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## EXECUTIVE SUMMARY

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This report reflects the findings and recommendations of the project team of MGT of America (MGT) who was retained by the City of Corpus Christi following a competitive request for proposal and selection process to conduct a study on the Effectiveness and Efficiency of the City of Corpus Christi Fire Department, and to make recommendations on positioning it effectively to meet the future needs of the community.

The results found in this report represent over five months of data gathering, analysis and evaluation by a project team comprised of professional consultants and subject matter experts. During this time, system participants and stakeholders were interviewed and data collected. Interviews were conducted with line staff, administrative staff, and command staff of the fire department. In an effort to gain a fuller understand the issues facing the City, members of the planning staff, City Information Technology and MetroComm were interviewed. Multiple opportunities were provided for the leadership of the Firefighters Union (IAFF Local # 936) to participate and they were also interviewed.

Data was collected directly from the Computer Aided Dispatch System utilized by the City as well and the Records Management System that contains data on training, detailed incident and property management information.

A steering committee was formed including City Manager, Assistant City Managers, Fire Chief and other City staff for purposes of providing governance over the project and assisting in the acquisition of needed data and information.

Based on the scope of services from the Request for Proposal (RFP) this project is focused on 11 specific questions that were identified by the City as being particularly meaningful. These questions include:

- 1. What is the best way for the Department to be organized to efficiently and effectively provide responses to EMS and Fire calls for service?*
- 2. Should the department consider alternative delivery models for services provided?*
- 3. Are stations optimally located?*
- 4. Can efficiency and effectiveness be improved through changes in apparatus configuration and deployment, including use of quints?*
- 5. Can improvements be made in efficiency and effectiveness of apparatus maintenance?*
- 6. Can the City improve ISO rating and if so what needs to be done?*
- 7. Are there opportunities to reduce personnel costs by increasing relative use of civilian personnel to perform duties currently done by sworn personnel?*
- 8. Is the City making best use of training available from Del Mar College?*
- 9. What needs to be done now to prepare to meet fire service needs over the next decades?*
- 10. Is the Fire Department using appropriate measures for the City Performance Report?*
- 11. Are there provisions of the CBA that are detrimental to the efficient operation of the department or should consideration be made for modification?*

After a comprehensive review and analysis it is important to note that the Fire Department does an exceptional job in delivering services to the City of Corpus Christi. The professionalism and dedication of the men and women of the Department and its leadership are exemplary and representative of best practices in many instances.

The review has resulted in 28 recommendations focused primarily on the questions identified above. These recommendations are summarized in the table below with more comprehensive discussion and analysis in the body of the report and its associated appendices.

**CITY OF CORPUS CHRISTI FIRE DEPARTMENT STUDY 2014  
SUMMARY OF SPECIFIC RECOMMENDATIONS**

Number	Recommendation
<b>1a</b>	Eliminate the shift-supervision distinction between EMS and Fire by re-classifying the EMS Captain position into a Battalion Chief position.
<b>1b</b>	Strengthen the responsibility of Battalion Chiefs to include on-scene supervision of EMS calls (life threatening and otherwise).
<b>1c</b>	Eliminate the Assistant EMS Director position and replace with position described immediately below.
<b>1d</b>	Provide additional funding to the Medical Director to retain a Nurse Practitioner or Physician’s Assistant to provide day-to-day clinical oversight of the EMS providers in the Department.
<b>1e</b>	Re-brand from the Corpus Christi Fire Department to the Corpus Christi Medical, Rescue and Fire Department (or, alternatively, the Corpus Christi Emergency Services Department).
<b>2a</b>	The effectiveness of the Fire Department could be improved by employing some form of dynamic deployment as it relates to the demand for EMS Services during peak hour demand.
<b>2b</b>	The Battalion chief positions should be relocated and enhanced to improve span of control, EMS/Medical Supervision and first alarm assembly geographic coverage.
<b>2c</b>	Fully implement Emergency Medical Dispatch (EMD) protocols and continue to evaluate and evolve response alternatives currently employed by the CCFD.
<b>2d</b>	Response time performance objectives should also be adjusted based upon criticality.
<b>2e</b>	A public education program to educate the public about the correct use of emergency resources may aid in the reduction of non-critical calls for service. Our findings indicate that there is no need for a new station at this time. Future growth and development will require this to be re-examined.
<b>3a</b>	Our findings indicate that there is no need for a new station at this time. Future growth and development will require this to be re-examined.
<b>4a</b>	Maintain the current type, size and configuration of trucks, engines and ambulances will provide a firefighting/pumping capacity generally consistent with the levels of service provided today. Maintaining the larger Medium Duty/Type I ambulances currently utilized by the department.
<b>5a</b>	Co-locate a new and needed fire apparatus maintenance facility with a larger facility serving the needs of the entire City fleet. Given the special, complex and unique nature of fire apparatus and their components.

Number	Recommendation
<b>5b</b>	Fire fleet maintenance staff should be certified as Emergency Vehicle Technician/Fire Apparatus Mechanics. Position descriptions should reflect this need and the City should consider this as a minimum qualification for future employment requirements.
<b>5c</b>	The Fire Department should adopt a comprehensive and strategic apparatus needs plan as it currently faces a significant vehicle replacement challenge with the age of its fleet.
<b>6</b>	Given the expense, and the fact that the Texas DOI reports that homeowners will save 0% on their fire insurance from such a change, MGT does not recommend pursuing an improvement in the ISO PPC for the City of Corpus Christi from PPP-2 (current) to PPC-1.
<b>7</b>	City and Department can achieve significant ‘opportunity cost’ savings by utilizing civilians in support roles currently filled with safety personnel and redeploying those personnel to their primary mission.
<b>8a</b>	The existing ‘Alternative Hire’ process could be improved with greater coordination of the hiring cycle with the Graduation of Firefighter/Paramedics from the Del Mar Fire Technology program.
<b>8b</b>	The Fire Department, City Human Resources and College Staff should conduct a comprehensive review of the overall hiring process that includes the college and faculty roles.
<b>8c</b>	Contract with Del Mar College to develop and integrate adult learning models into curriculum for both Continuing Education/Line and initial cadet training.
<b>8d</b>	Work cooperatively with the college to improve existing on-line training mechanisms to include contemporary adult learning techniques.
<b>8e</b>	Form a ‘Learning Council’ comprised of Fire Department members and professional educators from the college to evaluate and construct training plans and priorities based upon review of identified gaps in performance. This will provide: A) A needed closure of the feedback loop from ‘after-action reviews’ and performance reviews through design and implementation of training interventions, and B) A mechanism for a systematic review and audit of the current training program with a focus on creating results/performance based metrics of training efforts and enhanced relevance of training experiences.
<b>9a</b>	Enhance Technology – Specifically, develop more effective mobile and tablet applications for enhanced data exchange and management effectiveness across all areas of the operation. Additional data integration both across city departmental boundaries (intra-organizational) and with external stakeholders or partners including the health care delivery and public safety infrastructures. Additional technology including the application of bar-coding or RFID will assist the Fire Department with everything from inventory management to fire ground safety management.
<b>9b</b>	Enhance Human Resource Selection, Development and Retention – The Department would benefit from a concentrated and renewed focus on human resource development and retention. Elements to be included are an evaluation of currently needed skills, knowledge and abilities reflective of the current and future delivery needs of the organization, a comprehensive wellness and safety culture including the implementation of physical fitness evaluations and programs, incentives for targeted education, clearly defined succession planning and on-going/continuous learning with closed feedback loops to integrate new practices and procedures into the organization on a systemic basis.

Number	Recommendation
9c	Enhance integration with Community Health and Population Health Management Initiatives - This will allow the department to play an appropriate and value adding role in the on-going redefinition of community health care delivery especially as it relates to the utilization of EMS resources.
9d	Alter Organizational Structure and Supporting Systems to meet current and future demands – As the department continues to evolve from a traditional fire response agency to a multi-functional, key resource within the overall fabric of community health and safety, the systems and structures that support its operations must also evolve. Specifically, the organization must structure itself in a more coordinated and seamless manner, eliminating the vertical silos that now exist between EMS, Operations, Fire Prevention and Training. The flexibility required to respond to the rapidly changing environment in which the department finds itself requires a workforce and workplace rules that are fair as well as flexible, allowing the organization to meet the changing needs and expectations of the community.
10a	Management Reporting and CPR Integration - All ‘AVERAGE’ Response times should be supplemented such that data are also reflected on a fractile basis. Goals should be reflected by response time standards expressed on a basis of 90% compliance. By way of example: Time of first arriving unit after dispatch to structure fire calls shall be 4 minutes and 8 seconds or less for 90% of all such calls responded to.
10b	All data points should be additionally reflected on a per capita or other percentage basis based upon some logical denominator. This provides a common and meaningful measure of performance across time normalizing for changes in the environment. Thus, ‘Number of Structure Fires’ should be additionally described by the metric ‘Structure Fires/1,000 Population.’
10c	Specific ‘output’ or ‘results based measures’ should be included. By way of example, ‘Number of Citizens in attendance at fire safety presentations’ is an activity measurement – but a true measure of desired outcome should be reflected as well. Based upon meaningful analysis of fire or community health issues, goals and related measures impacting the community in meaningful ways should be included. These might include: Reduction in drowning incidents to a level below 5 per 100,000 Population or Reduction in arson fires to a level below 0.5 per 1,000 population.
10d	Specific EMS Performance Goals should be included based upon the needs of the Medical Director. Examples of these might include: ‘Percentage of full cardiac arrest events obtaining Return of Spontaneous Circulation (ROSC) prior to arrival at hospital’ or ‘Percentage of cases presenting outside of normal vital sign limits presented to the ER within normal limits or stabilized.’
11a	Article 2 / Section 3 provides that current or past working conditions not specifically mentioned in the contract remain in full force and cannot be diminished during the term of the agreement. Eliminate the reference to past working conditions entirely from the contract. This language could be used to slow down or block needed changes in the Fire Department.
11b	Article 4 / Section 3 provides that overtime is calculated on specific rates and times. These should be reviewed with City human resources for whether they maximize the City’s benefit under FLSA 7(k) exemptions. Staff should be compensated for overtime based on allowable rules.

Number	Recommendation
<b>11c</b>	Article 4 / Section 7 and Article 7 / Section 4 contain language which appears at odds with the donation of Personal Leave by all union members to support the non-line work of the union president. Clarify that staff in the union who are donating Personal Leave to the union president should have to take 8PL/16VL for their third shift off.
<b>11d</b>	Article 5 / Sections 1-3 detail the fact that compensation for EMS (and other specialties) is linked to holding the certification, rather than performing the tasks. The City should link compensation to performing the job. Perhaps by compensating by the shift worked on the ambulance or on a paramedic fire unit (higher pay for ambulance work).
<b>11e</b>	Article 6 / Section 1 and Article 6 / Section 2 allow firefighters to opt-out of paramedic status after 8-year term. They are required to serve a minimum of five years in 'EMS service'. No ability to require skill maintenance – i.e., staff can opt out of working on the ambulance. Make EMT status a condition of employment for all staff. Make paramedic status a condition of employment for all non-driver firefighters. Serving on ambulance a shared duty for line staff – remove opt out provisions. Add a requirement that all paramedics must work the number of shifts not less than that designated by the Medical Director. Need flexibility for now and for the future. Avoid specific duties or assignments.
<b>11f</b>	Article 8 / Section 1 identifies several support classifications that can be filled with civilians rather than with certified firefighters. There is no allowance for operational positions. Alter the language allowing for the use of civilians in any 'non-firefighting' task. The specific objective should be to gain the flexibility to utilize civilians in staffing EMS-only units, including those assigned to 'community para-medicine,' peak load ambulances, and 24-hour staffed ambulances.

## **QUESTION I - What is the best way for the department to be organized to efficiently and effectively provide responses to emergency medical service calls and fire service calls?**

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### **ANSWER**

The current organizational structure of the Corpus Christi Fire Department (CCFD) contains vestiges of the transition that the Department has gone through over the past decades to move from a *fire department* to an *emergency services department* responsible for a wide range of (non-law enforcement) public safety programs. The Fire Department's organizational structure should be modified in order to remove the historical distinction between *fire* and *EMS* that has been built into the command structure, policies and procedures, unit assignments, deployment and the collective bargaining agreement. The current organizational structure of the CCFD institutionalizes the administrative dichotomy between the delivery of fire / technical rescue services (traditional) and emergency medical services ('contemporary') which now make up the vast majority of workload in the Department. The City and the Fire Department should pursue several changes to enhance the efficiency and effectiveness of medical and fire service delivery in the City of Corpus Christi. These changes include:

- ◆ Eliminate the shift-supervision distinction between EMS and Fire by re-classifying the EMS Captain position into a Battalion Chief position.
- ◆ Strengthen the responsibility of Battalion Chiefs to include on-scene supervision of EMS calls (life threatening and otherwise).
- ◆ Eliminate the Assistant EMS Director position.
- ◆ Provide additional funding to the Medical Director to retain a Nurse Practitioner or Physician's Assistant to provide day-to-day clinical oversight of the EMS providers in the Department.
- ◆ Re-brand from the Corpus Christi Fire Department to the Corpus Christi Medical, Rescue and Fire Department (or, alternatively, the Corpus Christi Emergency Services Department).

These options are discussed further in the following section of our report.

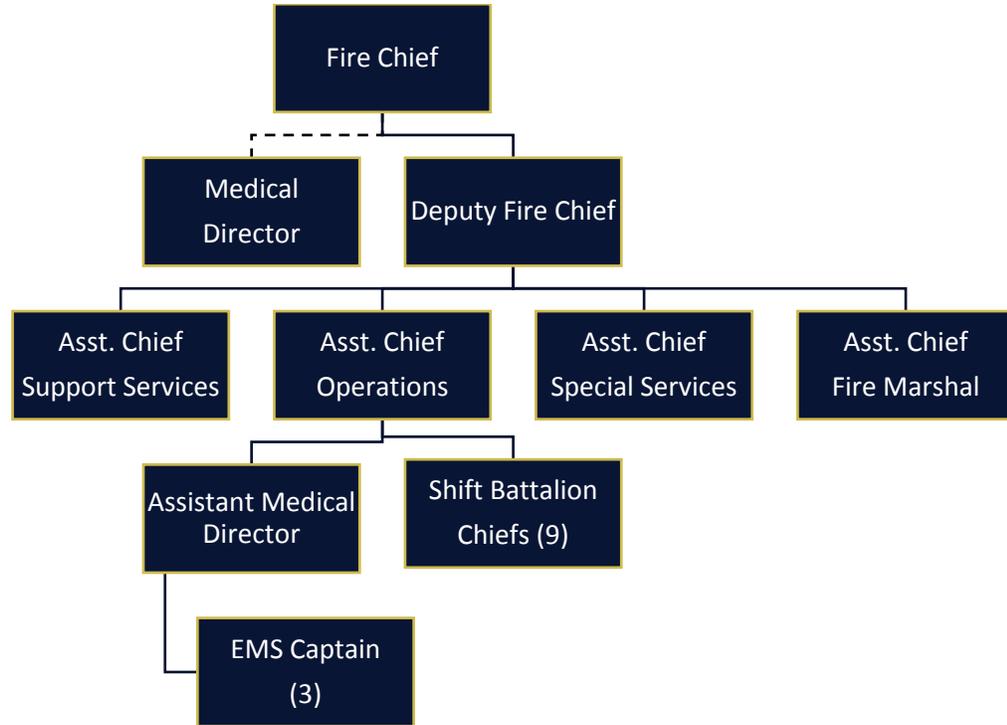
### **DISCUSSION**

#### **EMS CAPTAINS AND BATTALION CHIEFS**

Currently, the CCFD operates with a system of three (3) Battalion Chiefs and one (1) EMS Captain operating in supervisory roles for the shift. The roles between the two functions both vary and cross one another, based on interviews and observations. Further, there is organizational inconsistency as to the reporting and oversight relationships for the EMS Captains, as shown in the organization chart -- this chart reflects the current operational reality.

There are a number of less than optimal reporting relationships (as designed vs. as implemented) in this area of significant service delivery.

### CURRENT COMMAND STAFF STRUCTURE



The table, below, provides a summary of the primary roles and responsibilities of the two positions.

Position	Roles / Responsibilities
<b>Battalion Chief</b>	<ul style="list-style-type: none"> <li>◆ Staffing and deployment of shift resources.</li> <li>◆ Responses limited to major incident command and control (structure fires, multiple unit accidents, technical rescue and HazMat).</li> <li>◆ Supervision of Captains and their fire / EMS units assigned within each of 3 Battalions.</li> <li>◆ Significant administrative responsibilities for specific functional areas within the department as well as time and payroll, scheduling, quality assurance, and intra-organizational communication</li> </ul>
<b>EMS Captain</b>	<ul style="list-style-type: none"> <li>◆ Supervision of the ambulance crews assigned to their shift – including working to expedite their return to ready status.</li> <li>◆ Responsible for overseeing re-stocking of controlled substances.</li> <li>◆ Review of run reports for basic compliance with medical protocols.</li> </ul>

Our interviews, observations and review indicate that there is little that the EMS Captains do that cannot be done by Battalion Chiefs. The supervision of the EMS function is as example of the administrative dichotomy referred to earlier. Observation and discussions with Battalion

Chiefs and EMS Captains indicate that tasks related to the functioning of EMS operations are often prioritized lower than other supervisory tasks more consistent with fire and rescue operations. Given that over 80% of calls for service are EMS in nature, the current demonstrated priorities cannot continue. We also observed that currently the geographic and units per Battalion Chief is on the upper end of acceptable in terms of response times and ability to properly oversee staff in training, operations, and support services. Therefore, we recommend that the City and the Fire Department convert the current EMS Captain position into a fourth Battalion Chief on each shift. This will require the Fire Department to take the following steps:

- ◆ Reconfigure the battalions from three to four.
- ◆ Alter the expectations for shift Battalion Chiefs to include more frequent interaction with their units.
- ◆ Define specific roles for various Battalion Chiefs. For example, it might be sensible to assign the Battalion Chief who has the hospitals to be responsible for ensuring that EMS units are being expeditiously returned to service, and, if necessary, to oversee the wasting and replacement of controlled substances.
- ◆ It should also be made clear that if that Battalion Chief is committed, any other Battalion Chief can be called upon to oversee wasting and replacement of controlled substances.
- ◆ Formally designate a senior Battalion Chief on each shift to serve as the ‘first among equals’ to make intermediate level decision making at a peer level on those Battalion Chief level decisions that cannot be agreed upon by the peer group, but should not be appropriately escalated to the Assistant Chief. This will also provide some recognition of the heavier workload and responsibility of Chiefs responsible for scheduling and serving as the direct administrative conduit of Battalion 1.
- ◆ Increase Battalion Chief involvement in responding to and supervising EMS calls for service, to include the following:
  - Respond to all working cardiac, drowning and other similar threat-to-life calls.
  - Calls with an expected significant delayed response by the ambulance.
  - Respond to all car accidents with injuries, extrication or other hazardous circumstances (i.e., the incident is on a high-speed roadway).
  - Respond to all incidents where law enforcement is on-scene as well.
  - Respond to randomly selected less serious calls for service to observe medic / EMT interaction with patients.
  - Make follow-up contact with families of patients to determine whether the level of service provided met expectations.

With medical calls making up such a significant proportion of the workload in the Department, it is more than reasonable to expect that front line supervisors will be assigned to respond to

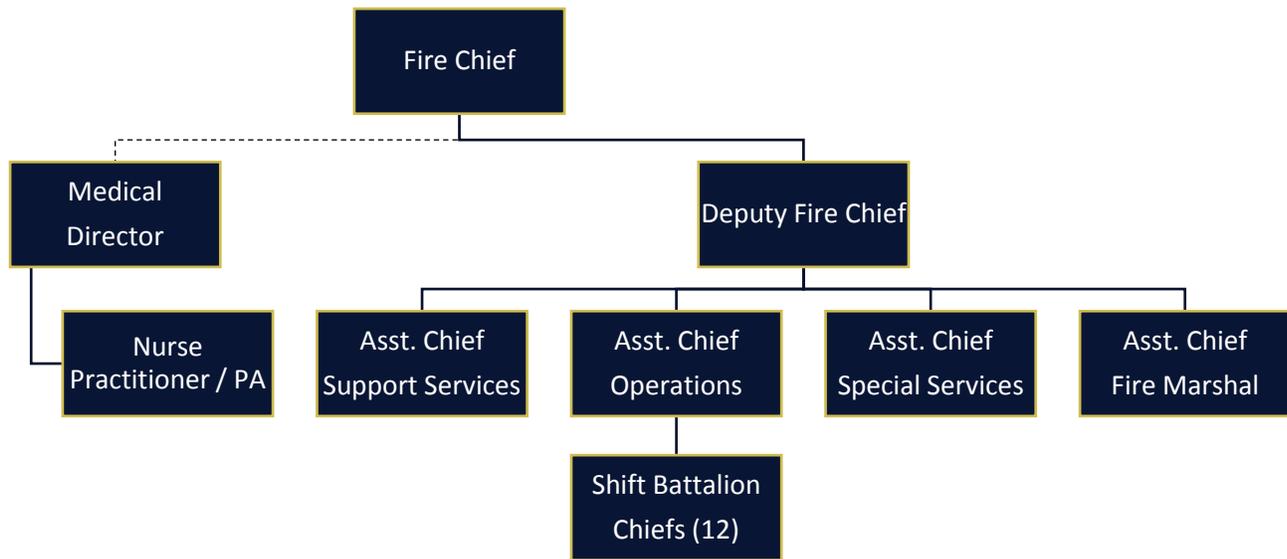
calls for service to ensure that targeted levels of service are being provided. Battalion Chiefs can also make decisions, in conjunction with the medics on scene, regarding return of units to service and other key management decisions.

#### ASSISTANT EMS DIRECTOR

Like the EMS Captains, the Assistant EMS Director is caught between two command structures. This position reports to both the Medical Director Physician (a contract position which is outside the command structure of the Department, but which holds the licensure authority for all medics and EMTs in the Department) and the Assistant Chief for Operations, Deputy Chief and Chief. The Assistant EMS Director is responsible for overseeing the emergency medical services program in the Department – as if it were a separate and distinct function from the Operations functions of the Department – a vestigial arrangement stemming from the early days of introducing EMS into the Department and the resistance to that change that was harbored by staff at the time. The primary focus of the Assistant EMS Director is to serve as the day-to-day overseer of the EMS program, to interface with the EMS Captains, Paramedics, EMTs and the Medical Control Physician and to ensure that protocols are being followed, and that new ideas are effectively researched prior to implementation.

With a realignment of Battalion Chief responsibilities on shift, there is no longer a need to have an Assistant EMS Director in its current form, overseeing EMS as if it's a separate program from Operations – EMS is Operations in the modern Corpus Christi Fire Department. There is no longer a distinction between those who 'do EMS' and those who do not. What is needed is more focused clinical attention on EMS service delivery, protocol compliance and training. This can be better provided by a civilian position who holds a high level of medical authority than do the paramedics, who is not in the direct chain of command with the shift Battalion Chiefs. This change eliminates the question about who works for which part of the organization and also enhances the medical oversight by the Medical Director.

## RECOMMENDED COMMAND STAFF STRUCTURE



The advantages to this re-organization proposal are summarized below:

- ◆ It provides greater organizational efficiency and alignment by redefining an Assistant EMS Director role that exists outside of the clearly defined rank structure of the department.
- ◆ It provides an independent clinical review component and enhances quality assurance efforts. Independence of the quality review function has been identified as a best practice within high performance EMS systems
- ◆ It makes the span of control of the Battalion Chief more acceptable while recognizing the practical realities of the current service demands and the organizational response to those needs.

## NAME CHANGE

The Corpus Christi Fire Department has a long history of providing dedicated life and property-saving services to the community. The City may want to consider, as have others, a change of name to reinforce to the community and the staff the wide range of services provided by the Department. A review of the names found in other 'metro' agencies include the following examples:

- ◆ Fire Rescue Department
- ◆ Fire & Rescue Department
- ◆ Emergency Services Department
- ◆ Fire, Rescue & Emergency Services Department
- ◆ Fire Medical Department

The project team recommends that the City consider shifting the name to something like:

- ◆ Corpus Christi Medical, Rescue and Fire Department

- ◆ Corpus Christi Emergency Services Department

Both of these names capture a broader range of services, and send the message to both the community and the staff that 'fire' alone is not the focus of the agency.

## **QUESTION 2 - Should the Fire Department consider alternative service delivery models for any services currently provided?**

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### **ANSWER**

Yes. The effectiveness of the Fire Department could be improved by employing some form of dynamic deployment as it relates to the demand for EMS Services. Additionally, alterations in station deployment would improve overall response time and staffing delivery performance. The Battalion chief positions should be relocated and enhanced to improve span of control, EMS/Medical Supervision and first alarm assembly geographic coverage (see Question 1). Overall effectiveness can and should be improved by alternative methods of managing EMS call demand including the implementation of Emergency Medical Dispatch (EMD) protocols and a continuing evaluation and evolution of response alternatives currently employed by the CCFD. This may include the evolution and refinement of the current dispatch algorithms to improve on the impressive concepts involved in identifying response time performance and call acuity in areas deemed acceptable or desirable by the medical director. In conjunction with the implemented EMD Program the Fire Department should implement response policies that are consistent with the various levels of medical acuity, including various levels of priority response, some of which include limiting the use of warning devices during response to less critical incidents. Response time performance objectives should also be adjusted based upon criticality.

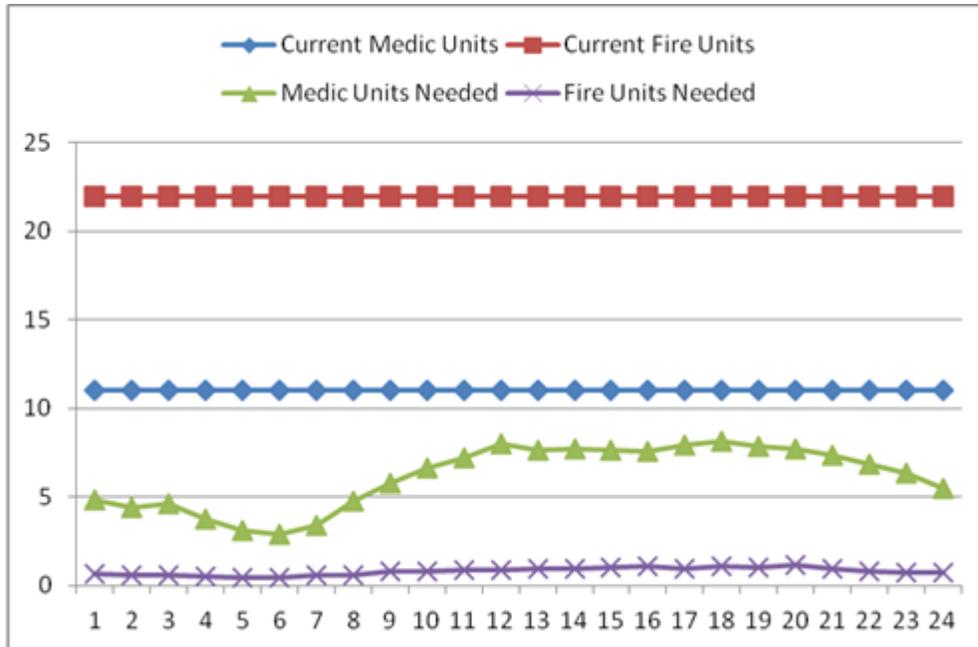
### **DISCUSSION**

#### **DYNAMIC DEPLOYMENT OF CURRENT RESOURCES**

Elsewhere in this report, it has been determined that EMS type calls account for the majority of the service demand within the city. It has also been determined that regardless of call type, there is a change in volume of demand depending upon the time of day<sup>1</sup>; notably increasing during daylight hours. While the CCFD utilizes a static staffing deployment model with personnel working 24-hour shifts, it is worth examining if peak load staffing is a viable alternative. To determine the apparatus needs by the time of day based upon recent workload, a baseline analysis was conducted utilizing the demand for calls for service by station hour by hour of day.

