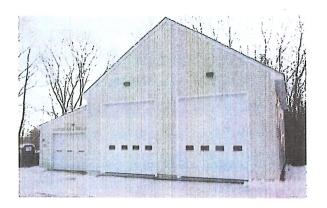
# STRAFFORD FIRE STATION FEASIBILITY STUDY

# Warch 5, 2025







# Prepared by Michael Petrovick Architects, PLLC



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# PROJECT TEAM

# Michael Petrovick Architects, PLLC

- Michael Petrovick, NCARB, AIA, Principal-in-Charge
- Hunter Davis, Senior Designer
- Kristen Noonan, Project Administrator

# ACKNOWLEDGEMENTS

Our team acknowledges and thanks the following individuals and groups for contributing their time and expertise to this feasibility study project.

# **Fire Department Representatives**

• Steve Johnson, Chief, Fire Station Committee Chair

#### **Town of Strafford Select Board**

- Lynn Sweet, Chair
- Bryant Scott
- Chris Garcia

# STUDY INTRODUCTION AND BACKGROUND

The Strafford Fire Department is the cornerstone of the community's safety and emergency response. Currently, the town operates three active fire stations: Crown Point Station, Bow Lake Station, and Center Station. Originally, the three remote locations were established to provide faster response times by volunteers located throughout the community, and during an era when fire stations served as little more than garages for trucks.

The department's primary location is Bow Lake Station, which houses apparatus and equipment, a small administrative office, a day room, and a bunk room for full-time staff. The Center and Crown Point stations continue to house only apparatus and equipment.

These three stations have served the department for more than 50 years. Except for modifications to accommodate newer apparatus and full-time staff, they have not been modified or expanded since being put into service as fire stations.

The Strafford Fire Department has determined that the Bow Lake Station and Center Station can no longer meet the department's evolving needs due to their limited size, outdated infrastructure, and inadequate capacity. These facilities cannot accommodate the larger, modern fire apparatus now required for effective operations. They also lack adequate space to support modern fire department demands and an increasing number of full-time staff. Additionally, both sites lack room for expansion, further hindering the ability to upgrade the facilities to meet the growing demands of the department and the community.

Based on current staffing trends, modern equipment, and first responder health and safety, the department established their goal to consolidate Bow Lake and Center stations into one new station located on an adequate site to support the new facility.

In October 2024, the Strafford Fire Department commissioned Michael Petrovick Architects, PLLC, to conduct a "Feasibility Study" for replacing the town's existing Bow Lake and Center fire station facilities. The study included an assessment of the buildings to confirm the shortcomings of the existing stations and explore programming for one new station to replace the two stations.

The initial project goals that the fire department outlined included delivering a building design that:

- Has a life span of fifty (50) years to meet the department's current and future operational needs.
- Meets the programmatic requirements of a rural blended (staffed and volunteer) department for a community of Strafford's size.
- Utilizes a quality and cost-effective approach that will serve the department and taxpayers.
- Fulfills the requirements of a responsibly sustainable facility.

Additionally, as the town and its population have evolved, to provide needed services, the department has transitioned from a fully volunteer to a "blended" department of full-time staff and volunteers, making it necessary to provide space to support staff living at the station while on duty.

Michael Petrovick Architects was retained to complete this phase of discovery, which requires preparation of conceptual designs and supporting documents to assist in the planning, design, budgeting, and scheduling for the town to pursue a new fire station. Void of an actual site for the new station, the conceptual design process included providing planning and programming services to develop options to meet current and future spatial

and operational needs for a new station design that could be supported on any number of site configurations. Once a site is obtained and the project is approved, further design services to develop the project for bidding and construction will include amending the design if needed to accommodate the selected site.

During this study, a general review of current codes, the International Building Code (IBC) and the National Fire Prevention Association (NFPA) Code, as they relate to the health and wellness of fire stations, was performed. It was determined that the existing stations are not designed to meet Category IV Risk Factor, required for critical operation facilities such as fire, police, and ambulance facilities. These standards have been incorporated into the study.

In response to these challenges and the study findings of Michael Petrovick Architects, the Town of Strafford is considering replacement of the Bow Lake and Center fire stations with a new, larger fire station that will consolidate the operations of the two outdated sites. This new station will be designed to address both current and future operational needs, providing ample space for fire apparatus and additional staffing, and achieving modern facilities to ensure the fire department continues to deliver efficient and effective emergency services to the community.

