HILTON HEAD ISLAND FIRE RESCUE

Community Risk Assessment

Standards of Cover

2017

ACCREDITED AGENCY
2012-2017
CFAI

An Internationally Accredited Agency

This page intentionally left blank

Hilton Head Island Fire Rescue
Hilton Head Island, South Carolina

Community Risk Assessment and Standards of Cover

Steve Riley, Town Manager

Brad Tadlock, Fire Chief

Fourth Edition

March 2017

Revisions:

First Edition – September 2002

Second Edition – September 2007

Third Edition – September 2012

This page intentionally left blank

COMPLIANCE TEAM

Brad Tadlock, Fire Chief

Michael Mayers, Deputy Fire Chief – Operations (Editor)

Ed Boring, Deputy Fire Chief – Support Services (Accreditation Mgr.)

Joheida Fister, Battalion Chief – Fire Marshal

Ben Waller, Battalion Chief – Training

Tom Dunn, Emergency Management Coordinator

Cathy Jones-Gooding, Communications Manager

Stephen Ralston, Public Safety Systems Administrator

Laura Nold, Senior Administrative Assistant

Special thanks also to:

Eric Lainhart, Captain – Training

Kathleen Strope, Supervisor – Communications

Jacob Deuel, GIS Administrator

Chad McRorie, Battalion Chief – Operations

Jeff Hartberger, Battalion Chief – Operations

Kevin Osterstock, Battalion Chief – Operations

Randy Marrero, Public Safety Systems Analyst

Scott Sexson, Senior Firefighter/Paramedic

This page intentionally left blank

INTRODUCTION

An important component of the agency self-assessment process is defining community mission and vision. Many fire departments are constrained by a finite amount of resources available to respond to emergencies. In order to properly allocate these limited resources, a community should set clear response standards which are in turn based upon the analysis of the existing risk in the community. When departments do not conduct a routine risk assessment they find it difficult to properly plan, budget, justify, and educate the leadership in the community of their actual needs.

The initial efforts to create a Standards of Cover (SOC) for Hilton Head Island Fire Rescue occurred in 2002 and were subsequently adopted by the agency and elected officials. Over the years, the SOC sufficiently estimated relative risk in the community. The tools and analytical resources available, however, have evolved. A review of the SOC was completed as part of the re-accreditation process. The decision was made to completely overhaul the Standards of Cover document, utilizing more modern techniques to evaluate risk and maintain currency.

The latest edition of the Commission on Fire Accreditation International (CFAI) Standards of Cover document defines the term ***Standards of Cover*** as: "*Adopted written policies and procedures that determine the distribution, concentration, and reliability of fixed and mobile response forces for fire, emergency medical services, hazardous materials and other technical types of response*" (CFAI, 2015). SOCs are best developed through the evaluation of Fire Rescue's present practices, historical response data, and a comprehensive risk analysis.

The results of these analyses are then used to make formal statements of the level of service Fire Rescue could be expected to provide. Fire and emergency service providers must ensure that services meet the needs and expectations of the community. One of the principal methods for examining these issues is through completion of a Community Risk Assessment (CRA). The CRA is a vital component of the department's Standards of Cover and serves as the basis for determining response and staffing levels to coordinate with community needs and expectations. A validated risk assessment helps the fire chief, staff, and elected leaders make educated decisions on services they currently provide and plan to provide in the future. The validated risk assessment also allows the department to get a very clear understanding of the current levels of service provided to the community and time elements required to provide such services.

Risk assessment calls for analysis of all properties in the context of location throughout the community. Examples of factors taken into consideration in the risk analysis include, but are not limited to:

- Building square footage.
- Estimated water needs for 25, 50 and 100 percent of fire involvement of the property.
- Assessment of any hazardous or special materials stored or produced on site.

- Assessment of any special needs (technical rescue or HAZMAT response) based upon the materials and/or processes on site.

Therefore, agencies with similar community characteristics were contacted to review their efforts at SOC/CRA. As a result, Fire Rescue found a standardized tool employed by the Naval Air Station Jacksonville (FL) Fire Department, and also utilized by Winter Park (FL) Fire Rescue, that provided a suitable model for use. Their CRA took known information about specific occupancies, combined it with follow-up information obtained by personnel in a drive-by survey, and compared it to determine potential risk.

Each type of service that Hilton Head Island Fire Rescue provides is also assessed; Critical tasking measurements, including resource needs and time frames are developed. The result of these analyses, combined with GIS data, allows Fire Rescue to develop the most efficient deployment plans for apparatus and staff throughout the community.

Hilton Head Island Fire Rescue's strategy for providing world-class customer service is best understood by their Vision, Mission, and Core Values:

VISION

To achieve the highest levels of community service and protection by delivering excellent customer service in all that we do.

MISSION

To protect the people, property and environment of Hilton Head Island with courage, commitment, and compassion.

CORE VALUES

To take responsibility, lead by example, be honest, help others, and have a passion to serve.

This fourth edition of the SOC is demonstrative of Fire Rescue's continued commitment to regular community risk assessment. The agency has adopted a formal process of reviewing and assessing risk as an annual process. Fire Rescue anticipates that regularly revisiting and revising the SOC and CRA will allow the agency to stay on top of changes in community as well as enable staff to efficiently distribute and plan for resources allocated throughout the town.

TABLE OF CONTENTS

A.	**Description of Community Served**	13
	Legal Basis	13
	History and Organization of the Agency	14
	Service Milestones	15
	Financial Basis	22
	Area Description	23
B.	**Services Provided**	31
	Service Delivery Programs	32
	Current Deployment	35
	Community Response History	37
C.	**Community Expectations and Performance Goals**	39
	Community Expectations	39
	Performance Expectation Goals	39
D.	**Community Risk Assessment and Risk Levels**	43
	Risk Assessment Methodology	44
	Station 1 Hazard Planning Zone	49
	Station 2 Hazard Planning Zone	53
	Station 3 Hazard Planning Zone	57
	Station 4 Hazard Planning Zone	61
	Station 5 Hazard Planning Zone	65
	Station 6 Hazard Planning Zone	69
	Station 7 Hazard Planning Zone	73
	Risk Assessment	77
E.	**Historical Perspective and Summary of System Performance**	85
	Distribution Factors	85
	Concentration Factors	85
	Reliability Factors	86
	Comparability Factors	86
F.	**Performance Objectives and Measurement**	87
	Performance Objectives – Benchmarks	89
	Performance Objectives – Baselines	92
G.	**Compliance Methodology**	97
	Compliance Team / Responsibility	97
	Performance Evaluation and Compliance Strategy	97
	Compliance Verification Reporting	98
	Constant Improvement Strategy	99
H.	**Overall Evaluation and Conclusion Recommendations**	101
	Evaluation Methodology and Determinations	101
	Conclusions	109
	Recommendations	110
I.	**Glossary, Exhibits, and Attachments**	113
J.	**References**	123

This page intentionally left blank

EXECUTIVE SUMMARY

Hilton Head Island Fire Rescue has obtained recognition for excellence in many facets of protecting the community. Fire Rescue has been accredited since 2002 and is rated by the Insurance Services Organization as a Class 3 fire department with an expected re-assessment in 2017.

Fire Rescue has determined and adopted a methodology to provide an excellent level of service. Each Fire Rescue member routinely provides a variety of public safety related services and the organization also provides emergency management, fleet maintenance, and E911 dispatching services for the entire Town. These responsibilities are documented in accordance with NFPA 1201 *Standard for Providing Fire & Emergency Services to the Public* (National Fire Protection Association, 2015) in the form of an adopted Statement of Purpose.

The agency delivers the appropriate forces and equipment within an acceptable time frame, arriving at 88% of medical calls within eight minutes and five seconds, and 86% of fire calls within eight minutes and 50 seconds. There are technology improvements, methods of changing workflow, and other processes requiring analysis that will continue to help the organization to measure progress.

From a service delivery standpoint, all times for the five year period beginning in 2012 and ending in 2016 are relatively consistent. The methodology for determining an acceptable benchmark considered the success at which Fire Rescue was already delivering service, and Senior Staff agreed those times could be achievable at the 90th percentile with continued improvement.

Fire Rescue must evaluate and ensure that it is meeting the expectations of the residents and visitors in a manner consistent with the Town's defined Customer Service Standards. Senior staff has already identified that in the upcoming edition of Fire Rescue's Strategic Plan, refinement of community expectations with quantitative and qualitative data instead of anecdotal evidence is required. This need for stakeholder feedback has been identified as a recommendation in this SOC. It is the intent of Fire Rescue to partner with external stakeholders to aid updating the Strategic Plan and the SOC in 2018. In addition to meetings and discussions, a community survey will be conducted to help guide the process.

Further recommendations for improvement have been formulated and are included in the conclusions of the document.

This page intentionally left blank

A. DESCRIPTION OF COMMUNITY SERVED

This section provides legal and historical background pertinent to the delivery of emergency service within the Town of Hilton Head Island. Included in this section are reviews of the legal and governmental structure, overview of the demographics and physical environment, and characteristics of particular areas for which Fire Rescue provides service.

LEGAL BASIS

The Town of Hilton Head Island was formed on September 26, 1983 and has a Council-Manager form of government. The Mayor is elected at large and there are six council persons elected from six wards. These individuals are elected to four year alternating terms.

Elected Town Officials	
David Bennett	Mayor
Marc Grant	Ward 1
William Harkins	Ward 2
David Ames	Ward 3
Kimberly Likins	Ward 4
Thomas Lennox	Ward 5
John McCann	Ward 6

Appointed Town Officials	
Steven Riley	Town Manager
Greg DeLoach	Asst. Town Manager
Bradley Tadlock	Fire Chief

Vital Numbers	
Incorporated	1983
Area	54 sq. miles
FY2017 Millage Rate	22.18
FY2017 Town Budget	$102,626,393
FY2017 Fire Rescue	$15,517,963

The Town Manager acts as the Chief Executive Officer for the Town of Hilton Head Island and appoints the town department heads. The Town Manager is responsible for carrying out the policies set forth by the Mayor and Council through the Town Staff.

The Fire Chief is directly responsible to the Town Manager. A 1992 ordinance consolidated the then-existing fire districts under the Town, and fire protection service guidelines within the Town were set forth under Ordinance No. 83-07, adopted on October 3, 1993. Another ordinance, No. 2015-07, enacted in 2015 clarified the agency name and services provided (The municipal code of the Town of Hilton Head Island, South Carolina, 1983).

HISTORY AND ORGANIZATION OF THE AGENCY

The first formal fire protection and ambulance services on Hilton Head Island were organized during the Civil War at Union Army facilities. After the end of the war these services were discontinued as wartime facilities were abandoned.

Development on the Island in the late 1960's required fire protection services to be re-established, at least through volunteers. Two public service districts on the south end of the Island partnered to form the Sea Pines – Forest Beach Fire Department in 1969. Later that year, Hilton Head Island Fire District was formed as a service district through the state legislature. The Hilton Head Island district provided coverage on the northern end of the island. In 1970, concerned citizens banded together to purchase an ambulance and charter the all-volunteer Hilton Head Island Rescue Squad.

Figure 1: Fire station on Hilton Head Island, 1863

During those early years of service, both Fire Departments provided fire protection, rescue services, and assisted the Rescue Squad through first responder EMS. In fact, many of the volunteers of the Rescue Squad were also members of one or the other of the two fire departments. The Town of Hilton Head Island was incorporated in 1983, but fire protection services remained with the two Island departments until 1993, when the Town consolidated both districts and the Rescue Squad into a single municipal service. No change was made in the "all-hazards" approach with the merger, as both of the pre-merger fire departments were also already providing Hazardous Materials response and Technical Rescue capabilities, and the Rescue Squad was already providing Advanced Life Support (ALS) ambulance and transport services within the town limits.

Today, Hilton Head Island Fire Rescue is formally organized and structured as a traditional fire department with the Fire Chief serving as the organization's chief administrative officer. The Fire Chief is supported by a senior staff and management team consisting of two Deputy Chiefs, two administrative Battalion Chiefs and one Battalion Chief - Fire Marshal. A communications manager provides administration and supervision of the E911 call center. The agency's clerical needs are provided by a Senior Administrative Assistant, three full-time, and two part-time administrative assistants. A full service vehicle maintenance facility is also part of the organizational structure.

Fire Rescue Operations are managed by the Deputy Fire Chief – Operations. Operations is the largest functional Fire Rescue division, comprised of Line Operations, Training, and Planning groups. Line Operations personnel respond to emergent and non-emergent requests for service. The Training group administers the educational, research, and developmental aspects of Fire Rescue. The Planning group has the important role of information management and providing strategic analysis to continually improve customer service.

Support Services and Special Operations are supervised by the Deputy Fire Chief - Support Services. Support Services performs the "behind the scenes" work that keeps the organization running smoothly.

These responsibilities include oversight of all purchasing, supply, facilities, public safety systems, 911 communications, and the vehicle and apparatus maintenance programs.

The Fire Marshal is responsible for the management and review of all commercial construction plans, fire inspections and public fire education functions for the agency. The Fire Marshal reports directly to the fire chief and is responsible for supervising three field inspectors as well as the agency's public safety educator. All positions are clearly outlined in the agency's 2016 organizational chart.

Emergency Management for the Town is provided through Fire Rescue as well. The mission of Emergency Management is to develop plans and procedures that provide an effective response to the threats facing the community. By developing and exercising all-hazards plans, Fire Rescue strives to minimize the impacts of an emergency or disaster on the citizens, visitors, property, environment, and the Town's economy.

The Emergency Management Division works closely with public and private sector partners to ensure coordination during an emergency or disaster. The Division holds an annual meeting with private sector partners to ensure understanding of plans and coordination of needs. One of the Town's critical partners in this discipline is the Beaufort County Sheriff's Office, Division of Emergency Management. This relationship assists in acquiring the resources and support needed to manage a significant disaster impacting the Town.

Hilton Head Island is designated a HEARTSafe Community by the International Association of Fire Chiefs; a Gold level Mission: Lifeline Community by the American Heart Association; and a StormReady community by the National Weather Service. All of these honors recognize the dedication and teamwork involved from Fire Rescue, the local hospital, law enforcement, volunteers organized in disasters, and most of all, the citizen stakeholders.

SERVICE MILESTONES

Compared to the average American fire organization, Hilton Head Island Fire Rescue has had a very short history. From the origin of Hilton Head Fire District and the Sea Pines – Forest Beach Fire Department in 1969, the Hilton Head Island Rescue Squad in 1970; through incorporation of the Town in 1983; and merger of the three agencies in 1993, service milestones occurred rapidly over the next two decades. Fire Rescue's first Accreditation made them second in the state to do so and 53rd internationally; and in 2007, Fire Rescue was re-accredited once again.

Despite an economic downturn in 2008, the Mayor, Council, and the Town Manager all supported the continuation of fire station replacements, the construction of a new fire/rescue training center, refurbishment of the ambulance fleet, and a complete replacement of the agency's aged fleet of fire apparatus with eight new engines and two new quints.

Fire Rescue earned its third International Accreditation in 2012. Since that period in time, Fire Rescue has achieved the following milestones:

2012 Milestones

- **Awarded International Fire Chiefs' Association *HEARTSafe Community of the Year*** – While Fire Rescue's innovative cardiac program was awarded "Runner Up" the year before, the subsequent outcomes in witnessed cardiac arrest patients who returned to Spontaneous Circulation (ROSC) on the Island resulted in a save rate of 78% for 2012 - well above the CDC survival rate of 30.6% for agencies with similar programs - and earning Fire Rescue the first "back-to-back" recognition of any program.
- **Utility Air and REHAB Unit** – Purchased and deployed new apparatus to improve firefighter safety by providing rapid rehydration and cooling of personnel at an incident scene and to provide a ready source of breathing air in the field.
- **Wildland (Brush) Truck Replacement** – While reducing the overall fleet by one unit, there was increased compliance with NIOSH and NFPA standards. (Eliminated two aged military surplus trucks).
- **Patient Care Reporting Software** – Purchased replacement PCR application from Zoll Data. The application works more closely with existing NFIRS compliant RMS and provides compliance with state and NEMSIS data collection guidelines.
- **HazCat Chemical Classification System** – Hosted a two-day class on the HazCat Chemical Classification System. This system, essentially a portable chemistry laboratory, is used by specially-trained Hazardous Materials Technicians to classify unknown liquid or solid products found at chemical spills or leaks.
- **SC Homeland Security Grant – General Urban Search & Rescue (US&R) Equipment** – Received $76K for the purchase of additional US&R Regional Response equipment to bring Fire Rescue's team into compliance as a FEMA Type 1 Collapse Rescue Team.
- **SC Homeland Security Grant – Radiological Detection** – Received $136k for purchase of radiological detection equipment to enhance regional Fire Rescue's HAZMAT and counter-terrorism response coinciding with FEMA Type 1 HAZMAT Response Team specifications, providing the ability to improve radiological detection capabilities.
- **Fire Service Instructors** – New instructor ratings were obtained by personnel in the areas of Hazardous Materials Operations, Intermediate and Advanced Incident Command Systems, Initial Company Operations, and Driver/Operator instruction.
- **Fire Service Legal Seminars** – Fire Rescue hosted two legal seminars conducted by the Public Safety Training Council including a two-day seminar on Fire Department Administrative Investigations and a one-day seminar on Managing Fire Departments in the Digital Age.
- **Reduced 911 Error Rates** – Began program to correct migration errors and identify root cause of those errors. This joint effort with Beaufort County and Hargray Telephone Company to prevent similar problems corrected 431 migration errors and 235 numbers with no associated address. Each correction represents one phone number that will display the correct phone number and address when used for calling 911. (On-going project).
- **Reduced Marriott PBX errors** – In a joint effort with Hargray and Marriott, specific locations were added to 220 phone numbers within Marriott's PBX. This project enabled the caller's location from the many Marriott properties in the jurisdiction to properly display when calling 911.

- **Dispatch Quality Assurance/Quality Improvement Program** – Developed a procedure to review all 911 phone calls requesting medical assistance to ensure they are handled in the best possible manner. The process helped identify areas for improvement and additional training to improve call handling.
- **Emergency Contact Updates** – Dispatch worked with Fire Prevention to streamline the process for maintaining emergency contact information to avoid duplication, reduce work load, and to produce more timely and accurate information during emergency operations.
- **CAD Database Migration from Oracle to Microsoft SQL** – Provided a common database platform across all Fire Rescue field data applications to allow for greater flexibility in retrieving data as well as greater ease of maintenance.

- **Computer Virtualization** – Virtualized all of the Town's Public Safety System applications and operating systems, by installing virtual host servers and storage area networks. Provided Fire Rescue systems such as CAD, FireRMS®, and ePCR with improved disaster recovery and disk-to-disk backups in geographically separate locations, improving the resiliency of the systems.
- **Radio Frequencies Narrow Banding** – Completed the FCC mandated narrow banding of all VHF and UHF frequencies to ensure continued communications and to avoid potential loss of frequency and heavy financial penalties.
- **Public AED Program** – Provided assistance and patient care coordination for civilian agencies wishing to participate in Fire Rescue's Automated External Defibrillator (AED) Program. Established guidelines for the provision of training, education, interagency cooperation, and supervision of civilians utilizing an AED within the parameters set forth by state law and the AED Program. (On-going program).
- **Home Fire Sprinkler Demonstration** – Conducted burn demonstrations to demonstrate the effectiveness of home fire sprinkler systems. Viewed by over 200 people, the public has a better understanding of fire growth, rate, and spread, smoke alarm use, the need for residential fire sprinkler systems.

- **Special event emergency services coverage** – In accordance with potential risks, added special coverage for events with an unusually high concentration of people. The coverage changes utilized bike teams, additional units, changes in response area, and establishment of incident management structures. Included the Heritage Golf Tournament, Hilton Head Concours d' Elegance, St. Patrick's Day Parade, the Hilton Head Island Marathon and other special events. (On-going).

2013 Milestones

- **Response Time Improvements** – Since 2012, identified that Fire Rescue responded to emergencies within two minutes 26.8% of the time, within three minutes 53.2% of the time, and within five minutes 85.2%. These response time numbers represented a slight improvement over the previous year of ~1%, 1.2%, and 1.3% respectively.
- **Awarded *South Carolina Child Car Seat Fitting Station of the Year*** – Awarded the Fitting Station of the Year award by SC DHEC for work in installation of child passenger seats. Selected out of 75 fitting stations in SC.

- **Opened replacement Fire Station 1** – Fire Rescue dedicated Fire Station 1's replacement on the grounds of the old station. This facility was one of the first Town-owned building projects to incorporate some LEED recommendations.
- **Gas Monitor Technology** – Added new four-gas air monitors to each engine to provide first arriving personnel the ability to quickly evaluate the scene for hazardous atmospheres.
- **Emergency Access Gate - Haig Point Embarkation into Wexford Plantation at Fairfax Lane** – Adding this access reduced response times into Wexford Plantation from the Palmetto Bay area and created a secondary egress point as well.
- **Rope Training Center Certification** – Fire Rescue's Training Center was certified as a Rope Rescue Training Site by the South Carolina Fire Academy. Following this certification, the Training Division hosted the first South Carolina Fire Academy *High Angle Rope Rescue Operations* course taught in this region.
- **Installed specialized communications equipment in the Battalion Chief Vehicle** – A mobile repeater was added to improve communications in areas that are less than ideal to transmit, using current radio system (i.e. areas out on the beach, or large metal buildings, others). A wireless radio/headset system was also added, improving the incident commander's ability to hear transmissions, and other officers to monitor radio traffic while maintaining some mobility.

- **Outdoor Classroom Construction** – Specified and coordinated construction of an outdoor classroom at the Training Center with Facilities Management. The classroom provides a place to conduct training briefings, skills development, and firefighter rehabilitation during live fire training, company drills, South Carolina Fire Academy classes, and other training activities. It also shelters Class A fuels to reduce inclement weather impact on live fire training.
- **Obtained Heritage Foundation Donation** – Fire Rescue obtained a $14K donation from the Heritage Foundation to purchase an automatic chest compression device that will help to improve outcomes of sudden cardiac arrest victims though enhanced cardiac compressions established in the field or during transport.
- **South Carolina Wildland Firefighting Course** – Hosted a South Carolina Fire Academy *Wildland Firefighting for Structural Firefighters* pilot course. This two-day course involved specialized Forestry firefighting equipment to construct fire lines and to fight simulated woods fires with water and foam. Fourteen Fire Rescue employee completed this course. Two Fire Rescue officers also completed the instructor requirements for this course.
- **New Cardiac Care Instructors** – Six new instructors were trained and qualified to conduct American Heart Association courses for Fire Rescue. These instructors are certified to teach CPR, Advanced Cardiac Life Support, and Pediatric Life Support. This initiative increased the ability to meet the State's regulations for annual EMT and Paramedic training while reducing cost.
- **New Live Fire Instructors** – Fifteen new instructors were trained and qualified to conduct live fire training at the Training Center. The addition of these instructors permitted achievement of state and national live fire safety standards while greatly reducing overtime cost.

- **SC Homeland Security Grant** – Received $167K for the purchase of equipment, training and upkeep of Fire Rescue's US&R and WMD HAZMAT Regional Response Teams.
- **Established Dispatcher Hiring Pool** – Streamlined and improved hiring process for Communications Center personnel using a validated electronic test. In creating a hiring pool of successful candidates, drastically decreased time to hire new personnel throughout the year.
- **Installed new Patriot Phone System** – In conjunction with Beaufort County Emergency Management, replaced analog phone system with VoIP (Voice over IP) phone system.
- **Emergency Fire Dispatch Protocol** – All dispatchers were certified in using the Emergency Fire Dispatch protocol. The ISO Public Protection Classification (PPC) program added points for the use of emergency fire dispatch protocols, and required certification, continuing dispatch education and quality assurance.
- **Call handling time improvements** – Dispatch answered both emergency and non-emergency phone lines in less than five seconds 96.4% of the time.
- **Dispatch Quality Assurance/Quality Improvement Program** – After a year and a half of consistent reviews, the Communications Center demonstrated a 96.9% compliance rate in use of the Emergency Medical Protocol.
- **High Angle Rope Rescue Level I and II Course** – The first 40-hour class in South Carolina developed to meet the *National Fire Protection Association* (*NFPA) Standard 1006 Professional Qualifications for Technical Rescuers* and the *NFPA Standard 1670 Standard on Technical Search and Rescue* for rope rescue. Twenty-five personnel completed this course. Two employees also completed their instructor requirements for this course.
- **CPR Education With Hilton Head Hospital** – Fire Rescue partnered with Hilton Head Hospital to jointly teach free public CPR classes once a month (On-going Program).

2014 Milestones

- **Change in Command** – Chief Brad Tadlock took over the helm of Fire Rescue as Chief Lavarn Lucas retired after 34 years of service, the last six as Fire Chief.
- **Replacement Fire Station 6** – Construction was completed and the new facility occupied, replacing the 30 year old building less than a quarter-mile away. Fire Station 6 was the first Town-owned facility to be awarded a LEED Silver Award.
- **Household Hazardous Waste Round-Up** – Collected hazardous materials and electronic waste from the public. Totals included 21,016 lbs. of hazardous materials such as paints and pesticides, and 46,050 lbs. of electronic waste including over 250 televisions and 600 computers.
- **Replaced patient care reporting tablets** – New tablets replaced outdated devices and enhance the process for capturing billing information.
- **Ethical Leadership Training** – Hosted two days of *Ethical Foundations of Leadership* training for the Fire Rescue officers. This training was conducted by nationally-known Fire Law speaker and author J. Curtis Varone, J.D.
- **Computer Aided Dispatch (CAD) mapping application** – In partnership with Town Operations, an interactive app for use in emergency apparatus was developed in-house and implemented. This

application provided enhanced map features and reduced support costs related to the previous program.

- **Traffic Calming Device Program** – The program guiding installation and upgrade to traffic calming devices (Strategic Plan Recommendation) was developed as an insert into the *Land Management Ordinance* rewrite, allowing consistent enforcement of the fire code requirements for traffic calming devices.
- **Video conferencing in all fire stations** – Video conferencing allows for firefighters from different stations to train and have interaction while remaining in coverage areas. This was a joint effort between Fire Rescue and Town Operations.
- **Hemorrhagic Fever Training** – Prior to the international concern over Ebola, Fire Rescue anticipated the issue and was ahead of many agencies in the region. As other organizations worked to catch up, all line personnel were trained and equipped in compliance with new federal guidelines. The additional equipment also brought all Fire Rescue ambulances into compliance with FEMA Type 1 ALS ambulance recommendations.
- **Traffic pre-emption system replacement** – In cooperation with Town Traffic Engineering, replaced an older infrared-triggered system with new Automated Vehicle Locating (AVL) technology.
- **Upgrade Radio Firmware and Software** – Updated firmware and software for all radios ensuring the radios operate optimally and are programmed with the new system information, including new radio IDs.
- **Hazardous Materials Training** – Hosted a grant-funded Hazardous Materials Incident Command course. 11 members obtained national certification in this specialty.
- **Hybrid Electric Vehicle Training** – Conducted hybrid/electric vehicle training for all firefighters. This training was conducted with a Chevrolet Volt in partnership with the Palmetto Electric Cooperative.
- **Call processing time improvements** – Dispatch answered both emergency and non-emergency phone lines in less than ten seconds 99.9% of the time.
- **Home Inspection Checklist** – Home Inspection Checklists were updated and placed on the Town website, encouraging residents to conduct a safety inspection of their home.
- **Dispatch Quality Assurance/Quality Improvement Program** – Communication Center implemented the Priority Dispatch Fire Protocol system ensuring that all fire calls are processed and dispatched in an efficient and timely manner. The center also implemented a Quality Assurance program for the Fire Protocol, assuring that both medical and fire calls for service are reviewed and areas for improvement are identified. In the course of the year, the Communication Center measured 95% compliance in use of both the Emergency Medical and Emergency Fire Protocol.
- **Special event emergency services coverage** – Continued special coverage for large events with additional planning efforts provided to entities proposing an Ironman bid for the Island.

2015 Milestones

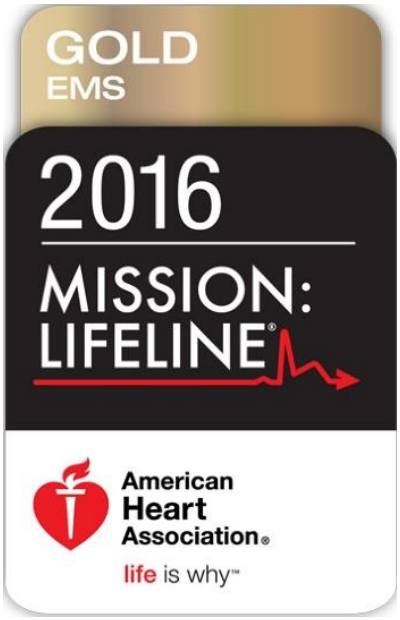
- **Awarded National Weather Service's *StormReady* Community designation** – Awarded as one of only six South Carolina communities to meet the NWS standards for storm preparedness. Emergency Management for the Town falls under Fire Rescue's purview.
- **Awarded American Heart Association's *Mission: Lifeline Silver EMS Award*** – Fire Rescue was recognized for efforts in improving the quality of care for STEMI and Acute Coronary Syndrome patients in 2014.
- **Continued reduction in 911 Error Rates** – Corrected 120 numbers with no associated addresses as well as working to resolve 168 errors in PBX phone systems.

- **Updated Fire Reports Management System** – Update enhances ability to capture data to comply with reporting mandates and analyze response data. (on-going)
- **Reduced medical supply inventory levels** – This process reduces overall inventory and the spoilage expiration of drugs and other medical items, thus reducing overall expenses. (on-going)
- **Updated Town's Emergency Operations Plan** – Completed the required two year update of the Town's Emergency Operations Plan. As part of the initiative, the Town's Emergency Preparedness Guide was updated in both in an English and Spanish version and distributed Island-wide.
- **New damage assessment program and incident information program** – Emergency Management coordinated with the Geography Information System (GIS) Division to develop a program for the EOC. The program allows for rapid damage assessment of the Town by identifying location and level of damage in buildings. The incident information viewer visually displays the impact areas, incidents and HHI resources on a real-time map to enhance decision-making capability.
- **Completed State DHEC re-permitting of the EMS response fleet** – Fire Rescue was the first fire-based EMS system in SC to be evaluated in compliance with new requirements to bring all "first responder" apparatus into compliance.
- **Coordinated emergency response services with representatives of Wexford Plantation and Palmetto Dunes Plantation** – Due to major bridge repairs in these communities, entire fire and medical response plans required coordinated planning within each specific community.
- **Enhanced security of controlled substances** – Introduced the utilization of a vault system that requires the use of a private pin code to access the medications. The improved technology can produce a detailed audit of when the vault was accessed, thus increasing accountability and control.
- **Conducted Annual Household Hazardous Waste Round Up -** This year, Fire Rescue collected 35,946 lbs of hazardous materials and 45,734 lbs of Electronic waste including 181 PCs, 180 Monitors, 156 Printers, and 358 Televisions.

2016 Milestones to date

- **Awarded American Heart Association's *Mission: Lifeline Gold EMS Award*–** Fire Rescue was recognized for significant efforts in improving the quality of care for STEMI and Acute Coronary Syndrome patients in 2015.
- **CPR, AED, and First Aid Training** – Fire Rescue continues to offer public CPR, AED, and First Aid and instructed 545 students this past year. Also, partnered with the Hilton Head Hospital to provide free CPR classes to the public once a month and had 88 participants in this program. (on-going)
- **Mobile Computing –** Through Wi-Fi connectivity and terminal applications, FR Public Safety Systems personnel and Town IT personnel worked to enable email and access to databases from the field.

- **Firefighter Candidate Application and Testing Process** - Conducted the firefighter candidate application and testing process for over 200 applicants and hired seven new firefighters.
- **Increase AED's in the public-** AEDs were installed in 15 Fire Rescue administrative vehicles. Additionally 11 AEDs and appropriate signage have been placed at Town owned locations such as parks and public offices. These locations are noted in Fire Rescue Computer Aided Dispatch and E911 dispatchers will prompt civilians to access the lifesaving devices at those locations.
- **Fleet Maintenance Service Truck Reduction-** Fleet Maintenance vehicles used for repair and maintenance of the Town's vehicle fleet has been reduced by the replacement of two service trucks with one more versatile service truck.
- **Enhanced Logistical Capabilities -** Purchased and traded in three light/medium duty trailers. This reconfiguration of trailers improves Fire Rescue's ability to move specialized assets in times of emergency and enhance the Towns FM division in their daily transport of equipment.



