



Naguabo Greenbay Marina, Naguabo PR

Civil & Environmental Engineering Department
 CE-4920 Civil Engineering Senior Design Project II
 Dr. Balhan Alsaadi
 Dr. Dharma Delgado

German Acevedo Perales
 Osvaldo Delgado Rivera
 Jose Mangual Gerena
 Gerardo Rodriguez Ayala
 Wesley Santiago Cruz
 Pamela Velez Diaz

Project Description:

The project consists in the design of Naguabo Greenbay Marina in the Naguabo Municipality. This project is composed of several phases that will boost tourism and economy for the area. The phase to be worked out with priority will be the creation of a floating marina located in the area known as, Malecon in Hucares, Naguabo. Currently there exists a small port that limits what would be a tourist attraction and another access to the area. The innovative technology to be used consists of a floating marina dock that is currently used in the United States and Europe.

The Floating Marina Concept was integrated in the project to implement creative design and construction in Puerto Rico. In the last few years the East Coast of the island has seen an increase in marina developments. The Naguabo Greenbay Marina can accommodate 44 boat slips for vessels of 36ft and over including mega yachts and 46 parking spaces for visitors.



Location



Naguabo Greenbay Master Plan

Objective:

The main purpose of this project is that Naguabo Greenbay Marina will be sustainable and innovative. The Floating Marina will be anchored and shall not be fixed to protect the sea bed. The method to be used to connect the Marina to the seabed is a system called Seaflex that is the most modern and technologically advanced mooring system on the market today, providing secure moorings even under the worst weather conditions. The moorings are self-regulating according to variations in water level, slowly elongates and retracts in a smooth, even movement. With this technological breakthrough this project is implementing modern construction methods applying new types of tourists attractions unique in Puerto Rico and in the Caribbean.