#### This report is intended to:

- Outline the condition of the three existing facilities and the potential need to replace them
- Provide a spatial needs assessment (program)
- Provide reasonable budgets for constructing a new station
- Present design options to guide decision-making and the development of the future station

This report is based upon information Michael Petrovick Architects gathered through visual observations of the buildings and discussions with the Strafford Fire Department in the fall of 2024.

## EXECUTIVE SUMMARY

This feasibility study examines the development of a new fire department building in Strafford County, New Hampshire. The goal is to determine the best course of action for providing a modern, functional, and costeffective facility to support the fire department's current and future needs.

The Town of Strafford's Fire Department is located within three (3) separate stations: Bow Lake, Center, and Crown Point. The department is blended—volunteer and staff—with two (2) personnel regularly on duty. The Bow Lake station serves as the department's headquarters.

Our work on the study began with understanding the culture of the community and the department and how they currently function. Michael Petrovick Architects met with members of the Strafford Fire Station Committee to discuss modern fire department best practices and fire station programming recommended by National Fire Safety Standards, review spatial programming of stations in comparable communities, and analyze the information compiled during the study. The goal of programming was for the fire department to consider best practices and collectively determine the needs for the Town of Strafford.

Simultaneously with the programming assessment, we reviewed the existing buildings and their sites. We reviewed the Bow Lake station and understood the other stations to be little more than storage for apparatus and equipment. We concluded that none of the existing sites could support expansion or construction of a new station and determined there was no value for reconstructing any of the existing stations to comply with current codes or provide the space necessary for the department to function as a modern department.

Consequently, the study focused on the design of a new station, for which the Town of Strafford would search for a new site.

After several iterations to understand space requirements and collectively conceptualize functionality, the program is diagrammed for approximately 13,000 square feet of space. After consideration, the selected concept is a new linear plan option that considers operation efficiency, lower overall cost, and a 50-year building with the ability to support growth over time. The resulting station will accommodate projected staff and equipment for 25 years and offer the ability for future expansion.

## EXISTING FACILITY ASSESSMENT

The existing facility assessment supplies essential information to make professional recommendations concerning the site, building systems, and infrastructure, including determining whether a building has lived its useful life or can sustain selective demolition for renovation and additions. If we determine the building has reached the end of its useful life, we can analyze whether any repairs should be made as a short-term solution. The assessment also informs us whether the existing building (or a portion of it) could be utilized cost-effectively to meet some programmed requirements.

Michael Petrovick Architects conducted a physical walk-through to analyze existing spatial and operational issues, compliance with NFPA facility safety codes and building codes, and operational obstacles that negatively impact service to the community and safety of fire department staff. This assessment focused primarily on the Bow Lake station since it also includes administrative support spaces not included at the Center or Crown Point stations.



While the purpose of this assessment is to outline the conditions of the existing facilities—not to focus on non-compliance with codes and unsafe situations, we identified the presence of critical physical and operational conditions at the Bow Lake station, as detailed below.

#### **Operational Spatial Analysis**

The Bow Lake station's size and condition limit the department's ability to provide services to the community and a safe and healthy environment for the department to function. The facilities to support full-time first responders are limited, restrictive, and somewhat makeshift. The dayroom, where they spend much of their time, also serves as a conference room. Bunk rooms located off the apparatus bay provide space for sleeping between calls. The facilities are not OSHA or code-compliant and are described as "making do with what they have." The ambulance was pulled out of the bays to provide space for our meetings with the department.

One characteristic of a well-operated fire station is the separation of public areas and work areas, which protects the privacy of staff and eliminates the risk of incident and emergency response reports being exposed to the public as they are written by personnel. At Bow Lake Station, however, there is no separation of public and non-public spaces.

The fire apparatus barely fits into the bays. The truck widths and heights are within inches of the overhead door widths and heights, and while the overhead door heights were increased to accommodate the newest front-line trucks, they remain challenging. In addition, trucks are parked in the station within inches of each other and there is insufficient space to park all vehicles within the station, so some vehicles are stored outside, which can create potential delays in response time during an emergency and unnecessarily expose the vehicles to the elements.

In colder weather, vehicle engines are left running to maintain the temperature of the interiors and the supplies on board. This is not safe and impedes the department's operational functionality and ability to provide service to the community. The station is located on a very small parcel of land, which means there is no opportunity to expand the existing station or build on the current site.