- **Purchased and configured a Recovery Node for Fire Rescue's critical data and operating systems-** The recovery node backs up all reporting, inspection and CAD as well as its critical operating systems nightly. This node is used to recreate the Dispatch and reporting infrastructure in case of catastrophic failure of the E911 center, or in the event the Communications Center is taken off island in time of Hurricane evacuation.
- **Fire in the Streets Project** – Fire Rescue initiated a project to do outreach as well as install/maintain smoke detectors in vulnerable communities. While Fire Rescue is the primary driver of this program, there are partnerships with the American Red Cross and the State Fire Marshal's Office, and a grant provided by FM Global.
- **Recipient of federal Assistance to Firefighters Grant –** Fire Rescue received an important $375,567 award, matched by $41,267 from the Town, to replace aging cardiac monitors, all part of the aggressive support of the community's cardiac care program.
- **2016 Tropical Season** - Four tropical systems had direct impact on Hilton Head Island, beginning with Tropical Storm Colin (June 5 -7); Tropical Storm Hermine (August 28-September 3); Tropical Storm Julia (September 14-18); and Hurricane Matthew (October 5-11). The Island is, as of the date of this publication, still in recovery from the Matthew event.

FINANCIAL BASIS

Fire Rescue operates as a department of the municipal government of the Town of Hilton Head Island. The agency is funded solely through appropriations made by a budgeting process undertaken by the Town.

The agency annually identifies and prioritizes needs through a community-driven strategic planning process. The resulting goals and objectives drive creation of a budget proposal submitted to the Town Manager and Finance Director. The Town Manager has responsibility for presenting a balanced budget to the Mayor and Town Council for their consideration.

The Mayor and Town Council set fiscal plans, priorities, and policies which are then monitored by the Town Manager and the Finance Department. The agency uses the Finance Department's electronic management system, MUNIS, to manage expenditures and keep track of its budget. The MUNIS system accepts both personnel and non-personnel expenses.

Scheduled reports ensure all Town-wide departments, including Fire Rescue, regularly report on financial performance. When required, budget adjustments are formally presented to Town Council for consideration and approval. The Finance Department prepares a comprehensive annual financial report (CAFR) which includes the operations, performance and compliance measurements for the entire town. The town's Finance Department has been awarded the Government Finance Officers Association (GFOA) Certificate of Merit for their procedures and practices each year for the past fourteen years.

AREA DESCRIPTION

Hilton Head Island is a resort town (located on an island of the same name) in Beaufort County, South Carolina, United States. The island is 20 miles (32 km) north of Savannah, Georgia, and 95 miles (153 km) south of Charleston. The island features 13 miles (19 km) of beachfront on the Atlantic Ocean and is a popular vacation destination. An estimated 2.6 million visitors annually spend more than $1.7 billion to support the local economy.

Originally, the area which is now Hilton Head Island was inhabited by various native peoples. In 1521 a Spanish expedition led by Francisco Cordillo explored the area, marking the first European contact with the local tribes. By 1663, Captain William Hilton sailed from Barbados to explore lands granted by King Charles II to the eight Lords Proprietors. The island gets its name from Captain Hilton, having identified the headland near the entrance to Port Royal Sound, he named "Hilton's Head" after himself.

Figure 2: Ambulance depot on Hilton Head Island, 1863

Hilton Head Island was comprised primarily of plantations from the period of about 1700-1860, growing Sea Island cotton amongst other crops. The island also saw a great deal of activity during the civil war, with the population reaching as high as 40,000, including Union troops, civilian store-keepers, missionaries, prisoners of war, and slaves seeking refuge from owners. Remnants of several Union fortifications built to protect the island are still visible today. Mitchelville, at the far north end of the island, was the home of the first self-governed freedmen's community in the United States. As mentioned earlier, a fire station and an ambulance depot were built to support service to the fledgling community. Following the Civil War the island's population fell to only a few thousand and most of the property went back to the pre-war plantation owners. The island has a rich history as hundreds of "native islanders" are descendants of freed slaves known as the Gullah (or Geechee), and have sustained much of their ethnic and cultural identity.

Hilton Head started to break into the modern era in 1949 when the Hilton Head Company was formed to operate timber operations on the island. Palmetto Electric Cooperative brought electricity to the Island in

1950. In 1953 a car ferry to the Island, operated by the state, was initiated. In 1956, Charles E. Fraser bought his father's interest in the Hilton Head Company and started developing Sea Pines Plantation, now a thriving world renowned resort. The first PGA Heritage Golf Classic played at Sea Pines Harbour Town Links was held in 1969. With the 1982 construction of a four-lane bridge to the mainland, development of the island began to peak.

The Town of Hilton Head Island incorporated as a municipality in 1983. The Town incorporated to resist efforts toward overdevelopment, specifically in regard to efforts by chemical producer BASF, oil exploration company Brown and Root, and Chicago Bridge and Iron to industrialize Victoria Bluff. Hilton Head Island would be downstream from these initiatives and there was concern that these efforts would pollute the pristine waters surrounding the Island.

The Town's Community Development Department enforces the Land Management Ordinance (LMO). The LMO minimizes the impact of development, governs the style of buildings, and limits how building affects the natural and physical environment. By design, Hilton Head Island enjoys an unusual amount of tree cover relative to the amount of development. Approximately 70% of the island, including most of the tourist areas, is located inside gated communities. The town maintains several public beach access points, however, including one for the exclusive use of parking spaces for town residents.

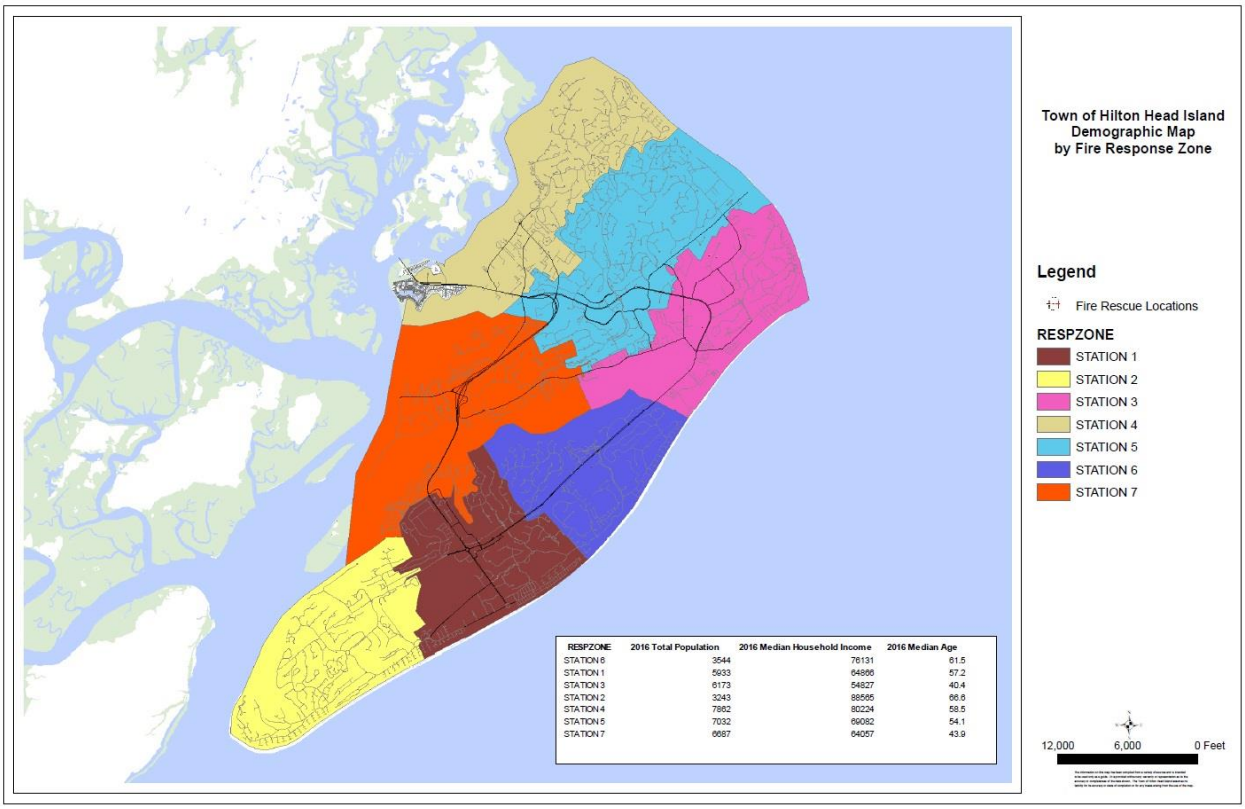
Residents have approved several multi-million dollar land acquisition bond referenda to control the amount or location of commercial growth; protect green, open space and the environment; and provide for active and passive public use such as pathways, parks and recreational facilities. Recent interpretations of the LMO have relaxed somewhat in an effort to stimulate growth and to encourage revitalization of vacant occupancies. These codes are still strict when compared to the surrounding unincorporated parts of Beaufort County.

Hilton Head Island offers a large number of cultural opportunities for a community its size, including Broadway-quality plays at the Arts Center of Coastal Carolina, the 120-member full chorus of the Hilton Head Choral Society, the highly-rated Hilton Head Symphony Orchestra, the largest annual outdoor, tented wine tasting event on the east coast, the Concours d' Elegance Motoring Festival, and several other annual community festivals. It also hosts the RBC Heritage Presented by Boeing, a stop on the PGA Tour which is played on the Harbour Town Golf Links in The Sea Pines Resort.

While geographical service area has remained identical over the years, the services provided by Fire Rescue have changed dramatically. One of the most significant areas has been the gradual increase in provision of EMS services. Prior to consolidation of the fire districts under the Town in 1993, EMS was provided through one staffed Beaufort County EMS unit and the all-volunteer Hilton Head Island Rescue Squad. In later years, Fire Rescue took over those duties and by local ordinance, is the provider of EMS service in the community. Additionally, with more technical responsibilities constantly being placed upon the fire service, the agency has adopted an all-hazards model to serve those in need.

Population and Densities

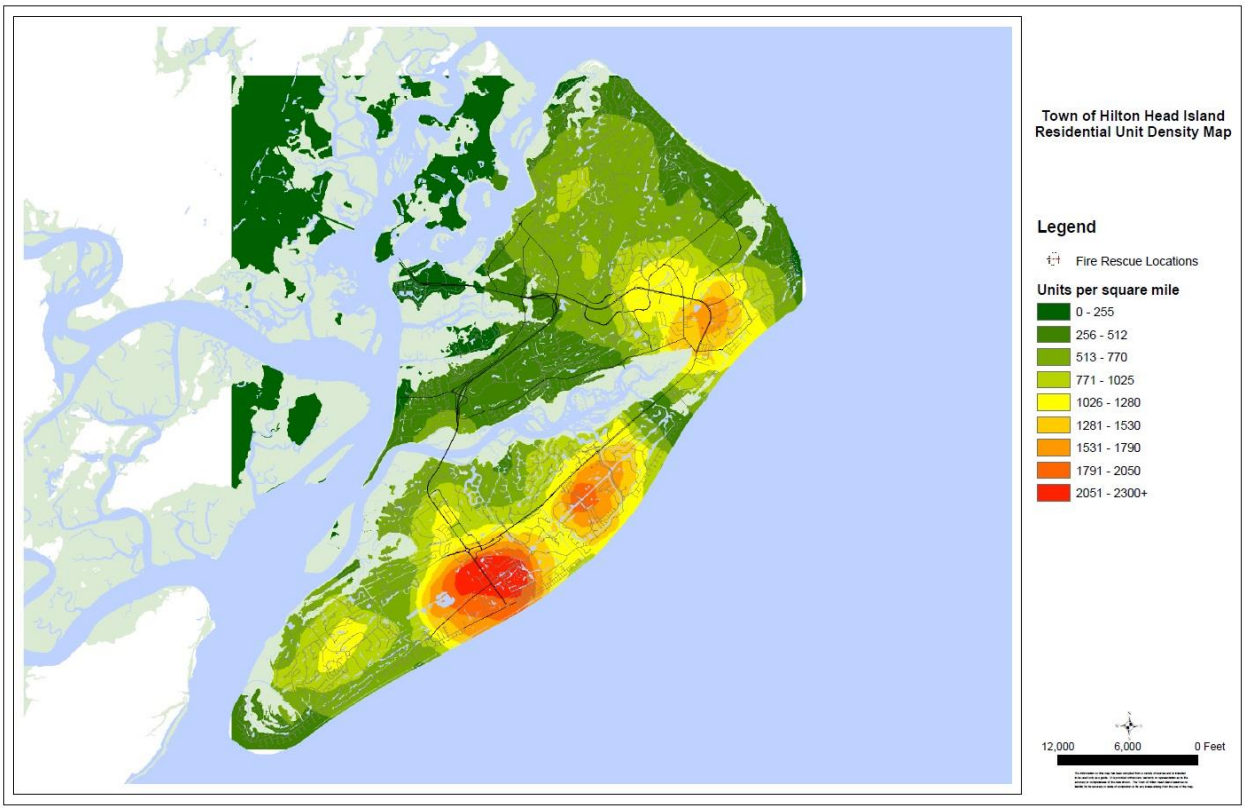
Hilton Head Island is the anchor of the *Hilton Head Island-Beaufort* micropolitan area, as described by the United States Census (2015). Hilton Head Island's population is unique in that census numbers are based on permanent residents, but there are significant impacts from the visitor and workforce community. A regional sampling (2015 U.S. Census) shows the total population of Beaufort County at 179,589 people. A breakdown of the county indicated that 77.1% of the population was white, 19.1% African American, 11.4% Hispanic, 1.4% Asian, 0.4% Native American, and 2.1% from other races. The population distribution by sex is 49.4% male and 50.6% female.



RESPZONE	2016 Total Population	2016 Median Household Income	2016 Median Age
STATION 6	3544	76131	61.5
STATION 1	5933	64886	57.2
STATION 3	6173	54827	40.4
STATION 2	3243	88565	66.6
STATION 4	7862	80224	58.5
STATION 5	7032	69082	54.1
STATION 7	6687	64057	43.9

Hilton Head Island's census differed slightly in that 82.9% of Hilton Head's population was white, 7.5% African American, 15.8% Hispanic, 0.9% Asian, 0.2% Native American, and 0.2% from other races. The population distribution by sex is 49.9% male and 50.1% female. Other significant statistics bear consideration:

Hilton Head Island, population	.....	40, 512 (2015 US Census)
Per capita income	.....	$45,116
Median household income	.....	$68,437
Persons under 18	.....	16.6%
Persons 65 and over	.....	28.8%
Average age	.....	50.9 years
Percentage, high school graduates	.....	92.8%
Percentage, college graduates	.....	47.2%
Percentage, language other than English spoken at home	.....	17.5%



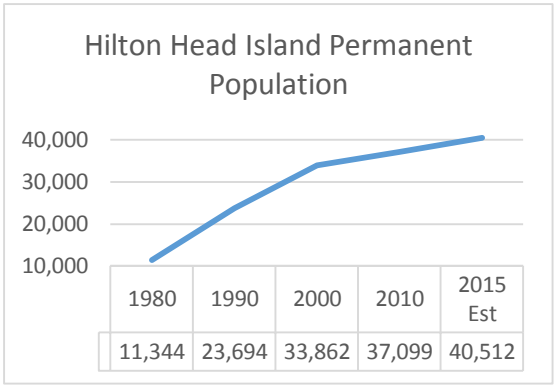
The Town of Hilton Head Island is literally bound by its shores and geographically stable. No significant opportunities exist for annexation or redistribution of its boundaries. Compared to its regional neighbors, Hilton Head Island has a significantly higher population (Bluffton 16,728 and Beaufort 13,306 at the 2015 Census) and density (Bluffton 244.2/sq. mile and Beaufort 447.9/sq. mile as compared to Hilton Head Island 896.9/sq. mile). As is illustrated by the Residential Unit density map (above), dwellings are found most concentrated in the Pope Avenue and Forest Beach corridor; along Queen's Folly and Ocean Lane in Palmetto Dunes; and in the Mathews Drive and the old Pineland Mall neighborhood. These numbers only hint at the difference, however. For the sake of understanding population impact, permanent population and seasonal population are defined and discussed.

Permanent Population

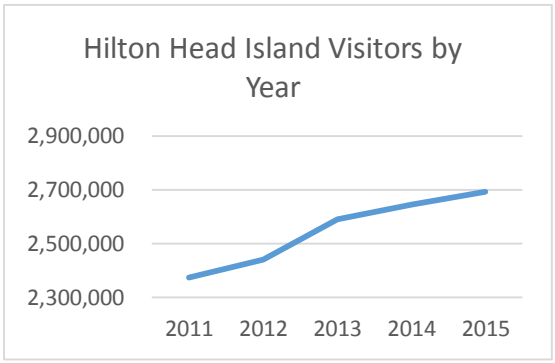
The Town's geographical mild climate, nature, ocean frontage, history, and unique recreational facilities are a few of the reasons people choose to live and retire here. The total permanent resident population of the Town of Hilton Head Island, according to the July 2015 Census estimate, is 40,512 persons. When compared to the 2015 population estimate of Beaufort County at 179,589 the Town's permanent population comprises nearly 21 percent of the county's population. Nearby Savannah, Georgia's population is 145,674 and is a much more "urban" area, with 1321.2 persons per square mile (2015). However, these numbers do not account for the daily influx of visitors and workforce to support the Town's economy. Due to a lack of affordable housing, a significant amount of the workforce commutes from the remainder of the micropolitan area, Jasper County, and as far as Savannah, Charleston, and outlying counties (Hampton, Barnwell, Allendale, and Colleton) (Lurye, 2016).

Visitor Population

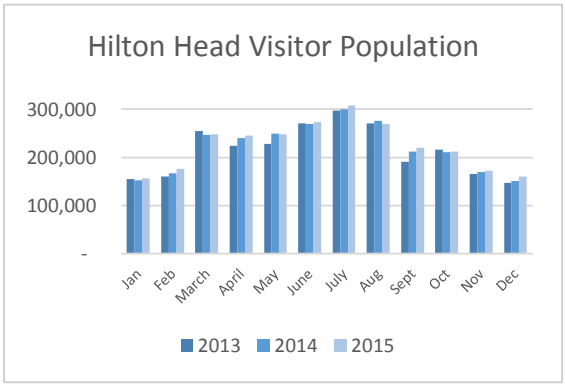
As discussed, the permanent population numbers do not tell the complete story of the number of people that occupy the island at different times of the year. As a community with four large resorts, numerous hotels and rental properties, recreational activities and a retirement component, the number of persons on the island is considerably higher than reported by the United States Census. Visitor counts continued to increase in what was traditionally considered "off season" (April and May), as well as in September and October, but the overall number of visitors also continues to increase. Visitors to the island, including day and weekly visitors, have increased by 20.8% from 2010, according to the numbers used in the Town's Comprehensive Budget Report.



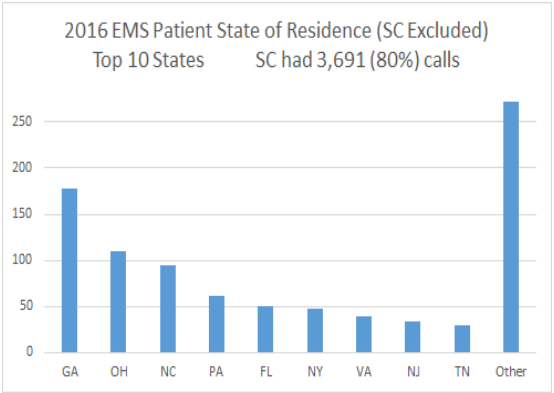
In July 2015 the number of visitors exceeded 300,000 (Town of Hilton Head Island, 2016) for the first time. Since 1982 the number of visitors to Hilton Head Island annually has increased more than five-fold to over 2.5 million a year.



The community has continued to modernize and redevelopment of older commercial developments is under way. A number of the original homes constructed in the 1970's and 1980's are steadily being replaced by larger and more modern homes, some of which exceed 6,000 square feet.

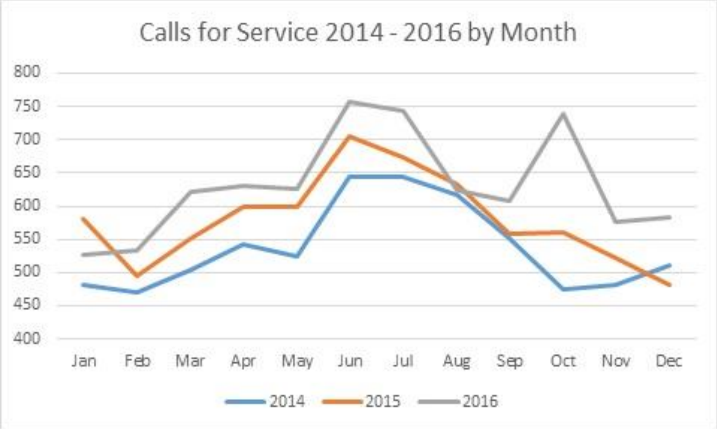


During "off-season" months, the Island's permanent population of 40,512 and daily increase from visitors and workers puts the population into either the low-end definition of "urban area" at 50,000, or the high end of an "urbanized cluster" of at least 2,500 to 50,000. Therefore, for the purposes of this document, and given the average daily population, the entire service area is considered to be "urban" in nature as defined by the United States Census.

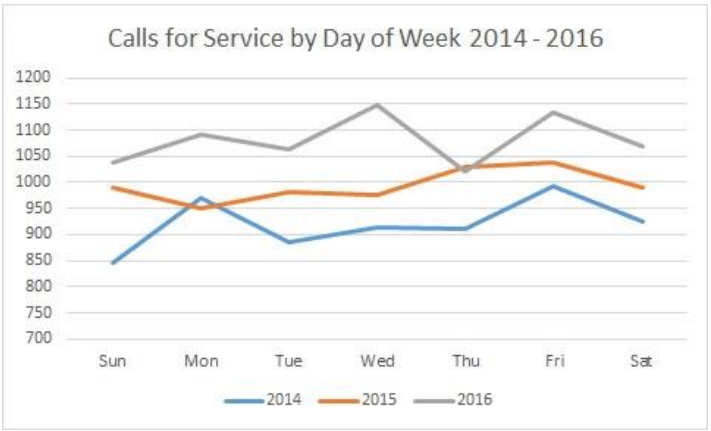


Much, if not all, of the population occupies the community's residential neighborhoods with noted fluctuations in seasonal tourism, "day-trippers" and workforce, all of which dramatically impact the agency's coverage. Special events scheduled throughout the year are noted and staffed accordingly

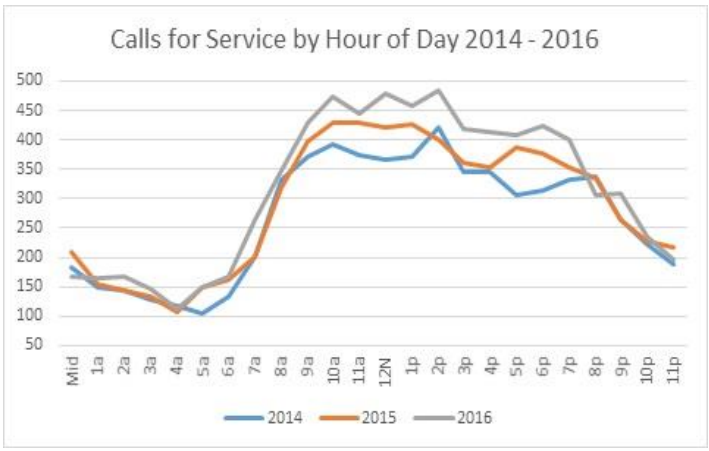
with additional assets and personnel. Also located within the service area are a number of assisted living facilities with several thousand residents. While these properties have not historically presented with increased fire loss, the call demand for EMS services from assisted living facilities accounts for about 20% of Fire Rescue's annual call volume.



Being a predominantly service-oriented local economy, there are few manufacturing or industrial occupancies. There are, however, several light-industrial areas in the community. In most cases, they are identified as moderate risk properties with their contents and activities noted in Fire Rescue's pre-fire planning efforts.



There are a number of key commercial retail areas in the community. Included are the Pope Avenue/Coligny Plaza areas, Shelter Cove, Harbour Town, and Main Street. Special events and activities conducted in these areas are noted and require a Special Event Permit in order to legally take place. These areas attract a large number of visitors and residents alike and events held nearby draw considerable numbers of people. The entire Pope Avenue corridor, including Coligny Plaza and Heritage Plaza, is currently in the design phase for redevelopment, and is vulnerable due to its age and construction type.

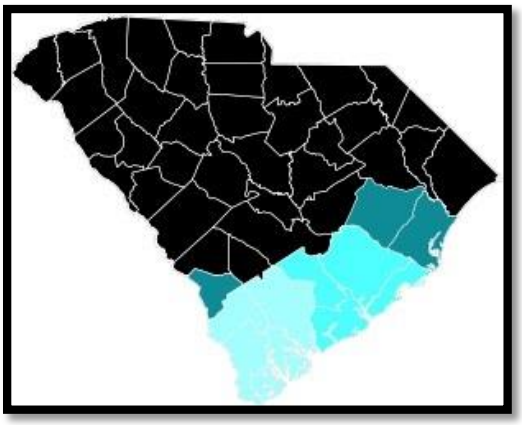


Physiography

Hilton Head Island is located in Beaufort County, South Carolina in an area known as the "Low Country". The general area is comprised mostly of flat or rolling hills with little topographic relief, and is bordered to the East by the Atlantic Ocean. Hilton Head Island rises at its high point to only a few feet above sea level. The low elevation of the island, compounded with the flat characteristics of the land, causes storm drainage to be a critical issue.

The landscape is also covered with a thick canopy of trees. The combination of the heavy tree canopy and the low elevation impacts the assessment of community risk when addressing accessibility and the ability to deal with severe weather conditions. Impacts from Tropical Storm Hermine and Hurricane

Matthew (2016) illustrated the significance of the tree canopy as fallen trees damaged buildings and blocked roads for days.



Weather Variables

The Hilton Head Island area's moderate, tropical climate is attractive to many people who relocate to the region, as well as to both long-term and short-term visitors. Conversely, high humidity and the continued risk of severe weather events such as thunderstorms and hurricanes are balanced against those benefits.

Over the course of a year, the temperature typically varies from 42°F to 90°F and is rarely below 31°F or above 94°F. The warm season lasts from May 28 to September 22 with an average daily high temperature above 83°F. The hottest day of the year is July 29, with an average high of 90°F and low of 76°F.

The cold season lasts from late November to the beginning of March, with an average daily high temperature below 64°F. The coldest day of the year is January 24, with an average daily low of 42°F and high of 58°F.

The average annual low temperature occurs in January at 40°F, with the average low in July being 74°F. Precipitation in May is 1.97 inches while August rainfall averages 7.8 inches. In the summer the threat of daily thunderstorms exists.

Disaster Potential

Located on a barrier island on the Atlantic coast, Hilton Head Island's greatest risk for disaster potential is a tropical cyclone (hurricane). The annual Atlantic hurricane season begins on June 1 and extends to the end of November. Hilton Head Island is not just vulnerable to tropical events attacking from the ocean side; the Island's proximity to the Gulf of Mexico is such that Gulf-side events also can have a significant impact.

Figure 3: Waterspout off North Forest Beach, 2016

With tropical events as the primary catastrophic risk, Fire Rescue works to prepare the community and itself to handle those impacts. Flooding and high wind damage to the community are the most significant impacts of tropical events. The Emergency Management Coordinator for the Town regularly reviews and revises plans for response to these types of incidents. The department regularly conducts training for staff and outreach programs for the public.

While a number of storms have come close to the Island, the last major hurricane to strike near the Island was Hugo in 1989, making landfall as a Category 4 storm. Hurricanes Bertha (1996), Floyd (1999), Charley (2004) also prompted evacuations, although major damage to Hilton Head was ultimately avoided. Four tropical systems in the 2016 Tropical Season, however, had direct impact on Hilton Head Island: Tropical Storms Colin (June), Hermine and Julia (September), and Hurricane Matthew on October 8.

The existence of fault lines in and near South Carolina make planning for earthquake response and recovery an important consideration for the agency as well. In 1886, nearby Charleston, SC, was struck by a 7.0 magnitude quake. Within the last decade, tremors have originated from the Summerville fault, and in February 2014, the United States Geological Service reported a 4.1 magnitude earthquake centered seven miles west of Edgefield, SC (WYFF-TV News, 2014).

Given recent terrorism threats, Fire Rescue and other public safety partners coordinate efforts to ensure public safety for all major events on the Island. The RBC Heritage Golf Tournament, a nationally-televised PGA Tour event, is held every spring on the Island. The Concours d 'Elegance is a well-attended luxury car show, and other special events have high attendance.

Boundaries

The town limits of Hilton Head Island are generally set by virtue of the community being located on an island. With this locked geographical definition, the Town has limited ability to annex for further development. Redevelopment of existing residential and commercial properties, as stated previously, has taken place in many areas of the island. A majority of redeveloped commercial or mixed-use property is protected by fire sprinklers.

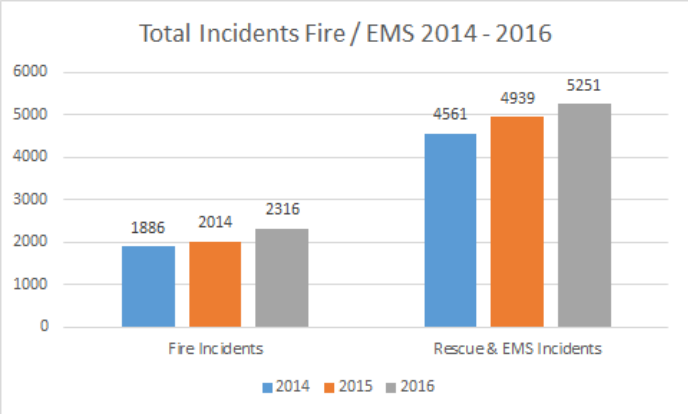
Generally, the town limits incorporate "all land and water located on and adjacent to Hilton Head Island, Beaufort County, South Carolina", which is more accurately described in *Exhibit 1, legal boundaries of the Town of Hilton Head Island, South Carolina.* However, the jurisdictional boundaries established in the Statement of Purpose identify Fire Rescue's responsibility as providing mission, services, and functions within the "Town's corporate boundaries above the high water mark" (Town of Hilton Head Island, 2015). Further, "Fire Rescue will respond to the extent possible and within its capabilities when an emergency exists between the high water and low water mark. However, the primary mission of Fire Rescue will be to serve as a coordinating agency with other local, county, state, and federal agencies as appropriate to assist those agencies with emergency services for events between the high water and the low water mark."

B. SERVICES PROVIDED

Each member of Hilton Head Island Fire Rescue provides a variety of public safety related services focused on customer service. In addition to response, the organization provides emergency management, fleet maintenance, and E911 dispatching services for the entire Town. These responsibilities are documented in accordance with NFPA 1201 *Standard for Providing Fire & Emergency Services to the Public* (National Fire Protection Association, 2015) in the form of an adopted Statement of Purpose.

Multiple research efforts conducted over at least the past decade revealed that Hilton Head Island's model is not widely replicated. Comparisons have been attempted for any number of reasons including staffing recommendations and compensation packages, and all that can be used are "nearly comparable". The combined fire suppression and emergency medical response and transport aspects alone are much different than anyone in the region. However, factor in the Town of Hilton Head Island's direct control over code enforcement, community hazard prevention and mitigation, community engagement, stakeholder partnerships, and the public safety answering point along with dispatching services, there are no known comparisons.

Fire Rescue has its own Support Services that oversees logistics and communications needs. The 9-1-1 Communications Center is managed internally, allowing the department to perform quick dispatch (responding at least the first unit while call-taker questioning is underway), employment of Medical Priority and Fire Priority Dispatch systems, and dictating its own methodology of resource deployment, sends the closest appropriate unit, regardless of its "assigned" district. Fire Rescue has its own EVT credentialed fleet maintenance facility and its own Public Safety Systems personnel to provide technological support.



The Bureau of Fire Prevention is more than just a code enforcement entity. Hilton Head Island's BFP looks at aspects of home risk prevention and mitigation, with award-winning community engagement, including bystander CPR courses, car seat installations, an AED program and registry, smoke detector and home hazard education programs, and consistent addressing.

The Town of Hilton Head Island's emergency management direction also falls under the purview of Fire Rescue. This allows the agency to tightly control preparation, mitigation, response, and recovery aspects of man-made and natural disasters. The Town's Emergency Operations Center is co-located with the Dispatch center and run by highly experienced and trained command personnel from Fire Rescue in the event of

activation. Education and advocacy for disaster preparedness is provided hand-in-hand with the BFP's prevention activities as well, and they coordinate delivery of programs seamlessly.