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<sup>1</sup> Comparatively, there is not significant change in volume monthly or by day of week.

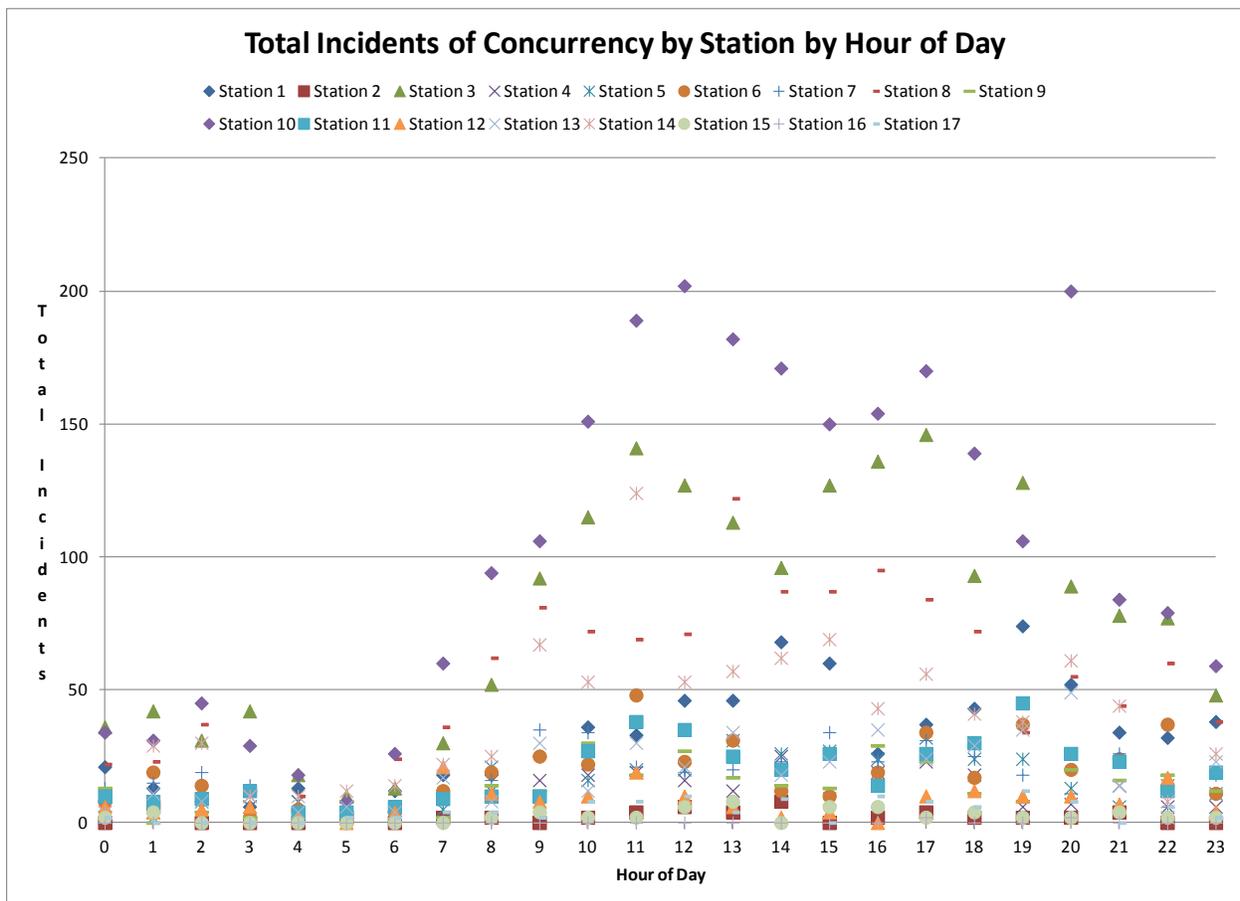


The factors of high variability of demand by time of day and possibility of simultaneous events occurring within the system creates a high degree of variability in the ability to meet that demand in the current system design. The preceding table illustrates the total call demand for EMS by hour throughout the system. As can be seen, the current total of scheduled and staffed units exceeds the demand for services for each hour when viewed as an entire system. When the demand is adjusted upward to take into account calls traversing over two hourly periods (in other words although system response capability is measured in specific hour segments, demand for services can occur at any point within that hour segment and requires the commitment of those resources into the next hourly block) the total system still has enough capacity to meet overall demand. There are, however, specific geographic station areas that experience concurrent call demands and a system design must be deployed to meet the service requirements in these areas. Given that the current expenditures result in a total resource commitment to meet demand, the issue becomes utilization of these resources in a way that meets community expectations. A reasonable industry standard for EMS Response is the ability to respond to 90% of calls for service within a 6-minute travel time. Currently the City level of service is a response time of 8 minutes and 27 seconds to 90% of all emergency calls for service. The table below summarizes the response performance by CCFD through 2013:

	Demand		Fire Calls		EMS Calls		Turnout Time
	Average	90th PCTL	Average	90th PCTL	Average	90th PCTL	Average
<b>CCFD Goal</b>			5:00		5:00		1:00
<b>NFPA 1710</b>				5:00		5:00	1:20
<b>Overall</b>	5:05	7:28	3:48	6:08	5:25	8:27	
							1:28 <i>Fire Units</i>
							1:09 <i>EMS Units</i>

It is interesting to note that the response time for EMS calls at the 90<sup>th</sup> percentile is 8:27 while the response time for fire calls at the 90<sup>th</sup> percentile is 6:08. This is occurring while the turnout time for fire calls exceeds EMS calls by 19 seconds. A substantial portion of this variation is a function of concurrent calls occurring within easily identifiable areas. In order to maintain or improve this standard, the City can either 1) increase the resources available during certain, peak times of the day, 2) dynamically deploy current ALS/Transport resources based on demand and probability of service demand, or 3), a combination of the two.

The graphic below illustrates the likelihood of concurrent calls within each station area over a given day. Specific hour-by-hour data for each station is attached as Question 2 Appendix of this report.



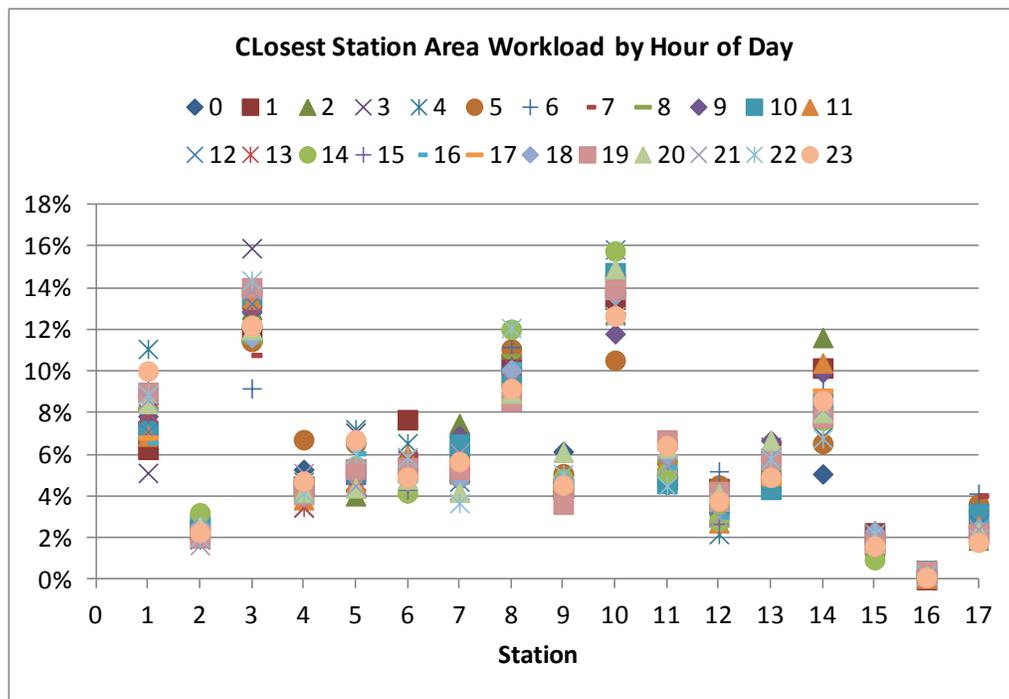
The most efficient system design utilizes existing resources and deploying them in a manner that maintains or improves overall response time while also maintaining acceptable levels of risk for the overall community when other resources are otherwise committed on incidents. It is important to note that this model of ‘dynamic deployment’ is not consistent with the current staffing plans, protocols, or operations of the Fire Department.

Because the total system resources currently exceed the total demand for services on an hourly basis, we cannot recommend acquisition of additional resources as a first option. The

redeployment of existing resources to areas of high concurrent activity based on historical demand patterns will provide reduced response times. However, this strategy will also provide the perception of increased risk as it sacrifices geographic coverage to some extent to provide for actual service demand coverage. This can be somewhat mitigated based on dynamic deployment of units to areas on the border of response areas and the provision of deployment models based on significant differences in call volumes of the areas moving up or being redeployed.

### EMS GEOGRAPHIC MINIMUM DEPLOYMENT

While the previous analysis reflects medic unit needs based upon demand, geographic aspects must be taken into account to meet response time goals given the extent of demand volume. Geographic analysis tools (GIS) were employed to determine the medical demand per hour closest to each station.



### RELOCATE BATTALION CHIEFS

The three Battalion Chiefs (BC) are currently located in Stations 1, 5, and 14. This clustering of 2 BC locations downtown, although in higher demand areas, affects the geographic extent of the first alarm assembly force and distances them physically from outlying stations. Elsewhere in this report, a fourth BC is recommended. It is recommended that the BC offices be relocated to stations 1, 4, 8, 9 to spread them more over the geography of the city and even out the span of control of area stations for each BC. The first alarm assembly will improve with a BC in station 8, closing the gap that can be seen in the map representation in the appendix similar to the representation shown that does not include BC travel extent into the analysis. A BC in 9 would not improve the first alarm assembly, but allow for supervision for the distant western areas of

the city. A BC in 12, though would equally space the BC areas, would be placed in an area of lower demand and result in no improvement in first alarm assembly contingent.

- ◆ BC1: Stations 1, 5, 3
- ◆ BC4: Stations, 4, 13, 15, 16, 17
- ◆ BC3: Stations 6, 7, 8, 11
- ◆ BC2: Stations 2, 9, 10, 12

This recommendation should be implemented concurrent with the recommendation to expand the role of Battalion Chiefs to include clinical/medical supervision responsibilities as outlined in Question 1 of this report.

#### EFFORTS TO REDUCE EMS DEMAND

CCFD should implement a program of prevention that can help reduce the incidence of injury such as from falls and motor vehicle accidents. A public education program to educate the public about the correct use of emergency resources may aid in the reduction of non-critical calls for service. A public service message media campaign to garner public support in only utilizing services in emergency situations and directing other inquires to a public resource communication center could reroute the calls to more appropriate services such as counselors and social workers.

### **QUESTION 3 - Are fire stations currently optimally located?**

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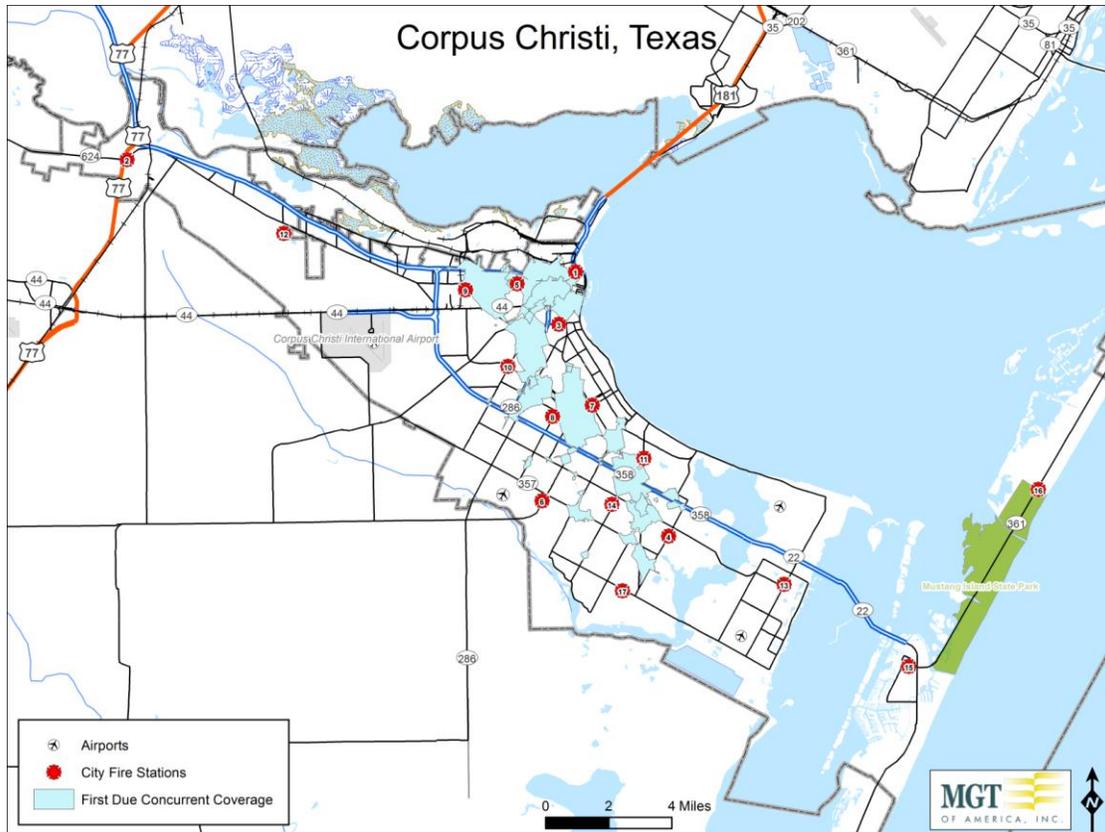
#### **ANSWER**

Given the complexity provided by the geographic layout and volume of incidents within Corpus Christi, the locations of the fire stations serve the city well. Current fire station locations in any community are a reflection of its history. In some communities, fire station locations still represent eras when horse drawn apparatus or early slower automotive technology were present. At this time, there is no need to add a new station. As a community increases in population, suburban sprawl, annexation, transportation flow improvements and other community developmental growth; subsequent fire stations are constructed as the need arises. Therefore, no community has optimally located fire stations and to relocate them based upon current technology, structural risk, and service demand is doomed to be outdated in short order and very costly.

#### **DISCUSSION**

In all communities, there are stations in very active, urban areas that contrast with stations in areas that are not very populated or developed, and have lower service demand. Usually, the number of apparatus and staff within these low demand stations reflect this, such as with CCFD's coastal stations. This may change as future planning allows for increased development. The dirt road that connects Station 15 southward to a large development should be improved for fire apparatus ease of access. It can be restricted if needed to emergency apparatus only.

One method to improve the efficiency of fire station locations is to evaluate stations that may be replaced by the coverage of other nearby stations. The first step is to examine concurrent first-due coverage areas that may preclude the need for a station. The following map shows the areas where two or more stations can provide concurrent coverage in the City.



It can be seen that Station 5 is located in an area where surrounding stations can reach within the travel time model. There is a small area it covers south of the station that would require more time to reach. It can be discerned from the following table that anticipated coverage levels do not suffer significantly with Station 5's closure.

	4 min travel time from fire stations		
	All Demand	Fires only	EMS calls
<i>Current Stations</i>	81.50%	75%	82%
<i>No Station 5</i>	81%	74%	82%

However with the loss of Engine 5, Insurance Services Office (ISO)<sup>2</sup> coverage for an area that does contain high risk properties would be affected. The loss of ISO Engine Distance coverage could translate into higher property insurance premiums for the property owners in the area outside the ISO coverage from surrounding stations. An overall 3% loss in ISO Engine distance coverage would be realized with the loss of Station 5.

<sup>2</sup> The ISO is a firm which evaluates public and private fire protection systems, providing a rating (for cities the rating is the Public Protection Classification or PPC) that is used by insurance companies to underwrite fire insurance costs for various types of residential structures.

## **SUMMARY:**

With the geographic extent and volume of incidents within Corpus Christi coupled with the general lack of concurrent coverage, the locations of the fire stations serve the city well. For more background information, see the Appendix for this question. Station 18 is not needed at this time.

## **QUESTION 4 - Can efficiency and effectiveness be improved through changes in apparatus configuration and deployment, including use of quints?**

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### **ANSWER**

Within the context of the recommendations in other areas of this report, it is not recommended that significant changes be made in the composition of the current fleet of apparatus type and configuration. Deployment is discussed in detail under Question 3.

### **DISCUSSION**

As discussed in Question 2, this report recommends a deployment model that is more dynamic than the current model of delivery. This is an effort to maximize the efficiency of current resources while maintaining acceptable levels of risk (i.e. geographic coverage). Because of this, maintaining the current type, size and configuration of trucks, engines and ambulances will provide a firefighting/pumping capacity generally consistent with the levels of service provided today. Maintaining the larger Medium Duty/Type I ambulances currently utilized by the department provides the ability to carry safety and other equipment that allows personnel to fully function in fire suppression and rescue roles when required.

While providing 'jump-staffed' alternative apparatus such as Utility Vehicles, will provide maintenance savings over the life of an apparatus, it will not halt the total life cycle replacement needs of fleet. Apparatus replacement is based only partially on mileage and is more reliant on age and pump hours which will not be impacted by use of alternative vehicles.

Alternatively, as call volume increases within specific hourly segments, or as the demand for alternative roles for the CCFD develop (see discussion on Community Para-medicine and Population Health Management Strategies in Question 2) alternative vehicles are likely to be appropriate in a peak demand or 'surge' response capacity.

The utilization of Quints (apparatus that carry water, pump water, carry ground ladders, have an aerial device and carry hose) is usually driven by one of two desired outcomes – consolidation of apparatus function giving the pumper and aerial stream capability or the addition of pumping, fire stream capability to and aerial device. There are specific areas where these goals are optimal and quint delivery is recommended. These are usually in more rural

areas where the need or demand is not easily predictable and a lack of staffing or other available resources may make the need to consolidate functions into one apparatus desirable.

As an overall strategy of apparatus deployment and acquisition, given adequate staffing and the ability to provide both truck and engine capabilities independently, the utilization of Quints should be the exception rather than the rule. The quint unit adds substantial weight to chassis requiring significant additional expense in construction and maintenance. The addition of a fixed aerial device adds additional annual expense in its maintenance and certification requirements.

## **QUESTION 5 - Can improvements be made in the efficiency and effectiveness of apparatus maintenance?**

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### **ANSWER**

The most significant challenge faced by the CCFD revolves around the facility that is currently assigned for fire apparatus maintenance. A number of facility-related challenges pose significant efficiency challenges. Co-location of a fire apparatus maintenance facility with a larger facility serving the needs of the entire City fleet would be optimal and effectively leverage a very large capital investment needed by the City. Given the special, complex and unique nature of fire apparatus and their components, fire fleet maintenance staff should be certified as Emergency Vehicle Technician/Fire Apparatus Mechanics. Position descriptions should reflect this need and the City should consider this as a minimum qualification for future employment requirements. The Fire Department also faces a significant vehicle replacement challenge with the age of its fleet. These should be addressed, in conjunction with broader City fleet maintenance issues. The new CCFD manager has taken a number of positive steps towards enhancing preventive maintenance and other key aspects of service delivery.

### **DISCUSSION**

The project team from MGT met with staff in the fleet maintenance facility, and identified the following major issues:

- ◆ Ladder trucks cannot fit into the building or under the rear awning for maintenance work.
- ◆ Engines can fit into the building, but when their cab is tilted to perform engine maintenance, it barely clears the ceiling.
- ◆ There is no drainage system for water in the floor.
- ◆ There are no grease traps for oil contamination remediation.
- ◆ There is no plumbing for a sink to provide in-shop washing for mechanics.

- ◆ There is no overhead crane for engine and other maintenance. There is no sufficient structure in the ceiling on which to mount such a crane.
- ◆ Parking is currently insufficient when multiple engines stop in for SCBA and other work (although this issue may be remedied by implementation of a mobile SCBA repair unit).
- ◆ No runner or parts person (could be the same civilian position).
- ◆ No administrative assistance provided to the Service Supervisor, who is doing all of the data entry himself.
- ◆ A fleet management study of the unit would likely recommend, based on 'vehicle equivalent units' an increase in technician staffing from three (3) to five (5).
- ◆ No inventory system is in place.
- ◆ Time tracking is minimal.
- ◆ Unit is using Firehouse rather than the City's current enterprise wide maintenance management system (M5).
- ◆ The fleet has been allowed to age and there is no formal fleet replacement plan.
- ◆ Preventive maintenance was historically allowed to go undone.
- ◆ Lack of technical training and certifications for maintenance technicians, while the Department has begun to address this, position descriptions should reflect these requirements and future employees hired to these minimum specifications.
- ◆ The lack of training / certification may be exacerbated by the wide variety of unit types included in the fleet (various manufacturers).

The area of fleet and apparatus maintenance has begun to receive appropriate attention from the Chief and his command staff. This is personified in the recruitment and hiring of a private-sector experienced Service Supervisor. However, for this program to improve, there will need to be significant capital and operating support provided to the Fire Department's fleet operations. Based on our conversations with other City staff, it is clear that similar issues exist in other parts of the City's fleet operations. The cause of the issues appear to extend back decades into various city policy, budget and operational decisions.

## QUESTION 6 - Can we improve our ISO rating and if so what needs to be done?

### ANSWER

There is no reason to do this. The City should take incremental steps to continuously enhance the delivery of EMS, fire and rescue services. However, this should not be focused on achieving an Insurance Services Office (ISO) Public Protection Class (PPC) 1 as the primary objective. The City of Corpus Christi would have to make significant personnel and capital investments in order to improve the current ISO classification of Class 2 to move to a Class 1. This would include adding engine companies (and staffing), truck companies (and staffing) and personnel in emergency communications. Further, it would require, at minimum, the construction of four additional fire stations. A review of the Texas Department of Insurance website indicates that there would be no likely premium benefit for homeowners moving from an ISO Class 2 to an ISO Class 1.<sup>3</sup> This table shows a 0.0% premium change for homeowners moving from a Class 2 to a Class 1.

### DISCUSSION

The most recent ISO report, dated 2009, indicates that there are several areas where the City and the Fire Department could enhance their ISO classification (which is currently set as a Class 2). The project team reviewed the letter which includes the deficiencies, as viewed by ISO, which exist in the Fire Department and in the City of Corpus Christi at the time of the evaluation. A summary of their key findings and the enhancements which would be required include:

Finding	Enhancement to Achieve More Points
Had 6.7 personnel on duty, on average in the communications center.	Increase to an average of 9.0 personnel on duty in the communications center.
Had 18 engine companies.	Require 20 engine companies to get full credit.
Received credit for 8 ladders and 2 service companies (included quints).	Improve equipment, ladder size, etc. on majority of ladders. Replacement of quints with engines will result in further erosion of the points for this category.
Reserve engine and truck capacity.	Increase number of operational AND fully equipped engines and trucks held in reserve to handle repair down-time, etc.
On-duty staffing for fire services.	Received 10.47 / 15.00 points – would need to add another 50 personnel on duty to achieve full credit. <sup>4</sup>
Training showed two deficiencies – lack of pre-fire planning of major structures and lacking documentation for training.	Increase pre-incident planning to twice a year for major facilities (all commercial, industrial and institutional) and improve record keeping in training and pre-incident plans.

<sup>3</sup> As an example, please review: <http://www.tdi.texas.gov/fire/documents/fmppcbrick.pdf>

<sup>4</sup> ISO report dated August 3, 2009 indicates that “An increase in the on-duty company personnel by one person will increase the fire department credit by 0.09.” With a cap of 15.00-10.47 = 4.53 / 0.09 = 50.33 personnel.

Finding	Enhancement to Achieve More Points
The City received full credit for water supply and for the number of hydrants. The deficiency occurred in the inspection / condition of hydrants.	Improve the frequency of inspections and the quality of hydrant maintenance and overhaul. <sup>5</sup>

These findings shows several key issues that should be kept in mind:

- ◆ The Corpus Christi Fire Department has an excellent foundation for the delivery of fire services to the community. A review of the ISO website shows that only 0.1% of communities have a Class 1 rating, and only 0.7% of communities have a Class 2 rating.
- ◆ These ratings do not take into account unique community characteristics.
- ◆ These ratings do not take into account the City’s actual experience with fires or fire loss.
- ◆ The classifications do not take into account the delivery of emergency medical services, a critical and substantial part of the Fire Department’s emergency service delivery system, which requires significant resource allocation.

Given the lack of improvement in homeowners’ insurance rates and the significant expense that would be incurred in order to move from ISO Protection Class 2 to ISO Protection Class 1., there is no compelling reason to move in this direction.

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<sup>5</sup> The project team fully supports the current plan to shift hydrant inspections and maintenance from the Fire Department to the Water Department, including a shift in budget resources from Fire back to Water to pay for additional staff time / equipment. Our team attended a meeting where this agreement was outlined between the two Departments.

**QUESTION 7 - Are there opportunities to reduce personnel costs by increasing the relative use of civilian personnel to perform duties currently performed by sworn personnel?**

**ANSWER**

There are several opportunities to reduce personnel cost by increasing the use of civilian personnel. These exist in several support functions jobs found within the Fire Department. The collective bargaining agreement currently prohibits the use of civilian personnel in a number of operational jobs.<sup>6</sup> While the direct savings might not be that significant, the certified firefighter / medic incumbents who are currently assigned to these tasks can be reassigned to line functions as soon as a replacement could be identified, hired and trained, representing a significant ‘opportunity cost’ savings for the City. The project team from MGT recommends that the City and Department move towards converting the identified positions in operations to civilians. This includes the captains assigned to equipment maintenance and the firefighter assigned to EMS supplies. The direct savings from making these transitions are estimated to be approximately \$50,000/year.

**DISCUSSION**

In reviewing the various assignments within the Corpus Christi Fire Department, the project team examined those which are assigned to certified firefighters at this time and asked the following questions of each one:

- ◆ Do the duties require the person to be a certified firefighter?
- ◆ Do the duties require the person to have been a certified firefighter at some point?
- ◆ Do the duties require the person to be a paramedic or EMT?
- ◆ Is specialty training of some kind required?