## **Regulatory Compliance Assessment**

The team also carried out a general review of current codes, which apply to new fire stations as well as older buildings such as the Bow Lake station. Buildings considered for rehabilitation are regulated by the International Existing Building Code, which is enforced by the local code enforcement official and the state for critical response buildings. The IEBC requires any proposed work on an existing building first undergo an evaluation to determine if the effect of the proposed work will exceed more than 50% of the existing area and affect structural systems. Any work to the existing stations would classify as Level 3 Alterations under the IEBC requiring the entire building to be made code-compliant, including Risk Category IV.

Buildings designated as essential facilities, and therefore Risk Category IV compliant, include fire, rescue, ambulance, and police stations, including emergency vehicle garages, for both new and renovated portions of the work. The team determined and discussed with the department how the Bow Lake station is not in compliance with Category IV Risk Facility construction requirements.

The IEBC and NFPA requirements also would require the building to be sprinklered. Buildings in rural communities without sufficient public water supply are required to be equipped with underground water storage tanks, fire pumps, and generators to always ensure the sprinkler's operation. The Bow Lake station is not equipped with an automatic fire sprinkler system.

For several years, the NFPA has issued code revisions that require more focus on the safety of firefighting and first responder staff. Cancer-causing carcinogens generated during emergencies have driven the requirement for more space, decontamination protocols, and planning requirements for upgraded and new critical services structures. Creating hazardous zones (red) and non-contaminated zones (green) are used to identify and separate spaces within a fire station. These zones are required to be separated by enclosures and include systems to ensure clean air in these spaces. The progression of moving from red to green zones is intentional in modern fire station planning. When returning from a call, responders are required to enter decontamination areas for washing and drying turnout gear and equipment. Only after decontamination is completed are they

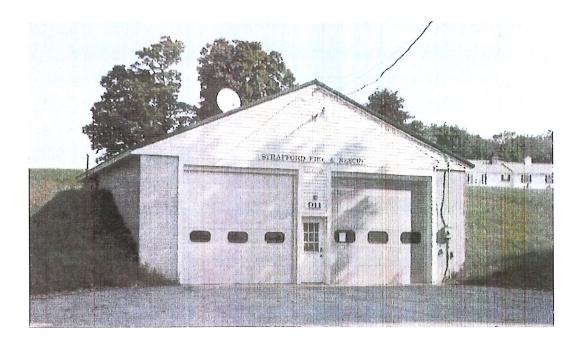
permitted to enter non-contaminated zones (green). The team observed that there is no separation between hazardous and non-contaminated spaces within the Bow Lake building.

#### **Conclusions**

The age and size of the Bow Lake station and its site do not provide an opportunity for rehabilitation and expansion to meet the functional programming requirements of a modern facility and the community's needs.

The department and team from Michael Petrovick Architects recommend that the Town of Strafford seek to obtain an adequate site for a new fire station in a location that will provide compliant emergency response times.

The remainder of this report will focus on the requirements and conceptual design for a new fire station for the Town of Strafford.



# REGULATORY OVERVIEW

Because the assessment of the existing facility concluded that work to the existing building is not feasible, this report includes this regulatory assessment to guide conceptual design for a new fire station.

# **Applicable Codes**

New buildings will be permitted under the following codes:

- International Building Code (IBC)
- International Energy Conservation Code
- International Mechanical Code
- International Electrical Code
- International Plumbing Code
- National Fire Protection Association (NFPA)
- American National Standards Institute (ANSI A117.1)
- 2010 ADA Architectural Accessibility Guidelines

In addition, buildings considered essential because they are needed continuously, particularly in disaster response, are Risk Category IV buildings. All new work on these buildings will be designed to meet these requirements.

## International Building Code (IBC), NFPA, and Fire Code Requirements

Two regulatory requirements govern sprinkler protection: the IBC and NFPA. The IBC is the guiding regulation for new buildings, which local building officials and the New Hampshire Division of Fire Safety enforce. NFPA, enforced by the Department of Fire Safety and Fire Officials, requires sprinkler protection in buildings housing fire, ambulance, and police. Based on this requirement, the study will assume a sprinkler protection system will be added to the project.

In addition to the building code (IBC) and NFPA, several codes are enforced by local fire officials and the State of New Hampshire Department of Fire Safety. The fire code is generally enforced as a safety maintenance code intended to prevent or remedy any conditions that may be serious hazards and to provide safety requirements to protect the public in the event of a fire or other emergency or disaster.