But the most visible aspect of the organization are the Line Operations personnel who deliver the service to the community. These members share their broad knowledge and skill by responding competently from wherever they may be located within the Town, but essentially from seven strategically located Fire/EMS stations. Although the most commonly thought-of service provided by the agency is fire protection, every member of Line Operations is cross trained in a number of different disciplines. When an alarm is dispatched, appropriately trained and assigned personnel take a pumper, a medic, or specialty apparatus based on the nature of the emergency.

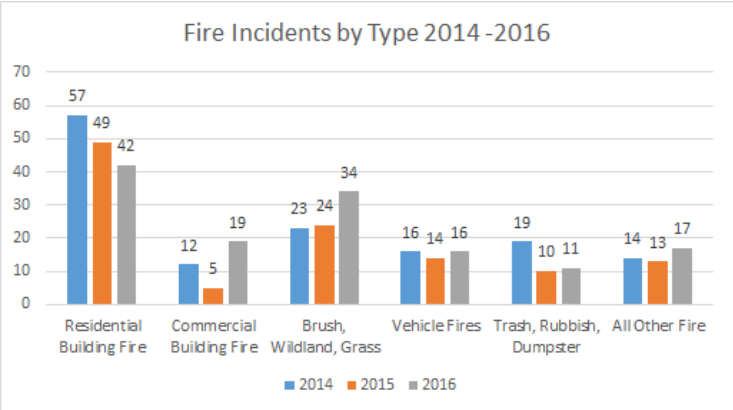
All members of Hilton Head Island's firefighting personnel are required to be certified emergency medical technicians, and every engine company is also assigned an ambulance. The crews cross-staff the ambulance or the engine as necessary. Likewise, Fire Rescue provides technical rescue, hazardous materials emergency, and Special Operations response. In the instance of one of these calls, specialty units are cross-staffed and respond to manage the incident.

SERVICE DELIVERY PROGRAMS

Fire Suppression

ISO Class 3 fire suppression services are provided by five pumpers (1,500 gallon per minute pump), two 100' "quints" (1,500 gallons per minute pump and an attached aerial ladder), and one 100' tractor-drawn aerial, which are staffed full-time by trained and qualified personnel.

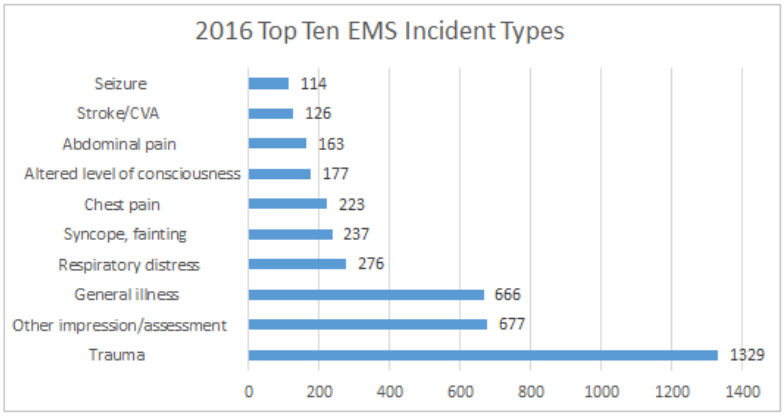
All of the pumpers and quints are equipped with a class A foam systems. All pumpers carry 1,000' of large diameter hose (5") and are equipped with 500 gallon water tanks. An additional pumper is staffed on a daytime four-day work week. Specialized firefighting apparatus include a wildland/brush pumper and an air supply/REHAB unit. Reserve apparatus include two pumpers, one tractor-drawn 100' aerial device, and two ambulances. Additional suppression assets are available through county wide mutual aid agreements.



All uniformed personnel at the minimum have national certification to the NFPA 1001 Firefighter II level (NPQ and/or IFSAC), and all officers are required to, at the minimum, possess NFPA 1021 Fire Officer I and NFPA 1041 Instructor I credentials (NPQ and/or IFSAC).

Emergency Medical Services

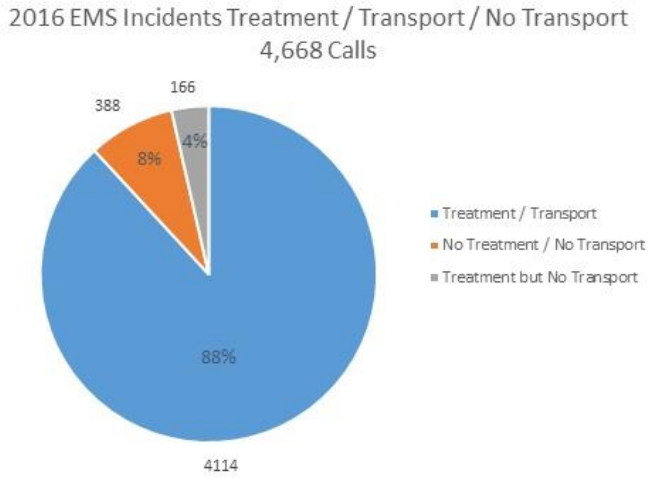
Ambulances are cross-staffed at each of the seven fire stations. An additional ambulance is similarly staffed on a daytime four-day work week. Two ambulances are in reserve.



All line personnel at the minimum have both national and state certification as emergency medical technicians; over fifty personnel have both national and state Paramedic certifications (NREMT). Each ambulance, when staffed, meets South Carolina DHEC standards as an advanced life support unit. By all uniformed personnel also being trained at the minimum to HAZMAT Operations and appropriate equipment added to each, Fire Rescue's ambulances also meet FEMA equivalence as Type I advanced life support units (Federal Emergency Management Administration, 2005).

The agency has a designated Medical Control Physician who is an emergency department physician. Some of the roles of the Medical Control Physician include managing the emergency medical service protocols, advanced training, and performing liaison duties with the local hospital.

All EMS responses are assigned a minimum of one ALS unit. A standard application for determination of incident severity is applied that may indicate response of more resources.



Generally speaking, the agency is capable of handling incidents with no more than 10 patients using only internal resources (depending upon incident size and complexity). Exceeding 10 patients constitutes a need for mutual aid, generally granted by Beaufort County EMS, but can also be obtained through state-wide and intrastate agreements. In addition to EMAC, Georgia and North Carolina have state-to-state agreements with South Carolina.

Technical Rescue

The agency internally maintains a Technical Rescue Team (TRT). Through partnership with Bluffton Fire District, the asset is one of the South Carolina State Search and Rescue Program's five designated Regional Response Teams and can function as a FEMA-equivalent Type II Collapse Rescue Team (Federal Emergency Management Administration, 2005). Fire Rescue obtains most TRT funding through federal and state grants.

The TRT has the capability of rescuing victims from confined spaces, trenches, and collapse entrapments as well as high and low angle rescue. Team equipment is located with a rescue apparatus located at Fire Station 1. The department also equips three staffed front line units with hydraulic rescue tools for typical vehicle extrication response.

Over twenty personnel are trained and have met NFPA 1006 standards for Collapse Rescue Technician and one member of the TRT is a member of the South Carolina Task Force 1 (SCTF1). SCTF1 is a Type I Urban Search and Rescue (US&R) team that maintains its equipment and vehicle cache at the State Fire Academy in Columbia, South Carolina. SCTF1 is available to assist the department upon request through the State Mutual Aid Agreement.

Hazardous Materials

As discussed earlier, all Fire Rescue uniformed personnel are cross-trained at a minimum to NFPA 472 hazardous materials operations level and certified through IFSAC and/or NPQ. While previous risk assessments have not found high potential for hazardous materials events, the department, again in partnership with Bluffton Fire District, maintains a FEMA-equivalent Type I WMD Hazardous Materials Response Team (Federal Emergency Management Administration, 2005).

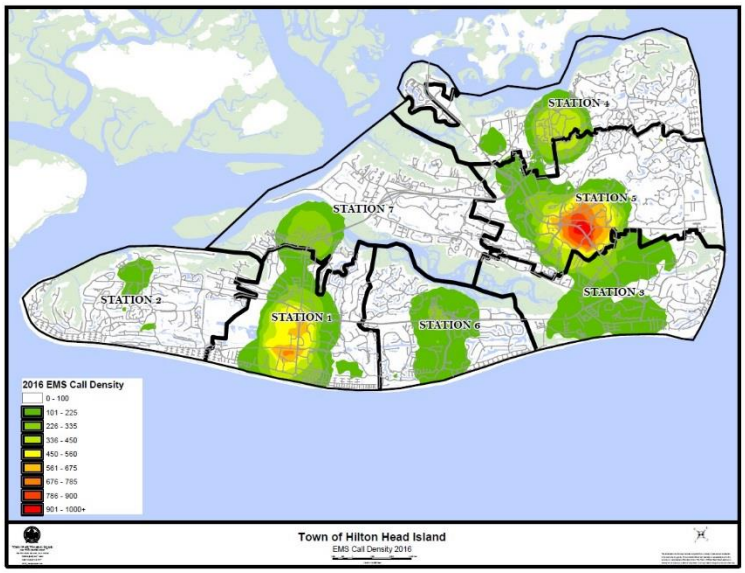
Fire Rescue's team plays a key role in the South Carolina state-wide hazardous materials response plan and is designated through that plan as a regional WMD HAZMAT and counter-terrorism response asset. As in the case of US&R, the Hilton Head Island-Bluffton team can be activated through the State Mutual Aid Agreement.

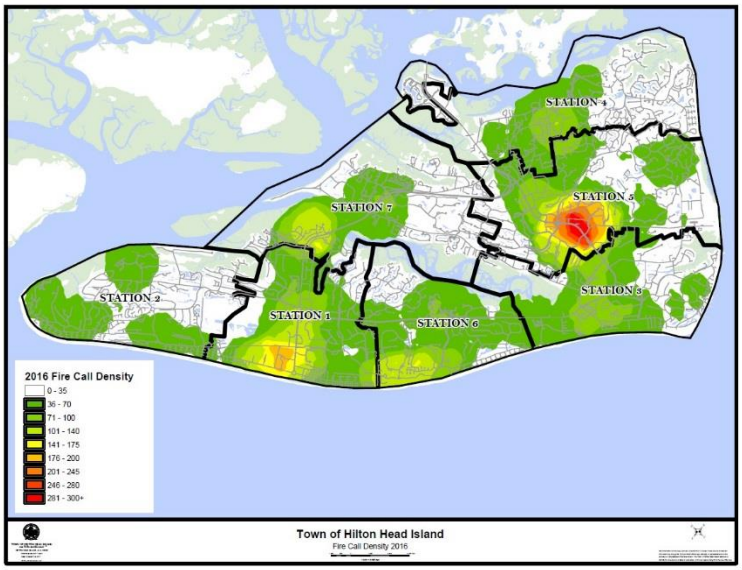
Over fifty Fire Rescue personnel are trained and credentialed at the Hazardous Materials Technician level (NPQ and IFSAC) and they are distributed throughout Administration and the three duty shifts. If an event requires more specialized skills or equipment then additional resources may be requested through the state.

CURRENT DEPLOYMENT

Deployment Coverage

The agency currently provides its emergency services and deploys its human and physical resources from seven fire stations located strategically throughout the community, as well as one roving daytime "Coverage Company". With the community not contiguous with any other communities along its borders, the siting of these facilities considers that coverage must be maximized to the extent possible. Further difficulty is encountered in that Hilton Head Island does not have "gridded" street patterns, and communities are broken up by fence lines, gates, and topography.





Original siting of the stations was done to provide coverage central to each district. The placement works well; As noted in the adjoining *EMS Call Density* and *Fire Call Density* maps the units the frequency of incidents are actually coincident with station location.

With the advent of AVL hardware installed on each piece of response apparatus, however, Hilton Head Island assigns the closest appropriate unit with the assistance of computer aided dispatching. The station locations are as follows:

Fire Station 1 – 70 Cordillo Parkway
Fire Station 2 – 65 Lighthouse Road
Fire Station 3 – 535 William Hilton Parkway
Fire Station 4 – 400 Squire Pope Road
Fire Station 5 - 20 Whooping Crane Way
Fire Station 6 - 12 Dalmatian Lane
Fire Station 7 - 1001 Marshland Road

In addition to these stations, the agency's Headquarters is located at 40 Summit Drive. The agency's administrative staff, apparatus and equipment maintenance facility, and training facilities are all co-

located at this headquarters. The Town's Emergency Operations Center is co-located with the E911 center at 21 Oak Park Drive.

Resources

Through cross-staffing, Fire Rescue's resources are sufficient to deliver fire suppression, advanced patient treatment and transport, technical rescue, and hazardous materials services to the jurisdiction. Physical resources include the standardized modern fleet of fire apparatus, ambulances, as well as specialty apparatus. Sufficient reserve apparatus are available to ensure that resource down-time is minimized to the greatest extent possible.

Although each shift has an authorized staffing level of 35 personnel, it is the policy of Fire Rescue to maintain a minimum complement of 29 career positions on-duty each shift, not including the Coverage Company. This complement allows the agency to maintain an effective response force for each of the defined response scenarios.

Each shift is supervised by a Battalion Chief (or an individual qualified to act temporarily in that position) and each company (engine, quint, or truck) is led by a Lieutenant or Captain (company officer or qualified back-up). Each fire apparatus is operated by Fire Apparatus Operator (or qualified back-up).

All units are staffed on a 24/7/365 basis under Fire Rescue Policy 3.01 – Minimum Staffing. According to the policy, stations shall operate with no less than the following personnel:

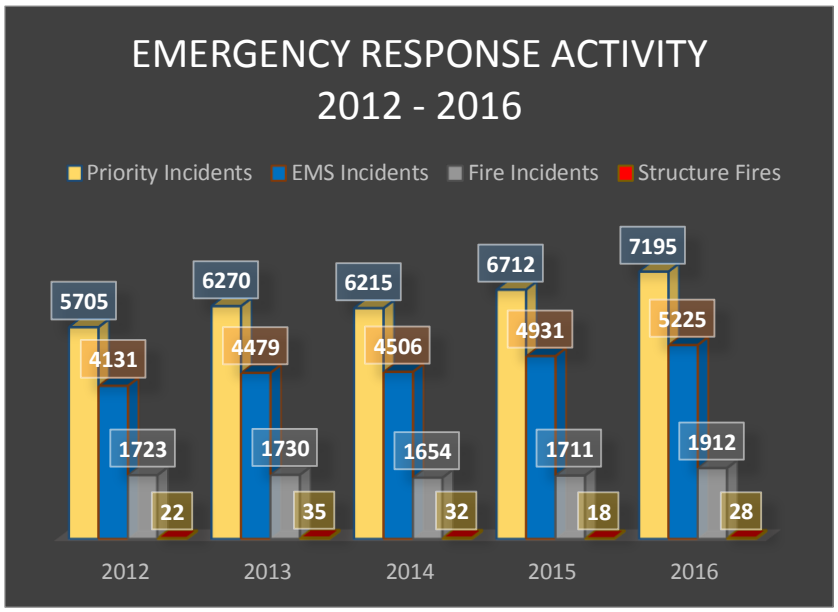
Station 1	-	4 personnel
Station 2	-	4 personnel
Station 3	-	3 personnel
Station 4	-	3 personnel
Station 5	-	4 personnel
Station 6	-	7 personnel
Station 7	-	3 personnel
Battalion Chief	-	1 personnel
Total	-	29 minimum staffing

In addition to the minimum numbers, Fire Rescue maintains a minimum of seven paramedics on duty at all times, with at least one on duty at each station. When the Coverage Company is staffed, that unit must also have a paramedic assigned.

COMMUNITY RESPONSE HISTORY

While each fire station has a defined first-response area surrounding the station, these areas are actually dynamic, as they are determined in a real-time basis using a response unit's GPS location (detected via AVL technology on all response units).

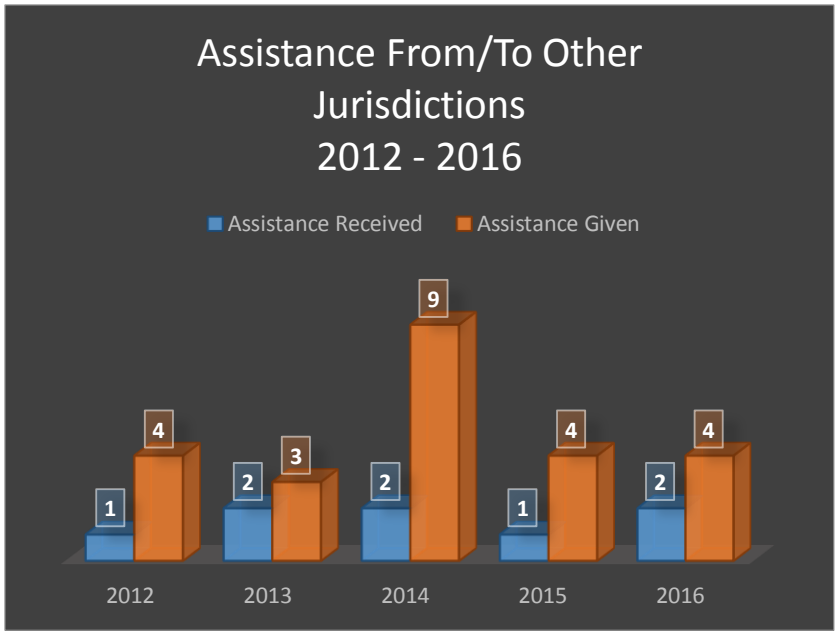
Fire Rescue's Computer Aided Dispatching (CAD) system assigns appropriate units based upon unit location as well as incident type, severity, and unit capability to manage the incident. Additional response areas are used to establish the agency's Fire Demand Zones (FDZ). The FDZ areas have map layers detailing the associated risks assigned to properties in the FDZ based upon community surveys.



The chart *Emergency Response Activity 2012-2016* details five years' of priority response activity broken down by broad category. The data reflects increases in total call volume that annually trend at 10%. While increases are seen in the number of medical and fire events (6% and 4.8% respectively), there are increases in "other" call types, mostly non-emergent calls for service. Fire related calls associated with "structure fires" have fluctuated over the five year range but are estimated to remain relatively flat, as code enforcement, prevention activities, and socioeconomic conditions are not expected to change.

Other Agency Assistance

Fire departments routinely respond to incidents outside of their jurisdiction when other agencies require assistance, to address existing service agreements, through inter-agency agreements, and upon activation through the State. While these responses are limited, they do impact the provision of services to a small degree. During 2011, Hilton Head Island received assistance on four occasions from other agencies while providing



assistance to other agencies 30 times. Most of these were EMS incidents where Fire Rescue transported a Daufuskie Island EMS patient, or a response into the Windmill Harbor area for EMS. “Assistance given” dropped precipitously after 2011, when Fire Rescue ceased providing regular transport of patients being transported from Daufuskie to Harbour Town for continued transport to Hilton Head Hospital. Beaufort County, when confronted with the need to offset cost to the Town for these services, instead elected to respond an ambulance from Bluffton to continue these transports.

Otherwise, from 2012 through 2016, Fire Rescue’s mutual aid assistance (and need for assistance) has remained fairly consistent.

C. COMMUNITY EXPECTATIONS AND PERFORMANCE GOALS

Planning for emergencies and disaster scenarios better prepares the agency and the community when events do occur. Fire service planning provides a means to logically evaluate fire and emergency service and to efficiently provide levels of service in response to measured needs, levels of risk, and the financial capabilities of the community.

COMMUNITY EXPECTATIONS

Fire Rescue must evaluate and ensure that it is meeting the expectations of the residents and visitors in a manner consistent with the Town's defined Customer Service Standards.

Anecdotally, the number one item that seems important to the largest number of people is rapid response to the situation. The importance of this issue can be seen in letters to the local newspaper or in social media commentary. In many cases, dissatisfaction with the speed of service delivery can be traced to a lack of understanding of the underlying processes that must take place to get appropriate resources to an emergency. Simply stated, people want help to arrive as fast as possible.

The next most often cited desire has been for responders to be competent and well trained to handle various emergencies. Gauging by community reactions, letters and messages of appreciation, and observable reactions in social media, the public perception of Fire Rescue personnel appears to be that they are highly trained and educated sufficiently to handle their calls with speed, skill, and professionalism. Town Council has had expressed positive first-hand experiences with Fire Rescue's service delivery as well.

Fire Rescue does not provide a method for objective evaluation of programs and activities, or constituent priorities. Senior staff has already identified that in the upcoming edition of Fire Rescue's Strategic Plan, refinement of community expectations with quantitative and qualitative data instead of anecdotal evidence is required. This need for stakeholder feedback has been identified as a recommendation in this SOC. It is the intent of Fire Rescue to partner with external stakeholders to aid updating the Strategic Plan and the SOC in 2018. In addition to meetings and discussions, a community survey will be conducted to help guide the process.

PERFORMANCE EXPECTATION GOALS

Mission, Vision and Values Statements

Expectations of the public have helped to shape the formation of Fire Rescue's vision, mission, and core values statements. These statements form the substance of how the agency provides service to the community.

VISION

To achieve the highest levels of community service and protection by delivering excellent customer service in all that we do.

MISSION

To protect the people, property and environment of Hilton Head Island with courage, commitment, and compassion.

CORE VALUES

To take responsibility, lead by example, be honest, help others, and have a passion to serve.

Performance Goals

Realistic and achievable performance goals and objectives must be identified to guide personnel toward meeting the agency's mission. Goals and objectives allow the department to build upon its strengths and to improve upon identified weakness or deficiencies. The members of the department can perform their duties with clear instructions designed to meet customer expectations and to improve on those expectations into the future. More importantly, though, a shared culture gives direction when more detailed guidance is absent. When faced with an ambiguous situation, as often is presented during emergency response, personnel familiar with the Core Values of the organization can provide the service that is ultimately desired.

As a part of the CFAI Accreditation model, Fire Rescue treats goals and objectives as management tools and must regularly update them to keep pace with industry or community changes and with changing service expectations. While achieving a goal should be celebrated, it should also serve as an opportunity to adjust the goal post and strive for future service and delivery improvements.

By setting goals and objectives, Fire Rescue can allocate resources, improve processes and procedures, and remain focused on improving. Long term goals were developed as part of the Fire Rescue Strategic Plan. These goals are reviewed and updated annually as objectives are accomplished. Organizational performance goals and objectives are reviewed as part of the annual budget process. Personnel performance goals are also tied to organizational goals. As part of annual evaluations, data is examined to reinforce compliance with stated goals, especially in regard to customer service, response times, and fire loss.

Problem Solving Process

Fire Rescue realizes that a consistent method is required for employees to solve problems, to innovate, or to manage projects. Committee chairs and workgroup leaders have been encouraged to utilize a uniform means of solving issues. Members of committees or workgroups are asked to employ cooperative skills, work respectfully of each other, and develop consensus.

This method includes identification of the need, the problem, or the challenge; getting facts from stakeholders; analysis and determination of alternatives; choosing the best alternative and developing a plan; implementation of the plan; and monitoring results with revision or improvement if necessary. Having a common problem solving process contributes to issues being handled at the lowest level, encourages committee participation, fosters buy-in of stakeholders, and the steps are traceable, which helps in continuity of planning.

This page intentionally left blank

D. COMMUNITY RISK ASSESSMENT AND RISK LEVELS

Levels of response and protection are often based upon experience and historical expectations. Experience, however, is not always an accurate indicator of potential risk. In the case of fire and emergency services, communication of known or potential risk is required to educate elected officials and decision makers on resource expectations or to illustrate unmet needs.

As Hilton Head Island Fire Rescue is an "all-hazards" response agency, hazard and risk analysis must incorporate not only response to the community fire problem, but for medical service, specialized rescue, hazardous materials, or disaster response. In 1993, Fire Rescue not only observed the national trend, but as a community, recognized the potential of declining fire response and the likelihood of increased medical service requests. The research and subsequent changes led to adoption of a different delivery approach, not only by cross-training personnel, but through cross-staffing.

Fire Rescue realizes the limitations of the community risk assessment. For a significant period of time, Fire Rescue used a list of inspected properties and utilized Dr. William Jenaway's Pre-Incident Planning Matrix (1986) to determine which occupancies required pre-planning first. The methodology incorporated occupancy type, construction type, existing fire protection, and numbers of occupants to determine a hierarchy. The various methods in place over the years have included many of the same components as Jenaway's Matrix, for instance: fire flow, water supply, industry or activity at the occupancy, or other special hazards. However, none of the systems seemed to be sufficiently customizable to properly evaluate risks in the jurisdiction.

There is an opportunity, however, to better utilize origin and cause investigation to more definitively address risk management. Fire Rescue's Bureau of Fire Prevention does an extraordinary job in code enforcement and outreach. Fire loss is, compared to protected property values, very low. Incidence of fire in a neighborhood has triggered efforts to better support those neighborhoods with smoke detector distribution and home hazard prevention, while the idea is fresh. Likewise, further targeted outreach in at-risk populations might be more efficacious if origin and cause could be tied to recent fires.

Fire Rescue regularly utilizes hazard threats and risk assessments conducted at the local, county, and state levels to assess community risk in non-fire related standpoints. For this purpose, as undertaken in the development of the Town's Comprehensive Emergency Management Program, a detailed hazard vulnerability assessment for the Town of Hilton Head Island was accessed from the Beaufort County South Carolina Hazard Mitigation Plan. Some of that assessment originated in the South Carolina 2016 Threat and Hazard Identification and Risk Assessment (South Carolina Emergency Management Division, 2016). Analysis of EMS chief complaint and consideration of national trends have also yielded improvements taken by Fire Rescue, such as in addressing mortality rates due to cardiac arrest, planning

and equipping to respond to potential epidemics, and taking more formulaic approaches to pediatric emergencies in order to reduce the stressors on response personnel.

The data, however, requires deeper examination as it pertains specifically to the Hilton Head Island community. Given neighborhood population and demographics, public safety use should be proportionally higher in those specific areas, and there does not appear to be a corollary result. A classic example would be an expected service demand in low income areas associated with an acute disaster. During Hurricane Matthew, anticipated service requests in typically vulnerable neighborhoods were no more frequent than those in other areas. On the other hand, analysis of census data indicating an older population suggested an equivalent rise in medical system use, and responses are in fact increasing at roughly the same rate of age increases (Heffernan, 2016).

All of this suggests that perhaps other casual factors are in play. While buildings and other locations can be surveyed for hazards and potential risk, people cannot. Fire Rescue can anticipate future needs based on generalities, such as the referenced census data and comparing it against call data, but the predictive nature of the data is still elusive and requires examination.

RISK ASSESSMENT METHODOLOGY

Fire Rescue was not satisfied that the results of previous efforts appropriately assessed risks faced by the community, especially having read the results of other community's risk assessments (CRA). Fire Rescue's senior staff agreed that there was likely a better tool that was already being used that would meet their needs. A search was made to find different and more customizable methodology to conduct risk analysis. Fire Rescue became aware of another tool which has been successfully employed in other southeastern fire departments.

In regard to the measurement of fire risk, the particular instrument used by Fire Rescue was obtained from the Winter Park Fire Department (FL). This CRA had been adopted from a previous version which was employed by Naval Air Station Jacksonville (FL) and appeared to be a variant of Jenaway's matrix. The most notable feature of the tool is the ability to customize underlying data to better reflect the types of risks encountered in the community.

The CRA tool specifically looks at the following criteria when rating risk hazards:

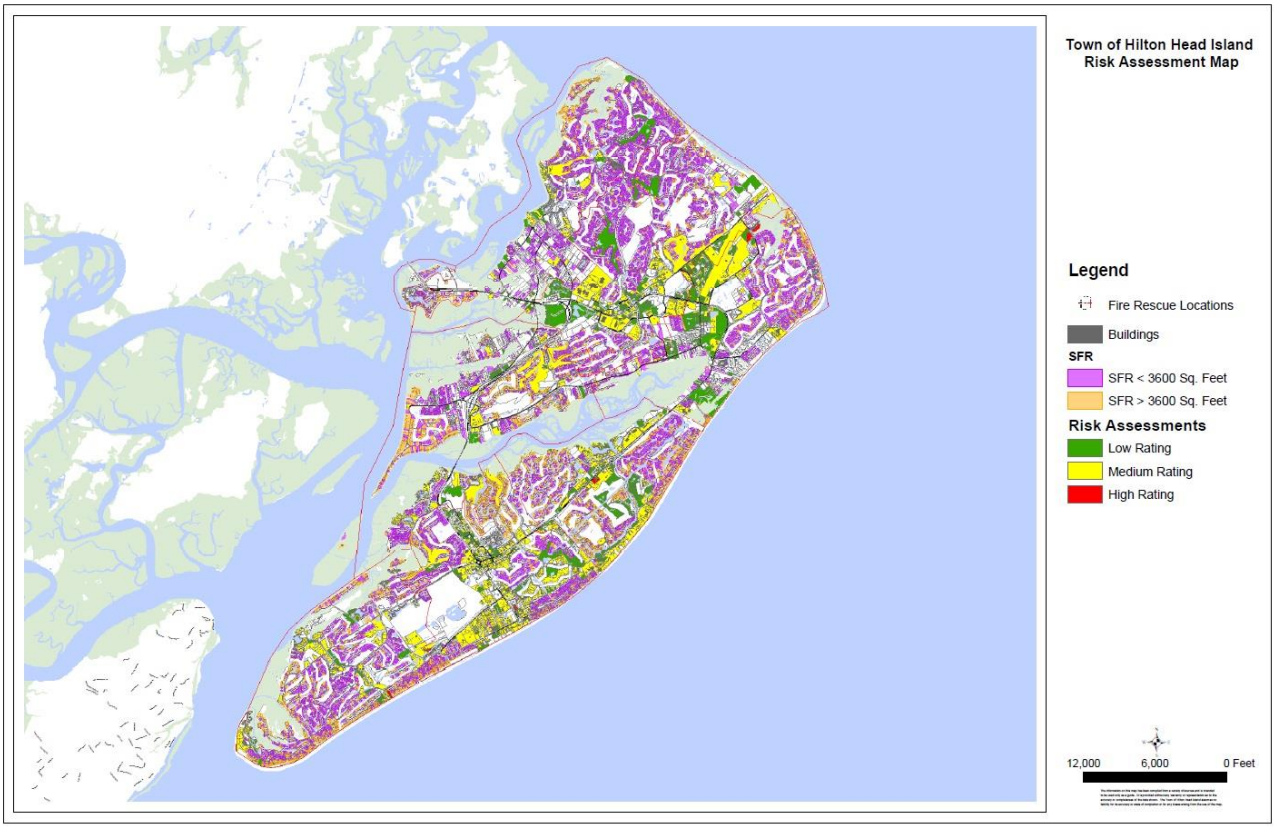
- Life Hazard
- Community Impact
- Life Impact
- Water Impact
- Building Usage
- Building Construction
- Building Stories
- Square Footage
- Fire Protection

Risk Classification Score	
Risk classification	Score
High Risk	24-27
Medium Risk	15-23
Low Risk	<14

Fire Rescue deployed the CRA tool in the field, utilizing the list of commercial occupancies maintained by Fire Prevention. The CRA tool utilizes a scale which was customized to more effectively accommodate local community risk. The tool deployed in 2016 in conjunction with the Town GIS department to create

a map layer where risk can be visually depicted. Each property is rated on the criteria; the sum of the ratings determine the level of hazard. The resulting Risk Classification Score is illustrated in the adjoining table.

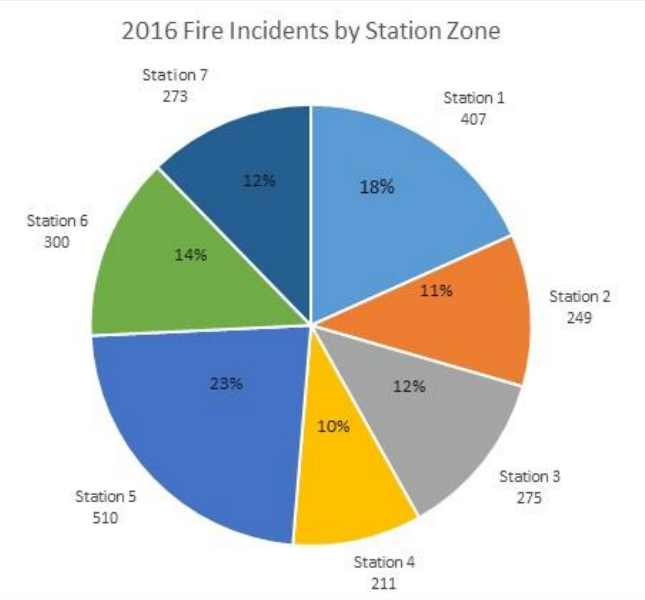
To utilize the tool requires a rapid visual inspection of each commercial property by conducting a "windshield" survey. Assigned personnel may quickly rate the occupancy on the criteria, which is then incorporated into a database and subsequently, into a GIS map layer. The ease of use of this system allows the department to quickly evaluate hundreds of commercial properties on scheduled or on an "as-needed" basis. Regularly scheduled fire inspections by Fire Prevention are opportunities to quickly and efficiently reevaluate properties. The updated data allows Fire Rescue to ensure that appropriate



emergency response assignments are made for the occupancy. Incorporating the data into GIS allows mapping of any or all of the grading criteria on a geographical basis. For example, necessary fire flow could be plotted and in the resulting graphic, the areas of higher risk would be quite obvious. With water supply being critical to any extinguishment effort, advance knowledge of fire flow, accompanied by an overlay of the existing hydrant capacity, gives an on-scene commander more accurate and easily interpreted data to plan training and operations.

