ACUTE-UNTF NAVAJO HOUSE PLANS
PROJECT ID: CEEN_2018CPST_003

by

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A Capstone Project 30% Completion Report

Submitted to

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Executive Summary

PROJECT TITLE: ACUTE-UNTF NAVAJO HOUSE PLANS
PROJECT ID: CEEn_2018CPST_003
PROJECT SPONSOR: Paul Thorley
TEAM NAME: B^4 Engineering

The capstone group B^4 Engineering has been assigned to the Acute-UNTF Navajo house plans project. Project deliverables include:

- Complete set of engineered plans based on architectural drawings
- List of required materials and pricing for house construction
- Instructions for building these plans

Students conducted research to understand the history and the organization of the Utah Navajo Trust Fund. Design criteria were gathered using accepted engineering practices. Plans were analyzed using the Acute Tools and compared with the prescriptive designs obtained from the building codes.

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Introduction

The capstone group B^4 Engineering has been assigned to the Acute-UNTF Navajo house plans project. This project will include: completing a set of engineering plans based on architectural drawings, compiling a list of required materials for house construction, and developing construction steps to build these plans. Students will perform research to understand the Utah Navajo Trust Fund and fulfill the project according to the desires of the client. An understanding of the availability of construction materials and tools will be necessary to complete this project. The objective of this project is to engineer house plans that are structurally sound and have been optimized for rapid construction. This project will be completed during the Fall 2018 and Winter 2019 semesters. The deliverables for the final product are: structural house plans and structural details, structural calculations, a list of materials with their costs, and a set of instructions for construction.

Schedule

Weekly Group Work Schedule:

- Group meetings are to be conducted every Monday and Thursday for one hour to follow up on assigned tasks, complete assignments, and coordinate as a team with the sponsor about upcoming milestones. This schedule is subject to change based on student schedules.

- Each team member will dedicate 1 hour of personal time weekly to focus on tasks that they have been specifically assigned.

- Communication with the client for this project must be completed through the sponsor. Weekly communication will be established with Paul Thorley.

Project Milestones:

- Stage 1: Students will work with Paul to research the Utah Navajo Trust Fund and understand their expectations for the project.
    - This stage was completed on November 12th.

- Stage 2: Students will develop the house plans and compile a materials list (including cost and source of materials).
    - A first draft of plans and materials was completed on December 3rd.
    - A final draft of plans and materials will be completed by February 15th.

- Stage 3: Students will prepare instructions for the construction of the houses. Instructions will be followed by unskilled laborers and will be created with a two-week construction period in mind.
    - The stage is to be completed by April 1st.

- Stage 4: Students will compile a report consisting of the house plans, all relevant calculations, a materials list (including cost and source), and instructions for construction.
    - The final product will be completed by April 15th.

- Group members will present the final results of the project in the last seminar of the Winter 2019 semester.

Assumptions & Limitations

Design criteria were determined for a wide range of locations across Southern Utah. The worst-case scenarios were selected for each design variable (frost depth, snow load, etc.). No specific site locations were identified as the scope of the project incorporates multiple localities. As a result, the engineering for specific locations could be reassessed based on site-specific criteria.

Team will provide work for this Capstone project "as is" using best practices and with best effort. Project results cannot be construed as work performed by licensed professionals and cannot be used as "stamped deliverables" without first being reviewed, approved and stamped by a qualified and relevant license professional engineer.

Design, Analysis & Results

The majority of design criteria were determined using the prescriptive methods outlines in the 2015 International Residential Code (IRC) and ASCE 7-10. Seismic coefficients and design loads were determined using the Acute Tools. See Table 1 and Table 2 in the appendix for location information and design criteria.

Lessons Learned

<Click to list challenges encountered during the course of the project and how your team overcome it (see your status reports). This is for others to learn and avoid in the future. This is what defines you and your team among potential employers. They value this morning than most other things in assessing a potential employee.>

Conclusions

<Click to discuss what your team has learned from the results of this project: Explain what, how and why your team has arrived at the conclusions listed here (i.e. justifications and backup information in support of your conclusions)>

Recommendations

<Click to list what your team recommends your sponsor to do (i.e. Perform follow-on analysis; assess, evaluate and propose to their customer for implementations and support etc.>

Appendix A

<C lick to add a one-page resume for each team member with each resume on a new page by itself. Add other Appendices as necessary for data, numerical results and result summary tables, software/app source code & sample software/app execution, etc.>

Appendix B

Table 1: Design Criteria for All UNTF Chapters

Chapter	Soil Classification	Roof Snow Load (psf)	Ground Snow Load (psf)	Frost Depth (in)	Wind Speed (mph)	Wind Exposure
Aneth	D	30	43	20	115	C
Dennehotso	D	30	43	20	115	C
Mexican Water	D	30	43	20	115	C
Navajo Mountain	D	30	43	20	115	C
Oljato	D	30	43	20	115	C
Red Mesa	D	30	43	20	115	C
Teec nos pos	D	30	43	20	115	C
Blanding (BMDC)	D	30	43	20	115	C
Monticello (BMDC)	D	35	50	20	115	C
Bluff (BMDC)	D	30	43	20	115	C
Westwater (BMDC)	D	30	43	20	115	C

Table 2: UNTF Chapter Location Information

Chapter	Latitude	Longitude	Elevation	County	Nearest City	Zip Code
Aneth	37d 15' 38.24"	109d 18' 26.52"	4500	San Juan	Aneth	84534
Dennehotso	36d 50' 26"	109d 51' 7.9"	5000	Apache (AZ)	Dennehotso	86535
Mexican Water	36d 55' 16"	109d 5' 8"	5200	San Juan	NA	84531
Navajo Mountain	37d 1' 1"	110d 47' 48"	6000	San Juan	Navajo Mountain	86044
Oljato	37d 0' 15"	110d 10' 22.8"	5200	San Juan	NA	84536
Red Mesa	37d 3' 53.5"	109d 21' 49.8"	5450	San Juan	NA	84534
Teec nos pos	36d 55' 16"	109d 5' 8"	5250	Apache (AZ)	NA	86514
Blanding (BMDC)	37d 37' 24"	109d 28' 44"	6100	San Juan	Blanding	84511
Monticello (BMDC)	37d 52' 9"	109d 20' 31"	7100	San Juan	Monticello	84535
Bluff (BMDC)	37d 17' 1"	109d 33' 10"	4300	San Juan	Bluff	84512
Westwater (BMDC)	37d 37' 24"	109d 28' 46"	6100	San Juan	Blanding	84511