The table, below, provides a summary of our findings:

Position	Certified FF?	Experience as Certified FF?	Paramedic / EMT?	Specialty Certification?
Battalion Chief	X	X	X	X
EMS Battalion Chief				X
Captain	X	X	X	X
Paramedic on Engine	X	X	X	X
Paramedic on Ambulance			X	
EMT on Engine	X	X	X	X
EMT on Ambulance			X	
Plan Review / Inspector	X	X		X
Mechanic / Maintenance				X

<sup>6</sup> Article 8 Section 1 of the Collective Bargaining Agreement states that City administration “reserve the right to use civilians in the Fire Department to perform duties which do not require a certified Firefighter.”

Position	Certified FF?	Experience as Certified FF?	Paramedic / EMT?	Specialty Certification?
Battalion Chief	X	X	X	X
Supplies				

This assessment shows that there are several positions that could be candidates for future consideration for civilianization that are currently staffed using certified firefighters:

- ◆ The EMS Battalion Chief could be shifted from a certified firefighter position to one using a medical professional. This has already been recommended in Question 1. This might require a change in the collective bargaining agreement – though it may not if the position is simply eliminated and replaced with a contract medical professional as recommended.
- ◆ Paramedics and EMT’s assigned to ambulances could be medically certified without carrying the firefighter certification. It must be noted that the current Firefighter/Paramedics assigned to ambulances are an integral part of the overall fire defense system and this report is not recommending civilianizing the ambulance service delivery segment. However, in the future it is conceivable that, based on increased demand, peak hour demand staffing, or identified lower priority calls could be handled in some alternative manner utilizing EMT’s or some other delivery mechanism than is currently available to the City. This could be used to hire back-up crew members from the academy who are certified paramedics or EMT’s but do not have their firefighter certification, or to hire crews for these peak-load periods. This would appear to require a shift in the language in the collective bargaining agreement (Article 8 Section 1).
- ◆ Personnel assigned to maintenance or repair tasks, even when those tasks are associated with life-safety equipment (SCBA’s, firefighting tools) could be handled by certified civilians. This would not require a change in the collective bargaining agreement as these positions are already recognized as eligible for civilianization.
- ◆ Personnel assigned to delivery tasks could also be civilians rather than certified firefighters / paramedics. While these positions handle a wide range of expensive EMS supplies, they are not authorized to handle controlled substances (these are restocked in the hospital).

The primary value in this recommendation is to better utilize existing staff in line suppression and rescue functions. This represents a substantial opportunity cost that is more appropriately applied to direct public safety functions, while civilians are utilized in the supporting functions to these operations. While the savings might not be significant from making these changes (less than \$50,000 to convert several positions) the certified firefighter / medic incumbents who are assigned to these tasks could be reassigned to line functions as soon as a replacement could be identified, hired and trained.

**QUESTION 8 - For fire cadet training is the City making best use of training available from Del Mar College and are there opportunities to improve the cost efficiency of the City's Fire Academy? Are there opportunities to more efficiently provide on-going firefighter and paramedic training?**

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**ANSWER**

The Fire Department is making good use of the resources and facilities of Del Mar College. This relationship should be further leveraged to the benefit of the City by implementing the following:

1. Pre-employment programs should be integrated with recruit training to minimize the time to onboard a new employee and provide a cadre of known candidates. While the department has made significant efforts and progress in enhancing on-boarding through the existing Alternative Hire process this could likely be improved with greater coordination of the hiring cycle with the Graduation of Firefighter/Paramedics from the program. A comprehensive review of the overall hiring process that includes the college and faculty is recommended.
2. Contract with DMC to develop and integrate adult learning models into curriculum for both Continuing Education/Line and initial cadet training.
3. Work cooperatively with the college to improve existing on-line training mechanisms to include contemporary adult learning techniques.
4. Form a 'Learning Council' comprised of Fire Department members and professional educators from the college to evaluate and construct training plans and priorities based upon review of identified gaps in performance. This will provide:
  - a. A needed closure of the feedback loop from 'after-action reviews' and performance reviews through design and implementation of training interventions.
  - b. A systematic review and audit of the current training program with a focus on creating results/performance based metrics of training efforts and enhanced relevance of training experiences.

**DISCUSSION**

The City is advantageously positioned with the resources and facilities of Del Mar College which are located within its corporate boundaries. The Fire Department has leveraged this presence with the co-location of its training office within the College. With respect to the overall training and human resource development component of the department, there are several gaps identified between optimal and current performance.

1. There is a tension between Fire related training and EMS Training. The manipulative fire-based skills training for new Firefighter/Paramedics has become the critical path in the timeline for bringing on new recruits with the entry level academy taking a year to bring a new recruit on line.
2. The existing Continuing Education/Line Training is currently measured primarily by inputs (i.e. number of hours spent on training activities) with very little measurement of outputs (i.e. demonstrable behaviors or ability to meet defined performance objectives).
3. The current Continuing Education/Line Training is generally viewed by department personnel as legacy based and not necessarily relevant to the environment encountered by contemporary fire/rescue organizations. The content and approach to teaching are thus challenged with respect to their relevancy.
4. There is no closure or connection between identified needs or 'lessons learned' and the development, implementation or focus of specific educational or training remediation.

Closer and systematic partnership with college staff, faculty and resources would enhance the overall effectiveness of the department and its human resource development efforts.

The first systematic effort is recommended to be the formation of a 'Learning Council' comprised of Fire Department leadership, College faculty or staff, the EMS Medical Director (or designate), Training Staff members and line firefighters. The purpose of this group is initially to conduct an internal audit of training efforts and identify gaps between contemporary learning models, organizational needs and system performance. Its on-going purpose will be to evaluate performance metrics and all critical after action reports to prioritize (and design where necessary) educational or manipulative skills necessary to close identified gaps between organizational needs and performance.

The Department should also seek out assistance from the college and its associated resources in introducing more contemporary teaching and adult learning modalities into both EMS and Fire Ground skills curriculum. This should be tied to a redesign of performance metrics that are representative of demonstrable outputs of training, as opposed to tracking activities such as the number of hours or other inputs (see discussion under Issue 10 in this report).

## **QUESTION 9 - What needs to be done now to prepare to meet Fire services needs over the next decades?**

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### **ANSWER**

The essence of any organization's success and sustainability is its ability to recognize and respond effectively to changes in its environment. Our analysis has provided the project team with 5 specific challenges and opportunities that the Fire Department must address to position it for future effectiveness. These are identified as:

1. **Enhanced Technology** – Specifically, develop more effective mobile and tablet applications for enhanced data exchange and management effectiveness across all areas of the operation. Additional data integration both across city departmental boundaries (intra-organizational) and with external stakeholders or partners including the health care delivery and public safety infrastructures. Additional technology including the application of bar-coding or RFID will assist the Fire Department with everything from inventory management to fire ground safety management.
2. **Human Resource Selection, Development and Retention** – The Department would benefit from a concentrated and renewed focus on human resource development and retention. Elements to be included are an evaluation of currently needed skills, knowledge and abilities reflective of the current and future delivery needs of the organization, a comprehensive wellness and safety culture including the implementation of physical fitness evaluations and programs, incentives for targeted education, clearly defined succession planning and on-going/continuous learning with closed feedback loops to integrate new practices and procedures into the organization on a systemic basis.
3. **Enhanced integration with Community Health and Population Health Management Initiatives** - This will allow the department to play an appropriate and value adding role in the on-going redefinition of community health care delivery especially as it relates to the utilization of EMS resources.
4. **Organizational Structure and Supporting Systems** – As the department continues to evolve from a traditional fire response agency to a multi-functional, key resource within the overall fabric of community health and safety, the systems and structures that support its operations must also evolve. Specifically, the organization must structure itself in a more coordinated and seamless manner, eliminating the vertical silos that now exist between EMS, Operations, Fire Prevention and Training. The flexibility required to respond to the rapidly changing environment in which the department finds itself requires a workforce and workplace rules that are fair as well as flexible, allowing the organization to meet the changing needs and expectations of the community.
5. **On-going System of Capital Replacement and Capital Maintenance** – With respect to facilities and fleet, the Department is currently below an optimal replacement curve. Substantial investment would be required bring the current fleet up to consistency with accepted industry standards. A comprehensive fleet management program and additional accountability within the fleet and facilities maintenance programs will allow

the City to make informed decisions about replacement vs. repair decisions. This is especially true within the context of changes discussed in this report as it relates to alternative fleet and service delivery options.

These broad strategic issues are discussed below.

## DISCUSSION

1. **Enhanced Technology** - The Department requires upgrades and refinements to the technology that is utilized in providing its services to the community. Historically, the department has made appropriate investments including acquisition of automated Records Management Systems (RMS), Electronic Patient Care Reporting (ePCR) and Inspections Records. The addition of Payroll and Personnel Scheduling enhancements and expansion or improvement of network technology will provide significant benefit to the department of the future.
  - a. The Department should form a Technology Council that forms the Information Technology Strategic Plan, integrates required Department technology with other Departments and Citywide initiatives, scans the environment for industry wide practices, and identifies the technology investments necessary to drive the organizations vision and mission.
  - b. The Department should adopt a wider mobile platform capability and expand it to all divisions of the department. This includes training, operations, emergency management, prevention and EMS. Mobile computing is evolving from what was once a 'data collection' device to a tool that allows for multiple channels of communication, management information, data coordination and analysis. The capabilities of the City to develop comprehensive Customer Relationship Management (CRM) Solutions, as well as gain efficiencies in current automated systems such a fleet management, finance, payroll and inventory control all can be leveraged off of mobile platforms.
  - c. In order to develop the bandwidth and connectivity necessary to support this mobile environment, the Department should begin acquiring technology that makes their operating fleet mobile 'hot spots'. Providing each ambulance (for example) with mobile hot-spot capability will provide broadband connectivity and amplification necessary to provide a meaningful platform for the increasing stream of data required in the delivery of EMS and ultimately community health care delivery (e.g. Community Paramedicine). This type of investment will also spread the City's net infrastructure over a much wider geographic base allowing the future implementation of fully integrated, seamless customer and property management functions.
  - d. The department should review and upgrade existing software platforms. This includes the Records Management System, the Time and Payroll System (more robust systems such as TeleStaff or equivalent will provide substantial efficiencies), and the feasibility of integrating with existing, citywide software efforts such as M5 (fleet management).

2. **Enhanced Human Resource Selection, Development and Retention Systems** – Under any imaginable scenario, the future will require greater organizational flexibility and responsiveness than those that are deemed adequate today. As a community's methods of funding and perceptions of value change over time, government agencies must be in a position to quickly adapt to these changes. Critical to any organizations effectiveness is the plan for staffing and the expense associated with putting the right people, with the right skills, in the right place and the right time. In order to meet this fundamental challenge for future success, the Fire Department should position itself in accordance with several guiding ideas:
  - a. Job descriptions and positions should be flexible enough to allow the organization to provide different and alternative services to those being currently provided. For example, as EMS evolves, the role of all EMS providers will likely change as well - requiring different or additional skill sets to those found in today's organization. The systems and structures that support the organization must reflect this needed flexibility. As such, the selection, training, and retention of individuals must include the ability to adapt to changing needs. The selection process should attempt to leverage activities or functions that exist outside of the organization (e.g. Community Colleges or regional hiring/candidate validation conducted regionally or by other agencies) and avoid duplication of those efforts, thus speeding the on-boarding time of individuals.
  - b. On-going training and continuing education must be constantly re-focused to meet real time needs in the work place and be the result of measurement driven evaluation of services offered and services needed. A series of career expectations (formerly a career path) should be provided by the organization that culminates in a succession plan to help remove ambiguity with respect to the organization's ability to provide opportunities to its members.
3. **Enhanced Integration with Community Health and Population Health Management Efforts** - The Patient Protection and Affordable Care Act (ACA) has created significant disruption across the spectrum of health care delivery – and EMS is not immune to that disruption. At the current time, there is little ability to accurately project the ultimate impact to EMS system of the ACA, given that there is currently no proposal or information on future ambulance transportation or EMS reimbursement. As such, EMS agencies are attempting to discern how their resources, already pre-positioned in the community, can be utilized for community health activities for which there are identified incentives within the ACA. The challenges facing EMS providers at the current time are significant:
  - a. The current incentives fall to others (i.e. health care systems, providers or payers) that can meet population health goals. Their willingness to assign a value to, or actually pay for, EMS resources to help meet these goals has not been determined.
  - b. The current skills and protocols of EMS agencies are not consistent with the skills/protocols necessary to provide value in a community health/Population Management paradigm.

- c. A lack of data integration between EMS and legacy hospital data systems provides a substantial barrier to the ability for EMS to add value without additional investment.
- d. There are significant cultural differences between the rapid response, fix it “Rescuer Mentality” specifically found in the Fire Services, and the long-term clinical care giver.

That is not to say that the role of EMS is not changing. The critical aspect to positioning for this change is to understand that the overall tenor of health care delivery is now based on an intense focus on “population management.” The ability of an Accountable Care Organization (ACO) or Medical Home Health Organization (MHHO), the currently consolidating organizational forms that will likely receive payment for the management of patient access, care and wellness, to effectively manage that population will drive reimbursement. The extent to which value will be attributed to the City’s EMS resources will lie in the ability of the Fire Department to integrate, gain confidence and provide demonstrable value to these entities.

It is essential for any EMS planning effort with a horizon longer than 12-months, to include a mechanism for enhancing relationships with these ACO organizations within the community. While it is fashionable for EMS leaders to attempt to move their organizations into widely described “Community Paramedicine” programs, to do so in the absence of this context with the community ACOs will inevitably doom such efforts to failure.

- 4. **Organizational Structure and Supporting Infrastructure** - Just as the organization’s Human Resource selection, development and retention efforts require flexibility and change, so do the systems and structures that support the organization in a dynamic environment. Currently the organization is highly vertical in nature, with very unique and disparate silos for areas such as EMS, Training, Fire Prevention, Hazmat/Technical Rescue and Operations. These individual functional areas are all reliant in reality, if not in theory, on the activities and actions of a very few individuals usually residing within the Operations Division – primarily the Battalion Chiefs. As such, there are numerous inconsistencies in how activities and issues within the functional areas are handled and significant issues related to effective communication.

In order to be effective over the next ten years, the Fire Department should reorganize in such a way as to integrate essential functions within a framework that is as close to the citizen customer as possible, with full responsibility and accountability lying at that level. To the extent possible, organizational systems and structure should provide incentives to remove vertical ‘silo’ thinking among members.

- 5. **On-going System of Capital Replacement and Capital Maintenance** – The various recommendations of this report, specifically those related to Alternative Vehicle Utilization and Alternative Service Delivery Models, provide an excellent point of leverage for the Department to begin a new and thorough process of Capital and Facility planning. The current organization has several gaps between optimal fleet and facility resources and the current state. Often staffing is not consistent with specialized equipment needs (e.g. Marina/Water protection). Station design is an issue with many facilities in need of substantial renovation and application of contemporary design

features. The current apparatus replacement program appears to be based more on quantity and availability of funds, than a significant and justifiable strategic intent and purpose.

**QUESTION 10 - Is the Fire Department using appropriate measures for the City Performance Report (CPR)?**

**ANSWER**

The Fire Department can improve upon the current CPR by adding new dimensions that are reflective of manageable activities and directly related to relevant and measurable outcomes.

**DISCUSSION**

The current CPR contains 7 ‘Mission Elements’ and ten comparative data sets. The Mission Elements are identified as follows:

Mission Element	Measure
Respond to Fire Suppression Calls	Average Response Time after dispatch
Respond to Emergency Medical Calls	Average Response Time after dispatch
Conduct Fire Prevention Activities	Number of attendees at fire safety presentations
Conduct Fire and Arson Investigations	Number of Structure Fires Investigated
Enforce Fire Codes	% of plans reviewed within 7 working days % of Fire Code Violations receiving follow up within 30 days
Manage Emergency Operations including EOC	% of departments for which emergency ops plans have been updated
Respond to special services such as HAZMAT, Technical Rescue and Water Rescue	% of departmental members trained to departmental and national standards.

There are an additional ten data points used to describe trends in activity:

- ◆ Average Response Time
- ◆ Total Budget
- ◆ Authorized Uniform Personnel
- ◆ Calls for Service
- ◆ Medical Calls for Service
- ◆ Non-Structure Fire Calls for Service
- ◆ Working Structure Fire Calls for Service
- ◆ Fire Dollar Loss
- ◆ Civilian Injuries

- ◆ Civilian Fatalities

These data points and measures are appropriate and serve as an excellent foundation for a performance management system that can be utilized on a more granular, day to day management basis by department leadership. Specifically it is recommended that the following changes and additions be implemented to the existing CPR measures:

1. All 'AVERAGE' Response times should be supplemented such that data are also reflected on a fractile<sup>7</sup> basis. Goals should be reflected by response time standards expressed on a basis of 90% compliance. By way of example: Time of first arriving unit after dispatch to structure fire calls shall be 4 minutes and 8 Seconds or less for 90% of all such calls responded to.
2. All data points should be additionally reflected on a per capita or other percentage basis based upon some logical denominator. This provides a common and meaningful measure of performance across time normalizing for changes in the environment. Thus, 'Number of Structure Fires' should be additionally described by the metric 'Structure Fires/1,000 Population.
3. Specific 'output' or 'results based measures' should be included. By way of example, 'Number of Citizens in attendance at fire safety presentations' is an activity measurement – but a true measure of desired outcome should be reflected as well. Based upon meaningful analysis of fire or community health issues, goals and related measures impacting the community in meaningful ways should be included. These might include:
  - a. Reduction in drowning incidents to a level below 5 per 100,000 Population.
  - b. Reduction in arson fires to a level below 0.5 per 1,000 population
4. Specific EMS Performance Goals should be included based upon the needs of the Medical Director. Examples of these might include:
  - a. Percentage of full cardiac arrest events obtaining Return of Spontaneous Circulation (ROSC) prior to arrival at hospital.
  - b. Percentage of cases presenting outside of normal vital sign limits presented to the ER within normal limits or stabilized.

Additionally, the performance measurement system should be integrated with the Department's data collection and reporting system. Currently, significant management time is committed to manually collecting and entering performance metric data into a reporting tool. This tool is then forwarded to City administration, there is little evidence that the Performance Metrics are utilized for the actual management of process improvement efforts within the

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<sup>7</sup> 'Fractile' is a mathematical concept of looking at the quantity or proportion of events that meet a particular threshold. In the case of EMS and fire, many agencies focus on being able to achieve a targeted response time or response capability 90% of the time. Thus, one could report that a system's response time at the 90% fractile is x minutes. This will almost always be a higher number than the average, but it is also a more accurate way of assessing the performance of a system as a whole.

Department. The City should actively seek out appropriate software functionality that will generate meaningful management metrics in a 'near time' manner and present such data to the agency in a dashboard type format with drill down capability. This will allow the department leadership to develop actionable management information that impacts the department's efficiency and effectiveness directly.

**QUESTION 11 - Are there any provisions in the Collective Bargaining Agreement that are detrimental to the efficient operation of the department or should be considered for modification?**

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**ANSWER**

There are a number of issues that should be addressed in the collective bargaining agreement. Many of these issues are related to the organic nature of the agreement and the ways in which it was developed. A number of issues should be address within the CBA in the upcoming negotiation, scheduled to begin in the spring of 2014. Specific improvements should be made in a number of areas which directly impact the ability of the Chief to effectively manage the operations of the Department in an efficient and effective manner. These include:

- ◆ Past practice is explicitly denoted as a 'prevailing right' as a working condition, limiting management's ability to respond to new challenges.
- ◆ Overtime calculations are laid out in the CBA, rather than noting that they will be calculated according to the Fair Labor Standards Act.
- ◆ Utilization of personal time in conjunction with vacation leave.
- ◆ Opportunities to use civilians in both support (currently allowed) and some operational positions.
- ◆ There are a number of issues in the way in which EMS certification and work assignments are handled within the contract.
- ◆ EMS compensation is predicated on maintaining the certification, rather than a combination of certification and performance pay.

Making these changes will make the Fire Department more flexible and able to respond to new challenges. A crucial management tool in a rapidly changing healthcare and emergency services world.

**DISCUSSION**

The collective bargaining agreement (CBA) under which the City and Fire Department are operating is set to expire this year. The project team's review identified a number of issues for improvement within the CBA. These issues, and recommended modifications, are provided in the table that follows:

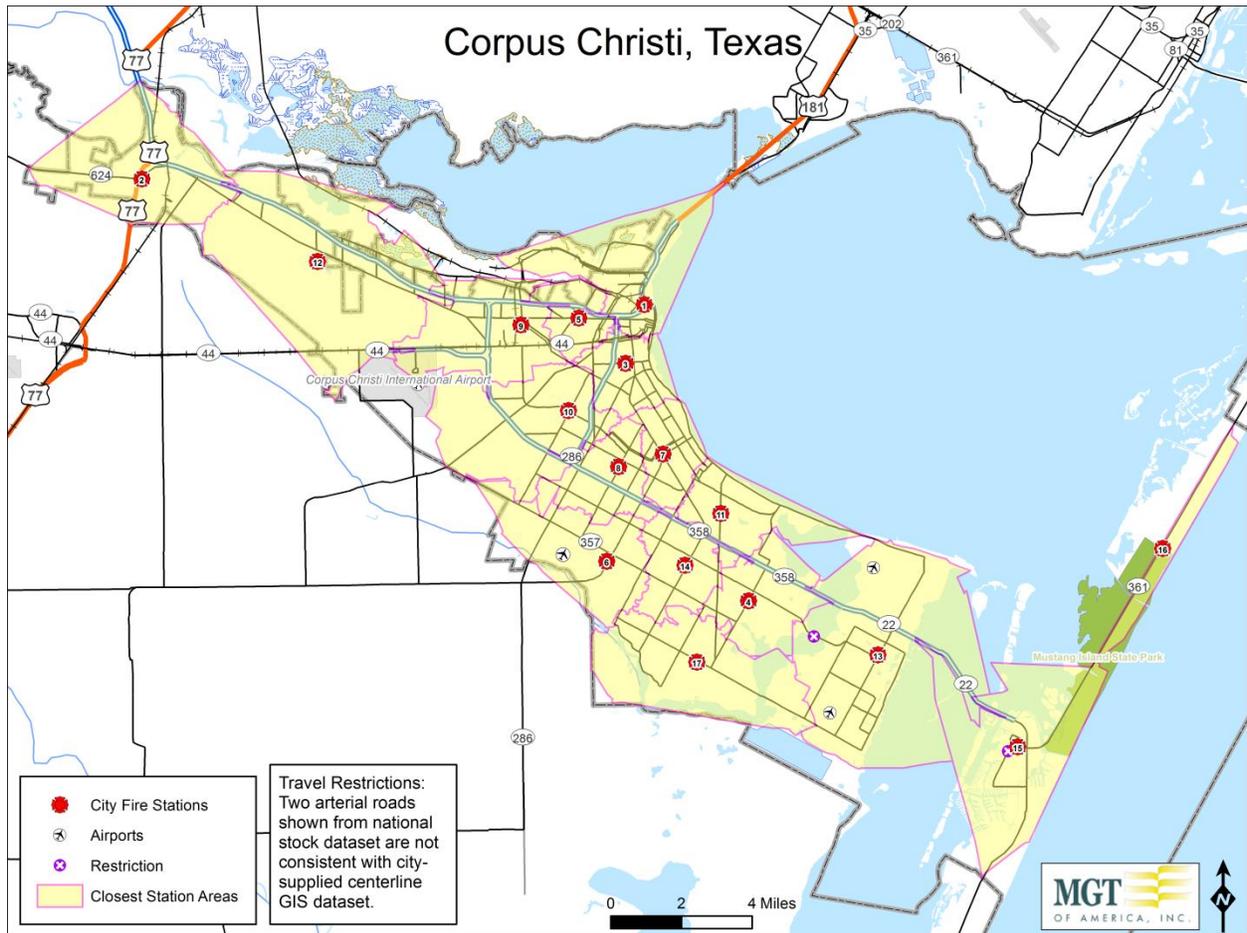
Article / Section	Issue	Improvement
Article 2 / Section 3	Provides that current or past working conditions not specifically mentioned in the contract remain in full force and cannot be diminished during the term of the agreement.	Eliminate the reference to past working conditions entirely from the contract. This language could be used to slow down or block needed changes in the Fire Department.
Article 4 / Section 3	Provides that overtime is calculated on specific rates and times.	These should be reviewed with City human resources for whether they maximize the City's benefit under FLSA 7(k) exemptions. Staff should be compensated for overtime based on allowable rules.
Article 4 / Section 7 & Article 7 / Section 4	Language in the two locations in the CBA appears at odds with the donation of Personal Leave by all union members to support the non-line work of the union president.	Clarify that staff in the union who are donating Personal Leave to the union president are donating sufficient time to cover the lost time that needs to be covered from the FTE.
Article 5 / Sections 1-3	Compensation for EMS (and other specialties) is linked to holding the certification, rather than performing the tasks.	Link compensation to performing the job. Paid by the shift worked on the ambulance or on a paramedic fire unit (higher pay for ambulance work).  Continue 'patch pay' for maintaining the certifications.
Article 6 / Section 1 & Article 6 / Section 2	Allows opt-out of paramedic status after 8-year term.  Required to serve a minimum of five years in 'EMS service'.  No ability to require skill maintenance – i.e., staff can opt out of working on the ambulance.	Make EMT status a condition of employment for all staff. Make paramedic status a condition of employment for all non-driver firefighters.  Serving on ambulance a shared duty for line staff – remove opt out provisions. Add a requirement that all paramedics must work the number of shifts not less than that designated by the Medical Director.  Need flexibility for now and for the future. Avoid specific duties or assignments.
Article 8 / Section 1	Language in the CBA identifies several support classifications that can be filled with civilians rather than with certified firefighters. There is no allowance for operational positions.	Alter the language allowing for the use of civilians in any 'non-firefighting' task. The specific objective should be to gain the flexibility to utilize civilians in staffing EMS-only units, including those assigned to 'community para-medicine,' peak load ambulances, and 24-hour staffed ambulances.