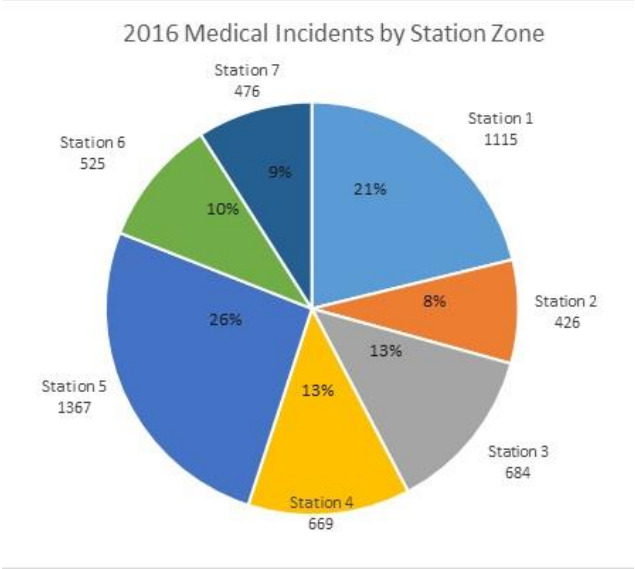
As a result of reviewing the risk classifications, however, historical comparison caused Senior Staff to consider alternative views on classifications between low, medium, and high risk. Further evaluation is warranted to analyze not only the "real world" effect of occupant type (residents as compared to visitors), socioeconomics, call history, and the effect of early detection (many medium risk occupancies in the jurisdiction have detection systems). Another issue detected was the relative ambiguity of some of the criteria (community impact and life impact) which may have skewed some of the results. Life-safety risk involved in other types of response (other than fire response) must also be further examined.

As an example, while the number of EMS alarms tend to aggregate in nursing homes and might be very obvious, trends might emerge within other occupancy types to aid Fire Rescue in planning for future service enhancements.



Hazard Planning Zones

Hilton Head Island's town limits are comprised of an area that is completely surrounded by water, making the boundaries of the jurisdiction easily defined. For the purposes of evaluating defined areas within the jurisdiction, the Island was divided into hazard planning zones (HPZ), one for each of the seven stations. The HPZ was defined by what would be, all things being equal, the closest fire station to that location via the road network (in distance).



Hilton Head Island does not dispatch according to a traditional "first due" response district but instead uses AVL to determine the location of the closest appropriate unit and sends that resource. Depending on the status of available units, sometimes resources flex to meet increases or decreases in service demands. While call volume is not sufficient to warrant "system status" movement of apparatus throughout the day, system stress (increased call volume, major incidents, "gaps" in coverage, etc.) causes units to "move up" and cover more area. Since requests for service are allocated to the closest appropriate unit, this flexibility has a measurable effect on reliability. For the purposes of mapping, the entire community utilizes 231 Fire Demand Zones that were developed in the 1990's and are also used Town-wide for other analyses. Since the switch to using AVL, these maps have no bearing on selecting response assets.

In conducting this Community Risk Assessment, Fire Rescue utilized the HPZs to identify risks and evaluate as to whether or not the agency has sufficiently prepared to manage those risks. Each of the following sections provide an area profile, describing the general nature of that neighborhood and the associated issues; location factors, identifying major roadways and infrastructure, as well as hindrances to travel based on geography or proximity to certain landmarks; the risk assessment for that area; event probability and impact factors, outlining historical response over the course of the previous five years; consequence factors, discussing various impacts and significance of issues that could occur within that area; and finally, fire flow factors, discussing the presence or lack of sufficient water supply to the area and potential ramifications.

Water Distribution Capacity

Hilton Head Island is served by a trio of water districts, Hilton Head Public Service District #1, Broad Creek Public Service District, and South Island Public Service District. Through a number of mergers of smaller districts, these three have worked together for at least a decade to deliver a reliable clean water supply. These districts have different origins in their formation, but have been close partners with the Town and especially with Fire Rescue to ensure water is there when needed. Fire hydrants are strategically located throughout the entire jurisdiction; Fire Rescue does not use rural water operations.

Hilton Head PSD covers the northern end of the island, supplying Station 3, 4, 5, and most of Station 7's Hazard Planning Zones. This district obtains most of their water from their Reverse Osmosis Water Treatment Facility located on Jenkins Island, near to the entrance to the Island, producing four million gallons a day. Wholesale water is also procured from the Beaufort Jasper Water and Sewer Authority from an underground main that is piped in under the Intercoastal Waterway from the mainland. Hilton Head PSD has the ability to draw two million gallons a day from their Aquifer Storage and Recovery facility which stores over 240 million gallons of water. In addition, five elevated and three ground storage tanks store over 8.4 million gallons of water.

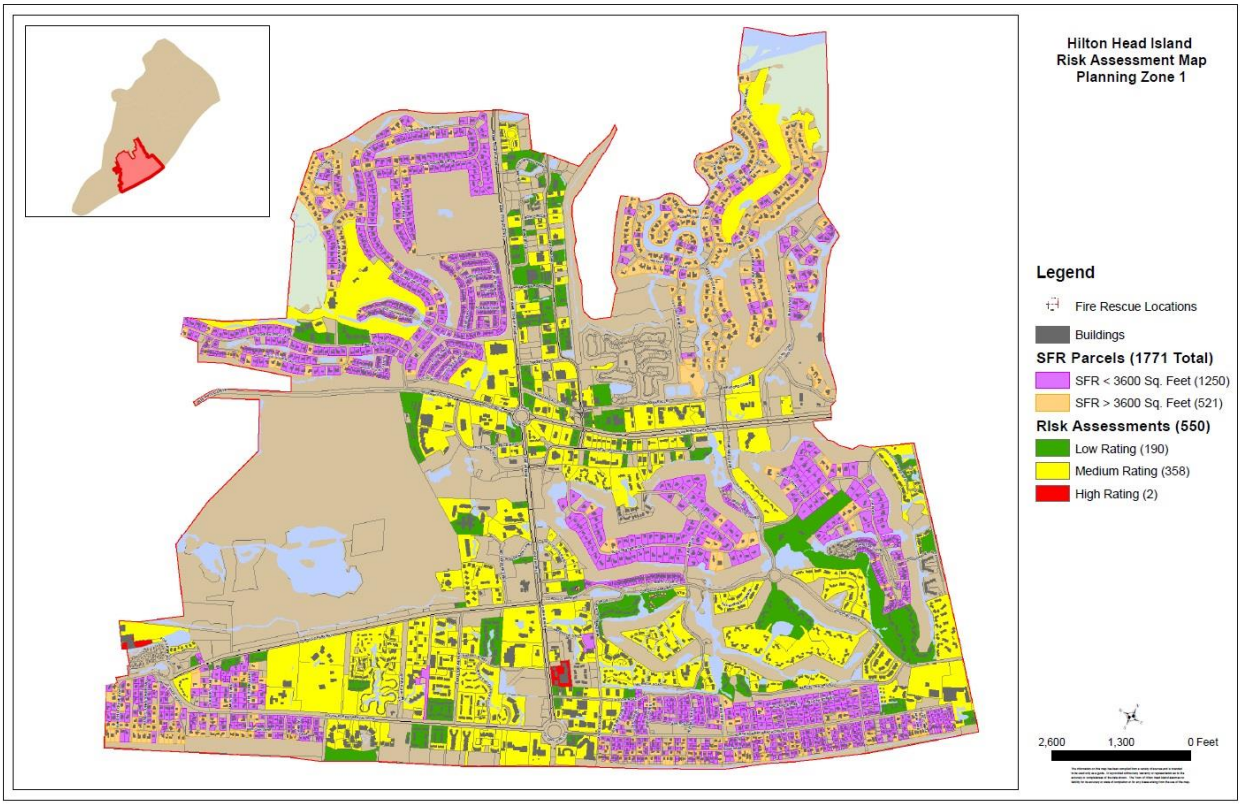
Broad Creek PSD serves Palmetto Dunes, Shelter Cove, and the remaining Station 6 HPZ except Long Cove. Their treatment plant draws from three Floridian aquifers and a transmission line linked to Hilton Head PSD to supply 2.08 million gallons of water a day. Broad Creek stores 300,000 gallons in one elevated storage tank located at the entrance to Palmetto Dunes.

South Island PSD provides service to Station 1 and 2's HPZs, as well as small portions of the Station 6 and 7 HPZs. This system produces six million gallons a day with peak at 8.5 million gallons of water a day. South Island draws from 13 Floridian wells, one cretaceous well, and one Reverse Osmosis facility. South Island has two Aquifer Storage and Recovery facilities storing 300 million gallons of water, a two-million gallon above ground storage tank, and two elevated 300,000 gallon water storage tanks.

In the event of catastrophic system loss, Hilton Head Island has the ability to trigger county and state-wide mutual aid agreements for water supply assistance.

This page intentionally left blank

Station 1 Hazard Planning Zone – North and South Forest Beach, Coligny, Pope Avenue and Palmetto Bay Corridors, Point Comfort, Wexford, Shipyard, Sea Pines Club Course areas



AREA PROFILE

The Station 1 HPZ encompasses what may be called the "downtown" area of Hilton Head Island and has the largest number of commercial properties, restaurants, and busy roadways throughout. Residential unit density is highest here at nearly 2000 units per square mile, most being multi-family structures. During the summer season the Forest Beach area of the zone has some of the highest population density in the jurisdiction. The beachfront stretches along the entire southeastern boundary and the largest public beach park is located in this area. Pedestrian and bicycle traffic is heavy throughout this HPZ.

There are a number of shopping and professional offices in the area, particularly concentrated along Pope Avenue, William Hilton Parkway, New Orleans Road, and the Palmetto Bay Road corridors. Park Plaza, Crossings Center, and Circle Center are modified "strip" commercial occupancies using non-combustible bearing walls with steel-bar-truss joists typical to that HPZ. Several large churches and the Town Hall are located in the area. Large expansions of the Coligny Park area and a hospitality campus for The University of South Carolina - Beaufort are in the design phase.

Fire Station 1 is located at 70 Cordillo Parkway in Shipyard Plantation; emergency access gates are located in Shipyard and in Wexford that permit apparatus to enter from Stations 6 and 7, respectively, if those units happen to be closer.

LOCATION FACTORS

Major roadways in this HPZ include Pope Avenue, South and North Forest Beach Drives, Cordillo Parkway, Sea Pines Circle, William Hilton Parkway, and Palmetto Bay Road. Some "dead end" areas create response complexities: The Club Course community has one way in and one way out. Many "t-streets" along North and South Forest Beach are narrow, tree-covered, and set back from the main street.

As a relatively urbanized area, almost all the roads in this HPZ are paved, or at least crushed limestone and sand in the beachfront neighborhoods. Traffic can be a factor on the main roads with a significant number of visitor attractions in this part of the jurisdiction. Gated communities include Shipyard, Wexford, and Sea Pines, prohibiting alternate trans-district routes; most traffic runs along Pope Avenue and William Hilton Parkway, intersecting at Sea Pines Circle.

Traffic calming measures are limited to private properties throughout the HPZ, mostly in parking lots. These can extend times for responding units.

RISK ASSESSMENT RATINGS

Within the Station 1 HPZ, 550 commercial occupancies were assessed as part of the CRA in 2016. A subsequent analysis of single family dwellings was undertaken because occupancies with more than 3600 square feet are treated as commercial occupancies for the sake of determining fire flow. The Station 1 HPZ has 1771 single family dwellings, 521 of those units exceeding 3600 ft^2. The large single family dwellings are mostly within Wexford Plantation, but also some in Sea Pines, and scattered among the hard-to-access t-streets along the oceanfront.

Total number of assessed properties	……	2321
Commercial and multi-family properties	……	550
Residential properties >3600 ft^2	……	521
High risk occupancies	……	2

While there are still an appreciable number of single family dwellings in this HPZ, there are more commercial occupancies and multi-family dwellings located here than in any other, with a ratio of just over one for every three single family homes. The commercial occupancies are almost evenly distributed, with a 1.88 ratio between medium to low risk.

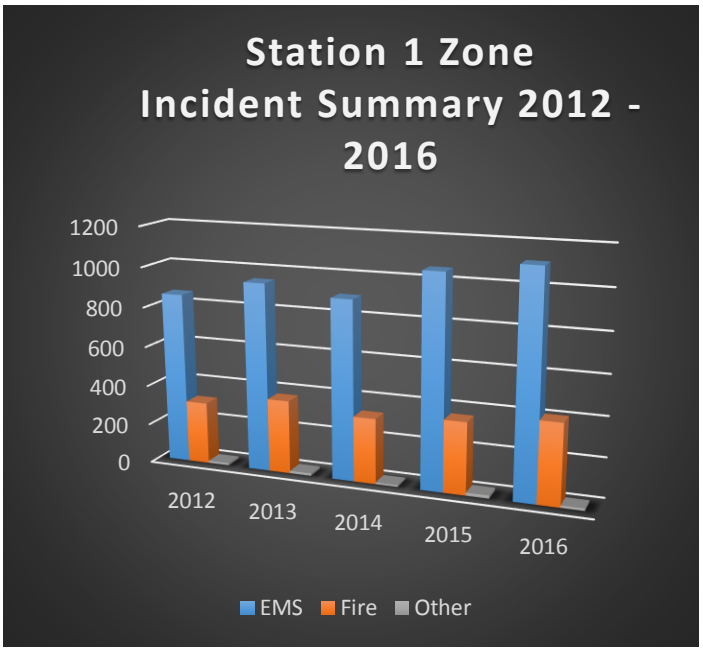
From a life-safety standpoint, a number of larger, unprotected commercial and residential occupancies exist in this zone. Because this area has some of the oldest commercial development in the jurisdiction. Most of residential properties meeting this description are located in the residential area and along the older sections of Shipyard Plantation and North Forest Beach Drive.

There are 31 high and moderately-high risk occupancies in this HPZ, more than double the next closest district. The Hilton Head Preparatory Academy and Sea Pines Montessori School campus are at the shared border between this HPZ and Station 2. Heritage Plaza shopping center, located in the heart of the commercial district surrounding the Coligny neighborhood, is in the planning process for revitalization.

The Hilton Head Island Town Hall Complex is a protected frame structure, but the presence of archives and infrastructure are critical to continuity of operations. The Dunagan's Alley electrical distribution center and part of South Island PSD's water treatment facility are in this HPZ. The water treatment facility has hazardous materials storage, elevation changes, `machinery, and permit-required confined spaces.

Other challenging occupancies include Coligny Plaza shopping center and New Orleans Plaza, the Courtyard Building, Reilley's Plaza, and Fountain Center, as well as any number of commercial entities operating out of the Arrow and Archer Road areas. From a population concentration standpoint, the Coligny Beach is the most popular public beach and some of the locations around that site host shows and events (Beach House/Tiki Hut, Beach Market, Coligny Plaza, and Coligny Beach Park) and are congested from just before Memorial Day through Labor Day.

EVENT PROBABILITY and IMPACT FACTORS 2012-2016



The response patterns for this area show the predominant response request to be for emergency medical service. 1522 calls were generated in this HPZ within 2016, with 1115 of those being medical and 407 fire related. This HPZ accounts for 21% of the total medical calls for the Island, as well as 18% of total fire call volume. Fire calls trend higher in the South Forest Beach area, while medical calls are more concentrated in the DeAllyon and Tanglewood Avenue neighborhood, and trailing up into Cordillo Courts and Woodhaven. Traditionally, the highest concentration of all calls island-wide occurred in this HPZ, but others are beginning to trend higher. The total number of responses for all calls for the previous five years has been charted above. Fire loss in this zone was estimated at $1,965,200 in the five-year period.

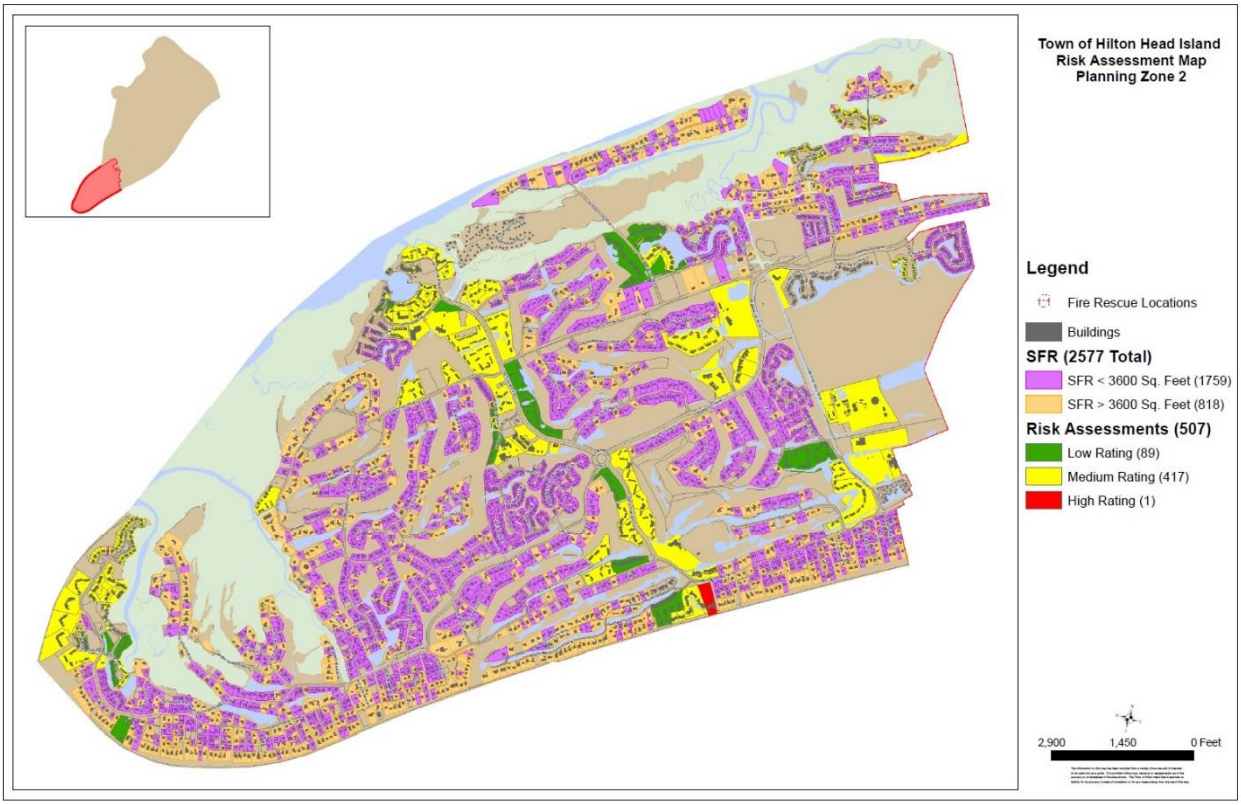
CONSEQUENCE FACTORS

Taking the Town's Hazard Vulnerability Assessment into account, and fire being the highest likelihood of consequence, several areas merit mention. Properties at Heritage Plaza and the buildings in the Hilton Head Preparatory Academy and Sea Pines Montessori School complex were indicated as high risk.

While the Hilton Head Island Town Hall Complex is also a protected structure, the threat to continuity of operations in any sort of disaster makes this a complicated occupancy to deal with. Threats to the Dunagan's Alley electrical distribution center and the South Island PSD's water treatment facility not only threaten quality of life, but as shown in the aftermath of Hurricane Matthew, extensive power or water/sewer outages can be catastrophic to the Island's economy. Within the water treatment facility the threat of hazardous materials release is of course, also a concern.

This page intentionally left blank

Station 2 Hazard Planning Zone – Sea Pines Resort, including North and South Sea Pines Drives, Land's End and South Beach, and Harbour Town



AREA PROFILE

The Station 2 HPZ encompasses Sea Pines Resort, a predominantly residential area of Hilton Head Island. This gated community has a large number of multi-family structures and some areas of light commercial activity with significant restaurant activity. There is a forest preserve of approximately 600 acres at the eastern aspect of this district that has limited access, limited hydrants, and a residential interface. Sea Pines is the host of the jurisdiction's largest annual event, the Heritage Golf Tournament, requiring special planning efforts. Besides the Heritage, Sea Pines has a very large year-round visitor population.

There are three shopping centers in Sea Pines: Harbour Town, South Beach Marina Village, and Sea Pines Center. Harbour Town has mercantile and restaurant occupancies and features an 85-slip marina capable of handling vessels up to 150 feet in length. South Beach Marina is located near the southern tip of the island and also comprises mercantile and restaurants, with a marina as well. The South Beach Marina has about 40 slips and can accommodate vessels up to 30 feet in length. Both South Beach and Harbour Town marinas have active marine fuel storage and dispensers available. Both are popular visitor destinations. Sea Pines Center comprises additional shopping and dining activities and also has the only vehicle fuel station in the district. There is a large electrical substation behind this occupancy, as well as the Sea Pines Golf Maintenance facility.

Fire Station 2, located at 65 Lighthouse Road, provides first response to occupancies in this zone. No emergency access gates are available.

LOCATION FACTORS

This HPZ is the only one in the jurisdiction that has no frontage to U.S. Highway 278, either via William Hilton Parkway or the Cross Island. Roadways in this area are all two lane and within a gated community, but many of the main roads are curvy, bounded by large trees, and difficult to navigate with fire apparatus. Major roadways in this zone include Greenwood Drive, Plantation Drive, Lighthouse Road, and both North and South Sea Pines Drive. Even in areas where parking covenants are strictly enforced, the HPZ has areas that are very congested, especially during the Heritage Golf Tournament, and throughout tourist season.

Some significant approach and operating challenges exist on the "t-streets" that front the beach, and long, narrow roads with dead ends (Calibogue Cay, Beach Lagoon, Deer Island, etc.). All of the roads in this HPZ, with the exception of within the Forest Preserve, are paved. Much of the area is intertwined by golf courses. Water hazards and landscaping make access to certain emergencies difficult sometimes. With only two ways into this particular HPZ, traffic movement is of great concern, as is the realization that when units are committed in this region, the next nearest resources may have very long response times to the far end (South Beach) of the district. Therefore, policies established by Fire Rescue require near-constant coverage.

While traffic calming fixtures are found in the Lawton Woods neighborhood and around the Preparatory School, they are not as prevalent throughout the zone.

RISK ASSESSMENT RATINGS

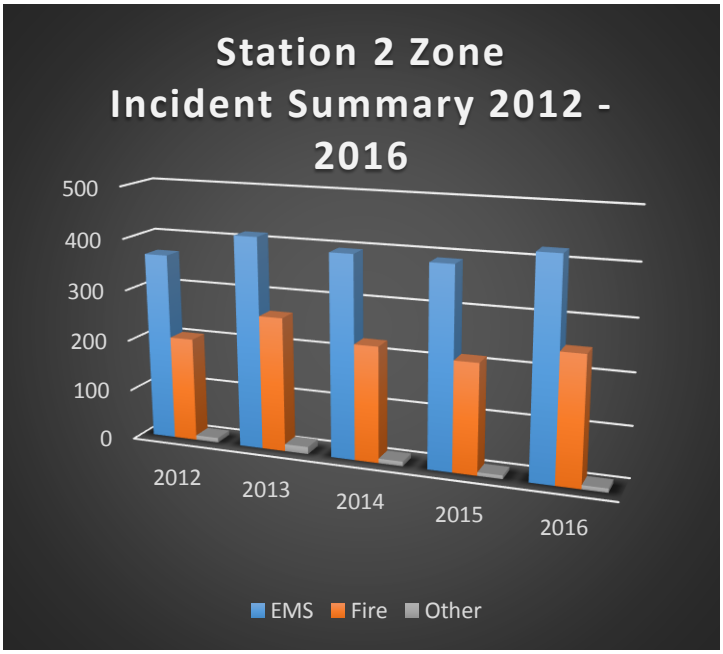
There are 2577 single-family dwellings in this area, more than anywhere else in the jurisdiction. 818 of these are larger than 3600 ft^2. Almost every occupancy bordering water, including those along Calibogue Sound, exceeds that 3600 ft^2 parameter.

507 commercial and multi-family occupancies were assessed as part of the CRA in 2016. A subsequent analysis of single family dwellings was conducted because occupancies with more than 3600 square feet are treated as commercial occupancies for the sake of determining fire flow.

Total number of assessed properties ……	3084
Commercial and multi-family properties ……	507
Residential properties >3600 ft^2 ……	818
High risk occupancies ……	1

While 507 of these occupancies were analyzed, 417 were moderate risk, as compared to one high and 89 low risk. Many of these moderate risk properties are in unprotected multi-family dwellings rather than truly "commercial" properties. 13 occupancies within this HPZ fell in the high to moderately-high risk category, including Sea Pines Beach Club, the balance of the Hilton Head Prep School properties, Sea Pines Golf Maintenance, Monarch, Ketch Court, Bluff and Sound Villas. Lighthouse Road, leading to Harbour Town, is the densest area in the HPZ at around 1000 to 1200 units per square mile. There are a number of timeshare and short term rental units in this area. This HPZ, and Sea Pines overall, has the least number of permanent residents (3243) but the most number of single family dwellings of all the hazard zones.

EVENT PROBABILITY and IMPACT FACTORS 2012-2016



The predominant response request in all of the hazard zones is for emergency medical service. Of 675 calls generated, 426 of those were medical and 249 fire related. Neither of the service types account for a significant percentage of the island's total call volume (8% and 11% respectively), but concentrations of fire and EMS calls tend to be in Harbour Town, as expected, and more EMS calls along South Beach, as well as North and South Sea Pines Drive (all oceanfront areas). The total number of responses for all calls for the previous five years has been charted above. Fire loss in this zone was estimated at $1,971, 005 in the five-year period.

CONSEQUENCE FACTORS

A considerable amount of residential occupancies in this HPZ are second homes or rental properties. Many of the homes along the "t-streets" are in excess of 3600 sq. ft. and require commercial fire flows. South Beach Marina and Land's End have older buildings of combustible construction and have been impacted by fires in the past, and one of the largest boat fires ever experienced on the Island. As it is on the far end of the island, response times are longer, especially if the primary response station is already committed.

Any incident in Harbour Town has significance as it is so directly connected to the Island's brand. Most of the buildings in this neighborhood are protected and of non-combustible construction, however, the marina has boats that are bigger than some single family dwellings, and the slips are nearly always full. Based on units per acre, Harbour Town itself is the most densely concentrated section of the Island, but in the "off season" may not necessarily be highly populated. During peak season most all units are occupied. Many people vacation or reside in the neighborhood, and traffic, as well as parking, is congested.

Infrastructure critical to the jurisdictional continuity of operations is limited, but the Sea Pines Center electrical distribution center and the main campus of South Island PSD's water treatment facility pose some technical challenges. The water treatment facility has significant hazardous materials storage, elevation changes, machinery, and many permit-required confined spaces.

This page intentionally left blank

Station 3 Hazard Planning Zone – Mid-Island, Chaplin Community, Port Royal, Folly Field, Marshland, Woodlake, Union Cemetery and Dillon, Mathews Drive Corridor, and Hilton Head Airport

AREA PROFILE

The northwestern end of the Station 3 HPZ centers on Mathews Drive, which prior to 1981, was known as "Industrial Park Drive". This corridor has mercantile, light industry, and a variety of residential occupancies. The Port Royal Plaza Shopping center is home to restaurants, a grocery store, and a currently vacant wholesale club. Palmetto Electric and Santee Cooper have electrical infrastructure located in the same neighborhood, including fuel storage. The Hilton Head Public Service District water treatment facility and the 9-1-1 Communications Center are also located here.

Shopping and professional offices are also concentrated along Mathews Drive and William Hilton Parkway. The former Pineland Mill property is experiencing retail redevelopment. Across the street, Northridge Plaza has also been discussed for revitalization. The Palmetto Headlands area of Cardinal and Hunter Roads have light industrial and commercial occupancies, and border Hilton Head Airport.

Marshland Road, which runs perpendicular to Mathews Drive and parallel to Broad Creek, has at its beginning a number of small garages and commercial occupancies, which then transitions to small neighborhoods of frame single family and multi-family dwellings. Port Royal and Folly Field, both of which are within this HPZ, are older residential communities with narrow, tree-lined streets. There are also multi-family dwellings along the ocean areas, one of the largest being Hilton Head Beach and

Tennis. The Westin Hotel, one of the largest hotels on the Island, divides Port Royal from the Folly Field district.

Fire Station 3 is located at 534 William Hilton Parkway near the entrance to Port Royal Plantation. Emergency access gates designed to decrease response times have been added in Port Royal, at Hilton Head Resort, and at the Airport.

LOCATION FACTORS

The major roadways in this zone include William Hilton Parkway, Marshland Road, Mathews Drive, and Beach City Road. The island's airport is located in this same area and along with Fish Haul Creek, creates a large response "hole" on the northern aspect of the district. To the south, Broad Creek bifurcates the district with one line along Marshland and one along William Hilton Parkway.

The entire area along Mathews Drive, as well as in the Cardinal and Hunter Road areas, house various commercial and light industrial occupancies. Some of the jurisdiction's affordable housing is located in this area: Woodlake, Heron Point, Old Woodlands, Beach and Tennis, Hilton Head Resort, Tabby Walk, Cotton Hope, and along Marshland Road. Some of the homes along Collier, Singleton, and Burkes Beaches are on narrow, single-lane bridges which span across marsh and have extraordinary setback issues.

Traffic calming measures are limited to private properties throughout the HPZ, mostly in parking lots, and at the end of Folly Field Road.

RISK ASSESSMENT RATINGS

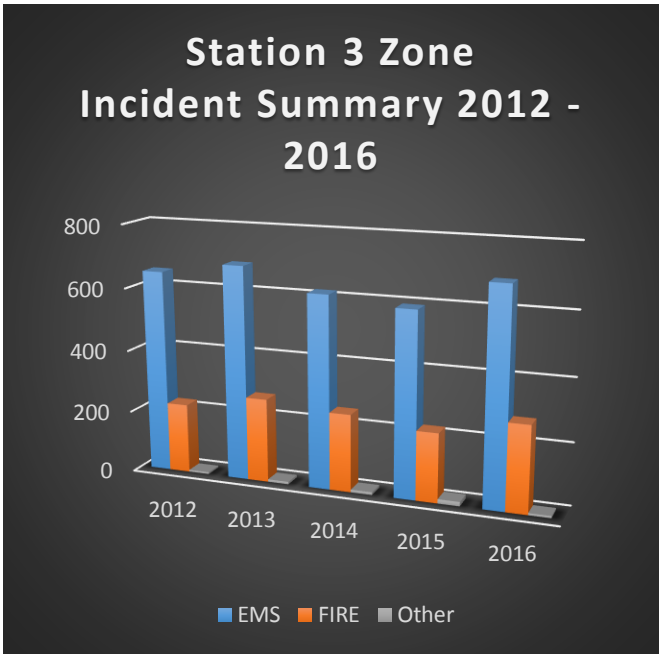
The Station 3 HPZ has the lowest total number of single family dwellings (1386) and the lowest number of dwellings that exceed 3600 ft^2 (308). A subsequent analysis of single family dwellings was also pursued because occupancies with more than 3600 square feet are treated as commercial occupancies for the sake of determining fire flow. These occupancies are pretty much exclusively along the oceanfront areas in Port Royal.

Total number of assessed properties ……	1275
Commercial and multi-family properties ……	197
Residential properties >3600 ft^2 ……	308
High risk occupancies ……	1

There are a number of storage facilities, especially around the airport. The commercial activities in some of the other areas along the cross-streets attached to Mathews Drive involve mechanic's shops, landscaping companies, construction storage, and others.

The high to moderately-high risk occupancies located in this HPZ include Cotton Hope, Hilton Head Beach and Tennis, First African Baptist Church, and First Presbyterian Church. Hilton Head Airport and Port Royal Golf Maintenance are also located in this HPZ. Port Royal is the largest gated subdivision in this HPZ. There are no multi-family dwellings located within it, and no short term rentals are permitted. This district has the highest ratio of permanent population to single family and multi-family dwellings on the island.