#### Accessibility

The Americans with Disabilities Act Architectural Guidelines (ADAAG 2010) applies to new buildings depending on their intended users. The new fire station will need to comply with both Title II and Title III of the ADAAG 2010, which prohibit discrimination of people with disabilities in public accommodations and require new construction to be accessible to people with disabilities.

#### **Energy Conservation**

New Hampshire currently observes the 2018 International Energy Conservation Code (IECC) as part of the Building Code. This specialized code, also enforced by local building officials, is intended to regulate the design and construction of facilities concerning the use and conservation of energy over the life of the building.

# PROGRAMMING AND SPACE ANALYSIS

Determining current station viability and making recommendations begins with understanding the fire department's requirements to operate now and into the foreseeable future. MPA developed a program from indepth meetings with fire department representatives that captures the department's current and future needs.

## The program:

- Determines the scope and operations of fire and rescue by employing tools and techniques developed specifically for emergency response facilities. It anticipates additional future needs, changing operations over time, and the facility's flexibility to accommodate them.
- Describes the critical functions, training, and activities within the building and the site.
- Identifies critical operations, priorities, security/public protocols, response issues, and operational efficiencies.
- Identifies "hot zones" and cleans areas to promote the health and safety of responders, staff, and the public.
- Assesses standard operating procedures, rescue and fire apparatus needs, and security issues.
- Examines the requirements for gender equity, current and future bunking, and the unique living environment for responders.
- Assesses fire-public interactions pertaining to facility access and shared civil amenities.
- Addresses energy use and sustainability as they relate to operations and cost of ownership.

# **Programming Summary**

The program on the following page was developed as a result of the spatial needs analysis Michael Petrovick Architects and the fire station committee discussed and produced in November and December 2024. It was also influenced by lessons learned from local fire departments that the team visited. The focus of the analysis was to determine the most spatially efficient layout and effective use of space.

As the analysis progressed and a program of spaces was developed, the team began to diagram to explore the right size spaces and functional organization. This process helped the team conclude that the department needs approximately 13,000 square feet of space.

## **Better Services = Better Community Benefits**

The proposed spaces will consolidate the Bow Lake and Center stations into one new station and provide the following to the community:

- A code-compliant station = Healthy & safe work environment for staff and visitors
- Easy access to vehicles and equipment = Quicker response time to emergencies
- A safe and healthy station = more interest in volunteering and better service
- A station sized appropriately for the town
- A station that can accommodate standard apparatus

Building Pr	ogram and	Square	Footage
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Space	Quantity	Size of Space (SF)	Size of Space (x'-y" x x'-y")
		Cool Zone	
Chief's Office	1	123	10'-0" x 10'-0"
Deputy Chief's Office	1	118	11'-0" x 10'-0"
Radio	1	108	10'-0" x 10'-0"
Prevention & Training	1	131	13'-0" x 10'-0"
Training Room	1	1,838	37'-6" x 49'-0"
Day Room	1	572	23'-6" x 22'-0"
Public Restroom	2	55	7'-6" x 7'-6"
Staff Restrooms	2	83	7'-0" x 8'-6"
E.O.C.	1	114	10'-6" x 11'-0"
Storage	1	110	8'-0" x 14'-0"
Sleep	6	71	9'-6" x 7'-6"
Fitness	1	227	20'-0" x 11'-6"

Total Administration Square Footage	4,043

	, 110	& EMS De-con	Banks   Exercise   Exe
De-con	1	357	25'-0" x 14'-6"
Locker Room	1	242	17'02" x 14'-6"
Restrooms	2	70	7'-0" x 8'-6"

Total Fire & EMS De-con Square Footage	739

Fire & EMS Apparatus				
Apparatus	1	5,205	78'-0" x 69'-0"	
Turnout	1 1	448	28'-0" x 17'-0"	
EMS Storage	1	78	8'-0" x 10'-0"	
Fire Storage	1	78	9'-6" x 8'-0"	
Workshop	1	180	11'-0" x 12'-6"	
SCBA	1	60	8'-6" x 7'-0"	

Total Fire & EMS Apparatus Square Footage	6,049
Total File & Livio Apparatus Oddale Footage	Q,Q-TQ