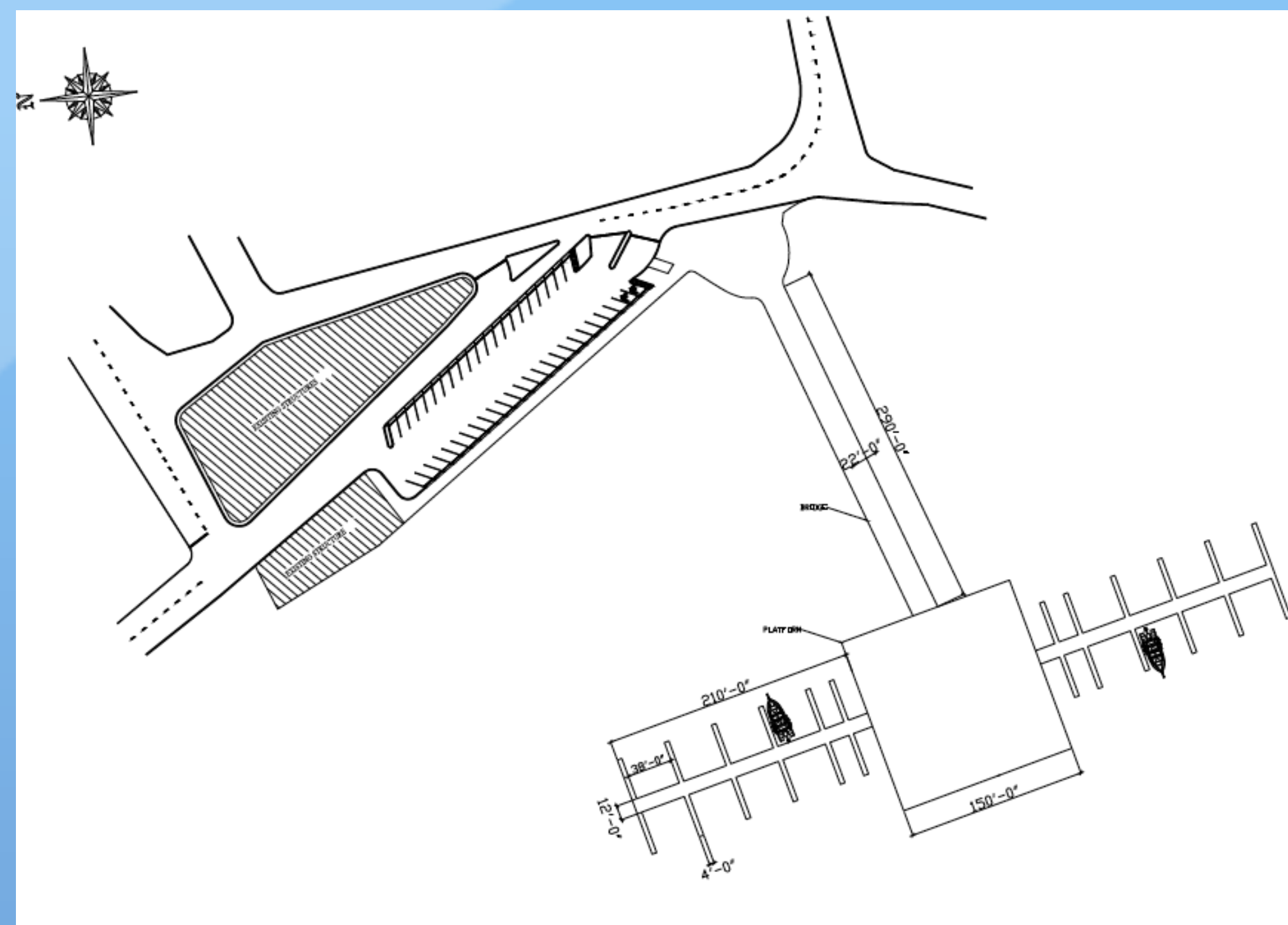


Proposed Site Plan

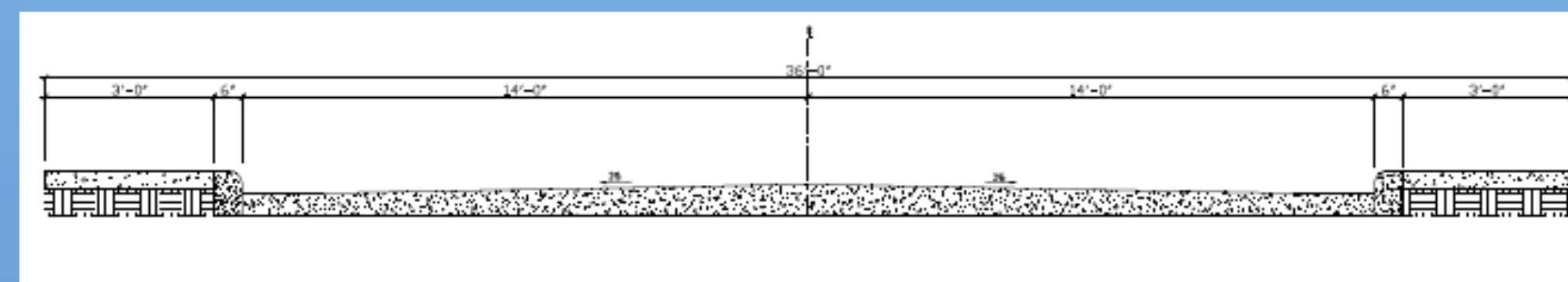
Project Costs

DIV	DESCRIPTION	SUBTOTAL COST	COST/SF	PERCENTAGE
A	SUBSTRUCTURE PLATFORM & MARINA	\$ 2,468,918.35		12.9
B1	PLATFORM & MARINA: STEEL	\$ 272,680.00	\$ 50.42/SF	8.19
B2	PLATFORM & MARINA: CONCRETE SLAB & PEDESTAL	\$ 2,626,365.26		13.8
B3	PLATFORM & MARINA: SEA FLEX ANCHORAGE			
A1	SUPERSTRUCTURE: ROOF FRAME	\$ 246,315.16	\$ 50.42/SF	1.3
B4	ROOF FRAME: STEEL	\$ 2,450,000.00		12.8
B5	ROOF FRAME: GLASS SOLARBAR #100	\$ 1,274,000.00		6.7
B6	ROOF FRAME: GLASS ALUMINUM FRAME CONNECTION	\$ 1,489,600.00		7.8
B7	ROOF FRAME: GLASS INSTALLATION & TRANSPORTATION TO SITE			
A2	PEDESTRIAN BRIDGE	\$ 203,166.72	\$ 31.85	1.1
B8	BRIDGE: PILES	\$ 47,253.80	\$ 50.42/SF	0.2
B9	BRIDGE: CONCRETE COLUMNS, SLAB, PILE CAP FOUNDATION	\$ 187,377.50		0.9
B10	BRIDGE: STEEL	\$ 227,355.06		1.2
B11	PARKING: PAVEMENT, DRAINAGE, MARKING & SIGNS	\$ 776,116.20		4.1
D1-6	SERVICES: ELECTRICAL, STORMWATER, WATER SUPPLY & SANITARY	\$ 5,589,192.00		29.3
E	CONSTRUCTION EQUIPMENT	\$ 37,713.10		0.2
G	SITEWORK	\$ 908,752.56		4.8
H	GENERAL CONDITIONS			
	CONSTRUCTION SUBTOTAL	\$ 19,083,803.71		
	SALES TAX	\$ 636,126.77		
	OVERHEAD & PROFIT	\$ 3,068,914.19		
	ARCHITECT FEE	\$ 1,011,433.84		
	CONTINGENCY	\$ 2,022,883.67		
	TOTAL COST	\$ 23,262,932.23		
			Duration: 622 days	