EVENT PROBABILITY and IMPACT FACTORS 2012-2016



As with all of the HPZ's, the predominant response request is for emergency medical service. The total number of responses for all calls for the previous five years has been charted above. In 2016, 684 medical calls and 275 fire calls were handled, for a total of 959 responses. The Station 3 HPZ sees 13% of the Island's total medical calls, and 12% of fire calls. Call volume for both fire and medical tends to radiate out from the Mathews Drive and William Hilton Parkway corridors. This zone experienced an estimated $ 1,555,729 in fire loss over the period.

CONSEQUENCE FACTORS

This HPZ has some of the most diverse challenges in the jurisdiction. With so many single and multi-family dwellings in the HPZ, residential fires are significant. Residential construction includes apartment complexes, multi-million dollar oceanfront homes along Singleton and Collier Beaches, and more modest homes elsewhere. The same can be said about the variance of commercial occupancies: One of the island's premier hotels, The Westin Resort, is within this zone, as well as any one of a few dozen small, "garage" businesses and companies operating out of storage closets.

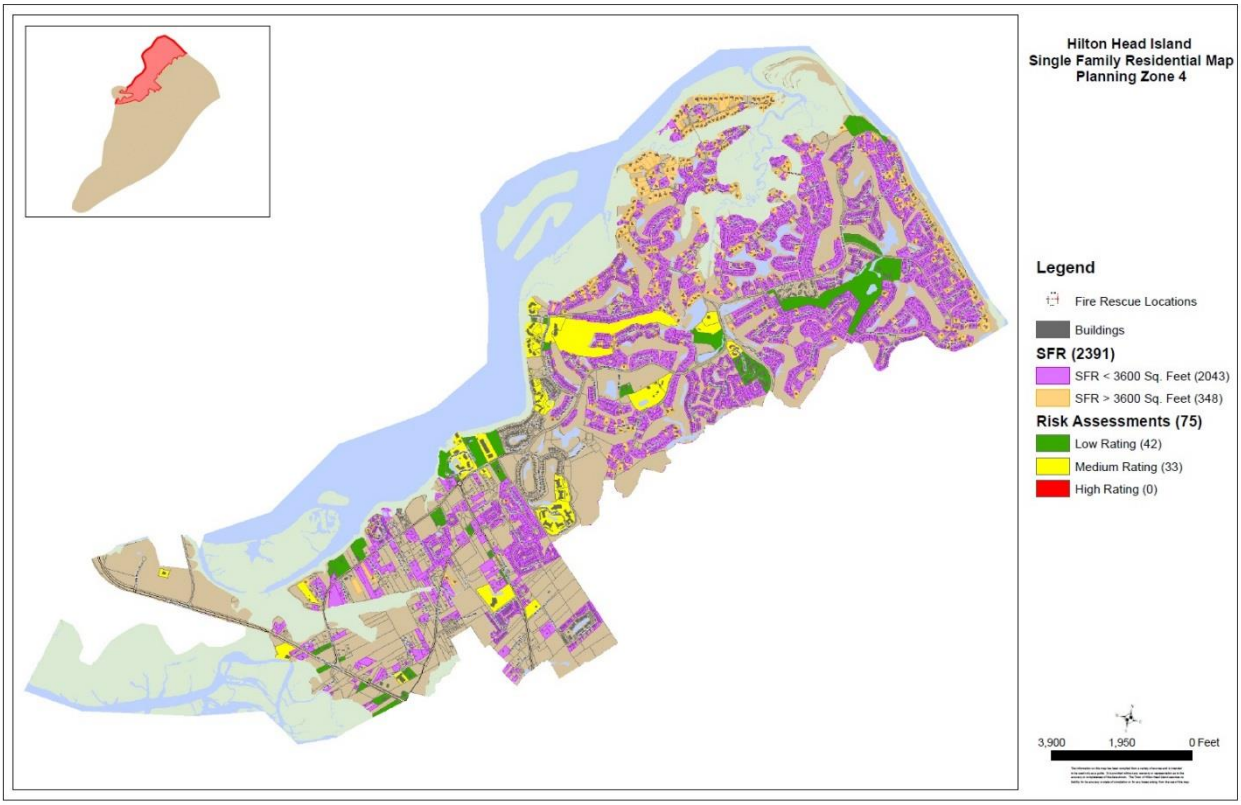
While Hilton Head Airport's crash and fire responses on that site are managed by a dedicated airport fire department, the approaches and departures from that facility occur mostly over this HPZ. Fire Rescue responds to anything that occurs "outside the fence" as well as providing anything other than crash-fire-rescue "within the fence", and providing backup to that agency in the event of an aircraft incident. According to news reports, while general aviation arrivals and departures were down 19% from 2011 to 2014, expansion underway to facilitate more economical regional jet traffic may result in a reversal of that trend (Murdock, 2015).

Along that same concern, the flight paths in and out of HHH are over Broad Creek to the southwest and Beach City and Mitchellville to the northeast. With limited access to Broad Creek's vast tidal marsh, a commercial aircraft crash into that area could prove complex to manage. As Broad Creek is also a pristine habitat integral to the environmental health of the Island community, hazardous materials release into these marshes or the creek are sensitive as well.

The critical infrastructure within Palmetto Electric's distribution and generating facility and the Hilton Head Public Service District's water distribution and treatment facility would also be a significant loss to the community if impacted.

This page intentionally left blank

Station 4 Hazard Planning Zone – Stoney Community, The Cypress, Squire's Gate, and Hilton Head Plantation (Seabrook, Spring Lake, Dolphin Head, and Skull Creek)



AREA PROFILE

The most residentially heavy district (residential to commercial occupancy ratio), Station 4's HPZ is entirely bounded along the northwest by Skull Creek. Overlooking the creek are several multi-family residential complexes and the Island's largest senior care complex. Approximately one-third of the geography of this HPZ incorporates the traditional Stoney Community (Squire Pope, Wildhorse, and Gumtree Roads). The other two-thirds of the land area are made up of the back half of Hilton Head Plantation.

The homes in this HPZ range from manufactured housing through larger homes that front Port Royal Sound and in the Ribaut Island area. There is also a marina (Skull Creek) and several recreational facilities (Country Club of Hilton Head, Spring Lake, and Dolphin Head). Immediately across the street from the station is a large boat storage facility and three popular restaurants.

Fire Station 4 is located at 400 Squire Pope Road and within a very short distance of the back gate to Hilton Head Plantation. No gates are located within this area to facilitate response.

LOCATION FACTORS

The major roadways in this zone include William Hilton Parkway, Seabrook Drive, Squire Pope Road, and Gumtree Road. Stoney's three major corridors are less dense, but have a mix of commercial, light industrial, and mostly residential occupancies. There are some small housing developments, larger middle class neighborhoods, and a number of undeveloped roads and driveways with long setbacks.

While all of the residences within Hilton Head Plantation are on paved roads, they tend to be smaller lots with moderate setbacks, yet range in size from modest homes in the Spring Lake and Seabrook neighborhoods to large homes that front Port Royal Sound or on Ribaut Island. Within Hilton Head Plantation there are any number of golf courses, water, and marsh that split areas apart and reduce cross-zone travel options.

Traffic calming measures are limited to some neighborhoods, like Squire's Gate and Chinaberry Ridge. These devices can prolong times for responding units.

RISK ASSESSMENT RATINGS

Single family dwellings smaller than 3600 ft^2 make up 96% of the occupancies in this HPZ (2043); 75 occupancies fell into the commercial and multi-family assessment criterion. Single family dwellings were also analyzed because occupancies with more than 3600 square feet are treated as commercial occupancies for the sake of determining fire flow.

Total number of assessed properties	……	2118
Commercial and multi-family properties	……	75
Residential properties >3600 ft^2	……	348
High risk occupancies	……	0

High to moderately high risk properties are within the HPZ included Schilling's Boathouse and the Country Club of Hilton Head. Skull Creek Marina can accommodate boats as large as 200 feet, but those tend to moor at places like Harbor Town or Shelter Cove, and it is rare to see a vessel that large docked here. The various other docks in this HPZ tend to be for personal use or for commercial fishing vessels.

Considering the area, this HPZ has the highest number of permanent population at 7862 persons. The Cypress and the multi-family dwellings along Skull Creek (inside Hilton Head Plantation) account for a significant number of those. The Chinaberry Ridge, Squire's Gate, Carolina Place, Allenwood, and Spring Lake neighborhoods are also popular among working families. Other concentrations occur in mobile home and small, subsidized housing neighborhoods off Wildhorse and Squire Pope Road.

The single point of drivable access to the Island, across the Intracoastal Waterway and Mackay's Creek bridges, runs through this HPZ. Vehicle accidents on Highway 278 are frequent and any kind of incident that creates stoppage has to be quickly managed. Especially at morning or evening rush hour, and during the height of the tourist season, traffic issues at this pinch point can have serious effect.

EVENT PROBABILITY and IMPACT FACTORS 2012-2016

As with all of the HPZs, review of the response patterns for this area show the predominant response request to be for emergency medical service. With 880 calls in 2016, the Station 4 HPZ's 669 medical calls accounted for 13% of the Island's total medical calls, and with 211 fire calls, 10% of the Island's fire calls. Fires in this zone resulted in an estimated $ 622,340 loss over the period. Both fire and EMS calls centered around Station 4, with concentration in The Cypress, Squires Gate, Boathouse, and upper Gumtree near the Wildhorse and Squire Pope intersections.

CONSEQUENCE FACTORS

Given that most of the large occupancies in this HPZ were built after the introduction of fire codes, almost everything of consequence has built-in fire protection. Numerous unprotected single family dwellings exist in this zone which, of course, pose a potential fire or life loss. There are a number of multi-family dwellings and one assisted care facility as well.

Also included for evaluation would be the Schilling Boathouse, located across the street from Station 4. While protected against fire, if the system became overwhelmed there could be a catastrophic loss. There are a number of marinas with fueling locations and this HPZ has some shared responsibility for the Hilton Head public schools campus.

There is a large electrical substation located just inside the back gate of Hilton Head Plantation that could substantially affect a large number of residents, as well as impact commercial activity downstream of that.

This page intentionally left blank

Station 5 Hazard Planning Zone – Indigo Run, Beach City, Mitchellville, Hilton Head Gardens, Sandalwood Terrace, Hilton Head School Complex, Main Street Corridor, Hilton Head Medical Complex, and Hilton Head Plantation

AREA PROFILE

The Station 5 HPZ runs along William Hilton Parkway from the western entrance to the Cross Island Parkway to the Northridge neighborhood and includes Beach City and Mitchelville. From the Gumtree Road and William Hilton Parkway intersection east to where this HPZ transitions to the Station 3 HPZ are commercial retail occupancies and care facilities that surround the Hilton Head Hospital and Medical Complex. Residential properties are predominant in Hilton Head Plantation, Indigo Run, and Palmetto Hall, and the multi-family residences of The Oaks, Sandalwood Terrace, and Hilton Head Gardens.

There are a number of institutional and large assembly occupancies in this area. The Island School Complex houses Hilton Head's public high, middle and two elementary schools, Hilton Head High School's Seahawk Stadium and the Seahawk Cultural Center. Also in that complex is the Island Rec Center. Another school, the Hilton Head Island Early Childhood Center is located here, as is a large daycare, The Childrens' Center.

Fire Station 5 covers this area on a first due basis from a station located at 20 Whooping Crane Way, at the front gate of Hilton Head Plantation.

LOCATION FACTORS

The major roadways in this zone include William Hilton Parkway, Whooping Crane Way, Indigo Run Drive, and Beach City Road. The vast majority of roads in this HPZ are paved with exceptions in the Mitchelville and Baygall neighborhoods.

Of all places in the jurisdiction, traffic seems to affect this HPZ the greatest. Vehicle accidents on William Hilton Parkway during rush hour in either direction can create traffic jams. Flooding has traditionally been a problem along the Parkway, even extending into surrounding neighborhoods, but while recent flood control efforts have significantly reduced the frequency of those events, this HPZ saw some of the worst flooding of Hurricane Matthew, as well as considerable wind damage in Hilton Head Plantation, Palmetto Hall, and Baygall.

Traffic calming measures are limited to private properties throughout the HPZ, mostly in parking lots and especially within Marsh Side, The Spa at Port Royal, The Oaks, Sandalwood Terrace, and Hilton Head Gardens.

RISK ASSESSMENT RATINGS

The Station 5 HPZ has the most commercial and large residential occupancies (multi-family and single family dwellings >3600 ft^2) in the jurisdiction: 2348 fell into that criteria as part of the CRA in 2016. The Station 5 HPZ has 2543 single family dwellings, but only 389 of those units exceed 3600 ft^2.

Total number of assessed properties	……	2348
Commercial and multi-family properties	……	194
Residential properties >3600 ft^2	……	389
High risk occupancies	……	0

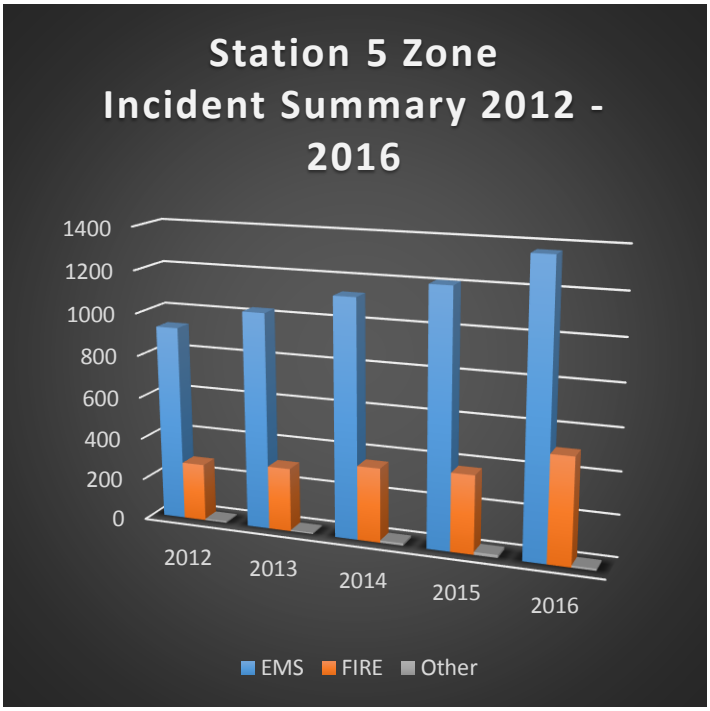
At 7032 persons, the Station 5 HPZ has the second highest number of permanent residents on the island. High-call volumes are associated with the assisted and skilled care facilities surround the Hilton Head Hospital and Medical Complex. The section of the William Hilton Parkway commercial corridor to where this HPZ transitions to the Station 3 HPZ hosts a number of commercial retail occupancies.

Both Hilton Head Plantation's and Indigo Run's occupancies particular to the HPZ are mostly middle to upper middle class residential occupancies, as the larger homes tend to be farther away from the William Hilton Parkway corridor, in Station 4 and Station 7's HPZs, respectively. As Beach City Road goes, Palmetto Hall also contributes a similar occupancy type. The Mitchelville neighborhood generally consists of very small frame or manufactured homes.

Deeper off William Hilton Parkway, on one side, the front half of Hilton Head Plantation contains mostly residential occupancies, as does the other side, reaching into Indigo Run. Farther down Beach City Road, Palmetto Hall also breaks into the planning zone. On all three accounts, these neighborhoods are generally homes under 3600 square feet located on cul de sacs or winding secondary roads. At the very end of Beach City Road is the Mitchelville neighborhood; most of these occupancies are very small frame or manufactured homes, with the exception of the Spa on Port Royal Sound, a complex of frame multi-family dwellings. The easternmost aspect of the district houses The Oaks, Sandalwood Terrace, and Hilton Head Gardens.

From a risk perspective, assembly and institutional occupancy risk has been largely mitigated by construction type and built-in fire protection and detection. All of the schools within this FPZ are protected non-combustible structures. There are a number of places of worship, and with the exception of the two small, but historically significant, native Islander churches, all of these are protected. Hilton Head Airport's passenger terminal is also protected. Seahawk Stadium, while not protected, is an open air, non-combustible "bleacher" structure. From a life safety standpoint, this arena has risk, but it again does not fall into a high risk category.

EVENT PROBABILITY and IMPACT FACTORS 2012-2016



Especially with the health care and institutional facilities, response patterns for this area are more often for emergency medical service than any other call type. With a total of 1877 calls, this HPZ was the busiest, and there were more medical calls (1367, at 26% of all Island medical calls) in this HPZ than total calls in any other district except Station 1. While there were 510 fire calls in this HPZ, reflecting 23% of the total fire calls on the Island, total fire loss was at $714,600. The total number of responses for all calls for the previous five years has been charted below. Both fire and EMS call volumes were high and most dense in the North Main Street and Sandalwood/Gardens neighborhoods, as well as in the Hospital Complex and surrounding area.

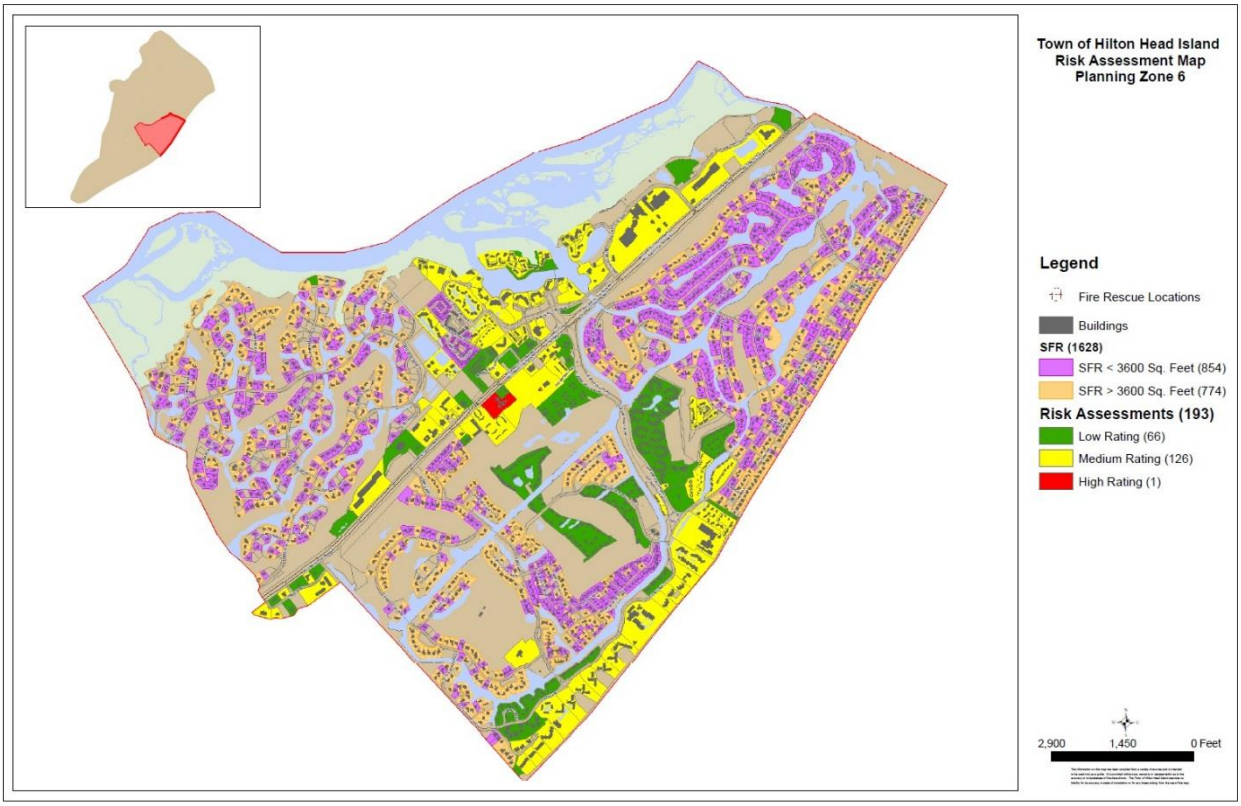
CONSEQUENCE FACTORS

Absent the fire protection within the many commercial, institutional, and multi-family residential occupancies in this HPZ, more might fall into a higher risk profile. Construction varies from non-combustible to frame types, and can be significantly affected by windstorms, as has been historically demonstrated. However, even in the assisted and skilled care facilities, Hilton Head Hospital, and the Medical Complex, fire call volume is high, but fire consequence has been historically low.

While there are exceptions, congestion is really not much of an issue in this HPZ, and there are no significant factors present that complicate fire attack. Within the past five years, fire loss in this HPZ has largely been contained to the room of origin. The risk of life loss is higher in this HPZ than in any other based on the number of assembly occupancies. Not just limiting the discussion of risk to fire, the consequences of violence have been discussed and planned for on a regional basis, and must be mentioned in this circumstance.

This page intentionally left blank

Station 6 Hazard Planning Zone – Palmetto Dunes Resort, Shelter Cove, Leamington, and Long Cove Plantation



AREA PROFILE

The Station 6 HPZ is one of the smallest zones, but is interspersed with commercial properties (retail and restaurants), timeshare and multi-family structures, and a number of large single family residences, many of those within Palmetto Dunes, are second or vacation rental homes. During the summer months this zone is highly populated. There are a row of "high-rise" multi-family and hotel occupancies located along the beach in this zone. There are two large assembly occupancies (Christ Lutheran Church and the Art Center of Coastal Carolina), and the recently developed Shelter Cove Town Center is an island "hot spot" where festivals are held almost every weekend from Spring through Fall.

There are a number of retail stores and restaurants along William Hilton Parkway. Several infrastructure points are within this zone. The Folly, a tidal creek, cuts across the main artery of the island, William Hilton Parkway. Broad Creek PSD has their treatment facility located off of Marina Side Drive, and while much of the phone infrastructure is now located off-island, Hargray Telephone's main offices are right along WHP.

Fire Station 6 recently occupied their new facility at 12 Dalmatian Lane at the entrance to Palmetto Dunes Resort. There are gates located to access the Mariner section of PD from WHP; from the end of Ocean Lane to provide access into the South Shore neighborhood and to cut across to Shipyard (also permitting Station 1 to cross into PD); and from WHP into Long Cove at Fife Lane.

LOCATION FACTORS

The major roadways in this zone include William Hilton Parkway, Queen's Folly Road, Ocean Lane, Mooring Buoy, Shelter Cove Lane, Leamington Drive, Yacht Cove Drive, Long Cove Drive, and Park Lane.

Water affects everything in this HPZ. The 12-Mile Lagoon system weaves in and out of the residential sections of Palmetto Dunes and Leamington and there are bridges on every primary road. Across the street, Shelter Cove Marina, one of the island's largest and busiest, provides access to Broad Creek. A significant enough tropical event could potentially cut the island in two in this HPZ at The Folly. The three miles of beachfront in this zone contain some of the largest and most expensive properties on the Island.

Traffic calming measures are limited to private properties throughout the HPZ, mostly in parking lots. These can extend times for responding units. Congestion can be a problem on occasion, with community events, and in the hotel and multi-family complexes.

RISK ASSESSMENT RATINGS

The Station 6 HPZ has the lowest ratio of large (>3600 ft^2) single family dwellings to those below 3600 ft^2, at nearly one for one. There are an appreciable number of multi-family dwellings in this HPZ that are unprotected, frame buildings constructed at the beginning of code enforcement on the island.

Total number of assessed properties	1047
Commercial and multi-family properties	193
Residential properties >3600 ft^2	774
High risk occupancies	1

This zone has two of the largest hotels in the jurisdiction, the Marriott Beach and Golf Resort, as well as the Omni. Along William Hilton Parkway not only are there more hotels, but several strip commercial occupancies (Shoppes on the Parkway, Plantation Center, Shelter Cove Plaza). The recently redeveloped Shelter Cove Town Center is a popular festival venue as is the Art Center of Coastal Carolina. Shelter Cove also hosts a Tuesday night "Harbourfest" from Memorial Day through Labor Day that features fireworks and family fun, drawing large crowds at the marina and at the park. There have been several fires in the retail areas of Shelter Cove Harbor, but with construction type and early detection, limited to the unit of origin.

During the summer months this zone is highly populated. Pedestrian and bicycle traffic volume is high. From late November through February, population drops dramatically, and the permanent population is the second lowest of all the HPZs, at 3544 persons.

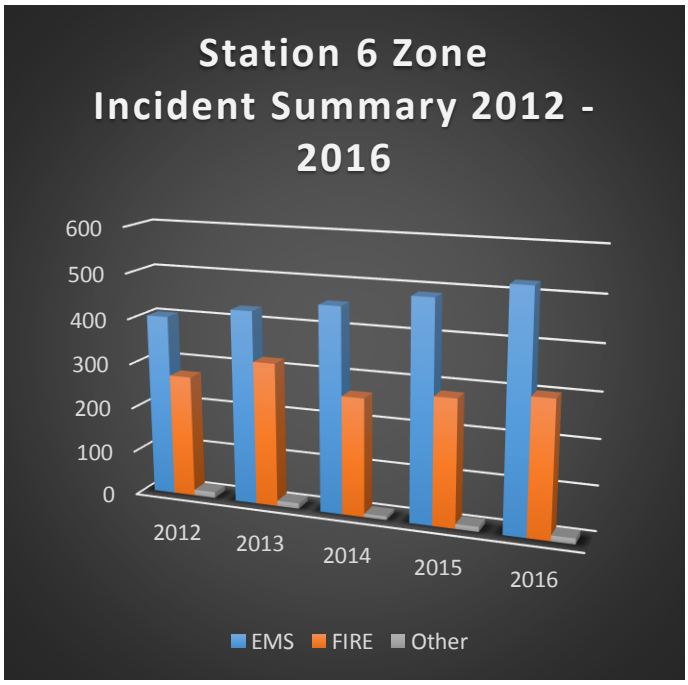
Many large "single family" dwellings within Palmetto Dunes and Leamington, especially along the beachfront, are second homes, or more commonly, vacation rental properties. There are also a number of large homes in Long Cove Plantation; these are throughout that neighborhood and often have water along the back of the homes, posing challenges to rear access for firefighting operations.

Broad Creek Public Service District has their treatment facility located in this HPZ and does present hazardous materials release potential as well as opportunities for technical rescue. Shelter Cove Marina

is one of the busiest on the island and hosts a number of large vessels; there have been more boat fires in this marina than in any other.

EVENT PROBABILITY and IMPACT FACTORS 2012-2016

With 525 medical calls compared to 300 fire calls, this district has the highest ratio of medical to fire response patterns than any of the other HPZs. The Station 6 HPZ accounts for 14% of all fire calls and 10% of all medical calls Island-wide. The total number of responses for all calls for the previous five years has been charted above. This zone experienced an estimated $787,625 in fire loss over the period. Most of the fire calls originate in the Ocean Lane, South Shore, and Inverness neighborhoods, most of which are second homes or short term rentals. Medical calls are distributed a little farther west with more concentration in Shelter Cove, and along Queen's Folly Road.



CONSEQUENCE FACTORS

Fire loss, again, is generally mitigated in target occupancies by construction and fire protection, but that has not always been the case: One of the historically largest fire losses in this jurisdiction happened in a protected multi-family dwelling in this HPZ. Congested and densely configured complexes, pose the risk of delays that could evolve into fire spread. With the previously-discussed large residential factors, a fire can get ahead of the effective force and be well advanced, resulting in significant loss.

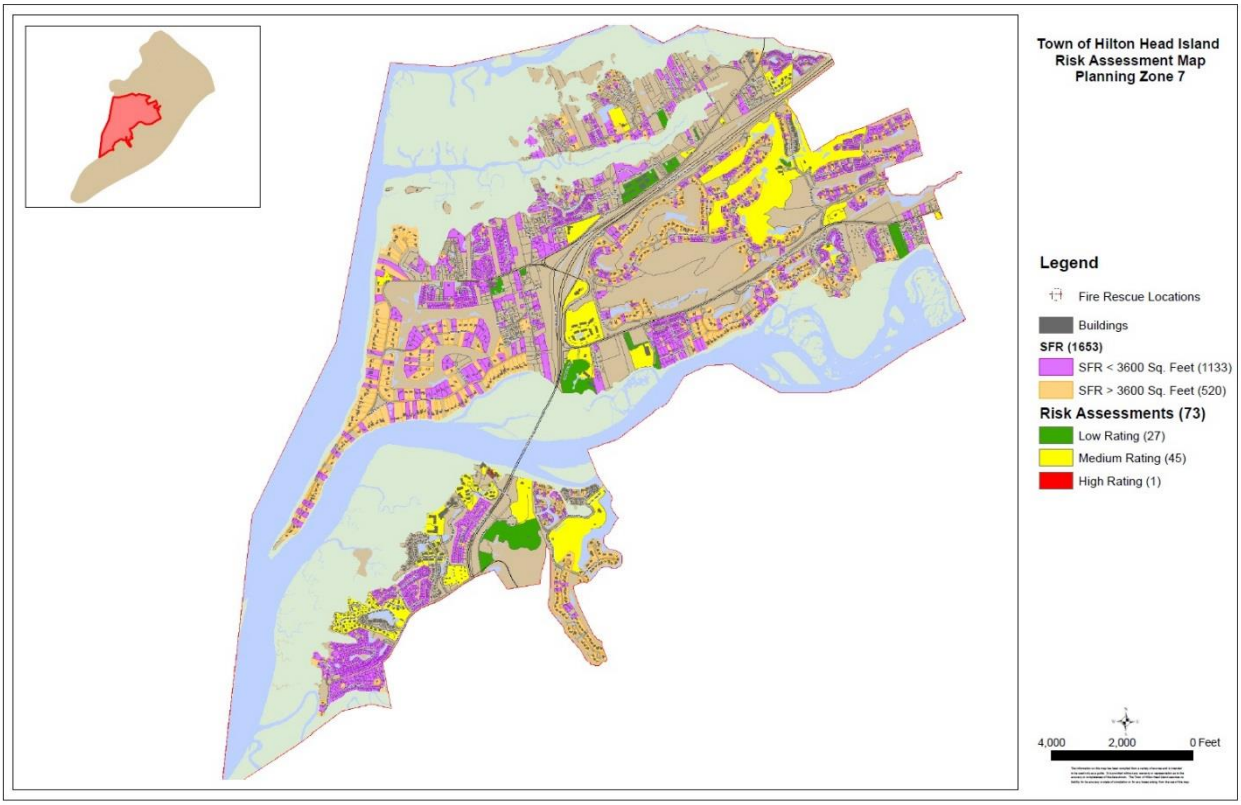
Shelter Cove's redevelopment has resulted in its being substituted as the community gathering and celebration place. Given that, any hazard that strikes this area could have a greater impact on the local residents, more so than on the economy. Of course, there are any number of consequences that can result from this kind of concentration, including violence, or mass injury from a weather event or hazardous materials release.

Previously discussed hazardous materials release and technical rescue potential exists with the waste treatment center and its proximity to dense residential complexes along Yacht Cove Drive can create a significant evacuation event.

Any event that impacts the Hargray Communications Center has the potential for a complex emergency, as this facility, while protected and constructed appropriately, houses some of the infrastructure for phone and internet communications on the island.

This page intentionally left blank

Station 7 Hazard Planning Zone – Cross Island Parkway and Bridge, Spanish Wells, Jonesville, Indigo Run, Marshland, Palmetto Bay Marina Village, Point Comfort and Tidepoint



AREA PROFILE

The Station 7 HPZ is the only area with a limited access toll road, the Cross Island, and is surrounded by water: Broad Creek, Calibogue Sound, and Jarvis and Old House Creeks. This HPZ was the last to be formed with the opening of Fire Station 7, relieving some of the call volume from Stations 1, 3, and 4's HPZs. While this zone has the most miles of the Cross Island Parkway and bridge to cover, call volume on that road has remained low.

The area is overwhelmingly residential, with a commercial park and two retail areas, both along Broad Creek (Palmetto Bay and Broad Creek Marina). There are several golf clubhouses, and assembly occupancies are limited to the four small to medium-sized churches located in the area. The Tidepoint assisted care facility is the largest generator of alarms in this HPZ.

The two marinas located in this area are the two primary embarkation points for workers and visitors traveling to Daufuskie Island. Palmetto Bay has a significant number of water-related businesses, such as fishing charters, jet-ski and boat rentals and excursions, and parasailing. Broad Creek has less so, but also hosts a large zip-line operation.

Fire Station 7 covers this area from a station located at 1001 Marshland Road, at the Spanish Wells exit to the Cross Island Parkway.

LOCATION FACTORS

The major roadways in this zone include the Cross Island Parkway, Spanish Wells Road, Marshland Road, and Jonesville Road, as well as Colonial and Pond Drives within Indigo Run. This HPZ is the only one contiguous to more than two Stations; it can be backed up from Stations 1 and 4 via the Cross Island, Station 5 via Indigo Run, and Station 3 from Marshland Road. Deep water and marsh surrounds this entire zone while the Cross Island and limited access into Indigo Run make for segmented areas with limited access opportunities.

