



El Yunque National Forest Welcome Center

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Abstract

El Yunque has been a federal forest reserve for over a century. A Welcome Center has been designed to provide the visitors a free-of charge information and basic service facility. The project is been located at the entrance of the forest through state road PR-191. Concerns with environmental impact led to designs that comply with LEED Certification, permeable pavement, and precast construction technics. The site was prepared as a "stop and go" facility. The structure was designed with a mixture of concrete and steel frame that interacts with an architectural design that maintains a sense of harmony with surrounding structures. Amenities' operational cost and maintenance were set at an annual \$100,000.00 budget. Construction cost for this project is expected to not exceed \$3,000,000.00.

Introduction

El Yunque National Forest is located in northeastern Puerto Rico, on the slopes of the mountains of Sierra de Luquillo, encompassing 28,000 acres of land, making it the largest block of public land on the island. Annually receives about 600,000 to 1,250,000 visitors from all over the world who come to experience the rainforest's eco-tourism pleasures while developing a greater understanding of its ecological importance. The Welcome Center has been designed to solve the misuse of the Administration Building as a source of information for the public and basic services. It serves as a connection between visitors and the rainforest's points of interest. The project designed building is a single-story sloped-roof building within the boundaries of the existing El Portal. It has public restrooms, a lobby, a small theater, a gift shop and additional space that could be used as a small café, a security office or a small administrative office.

Initial Assessment

For the preparation of the project several data was required from the client. Those included a Topography Map of the areas that can be impacted, along with a copy of the Environmental Impact Declaration made for El Portal. With these two pieces of information, conceptual ideas and alternate areas for the development of the project were prepared. The forest administrators also delivered traffic counts for the years 2012 and 2013. One group from the senior design project prepared a new Traffic Evaluation based on a traffic count for the peak week of March 2014. These studies set the amount of parking spaces to be no less than 25 and helped with the geometry of the site. Another group prepared a Geotechnical Study Report, which set the allowable bearing pressure of the soil at 1,800 pounds per square feet and recommended a fill material of A-2-4 or better. The geotechnical report also recommended slopes of 1(V) : 2(H) for embankments. A third group created a new Environmental Evaluation for the proposed project, and another group created a new As-Built and Topography Map of the proposed areas. These maps showed no significant changes in the land features or the surface shapes. Finally, the As-Built provided a better view of where the project should be developed by finding an impacted area that was not in use anymore and where the natural features of the surface were favorable for the development of the proposed project.

Design Process & Final Design

The most utilized construction materials are reinforced concrete and steel. To promote low construction costs and low environmental impact, precast concrete panel was chosen as the primary construction method. The foundation, a small retaining wall and minor structural and site details will be cast in place. The open roofed area is expected to avoid high-energy cost by allowing the free pass of air to ventilate. Another key component for low operational costs is the utilization of rainwater instead of potable water for toilets and irrigation. The building roof is designed to capture all the rainwater and store it for sanitary services and irrigation. A water pump and pressurization tank will be utilized to provide, at least, 30 psi in the system at all time. Other significant structures designed for the welcome center were a gabion retaining wall and a parking area. The gabion retaining wall consists of four sections, that combined are 59 meter in length and have a maximum height of 7 meters. The gabion retaining wall will maintain a natural look but also provide a reliable and cost efficient way of soil stabilization. The parking area has been located in order to reuse an old road. It will also accommodate 32 cars and one bus. The parking area will be paved with two inches of permeable concrete and four inches of sub-base. The project design has considered the LEED Certification for Building Design and Construction. The facility complies with the following credits:

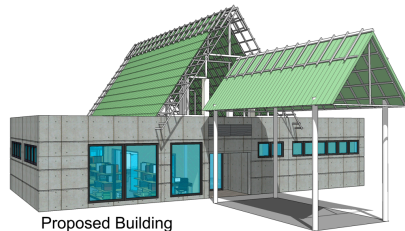
Credit	Point
1. Location & Transportation	4
2. Sustainable Sites	6
3. Water Efficiency	5
4. Energy & Atmosphere	6
5. Material & Resources	5
6. Environmental Quality	14
Total	40

Recommendations and Conclusion

It is recommended further investigation on how the wastewater system works around the facilities. Although, the project design includes a septic tank to handle wastewater it is preferable the use of a public sewer system. It is also recommended to consider a more walkable and cyclist friendly environment around all park's facilities. The project design has all the attributes to fulfill the initial expectations. It provides guidance, satisfies the need of basic services, and solves the client's problem with a simple and efficient infrastructure.