Article / Section	Issue	Improvement
Article 11 and Article 15	<p>Document is not consistently formatted.</p> <p>Document has specific references to a prior consulting report.</p>	<p>Ensure that the document is consistently formatted, numbered, outlined for ease of reference.</p> <p>Remove and do not replace specific consultant references.</p>

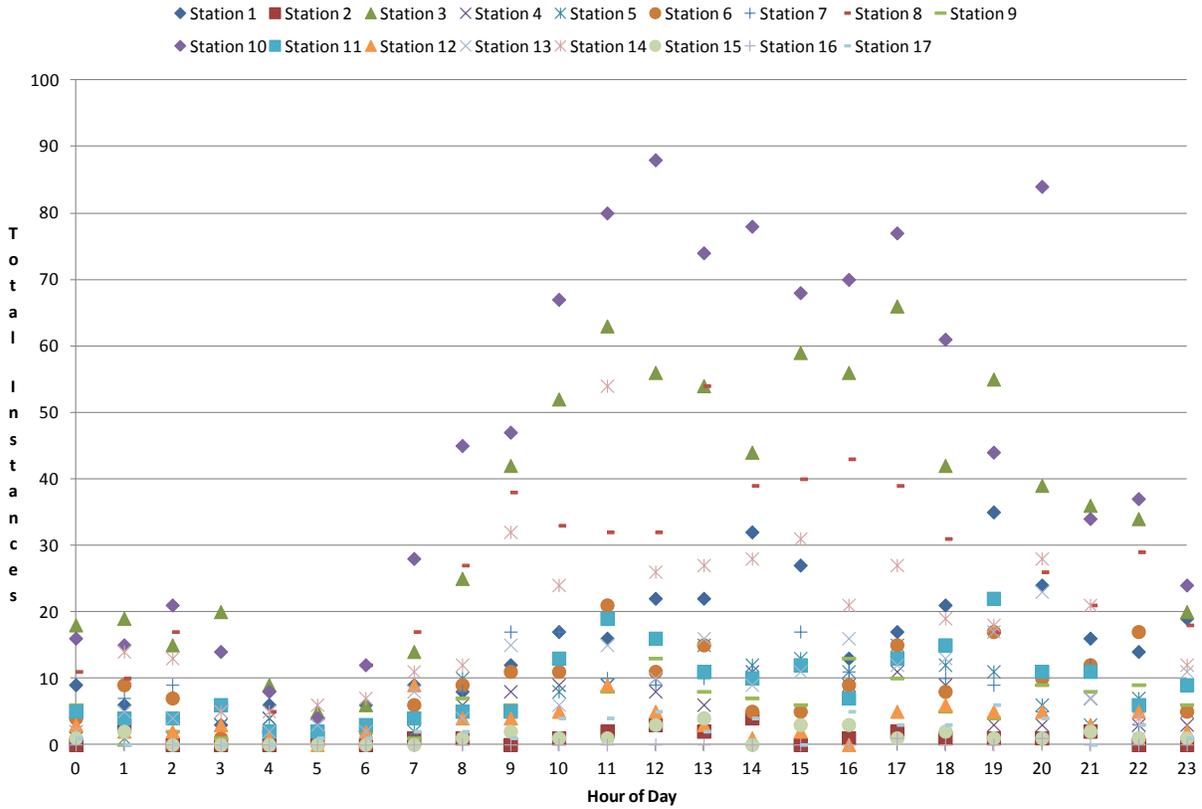
The CBA is a very powerful management tool and an equally powerful management challenge. The City should work closely with the Fire Chief to determine the specific language which will protect the City's rights and which will provide for maximal flexibility.

## QUESTION 2 - APPENDIX

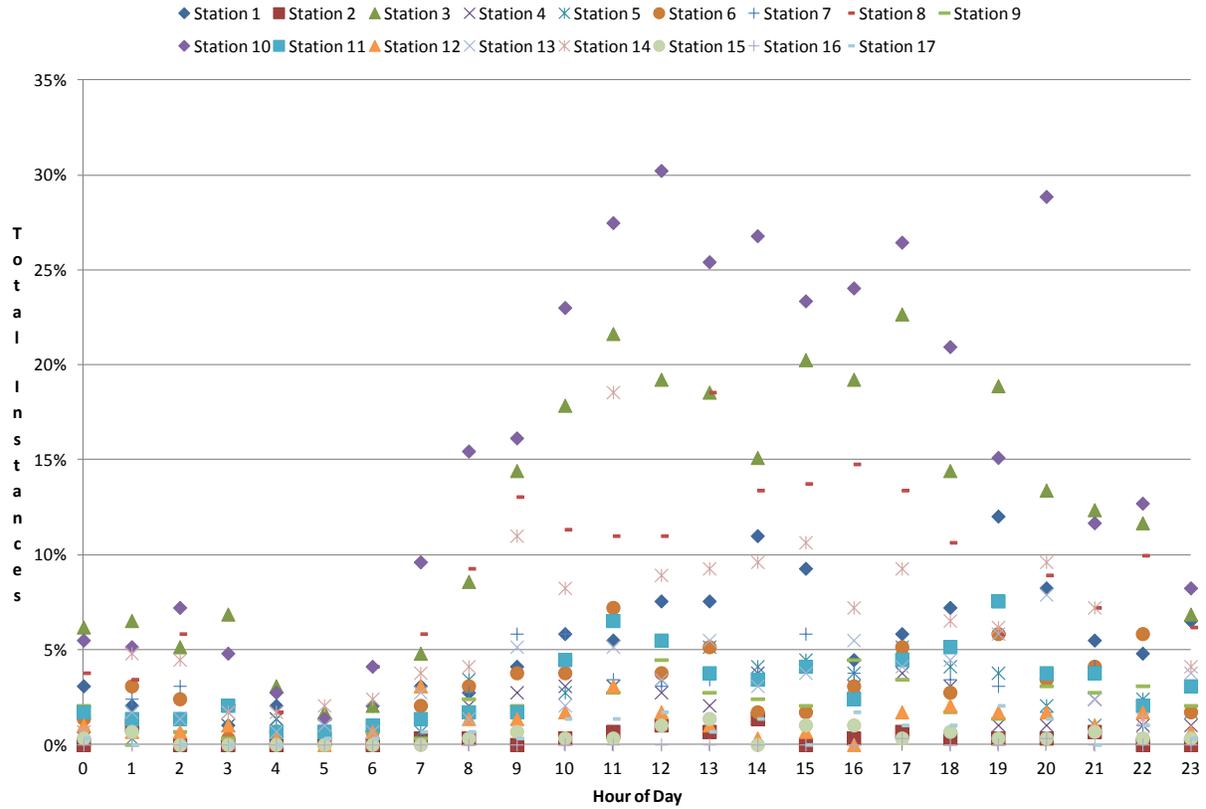
CLOSEST STATION AREA MAP



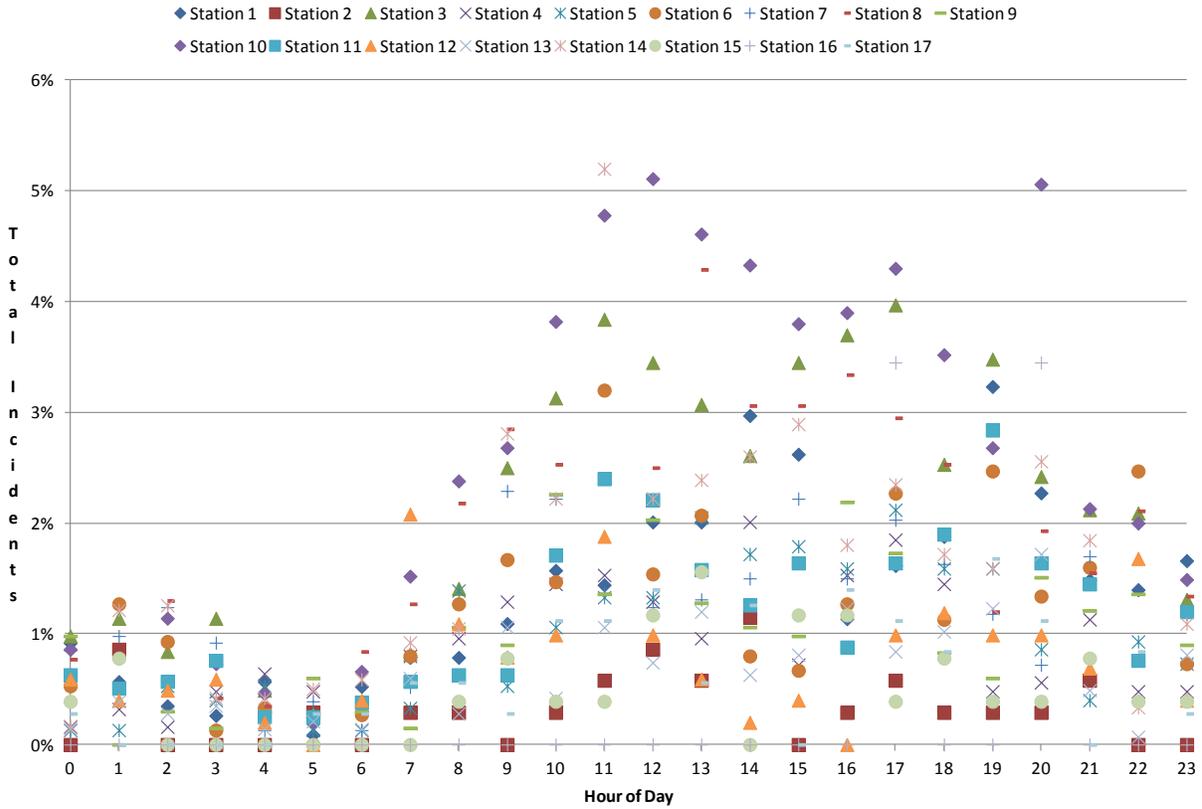
### Total Instances of Concurrency by Station by Hour of Day



## Percent of Total Instances of Concurrency by Station by Hour of Day



## Percent of Total Incidents of Concurrency by Station by Hour of Day



TOTAL INSTANCES OF CONCURRENCY BY HOUR BY STATION AREA

Hour of Day	Station 1	Station 2	Station 3	Station 4	Station 5	Station 6	Station 7	Station 8	Station 9	Station 10	Station 11	Station 12	Station 13	Station 14	Station 15	Station 16	Station 17
0	9	0	18	1	1	4	5	11	6	16	5	3	2	2	1	0	1
1	6	3	19	2	1	9	7	10	0	15	4	2	5	14	2	0	0
2	4	0	15	1	4	7	9	17	2	21	4	2	4	13	0	0	0
3	3	0	20	3	3	1	6	6	1	14	6	3	5	5	0	0	0
4	6	0	9	4	4	2	1	5	2	8	2	1	2	5	0	0	0
5	1	1	5	3	1	0	3	4	4	4	2	0	3	6	0	0	1
6	6	0	6	2	1	2	1	12	2	12	3	2	2	7	0	0	1
7	9	1	14	5	2	6	4	17	1	28	4	9	8	11	0	0	2
8	8	1	25	6	10	9	8	27	7	45	5	4	4	12	1	0	2
9	12	0	42	8	4	11	17	38	6	47	5	4	15	32	2	0	1
10	17	1	52	9	8	11	17	33	13	67	13	5	6	24	1	0	4
11	16	2	63	9	9	21	10	32	8	80	19	9	15	54	1	0	4
12	22	3	56	8	10	11	9	32	13	88	16	5	10	26	3	0	5
13	22	2	54	6	15	15	10	54	8	74	11	3	16	27	4	0	2
14	32	4	44	11	12	5	11	39	7	78	10	1	9	28	0	0	4
15	27	0	59	4	13	5	17	40	6	68	12	2	11	31	3	0	0
16	13	1	56	9	11	9	11	43	13	70	7	0	16	21	3	0	5
17	17	2	66	11	15	15	13	39	10	77	13	5	12	27	1	1	3
18	21	1	42	9	12	8	10	31	5	61	15	6	13	19	2	0	3
19	35	1	55	3	11	17	9	17	4	44	22	5	17	18	1	0	6
20	24	1	39	3	6	10	5	26	9	84	11	5	23	28	1	1	4
21	16	2	36	7	3	12	12	21	8	34	11	3	7	21	2	0	0
22	14	0	34	3	7	17	3	29	9	37	6	5	1	4	1	0	3
23	19	0	20	3	5	5	9	18	6	24	9	2	11	12	1	0	1

PERCENTAGE OF CONCURRENT INSTANCES BY STATION AREA BY HOUR OF DAY

Hour of Day	Station 1	Station 2	Station 3	Station 4	Station 5	Station 6	Station 7	Station 8	Station 9	Station 10	Station 11	Station 12	Station 13	Station 14	Station 15	Station 16	Station 17
0	3.09%	0.00%	6.19%	0.34%	0.34%	1.37%	1.72%	3.78%	2.06%	5.50%	1.72%	1.03%	0.69%	0.69%	0.34%	0.00%	0.34%
1	2.06%	1.03%	6.53%	0.69%	0.34%	3.09%	2.41%	3.44%	0.00%	5.15%	1.37%	0.69%	1.72%	4.81%	0.69%	0.00%	0.00%
2	1.37%	0.00%	5.15%	0.34%	1.37%	2.41%	3.09%	5.84%	0.69%	7.22%	1.37%	0.69%	1.37%	4.47%	0.00%	0.00%	0.00%
3	1.03%	0.00%	6.87%	1.03%	1.03%	0.34%	2.06%	2.06%	0.34%	4.81%	2.06%	1.03%	1.72%	1.72%	0.00%	0.00%	0.00%
4	2.06%	0.00%	3.09%	1.37%	1.37%	0.69%	0.34%	1.72%	0.69%	2.75%	0.69%	0.34%	0.69%	1.72%	0.00%	0.00%	0.00%
5	0.34%	0.34%	1.72%	1.03%	0.34%	0.00%	1.03%	1.37%	1.37%	1.37%	0.69%	0.00%	1.03%	2.06%	0.00%	0.00%	0.34%
6	2.06%	0.00%	2.06%	0.69%	0.34%	0.69%	0.34%	4.12%	0.69%	4.12%	1.03%	0.69%	0.69%	2.41%	0.00%	0.00%	0.34%
7	3.09%	0.34%	4.81%	1.72%	0.69%	2.06%	1.37%	5.84%	0.34%	9.62%	1.37%	3.09%	2.75%	3.78%	0.00%	0.00%	0.69%
8	2.75%	0.34%	8.59%	2.06%	3.44%	3.09%	2.75%	9.28%	2.41%	15.46%	1.72%	1.37%	1.37%	4.12%	0.34%	0.00%	0.69%
9	4.12%	0.00%	14.43%	2.75%	1.37%	3.78%	5.84%	13.06%	2.06%	16.15%	1.72%	1.37%	5.15%	11.00%	0.69%	0.00%	0.34%
10	5.84%	0.34%	17.87%	3.09%	2.75%	3.78%	5.84%	11.34%	4.47%	23.02%	4.47%	1.72%	2.06%	8.25%	0.34%	0.00%	1.37%
11	5.50%	0.69%	21.65%	3.09%	3.09%	7.22%	3.44%	11.00%	2.75%	27.49%	6.53%	3.09%	5.15%	18.56%	0.34%	0.00%	1.37%
12	7.56%	1.03%	19.24%	2.75%	3.44%	3.78%	3.09%	11.00%	4.47%	30.24%	5.50%	1.72%	3.44%	8.93%	1.03%	0.00%	1.72%
13	7.56%	0.69%	18.56%	2.06%	5.15%	5.15%	3.44%	18.56%	2.75%	25.43%	3.78%	1.03%	5.50%	9.28%	1.37%	0.00%	0.69%
14	11.00%	1.37%	15.12%	3.78%	4.12%	1.72%	3.78%	13.40%	2.41%	26.80%	3.44%	0.34%	3.09%	9.62%	0.00%	0.00%	1.37%
15	9.28%	0.00%	20.27%	1.37%	4.47%	1.72%	5.84%	13.75%	2.06%	23.37%	4.12%	0.69%	3.78%	10.65%	1.03%	0.00%	0.00%
16	4.47%	0.34%	19.24%	3.09%	3.78%	3.09%	3.78%	14.78%	4.47%	24.05%	2.41%	0.00%	5.50%	7.22%	1.03%	0.00%	1.72%
17	5.84%	0.69%	22.68%	3.78%	5.15%	5.15%	4.47%	13.40%	3.44%	26.46%	4.47%	1.72%	4.12%	9.28%	0.34%	0.34%	1.03%
18	7.22%	0.34%	14.43%	3.09%	4.12%	2.75%	3.44%	10.65%	1.72%	20.96%	5.15%	2.06%	4.47%	6.53%	0.69%	0.00%	1.03%
19	12.03%	0.34%	18.90%	1.03%	3.78%	5.84%	3.09%	5.84%	1.37%	15.12%	7.56%	1.72%	5.84%	6.19%	0.34%	0.00%	2.06%
20	8.25%	0.34%	13.40%	1.03%	2.06%	3.44%	1.72%	8.93%	3.09%	28.87%	3.78%	1.72%	7.90%	9.62%	0.34%	0.34%	1.37%
21	5.50%	0.69%	12.37%	2.41%	1.03%	4.12%	4.12%	7.22%	2.75%	11.68%	3.78%	1.03%	2.41%	7.22%	0.69%	0.00%	0.00%
22	4.81%	0.00%	11.68%	1.03%	2.41%	5.84%	1.03%	9.97%	3.09%	12.71%	2.06%	1.72%	0.34%	1.37%	0.34%	0.00%	1.03%
23	6.53%	0.00%	6.87%	1.03%	1.72%	1.72%	3.09%	6.19%	2.06%	8.25%	3.09%	0.69%	3.78%	4.12%	0.34%	0.00%	0.34%

TOTAL CONCURRENT CALL COUNT BY STATION BY HOUR OF DAY

Hour of Day	Station 1	Station 2	Station 3	Station 4	Station 5	Station 6	Station 7	Station 8	Station 9	Station 10	Station 11	Station 12	Station 13	Station 14	Station 15	Station 16	Station 17
0	21	0	36	2	2	8	13	22	13	34	10	6	4	4	2	0	2
1	13	6	42	4	2	19	15	23	0	31	8	4	11	29	4	0	0
2	8	0	31	2	8	14	19	37	4	45	9	5	8	30	0	0	0
3	6	0	42	6	6	2	14	12	2	29	12	6	10	10	0	0	0
4	13	0	18	8	8	5	2	10	4	18	4	2	4	10	0	0	0
5	2	2	10	6	2	0	6	8	8	8	4	0	6	12	0	0	2
6	12	0	13	4	2	4	2	24	4	26	6	4	4	14	0	0	2
7	18	2	30	10	5	12	8	36	2	60	9	21	17	22	0	0	4
8	18	2	52	12	21	19	16	62	14	94	10	11	8	25	2	0	4
9	25	0	92	16	8	25	35	81	12	106	10	8	30	67	4	0	2
10	36	2	115	18	16	22	34	72	30	151	27	10	12	53	2	0	8
11	33	4	141	19	20	48	21	69	18	189	38	19	30	124	2	0	8
12	46	6	127	16	20	23	19	71	27	202	35	10	21	53	6	0	10
13	46	4	113	12	31	31	20	122	17	182	25	6	34	57	8	0	4
14	68	8	96	25	26	12	23	87	14	171	20	2	18	62	0	0	9
15	60	0	127	9	27	10	34	87	13	150	26	4	23	69	6	0	0
16	26	2	136	19	24	19	23	95	29	154	14	0	35	43	6	0	10
17	37	4	146	23	32	34	31	84	23	170	26	10	24	56	2	2	8
18	43	2	93	18	24	17	25	72	11	139	30	12	29	41	4	0	6
19	74	2	128	6	24	37	18	34	8	106	45	10	35	38	2	0	12
20	52	2	89	7	13	20	11	55	20	200	26	10	49	61	2	2	8
21	34	4	78	14	6	24	26	44	16	84	23	7	14	44	4	0	0
22	32	0	77	6	14	37	6	60	18	79	12	17	2	8	2	0	6
23	38	0	48	6	11	11	18	38	12	59	19	4	23	26	2	0	2

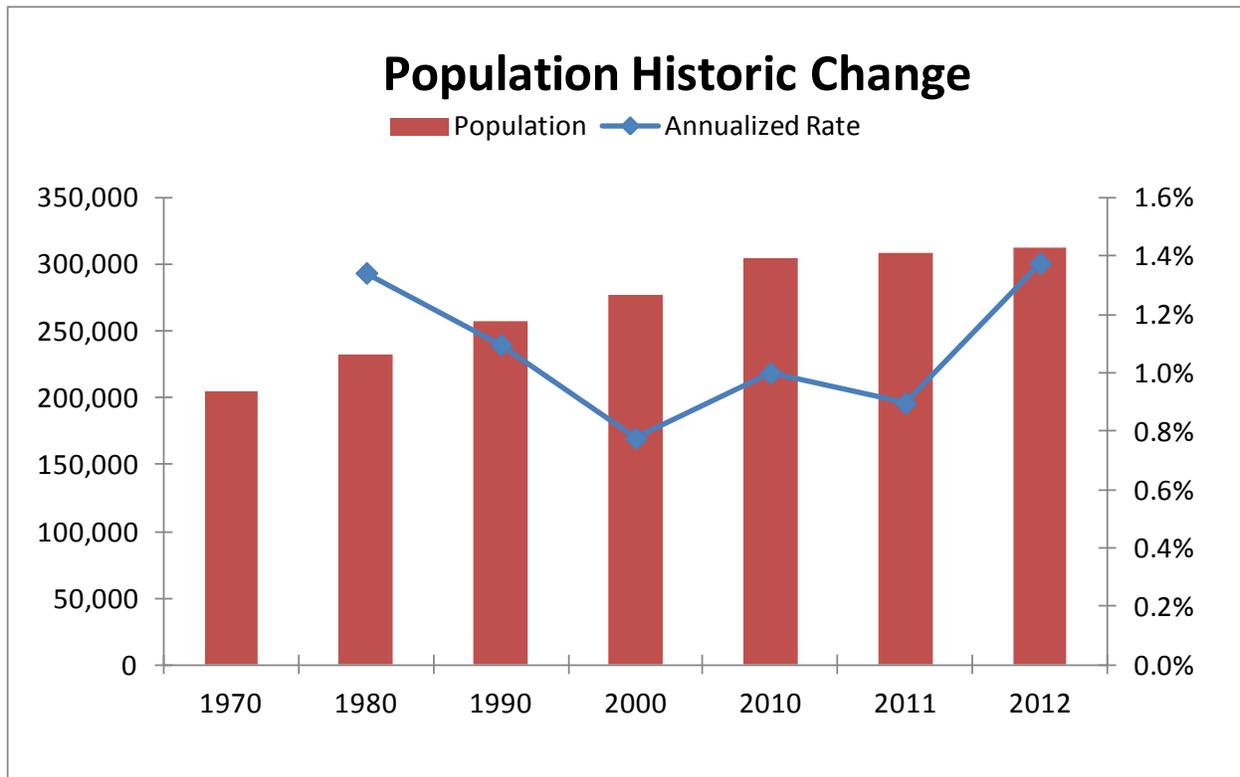
TOTAL CONCURRENT CALL PERCENTAGE BY STATION BY HOUR OF DAY

Hour of Day	Station 1	Station 2	Station 3	Station 4	Station 5	Station 6	Station 7	Station 8	Station 9	Station 10	Station 11	Station 12	Station 13	Station 14	Station 15	Station 16	Station 17
0	0.92%	0.00%	0.98%	0.16%	0.13%	0.53%	0.85%	0.77%	0.98%	0.86%	0.63%	0.59%	0.14%	0.17%	0.39%	0.00%	0.28%
1	0.57%	0.86%	1.14%	0.32%	0.13%	1.27%	0.98%	0.81%	0.00%	0.78%	0.51%	0.40%	0.39%	1.22%	0.78%	0.00%	0.00%
2	0.35%	0.00%	0.84%	0.16%	0.53%	0.93%	1.24%	1.30%	0.30%	1.14%	0.57%	0.49%	0.28%	1.26%	0.00%	0.00%	0.00%
3	0.26%	0.00%	1.14%	0.48%	0.40%	0.13%	0.92%	0.42%	0.15%	0.73%	0.76%	0.59%	0.35%	0.42%	0.00%	0.00%	0.00%
4	0.57%	0.00%	0.49%	0.64%	0.53%	0.33%	0.13%	0.35%	0.30%	0.46%	0.25%	0.20%	0.14%	0.42%	0.00%	0.00%	0.00%
5	0.09%	0.29%	0.27%	0.48%	0.13%	0.00%	0.39%	0.28%	0.60%	0.20%	0.25%	0.00%	0.21%	0.50%	0.00%	0.00%	0.28%
6	0.52%	0.00%	0.35%	0.32%	0.13%	0.27%	0.13%	0.84%	0.30%	0.66%	0.38%	0.40%	0.14%	0.59%	0.00%	0.00%	0.28%
7	0.79%	0.29%	0.82%	0.80%	0.33%	0.80%	0.52%	1.27%	0.15%	1.52%	0.57%	2.08%	0.60%	0.92%	0.00%	0.00%	0.56%
8	0.79%	0.29%	1.41%	0.96%	1.39%	1.27%	1.05%	2.18%	1.06%	2.38%	0.63%	1.09%	0.28%	1.05%	0.39%	0.00%	0.56%
9	1.09%	0.00%	2.50%	1.29%	0.53%	1.67%	2.29%	2.85%	0.90%	2.68%	0.63%	0.79%	1.06%	2.81%	0.78%	0.00%	0.28%
10	1.57%	0.29%	3.13%	1.45%	1.06%	1.47%	2.22%	2.53%	2.26%	3.82%	1.71%	0.99%	0.42%	2.22%	0.39%	0.00%	1.12%
11	1.44%	0.58%	3.84%	1.53%	1.33%	3.20%	1.37%	2.43%	1.36%	4.78%	2.40%	1.88%	1.06%	5.20%	0.39%	0.00%	1.12%
12	2.01%	0.86%	3.45%	1.29%	1.33%	1.54%	1.24%	2.50%	2.03%	5.11%	2.21%	0.99%	0.74%	2.22%	1.17%	0.00%	1.40%
13	2.01%	0.58%	3.07%	0.96%	2.05%	2.07%	1.31%	4.29%	1.28%	4.61%	1.58%	0.59%	1.20%	2.39%	1.56%	0.00%	0.56%
14	2.97%	1.15%	2.61%	2.01%	1.72%	0.80%	1.50%	3.06%	1.06%	4.33%	1.26%	0.20%	0.63%	2.60%	0.00%	0.00%	1.26%
15	2.62%	0.00%	3.45%	0.72%	1.79%	0.67%	2.22%	3.06%	0.98%	3.80%	1.64%	0.40%	0.81%	2.89%	1.17%	0.00%	0.00%
16	1.14%	0.29%	3.70%	1.53%	1.59%	1.27%	1.50%	3.34%	2.19%	3.90%	0.88%	0.00%	1.23%	1.80%	1.17%	0.00%	1.40%
17	1.62%	0.58%	3.97%	1.85%	2.12%	2.27%	2.03%	2.95%	1.73%	4.30%	1.64%	0.99%	0.84%	2.35%	0.39%	3.45%	1.12%
18	1.88%	0.29%	2.53%	1.45%	1.59%	1.13%	1.63%	2.53%	0.83%	3.52%	1.90%	1.19%	1.02%	1.72%	0.78%	0.00%	0.84%
19	3.23%	0.29%	3.48%	0.48%	1.59%	2.47%	1.18%	1.20%	0.60%	2.68%	2.84%	0.99%	1.23%	1.59%	0.39%	0.00%	1.68%
20	2.27%	0.29%	2.42%	0.56%	0.86%	1.34%	0.72%	1.93%	1.51%	5.06%	1.64%	0.99%	1.72%	2.56%	0.39%	3.45%	1.12%
21	1.49%	0.58%	2.12%	1.13%	0.40%	1.60%	1.70%	1.55%	1.21%	2.13%	1.45%	0.69%	0.49%	1.84%	0.78%	0.00%	0.00%
22	1.40%	0.00%	2.09%	0.48%	0.93%	2.47%	0.39%	2.11%	1.36%	2.00%	0.76%	1.68%	0.07%	0.34%	0.39%	0.00%	0.84%
23	1.66%	0.00%	1.31%	0.48%	0.73%	0.73%	1.18%	1.34%	0.90%	1.49%	1.20%	0.40%	0.81%	1.09%	0.39%	0.00%	0.28%