Traffic calming measures are limited to private properties throughout the HPZ, such as Spanish Wells, Summer House, Summerfield, Cedar Woods, Broad Creek Landing, and Tidepoint.

RISK ASSESSMENT RATINGS

The Station 7 HPZ is the least dense district, consisting of 1726 occupancies, and a density of 250-750 units per square mile. 1653 occupancies were single family dwellings and 73 occupancies were assessed as commercial or multi-family dwellings part of the CRA in 2016. Nearly 95% of the occupancies within this HPZ are classified as single family residential and not subject to installation of fire protection systems.

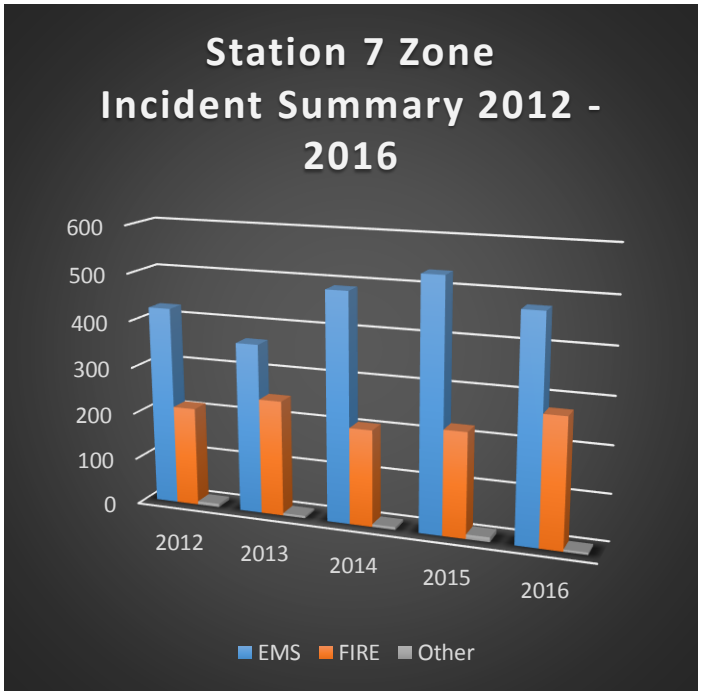
Total number of assessed properties ……	1206
Commercial and multi-family properties ……	73
Residential properties >3600 ft^2 ……	520
High risk occupancies ……	1

Palmetto Bay Marina Village has a concentrated number of shops around a popular gathering location. Some of this complex is protected, having rebuilt after a significant fire over a decade ago, but the majority is not. Access is a continual problem. This is also located within a marina community where the largest boat repair facility on the island is co-located. The marina itself was destroyed as a result of Hurricane Matthew in October 2016. While it is assumed the marina will be rebuilt, there are still significant salvage operations ongoing.

Of the commercial occupancies, the Spanish Wells Business Park has a number of offices and some storage, and a small boat repair facility. There are an appreciable amount of multi-family dwellings, especially those of Summerfield (Spanish Wells Road) and Summer House (Marshland Road), Brighton Bay, Palmetto Bay Villas, and Broad Creek Landing.

EVENT PROBABILITY and IMPACT FACTORS 2012-2016

Review of the response patterns for this area show the predominant response request to be for emergency medical service. Medical calls at the Tidepoint complex are frequent. Fire calls spread out a little more, radiating into the Cross Island, Crossings Park, and Bay Point areas. Of 749 alarms in 2016, 476 were medical (9% of all medical Island-wide) and 273 were fire related (12%). The total number of responses for all calls for the previous five years has been charted above. This zone generated an estimated $683,695 in fire loss over the period.



CONSEQUENCE FACTORS

Palmetto Bay Marina presented the most likely fire-related risk within the jurisdiction based on occupancy, potential exposure, and lack of built-in fire protection equipment. Recent boat fires here were held to the vessel of origin. A large fire in this marina could become an economic and environmental disaster. At the mouth of Broad Creek, more severe infrastructure impact is also possible if the navigable waterway has to be closed, affecting transit from Shelter Cove and Broad Creek Marinas.

This page intentionally left blank

RISK ASSESSMENT

While fire suppression organizations across the nation have recently begun efforts to incorporate other risk management activities in their portfolio, the post-merger Hilton Head Island Fire Rescue has provided "all-hazards" response for over two decades. The agency recognizes that improvement must be made to better formalize analysis. Process improvement and evaluation of service delivery has been conducted, albeit less scientifically than desired. In one example, optimization of station location was historically evaluated using response time projections from an identified location. The implementation of automatic vehicle location, found that the station locations also correlate with increased areas of call volume. In other words, each of the hazard planning zones happen to surround areas with concentrated incident activity.

In 1993, Fire Rescue was already in the business of providing emergency medical response and transport for the jurisdiction. While line personnel were already required to certify as firefighters and emergency medical technicians, every station was staffed with at least an engine company, but ambulances in only a few. With fire calls still increasing, but not at the same rate as the medical calls, the logical application of manpower appeared to favor an increase in ambulance distribution, but without considerable sacrifice to fire suppression coverage. The result was the current cross-staffing model in which every engine company is assigned an ambulance; if the call happens to be a fire call, personnel respond the engine. If the call is for a medical incident, the crew responds in an ambulance. Flexibility was built into the system to distribute personnel for other calls, as well, including the ability to "jump" to the hazardous materials response unit or the technical rescue unit, thus addressing the special operations issues.

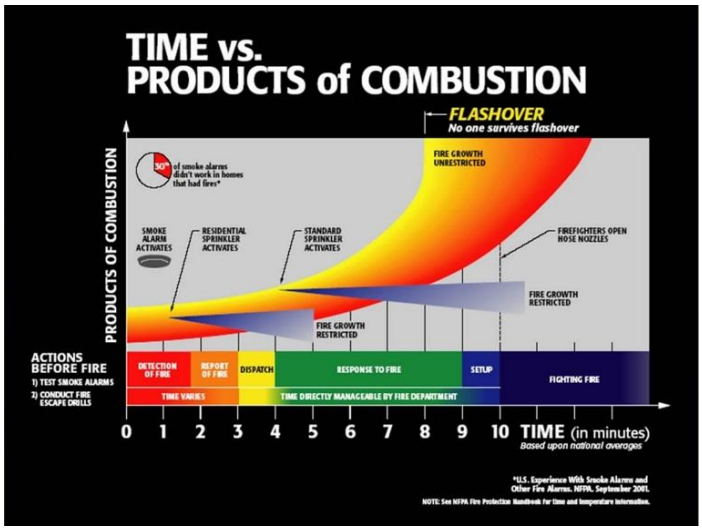
The determination of community risk has certainly been addressed, but fire risk is one area that seems to have seen positive effects of prevention and mitigation efforts. Hilton Head Island's stringent building codes and enforcement, an emphasis on built-in fire protection systems, a robust public outreach, and excellent distribution has resulted in low overall fire loss as compared to real property value.

Since the highest tradition and mission of the fire service is to "save lives", finding means to do that is an important reason for existence. A traditional approach to risk evaluates occupancies or occurrences using an inventory of influences, and estimates the impact on life safety. Disaster potential as well as fire potential can certainly be estimated on history as compared to estimated consequence. The one place where Hilton Head Island has found to have the most impact has been in the response to medical emergencies, particularly in the response to cardiac arrest.

Given that survival rates from EMS-treated out-of-hospital cardiac arrest in the U.S. were nearly 10% (American Heart Association, 2014), Hilton Head Island Fire Rescue personnel saw indications that "high-performance CPR" could potentially increase those chances of survival to around 30%. The cardiac program began an effort to tie bystander education, AED placement, rapid dispatch and dispatch-

assisted CPR, best practices in EMS, and aggressive in-hospital intervention together. With a potentially at-risk population but a community receptive to education, prevention, and cooperation, the chances were that the right resources could have very positive results. Hilton Head Island's first efforts did, with annual rates of survival ranging between 70% and 40%. Gaps that may have created the fluctuation in survival rates have been identified and action to stabilize those outcomes into the higher ranges have been addressed.

Fire Suppression Service



Factors impacting reduction of fire loss include the physics of fire and spread, contrasted against the arrival of adequate resources to intervene and affect positive change to improve outcomes.

Fire within a structure has been classified into three defined growth stages. The first is the incipient phase and occurs from ignition to open flame. The second phase of fire is the free-burning stage and is characterized by rapid growth and heat production. During this phase of fire growth, the fire can reach the point of flashover (National Fire Protection Association, 2008).

Flashover is the point at which the fire dramatically grows because the temperatures and conditions are sufficient to permit ignition of all of the contents in the space. Flashover is likely to occur if the temperature of the upper gas layer in an enclosure reaches approximately 1,100 degrees Fahrenheit.

The final phase of the fire growth is the smoldering phase, which occurs when the available oxygen is consumed by the fire. At this stage, a rapid introduction of oxygen into the room can lead to a backdraft.

It has long been known that the real killer in structure fires is smoke, not the flame or heat. Smoke contains many toxic gases released as byproducts of the combustion process. Carbon monoxide is one of those gases. Test fires in furnished residential structures have demonstrated the production of carbon monoxide in measurable amounts after three and one half minutes from the ignition of the fire. Carbon monoxide is also a readily-accessible fuel to feed the fire, which creates a cycle that perpetuates fire spread.

Hilton Head Island has long understood that a fire station cannot be on every street corner. Engagement is needed from the community to minimize elapsed time between fire detection and arrival of suppression forces. Strict code enforcement has required the installation of fire protection systems in most commercial and multi-family occupancies built since the 1980's. Fire Rescue has aggressively pushed smoke detectors and detector maintenance to the community through outreach programs. Deaths from fire in the jurisdiction are historically low for a community of this size, with only one fire death (structural) in five years.

The national average residential fire loss in 2014 was $18,800 per occurrence, with a 16% decrease in dollar loss noted (U.S. Fire Administration, 2014). Many factors impact the calculation of that number, especially on Hilton Head Island. Not only is the average home value higher, the cost per square foot for reconstruction is on occasion, several times the average cost in other communities. While one cannot realistically estimate the value saved whenever the fire has been stopped in its earliest stages, loss certainly can be, and the effects of that loss on the neighboring community as well.

What is conclusive, though, is that fire spread is associated with increased fire loss. Since fire spread increases exponentially from the time of ignition to the time it is controlled, to minimize fire loss, a community must intervene earlier rather than later.

Fire spread can be reduced in a number of ways and forward-thinking communities do these things. Codes can be strengthened to require better building practices, certain fuels can be restricted or managed, and of course, fire protection systems like automatic sprinklers can be installed. Detection is an important part of the equation as well, and communities with good public engagement manage to increase the number of smoke detectors present in homes, help citizens understand the importance of good housekeeping, and to be vigilant. All of these actions take place before the arrival of fire suppression resources however, and if there is any sort of delay between that ignition time and the arrival of those resources, the fire continues unchecked and damage continues to expand.

The Town of Hilton Head Island spans 54 square miles and has within it subordinate communities that are often gated and access restricted. The Town has encouraged emergency access gates to some of those communities to decrease response times. The Town added a traffic signal preemption system several years ago and this system was recently upgraded to incorporate the latest in AVL technologies. The existing fire stations are so located as to minimize travel time to as much occupied area as possible.

All said, Hilton Head Island has very few occupancies that classify as “high risk” in regard to fire response. Codes and code enforcement, combined with zoning restrictions on occupancies that might be otherwise hazardous (as in industrial or heavy commercial settings) eliminate much of that potential.

The following criteria were recently used in part to define risk categories for fire suppression services:

- Very low risk – Automobile fires, fires in detached outbuildings, rubbish or brush fires.
- Low risk – Single family dwellings, offices, and other protected buildings using non-combustible construction.
- Medium risk – Protected assembly, commercial, or multi-family dwellings.
- High risk – Unprotected assembly, large commercial, or multi-family dwellings, or high-economic value to the community.

Fire Suppression Critical Tasking Analysis – Effective Response Force

Fire Rescue currently treats all structure fires at the same risk level, and responds to structure fires with three engines (one with a tagged medic), one truck, and one Battalion Chief, delivering an effective response force of 14 personnel. The assigned incident commander may, at their discretion, call for additional resources if conditions or complexity dictate.

Response assignments originate from CAD recommendations for the closest units as determined by AVL. While incident priorities always consider life safety, property conservation, and environmental

protection, the arrival of companies and staffing present dictate the actions taken. For example, the arrival of an engine company staffed with three trained personnel may be able to effectively check fire progress with a well-executed exterior attack line (two personnel on the line and one pump operator).

This rapid line placement may be sufficient to save lives by stopping fire progression from reaching live victims. Obviously, the effectiveness of the force is dependent upon the equipment and knowledge they bring to bear against the nature and location of the fire, the involved (or potentially involved) fuels, and the presence of occupants, among many other things.

Structure Fire Response	
Task	**Minimum Personnel Needed**
Incident Command	1
Safety	1
Pump Operator	1
Handline 1	2
Handline 2	2
IRIC/RIC	2
Search	2
Ventilation/Utilities	2
Rehab	1
Minimum Personnel	**14**

In order to gauge effectiveness, standards must be established. In this case, Fire Rescue used critical task assignments typically found on a representative incident. Some but not all of the task assignments may include:

- Establishment of correct response assignment
- Establishment of incident command
- Determination of fire attack type and location
- Establishing attack lines, water supply, and back-up or exposure lines
- Conducting a primary and secondary search of the structure for victims
- Providing an initial rapid intervention crew (2 personnel outside for 2 personnel inside, in case of injury, entrapment, or other emergency)
- Properly controlling fire gases and smoke
- Securing utilities and minimizing hazards to operating personnel
- Accounting for personnel and providing risk analysis and intervention if necessary
- Providing victim/patient care or firefighter rehabilitation

The objective of determining effective response, therefore, comes from having sufficient numbers of personnel on scene to whom tasks can be assigned within the prescribed period of time.

Emergency Medical Services

The successful stabilization of medical and trauma related incidents is also time-dependent. In a worst case scenario (cardiac arrest), actions taken by patients or bystanders after recognition of signs and symptoms make all the difference in the world. Physiologically, brain death begins within four to six minutes after the cessation of circulation and after ten minutes, the survivability of that patient is unlikely (American Heart Association, 2011). There is a direct correlation between the timely arrival of first responders with the proper equipment, skills, and knowledge to intervene.

Fire Rescue's leadership agreed that a patient in (or near) cardiac arrest warranted an equal lifesaving effort to that of a fire victim. Hilton Head Island's approach assigns the closest medic, the closest engine, and the next closest unit (engine, medic, or truck company), as well as a Battalion Chief on all suspected cardiac arrest alarms.

Hilton Head Island's emergency medical system is recognized as exceptional in the delivery of patient care. Fire Rescue, as they have done with fire-related situations, has engaged the public as the first step toward solving the problem. CPR, AED, and First Aid classes are offered for free and conducted regularly by the agency. The 9-1-1 Center has been trained and coaches individuals to perform important initial duties. An aggressive effort has been made to add automated external defibrillators to many public areas. The hospital supports the definitive care aspects of the plan.

The agency's early adoption of high performance CPR has been recognized by the IAFC and the AHA, among others. Fire Rescue, and the Hilton Head community as a whole, has been selected as one of the first outside of the Seattle and Wake County communities to participate in the Resuscitation Academy, and is also being considered in a partnership with the Resuscitation Academy, the American Heart Association, and Laerdal as a Global Resuscitation Alliance site.

The following criteria were used in part to define risk categories for medical services:

- Very low risk – Sick calls, falls without injury, alert with no respiratory difficulty (Alpha).
- Low risk – Acute illness, limb injuries, pain, fainting (Bravo, Charlie).
- Medium risk – Illness or injury including respiratory compromise, significant and sustained changes in consciousness, systemic reactions, shock (Delta).
- High risk – Cardiac arrest (Echo).

Emergency Medical Critical Tasking Analysis – Effective Response Force

Every Hilton Head Island engine company has at least one paramedic and two EMTs on board, as well as medical equipment to immediately intervene in a life-threatening emergency. The agency's cross-staffing system utilizes those same personnel to staff an ambulance if so dispatched. The same personnel who staff a medic are the same who staff an engine company, so the level of care is the same.

Cardiac Arrest Response	
Task	**Minimum Personnel Needed**
Incident Command	1
Code Commander	1
Airway	1
Monitor	1
Meds	1
Compressions	2
Minimum Personnel	**7**

Every Fire Rescue ambulance is a South Carolina licensed advanced life support unit. These medics carry state-of-the-art medical equipment, including the latest technology in cardiac diagnostics, to deliver extraordinary and compassionate healthcare.

When an individual calls 911 on Hilton Head Island, not only do trained dispatchers utilize an approved protocol to determine what resources are best sent, but can also give life-saving directions to the caller in order to stabilize the situation before the arrival of the team. From that perspective, a standard response to high risk medical incidents in the jurisdiction are based upon the projected tasks:

- Establishment of correct response assignment
- Establishment of incident command
- Patient assessment and intervention
- Performance of basic patient management, including high performance compressions
- Maintenance of a patent airway and sufficient respiratory support
- Identification and interpretation of pertinent signs, symptoms, and diagnostics
- Administration of advanced therapeutic actions

Technical Rescue

Technical rescue has its own challenges, but is generally an issue of access to the victim and then extrication of the victim to a medical team that can deliver more definitive care. All Fire Rescue apparatus carry a minimum complement of equipment to stabilize incidents at the NFPA 1670 Operations level for confined space, trench, collapse, vehicle/machinery extrication, and high angle emergencies. Truck 6, Engine 1, and Engine 5 (quints) carry equipment sufficient to deliver vehicle and machinery extrication at the NFPA 1670 Technician level.

While there are some moderate to high hazard risks within the jurisdiction, call volume in this discipline has not produced significantly relevant statistics for analysis. Fire Rescue again, led the forefront of urban search and rescue response in South Carolina and the region, being the only one of five agencies qualified to become a state US&R response team that wasn't located in a major South Carolina city. Even then, Hilton Head Island's program was one of the only three programs to be considered "operational" after subsequent third-party evaluations conducted by the State in 2010.

The following criteria were used in part to define risk categories for technical rescue:

- Very low risk – Vehicle or building lockouts, elevator rescues (non-emergent except with mitigating factors like outside temperatures, assistance to law enforcement on health and welfare checks).
- Low risk – Automobile and simple machinery extrication, construction site accidents.
- Medium risk – Low angle or confined space entry, disentanglement (TRT).
- High risk – Structural collapse, trench, or permit required confined space entry (Regional Response Team).

Technical Rescue Critical Tasking Analysis – Effective Response Force

All Fire Rescue line personnel have been trained in vehicle extrication at the NFPA 1006 Operations level. A sufficient number of line and staff personnel have been trained using NFPA 1006 at the Collapse Rescue Technician level (which requires confined space, trench, vehicle/machinery, and high angle technician competency) to use equipment carried on the truck company and on Rescue 1 to conduct operations at NFPA 1670's Technician level. A critical task analysis for a low-risk technical rescue involved 10 personnel. Further analysis is required to refine the effective response force.

Hilton Head Island uses those internal resources (Technical Rescue Team) but by having that capability, has also been recognized and serves as a regional urban search and rescue response team through the South Carolina State Search and Rescue Program. Response at the State level is provided outside of the jurisdiction and requires activation of a partnership with Bluffton Fire District. Rescue 1 carries equipment sufficient to deliver capability of a FEMA-equivalent Type I Collapse Rescue Team.

Technical Rescue Response	
Task	**Minimum Personnel Needed**
IC/Safety	1
Pump operator	1
Hazard control	2
Medical	2
Extrication/Rescue	4
Minimum Personnel	**10**

The tasks necessary to manage a technical rescue are many and varied, but tend to involve fairly standard components:

- Establishment of correct response assignment
- Establishment of incident command
- Determination of hazard type and location
- Establishing hazard control such as isolating energy sources, stabilizing, and taking steps to remove fuels or ignition sources.
- Conducting a primary and secondary search and then stabilization of victims for removal
- Providing an initial rapid intervention crew
- Properly monitoring and controlling the atmospheric conditions
- Accounting for personnel and providing risk analysis and intervention if necessary
- Providing victim/patient care

Hazardous Materials

As with technical rescue, there are moderate to high hazard risks within the jurisdiction, but call volume in this discipline has not produced significantly relevant data. Hilton Head Island does not have an appreciable level of industry or heavy commercial occupancies that utilize hazardous chemicals, but that is not to say the threat is absent. Most incidents within the jurisdiction have been limited releases or releases involving known (and planned for) materials. On occasion, Fire Rescue is utilized as back-up to law enforcement for potential chemical/biological threats.

However, like the technical rescue discipline, Hilton Head Island instigated the development of a hazardous materials response team in the late 1980's. While the original partnership was within Beaufort County's fire departments, the effort has only been sustained in the team maintained between Hilton Head Island and Bluffton. Again, this joint team is one of only a few still considered "operational" after third-party evaluations.

The following criteria were used in part to define risk categories for fire suppression services:

- Low risk – Automobile fuel leaks, outside chemical odors, fuel or oil investigations in wetlands and waterways, individual exposure to chemicals (as part of a medical response), carbon monoxide alarms (Level 1)

- Medium risk – Chemical odors inside a structure, visible leaks or releases in known hazardous occupancies, hydrocarbon spills of greater than 20 gallons (Level 2)
- High risk – Large spills or releases, criminal release of biological, chemical, or other hazardous materials, exotic unknown material releases (Regional Response Team).

Hazardous Materials Critical Tasking Analysis – Effective Response Force

All Fire Rescue line personnel have been trained in hazardous material response at the NFPA 472 Operations level. Over fifty line and staff personnel have been trained using NFPA 472 at the HAZMAT Technician level. All Fire Rescue engine companies and the truck company carry equipment to manage small hazardous chemical spills, provided the products are not highly toxic or have high vapor pressures.

Level 2 HAZMAT Response	
Task	**Minimum Personnel Needed**
Incident Commander	1
Safety	1
Entry Team/Backup	4
DECON	2
Science (SITL)	1
EMS	2
Minimum Personnel	**11**

Hilton Head Island does have capability to respond to larger or more complex releases using its internal resources. In partnership with Bluffton Fire District, however, the team is recognized and serves as a regional HAZMAT and WMD response team through the South Carolina Mutual Aid Agreement. HAZMAT 2 carries equipment sufficient to deliver capability of a FEMA-equivalent Type I HAZMAT Team, if so staffed.

While hazardous materials response at its basic level is conducted by a single engine company, a "Level 2" hazardous materials response, as would be seen with a more complex or larger chemical release requires tasks that include:

- Establishment of correct response assignment
- Establishment of incident command
- Determination of hazard type, location, chemical characteristics, environmental effects
- Establishing hazard control such as isolating energy sources, stabilizing, and taking steps to remove fuels or ignition sources.
- Conducting entry and stabilization
- Providing an initial rapid intervention crew (back-up team)
- Providing decontamination and securing residual materials
- Accounting for personnel and providing risk analysis and intervention if necessary
- Providing medical monitoring of entry personnel

E. HISTORICAL PERSPECTIVE AND SUMMARY OF SYSTEM PERFORMANCE

DISTRIBUTION FACTORS

Distribution factors refer to the speed at which the first resources arrive. The Standards of Cover for Hilton Head Island Fire Rescue have been derived from, and are influenced by, two specific concepts: distribution of emergency resources and the concentration of those resources throughout the community. Distribution of response resources define the specific geographical location for each resource. Resources change locations at any one point in time. These estimates are based upon what is considered "first due" or the closest resource under normal response conditions.

Fire station locations on Hilton Head Island have been subject to review on a number of occasions. These reviews have resulted at times in the movement of stations (Stations 3 and 4) and the addition of stations (Station 7). They have also been used to emphasize that the current location for a station is the best location. In some cases, like as in the case of Station 1, movement of the station was considered, but acquisition of property problematic. The location works, however, because the majority of the calls in that HPZ are still proximal to the current station as compared to where the proposed location would have been.

Fire Rescue has also made attempts to speed response through the allocation of traffic preemption, and through the addition of emergency access gates. These attempts have improved coverage for less cost than relocating fire stations, but are not the complete solution.

CONCENTRATION FACTORS

Concentration of resources is the measure of how responding resources included in the balance of the first alarm assignment can arrive into a given area to mitigate the emergency within adopted benchmark performance with the defined effective response force (ERF). This defined concentration of resources allows response personnel to arrive in time to "stop loss" before a cascade event occurs. Examples include arrival in the pre-flashover phase of a fire, or to be providing medical care in time to change the outcome of a patient's medical emergency.

Concentration of emergency response resources on the Island is a result of a desire for optimum service. Fire Rescue does operate out of fixed locations, but relies upon AVL to determine the closest appropriate and available unit and sends that unit, assuring that the ERF is not driven by what should be occurring, but what actually is occurring. When a unit is closer to an emergency but it is not in their "district", they are sent to the alarm, regardless of whether or not the incident is over a perceived line or territory.

Because this is a dynamic situation, measurement is difficult, except when it is based upon the time it takes to get from an area where the resources are gathered on a higher percentage (fixed placement, as

in a fire station in the night hours). In the case of special events or anticipation for additional resource needs, the units may move closer to further improve the concentration (system status placement).

As service concentration pulls on the effective distribution, evaluation of the impacts on service delivery are difficult. When one company moves to handle an event, other companies flex and fill those gaps. The Fire Chief and Staff consider the most likely need for resources and staffing, and make decisions on placement based on what is known, what is anticipated, and what is feasible.

RELIABILITY FACTORS

Historical Reliability Within HPZ							
	HPZ 1	**HPZ 2**	**HPZ 3**	**HPZ 4**	**HPZ 5**	**HPZ 6**	**HPZ 7**
2011	88.19%	91.19%	87.64%	85.58%	82.72%	80.23%	82.27%
2012	88.61%	88.40%	89.83%	86.80%	82.07%	88.54%	86.93%
2013	83.62%	86.63%	88.60%	86.56%	85.21%	82.62%	82.35%
2014	73.77%	87.54%	85.57%	83.09%	85.13%	81.79%	75.43%
2015	82.39%	83.44%	81.93%	84.39%	86.54%	86.28%	83.45%
2016	86.60%	86.02%	82.90%	85.05%	87.56%	83.45%	81.68%

The balance of distribution and concentration of resources requires a third element: Reliability. The reliability factors of the SOC consider Fire Rescue's ability to place resources in place to meet the stated standard of cover, placing the appropriate resource in the right place in the right amount of time. While a review of reliability within each HPZ is notable for the understanding of station placement, it is less so of a factor in Fire Rescue, where the utilization of AVL technology finds the closest unit, regardless of assigned district.

That said, average reliability over a six year period (2011-2016) within each HPZ historically averages at 84.73%. Since the majority of calls are within waking hours, and it is at those times when Fire Rescue is not only responding to alarms, but tending to ancillary duties, reliability is sufficient even when out in their HPZ, for those units to respond within that zone with such high frequency.

COMPARABILITY FACTORS

Fire Rescue is assessed against best practices and industry standards. Hilton Head Island Fire Rescue has been an accredited agency since 2002. The organization uses National Fire Protection Association standards to guide staffing and performance, among other recommendations. The Insurance Services Office (ISO) rated the Town of Hilton Head Island a Class 3 and is expected to perform a scheduled reassessment in late 2016.

Fire Rescue is also recognized as an innovator and a leader through its delivery of medical services, its preparation for disaster, and through the number of participants it has had invited to international, national, and regional committees from its ranks. For a department the size of Hilton Head Island's, it is as well-respected an organization as many metropolitan agencies, and as well-known.

F. PERFORMANCE OBJECTIVES AND MEASUREMENT

The benchmark and baseline matrix provides guidance on response travel time for the self-assessment process. The matrix draws on consensus standards, particularly NFPA 1710. When variances occur, study should be performed to determine the cause, and should assist in evaluating whether the established standards of cover are valid. The data Fire Rescue evaluated for this assessment only include priority responses. Priority responses are those identified as requiring emergent processing, reaction, and response efforts to resolve immediate threat to life, property, or the environment. These incidents were marked on the incident report as being "priority".

While agencies are encouraged to look at response to various risks and build the deployment of resources to effectively manage the various associated risks, the end result should not be a "one size response" to fire and non-fire events in each category. Fire Rescue utilizes a tiered response approach based on the information received from the caller. While other agencies have different fire, hazardous materials, confined space, high-angle rescue and other similar response levels, Hilton Head Island Fire Rescue utilizes triaging at the calltaker level to categorize response based on established recommendations. Furthermore, Fire Rescue has empowered responding personnel to upgrade assignments if the condition dictates the need for more resources. Finally, Fire Rescue only has a certain number of resources it can call; mutual aid response can only come from one direction and even then, it is relatively limited.

Benchmark and baseline statements are used to illustrate what an agency can deliver with the resources it has. These statements have been provided for each of the services that Fire Rescue performs: Fire Suppression (5E); Emergency Medical Services (5F); Technical Rescue (5G); and Hazardous Materials (5H). Fire Rescue does respond to water, aircraft, and wildland incidents but does not have response or resources outside of normal fire, rescue, and EMS operations to specifically address them.

Cascade of Events

Each event carries its own timelines and is influenced by any number of factors, not the least of which is the time it takes before intervention occurs to stop the process. To the uninitiated, it would seem that arrival of the ERF would be the time that would need to be monitored. There are other factors that create that time, however: call processing, turnout, travel, and set-up upon arrival. During that elapsed time, the incident becomes more complex, depending on how rapidly it goes unchecked through the growth state.

While the different disciplines or services offered by Fire Rescue have been measured, the general response is the same: Fire Rescue expects to provide quality service in an expedient manner. Whether it is a fire or a medical emergency, the call gets processed and the personnel respond in the same manner. The differences are in what type of apparatus responds or what kind of preparation must take place before responding, but otherwise, the expectation is that an emergency is an emergency and times should be consistent regardless of what that emergency happens to be.

Alarm Handling Performance

Alarm handling is a part of the Total Response Time measurement and is tracked within the Computer Aided Dispatching (CAD) software. This time segment begins with answering 911 (first keystroke) at the Fire Rescue PSAP and ends when the *closest appropriate unit* has been notified of the event. Hilton Head Island's E911 center is exclusively operated by Fire Rescue, creating confidence that performance is being properly measured and managed.

Firefighter Turnout Time Performance

This segment begins at notification of the closest appropriate unit and ends at the point the unit status in CAD is changed to "en route". This segment is evaluated for priority calls only. When the officer on the responding unit transmits they are "responding", indicating their unit is in motion toward the scene, it cues the Dispatcher to change their status. Reaction of response personnel, determination of incident information, choosing the correct apparatus, donning gear, and safely boarding the apparatus for response constitutes the turnout time.

Part of the difficulty in measuring this element is the human interface. The time stamp is dependent upon radio transmission and the dispatcher reaction to the transmission. Congested radio traffic may cause transmission of the message to be delayed, resulting in a prolonged turnout time segment.

Unit Travel Time

Unit travel time starts when the unit status in CAD is changed to "en route" and ends when the unit status in CAD is changed to "on scene". Dispatch receives its cue to change the status when it receives a radio transmission from the unit that it has arrived "curb side" or to a designated staging location. Separately, Fire Rescue also measures time to arrival/interaction with the patient on all medical calls, as the time for arrival to the time of patient interaction may be delayed due to their location in a building or complex, or access to the patient (as in a technical rescue).

Travel time on Hilton Head Island is affected by much of the same issues as in many other communities. Nationwide, it seems that more and more drivers are distracted, and failure to yield is more prevalent. Traffic preemption was obtained and makes some difference. All community gates on the Island are required to install a Fire Rescue-triggered switch (Click2Enter) to open the gate, eliminating the need for access codes. Emergency access gates (also using the Click2Enter) make a difference as well, but not every neighborhood has the opportunity or the desire to add them, especially since these gates must be maintained.

Total Response Time

Total response time is indicated as a qualified data set when all three elements exist, creating a segment from the call receipt to the arrival of the first unit on the scene. This segment begins at the first keystroke (of alarm handling time) and ends when the appropriate unit status in CAD is changed to on scene. In regard to "total response time – first unit", this would end when the first unit arrives on scene. In regard to "total response time – last unit", this would end when the last arriving unit of a pre-determined response (usually a first alarm assignment) arrives on scene. This is the marker for achieving the effective response force parameter.

PERFORMANCE OBJECTIVES - BENCHMARKS

Benchmark statements, or goals, describe the ultimate level (future) of performance for an agency. These goals describe the level at which Fire Rescue is striving to perform, in the context of continuous improvement. For the purposes of definition and the need to establish a common benchmark for purposes of evaluating response time accreditation criteria, Fire Rescue's Senior Staff utilized data from previous alarm responses, considered realistic expectations, and as a group, considered benchmarks for use.