Acknowledgements

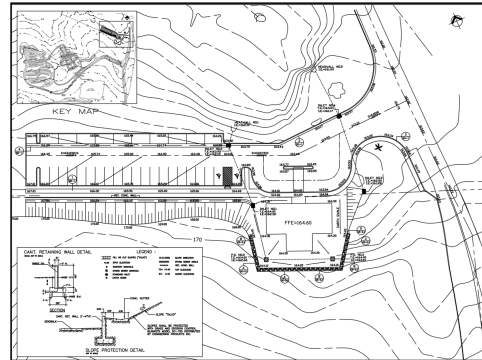
We thank Pablo Cruz, Forest Supervisor and Manuel Ortiz, Property Manager for their collaboration in this project.



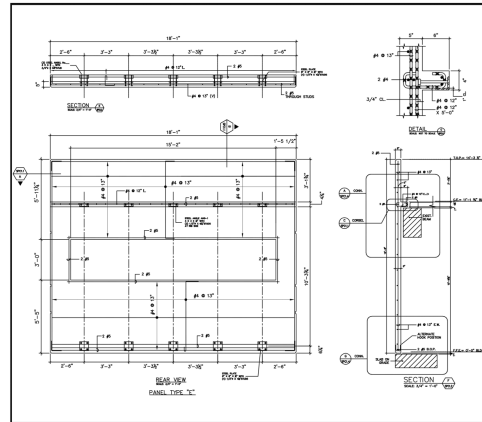
Proposed Building



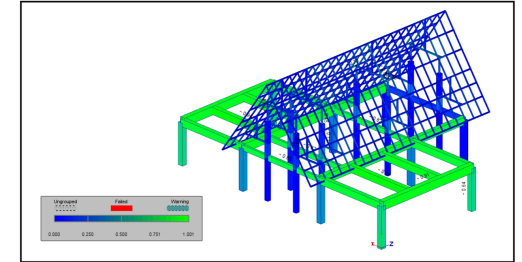
Proposed Site



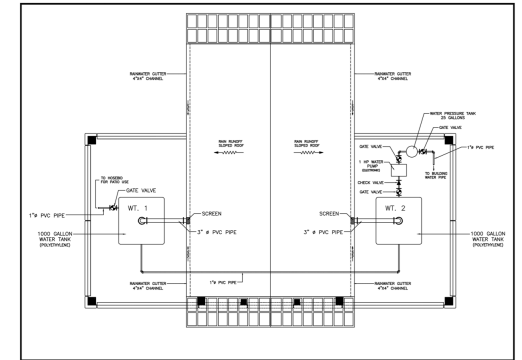
Site Plan



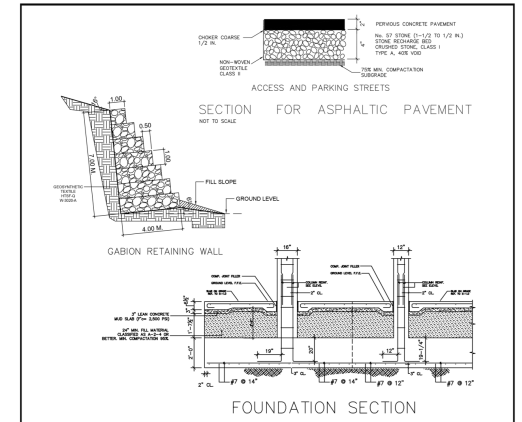
Precast Details



Structural Analysis



Rainfall Water Tank Details



Other Details