

# El Yunque Welcome Center

## Civil Engineering Senior Design Project / Fall 14

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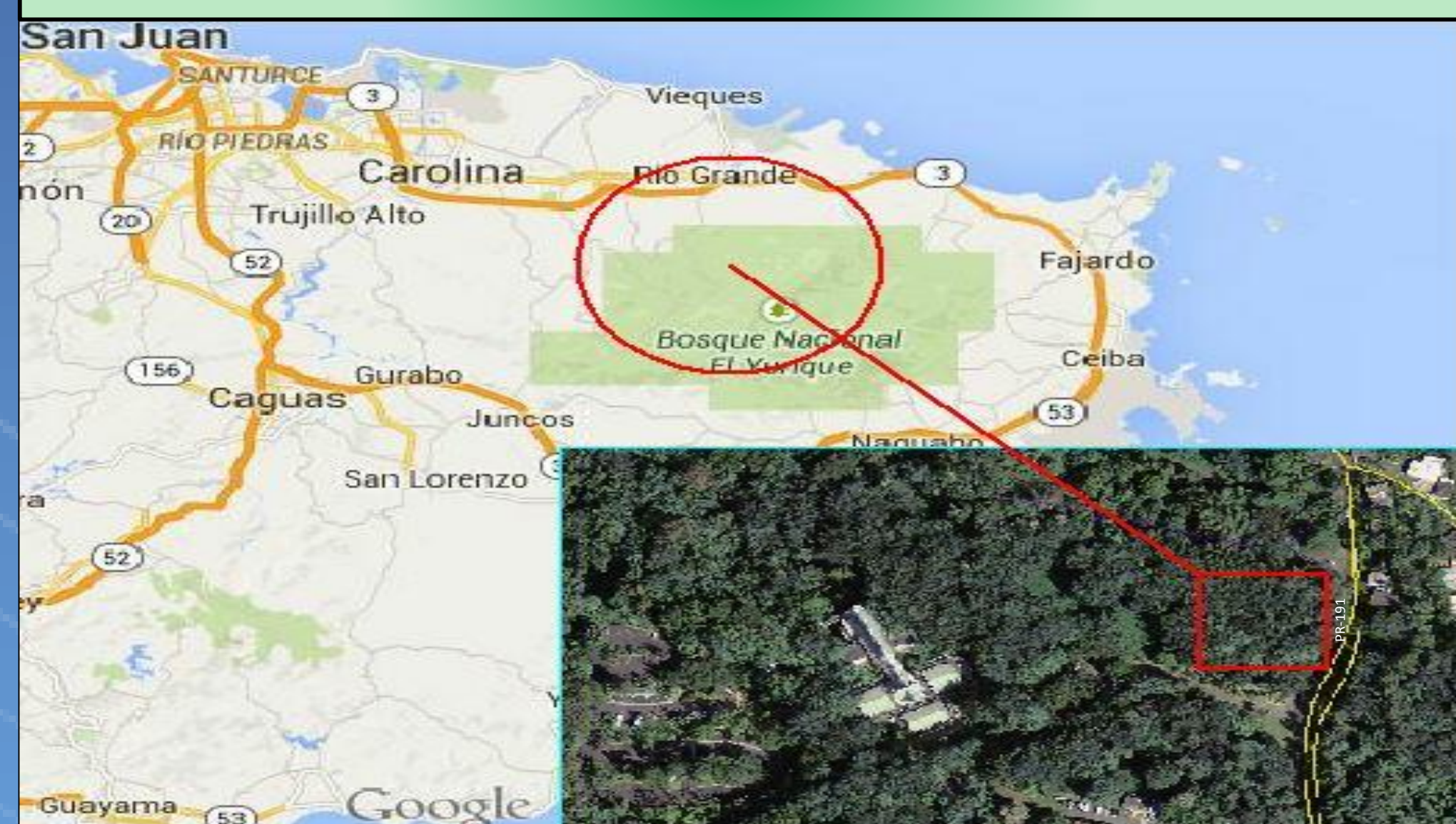
Advisors: Prof. Amado Vélez & Prof. Héctor Cruzado



### Introduction

El Yunque National Forest has a visitor center known as "El Portal del Yunque". Data collected by the administration shows that many visitors pass by without noticing "El Portal", which usually results in operational problems for the administration, due to the lack of orientation for the visitors. As a solution, a free of charge Welcome Center is proposed. The facility will be located adjacent to the main road (PR-191). The Welcome Center's design consists of an installation that operates on a "Stop and Go" basis to provide visitors with the opportunity to obtain information and satisfy their needs. Also, the new facility will help promote "El Portal" as an attraction. The design consists of a structure with an outdoor lobby, a gift shop, restrooms and a parking lot that satisfies the National Forest vehicular demand. The design will consist of an E-Friendly structure minimizing the environmental impact and lowering the Welcome Center's operational cost.