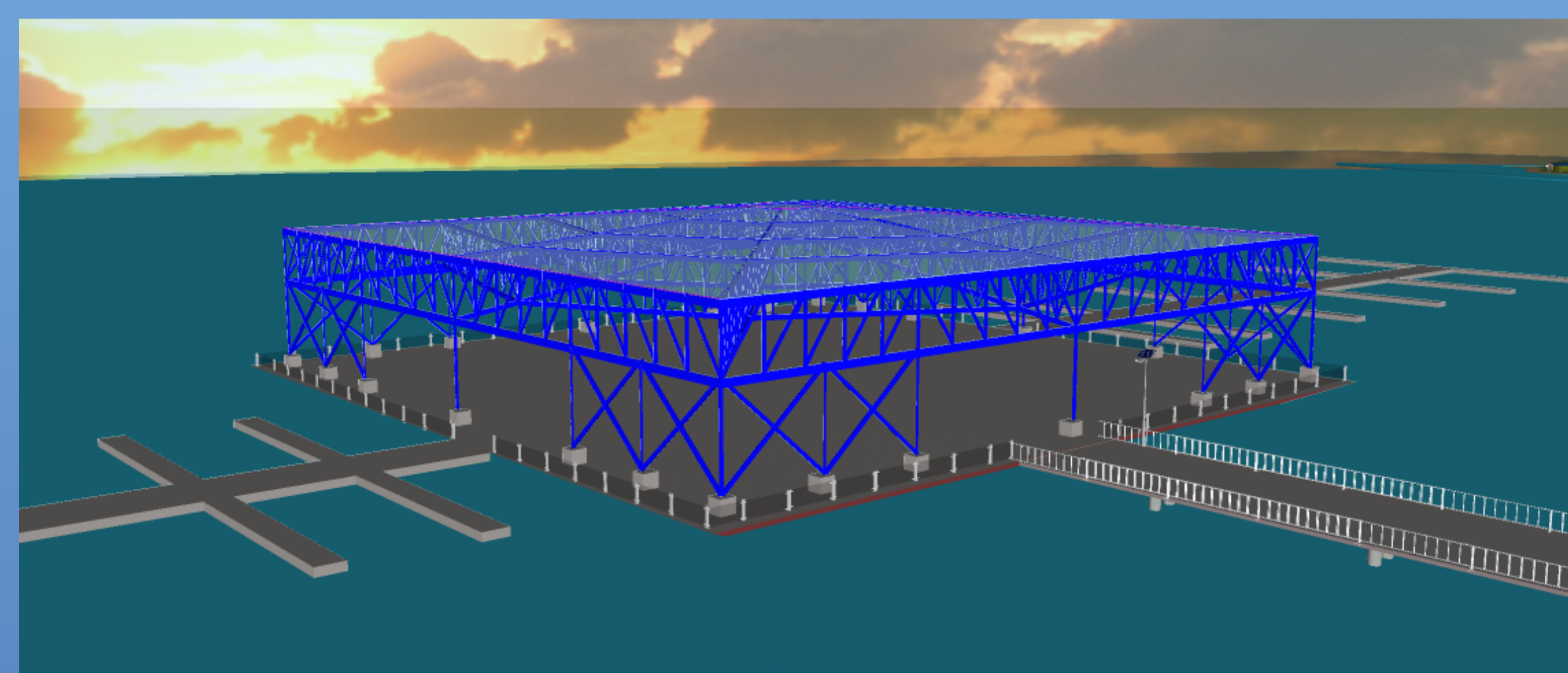
PROPOSED DESIGN



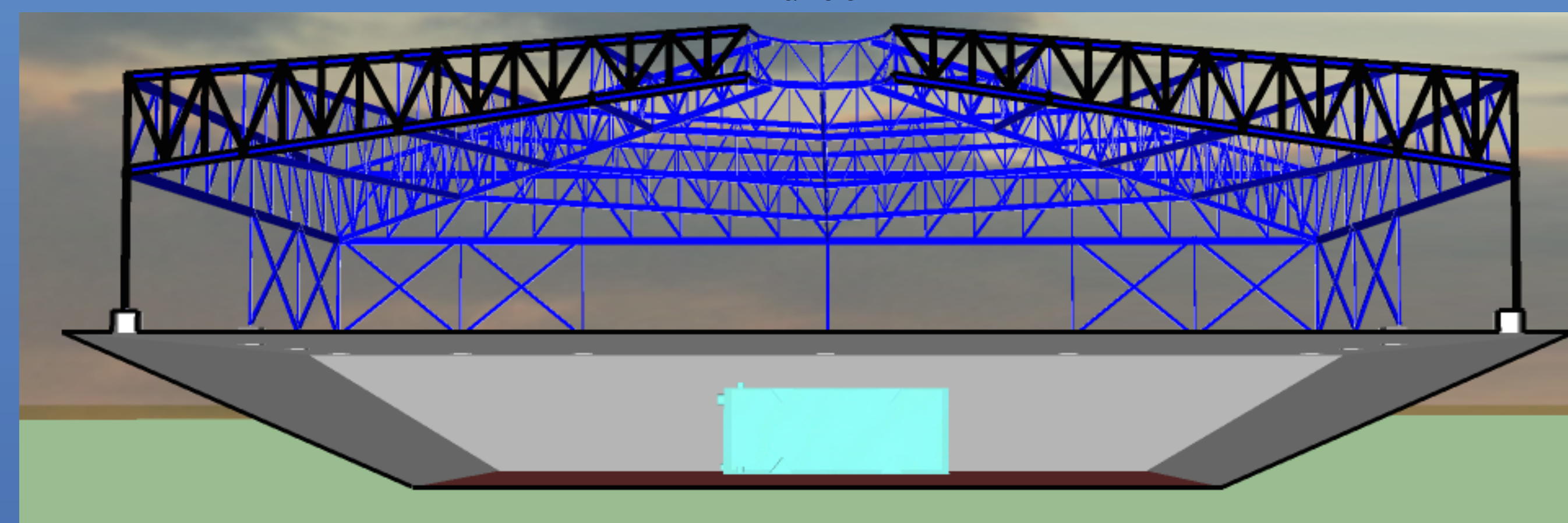
Site Plan