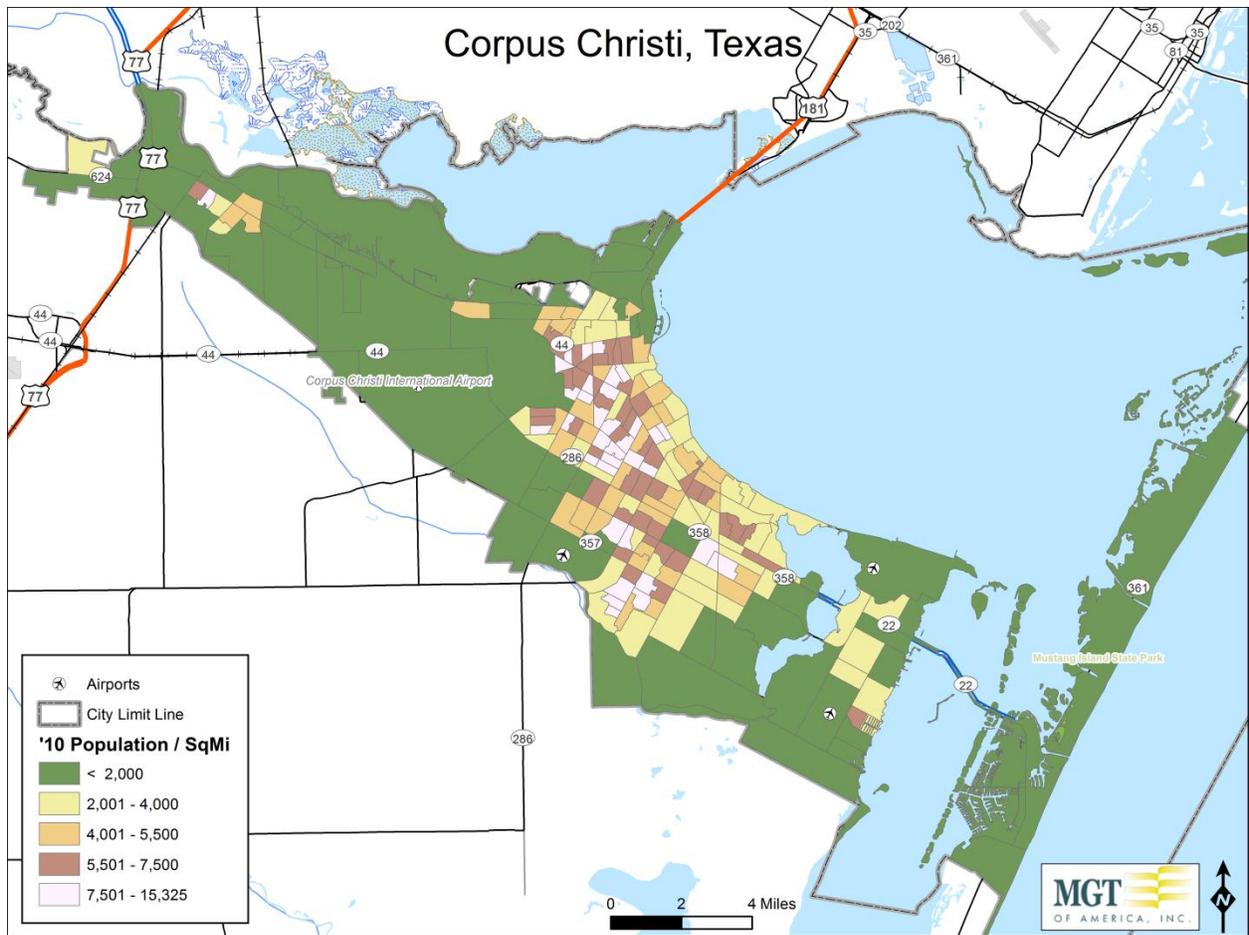
## QUESTION 3 - APPENDIX

### POPULATION & HOUSING

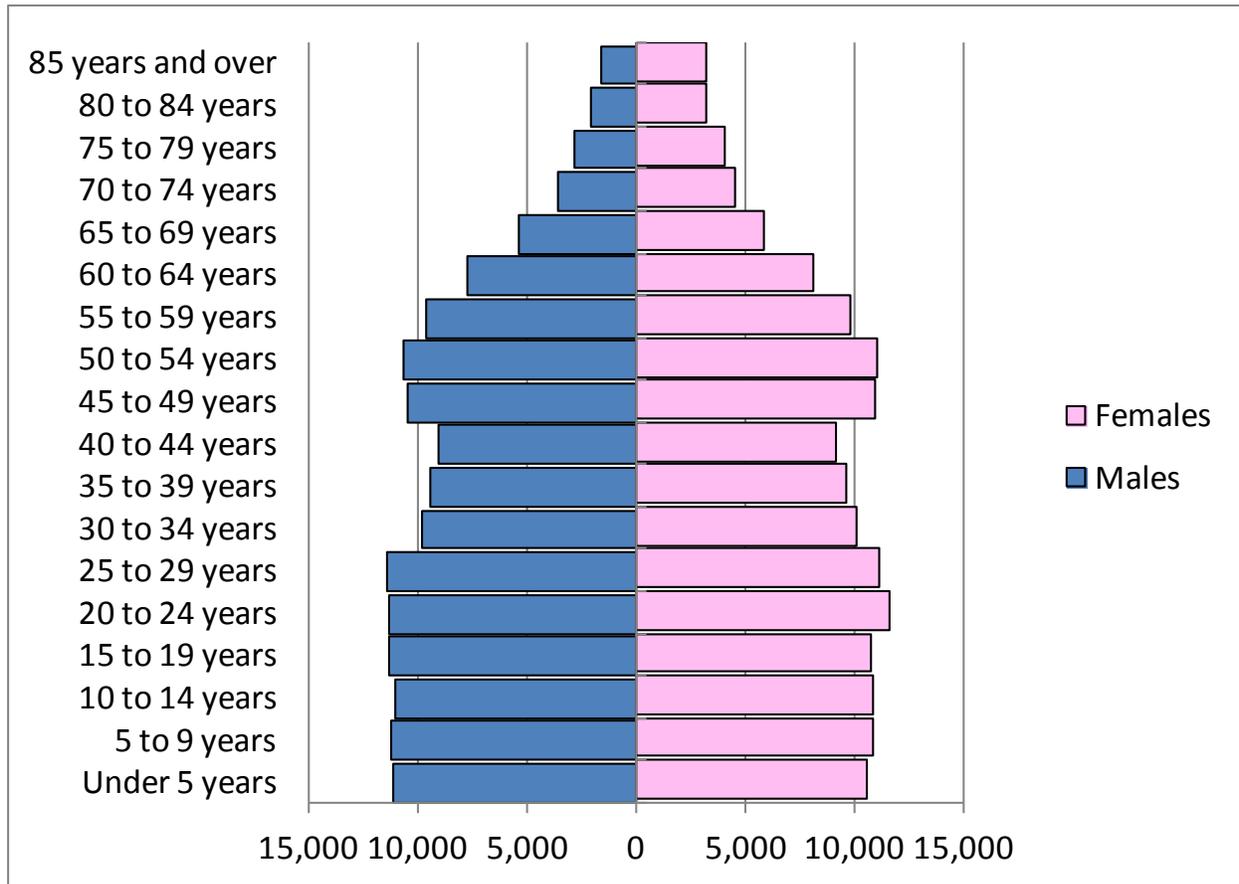
The population of Corpus Christi includes 77,062 residential units according to the 2010 U.S. decennial census. This is an increase of approximately 10% from a decade earlier when the residential population was 72,182 persons. Historically, the City population had been increasing steadily since 1970, growing about 1% annually.



These figures represent residential population and does not account for the variation during the daytime hours for commuters, shoppers, and out of area employees. It is estimated (using census data) that Corpus Christi increases approximately 3% in population as people converge into the City for work. Once again, this does not factor flow-through traffic, shoppers, and tourists. The residential population is also not evenly distributed. It is well understood that demand for emergency services correlate with areas of higher population. The following map shows the concentration of residential population by census block group areas.



Although general population levels play a role in the geographic distribution of demand for fire and medical services, it is important to examine the composition of the population since the aged and pediatric populations are more prone to serious medical emergencies and to succumb to smoke and fire due to their behavioral tendencies during a fire. Children often hide making an interior search by firefighters more difficult, while mobility issues limit the ability of the aged to escape. The following graphic illustrates the levels of population by age group in Corpus Christi.

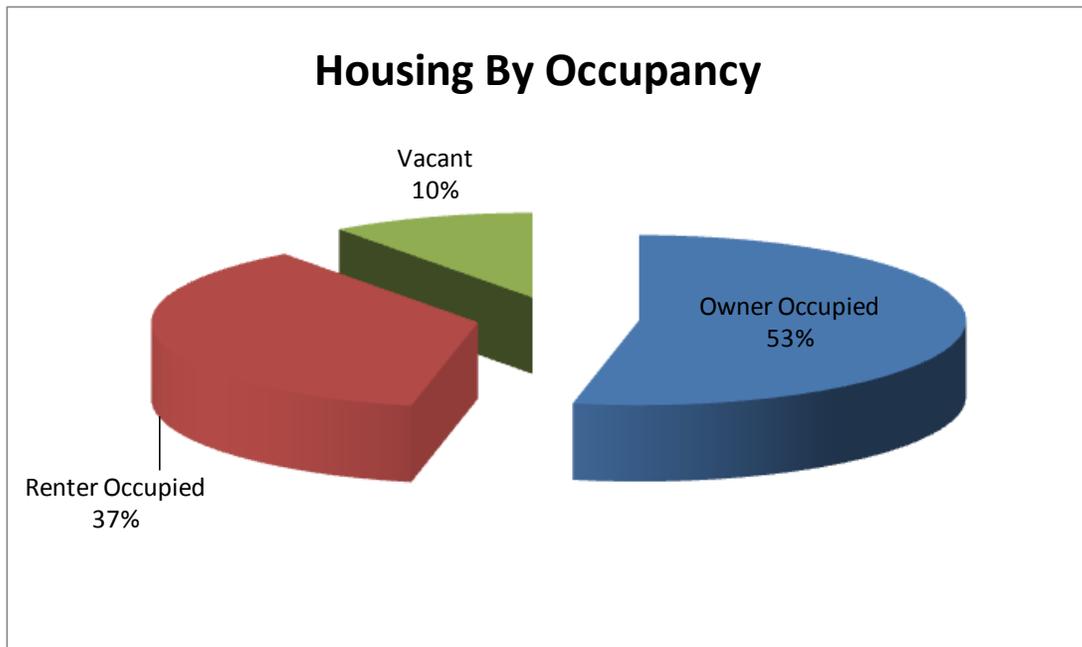


6% of the City's population is less than five years of age, while 12.6% are younger school aged (under age 15). An additional 15% are over aged 65, together with the younger population, efforts for fire prevention and fire escape procedures should be emphasized with these groups. It is fortunate for the City to have the largest segment of its population within the 5-24 years of age cohort. It has overtaken the next oldest age group, the prime working ages of 25-44 that has suffered a decline in numbers in the 2000 census. The following table details the change in age cohort levels over the previous two census tabulations of residential population.

	Total	Age <5	5 to 24	25 to 44	45 to 54	55 to 64	65 to 74	75+
<b>2010</b>	305,215	21,721	88,981	79,768	43,222	46,351	19,298	16,951
<b>2000</b>	277,454	21,544	85,905	81,067	36,585	21,551	16,944	13,858
<b>change</b>	10%	1%	4%	-2%	18%	115%	14%	22%

While the increase in student aged population could put pressure on the public education system for space, the older age cohorts (45+) have significant increases in population numbers. It should be noted that within the next ten years the bulk of these ‘baby boomer’ population (those born between 1946 and 1964) are poised to enter the ranks of the ‘senior citizen’ (generally those above the age of 65). It is expected that demand for medical emergencies will rise significantly and the threat of fatal fire death may also increase based upon the age progression of the population.

In the following graphic, housing is examined by occupancy types. It should be noted that, a higher than average national and statewide rate of renter-occupied properties exists. This is important because areas of lower vacancy and rental properties are typically reflective of better economic means that correlate with lower demand for emergency services.



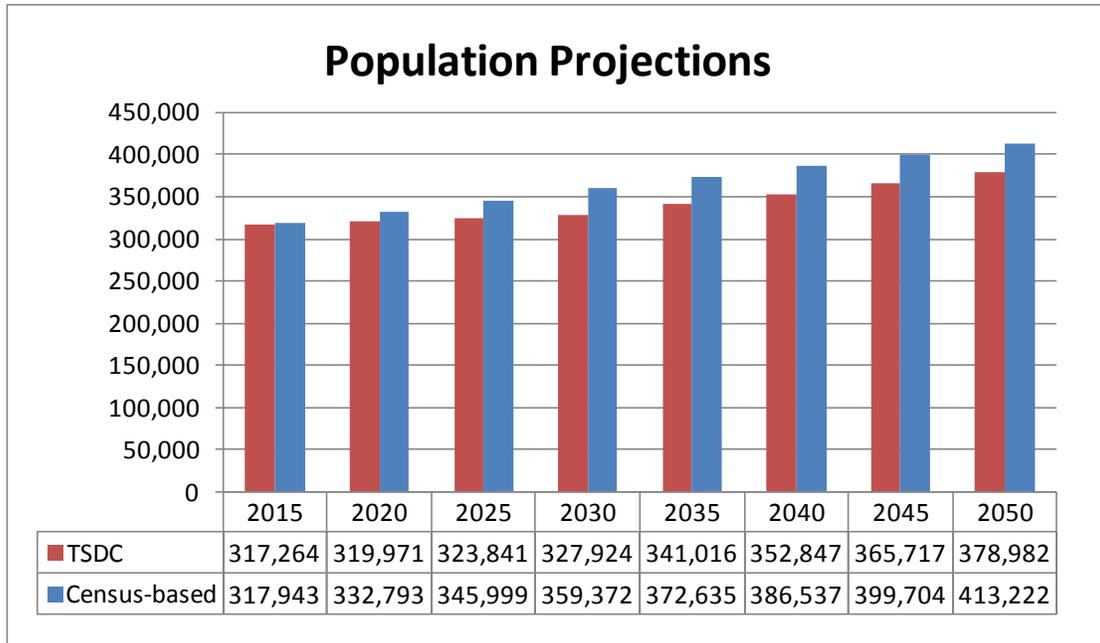
Rental properties and vacant properties are more numerous in areas such as Corpus Christi, not only because of its urban nature, but because of other factors such as collegiate housing. The following table illustrates that all segments of housing have increased since the 2000 U.S. Census.

	Total	Owner Occupied	Renter Occupied	Vacant
<b>2010</b>	125,469	66,832	45,963	12,674
<b>2000</b>	107,831	58,912	39,879	9,040
<b>change</b>	16%	13%	15%	40%

It is anticipated that additional population growth will continue into the future as residential developments are filled and new ones are constructed. One method to project population growth is based on several decades of census experience. Decennial census figures from 1990, 2010 and census estimates of population for 2011 and 2012 were used to extrapolate forecasted population figures through the year 2050.

This method, however, can fail to account for expected trends in the growth rate of an area. These changes often result from redevelopment, changes in employment capacity, or other socio-economic factors not taken into consideration in a linear projection from historic rates. Because of this, local population projections from agencies with differing methodology are also reviewed.

For Corpus Christi, information available from the Texas State Data Center of the University of Texas-San Antonio using the same growth rate methodology as the Metro Council of Governments that encompasses the City<sup>8</sup>. The comparison of the two methods of population growth for the City of Corpus Christi is presented in the following graph.



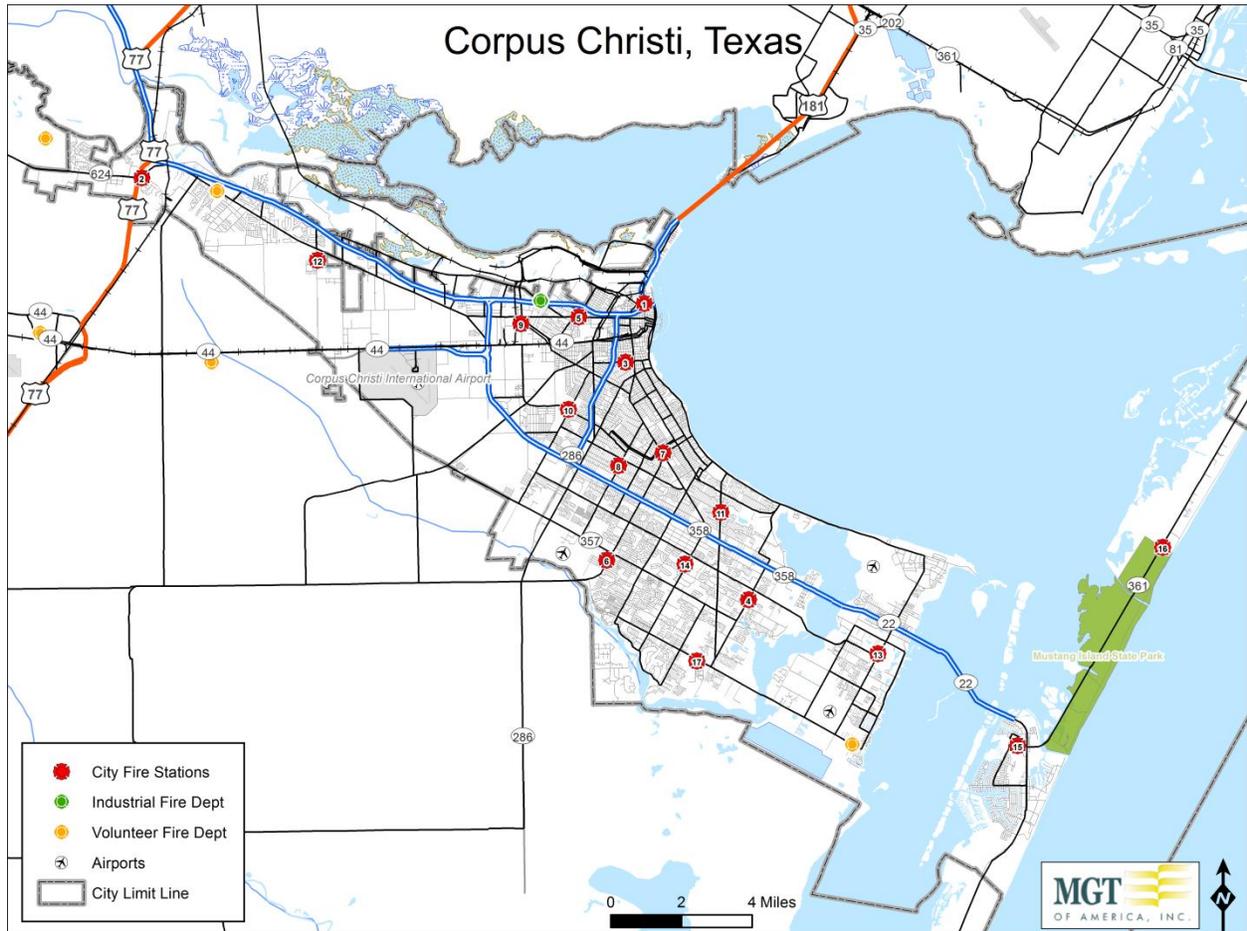
As the years progress, the census-based estimates predict increasingly higher population levels compared to the TSDC model. Considering the TSDC model takes into account local factors, it may reflect growth restraints not factored into the census-based forecast method. While these projections are not the definitive authority of future population within the City, they provide a way to base recommendations for future fire protection and emergency medical needs with expected service demand.

## FIRE STATION AND APPARATUS DISTRIBUTION

This section will examine the Corpus Christi Fire Department’s deployment, risks, and performance in delivering emergency services within the city. CCFD operates out of seventeen fire stations. Seven of these are clustered within the center of the city near the transportation corridors and the downtown urban area. There are two coastal stations located on the barrier islands. A private industrial fire department has six stations on the north part of the city to serve the petroleum industry. Two volunteer

<sup>8</sup> 0.5 migration methodology (<http://txsdc.utsa.edu/Data/TPEPP/Projections/Methodology.pdf>)

fire companies operate stations within the city limits as well. The following map displays the locations of the fire stations relative to the City area and roadway network.



While all but one of the fire stations have crews to operate an Engine-type apparatus, five have crews that are assigned to ladder or truck type apparatus. Ambulances respond from 11 stations. The rest of the limited space in the existing fire stations house specialty vehicles such as a Heavy Rescue unit and specific squad units.

## STATION LOCATION ASSESSMENT

The location of a fire station for a specific community depends upon the ability to travel within the geography, demographics, and the distribution of commercial, industrial, and residential property. There are nationally recognized benchmarks for locating a fire station that will be discussed in the sections that follow.

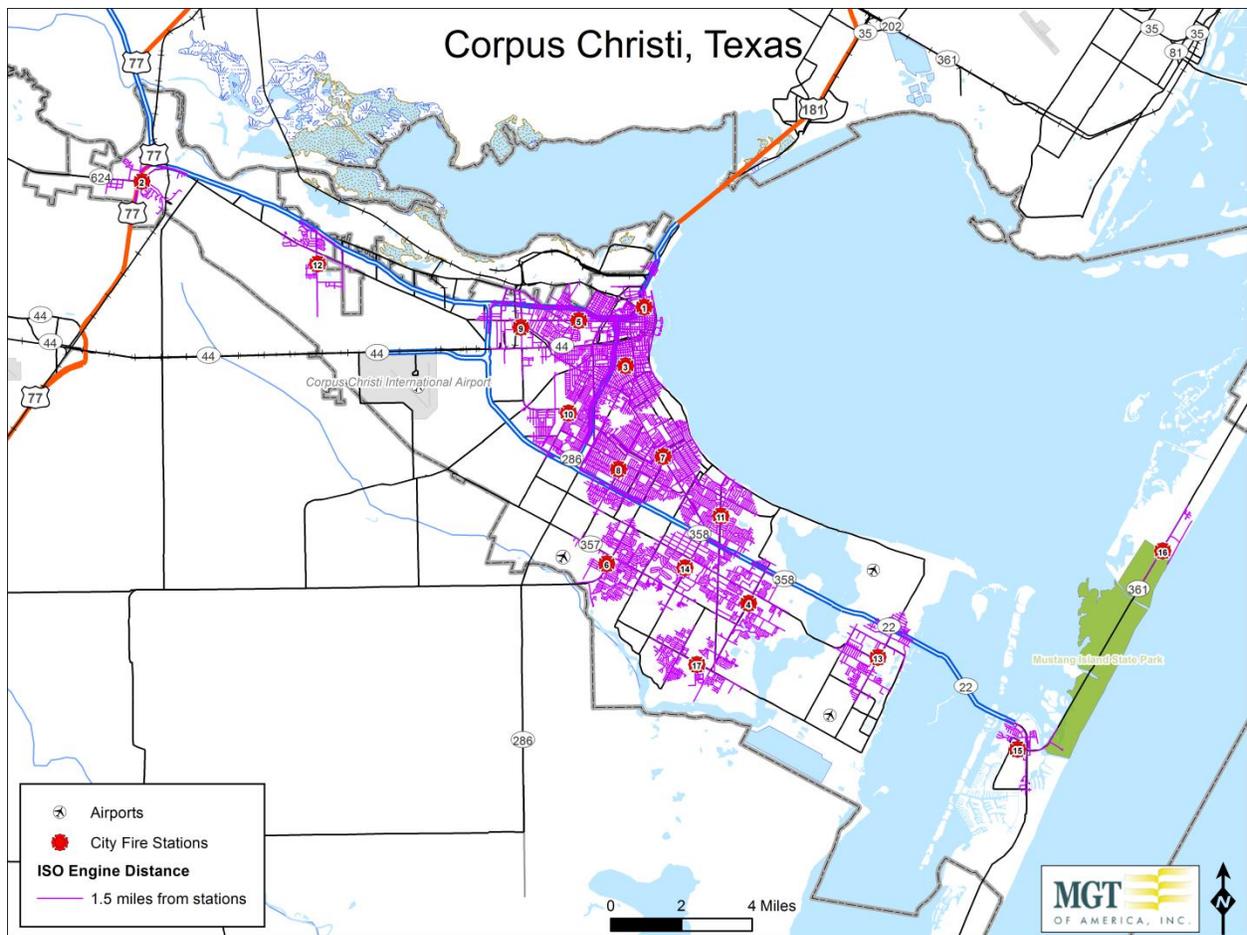
## ISO CRITERIA

The Insurance Services Office (ISO) utilizes its Fire Suppression Rating Schedule to evaluate municipal fire suppression capabilities. It includes fire station location analysis with objective mileage-based criteria as follows:

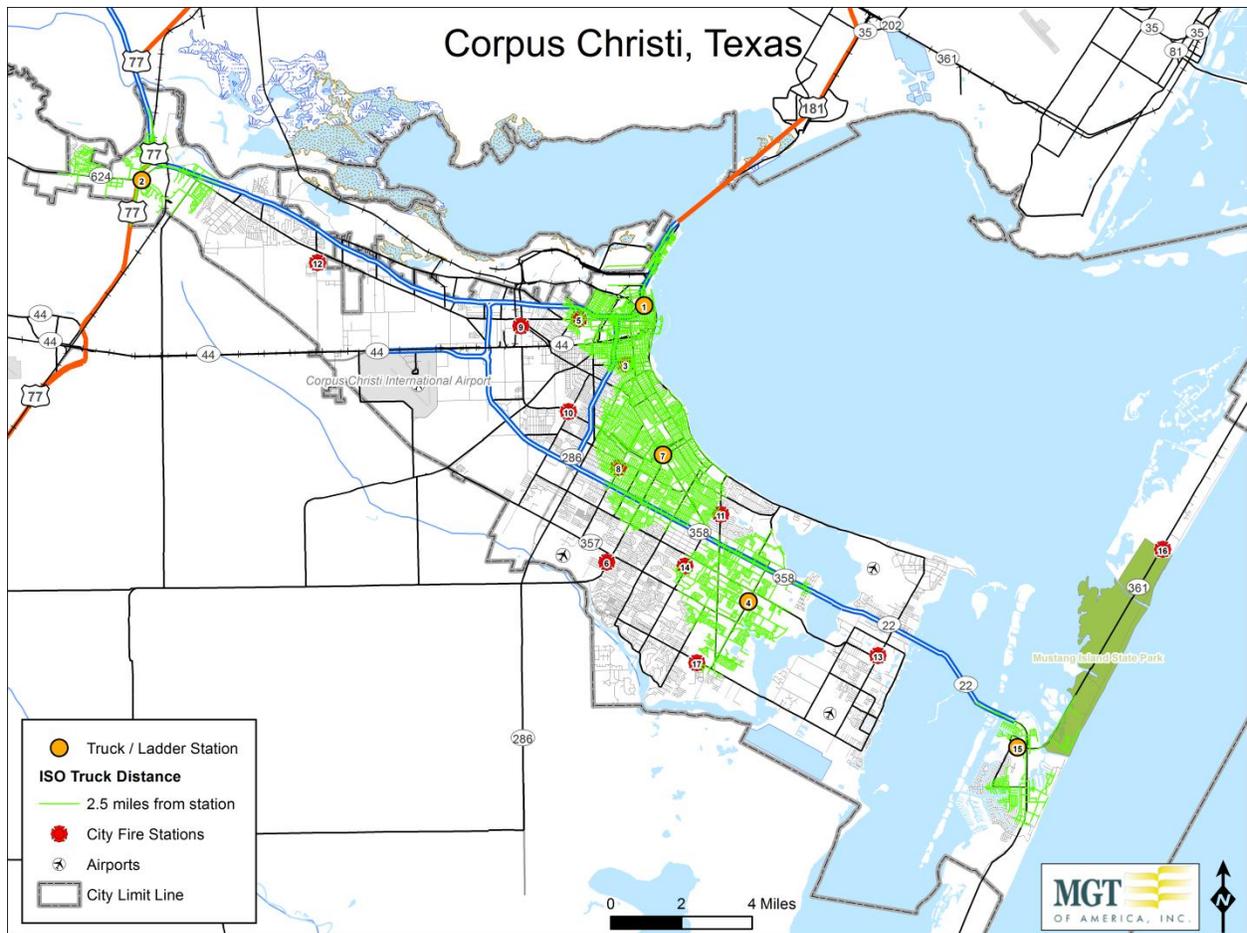
“The built-upon area of the City should have a first-due engine company within 1.5 miles and a ladder-service company within 2.5 miles.”

