Drone Assesment of Potential Rooftop Failure from Snow Loads: A Business Model

Daniel Marek, Jacob DeLashmutt, Brinton Dekreon
Faculty Advisor: Dr. Jennifer Jacobs, Mentors: Aiden Short, Adam Hunsaker

Department of Civil and Environmental Engineering, University of New Hampshire

dm1262@wildcats.unh.edu

Abbreviations

UAV – Unmanned Aerial Vehicle
GCP(s) - Ground Control Points
GSD – Ground Sampling Distance
ASCE- American Society of Civil Engineers
FEMA - Federal Emergency Management Agency
FAA - Federal Aviation Administration
NAS – National Airspace
SfM– Structure from Motion
DEM – Digital Elevation Model
GIS – Geographic Information System

Abstract

The opportunity to utilize drones to carry out **inspections** over **large areas**, with **minimal requirement** for **roof access** can reduce tasks which would otherwise take **days** to complete, down to a matter of **hours**. Key gains include **reductions in time, cost** and **allowance** for **provisions**. Whilst acquiring **pictures, videos and 3D models** to continuously **monitor changing conditions** over extended periods.

Project Goals

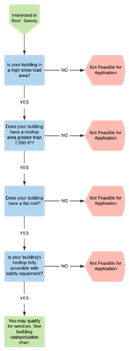
Research & License
Building Codes
FFA Part 107 License

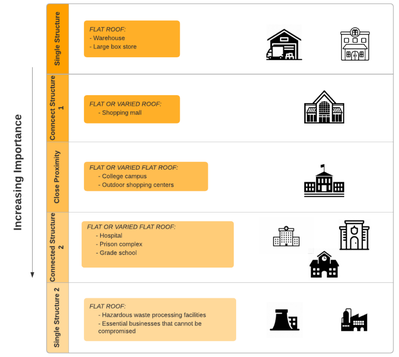
Computer Modeling
Baseline vs. Snow Load Analysis

Business Strategy
Service Pricing
Financial Analysis

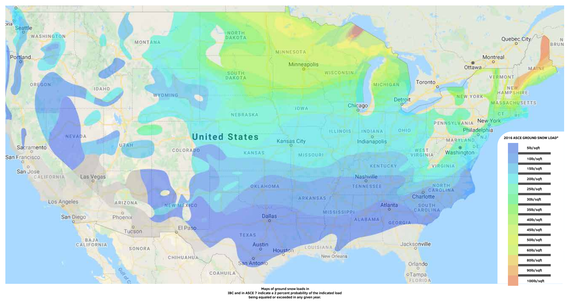
Protocol

Flow-charts





Ground Snow Loads



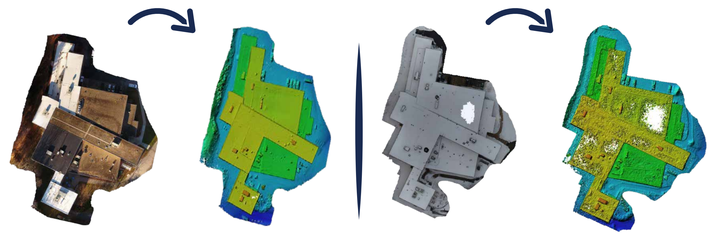
Maps of ground snow loads in SE and in ASCE 7 indicate a 2 percent probability of the indicated load being equaled or exceeded in any given year.

ASCE Design Code

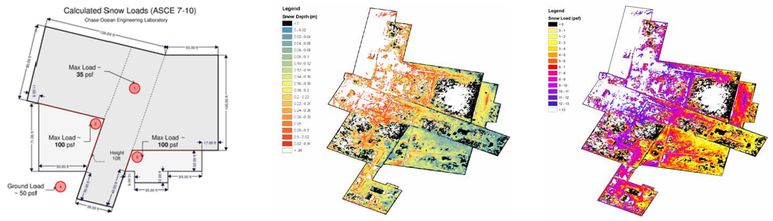
FEMA Snow Guide

Modeling

Pre-Post DEM's



Load Analysis



Interviews

Peter Kalaitzidis
Easy Aerial Inc.

"Drones are amazing, but what drones do is **replace** the human **eyes**… **not the skill of the human**".

Sargeant Eric Bourn
UNH Patrol Sergeant & County Drone Unit

"People often **lack** the **technical knowhow** to protect their buildings against **subtle** issues associated with snow".

Summary

Based on the findings, it would be possible for a startup business to **sustain growth** whilst offering **snow-roof services** and to secure a net profit upwards of **$30,000 per season**, by the third season of operatons. Our recommendation is that these services be considered by an existing roof inspection business. This is because the services could be an addition to their revenue stream which exists during the warmer months of the year. The snow load business would also benefit by utilizing an existing network of clients to maximize profits.

Service Strategy

Service pricing are an estimate only and based on a typical commercial building with roof area of 10,000ft2

Financials

Operations
6 Months/yr

Breakeven
16 Months

Profit
$50,000

Year	Costs	Revenue	Overall	Profit
1	$58,787	$51,000	-$7,787	-$7,787
2	$62,870	$90,000	$27,130	$19,343
3	$92,870	$122,400	$29,530	$48,873

Breakeven Analysis