# Lake Winnipesaukee Hotel Development

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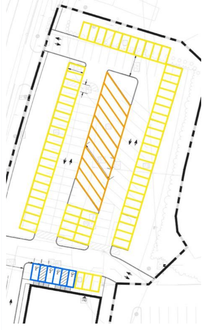
## Introduction

Meredith, New Hampshire, is a town of approximately 6,700 people located in the Lakes Region of the state. The area is notorious as a tourist destination, especially in the summertime. The goal of this project is to develop a 60-key hotel building on a roughly two-acre site, at 319 Daniel Webster Highway. The development of this hotel building is required to confine to the town of Meredith's regulations, primarily the Zoning Ordinance, while also providing a pedestrian-friendly aesthetic for its visitors. The proposed hotel building is a product of diligent site design, as well as responsible structural, geotechnical, and architectural design, with a cost estimate to summarize the practicality of this project.

## Parking Breakdown

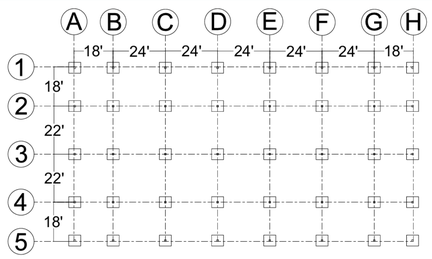


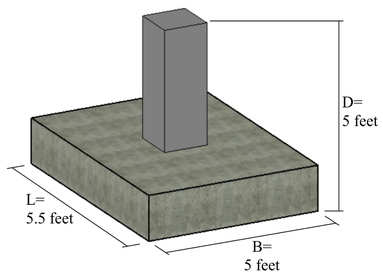
The proposed site needed a parking lot with 70 regular sized spaces, 4 of which are handicap and an additional 10 boat trailer spaces per client request. There were several parameters that needed to be met including the number of spaces, their dimensions and maximum impervious ratio.

| Parking | | | |
|---|---|---|---|
| **Type of Spot** | **Dimensions** | **Color** | **Amount** |
| Standard | 18' x 9" | | **66 Spaces** |
| Handicap | 18' x 9' & 18' x 5' aisle | | **4 Spaces** |
| Boat Trailer | 46' x 12' | | **10 Spaces** |

## Geotechnical Analysis and Design

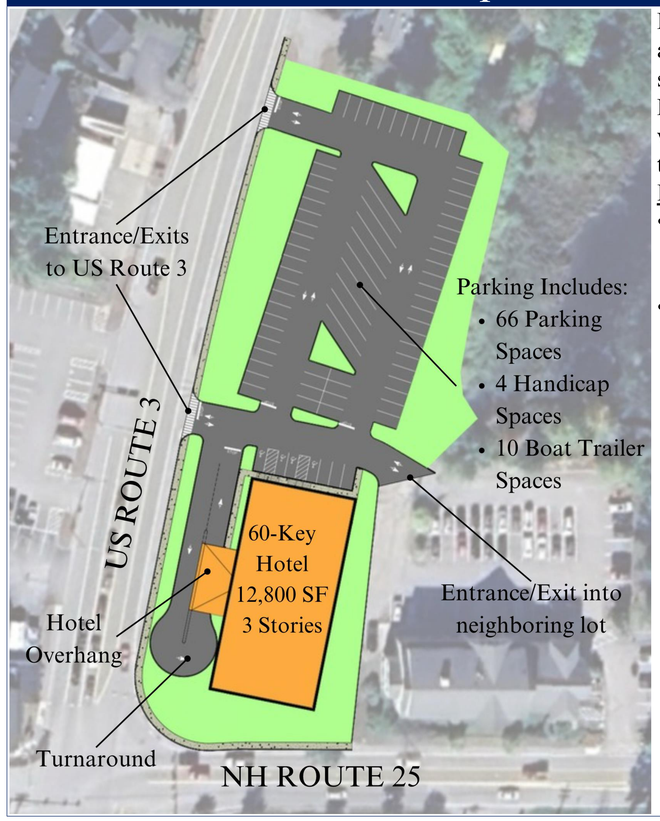
The proposed foundation design consists of 40 isolated footings at the location of the structural columns, with the following layout and dimensions:




A geotechnical analysis for the foundation design was composed of reviewing boring logs to understand the soils profile. From this resource and the structural load, a design load of 44,698 kN was calculated and used to create a safe and stable foundation.

## Proposed Site Plan




Developing the site plan took many factors into account including guidelines set by the project sponsor, TEC, the client, and the town of Meredith's zoning ordinance. All the information was compiled into a program and zoning table for the design of the site plan.