### Location



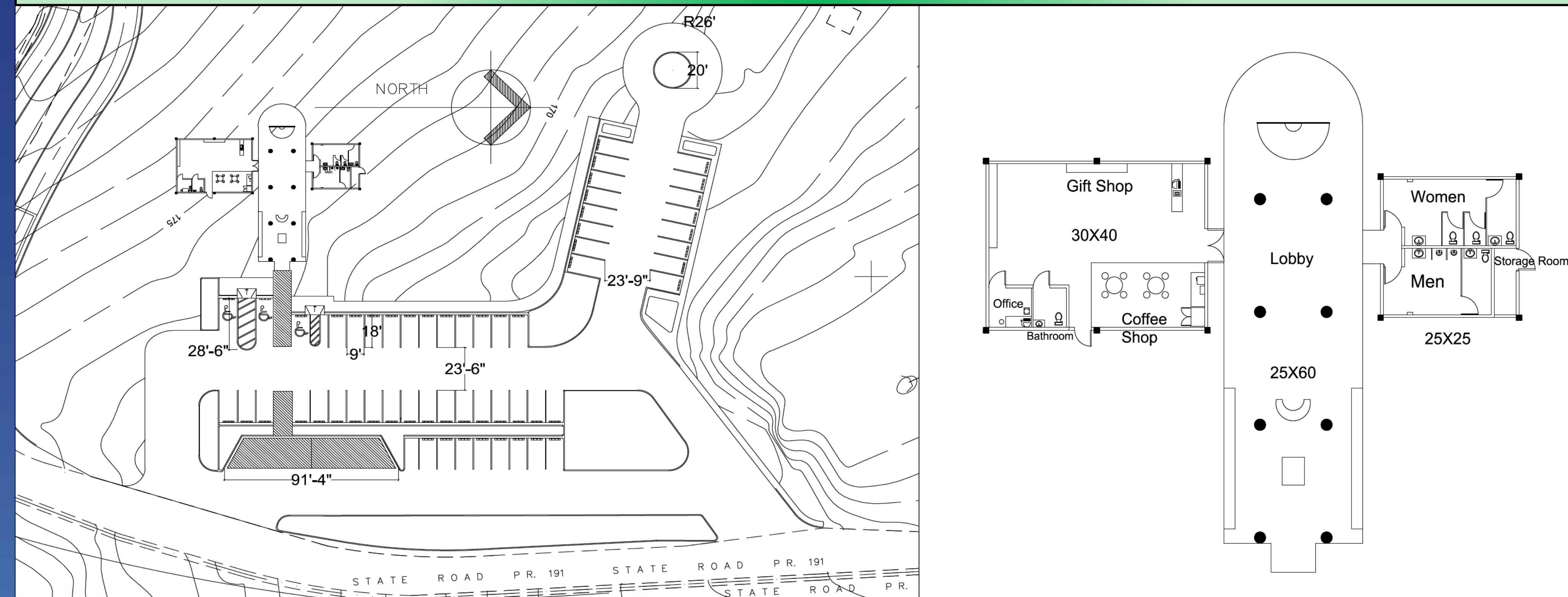
### Objectives

- Design a facility that operates as a Stop & Go.
- Maintain a construction budget under \$4,000,000
- Schedule an annual operational cost under \$100,000.
- Obtain a USGBC LEED certification.

### Sustainability

The National Forest Service demands every Visitor Center to comply with a LEED certification. The Welcome Center aims to acquire a LEED gold certification. To achieve this goal, several techniques were considered, such as: a rain water harvesting system, skylights implementation, high ceilings for illumination, the use of waterless urinals and automatic faucets for the restrooms, and parking spaces for low emissions vehicles.