The ISO considers the optimum physical location of engine companies and ladder companies essential to earning maximum credits. The problem with using mileage alone is that, speed capability of the road affects the time travelled; the ISO criterion does not take this into account. It should be strongly noted that ISO apparatus distance is only one of many criteria to which the ISO evaluates a department to include equipment, testing, and dispatching. Nonetheless, the following map showed the 1.5 mile distance of Engine Company from the stations.

Just less than fifty percent (51%) of the city streets are reachable within the ISO recommended distance for an Engine company. Notable areas without coverage are near the stations without an engine apparatus. Station 2 has a truck apparatus that is first due and would obtain credit for its distance. Most of the populated urban core area is adequately covered under this parameter.



The following map illustrates the 2.5 mile distance for a ladder truck from the stations that house them. Truck apparatus, with their long ladders are able to reach higher buildings and larger square footage structures such as ‘big box stores’. Fire departments typically position them near an area that contain many such structures and is why the CCFD has clustered them in the downtown area.



The core downtown area of Corpus Christi is within the ISO 2.5 mile review distance. It should be noted that all the hospitals and city hall are within the distance coverage. However, schools and universities tend to be large buildings and a geo-comparative analysis indicates one of three universities and 53 out of 110 schools or libraries<sup>9</sup> are within the ISO recommended distance of a truck company.

## LAND USE RISK CRITERIA

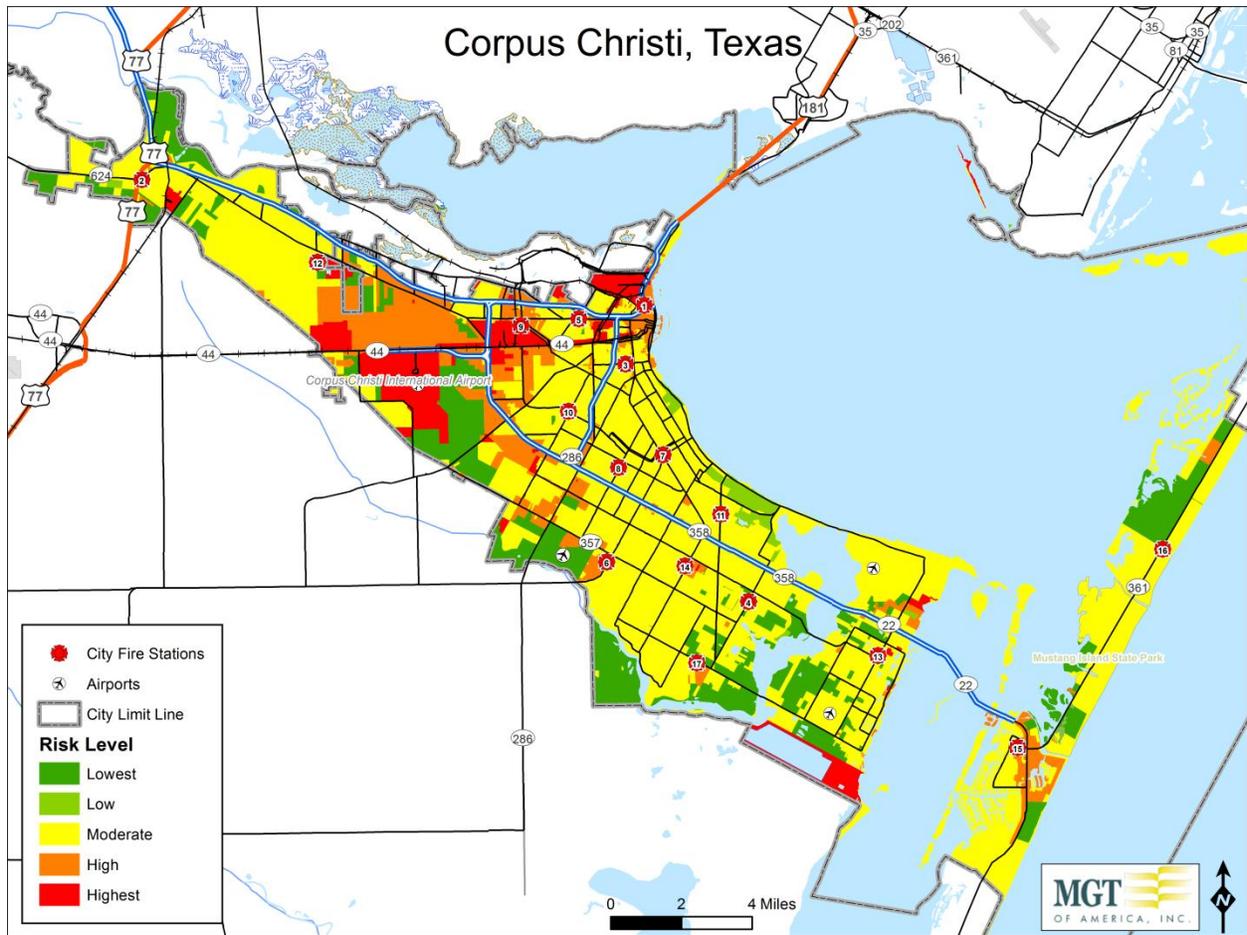
Another way of approaching this issue is to define levels of land use risk and assign a response-time requirement to each risk, rather than use just straight mileage response. These risks can be defined as follows:

- ◆ Highest - Refineries, large industry, hospitals, school dormitories, lumber yards, and propane storage facilities without built-in suppression or detection systems;
- ◆ High - High-rise hotels and residential buildings, large shopping centers, and industrial complexes;

<sup>9</sup> From City-supplied GIS file "Publicities"

- ◆ Medium - Commercial and industrial facilities with sprinkler systems, small shopping centers, and high-density, medium density residential buildings;
- ◆ Low – Lower density Single-family dwellings
- ◆ Minimum - Wide separation of single family dwellings and farm land.

In the following map, the zoning classifications<sup>10</sup> were re-categorized generally into the five risk levels described above.



Near the clustered set of fire stations are almost all of the highest risk areas. These are along the interstates, railways, and the downtown area. This is an appropriate and fortunate arrangement.

## RESPONSE TIME CAPABILITY CRITERIA

The response time of fire and EMS apparatus to the scene of an emergency incident is an essential determining factor as to the magnitude of the fire or medical emergency that the fire department must handle upon arrival on the scene of the incident. The theory is the shorter the response time, the smaller the fire that must be extinguished and the better opportunity for paramedics to save critical patients.

<sup>10</sup> Corpus Christi GIS Zoning Data

Time-related criteria for determining and evaluating fire station locations may be viewed from the perspective of two broad categories of types of incidents: fire and emergency medical service related incidents.

### ***NFPA 1710 Standard***

There are a number of applicable NFPA standards and practices that include response time considerations important to labor and fire officials nationwide. NFPA 1710 (Standard for the Organization and Deployment of Fire Operations) response time-related provisions are described in the following sections.

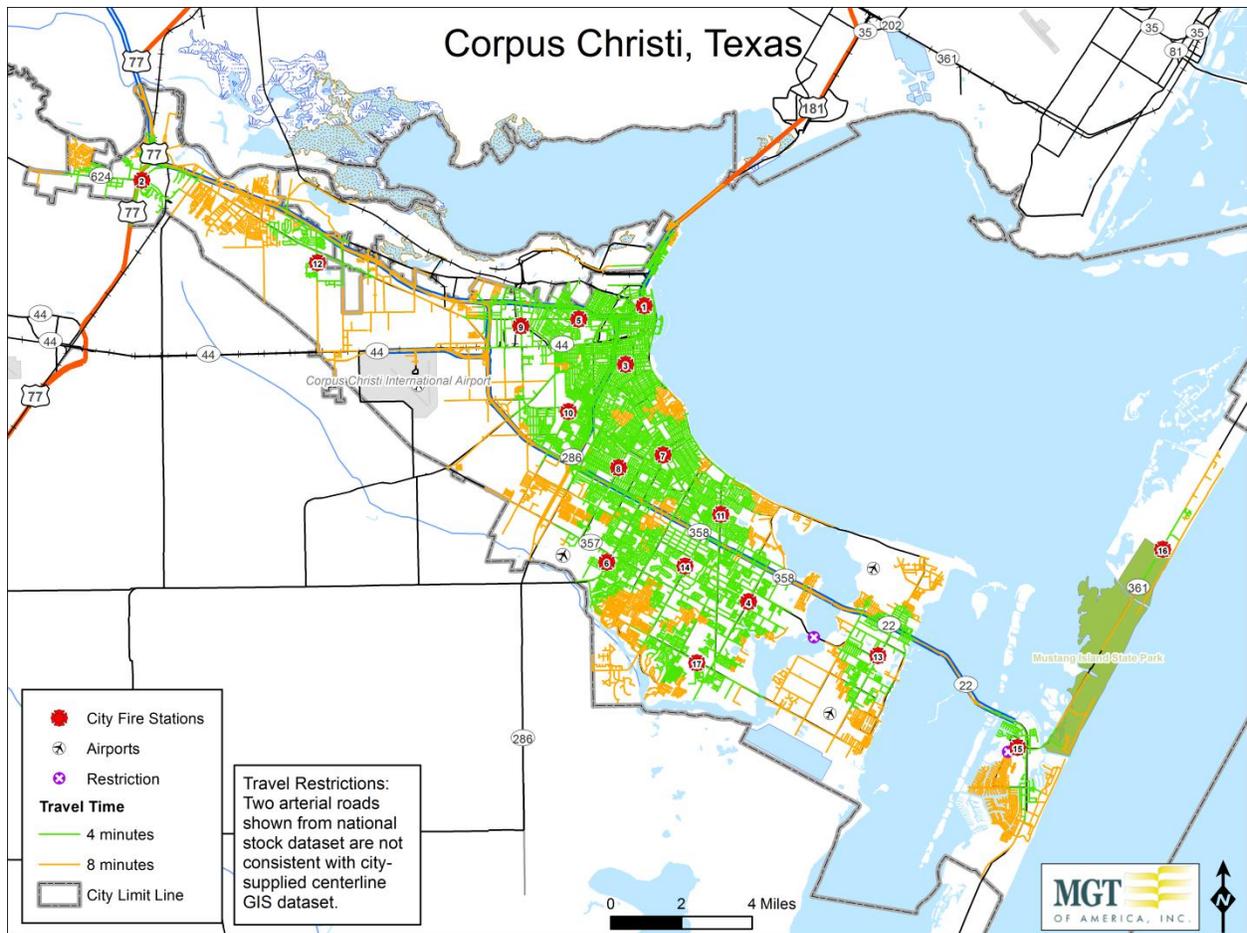
NFPA 1710 is a guideline that serves as a benchmark for the deployment of services offered by firefighters. It is a widely accepted goal for paid/career fire departments that describes the requirements for delivery of services, response capabilities, incident management, and strategy.

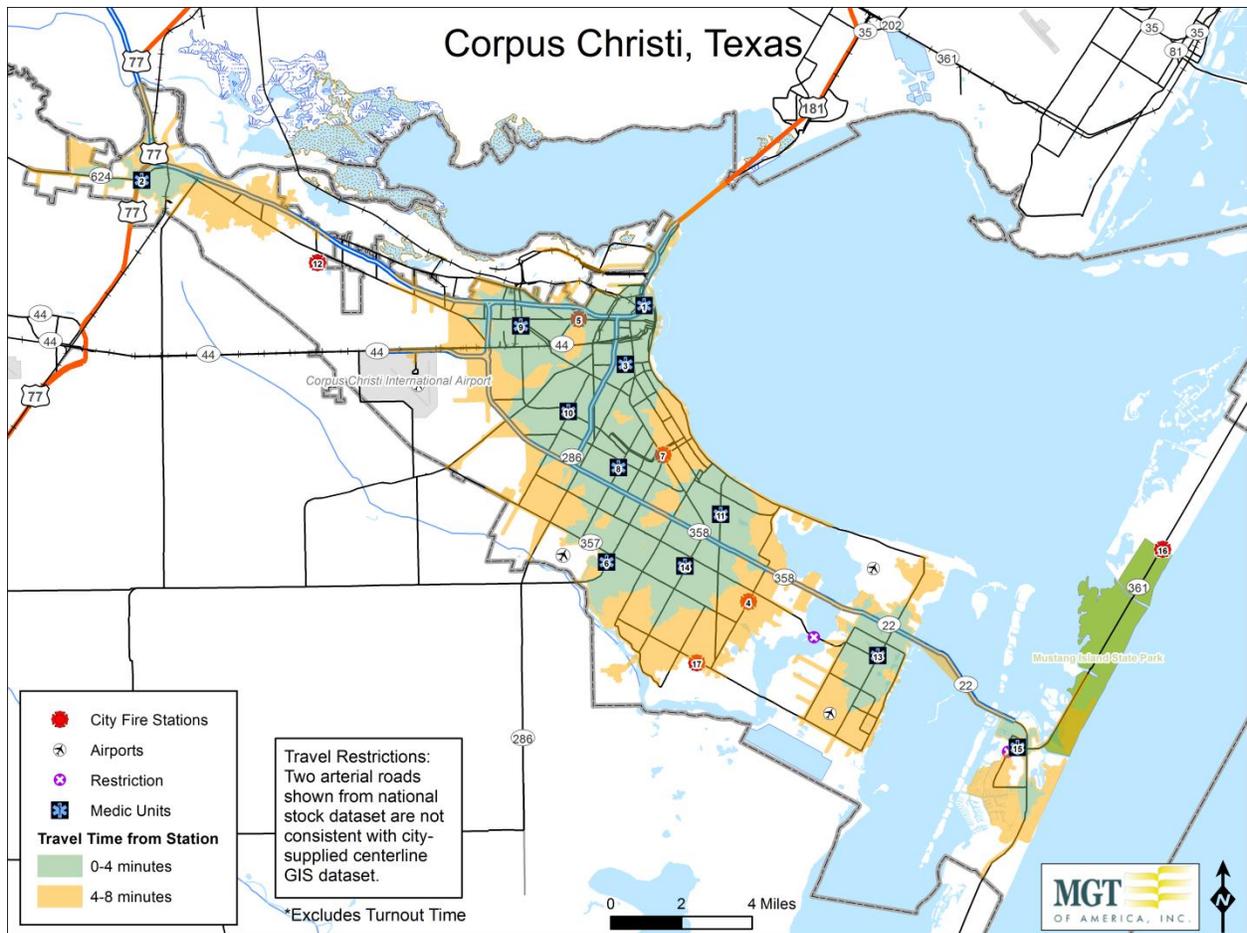
It includes the following benchmarks related to call receipt and processing time, turnout time, and response (travel) time:

- ◆ Turnout time of eighty seconds on fire suppression calls and sixty seconds for EMS calls; CCFD's goal is sixty seconds for all calls.
- ◆ The fire department's fire suppression resources deployed to provide for the arrival of an engine company within a four-minute travel time and/or the initial full alarm assignment within an eight-minute response time to 90 percent of the incidents; CCFD's goal is the same.
- ◆ The fire department's EMS basic life support (BLS) resources with automatic defibrillator equipment deployed to provide for the arrival of a BLS unit (EMS first responder or transport unit) within a four-minute travel time; and,
- ◆ The fire department's EMS resources providing advanced life support (ALS) service deployed to provide for the arrival of an ALS company within an eight-minute travel time to 90 percent of the incidents. CCFD's goal is the same.

Not all requests for services to the fire department ought to be construed as requiring apparatus to respond emergently or within the short time constraints. These should be limited to the critical emergencies in which they were designed.

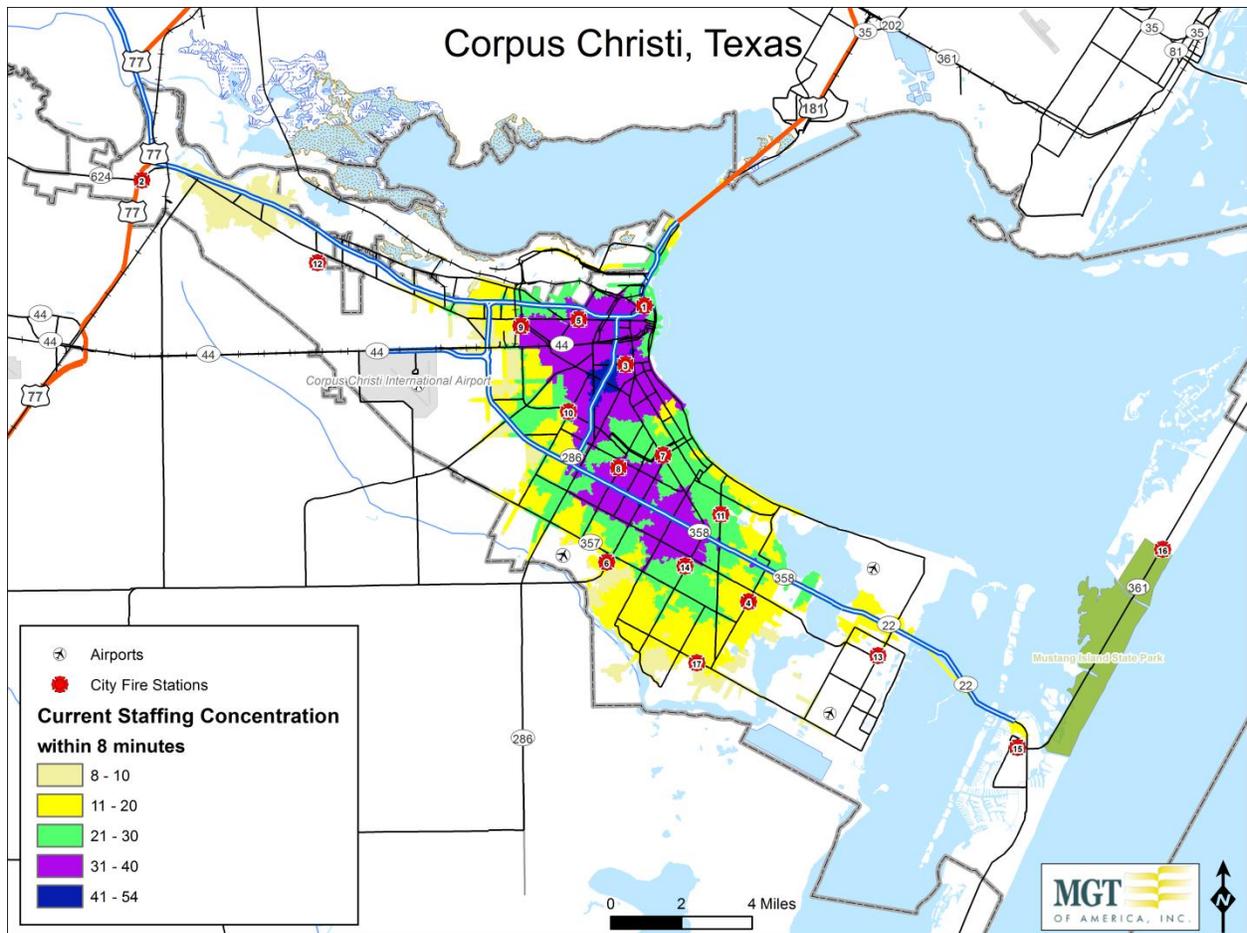
The following map models the travel time of apparatus from each of the current fire stations. The model utilizes the street network of the City and surrounding areas calculating the travel time extent via distance and speed capability of streets. Actual posted speed limits were utilized and time penalties were assessed for negotiating turns and intersections. This model assumes departure from the fire stations which may not always be the case. It also does not take into account weather conditions, traffic congestion, construction, or detours. It does respect the one way restrictions as they are in place.



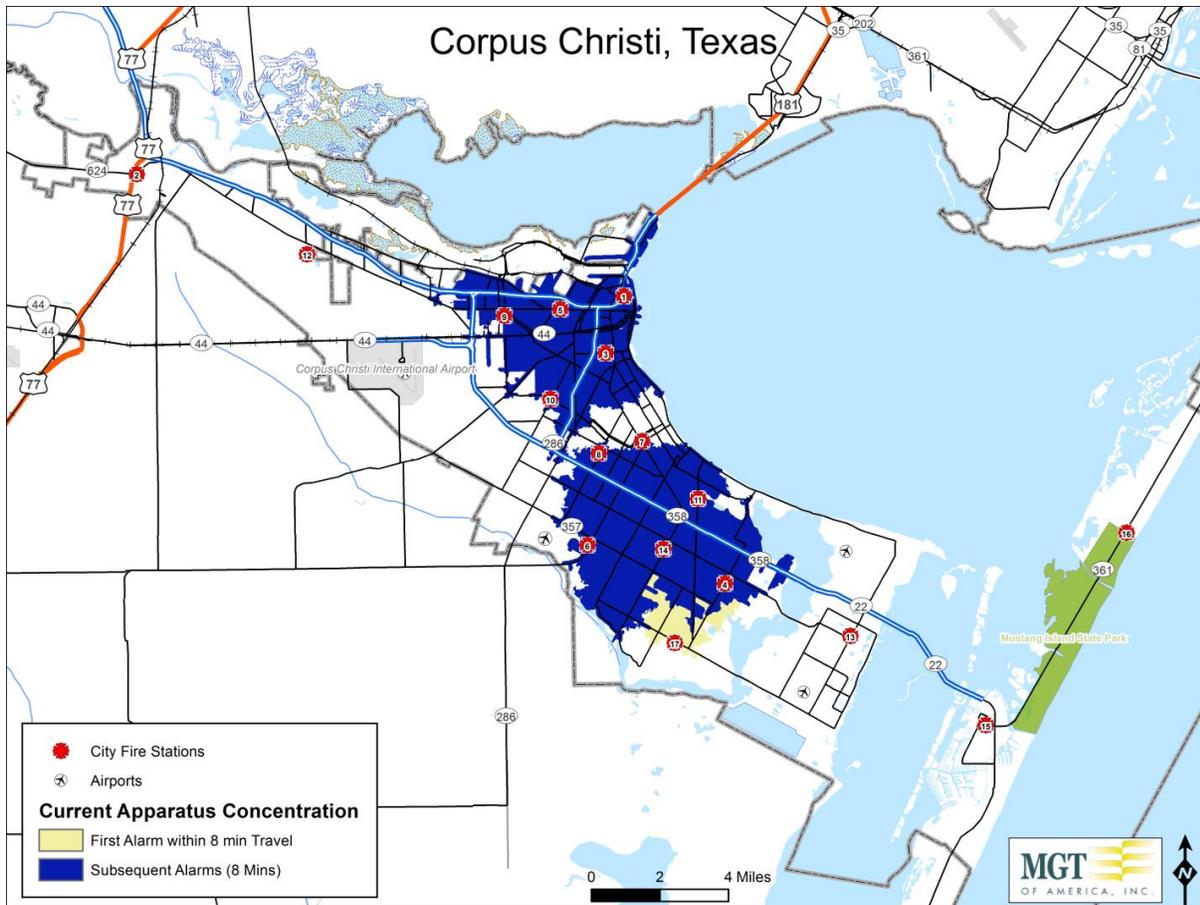


This particular model in the preceding figure represents the capability and geographic extent when responding to the most critical of incidents. Certain areas of town will require slightly more time to reach than those areas that are naturally closer and roadway accessible to the existing fire stations.

It can also be seen in that there could be some coverage overlap of the travel time between the downtown stations. While this may seem wasteful, it has to be taken into consideration that fire calls usually do not require a single apparatus response like medical calls. Multiple apparatus from many stations are standard firefighting procedure. It calls for the arrival of the entire initial assignment (sufficient apparatus and personnel to effectively combat a fire based on its level of risk) within a certain amount of time. Under NFPA 1710 guidelines for career departments this is usually 13-15 would equate to two engines, one truck and a chief within eight minutes of dispatch with each apparatus manned by four personnel. This is to ensure that enough people and equipment arrive soon enough to be effective in controlling a fire before substantial damage occurs. In Corpus Christi, current staffing for engines and nearly all trucks are three person crew and medic units are two. The following map illustrates the geographic extent of staffing concentration at varying levels.



The Corpus Christi Fire Department has established a first alarm for structure fires as a collective initial response of the on-duty deputy chief, three engines, one ladder truck, and one medic unit for *initial* report of a structure fire. The following map illustrates the geographic extent of first alarm coverage by the CCFD.



With the Battalion Chiefs located at Stations 1, 5, and 14; the geographic extent is limited to their travel time capability. Without the inclusion of a Battalion chief in the analysis, the geographic extent of the first alarm effective firefighting force is concentrated in the same area due to the cluster of stations.