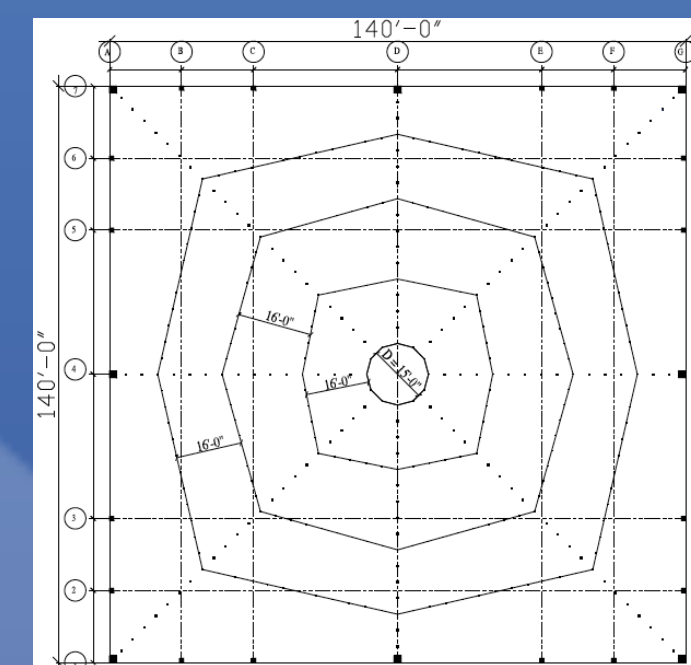
Street Profile



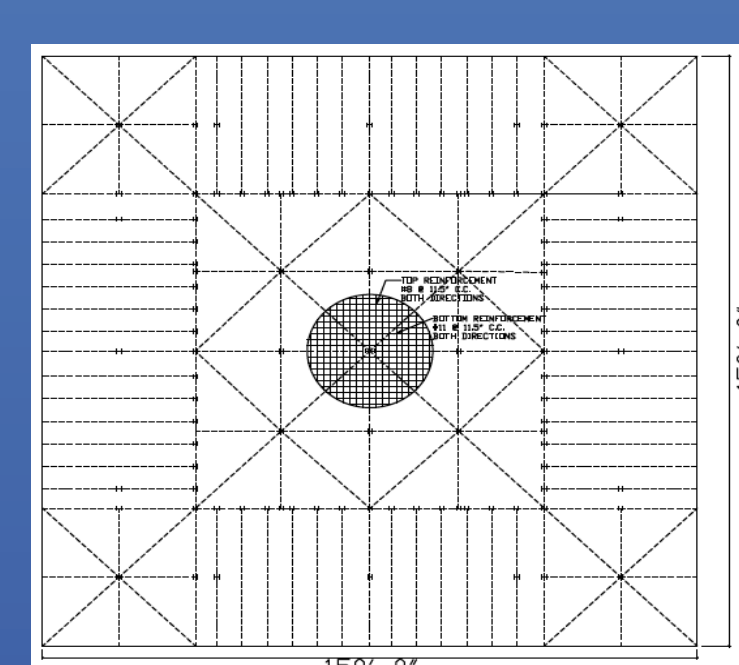
Frame 3D