### Site Plan



### Final Design



### Design Process

Lobby

Restrooms

Gift Shop

Rain Water Harvesting

The structural design elements consist of HSS beams, concrete columns and a galvalum roof deck. Although the structures were designed with Visual Analysis software, all the critical sections were hand verified, analyzed and compared using the LRFD method to validate the computer program's final results.

The RWHS design complies with the Welcome Center's water demand, although it will only be used for non-potable water purposes.

LEED® Facts	
"El Yunque" Welcome Center PR-191 Rio Grande, Puerto Rico	
LEED Building Design & Construction Certification October, 2014	
LEED GOLD CERTIFICATION	65**
Innovation & Design	6
Location & Linkages	2
Sustainable Sites	9
Water Efficiency	9
Energy & Atmosphere	20
Materials & Resources	8
Indoor Environmental Quality	11

\* Out of a possible 136 points  
\*\* Certified 40+ points, Silver: 50+ points  
Gold: 60+ points, Platinum: 80+ points

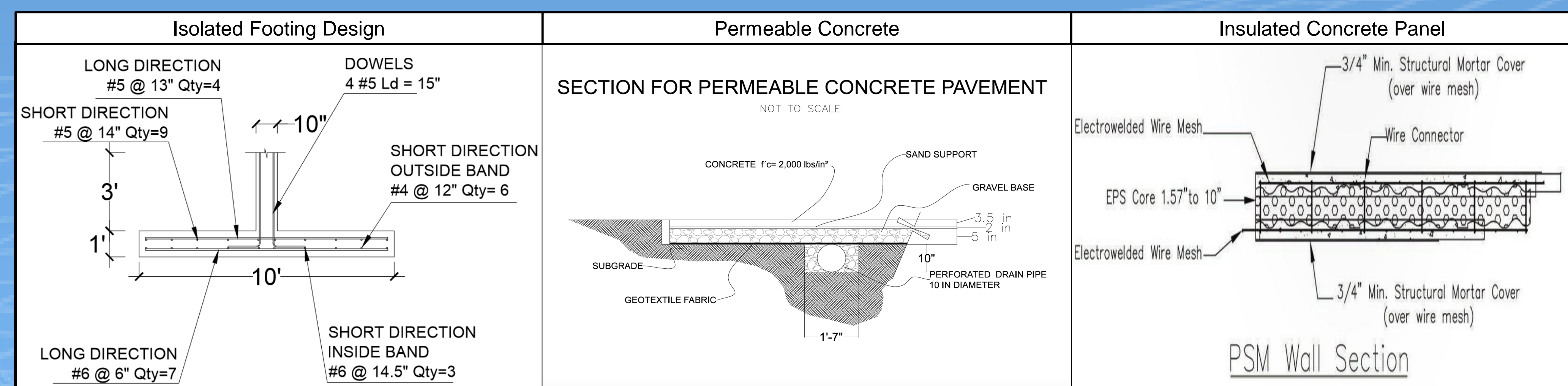
The impact area consists of 1 Acre, providing 60 parking spaces, of which 5% are for handicaps and 3% are for low emission vehicles. Considering collective transportation, the parking has two spaces for buses equal to 25 feet or less. The parking lot design considered a traffic study performed to calculate the National Forest vehicular demand. The three structures were designed with a combination of steel and concrete.

### Conclusions

After a careful research for LEED Gold certification requirements, 65 possible points were acquired. The structure design and components assimilate those of "El Portal" to create a similar environment for the visitors. All Structures were designed according to the ASCE-7-10, AISC 13th Edition, and the ACI 318-11. The design has a final construction cost of \$1.47 million and an annual operational cost of approximately \$86,000. The design team recommends the implementation of photovoltaic panels as a possible source of energy to lower operational costs.

### Acknowledgements

- Ginger Rossy, Assistant Professor, Ph.D.
- Roberto Marte, Associate Professor, P.E.
- Pablo Cruz, Forest Supervisor, P.E.
- Manuel Ortiz, Civil Engineer, Property Management & Administration Services
- Guillermo Aponte, Civil Engineer, Property Management & Administration Services



For the selection of the appropriate footings, the superstructure reactions, soil properties and recommendations from the soil report were considered. The selection of permeable concrete as pavement helps to manage the surface runoff, due to the high amount of rain during the year. The insulated panels will help maintain low temperatures and decrease environmental impact due to their modular construction methods. The GCT panels are capable of resisting any loads that a reinforced concrete wall would.