## CURRENT SERVICE DEMAND ANALYSIS

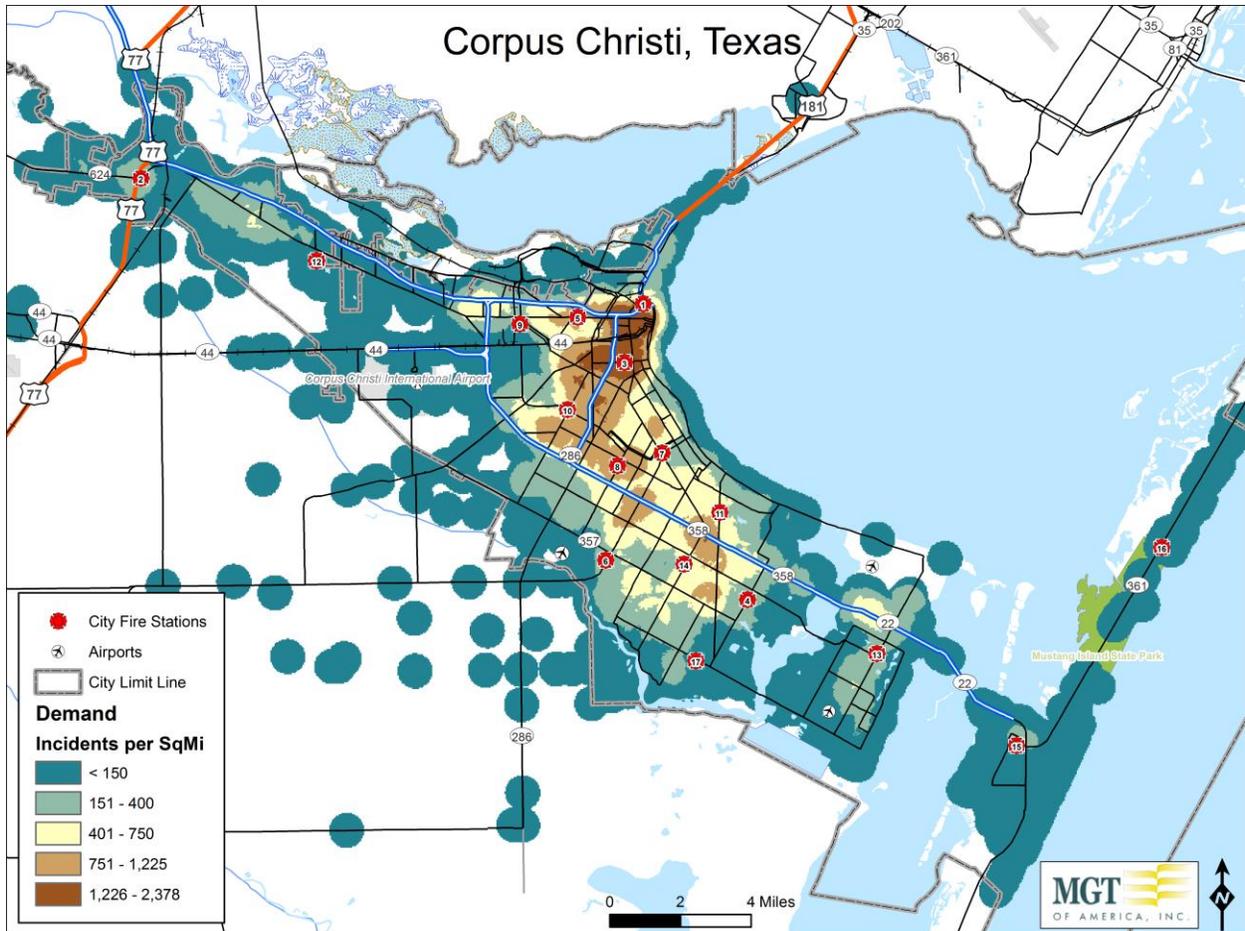
The name “Fire Department” has historical and traditional roots, but in today’s realm of services that are provided by the department, it can be misleading. Thanks to the preventive programs, improved construction codes enforced, and sprinkler systems; actual fires are fortunately fewer than in decades past but remain a potential serious threat. Demand for the services of the fire department range from medical incidents, to rescues, to trees down on wires, to calls for trapped people or animals to name a few.

Demand is not typically distributed evenly within an area. There are areas where incident calls occur frequently and near each other as well as other places where demand is less intense and the occurrence is further from each other. Service demand is typically higher in areas of higher population, not just

residential but as offices and shopping centers fill with people as well. The following map illustrates the level of demand for services over the last year<sup>11</sup> for the Corpus Christi Fire Department.

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<sup>11</sup> Dispatched Calls from PSAP plotted using supplied geographic coordinates

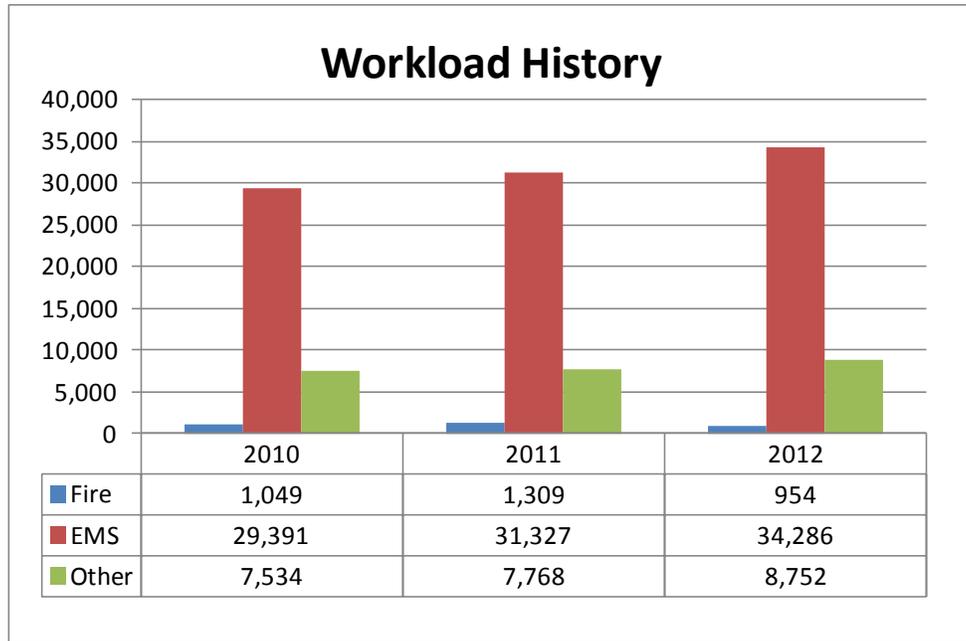


The amount of demand that can be reached within travel time parameters of four and eight minutes is of vital importance to evaluating the current station locations. Comparing the travel time model capability against the demand for services, it was found that 81.5% of all calls in 2013 were within a four minute drive time from a fire station and over 98% of demand was within an eight minute drive time. The most critical dispatch for fire apparatus is that of a reported fire. Isolating these reported fire dispatches (NFIRS<sup>12</sup> Code 100 series) compared to the modeled travel time reveals that 75% of reported fires are reached within four minutes and 97% within eight minutes of travel. Looking specifically at structure fires (NFIRS Series 111-121) reveal similar statistics. However, while all stations do house fire apparatus, not all stations host a medic unit. The eleven medic unit stations are within four minutes of travel from host stations to 69% of EMS type calls (NFIRS Series 300). They are within eight minutes away from another 22.6% of EMS calls. Some EMS calls are more critical than others but this is not distinguishable from the incident data supplied.

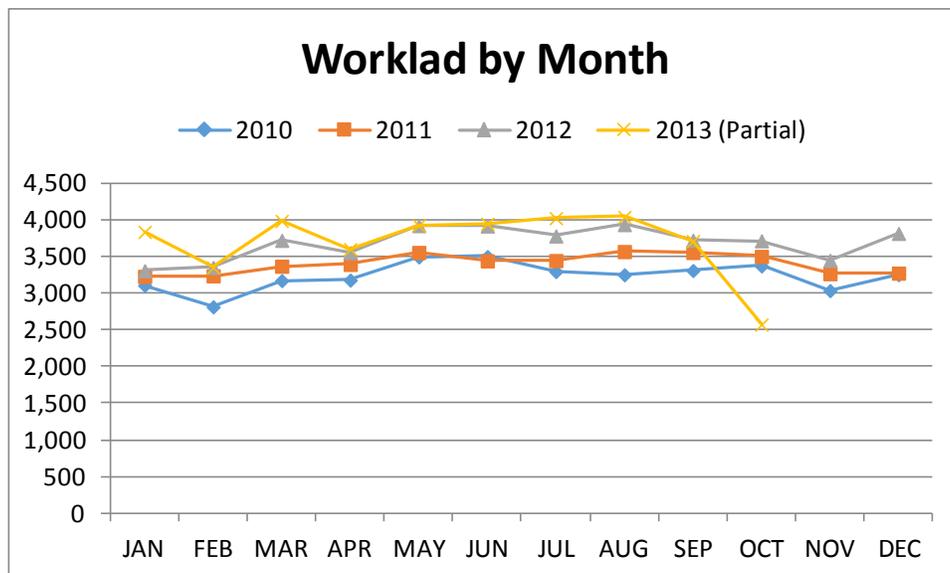
Records of incidents with the City of Corpus Christi were acquired from the fire department's records management system records. The call types discussed in the following analysis are categorized as they are dispatched, not what may have been actually found upon arrival of fire personnel. For instance, someone may have reported a fire, but it was found to be a smoke condition due to burnt food. This disposition and reclassification reporting is the fire department's responsibility. The following graph

<sup>12</sup> National Fire Incident Reporting System

illustrates the change in volume for categories of reported fire, medical and all other categories of incidents (alarm, hazard, spill, etc.) over the past nearly four years as 2013 was not complete when records were requested<sup>13</sup>.

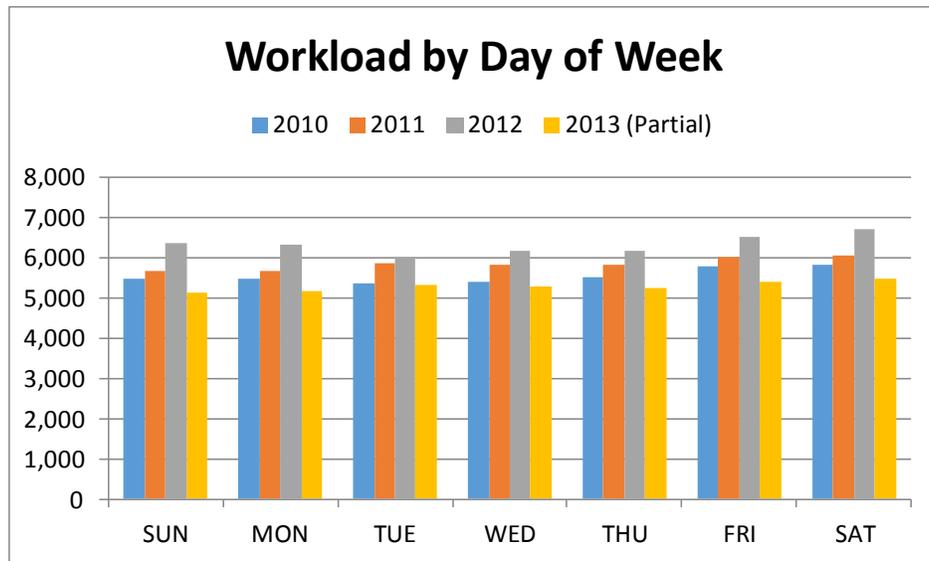


It can be seen that medical calls account for about 77% of service demand within the City of Corpus Christi. Fire calls are approximately 2 – 3% while other types of service calls account for the remaining percentage, just over 19%. Examining the data more closely, changes in demand can be seen on a monthly basis. The next graph illustrates that service demand is slightly higher in the summer months for all types of calls.

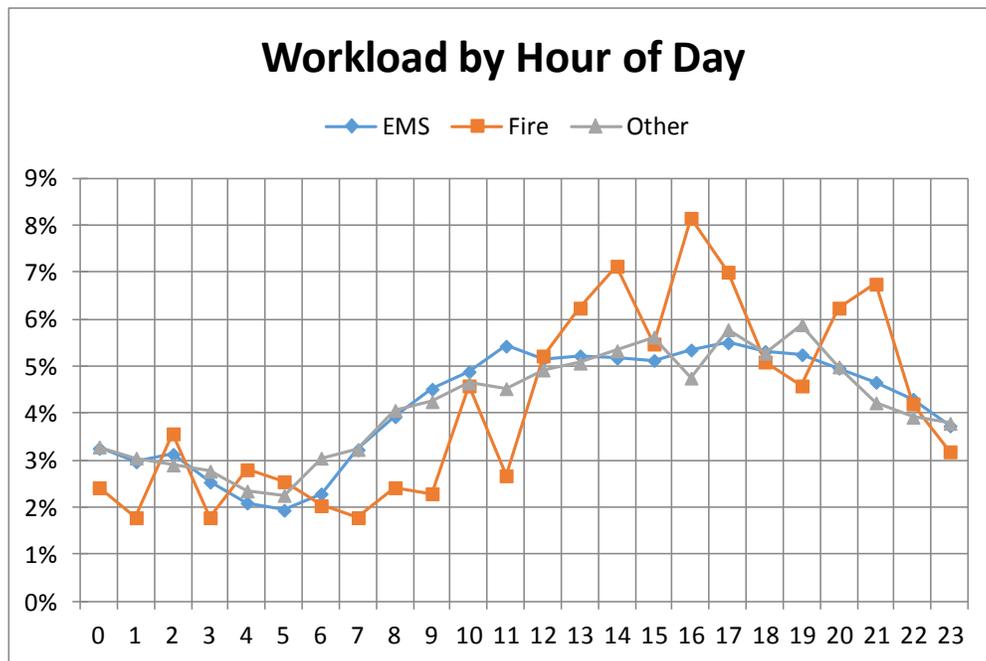


<sup>13</sup> 2013 records from Jan 1 to Oct. 22nd

Examining the department service demand by the day of the week reveals that Saturdays are the busiest days of the week for calls. Fire calls are most numerous on Sundays with all other call types volume varies by year.



Next, the workload is examined upon an hourly basis displayed as a *percentage by call type* because the higher EMS volume has been solidified as true in the previous figures. It can be seen in the following graph that service demand for the fire department increases with daytime human activity. Not surprisingly, EMS demand volume surges beginning at 6 AM and remains high until after 5 PM when it steadily declines. Calls for fires begin to really ramp up after 12 PM reaching an apex in volume at the 4 PM hour before falling off in number. All other types of calls follow a similar pattern to EMS calls but continue to rise after the 6 PM hour.



The geographic pattern of demand does not significantly shift towards one end of town or the other based on the time of day. The individual call points appear as scattered throughout town as they do during the day. To determine any real temporal movement, the center point of demand was determined by every 3 hours throughout the day and night. The center of demand remains near the downtown core as the hours elapsed.

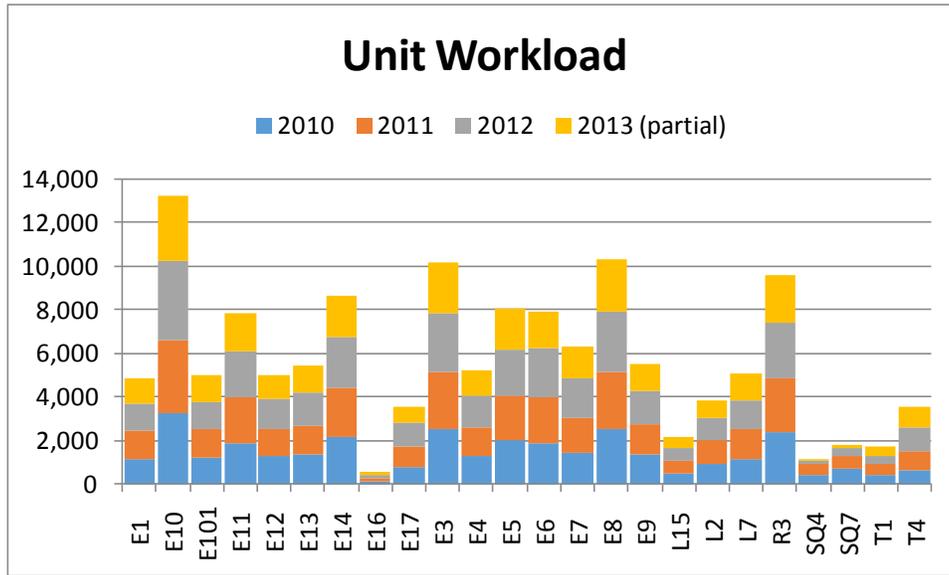
Peak demand hours are typically when simultaneous calls occur and this can reduce the available units for subsequent calls. To gauge the likelihood of this occurring, the following table illustrates the simultaneous call activity in 2013 for the City of Corpus Christi Fire Department.

Level	All Calls	Fire	EMS	Other
<b>Single</b>	19%	89%	18%	80%
<b>2</b>	19%	10%	20%	16%
<b>3</b>	16%	1%	18%	3%
<b>4</b>	12%	0%	14%	1%
<b>5</b>	10%	0%	11%	0%
<b>6</b>	7%	0%	7%	0%
<b>7</b>	5%	0%	5%	0%
<b>8</b>	4%	0%	3%	0%
<b>9</b>	3%	0%	2%	0%
<b>10</b>	2%	0%	1%	0%
<b>11</b>	1%	0%	0%	0%
<b>12</b>	1%	0%	0%	0%
<b>13</b>	0%	0%	0%	0%
<b>14</b>	0%	0%	0%	0%
<b>15</b>	0%	0%	0%	0%
<b>16</b>	0%	0%	0%	0%
<b>17</b>	0%	0%	0%	0%
<b>18</b>	0%	0%	0%	0%
<b>19</b>	0%	0%	0%	0%
<b>20</b>	0%	0%	0%	0%

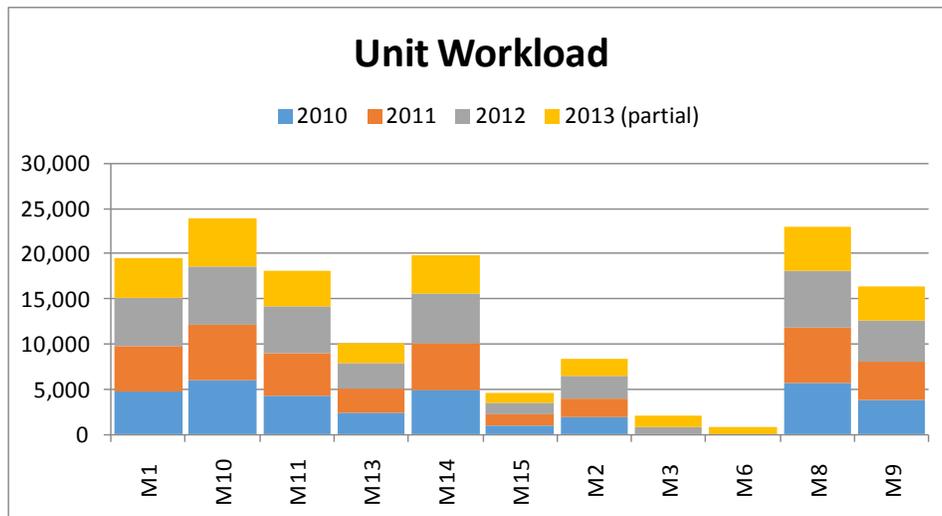
This table must be viewed with caution because it utilizes the last unit cleared time to calculate the level of concurrent calls. Many units dispatched initially may have cleared and are available, while one unit or the deputy chief may remain on scene, keeping the call 'open'. While most of the concurrency within the City is caused by EMS calls, it is important to remember that fire apparatus can clear quickly since they do not have a transportation component.

More importantly then is how busy the individual units are and if the City runs out or dangerously low in resources. The next section details the workload by unit for the last nearly four years of data.

**(Fire Apparatus)**



**(Medic Units)**

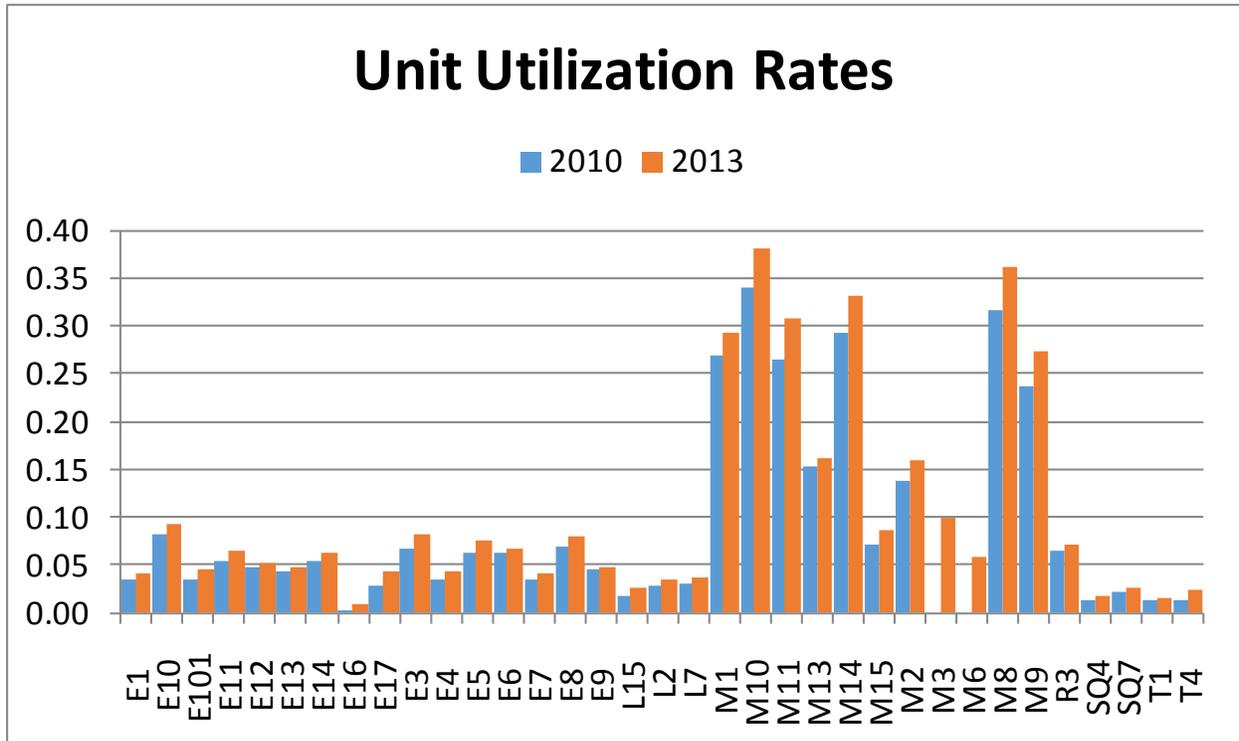


It can be seen which are the primary apparatus and the workload for each correspond generally with the level of demand in their primary area although many times they travel as needed to other areas.

Fire suppression apparatus should not respond to routine medical calls especially in situations where medical personnel already exist such as clinics, doctor’s offices, and nursing homes. An exception to this overall recommendation is where additional manpower is beneficial such as cardiac arrest, severe trauma, multiple victim incidents, obese patient and the like. Another exception would be to send a fire suppression unit if the ambulance is responding from out of district.

While the amount of calls for service may seem impressive, this belies the actual amount of time units spent on calls during their shift. Some calls, like fires, take hours while others are cancelled within minutes as units arrive or are called off by a crew already at the scene. Fire labor unions postulate that

fire suppression units should be no more than a .20 ratio; lest firefighter fatigue and career burnout ensue. It further proposes that fire based EMS units should be no more than .30 ratio. Private EMS industry considers adding an additional unit when ratios reach .45 and routinely run units at ratios higher than .50. The following graph measures the utilization rate for each apparatus in service utilizing actual time on calls according to the dispatch record.

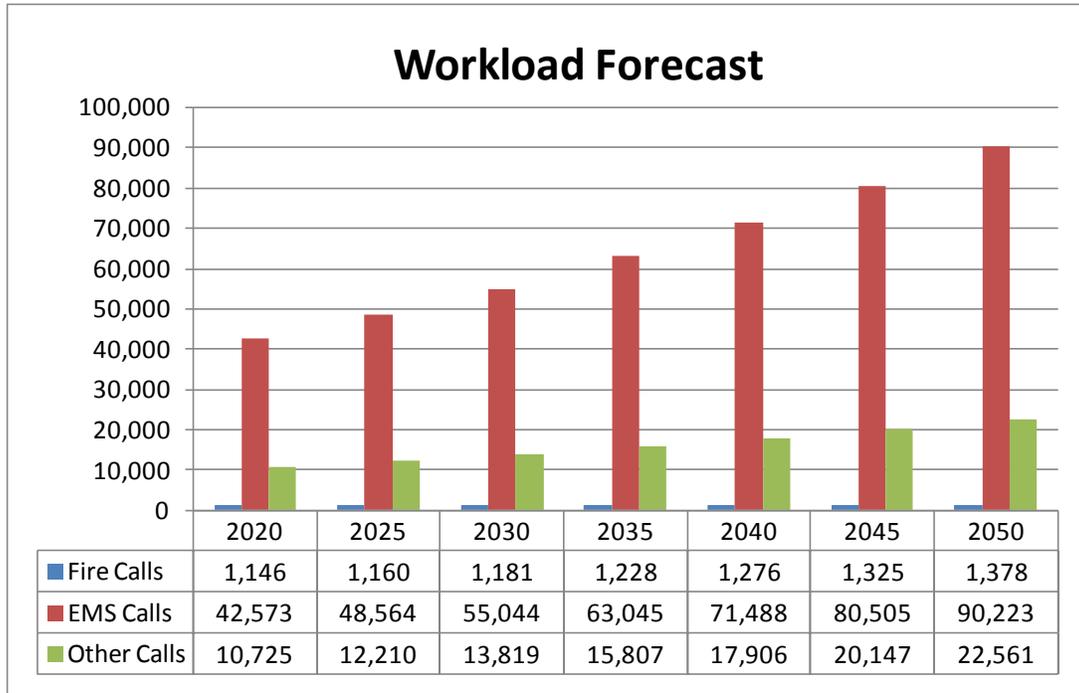


An increase in utilization rate can be seen since the year 2010 due to an increase in demand. In general, the busier units are in areas of highest demand. EMS units have higher utilization rates due to a transportation component when a patient is delivered to the hospital. Medic units were added to Stations 3 and 9 in 2013. While EMS calls are reportedly dispatched with both a fire apparatus and a medic unit, 21.5% of these calls in 2013 were answered with only one unit.

While it may appear to the cursory observer that many of the units are under-utilized and can be eliminated; a word of caution must be noted. These utilization rates come in glimmers of light with days and hours of heavier demand. A closer look at the needs based upon geographic coverage and temporal utilization will be discussed thoroughly in a following section, along with recommendations for station and apparatus deployment.

In evaluating the deployment of facilities, resources, and staffing, it is imperative that potential changes in workload that could directly affect such deployment be examined in order to maintain acceptable levels of performance.

For purposes of this study, population projections extrapolated from the Texas State Data Center proportional to Corpus Christi was multiplied to an average of the forecasted incident rate calculated from a five-year history of incidents per capita and the actual average incident rate per capita to estimate workload through the year 2050. The result of the analysis is shown in the following chart.



Fire incidents are forecasted to have a meager rate of growth, but this is reflective of national trends due to improvements in building codes and public fire education. EMS and other types of fire calls are expected to continue to rise because of the increased population. This will have a strong effect upon resource deployment and number of units needed in the coming years and will be discussed in a later section.

### COVERAGE SUMMARY

The following table summarizes the coverage of the aspects of the community against the various measures discussed above.