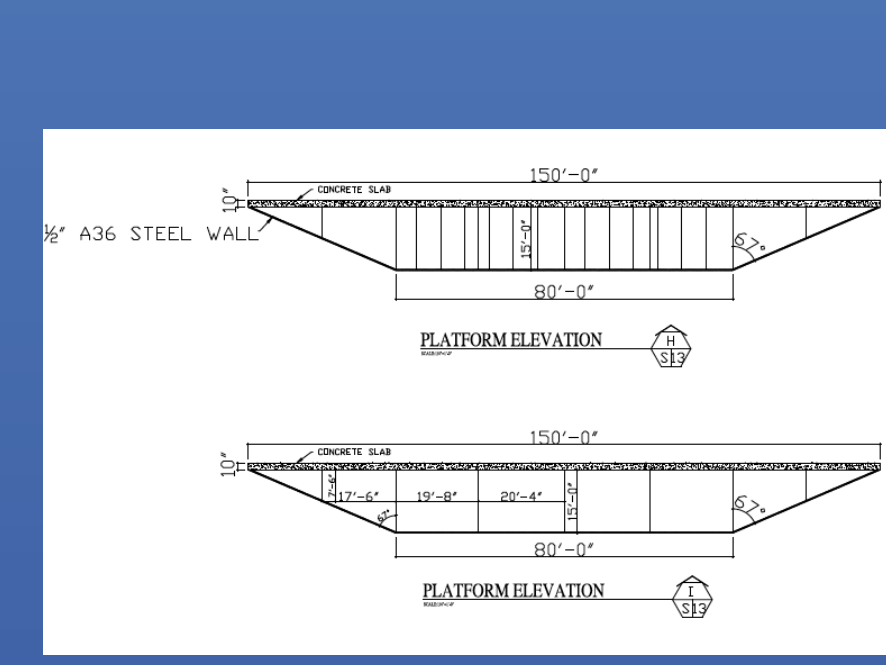
Frame 3D Section



Roof Steel Frame Top View



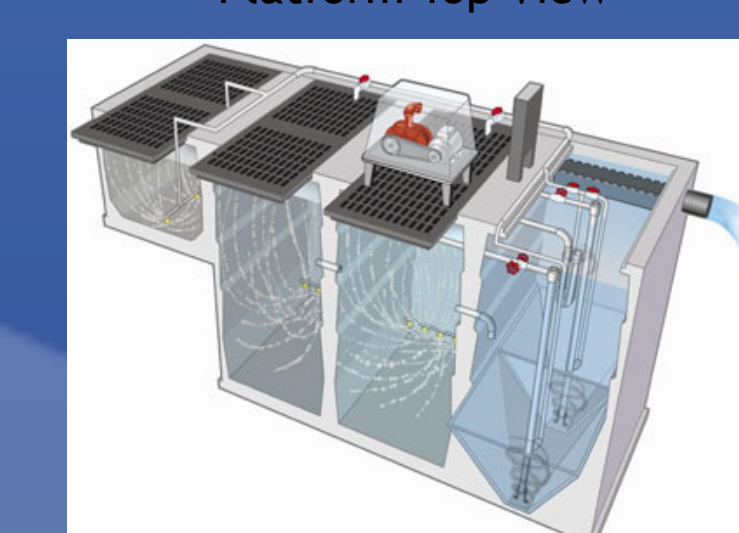
