

# Carlsbad Paseo Meets New Hydromodification and LID Requirements

## Bio Cleans' Innovative Treatment Train Proves Success



Assembling the StormTank

### The Situation

Located just 36 miles north of San Diego, Carlsbad, has become an international tourist destination. With attractions such as the world famous Flower Fields at Carlsbad Ranch and LegoLand the city is quickly growing and in need of more retail shops and restaurants. In recent years, most land in the coastal area of the city has been developed.

One of the last pieces of prime commercial real estate is situated on Paseo Del Norte, just east of the I-5, between Cannon Rd. and Palomar Airport Rd. This seven acre plot of land is a perfect spot for a California Spanish architecture inspired complex. It will include top-notch retailers, homey boutiques, salon services, and highly recognized restaurants.

Complying with stormwater regulations for coastal commercial developments has become increasingly difficult. New regulations require Low Impact Development strategies that can take up significant amounts of space, thus limiting the amount of buildable land. With the cost of prime coastal land, implementing traditional LID strategies would make the project infeasible.

Bio Clean Environmental Stormwater Engineer, Zach Kent, was contacted in the fall of 2008 by project engineer Gary Lipska of Aquaterra Engineering, Inc in search of a solution. Bio Clean is a known leader in the industry at providing creative solutions. The project was required to meet standard mitigation of pollutants generated by the site, along with LID and Hydromodification Requirements.

### The Challenge

The projects Hydromodification Requirements meant that any increase in runoff volume would need to be infiltrated or detained on site. The storage facilities would need to infiltrate and detain the flow of a ten-year storm event which generates a large quantity of water, and finding a place to store it would be essential.

Providing ample parking spots for this size project was another main concern. Storing



Grate Inlet Skimmer Box



### About Bio Clean

Bio Clean Environmental, Inc. has been in the stormwater filtration industry since 1998, providing highly efficient pollutant-reducing systems to the western region including California and Hawaii. Based out of Oceanside, CA, the company leads the industry in system quality, design and dependability. Bio Clean meets and exceeds the strict and ever changing water quality regulations to keep our environment clean and our water safe. For more information on Bio Clean, visit [www.biocleanenvironmental.net](http://www.biocleanenvironmental.net)

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water in an open catch basin would take up substantial buildable space, thus limiting the number of spots. Over 500 parking spots would be needed to accommodate the traffic. Another challenge is dealing with the pollutants generated by the parking lot and restaurants. The pollutants of concern for these land uses are: trash & debris, oil & grease, sediments, organics, & heavy metals from vehicles like antifreeze, brake fluid, fuels, and transmission fluid and nutrients and bacteria from the restaurants.

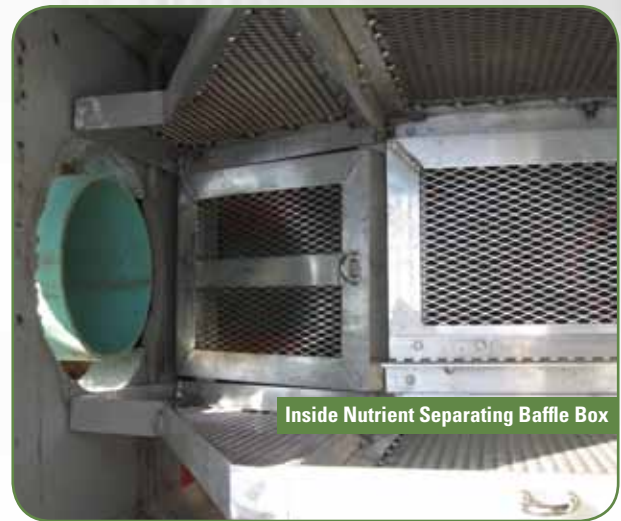
“The Carlsbad Paseo project had several challenging design drainage features. Not only was retention and treatment of the onsite drainage required, but the pass-through drainage from the upstream commercial properties had to be treated,” explained Gary Lipska. The information about the off-site treatment is presented in a separate case study, *Threatened Coastal Wetland Protected by Bio Clean Environmental*. This was also a high profile project that required 401 approvals by the San Diego Regional Water Quality Control Board because it discharged to a sensitive water body on the 303 (d) list.

## The Solution

After only a week in conceptual design, the stormwater engineering staff at Bio Clean Environmental Services drafted a proposal and concept that they believed the City

of Carlsbad and San Diego Regional Water Quality Control Board would approve. Due to the increased emphasis on using treatment trains, Bio Clean proposed a series of three structural BMPs.

A total of 21 Grate Inlet Skimmer Boxes (catch basin filters), six Nutrients Separating Baffle Boxes, and six separate StormTank underground infiltration/detention systems were used to establish a full proof treatment train system to filter stormwater runoff before infiltrating back into the natural soils or discharging downstream. The entire treatment process and detention system is located underground beneath the parking lot. This solution maximized the buildable space of the project.



The first stage of treatment is through a Grate Inlet Skimmer Box (GISB) which is installed at each of the 21 grate openings. The GISB is constructed of all fiberglass frame and stainless steel. It is fitted with an absorbent media for removal of petroleum hydrocarbons. These filters are of proven durability with an expected service life of 10-15 years. They are designed to allow for a high flow bypass which will not inhibit storm flows and cause flooding while capturing high levels of trash and litter, grass and foliage, sediments, hydrocarbons, grease and oil.

The second stage of treatment, the Nutrient Separating Baffle Boxes (NSBB), are located downstream of the inlets. Upon entering the system, the flows travel through a patented filtration screen system which captures and

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stores trash and organics in a dry state above the standing water which prevents septic conditions from occurring. Sediments and fine TSS drop into one of the three settling chambers maximizing capture. Before leaving the system, flows travel through a skimmer and box stage that collects hydrocarbons and controls flow velocity which improves removal efficiency.

The last stage of the treatment process involves the flow entering into an underground detention/infiltration system, StormTank. This system allows large volumes of runoff to be contained underground and then infiltrated into the native soil or discharged down stream in a control-

led fashion. The StormTank offers the largest void space (97%) available therefore maximizing storage capacity. The initial chamber, 6' x 6', is doubled wrapped with geotextile fabric to assure sediments do not travel further into the system. Above this initial chamber is a man hole to allow for easy maintenance. This is easily done with a vacuum truck to clean debris/sediment.

### The Result

The City of Carlsbad approved the development in fall 2008, and construction of the two restaurants, P.F. Chang's China Bistro and BJ's Restaurant & Brewhouse, began in March 2009. In addition to these, a two-story structure consisting of 45,000 square feet will be built between the restaurants. This structure will host retailers, salons and a place to relax.

"Bio Clean became a partner with our engineers to provide solutions to the challenges. As we went through the design and construction process, the Bio Clean staff was available at a moments notice to resolve each issue. I will be calling Bio Clean when I start a project with similar site conditions," said Gary Lipska.

All parties involved in this project are pleased with the way in which the Hydromodification, LID and pollutant removal requirements have been addressed. "Using this type of treatment train has proved to be the best type of defense against stormwater runoff. Eliminating and reducing runoff from this site will benefit the surrounding bodies of water" addressed Zach Kent. Before this type of system was implemented the runoff emptied into Carlsbad's Agua Hedionda Lagoon just north Cannon Rd.



Wrapping the StormTank with Geotextile Fabric