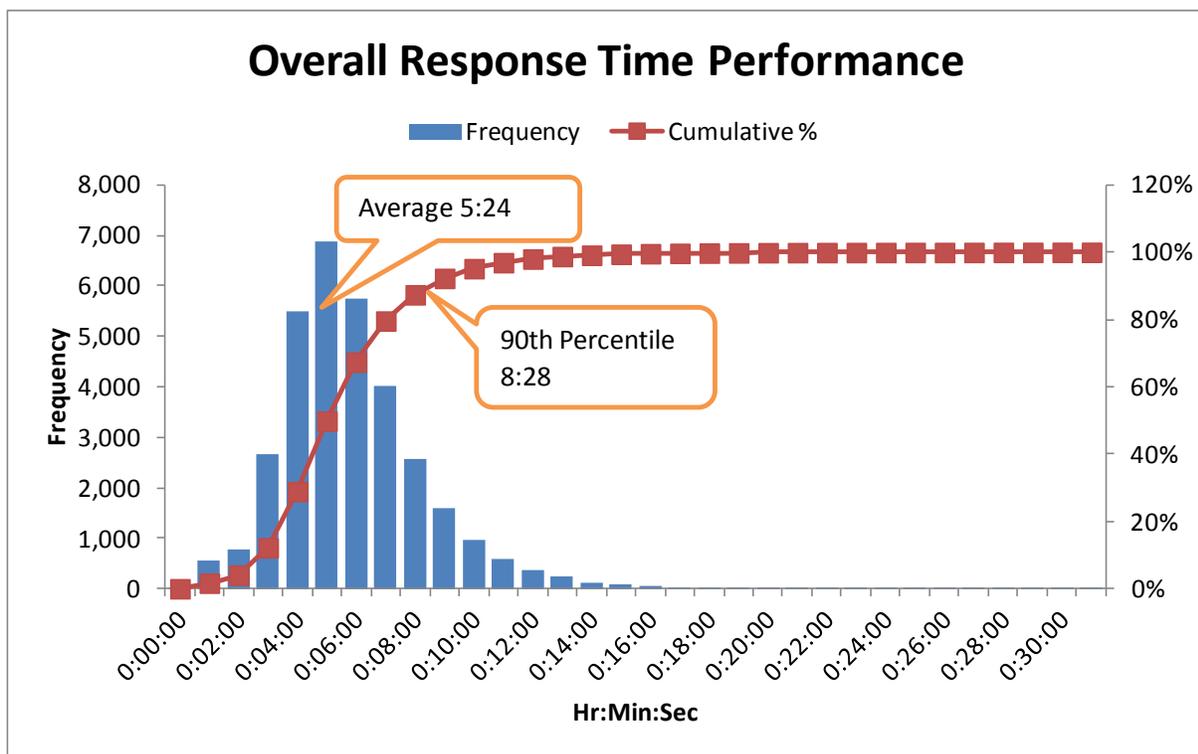
Coverage Type	ISO Engine	ISO Truck	4 Min Travel	8 Min Travel	Zoning Risk Totals
<b>Population</b>	N/A	N/A	73%	97%	
<b>Community Risk</b>	71%	64%	81%	98%	100%
Category 1	9%	9%	20%	17%	17%
Category 2	2%	2%	2%	1%	1%
Category 3	73%	77%	77%	62%	62%
Category 4	13%	8%	14%	12%	12%
Category 5	4%	4%	10%	8%	8%
<b>Demand</b>	N/A	N/A	81.50%	98.40%	
Fire	N/A	N/A	75%	97%	
EMS	N/A	N/A	69%	91.60%	

EMS Demand coverage in the above table reflects medic unit locations, not all fire stations or apparatus.

## CURRENT RESPONSE TIME ANALYSIS

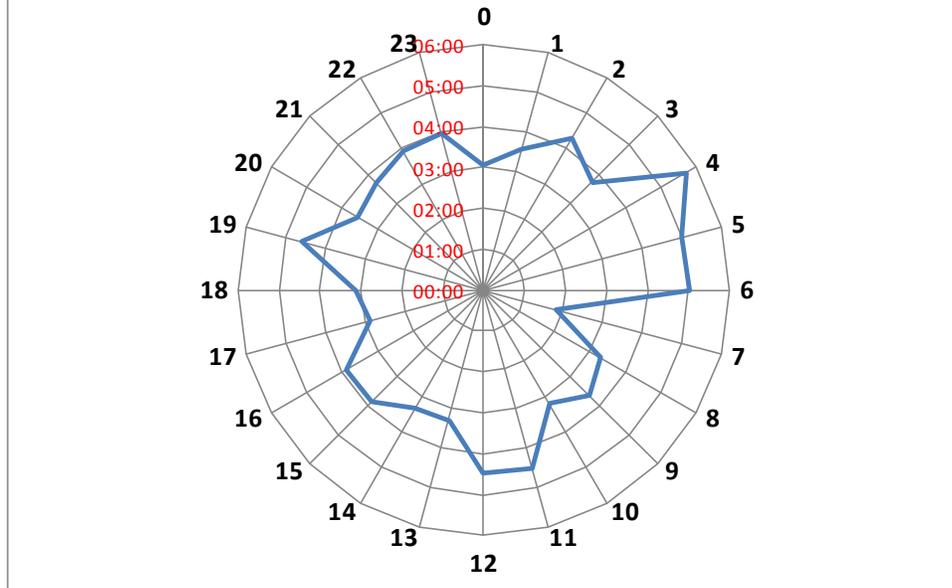
The most important measure of performance of any emergency service provider especially to whom they serve, is how fast does help arrive. Discussions of the reasons for and the specific parameters of the establishment of national response time guidelines from the NFPA have been outlined earlier. The following chart illustrates the overall response time performance for the first arriving apparatus using the incident dataset supplied. Mutual aid to other areas was removed as well were non-emergency requests, such as public assists and standby's.

The average response time for first arriving units is five minutes and five (0:05:05) minutes, while 90% of all calls is answered within seven minutes and twenty-six minutes (0:07:28).



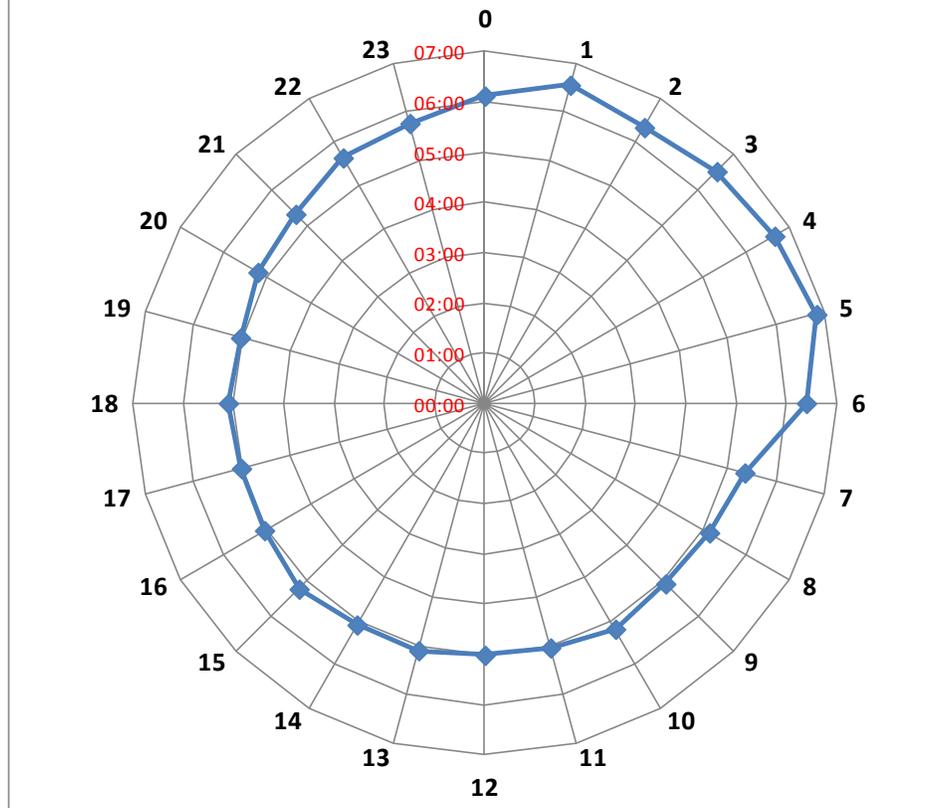
While the response time performance for all calls is longer than recommended benchmarks, it should be emphasized that these guidelines were established for the most serious and critical incidents. The fire department responds to a variety of calls, many of which do not necessarily require an absolutely urgent response. For instance, it is unquestionable that being dispatched to the report of a structure fire or a serious medical emergency requires the fastest response from the fire department. The following figure displays the hourly response time performance for calls dispatched as a structure fire. The overall average response to this type of call is three minutes and forty-eight seconds (0:03:48) for the first apparatus to arrive, with 90 percent of the calls reached within six minutes and eight seconds (0:06:08).

## Average Hourly Response Time (Structure Fires)

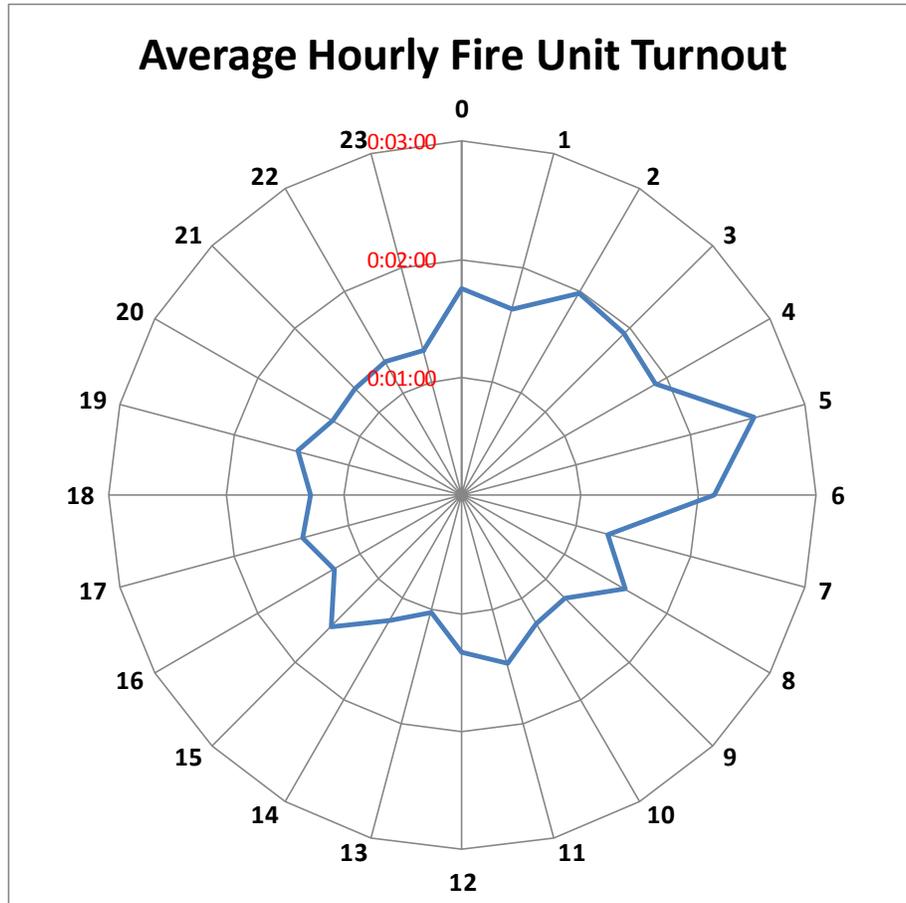


For serious medical emergencies, such as a heart attack, stroke, or major trauma, the community relies upon the CCFD to be the medical first responder to provide basic life support functions, such as oxygen, splinting, and defibrillation before the arrival or with the advanced level paramedics, provided by paramedics. The next chart shows the hourly response time performance for EMS call type for 2013. Unfortunately, because the dataset does not discern criticality, this chart shows the total EMS calls that occurred within the city. The overall smoother look of the graph is due simply to the more data points in the set. Nonetheless, the average response time to a serious medical call in Corpus Christi by the fire department is five minutes and twenty-five seconds (0:05:25), with 90 percent of all of these types of calls are answered with just under eight and a half minutes (0:08:27).

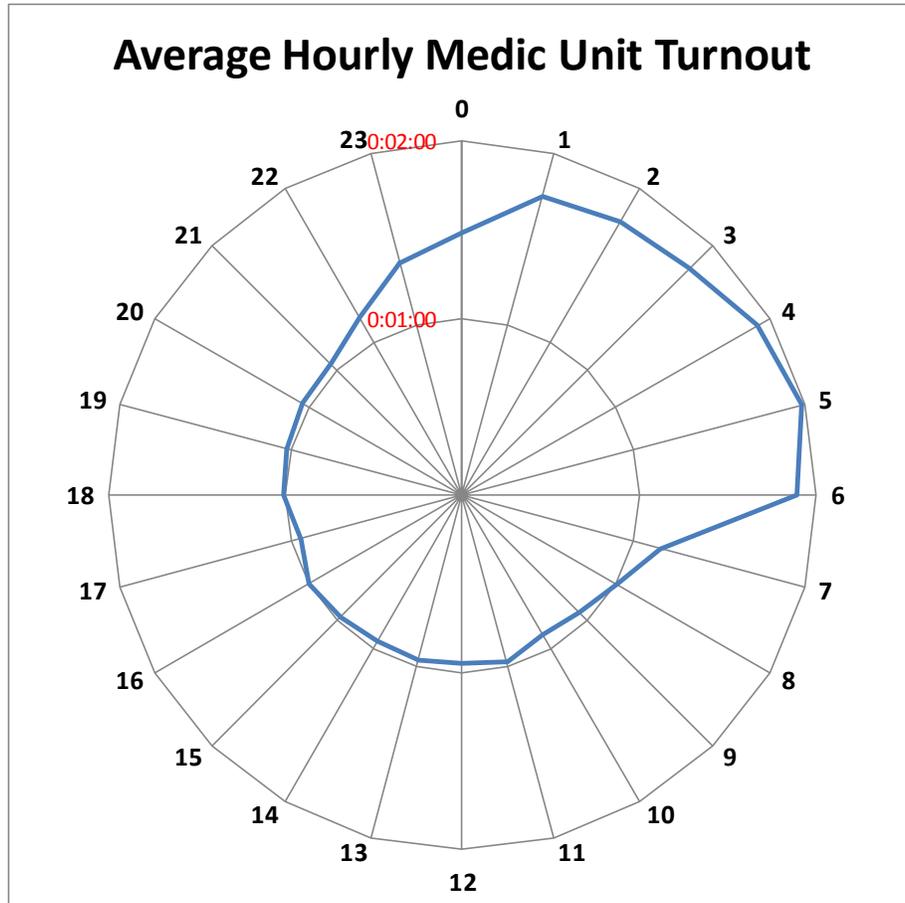
## Average Hourly EMS Response Time



There are many factors that can contribute to delaying a response, such as weather and construction to name a few, but one that is ultimately controlled by firefighters and paramedics is turnout time. Turnout time is elapsed between the dispatch and the unit becoming en route to the scene. For 24 hour shift workers, it is not unusual for this delay to extend during the overnight hours as seen in the following graphs. The first graph that follows measures the average hourly turnout performance for fire apparatus after being dispatched to a structure fire (NFIRS Code Series 111-121).



The overall average for this analysis is one minute and twenty-eight seconds (0:01:28). This is slightly longer than recommended by the NFPA and factors such as procedure, station design, length of shift, and supervision should be examined. The same holds true for medic units whose turnout time performance for EMS calls is also above recommended limits.



The overall average turnout time performance for a medic unit responding to an EMS call (NFIRS series 300) is one minute and nine seconds (0:01:09). Once again, determining the criticality, hence the urgency required for a given dispatch is not discernible by the NFIRS coding system.

### RESPONSE PERFORMANCE SUMMARY

The following table summarizes the response performance of CCFD for 2013 measured against various goals specified earlier.

	Demand		Fire Calls		EMS Calls		Turnout Time
	Average	90th PCTL	Average	90th PCTL	Average	90th PCTL	Average
<b>CCFD Goal</b>			5:00		5:00		1:00
<b>NFPA 1710</b>				5:00		5:00	1:20
<b>Overall</b>	5:05	7:28	3:48	6:08	5:25	8:27	
							1:28 <i>Fire Units</i>
							1:09 <i>EMS Units</i>

## BENCHMARK INFORMATION - APPENDIX

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For operational matters, a list of peers was compiled from metro fire departments (using the NFPA definition of “Chiefs of cities of over 250,000 population and/or paid departments of 400 or more firefighters”) in certain southern states (Texas, Oklahoma, Florida, and Arizona) and those metro fire departments for cities similar in size to Corpus Christi, regardless of where the department was in the country. This created a sample of 30 agencies. For budgetary comparison, only the later part of the peer group was considered to avoid issues related to the economies of scale. This created a sample of 10 agencies. All budget information is for FY 2014 (or FY 2013-14) unless stated otherwise.

In terms of total fire department budget, Corpus Christi has the 4th lowest per capita cost of its peers. Corpus Christi’s fire department accounted for the 4th highest percent of the city’s budget. By either method, Corpus Christi is in the middle tier of its peer group. Few cities split the fire department budget into Fire operations and EMS services. Despite the smaller sample, Corpus Christi’s ambulance service costs substantially less than any of the EMS services.

Most budgets displayed personal costs instead of salary and benefits broken down. Corpus Christi’s fire department had the 3rd lowest per capita personal cost of its peers, and the 4th lowest, and the 5th highest percent of the city’s budget. Corpus Christi is in the middle tier of its peer group. Unfortunately, with the exceptions of overtime and pension contributions, this means a review of the peer firefighting budgets does not illuminate much about issues of interest, such as special pay and healthcare.

## FINANCIAL INFORMATION

The first table shows the total budget (City and Fire Department) and the per capita cost for a sample of 10 'metro' fire departments. Note that Corpus is ranked as the 7<sup>th</sup> highest per capita cost but has the 4<sup>th</sup> highest for proportion of the City budget.

### Total Budget (General Fund)

Department	State	Population	# of Career Firefighters	City Budget	Fire Dept Budget	Per Capita Fire Dept Budget	% of City Budget	Rank (lowest to highest) Per Capita Cost	Rank (lowest to highest) % of City Budget
Corpus Christi	TX	312,195	414	\$ 212,828,891	\$ 49,545,777	\$ 158.70	23.3%	7	4
St. Paul	MN	290,770	400	\$ 231,063,796	\$ 54,218,453	\$ 186.47	23.5%	4	3
Greensboro	NC	277,080	441	\$ 253,479,923	\$ 41,657,654	\$ 150.35	16.4%	8	7
Toledo	OH	284,012	494	\$ 244,763,957	\$ 65,396,864	\$ 230.26	26.7%	1	2
Pittsburgh	PA	306,211	640	\$ 488,066,489	\$ 68,609,490	\$ 224.06	14.1%	2	8
St. Louis	MO	318,172	711	\$ 479,300,000	\$ 63,248,029	\$ 198.79	13.2%	3	9
Minneapolis	MN	392,880	423	\$ 465,900,000	\$ 58,027,452	\$ 147.70	12.5%	9	10
Riverside	CA	313,673	800	\$ 222,538,010	\$ 49,929,791	\$ 159.18	22.4%	6	5
Wichita	KS	385,577	370	\$ 241,714,283	\$ 42,301,778	\$ 109.71	17.5%	10	6
Laredo	TX	244,731	357	\$ 161,108,877	\$ 43,510,229	\$ 177.79	27.0%	5	1

Source: City budgets (2014 unless otherwise noted)  
Fire Department Budgets

The next table examines the personal services costs for our sample of metro fire departments:

**Fire Department Personal Services**

Department	State	Population	# of Career Firefighters	Total Fire Department Budget	Fire Dept Budget	Per Capita Fire Dept Budget	% of Department Budget	Rank (lowest to highest) per Capita Cost	Rank (lowest to highest) % of Department Budget
Corpus Christi	TX	312,195	414	\$ 49,545,777.00	\$ 36,268,785	\$ 116.17	73.2%	8	9
St. Paul	MN	290,770	400	\$ 54,218,453.00	\$ 52,609,212	\$ 180.93	97.0%	4	2
Greensboro	NC	277,080	441	\$ 41,657,654.00	\$ 37,059,450	\$ 133.75	89.0%	6	6
Toledo	OH	284,012	494	\$ 65,396,864.00	\$ 61,479,996	\$ 216.47	94.0%	2	3
Pittsburgh	PA	306,211	640	\$ 68,609,490.00	\$ 67,960,409	\$ 221.94	99.1%	1	1
St. Louis	MO	318,172	711	\$ 63,248,029.00	\$ 59,056,413	\$ 185.61	93.4%	3	4
Minneapolis	MN	392,880	423	\$ 58,027,452.00	\$ 49,220,451	\$ 125.28	84.8%	7	7
Riverside	CA	313,673	800	\$ 49,929,791.00	\$ 35,393,267	\$ 112.83	70.9%	9	10
Wichita	KS	385,577	370	\$ 42,301,778.00	\$ 38,807,878	\$ 100.65	91.7%	10	5
Laredo	TX	244,731	357	\$ 43,510,229.00	\$ 35,972,036	\$ 146.99	82.7%	5	8

In this comparison, Corpus Christi has one of the lowest personal service costs per capita personal service costs for its Fire Department from within the comparison group and has the second lowest percentage of the Departmental budget. The project team attempted to obtain the Overtime cost and Pension costs from these comparison agencies, but must do not break them out separately, or they were captured in a catch-all bucket for pension.

## OTHER ISSUES

The project team also collected benchmark information on a number of topics as part of our assessment. We focused on ‘metro’ departments that respond to emergencies in communities that are similar in size to Corpus Christi. This information is summarized in the tables that follow.

### DEPARTMENT NAME

Type of Name	Number	Percent
Fire Department	16	53.3%
Fire-Rescue	7	23.3%
Under Public Safety as Fire Department	2	6.7%
Bureau of Fire	1	3.3%
Fire & Safety	1	3.3%
Fire and Emergency Services	1	3.3%
Fire Suppression	1	3.3%
Under Public Safety as Division of Fire	1	3.3%
Total	30	100.0%

### FIRE DEPARTMENT FLEET MAINTENANCE

Merged Fleet Maintenance	Departments	# of Departments	% of all Departments
Yes	Austin, Toledo (has fleet managers on loan to fire department), Riverside	3	10.0%
No	San Antonio, Palm Beach County, Orange County (FL), El Paso, Oklahoma City, Tucson, Miami-Dade County, Sarasota County (although works closely with County fleet), Greensboro, Lexington-Fayette, St. Paul	11	36.7%
Information Not Found/ Unclear	Houston, Phoenix, Hillsborough County, Dallas, Jacksonville, Fort Worth, Cleveland, Tampa, St. Louis, Minneapolis, Wichita, New Orleans, Cincinnati, Newark, Laredo, Pittsburgh	16	53.3%
Total		30	100.0%

EMS SUPERVISION

Separate EMS Supervisor	Departments	# of Departments	% of all Departments
Yes at multiple levels	Cleveland, Tampa	2	6.7%
Yes at Command Level	San Antonio, El Paso, Oklahoma City, Tucson, St. Louis, Toledo, St. Paul	7	23.3%
No Evidence of Separate EMS	Hillsborough County, Cincinnati, Newark, Pittsburgh	4	13.3%
Not Found/Unclear	Houston, Phoenix, Palm Beach County, Dallas, Orange County (FL), Austin, Jacksonville, Fort Worth, Miami-Dade County, Minneapolis, Sarasota County, Wichita, New Orleans, Riverside (CA), Greensboro, Laredo, Lexington-Fayette	17	56.7%
<b>Total</b>		<b>30</b>	<b>100.0%</b>

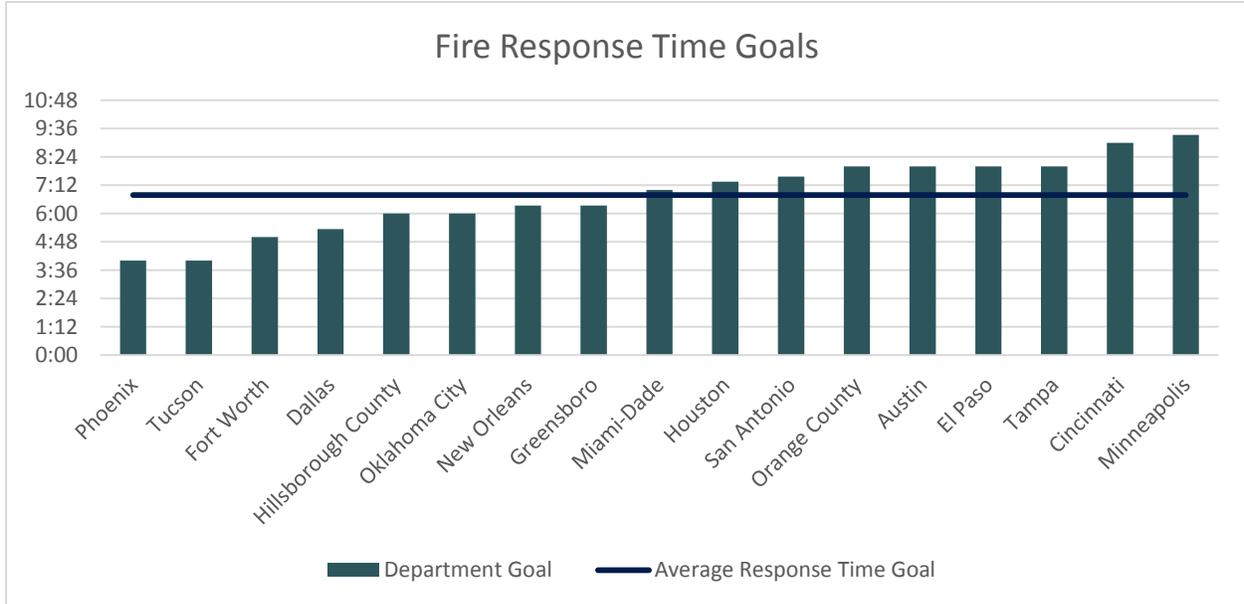
ISO RATING

ISO Rating	Departments	# of Departments
1	Houston, El Paso	2
2	Phoenix, Dallas, Austin, Fort Worth, Tucson, St. Louis	6
3	San Antonio, Minneapolis, Wichita	3
3 for part of jurisdiction	Palm Beach County, Jacksonville, Oklahoma City, Sarasota County	4
4	Miami-Dade County	1
4 for part of jurisdiction	Orange County (FL)	1
ISO Rating not found	Hillsborough County, Cleveland, Tampa, Toledo, New Orleans, Riverside (CA), Cincinnati, Newark, Greensboro, Laredo, Lexington-Fayette, St. Paul, Pittsburgh	13
<b>Total</b>		<b>30</b>

### ACCREDITATION STATUS

Accredited	Departments	# of Departments	% of all Departments
Yes	Houston, Orange County (FL), El Paso, Miami-Dade County, Tampa, Toledo, Newark, Greensboro	8	26.7%
Registered	Tucson	1	3.3%
No	Phoenix, San Antonio, Palm Beach County, Hillsborough County, Dallas, Austin, Jacksonville, Fort Worth, Oklahoma City, Cleveland, St. Louis, Minneapolis, Sarasota County, Wichita, New Orleans, Riverside (CA), Cincinnati, Laredo, Lexington-Fayette, St. Paul, Pittsburgh	21	70.0%
<b>Total</b>		<b>30</b>	<b>100.0%</b>

### RESPONSE TIME GOALS (FIRE)



## RESPONSE TIME GOALS (EMS)