Baselines & Benchmarks – Priority Calls, First Arriving Unit at 90th Percentile		
Segment	**Baseline 2012-2016**	**Benchmark**
Alarm handling – all calls	1:32	1:20
Turnout – EMS	2:31	1:45
Turnout – Fire	2:54	2:30
Travel – all calls	5:43	5:00
Travel – EMS	5:35	5:00
Travel - Fire	6:04	5:00
Total response - EMS	8:29	8:05
Total response - Fire	9:18	8:50

Each of the times are available and used in defining norms for Fire Rescue. Senior staff has discussed method-time study to create efficiencies, however, events that fall outside the norms should be examined for root cause to determine if improvements can be recommended.

Alarm Handling Performance Benchmark

Fire Rescue established the alarm handling benchmark at one minute and 20 seconds at the 90th percentile of all priority alarms. To assess performance, alarm handling baseline performance measurement will continue to be assessed on a quarterly basis.

Benchmark – Priority Calls, Arrival of Effective Response Force at 90th Percentile	
Segment	**Benchmark**
Cardiac Arrest (7)	12:00
Structure Fire (14)	15:00
Technical Rescue (10)	15:00
Hazardous Materials (11)	15:00

Firefighter Turnout Time Performance Benchmark

Fire Rescue established the turnout time benchmark at one minute and 45 seconds at the 90th percentile of all priority alarms. To assess performance, turnout baseline performance measurement will be assessed on a quarterly basis.

Unit Travel Time Benchmark

Fire Rescue will continue to utilize the unit travel time benchmark of five minutes for the 90th percentile of all alarms. To assess performance, unit travel time baseline performance measurement will be assessed on a quarterly basis.

Total Response Time Benchmark

Total response time is indicated as a qualified data set when all three elements exist. Fire Rescue established the total response time benchmark at eight minutes and five seconds for the 90th percentile of all priority alarms.

Fire Suppression Service - Benchmark Statement

For 90 percent of all structure fires, the total response time for the arrival of the first-due unit, staffed with 2 firefighters, shall be eight minutes and 50 seconds. The first-due unit for all risk levels shall be capable of: Providing 500 gallons of water and 1,500 gallons per minute (gpm) pumping capacity; initiating command; requesting additional resources; establishing an attack line, flowing a minimum of 150 gpm; establishing an uninterrupted water supply; and rescuing at-risk victims. All operations shall be done in accordance with departmental standard operating procedures while providing for the safety of responders and the general public.

For 90 percent of all low and medium risk structure fires, the total response time for the arrival of the ERF, staffed with 14 firefighters and officers, shall be 15 minutes. For 90 percent of all high risk structure fires, the total response time for the arrival of the ERF, staffed with 17 firefighters and officers, shall be 20 minutes.

The ERF for medium risk shall be capable of: Establishing command; appointing a site safety officer; providing an uninterrupted water supply; advancing an attack line and a backup line for fire control; complying with the Occupational Safety and Health Administration (OSHA) requirements of two-in and two-out; completing forcible entry; searching for and rescuing at-risk victims; ventilating the structure; controlling utilities; and performing salvage and overhaul. The ERF for high risk structure fires shall also be capable of placing elevated streams into service from aerial ladders.

Unless the minimum requirements of OSHA's two-in/two-out rule are met, guidelines established by Fire Rescue prohibit the entry of personnel into involved structures unless there is an immediate life-safety threat and entry must be made to rescue individuals. Even then, a risk analysis shall be considered as to the viability of victims prior to entry. Fire can be attacked in accordance with best practices by using streams, cooling or removing fuels, or isolating the fire. Otherwise, personnel shall wait until sufficient forces are present to comply with two-in/two-out regulations.

Emergency Medical Service – Benchmark Statement

For 90 percent of all emergency medical calls, the total response time for the arrival of the first-due unit, staffed with one EMT and one paramedic, shall be eight minutes and five seconds. The first-due unit for all risk levels shall be capable of: providing basic life support; initiating command; requesting additional resources; establishing patient contact and scene control; performing a patient assessment; providing treatment of injury and illness; and transporting the patient to a definitive health care facility. All operations shall be done in accordance with departmental standard operating procedures while providing for the safety of responders and the general public.

For 90 percent of all high risk medical calls, the total response time for the arrival of the ERF, staffed with 6 emergency medical technicians and one paramedic, shall be 12 minutes.

The ERF for high risk medical calls shall be capable of: Providing advanced life support; establishing command; requesting additional resources; maintaining patient contact and providing treatment of injury and illness; crew-oriented cardiopulmonary resuscitation; and transporting the patient to a definitive health care facility.

Technical Rescue Service – Benchmark Statement

For 90 percent of all technical rescue incidents, the benchmark total response time for the arrival of the first-due unit, staffed with one EMT and one paramedic is the same as in an emergency medical response, which is eight minutes and five seconds. Because of cross-staffing, the first-due unit is capable of: establishing command; evaluating the need for additional resources; sizing up to determine if a technical rescue response is required; isolating the scene and controlling immediate hazards; and providing basic life support to victims without endangering response personnel. All operations shall be done in accordance with departmental standard operating procedures while providing for the safety of responders and the general public.

For the 90th percentile of low and medium risk technical rescue incidents, the total response time for the arrival of the ERF, staffed with nine firefighters/officers and one chief officer (total of 10 personnel) is 15 minutes. The ERF is capable of: appointing a site safety officer; managing more complex hazards; accessing the victim; victim stabilization; extrication and disentanglement; treatment and transport.

High risk technical rescue incidents are outside the scope of Fire Rescue without activating mutual aid agreements for additional resources. For 90 percent of high risk technical rescue incidents, the benchmark total response time for the arrival of the effective response force, staffed with a minimum of 17 personnel is 30 minutes. The ERF is capable of: Providing a dedicated incident safety officer; site monitoring, ventilation, and support activities; rigging, cutting and/or shoring teams; and the knowledge, skills, and abilities to mitigate a technical rescue incident.

Hazardous Material Service Benchmarks

For 90 percent of all hazardous materials incidents, the benchmark total response time for the arrival of the first-due unit, staffed with a minimum of two firefighters is eight minutes and 50 seconds. The first-due unit is capable of: establishing command; evaluating the need for additional resources; sizing up to determine if a hazardous materials response is required; isolating the scene and controlling immediate hazards; and providing basic life support to victims without endangering response personnel.

For the 90th percentile of all medium risk hazardous materials response incidents (Level 2 responses), the total response time for the arrival of the ERF including the hazardous materials response personnel, staffed with 11 firefighters and officers, is 20 minutes. The ERF is capable of: Appointing a site safety officer; managing more complex hazards; accessing and stabilization of victims; mitigating material releases; decontamination; and/or stabilizing the scene for private clean-up contractors.

High risk hazardous materials incidents are outside the scope of Fire Rescue without activating mutual aid agreements for additional resources. For 90 percent of high risk hazardous materials incidents, the benchmark total response time for the arrival of the effective response force, staffed with a minimum of 17 personnel is 30 minutes. The ERF is capable of: Providing a dedicated incident safety officer; emergency or mass decontamination; defensive containment measures; and the knowledge, skills, and abilities to mitigate a hazardous materials incident.

PERFORMANCE OBJECTIVES - BASELINES

Baseline statements describe the agency's actual (current) performance and are provided for the same services as benchmark statements.

The chart, *All Priority Calls*, illustrates the total performance on all priority alarms where a unit arrived on scene. These calls include fire, EMS, rescue, and hazardous condition alarms. Within this chart, baselines for alarm handling, turnout time, travel time, and total response time are generally expressed.

All Priority Calls 90th Percentile Times Baseline Performance		2012	2013	2014	2015	2016	2012 - 2016
Alarm Handling	Pick-up phone to Dispatch	01:03	01:35	01:37	01:29	01:31	01:32
Turnout Time	Turnout time first unit	02:52	02:43	02:24	02:17	02:25	02:33
Travel Time	Travel time first unit	05:42	05:48	05:46	05:42	05:32	05:41
Total Response Time	Total response time for first unit	08:53	08:52	08:37	08:30	08:33	08:40

Alarm Handling Performance

The data supports that Fire Rescue had a baseline alarm handling performance for the period 2012 through 2016 in which all priority level calls were handled in one minute and 32 seconds at the 90th percentile. For fire calls, alarm handling occurred in one minute and 36 seconds at the 90th percentile; for EMS calls, alarm handling occurred in one minute and 30 seconds at the 90th percentile.

In 2012, Fire Rescue implemented industry standard protocols (ProQA) that while increasing time slightly, improved the quality of information and analysis for determining resources needed.

Firefighter Turnout Time Performance

Fire Rescue's baseline performance for turnout time for the period 2012 through 2016 was measured and only slight difference noted between fire and EMS responses. Turnout for all Priority level calls within the period measured two minutes and 32 seconds at the 90th percentile. Fire Rescue personnel turned out for fire calls within two minutes and 47 seconds at the 90th percentile; turnout for EMS calls occurred within two minutes and 25 seconds at the 90th percentile.

Unit Travel Time

Unit travel time was calculated using calls marked as "priority" where a Fire Rescue resource arrived on the scene. This has bearing because in instances where non-priority responses occurred, companies still move expediently as possible, but units are not permitted to take special exemptions to traffic laws. Fire Rescue's baseline performance for travel time for the period 2012 through 2016 in all priority calls was five minutes and 41 seconds at the 90th percentile. Travel for fire calls took six minutes and five seconds at the 90th percentile; EMS calls required five minutes and 33 seconds at the 90th percentile.

Fire Rescue, in earlier versions of their SOC, as well as identified in their Strategic Plan, established that the first arriving unit should arrive on the scene of a priority call within "an average of" five minutes. This same standard was cited as a reason for relocating Stations 3 and 4, as well as the addition of Station 7, improving distribution.

Total Response Time

The total response time was calculated using all priority calls in which the three criteria were present. The total response time for all priority calls was reported at eight minutes and 40 seconds within the 90th percentile. Fire Rescue established that fire calls had a total response time of nine minutes and 18 seconds within the 90th percentile; EMS calls required eight minutes and 24 seconds within the 90th percentile.

Fire Suppression Service Baselines

Fire Rescue's baseline statements reflect actual performance during 2012 to 2016. Fire Rescue does not rely on the use of automatic aid to provide its ERF. Fire Rescue considered all priority fire calls for the total response time of the first unit. Historically, the ERF for structure fires were measured where the balance of the first alarm assignment arrived and went into service. During response or on arrival, when information indicated a higher risk was involved, officers were always given discretion to add resources to the call.

In the period 2012 to 2016, for 90 percent of all structure fires, the total response time for the arrival of the first unit, staffed with at least two firefighters, was eight minutes and 39 seconds.

For 90 percent of all structure fires, the total response time for the arrival of the ERF, staffed with 14 firefighters and officers, was 18 minutes and one second. This was measured for a total of 135 incidents in that period.

Emergency Medical Service Baselines

Fire Rescue's baseline statements reflect actual performance during 2012 to 2016. Per Town Ordinance, Fire Rescue is the sole provider of E911-originated advanced life support treatment and transport within the jurisdiction. The department does not rely on the use of automatic aid to provide its ERF. These resources are immediately available as part of a seamless response system.

When a request for medical service is received by the E911 Center, at least one medic unit is immediately dispatched, to minimize the delay in the patient receiving emergency medical care. While this unit is responding, continued information is obtained and further resources added according to established protocols. Fire Rescue considered all priority medical calls for the total response time of the first unit.

Since for Fire Rescue, the ERF for cardiac arrest calls is consistent, all cardiac arrest calls were measured where the balance of the first alarm assignment arrived and went into service. A change must be noted, however: The ERF for cardiac arrest alarms has changed in the five year period since the last SOC was published. As a result of changes in the Emergency Cardiac Care recommendations, in 2013 Fire Rescue added a Battalion Chief to the ERF, then in 2014 established a new ERF to reflect Fire Rescue's "pit crew" approach to high-performance CPR.

For 90 percent of all emergency medical calls, the total response time for the arrival of the first-due unit, staffed with one EMT and one paramedic, was eight minutes and 12 seconds.

For 90 percent of all high risk medical calls, the total response time for the arrival of the ERF, staffed with at least six emergency medical technicians and one paramedic, was 16 minutes and 57 seconds. This was measured for 293 alarms in this period.

Technical Rescue Service Baselines

The number of technical rescue incidents during 2012 to 2016 did not provide a statistically significant result to analyze. The department does not rely on the use of automatic aid to provide its effective response force complement of technical rescue personnel on low or medium risk incidents. At the high risk level, the frequency of response is so low that these resources are not constantly staffed, but rely on a partnership with Bluffton Township as part of the response system.

For 90 percent of all technical rescue incidents, the baseline total response time for the arrival of the first-due unit, staffed with a minimum of two firefighters was 11 minutes and 47 seconds.

For the 90th percentile of low risk technical rescue incidents, the total response time for the arrival of the ERF, staffed with nine firefighters/officers and one chief officer (total of 10 personnel) was 16 minutes and 59 seconds. 31 incidents were utilized to develop this information. As no incidents met the specified level of risk, a baseline for medium or high risk technical rescue incidents was not measured.

Hazardous Material Service Baselines

Response to hazardous materials incidents during 2012 to 2016 also provided results that were difficult to measure. Again, the department does not rely on the use of automatic aid to provide its effective response force for low or moderate risk incidents, but these resources are constantly staffed as part of the response system. Likewise with Bluffton, a partnership that provides a full technician level response is utilized to meet any high risk incidents, but the number of those responses have been insignificant.

At the 90th percentile of all hazardous materials response incidents, the total response time for the arrival of the first-due unit, staffed with two firefighters, was nine minutes and 53 seconds.

For the 90th percentile of all medium risk hazardous materials response incidents (Level 2), the total response time for the arrival of the ERF including the hazardous materials response personnel, staffed with 11 firefighters and officers, is 30 minutes and eight seconds. The ERF is capable of: Providing a dedicated incident safety officer; emergency or mass decontamination; defensive containment measures; and the knowledge, skills, and abilities to mitigate a hazardous materials incident.

This page intentionally left blank

G. COMPLIANCE METHODOLOGY

The methodology used by Fire Rescue meets the compliance measures for the SOC. To maintain the community's confidence in the SOC, the methods used to ensure its compliance are critically important.

COMPLIANCE TEAM/RESPONSIBILITY

Since the first edition of the Fire Rescue's SOC, the development and primary responsibility for compliance has been placed with the Fire Chief and supported by a designated accreditation manager. With assistance from all divisions of Fire Rescue, the Fire Chief maintains and reports the agency's compliance to the Town Manager, the Mayor, and Town Council. Those outside Fire Rescue who contributed directly to the SOC compliance and documentation process included the Town's GIS Administrator.

PERFORMANCE EVALUATION AND COMPLIANCE STRATEGY

Fire Rescue, as charged in the statement of purpose, is an all-hazards response organization. As a fire department, Fire Rescue responds to traditional fire calls that all fire departments respond to. The similarities end there as Fire Rescue's scope and purpose focus efforts on extraordinary customer service. The Mission calls for Fire Rescue to respond with "courage, commitment, and compassion". Fire Rescue's culture is such that each individual understands they are charged with providing exemplary customer service. Responding to a request for service is not "just putting out a fire" or "picking up a patient"; personnel are encouraged to see each event as an opportunity to serve a neighbor in need.

As an emergency medical service, Fire Rescue provides advanced life support response, treatment, and transport. With the exception of water rescue, Fire Rescue is also charged with response to technical rescue and hazardous materials emergencies. Local risk of these events indicated that Fire Rescue should prepare, equip, and train for those eventualities, but the frequency was such that committing full-time staffing was not a rational decision. Innovation was required.

Fire Rescue has a methodology that originated in 1995 and has been continually evaluated. At that time, Fire Rescue reduced some companies and added a cross-staffing system to address 95% of the jurisdictional risk: fire and medical service requests. Based on service need, each HPZ has a medic and an engine assigned for response. During the time of day where call volume is at its highest, Fire Rescue also added a unit (Coverage Company) that can rove and fill gaps.

Analysis of call volume and type determined whether a HPZ should be routinely staffed with a four-person or a three-person engine/medic company. Stations 1, 2, and 5, due to location and call volume, were constantly staffed to provide a "split" crew, i.e.; two personnel would dismount from the engine company and staff a medic for response to EMS calls, leaving a two-person engine company available in these particular districts. At Stations 3, 4, 6, and 7, their proximity to other stations and their manageable call volume permitted an entire three-person company to "jump" from the engine company

to an assigned medic for response to the EMS calls. While adjusted over time to reflect needs, this model has served the entire time with very few reliability issues. Likewise, when a requirement occurs for specialty response (technician level HAZMAT or rescue), personnel assigned to regular companies will respond the appropriate apparatus (Hilton Head Island Fire Rescue, 2016).

Fire Rescue monitors performance through a number of methods, both organizationally and individually. Personnel evaluations are structured to provide feedback on meeting organizational goals and benchmarks. Post-incident analysis is conducted and the after action reports shared with all personnel for review. Cardiac arrest calls are evaluated and posted for improvement and shared through the Centers for Disease Control and Prevention's *Cardiac Arrest Registry to Enhance Survival* program (CARES Registry). There is routine quality assurance for 911 call-taking. Fire Rescue recognizes the need to improve their documentation of the methodology, but the organization is certainly examining their outputs, creating change to improve performance, and re-evaluating to ensure success.

While recognizing this model is not perfect, it has, with adjustments, served its purpose. Fire Rescue is aware that changes in risk are creating an increase in demands. Hilton Head Island is seeing escalated call volumes, changes in demographics, and socioeconomic risks reflective of more urban communities.

Station 4 was moved to cover a rise in population in the northern aspects of the Island. Station 7 was added to address a new opportunity with the opening of the Cross Island Parkway and to relieve call volume from one of the busier HPZs. Review of heat maps showing fire and EMS call distribution have demonstrated these moves/additions were effective.

As a matter of assessment, the system is working. Fire protection and sufficient code enforcement keep catastrophic fire loss down. Changes in technique and additional resources have increased the number of lives saved due to cardiac arrest. There is overwhelmingly positive, unsolicited feedback from customers, appreciative of the quality of their service. Continued evaluation, however, is prudent. As call volume or type or complexity evolves, there may need to be further adjustments.

COMPLIANCE VERIFICATION REPORTING

To assure overall system compliance, monthly and quarterly verification reports are generated. The risk assessment component is updated with information from both Fire Prevention and Line Operations as they each work in the field. SOC performance measurements are included in Fire Rescue's Strategic Plan and will be updated in the next revision of that document.

Data used to verify the SOC performance was and is generated by the Town's Computer Aided Dispatching software (CAD) and Zoll *FireRMS* software. Reports are developed and reviewed for compliance with the baseline measurements. Fire Rescue's CAD system initiates responses and the CAD

time stamps rely on human intervention. Then the information is checked by an officer who verifies its accuracy. Each of these human interventions are seen as weak spots in the reliability of the data.

Future efforts are being made to determine if automation can increase the performance. Likewise, ensuring the proper data sets are utilized to create reports for verification is a vulnerability. Historically, reports generated by some users provided outputs different than by others. A standardized data set is being discussed and agreed upon that can be used to build a "dashboard" for regular use by all Fire Rescue personnel. The graphic representation and access to uniform data will hopefully cause more interest in accuracy as well as in developing efficiencies.

CONSTANT IMPROVEMENT STRATEGY

Fire Rescue has historically stayed in front of emerging issues. As one example, Fire Rescue recognized in July 2014 that global increases in hemorrhagic disease could pose a local problem at some point. By October of that year, when the international community began to react, Fire Rescue already had a plan to develop capability and was well ahead of other responders in the ability to respond effectively, if so required.

All company officers are assigned a program or a project within the organization that they must manage. Some of these are much more intense than others, but every one of them addresses a necessary aspect that must be considered, monitored, and actions taken upon. Furthermore, an effort to develop more consistent problem solving methodology among personnel has resulted in committees and work groups being directed to use templates for recording meeting minutes, wider distribution of findings and workflow, and a systematic approach to addressing needs.

Fire Rescue utilizes a six step approach to problem solving that includes identification of the need, the problem, or the challenge; getting facts from stakeholders; analysis and determination of alternatives; choosing the best alternative and developing a plan; implementation of the plan; and monitoring results with revision or improvement if necessary. Having a common problem solving process contributes to issues being handled at the lowest level, encourages committee participation, fosters buy-in of stakeholders, and the steps are traceable, which helps in continuity of planning.

Reports on turnout time and total response time have been provided at monthly officer meetings and published in those minutes. Post-incident review is conducted in the form of "tailboard talks" as well as in formalized after action reviews. Cardiac arrests are scrutinized and the data shared with all personnel as well as through the CARES Registry, to measure system performance.

As the automation and the anticipated dashboard are two elements to produce improvement, Hilton Head Island Fire Rescue utilizes a strategic planning process which included stakeholders to determine priorities and set goals and objectives. This broad document included the base components of previous SOCs. While the performance measurements stated in previous SOCs were shared, as an observation in the development of this SOC, considerably more reporting and discussion will occur. The result of this SOC has already exposed that all facets of the organization must be regularly engaged on at least a monthly basis. Fire Rescue's personnel have routinely demonstrated a desire to self-police and improve in their performance. Creating a means by which individuals can see their contribution to the "big picture" is likely to pique their interest and motivate them to be innovative while adhering to the

agency's direction and policy. The dashboard, regular posting of statistics, scheduled meetings, and formalization of the process should together inspire more effective performance.

As a matter of educating all stakeholders, the measurements of the SOC will be included in the Town's annual budget reports and Fire Rescue's annual budget proposals. Lessons learned in this revision have educated the entire staff on the importance of the organization's performance measurements to ensure the needs of the community are met. While continued improvement is anticipated, changes in the service delivery are already being considered, from reorganization of staff to adding personnel. The annual increase in call volume has not yet affected reliability and total response time, but at some point there will obviously be a diminishing number of resources as compared to need, and adjustments will be required.

H. OVERALL EVALUATION AND CONCLUSION RECOMMENDATIONS

This component of the SOC provides a summary of overall system performance, determinations, and conclusions derived from the evaluation process. Risk faced by the community is measured against agency performance and results in recommendations for improvement. These recommendations will also be considered in Fire Rescue's Strategic Plan.

EVALUATION METHODOLOGY AND DETERMINATIONS

The results of evaluating Fire Rescue's performance revealed significant information. Prior to accreditation, Fire Rescue measured itself against the same benchmarks virtually every other agency was using. As far as the community was concerned, so long as fire loss and insurance premiums were relatively low, and the fire department came when they were called, the system met their needs.

Hilton Head Island Fire Rescue determined in 1999 that a different method was required. Community growth and evolution indicated a more strategic outlook would better meet the need. Evaluation of information, performing analysis, and developing strategic plans went hand in hand with continual improvement. Simply stating a plan is necessary, however, does not create improvement. The system also requires plan development, assuring best practices are being employed, and finally, action. Once that occurs, of course, a method of evaluation must be established, then the means to refine and improve. Four separate levels of review are recommended to assess overall agency performance: Technical, Operational, Financial, and Policy.

Technical review includes data collection to assess the current state of the data and if accurate, to establish baseline points and consider the best practices identified by industry.

Operational review includes analysis of service quality. However, there are other areas that support service quality, such as personnel safety, logistical support, professional development, and balance of service to all disciplines. Areas evaluated include communications, fire, EMS, HAZMAT, and technical rescue capabilities.

Financial review includes evaluation of financial health and appropriate management. Within that, anticipation of financial support must correlate with service demand identified in the SOC and in the Strategic Plan.

Policy review must be performed against the community-wide strategic plan. The SOC is created as a team by the Senior Staff, supporting staff, and line personnel, discussed, and refined. The results are shared with other stakeholders and further polished, then to the Town Manager for final adjustments and eventual adoption by Town Council.

Strategically, final decisions are made based on those four assessments. Performing these assessments, associated with education of external stakeholders, creates transparency, engages the community, and develops trust that their Fire Rescue organization is truly a quality asset.

Program Performance Evaluation

To assure compliance with the SOC, performance of all aspects of service delivery must be reviewed. For the purposes of evaluating and establishing baseline and benchmark performance, Fire Rescue measured events in each service program at the 90th percentile, which examines the majority of data and segregates outlier data for further evaluation as a potential sentinel event. The following data depicts performance over five years in each aspect of Fire Rescue's service delivery.

All Priority Calls

The chart *All Priority Calls*, utilized data from 32,097 calls to determine alarm handling, turnout time, travel time, and total response times for the first arriving unit at any priority call in which all those criteria occurred. As earlier discussed, priority events were defined as having been marked priority in the incident reporting, denoting that units responded in an emergent mode to the scene. While the requested service, once an assessment was conducted, may not have risen to an immediate life, property, or environmentally threatening condition, the caller information was such to trigger a priority response.

All Priority Calls 90th Percentile Times Baseline Performance		2012	2013	2014	2015	2016	2012 - 2016
Alarm Handling	Pick-up phone to Dispatch	01:03	01:35	01:37	01:29	01:31	01:32
Turnout Time	Turnout time first unit	02:52	02:43	02:24	02:17	02:25	02:33
Travel Time	Travel time first unit	05:42	05:48	05:46	05:42	05:32	05:41
Total Response Time	Total response time for first unit	08:53	08:52	08:37	08:30	08:33	08:40
Total calls		5705	6270	6215	6712	7195	32097

As can be seen, all times for the five year period beginning in 2012 and ending in 2016 are relatively consistent. An increase in alarm handling time, when discussed, seemed attributable to a change in procedure at that time to increase the quality of calltaker information. There is also a more appreciable drop in turnout time, in this case appearing to be discussion on increased scrutiny and better definition of that interval's measurements with the Line Personnel, along with recommendations to speed up reaction time. Travel time remained consistent with a 16 second deviation. There is also the likelihood that the increase in time for obtaining better information resulted in better determination of resource need, however, in all, total response time saw a net 20 second decrease between 2012 and 2016 while experiencing a call increase of almost 1500 alarms per year.

Data for the various call types were obtained and evaluated for compliance, as well as to understand potential efficiencies. Discussion on each category follows. ***All time segments are given at the 90th percentile.***

Emergency Medical Service

Emergency Medical Service - 90th Percentile Times, Baseline Performance						
	2012	2013	2014	2015	2016	2012 - 2016
Alarm Handling	1:21	1:33	1:33	1:29	1:30	1:30
Turnout Time	2:43	2:33	2:17	2:10	2:22	2:25
Travel Time	5:34	5:39	5:38	5:36	5:19	5:33
Total Response Time	8:36	8:36	8:21	8:21	8:16	8:24
Total calls	4131	4479	4506	4931	5225	23272

The most calls for service involved medical response. Emergency medical service was measured using all priority "medical" incidents from FireRMS that met the dispatching, turnout, travel, and arrival criteria. All times were relatively consistent, with the exception of some improvements in turnout, which likely translated into the total response time improvement.

A slight increase in alarm handling time appears to have occurred coincident with a change in EMS call-taker protocol, which reportedly improved the call triaging process.

Fire Suppression Service

Fire Suppression Service - 90th Percentile Times, Baseline Performance						
	2012	2013	2014	2015	2016	2012 - 2016
Alarm Handling	1:32	1:37	1:47	1:29	1:32	1:36
Turnout Time	3:08	3:00	2:36	2:29	2:34	2:47
Travel Time	5:59	6:13	6:08	5:58	6:08	6:05
Total Response Time	9:22	9:34	9:09	8:53	9:29	9:18
Total calls	1523	1730	1654	1711	1912	8530

Fire suppression service was likewise measured using all priority "fire" incidents from FireRMS that met the dispatching, turnout, travel, and arrival criteria. Turnout time had an appreciable improvement in the five year period, to which some analysis is warranted to examine if more efficiencies can be produced.

Travel times are slightly higher than EMS calls, which might be attributable to the response of the larger, less agile apparatus. Otherwise, the times appear to be consistent with EMS calls.

Technical Rescue Service

Technical Rescue Service - 90th Percentile Times, Baseline Performance						
	2012	2013	2014	2015	2016	2012 - 2016
Alarm Handling	2:14	4:04	2:57	2:41	4:07	3:15
Turnout Time	3:07	2:18	1:57	2:13	2:28	2:42
Travel Time	5:39	4:50	6:09	7:57	7:55	6:30
Total Response Time	9:50	11:20	9:48	13:01	12:41	11:47
Total calls	17	13	15	11	9	65

Technical rescue service encompassed calls coded for extrications from vehicles, machinery, structural or trench collapse, confined spaces, high angles, or otherwise "entrapped" victims. This category also covered priority animal rescue.

Although Fire Rescue responds to water and surf rescue for command and control purposes, as well as to provide emergency medical care for responders or victims, the actual rescue is provided by Beach Patrol or other agencies (Sheriff's Office, Department of Natural Resources, Coast Guard, etc.).

This analysis measured using all priority "technical rescue" incidents from FireRMS that met the dispatching, turnout, travel, and arrival criteria. Substantial variations in time were observed in every segment, and consideration was made that even a few outlier times, given the low sampling, could result in that effect. The first reaction was that analysis could improve definition of the call segments. For example, depending on the nature of the rescue, alarm handling could be wildly divergent if the call was one coming from an outside jurisdiction via 911 transfer.

As call volume in this category is low, one recommendation will be to individually review and discuss these incidents to better pin down consistencies.

Hazardous Materials Service

Hazardous Materials Service - 90th Percentile Times, Baseline Performance						
	2012	2013	2014	2015	2016	2012 - 2016
Alarm Handling	1:38	2:54	2:25	3:32	2:19	2:53
Turnout Time	2:35	2:49	2:17	2:15	2:35	2:30
Travel Time	5:17	4:57	5:10	5:33	5:23	5:25
Total Response Time	9:01	10:17	8:36	10:28	9:25	9:53
Total calls	33	47	39	58	49	226

Hazardous materials service encompassed calls coded for spills or leaks of flammable gas or liquid, combustible liquids, gasoline, refrigerants, or other chemical releases. Toxic or hazardous conditions, biological releases, and suspected hazardous or bio-hazardous substance investigations were also classified. Carbon monoxide detector activations and bomb or device investigations were not classified, as these responses are done in a non-emergent mode.

This analysis measured using all priority "hazardous materials" incidents from FireRMS that met the dispatching, turnout, travel, and arrival criteria. Observation was made that by comparison to technical rescue times, these times were relatively consistent. This could be the result of a larger sample, or it could possibly be that a large number of hazardous materials emergencies are handled at a lower level, such as for a Level I response, which delivers a single engine company response.

As discussed earlier, one recommendation will be to individually review and discuss these incidents to determine consistencies and to see if the knowledge can lend to improvement of the technical rescue data.

Fire Suppression – Structure Fire, Effective Response Force

Structure fire response data was segregated from the larger fire suppression dataset and examined. This data also included direction to observe the travel and arrival times of the "effective response force" and

report them to discover consistencies. The sampling appeared to be sufficient to provide some data stability. The alarm handling time was reported with an increase at 2013 and almost corresponding decrease in turnout time. Travel time of the first arriving unit had a considerable increase in 2013 and remained consistent throughout 2016. Total response time appears to have spiked in 2016. Further examination is indicated if that trend continues.

Structure Fires - 90th Percentile Times, Baseline Performance						
	2012	2013	2014	2015	2016	2012 - 2016
Alarm Handling	1:04	1:19	1:25	1:38	1:12	1:19
Turnout Time	3:14	3:02	2:47	2:32	2:57	3:00
Travel Time – 1stArriving	4:58	5:45	5:32	5:19	5:26	5:28
Travel Time - ERF	10:46	12:53	11:12	11:20	12:50	11:58
Tot. Resp. Time – 1stArriving	8:34	8:31	8:07	8:12	8:44	8:39
Tot. Resp. Time - ERF	15:56	17:34	16:42	14:45	23:18	18:01
Total calls	22	35	32	18	28	135
# personnel	14	14	14	14	14	14

According to the data, travel time of the ERF fluctuated year to year by nearly two minutes, and total response time also had curious fluctuations. These data points will require further analysis and definition for securing any future information.