Platform Top View



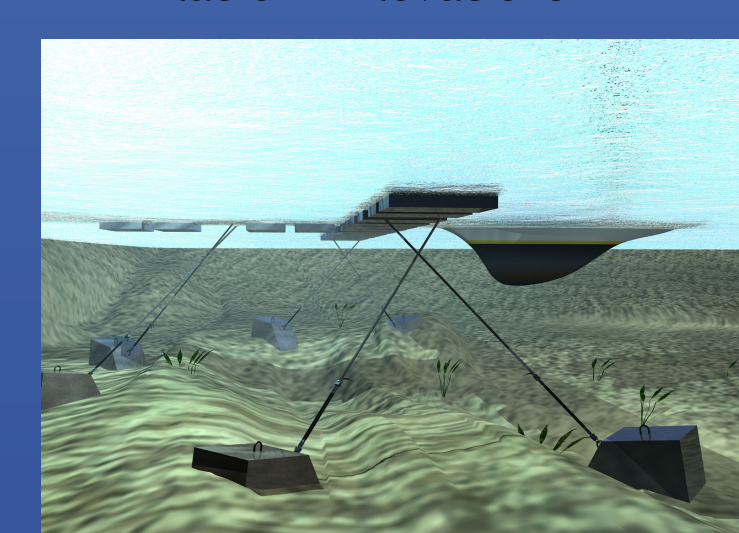
Platform Elevations



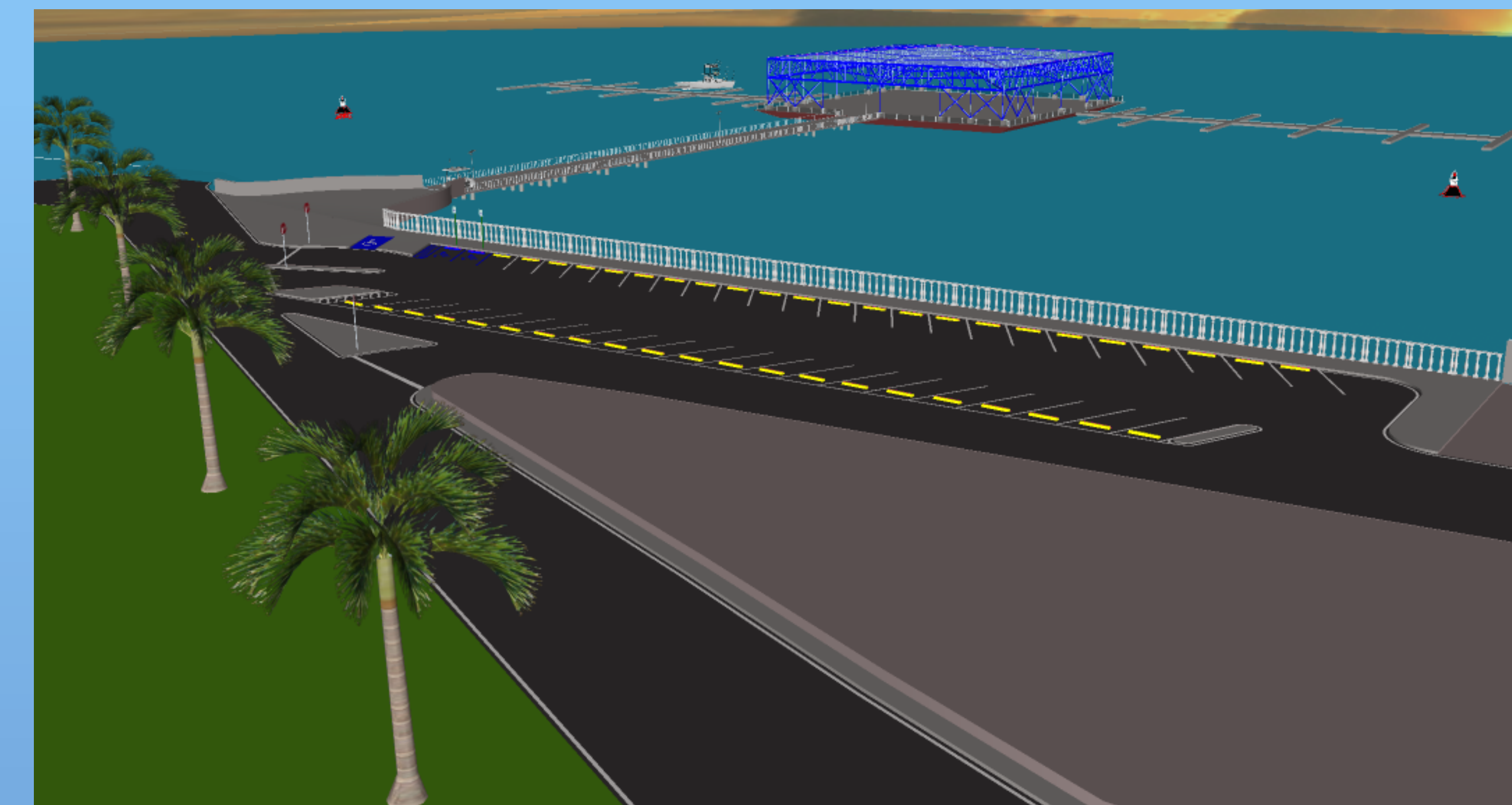
