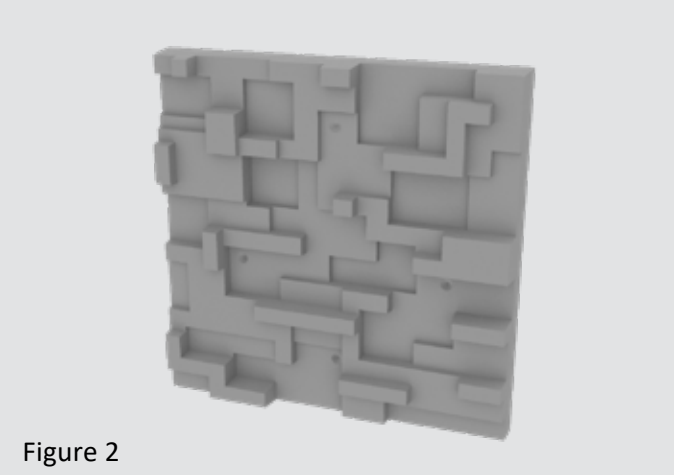


Figure 2

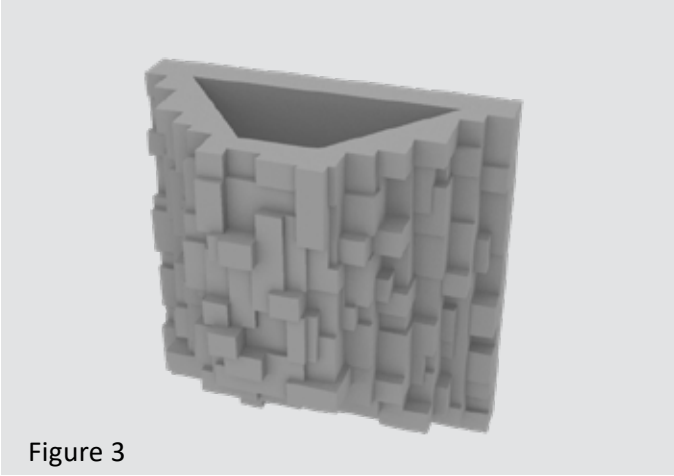


Figure 3

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.

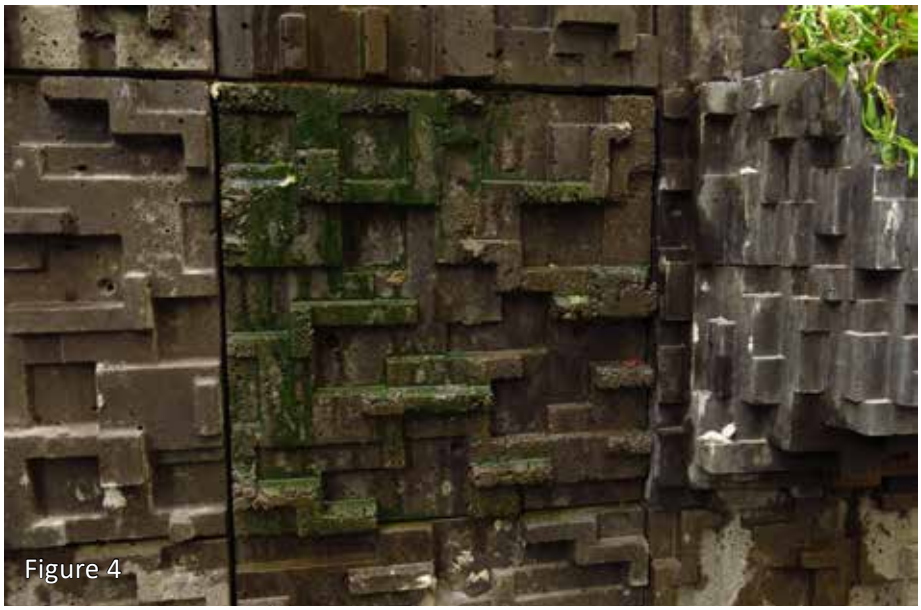


Figure 4

ECOncrete®'s unique Bio-Active Wall mix was tailored to keep the water accumulating on the concrete surface in appropriate conditions for biological development as opposed to water retained on standard concrete mix. As a result, mosses, lichens as well as climbing plants can effectively utilize the water on the wall and flourish.


Figure 5 - Three month post planting

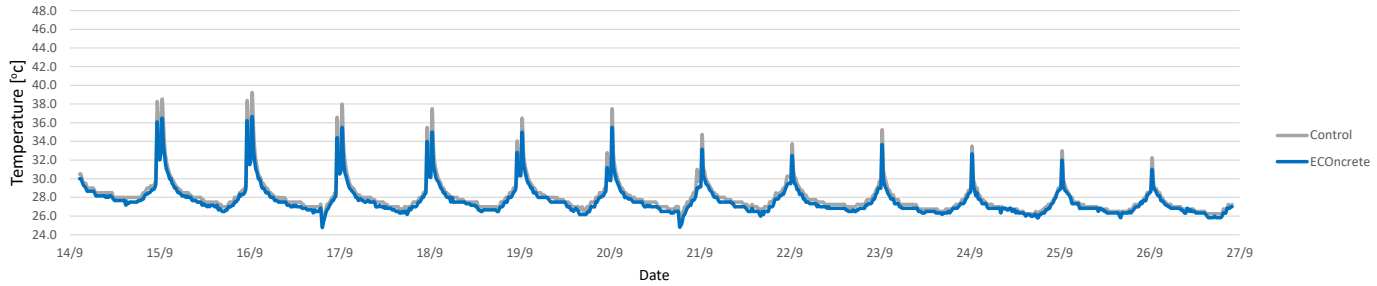
ECOncrete®'s Bio-Active wall helps decrease the ecological footprint of urban development by:

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

Key Findings

Approximately a month after planting, the wall started developing noticeable plant coverage surrounding the planter units. 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 5). The wall's contribution to reducing diurnal temperature changes is significant, with the surface temperatures on dry ECOncrete® Bio-Active Wall Tiles lower by an average of 7.6° C than a control wall (Graph 1, Table 1). This trend is more significant with plant covered, moist ECOncrete® wall tiles (Graph 2, Table 2), which present temperatures of up to 13.2° C lower than the control wall. As the project monitoring continue, farther studies are preformed, aimed at quantifying percent plants cover, thermal effect, contribution to air quality, and the diminishing of noise pollution.

Graph 1: Temp comparison between ECOncrete® to regular concrete wall both dry and exposed to direct sunlight



Graph 2: Temp comparison between moist ECOncrete® Wall under plant canopy to dry regular concrete wall exposed to direct sunlight

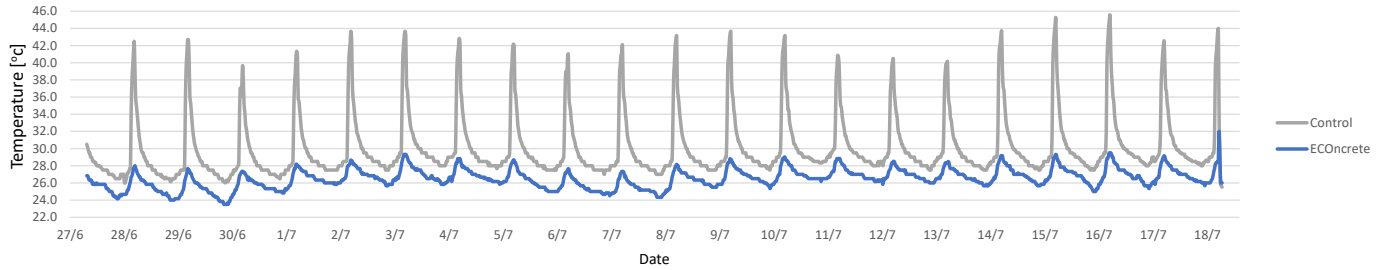


Table 1. Summary the data from graph 1

Average Temp (c°)	ECOncrete®	Control	Δ (c°)
Full term (continuous recording)	27.6	28.1	0.4
Day time (07:00-19:00)	30.4	33.1	2.7
Daily Maximum	36.5	44.2	7.6
Daily Minimum	27.4	28.1	0.6

Table 2. Data summary from Graph 2.

Average Temp (c°)	ECOncrete®	Control	Δ (c°)
Full term (continuous recording)	26.5	30.0	3.5
Day time (07:00-19:00)	26.8	31.4	4.6
Daily Maximum	28.6	41.8	13.2
Daily Minimum	25.3	27.1	1.9

Facilitating Green Certifications:

The first Israeli office building to receive a Gold LEED certificate, the Azouri Eco-Tower (2012, Tel Aviv, Israel), gained LEED innovation points for its ECOncrete®'s Bio-Active Wall installation.

Bringing concrete to life:

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

Secret Sunken Garden:

In a closed to the public governmental building, a 250 m2 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.

Customer Testimonial

"One of the things the wall stands out for is the scenic transformation it produces from year to year and season to season.
Another advantage is the fact that there is no situation in which the wall is "naked" as can happen in a regular green wall.
The lichens and mosses on the wall give the wall a very special appearance.
On the one hand a contemporary look but on the other a "permanent" look of " rootedness ".
Around of the wall there is always a feeling of coolness.
During the summer days it is pleasant to stand by the green wall which gives a feeling of clean and cool air.
The wall is easy to implement and even easier to maintain, with no financial investment or special know how."
Zisi Pinchas (Planing Coordinator, Waxman Gurvin Geva Engineering Co. Ltd.)

Carbon Footprint Reduction

Due to a combination of ECOncrete®'s proprietary admix integrating by-products and recycled materials, and the unique ability to enhance biological processes such as photosynthesis which facilitate CO2 assimilation, the carbon footprint of ECOncrete®'s Bio-Active Wall Tiles is reduced by up to 80%, compared to Standard Portland cement based concrete.

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, marina's and ports. ECOncrete® provides; bio-enhanced concrete admixtures suited for different aquatic environments; custom forms & form liners for creating complex textures and science based design features; as well as a unique line of precast ECOncrete® elements. All of ECOncrete® products serve to elevate the functionality of local ecosystems, while providing the structural performance required of urban, coastal, and marine infrastructure.

To date, ECOncrete®'s innovative technologies have been implemented towards the design and fabrication of precast seawalls, armoring units, tide pools, marine mattresses, terrestrial bio-active wall tiles, and on-site casting. ECOncrete®'s extensive and continuous R&D efforts, coupled with expert environmental and technical consulting allows for the creation of unique solutions for the development of all types of urban, coastal and marine infrastructure projects.

ECOncrete® personnel have the capability and expertise to tailor products and designs based not only on the project's specific needs, but also 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 and supply, as well as installation procedures 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