**Program**:

- 60-Key Hotel building
  - Ideally located & oriented
  - Meets all town regulations
- Parking Lot
  - Parking spots required
  - Meeting all town regulations
  - Pedestrian friendly
  - Entrances/Exits

| Zoning Table | |
|---|---|
| **Parcels** | 108 and 109B |
| **Zoning District** | Central Business (DC) |
| **Proposed Use** | 60-Key Hotel |
| **Dimension Requirements** | **Required:** |
| **Lots Area** | 1.94 acres |
| **Front Yard Setback** | 30 Ft |
| **Side Yard Setback** | 10 Ft |
| **Rear Yard Setback** | 20 Ft |
| **Wetland Setback** | 100 Ft |
| **Building Height** | 45 Ft |
| **Maximum Impervious** | 65% |
| **Maximum Lot Coverage** | 1.4 acres |

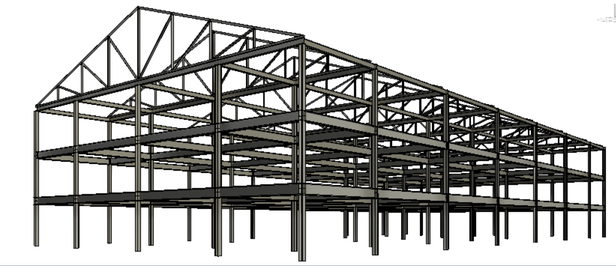
## 3D Rendering


## Structural Analysis and Design

The structural analysis consisted of developing loading combinations for the roof and each floor to obtain the loadings on each member of the frame. With the loadings the team could then go through and size each member accordingly to support the load provided. The main frame of the hotel consisting of the columns and beams will be constructed with wide flange steel members. The sizes and loadings on the beams and columns are shown below. The roof will be supported by 90 howe trusses constructed using 4"x4"x3/4" double angle steel members.

| Column Calculations Results | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Floor | Third Floor | | | Second Floor | | | First Floor | | |
| Column | Corner | Sidewall | Interior | Corner | Sidewall | Interior | Corner | Sidewall | Interior |
| Loading (kips) | 13.45 | 35.88 | 87.69 | 33.64 | 90.65 | 221.25 | 62.91 | 169.37 | 414.53 |
| Beam Size | W8x31 | W8x31 | W8x31 | W8x31 | W8x31 | W8x31 | W8x31 | W8x31 | W8x48 |

| Beam Calculations Results | | | | | | |
|---|---|---|---|---|---|---|
| Floor | Third Floor | | Second Floor | | First Floor | |
| Beam | Sidewall | Interior | Sidewall | Interior | Sidewall | Interior |
| Loading (kips) | 35.88 | N/A | 90.2 | 219.29 | 168.71 | 411.39 |
| Beam Size | W10x26 | N/A | W12x53 | W16x100 | W14x82 | W18x158 |



## Cost Analysis

| Cost Estimate: Site | | |
|---|---|---|
| **Material/Item** | **Cost per unit** | **Total Cost** |
| Asphalt Top Course | $120.00 | $41,900 |
| Binder Course | $100.00 | $46,600 |
| Dense Crushed Stone | $50.00 | $23,800 |
| Gravel Sub-Base | $80.00 | $76,200 |
| Paint | $10,000 | $10,000 |
| Loam | $50.00 | $17,600 |
| Curb | $50.00 | $80,000 |
| 4" Sidewalk | $200.00 | $21,200 |
| 6" Fire Suppression | $230.00 | $21,200 |
| 2" Water Line | $90.00 | $8,300 |
| 8" Sewer Line | $130.00 | $8,000 |
| | TOTAL: | $355,000 |

| Cost Estimate: Hotel | | |
|---|---|---|
| **Area (Sqft)** | **Cost per Sqft** | **Total Cost** |
| 38,400 | $114.85 | $4,400,000 |

The Meredith Hotel cost estimate was based on the structural design, using an assumed $3.00 per pound of steel. Member lengths were multiplied by their weight per foot and the unit cost to get section totals, which were summed and divided by the hotel's total square footage. While more materials are typically included in square foot costs, that level of detail was considered excessive for the scope of this project.

## Acknowledgements

The project team would like to extend a thank you to the project faculty advisor, Mr. Anthony Puntin, and the project sponsor, The Engineering Corp, Inc., with Christopher Raymond, Brenna Heinley, and Michelle Thibault serving as an essential resource for the team.