Emergency Medical Service – Cardiac Arrest, Effective Response Force

Cardiac Arrest - 90th Percentile Times, Baseline Performance						
	2012	2013	2014	2015	2016	2012 - 2016
Alarm Handling	1:44	1:26	1:31	1:22	1:32	1:31
Turnout Time	3:06	2:27	2:10	1:56	2:29	2:26
Travel Time – 1stArriving	4:43	5:17	5:40	5:03	4:45	5:13
Travel Time - ERF	3:44	7:59	7:13	6:48	8:03	7:37
Tot. Resp. Time – 1stArriving	8:23	8:05	7:52	7:40	8:23	8:12
Tot. Resp. Time - ERF	9:12	18:10	16:26	15:09	14:58	16:57
Total calls	4	77	69	75	68	293
# personnel	5	7	7	7	7	7

The data for this element was collected differently after 2013, which explains the significant change from 2013 forward. Response data involving patients with cardiac arrest was segregated from the larger dataset and examined. Even excluding the 2012 data, all times seem to fluctuate and there is no ready explanation. Total response time of the ERF appears to have improved since 2013 by over a minute. These data points will require further analysis and definition for securing any future information.

Technical Rescue – Low Risk, Effective Response Force

Fire Rescue had no medium or high risk incidents to measure in the five year time period. This data included observation of “effective response force” travel and arrival times and reported them to discover consistencies. Even the sampling for low risk incidents appeared to be insufficient to provide some data stability. The alarm handling time was reported with an increase at 2013 and 2016. Analysis of these two items found in each of those years, one water rescue and one lock out (2013 alarms 1301857 and 1303983; and 2016 alarms 1603102 and 1602946) skewed alarm handling times. In 2015

and 2016, two calls in each year (2015 alarms 1503779 and 1504956; 2016 alarms 1602946 and

Technical Rescue, Low Risk - 90th Percentile Times, Baseline Performance						
	2012	2013	2014	2015	2016	2012 - 2016
Alarm Handling	2:14	4:04	2:57	2:41	4:07	3:15
Turnout Time	3:07	2:18	1:57	2:13	2:28	2:42
Travel Time – 1stArriving	5:39	4:50	6:09	7:57	7:55	6:30
Travel Time - ERF	12:39	11:00	8:25	6:25	5:14	11:25
Tot. Resp. Time – 1stArriving	9:50	11:20	9:48	13:01	12:41	11:47
Tot. Resp. Time - ERF	17:16	17:18	15:48	13:10	12:58	16:59
Total calls	18	14	15	11	9	31
# personnel	10	10	10	10	10	10

1606811) unduly affected travel time of the First Arriving Unit.

Despite the latter increase, the ERF response time almost reciprocally decreased. These data points will require further analysis and definition for securing any future information.

Hazardous Materials – Low to Medium Risk (Level 2), Effective Response Force

HAZMAT Level 2 - 90th Percentile Times, Baseline Performance						
	2012	2013	2014	2015	2016	2012 - 2016
Alarm Handling	1:38	2:54	2:25	3:32	2:19	2:53
Turnout Time	2:35	2:49	2:17	2:15	2:35	2:30
Travel Time – First Arriving	5:17	4:57	5:10	5:33	5:23	5:25
Travel Time - ERF	8:53	33:36	12:13	7:26	9:36	11:59
Tot. Resp. Time – 1stArriving	9:01	10:17	8:36	10:28	9:25	9:53
Tot. Resp. Time - ERF	12:18	54:20	32:47	14:12	26:55	30:08
Total calls	6	9	10	5	2	32

The hazardous materials response dataset was also too small of a sample to provide reliable comparison. Future analysis and definition are recommended to improve data reliability and to provide comparative information.

Reliability – Unit Performance

Determination of Reliability Within HPZ with Responses from Other Units, 2016							
	HPZ 1	HPZ 2	HPZ 3	HPZ 4	HPZ 5	HPZ 6	HPZ 7
Station 1 Units	89.45%	4.00%	0.49%	0.00%	0.60%	6.30%	14.62%
Station 2 Units	4.87%	93.83%	0.12%	0.13%	0.24%	0.55%	2.04%
Station 3 Units	0.22%	0.00%	81.54%	0.76%	6.75%	2.19%	0.79%
Station 4 Units	0.07%	0.00%	0.98%	84.59%	4.76%	0.00%	3.30%
Station 5 Units	0.07%	0.00%	8.68%	12.36%	83.97%	0.14%	4.25%
Station 6 Units	2.65%	0.17%	6.48%	0.76%	1.57%	90.68%	1.42%
Station 7 Units	2.65%	2.00%	1.71%	1.40%	2.11%	0.14%	73.58%

Determining reliability of units in relation to their assigned HPZ is no longer as relevant as it once was with the use of AVL prompted dispatching. While it can be said that station position is relative to the

central location in a district, the closest unit to the alarm is dispatched. As it was, the first arriving Fire Rescue unit to priority calls in 2016 met the eight minute and five second benchmark for EMS calls in 88.4% of the alarms, and fire calls in 86.2% of the alarms, regardless of station assignment.

The chart above, *Determination of Reliability*, indicates the percentage of calls answered by stations within their own HPZ as compared to response in other HPZs. While one could assume that aside from the primary HPZ, units would respond as back-up to their neighboring HPZs, since dispatching is done by closest unit, this is not always the case.

For example, Station 2 units ran back-up to HPZ 1 for 4.87% of the calls in that HPZ. While HPZ 4 and HPZ 5 are located on the opposite side of the jurisdiction from where Station 2's units are based, Station 2 units still do, on occasion, pick up some of those calls. This occurs because the CAD selects the closest available and appropriate unit. In a number of cases, Station 2 units were selected as the closest unit due to their being in those HPZs when a call was generated.

That said, though, for a large part of the day, units are either in their home station or working near to it (within their HPZ) and do get selected to respond. During the review period (2012-2016) the overall performance reliability (where the assigned first due unit responded to incidents in their HPZ) was 84.73% (See the table, *Historical Reliability Within HPZ*, p.86). This proves that a vast majority of the incidents are handled by units within their own HPZ even with the use of CAD. The presence of the Coverage Company must be further evaluated. That unit covers gaps in the coverage and even occasionally, picks up alarms from a native unit in their own HPZ when their unit happens to be closer, such as in transit from one station to another, but was not factored into the reliability study.

This study also did not detect any mutual aid effect on system response. There were no calls during the evaluation period in which mutual aid units responded as the closest unit. While Fire Rescue meets the baseline SOC statements without considering the assets of any other agency, those assets would be included in meeting the effective response force for particular types of responses if they were so requested.

Performance Determinations

Of any issues regarding Fire Rescue's performance that was found in this evaluation as compared to the industry's best practices, it is in the authentication of process that the organization is most lacking. Time and again, the analysis of perceived issues, the consideration of influencing factors, the development of clearer policy, all occur, but with less formalized documentation. Participation in the SOC development process has made this clear to the entire Compliance Team.

As this most recent accreditation process has been undertaken, it can be seen that recommendations associated with previous SOCs have contributed to Fire Rescue's continued success. Factors that could be corrected or mitigated, were. Generally, and with the cooperation of the entire organization, if something could be improved upon, it was. In regard to data, no reasons exist to suspect the information is grossly inaccurate. For the purpose of improvement, however, there are a number of items that could be considered to better improve data security. That said, there are still community and regional conditions, as well as other determining factors contributing to some performance gaps. These are noted with their impact and magnitude explained.

Alarm handling time – Fire Rescue can only gauge alarm handling time on the moment they detect the incoming call. There is still an unmeasured gap between the time a call is initiated to the technology system and the time the PSAP's phone rings. Fire Rescue will continue to evaluate and measure this time and use best practices to improve.

Several items were identified as critical. Use of the medical and fire priority dispatching product to get better call information (and resulting in the right resources being dispatched) does involve more questions than before. Fire Rescue must balance the point at which sufficient information exists to dispatch the correct resources as compared to what other information is needed. There is possibility that a more efficient and technically robust station alerting system could help, an example of such being a station alerting system that provides simultaneous alerts instead of sequential alerts.

A more universal complication is the increased number of calls that come in from cell phones as compared to landline phones. The result is two-fold: Cellular phones do not permit accurate Automatic Location Identification (ALI) data, therefore, call-takers must spend additional time confirming incident locations. Cellular phone triangulation, which increases reliability of caller location, takes an appreciable amount of time for the dispatch to assess. Fire Rescue will continue to work with Beaufort County and telephone system providers to use emerging technology and improve the addressing interface with the intent of decreasing alarm handling times.

Turnout time – While attempts are made to obtain accurate data, the accuracy of data is influenced by human interface. High channel traffic and equipment malfunction (in one instance, a repeater malfunction from loss of power created a system failure) can cause radio transmissions to be jammed or missed. Verbal cues by units still rely upon a Dispatcher to initiate an action to CAD. If this were automated, the data could be made more reliable. Input errors can also occur. The agency considers a deviation of a minute as critical and requiring analysis. Fire Rescue will continue to research and recommend automated methods of recording the "wheels rolling" time to minimize human error or reactions.

Senior staff also recognizes that receipt of the alarm and transition to the appropriate apparatus has some ability to be controlled. Some solutions exist to aid in that improvement. For example, all Fire Rescue stations built in the last decade removed the need to have personnel moving toward apparatus from a second floor. Also, multiple travel points from activity areas to the apparatus bay have been included in station design. Maps and printers have been placed in routes of travel to the bay. Further improvements may come from strategically mounted "turnout clocks" around the station that very graphically display the elapsed time from notification. Simply acknowledging that these times were being evaluated created a Hawthorne Effect and a slight decrease in times was anecdotally noted. In any case, Fire Rescue should undertake a time-motion study to determine if any improvements to this element can be made and to make recommendations.

Travel time – This time indicates arrival at "curb side" and while Fire Rescue does measure the point at which patient interaction is made, that difference can be seconds or minutes, depending on any number of factors. Future inclusion of other data in regard to controlling scenes and stopping loss would certainly help Fire Rescue improve service and identify when mitigation has occurred.

Fire Rescue has taken a number of measures to decrease travel time while still providing for safe transit to service requests. One such method is the use of AVL to send the closest unit rather than a unit assigned to a certain district. The Town utilizes codes and makes recommendations to builders and others to decrease traffic calming devices where they might delay response times.

In the last five years, Fire Rescue updated their traffic preemption to an AVL-prompted system, and has added emergency access gates to gated communities. One remaining gate is currently under bid. Fire Rescue should continue to evaluate locations where gates might decrease travel times. Some pertinent observations demonstrate that Fire Rescue should continue to evaluate methods to decrease this interval though the use of automated routing; further training should reinforce the need for utilizing this tool on all responses.

Total response time – First Arriving – As mentioned, while Fire Rescue is striving to decrease times, the first arriving unit reliably arrives at scenes in 88.4% of the EMS, and 86.2% of the fire benchmark times. Any improvements to the different elements that make up this time will positively affect the total response time.

Total response time - ERF – Again, any improvement to other elements will improve total response time as a whole. However, the geography and road layout is problematic as it relates to the ERF. The reason for this is that the main road network is basically a large, 13.5 mile perimeter divided by Broad Creek. There is also a large "hole" created by the Airport that units must go around, rather than through, to respond. Most of the jurisdiction is made up of gated subordinate communities that are reluctant to add any more access than is absolutely necessary. Bridging any of these to decrease total response time is simply not logical or possible.

CONCLUSIONS

Fire Rescue's overall evaluation recognized performance was acceptable and identified areas for improvement. The agency delivers the appropriate forces and equipment within an acceptable time frame. There are technology improvements, methods of changing workflow, and other processes requiring analysis that will continue to help the organization to measure progress.

From a service delivery standpoint, all times for the five year period beginning in 2012 and ending in 2016 are relatively consistent. The methodology for determining an acceptable benchmark considered the success (88% at 8:05 for medical calls and 86% at 8:50 for fire calls) at which Fire Rescue was already delivering service, and Senior Staff agreed those times could be achievable at the 90th percentile with continued improvement.

The most calls for service involved medical response. Travel times for fire calls are slightly higher than EMS calls, which might be attributable to the response of the larger, less agile apparatus. Otherwise, the times appear to be consistent with EMS calls.

Call volume in technical rescue and HAZMAT is low. Therefore, one recommendation will be to individually review and discuss these incidents to better pin down consistencies. According to the data, travel time of the ERF fluctuated year to year by nearly two minutes, and total response time also had curious fluctuations. These data points will require further analysis and definition for securing any future information.

Determining reliability of units in relation to their assigned HPZ is no longer as relevant as it once was with the use of AVL prompted dispatching. Of any issues regarding Fire Rescue's performance that was found in this evaluation as compared to the industry's best practices, it is in the authentication of process that the organization is most lacking.

RECOMMENDATIONS

As a result of the Community Risk Assessment and the development of the Standards of Cover, the following recommendations have been advanced for consideration. Fire Rescue is due to begin a new Strategic Plan process in 2017 and therefore, should:

- Initiate discussions with stakeholders to refresh its vision, mission, and values, as well as to establish strategic initiatives that reinforce that direction. These stakeholders include, but are not limited to, Town elected and appointed officials, Town Staff, community leaders and representatives, the hospital, and mutual aid partners.

- Develop and publish a community survey to seek the public's expectation of service levels.

- Draft a formal guideline to explain the Standards of Cover and Risk Assessment process.

- Update the SOC as related to data analysis and creating improvements, in conjunction with the 5-year Strategic Plan.

- Standardize and conduct program analysis for all service delivery elements to quantify measurable objectives, as well as to create opportunities for constant improvement.

- Identify challenges to delivering the mission and continue to employ a standardized method of solving those issues.

- Research and identify methods to reduce turnout time through visual and/or audible prompts, training and education, or other adaptive and/or technical means.

- Improve CAD to FireRMS data sharing to eliminate potential transcription errors.

- Investigate means to detect response time automatically and record that time.

- Evaluate the time segments from "curb side" arrival to "action taken" ("patient side", "primary search started", "victim accessed", etc.) to determine if efficiencies can be made, thus reducing the effect of that lost time segment on loss reduction.

- Identify process to specifically review all calls that fall into in the HAZMAT, rescue, and cardiac arrest categories to analyze the divergence of times that have been documented.

- Develop a matrix for the ERF for all hazard levels and services provide by Fire Rescue.

- Research and identify new technologies and training that will support the collection, analysis, and documentation of data to support the improvement process.

- Fire Rescue will continue to work with Beaufort County and telephone system providers to use emerging technology and improve the addressing interface with the intent of decreasing alarm handling times.

- Fire Rescue must balance the point at which sufficient information exists to dispatch the correct resources as compared to what other information is needed.

- Fire Rescue should undertake a time-motion study in regard to turnout time activities to determine if any improvements to this element can be made and to make recommendations.

- Fire Rescue should continue to evaluate locations where gates might decrease travel times.

- Fire Rescue personnel should reinforce the need for using automatic call routing on all responses.

This page intentionally left blank

I. GLOSSARY, EXHIBITS, AND ATTACHMENTS

Glossary of Terms and Acronyms

Alarm handling	Time segment beginning with answering 911 (first keystroke) at the Fire Rescue PSAP and ends when the *closest appropriate unit* has been notified of the event
AED	Automated external defibrillator
ALS	Advanced life support
ANI/ALI	Automatic Number Identification/ Automatic Location Identification; the automatic display at the PSAP of the end user's call back number, the address/location of the end user and, in some cases, supplementary Emergency Services information
AVL	Automated vehicle location; technology on all response apparatus that provides global positioning systems (GPS) to determine vehicle location
Baseline	Historical performance of an agency
Benchmark	Goal performance for an agency
CAD	Computer aided dispatch
CFAI	Commission on Fire Accreditation International
CRA	Community risk assessment
E911	Enhanced 911
EMAC	Emergency Management Assistance Compact; State-to-state mutual aid agreement established in 1996, ratified by Congress and signed into law (Public Law 104-321). First national disaster-relief compact to be ratified by Congress since the Civil Defense Compact of 1950.
engine	Fire apparatus equipped with an approved pump, hose, water tank, and ground ladders
ERF	Effective response force; number of trained and equipped personnel necessary to conduct effective operations at a specific type of emergency, as determined by task analysis
GPS	Global positioning system; System of satellites, computers, and receivers able to determine the latitude and longitude of a receiver by calculating the time difference for signals from different satellites to reach the receiver
HAZMAT	Hazardous materials

High risk	Occupancy in which the presence of, or combination of, hazards present are considerable and require additional resources in the event of an incident. Factors assessed include: Life Hazard, Community Impact, Life Impact, Water Impact, Building Usage, Building Construction Building Stories, Square Footage, and Existing Fire Protection
HPZ	Hazard planning zones; associated with traditional station districts
IFSAC	International Fire Service Accreditation Congress
ISO	Insurance Services Office
ladder truck	See “truck”
Liveaboard	Water vessel which is used as a residence
micropolitan	Relating to an urban area with a population of at least 10,000 but less than 50,000
NFPA	National Fire Protection Association
NPQ	National Professional Qualifications Board
NREMT	National Registry of Emergency Medical Technicians
priority	Calls for which response was characterized as emergent, information from caller indicated a potential for immediate life, property, or environmental loss
PSD	Public service district
pumper	See “engine”
quint	Fire apparatus equipped with an approved pump, hose, water tank, ground ladders, and a truck-mounted aerial ladder
REHAB	In the context of emergency response, phase in which personnel are rehabilitated: Rested, re-hydrated, and monitored for health issues, before being returned into emergency operations on a scene
SOC	Standards of cover
THIRA	Threat and hazard identification and risk assessment
Total response time	Total response time is indicated as a qualified data set when all three elements exist, creating a segment from the call receipt to the arrival of the first unit on the scene. This segment begins at the first keystroke (of alarm handling time) and ends when the appropriate unit status in CAD is changed to on scene

Travel time	Unit travel time starts when the unit status in CAD is changed to “en route” and ends when the unit status in CAD is changed to “on scene”. Dispatch receives its cue to change the status when it receives a radio transmission from the unit that it has arrived “curb side” or to a designated staging location
truck	Fire apparatus equipped with a truck-mounted aerial ladder, ground ladders, and a complement of rescue tools (Local to Hilton Head Island)
Turnout	Segment beginning with notification of the closest appropriate unit and ending at the point the unit status in CAD is changed to “en route”. The change in CAD to en route occurs when the officer on the responding unit cues Dispatch by radio transmission that their unit is in motion toward the scene
Two-in/two-out	OSHA regulation requiring fire suppression personnel to refrain from interior firefighting until a sufficient back-up team is present, except when there is an imminent life-threatening situation
WMD	Weapons of mass destruction

This page intentionally left blank

Exhibit 1 – Corporate Boundaries

THE MUNICIPAL CODE OF THE TOWN OF HILTON HEAD ISLAND, SOUTH CAROLINA 1983

Sec. 2-1-20. - Corporate boundaries.

(a) The municipal corporate boundaries of the town shall be those now and hereafter specified by law along with any alterations that are made from time to time as provided for by law. A map and a written description of the municipal corporate boundaries shall be maintained and adjusted as required by changes made from time to time and a copy of the written description and map shall be contained herein, and shall be as follows:

All that certain area of land and water located on and adjacent to Hilton Head Island, Beaufort County, South Carolina, being described as follows: Beginning at a point, which point lies on the southern edge of the right-of-way of U.S. Highway 278 at the intersection of an arc 5 miles' distance from the current city limits of the Town of Bluffton, South Carolina; thence, in a northerly direction along the aforementioned five-mile arc across U.S. Highway 278 and an unnamed tidal creek to the mean high water mark on the southeastern shore of Blue Heron Point; thence, along the mean high water mark of the southeastern shore of Blue Heron Point to the edge of Skull Creek; thence, in a northeasterly direction across Skull Creek to an opposite point, which is the mean low water mark on the southeastern shore of Pinckney Island; thence, in a northeasterly direction along the mean low water mark on the southeastern and eastern shore of Pinckney Island to Port Royal Sound; thence, in a northeasterly direction to a marine navigation mark, now or formerly known as R "4" (32 degrees 16 minutes 23 seconds north latitude, 80 degrees 44 minutes 10 seconds west longitude); thence, in an easterly direction to a marine navigation mark known as R "2" bell (32 degrees 16 minutes 23 seconds north latitude, 80 degrees 42 minutes 23 seconds west longitude); thence, in an east southeasterly direction to a marine navigation mark, now or formerly known as "25" QK FL bell (32 degrees 15 minutes 37 seconds north latitude, 80 degrees 39 minutes 32 seconds west longitude); thence, in a southerly direction to the easternmost low water point on the Atlantic shore of Hilton Head Island at a point near the apex of the arc formed by the beach of Port Royal Plantation; thence, in a south southwesterly direction along the mean low water mark on the Atlantic shore of Hilton Head Island to the southern end of the front beach of Hilton Head Island and continuing from the shore to a marine navigation mark, now or formerly known as BW M "b" (32 degrees 05 minutes 48 seconds north latitude, 80 degrees 49 minutes 58 seconds west longitude); thence, in a northerly direction into the Calibogue Sound to a marine navigation mark, now or formerly known as FL R "32" (32 degrees 02 minutes 57 seconds north latitude, 80 degrees 49 minutes 44 seconds west longitude); thence, continuing up Calibogue Sound in a northeasterly direction to a marine navigation mark, now or formerly known as R "30" (32 degrees 10 minutes 0 seconds north latitude, 80 degrees 48 minutes 35 seconds west longitude); thence, on a northeasterly course along the western edge of the intracoastal waterway channel to the intersection of the aforementioned five-mile arc from the town limits of Bluffton; thence, in a northeasterly direction along the five-mile limit arc to the mean high water point on the southern shore of a portion of Hilton Head Island sometimes known as "Jenkins Island"; thence, in an irregular easterly direction along the mean high water mark on the southern shore of "Jenkins Island" until the intersection with the southern edge of the right-of-way of U.S. Highway 278; thence, in a westerly direction along the edge of the southern right-of-way of U.S. Highway 278 to the intersection of the aforementioned five-mile arc, which point is the point of beginning.

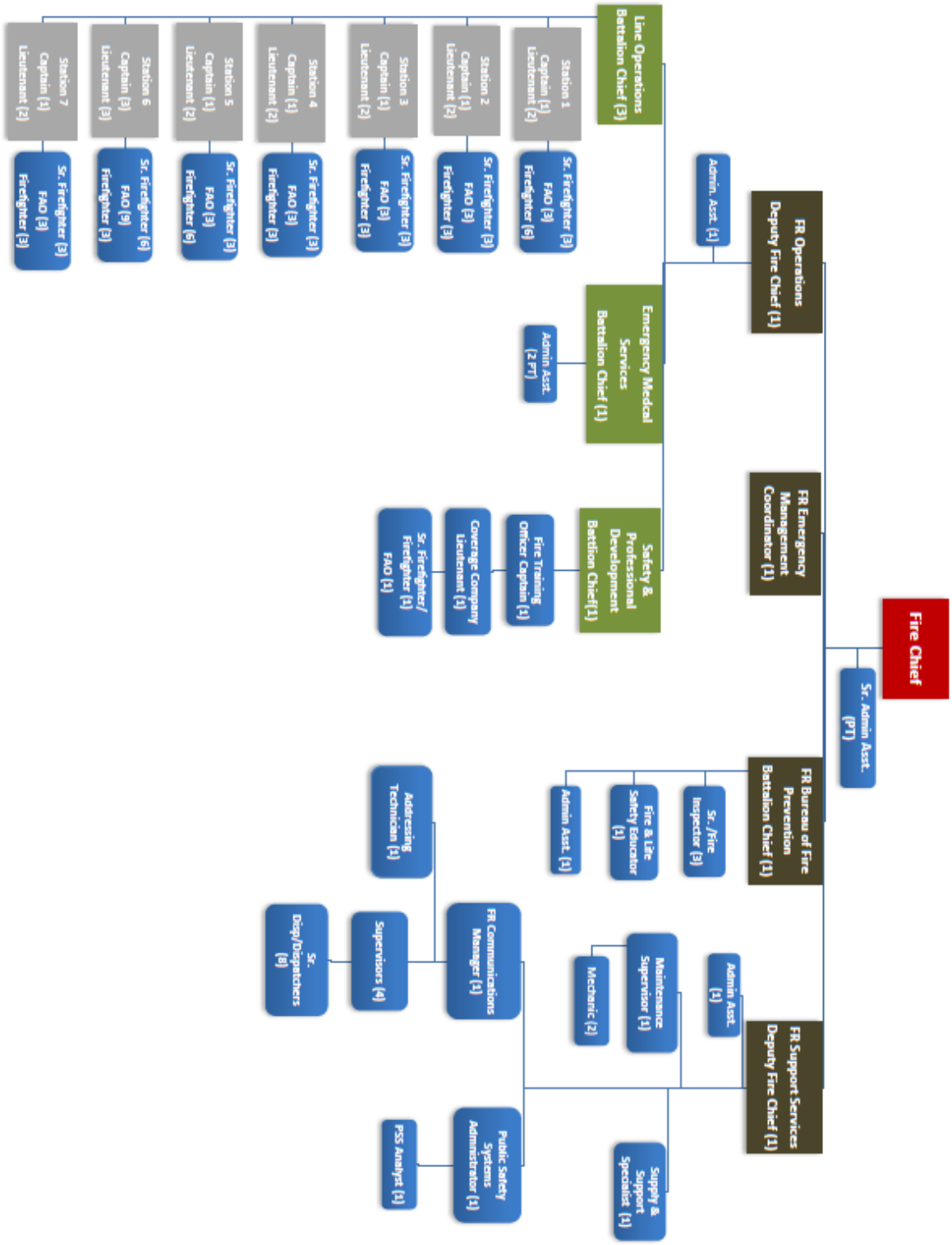
(b) For a more complete description of the locations of the various reference points forming the boundary of the above described property and navigation aids, reference is made to a chart prepared by the National Oceanic and Atmospheric Administration, United States Department of Commerce, entitled "Port Royal Sound and Inland Passages", No. 11516, 21st Edition, June 23, 1979.

(c) In the event that there is any discrepancy between the legal description and any map, the legal description shall control.

(Ord. No. 83-5, 9-26-83)

This page intentionally left blank

Exhibit 2 – 2017 Fire Rescue Organizational Chart



This page intentionally left blank

Exhibit 3 – Emergency Access Gate Program (2017 Update)

Gate Location	Improvement Noted	Expected Cost	Const. In FY	Status
Marshland Road to Pond Drive (Indigo Run near St. 7 on Marshland Road)	St. 7 7.21 min less travel time to back of Indigo Run. Secondary access point.	*$60k est	FY2004	Completed
William Hilton Parkway to Yard Arm (WHP to PD)	St. 6 to Yard Arm area 3.54 less travel time. St. 3 to Yard Arm area 7.78 less travel time. Secondary access point.	$72K	FY 2005	Completed
William Hilton Parkway to Fife Lane (WHP into Long Cove)	St. 6 5.52 min less travel time to back of Long Cove club. St. 1 .25 min less travel time to back of Long Cove Club. Secondary access point.	$73K	FY2006	Completed
North Forest Beach Drive to Breakers (NFB at Beach Market area)	St. 1 and 2 .33 min less travel time to Breakers. Secondary access point.	$62K	FY2010	Completed
Union Cemetery Road into Ordnance Place (Port Royal Plantation)	St. 5 1.75 min less travel time to Port Royal. St. 3 .88 min less travel time into Port Royal. Secondary access point.	$27K	FY2012	Completed
Beach City Road into Palmetto Hall (169 Beach City Road)	St. 3 2.16 min less travel time to back of Palmetto Hall. St. 5 1.45 min less travel time to back of Palmetto Hall. Secondary access point.	$36K	FY2012	Completed
Haig Point Embarkation to Fairfax Lane (Wexford)	St. 1 to back of Wexford .56 min less travel time. St. 7 to back of Wexford 5.57 min. less travel time. Secondary access point.	$60K	FY2012	Completed
William Hilton Parkway to Swing About (Palmetto Dunes)	St. 6 to Swing About area 4.05 min. less travel time. Secondary access point.	$100K	FY2013	Proposed

This page intentionally left blank

J. REFERENCES

A town is born. (n.d.). Retrieved from CH2 Magazine: http://www.celebratehiltonhead.com/article/723/a-town-is-born

American Heart Association. (2011). *BLS for healthcare providers* (1st ed.). (M. F. Hazinski, Ed.) Dallas, TX: American Heart Association.

American Heart Association. (2014, December 30). *AHA releases 2015 heart and stroke statistics.* Retrieved from Sudden Cardiac Arrest Foundation: http://www.sca-aware.org/sca-news/aha-releases-2015-heart-and-stroke-statistics

Beaufort County Emergency Management Division. (2016). *Beaufort County hazard mitigation plan.* Beaufort, SC.

Emergency management assistance compact. (1996, October 19). *Public Law 104-321, 110 Stat. 3877*. Washington, DC.

Federal Emergency Management Administration. (2005). FEMA 508-3. *Typed resource definitions: Emergency medical services resources*. Washington, DC: U.S. Dept. of Homeland Security.

Federal Emergency Management Administration. (2005). FEMA 508-4. *Typed resource definitions: Fire and hazardous materials resources*. Washington, DC: U.S. Dept. of Homeland Security.

Federal Emergency Management Administration. (2005). FEMA 508-8. *Typed resource definitions: Search and rescue resources*. Washington, DC: U.S. Dept. of Homeland Security.

Fire rescue policy 3.01. (n.d.). *Minimum staffing*.

Heffernan, E. (2016, March 18). *Hilton Head is growing older fast: How it helps, what it costs.* Retrieved from Island Packet: http://www.islandpacket.com/news/special-reports/article66923722.html

Hilton Head Island Fire Rescue. (2016). Standard operating guidelines manual.

Jenaway, W. F. (1986). *Pre-emergency planning.* Ashland, MA: International Society for Fire Service Instructors.

Lurye, R. (2016, September 8). *No place to go: What is happening to Hilton Head's affordable housing?* Retrieved from Island Packet: http://media.islandpacket.com/static/news/workforce/housing.html

Murdock, Z. (2015, January 17). *Number of Hilton Head Island Airport flights drop for fourth straight year.* Retrieved from Island Packet: http://www.islandpacket.com/news/local/community/beaufort-news/article33627540.html

National Fire Protection Association. (2008). *Fire protection handbook* (20th ed.). Quincy, MA: National Fire Protection Association.

National Fire Protection Association. (2011). *A third needs assessment of the United States fire service.* Quincy, MA: National Fire Protection Association.

National Fire Protection Association. (2012). NFPA 1041. *Standard for fire service instructor professional qualifications*. Quincy, MA: National Fire Protection Association.

National Fire Protection Association. (2013). NFPA 1001. *Standard for fire fighter professional qualifications* . Quincy, MA: National Fire Protection Association.

National Fire Protection Association. (2013). NFPA 1006. *Standard for technical rescuer professional qualifications*. Quincy, MA: National Fire Protection Association.

National Fire Protection Association. (2013). NFPA 472. *Standard for competence of responders to hazardous materials/weapons of mass destruction incidents*. Quincy, MA: National Fire Protection Association.

National Fire Protection Association. (2014). NFPA 1021. *Standard for fire officer professional qualifications*. Quincy, MA: National Fire Protection Association.

National Fire Protection Association. (2014). NFPA 1670. *Standard on operations and training for technical search and rescue incidents*. Quincy, MA: National Fire Protection Association.

National Fire Protection Association. (2015). NFPA 1201. *Standard for providing fire and emergency services to the public*. Quincy, MA: National Fire Protection Association.

National Fire Protection Association. (2016). NFPA 1710. *Standard for the organization and deployment of fire suppression operations, emergency medical operations, and special operations to the public by career fire departments*. Quincy, MA: National Fire Protection Association.

South Carolina Emergency Management Division. (2016). *South Carolina threat and hazard identification and risk assessment.* West Columbia, SC.

The municipal code of the Town of Hilton Head Island, South Carolina. (1983). Hilton Head Island, SC. Retrieved from https://www.municode.com/library/sc/hilton_head_island/codes/code_of_ordinances?nodeId=THMUCOTOHIHEISSOCA1983

Town of Hilton Head Island. (2012, July 3). Town of Hilton Head Island comprehensive plan. Hilton Head Island, SC. Retrieved from http://hhinet/manuals/CompPlan2010.pdf

Town of Hilton Head Island. (2014, May 12). Safety program manual. Hilton Head Island, SC. Retrieved from http://hhinet/manuals/SafetyManual.pdf

Town of Hilton Head Island. (2015, August 7). Policy manual. Hilton Head Island, SC. Retrieved from http://hhinet/manuals/policy/policylogin.cfm

Town of Hilton Head Island. (2015, January 23). Supervisor's manual (Revised). Retrieved from http://hhinet/manuals/supervisors/superlogin.cfm

Town of Hilton Head Island. (2017). *Consolidated municipal budget.*

U.S. Fire Administration. (2014). *Residential building fire trends (2005-2014).*

(2015). *United States Census.*

WYFF-TV News. (2014, July 18). USGS: Parts of South Carolina at high risk of earthquakes. Greenville, SC.

NOTES

NOTES