Utilities					
Sprinkler / Mechanical 1 126 15'-0" x 8'-6"					
IT	1	61	6'-6" x 10'-0"		
Electrical	1 1	62	10'-6" x 6'-0"		
Janitor's Closet	1	46	4'-0" x 6'-6"		

Total Utilities Square Footage	295
Circulation Space and Partitions	2,264
Total Building Square Footage	13,390

# **Right-sizing the Program**

Coupled with Michael Petrovick Architects' experience in fire station design, best practices, and department culture, the following decisions were made to right size the program:

- Minimal administrative space required
- Multi-purpose training and meeting space

- Single bunk rooms to reduce gender concerns
- Combined kitchen, dining, and day room
- Administrative space that is immediately accessible to the public entrance
- One floor to eliminate the requirement for an elevator
- Strategic development of the floor plan to minimize circulation space

## Sustainability

Michael Petrovick Architects' approach is to design buildings that protect the health, safety, and welfare of the public while simultaneously harnessing the power of design to create environmentally responsible buildings that are low-cost to operate and maintain—representing restraint and respect for taxpayers.

Considering the area of approximately 13,000 square feet noted in the space program and designed to exceed the International Energy Code minimum requirements, the new facility could operate efficiently while providing occupant comfort. The building envelope, including walls, windows, roof, doors, and floor slab, will be designed as high-performing with enhanced insulation and reduced air infiltration. The design will also facilitate using energy-efficient systems, such as heat pumps, to accommodate alternative energy sources, such as roof-mounted photovoltaic solar panels, and provide for future innovations in energy efficiency.

The process of driving down the energy needs of the building, from planning a compact building design to strategically implementing systems in an integrated design approach, provides proven results. These measures include:

- Building orientation and shape
- Building envelope ratio
- Window-to-wall ratio
- Thermal envelope and fenestration efficiency
- Lighting and ventilation
- HVAC equipment selection
- HVAC and lighting controls

Thorough measures and strategies result in a building with a low Energy Use Index (EUI) while keeping the system simple for ease of operation and maintenance.

As the project moves forward and schematic design begins, the design team will work with the Town of Strafford to establish the Owner's Project Requirements (OPR) for systems and products and create a Basis of Design (BOD) that will guide the decisions during the development of the project.

#### APRICONCE

Our approach is to design a facility that balances environmental responsibility, acquisition costs, and ownership costs. Considering the area of approximately 13,000 square feet, we conceptualized a building which would be constructed to operate extremely efficiently providing low cost of ownership and occupant comfort.

While systems have not been identified at this early phase, in addition to meeting code requirements for a fire station, we included building methods, materials, and system of greater efficiency when assembling the budget estimate provided as part of this study.

We envision designing with an EUI (energy usage index) target between 25 and 35, which would qualify the building for utility savings and incentive programs, further reducing cost and increasing occupant comfort.

The state of New Hampshire observes the International Energy Conservation Code (IECC) 2018, however, our firm practices standards designed around specific performance criteria rather than those prescribed by the code. The goal is to drive down the energy needs of a building from planning a compact building design to strategically implementing materials and systems that take advantage of proven industry results, specifically:

- Building orientation and shape
- High performance building envelope
- Window to wall ratio
- Systems selection
- Systems controls

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Because no site has been selected, the concept design is based on a relatively flat site. It is assumed that due to the nature of the building's use, a relatively flat site would be required and therefore obtained.

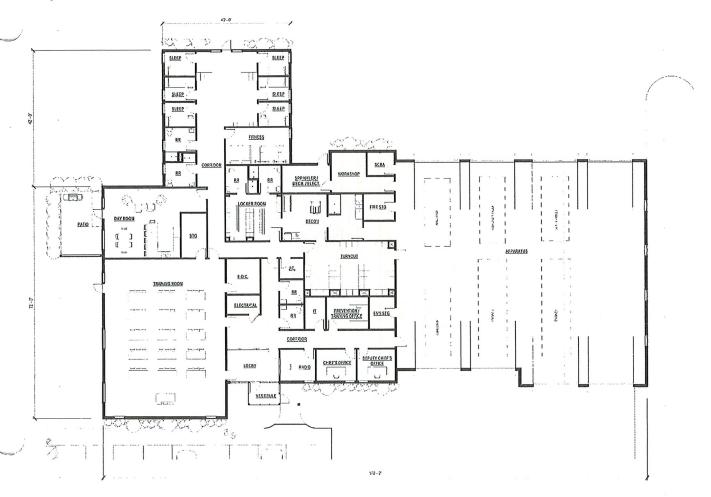
Starting with the program, we explored options to meet a functional, cost-effective, and sustainable solution. Over several weeks, the group met biweekly to review, discuss, modify, and refine several concepts that focused on achieving the project vision. Below is the recommended option presented as the preferred solution.