Wastewater Package Treatment Plant



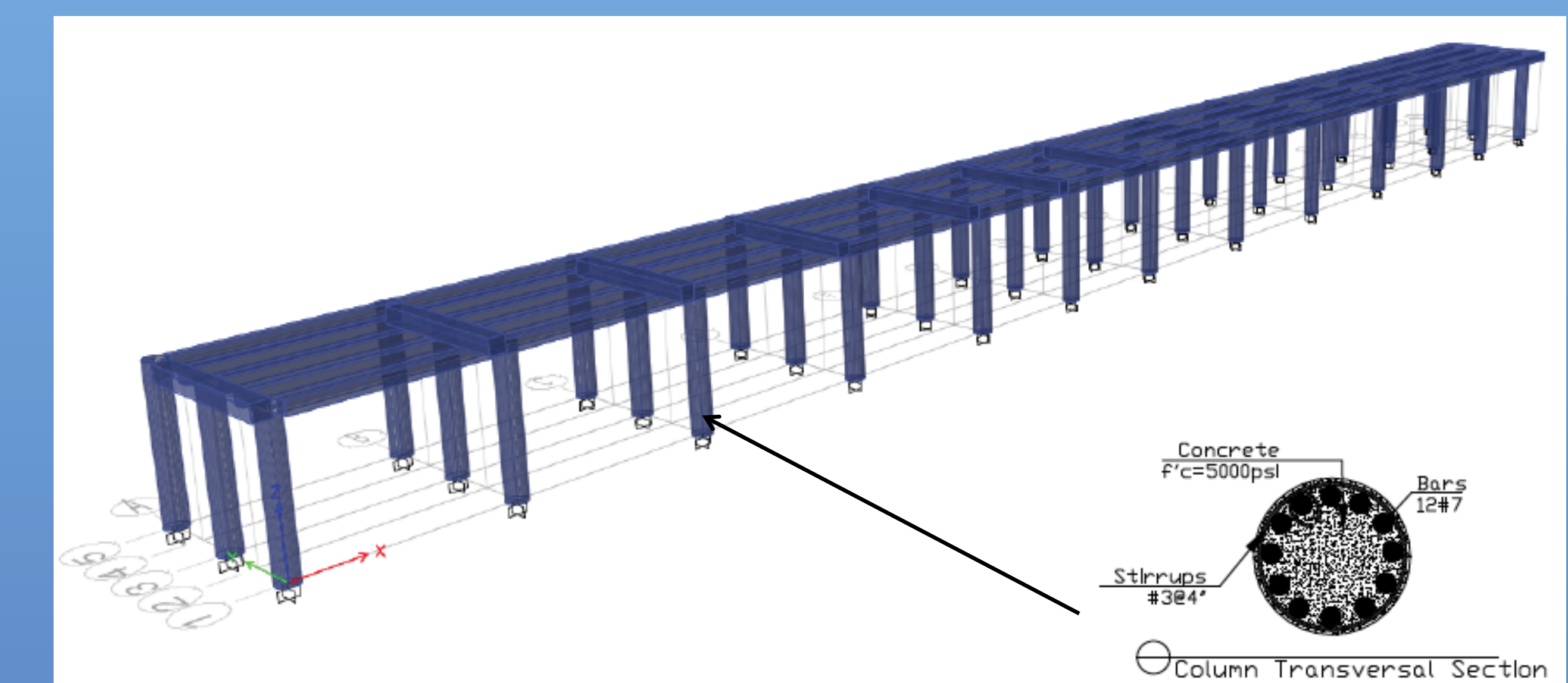
Wastewater Package Treatment Plant Section