This option uses a linear organization of spaces progressing from the apparatus bays, through decontamination and locker room, to the administrative area, and finally, the staff quarters. The design provides several key features:

- Double loaded apparatus bays for easy access to trucks and equipment
- Easily identifiable public entrance with direct access to public areas
- Secure staff quarters with direct access to apparatus bays

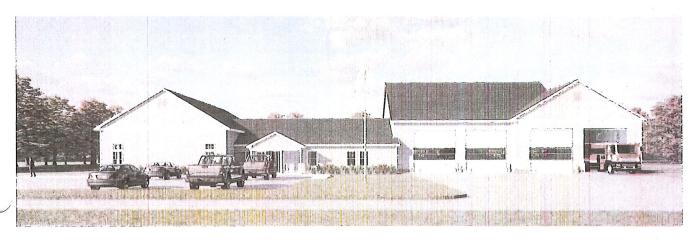
The resulting concept will be further refined during schematic design after a site is selected and the project moves forward.

# **Proposed Floor Plan – New Fire Station**

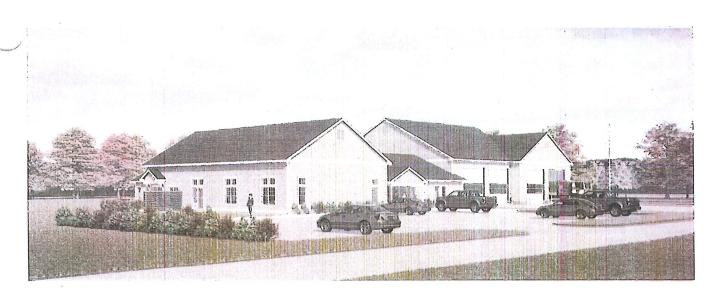


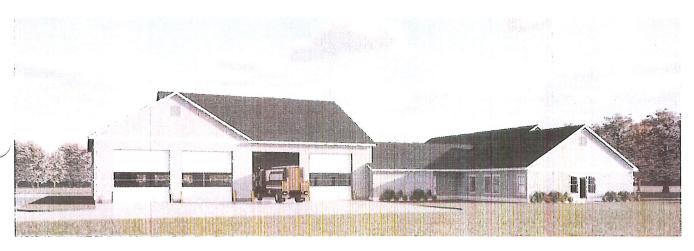
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Apparatus Bay, Fire and EMS	6,788 SF
Administrative Section	4,043 SF
Total Building Area	13,390 SF

# Proposed Building Exterior – New Building









# COST ESTIMATE - PROPOSED NEW BUILDING

			Gross Floor Area	\$/SF	Estimated Cost
New FS Building Site Work			13,390	\$320	\$4,284,800 \$500,000
SUB-TOTAL			13,390	\$357	\$4,784,800
Pre-Design/Concept Design Contingency Escalation Construction Contingency		10.00% 1.75% 2.50%			\$478,480 \$83,734 \$119,620
SUB-TOTAL			13,390	\$399	\$5,347,014
General Conditions General Requirements P&P Bonds Insurance		12 1.00% 2.00%	\$55,000		\$0 \$660,000 \$53,470 \$106,940
Sub-Total				•	\$6,167,424
Preconstruction Fee Construction Management Fee		3.00%			\$35,000.00 \$185,023
TOTAL OF ALL CONSTRUCTION			7,850	\$809	\$6,352,447
Hard Costs:	AT THE LAND	Markan spragn Services of A. Sal			
Construction	\$	6,352,447			
Soft Costs			10 (C)		
Owners Representative	\$	75,000			
A/E Fees (Design Team)	\$	478,480			
CM Preconstruction Fee	\$	35,000			
FF&E (4%)	\$ \$	191,392 25,000			
Materials Testing during Construction	Þ	25,000			
Contingencies:					
Soft Cost Contingency (.5%)	\$	38,994			
Owner's Contingency (5%)	\$	248,929			
TOTAL PROJECT COST	\$	7,445,242			