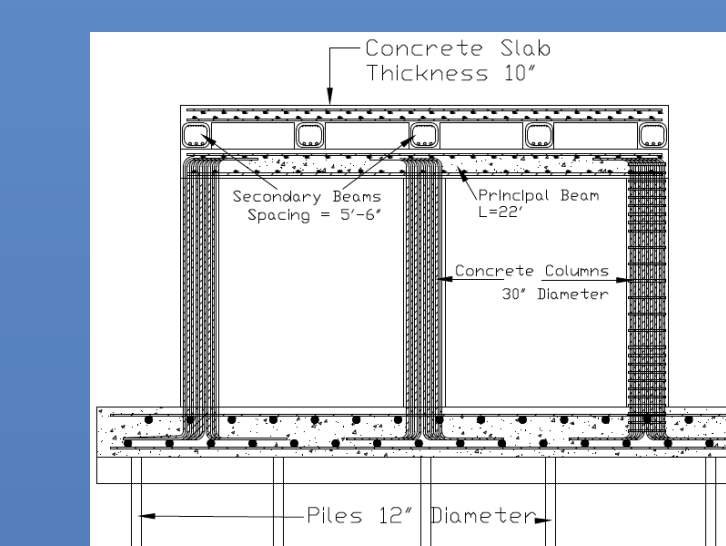
Sea flex anchorage Illustration



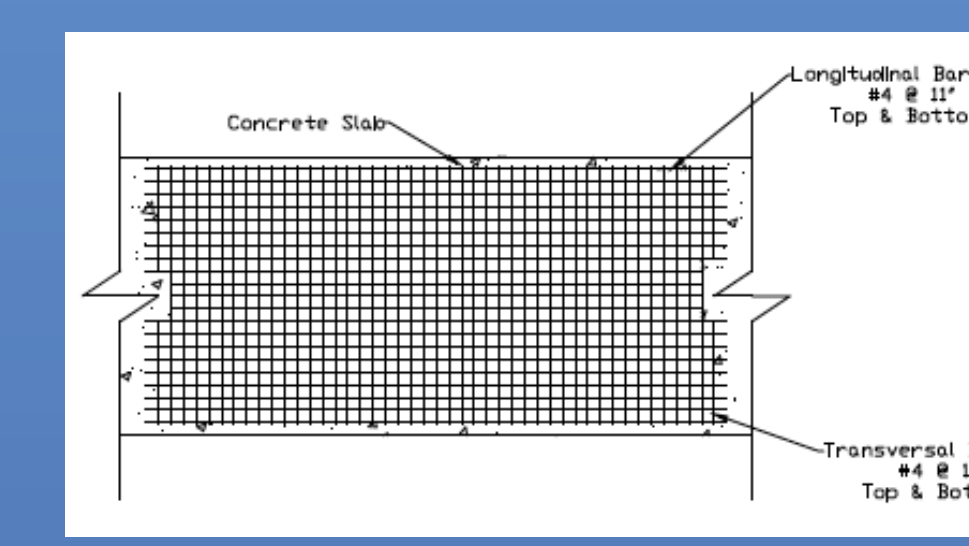
Site Plan 3D



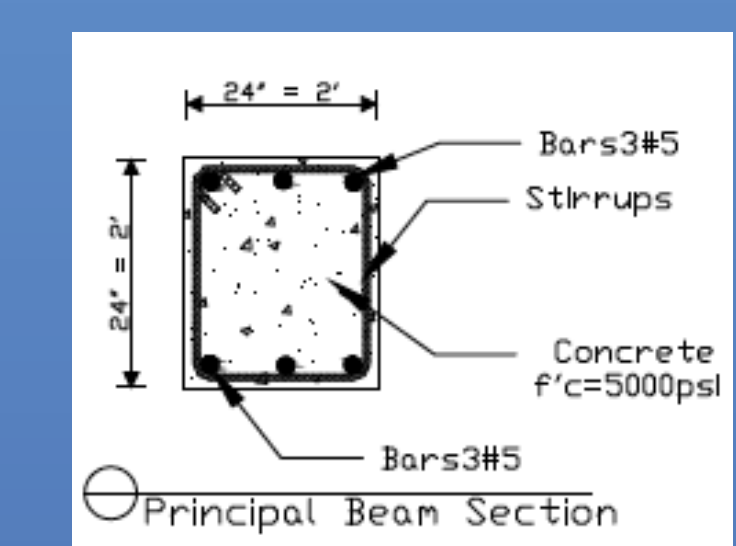
Bridge 3D



Bridge Section



Bridge Concrete Slab Detail



Bridge Beam Section

Conclusion:

After the study and analysis of the Naguabo Greenbay Marina project all the objectives proposed were fulfilled. The project design is unique in its nature since there is no other in the Caribbean. It provides new innovation with the floating technology and package plant for the treatment of wastewater. This Seaflex technology has a long life, requires little maintenance and has proved to be very safe. The package plant provides the technology of pre-fabricated structures, simple to operate and requires low manpower & maintenance. The project will promote a new environment for the area, an economic boost and new attractions not only for locals but for tourists. The design, construction, materials and disposal processes that will be implemented are environmental friendly. Also, new methods of construction will be used to accelerate the construction phase and to lower the environmental impact of the project on the district. The project will last approximately 622 days and will cost \$23,262,932.23.

Acknowledgments:

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- Dra. Dharma Delgado, Ph.D
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