FINAL REPORT
June 2017

Fire Department Operations and Staffing Study

Oakland Park Fire Rescue Department
Oakland Park, Florida

Prepared by:

FITCH & ASSOCIATES, LLC
2901 Williamsburg Terrace #G § Platte City § Missouri § 64079

CONSULTANT REPORT

FIRE DEPARTMENT OPERATIONS AND STAFFING STUDY
OAKLAND PARK, FLORIDA

TABLE OF CONTENTS

EXECUTIVE SUMMARY 7

COMMUNITY PROFILE & CHARECTERISTICS 8

POPULATION AND DEMOGRAPHICS 8
FINANCIAL OVERVIEW 8
TOPOGRAPHY 8

SERVICES PROVIDED 10

SERVICE DELIVERY PROGRAMS 10
Fire Suppression *10*
Emergency Medical Services *11*
Rescue & Hazardous Materials *11*
CURRENT DEPLOYMENT STRATEGY 11
Fire Stations & Apparatus *11*
CURRENT STAFFING STRATEGY 15
Organizational Structure *15*
Figure 1: Oakland Park Fire Organizational Chart 16
TRAINING 16
INSPECTIONS 17
LOGISTICS 17

METHODOLOGY 18

Figure 2: Sample Record from the Master Incident Data Table 19
Figure 3: Sample Record from the Vehicles Assigned Data Table 20

TECHNOLOGY LIMITATIONS 21

RELATIONSHIP OF CAD AND CDR TIMELINES 21
Figure 4: Relationship Between Timelines in the CAD and CDR Data Tables 21
DISPATCH PROCESSING INTERVALS 22
CREDIBILITY OF P2/P3 STATISTICS 22
FIELD RESPONSE INTERVALS 23
Table 1: Error Conditions Identified in the Vehicles Assigned Data Table 24

COMMUNITY RESPONSE HISTORY 25

RELATIONSHIP TO BROWARD COUNTY 25
Figure 5: FIRE Incidents in Broward County by Jurisdiction 25
MUTUAL AID OUTBOUND 26
Table 2: Mutual Aid OutBound 26
MUTUAL AID INBOUND 26
Table 3: Contribution of Mutual Aid InBound to Total Time-on-Task for Oakland Park Incidents 26

Table 4: Twenty Largest Contributors to MA InBound 27
RESPONSE HISTORY 27
Table 5: Incidents Dispatched by Category in Oakland Park 27
Figure 6: Incidents Dispatched by Category 28
Table 6: Average Incidents per Day by Month-of-Year 28
Figure 7: Average Incident per Day by Month-of-Year 29
Table 7: EMS and FIRE Response Intervals by Priority and by Month-of-Year 29
Figure 8: EMS Response Intervals at the 90th %-tile on Priority 6 Incidents 30
Figure 9: FIRE Response Intervals at the 90th %-tile on Priority 2 Incidents 30
Table 8: Average Incidents per Day by Day-of-Week 30
Figure 10: Average Incidents per Day by Day-of-Week 31
Table 9: Average Incidents per Hour by Hour-of-Day 31
Figure 11: Average Incidents per Hour by Hour-of-Day 32
Table 10: Average Time-on-Task per Hour-of-Day 33
Figure 12: Average Time-on-Task per Hour-of-Day 33
Table 11: All Hazards Time-on-Task by Stations and Unit 34
Table 12: Average P2/P3, Chute, & Travel Intervals by Category for Priority 6 Incidents 35
Figure 13: P2/P3 Intervals from EMS Incidents 35
Figure 14: Chute Intervals from EMS Incidents 36
Figure 15: Drive Intervals from EMS Incidents 36
Figure 16: Response Intervals from EMS Incidents 37
Figure 17: P2/P3 Intervals from FIRE Incidents 37
Figure 18: Chute Intervals from FIRE Incidents 38
Figure 19: Drive Intervals from FIRE Incidents 38
Figure 20: Response Intervals from FIRE Incidents 39
Figure 21: Average Dispatch, Chute, Drive, & Response Intervals for EMS and FIRE Responses. 39
Figure 22: Distribution of Chute Intervals for First Arrived Units 40
Figure 23: Distribution of Drive Intervals for First Arrived Units 40
Table 13: Vehicles Arrived at Scene & Total Time-on-Task 41
Table 14: Vehicles Cancelled Enroute 41

FIRE RELATED SERVICES 42

TEMPORAL ANALYSIS 42
Table 15: Average FIRE Related Incidents per Day by Month-of-Year 42
Figure 24: Average FIRE Related Incidents per Day by Month-of-Year. 43
Figure 25: Response Intervals for FIRE Incidents at the 90th %-tile by Month-of-Year 43
Figure 26: Average FIRE Related Incidents per Day by Day-of-Week 44
Table 16: Total and Average FIRE Incidents per Hour by Hour-of-Day 44
Figure 27: Total and Average FIRE Incidents per Hour by Hour-of-Day 45 Table
17: FIRE Related Signal Types (Non-Emergency Medical) 45 Table
18: Oakland Park Units Arrived At Scene on FIRE Incidents 46 Table
19: Time-on-Task for FIRE Incidents by Stations and Unit 46
GEOGRAPHIC ANALYSIS - FIRE 47
Figure 28: Fire Heat Map – Including Highway Vehicle Accidents 47
Figure 29: Fire Heat Map – Without Highway Vehicle Accidents 48

EMERGENCY MEDICAL RELATED SERVICES 49

TEMPORAL ANALYSIS 49
Table 20: Average EMS Related Incidents per Day by Month of Year 49
Figure 30: Average Emergency Medical Incidents per Day by Month-of-Year 49

Table 21: Average EMS Related Incidents per Day by Day of Week 50
Figure 31: Average EMS I*ncidents per Day by Day-of-Week* 50 Table
22: Average EMS Incidents per Hour by Hour-of-Day 50
Figure 32: Average EMS Incidents per Hour by Hour-of-Day 51 Table
23: EMS Time-on-Task by Stations and Unit, with-Transports & non-Transport Combined 52 Table
24: EMS Time-on-Task by Stations and Unit, with Transports 53 Table
25: Average Transport & non-Transport EMS Incidents per Hour by Hour-of-Day 53
Figure 33: Average Transport & Non-Transport EMS per Hour by Hour-of-Day 54
GEOGRAPHIC ANALYSIS – EMS 55
Figure 34: EMS Heat Map 55

REVIEW OF SYSTEM PERFORMANCE 56

CASCADE OF EVENTS 56
Detection 56
Call Processing 56
Turnout Time 56
Travel Time 57
Total Response Time 57
Figure 35: Progression of Response Intervals 57
Comparison of Workloads by Demand Zone 57
Table 26: Vehicle Responses and Workload by Station Demand Zone 57
Figure 36: Workloads by First Due Station Demand Zones 58 Table
27: Time-on-Task by Station, Unit, and Response Category 59
Comparison of Workloads by Unit Hour Utilization (UHU) 59
Table 28: All Responses UHU by Unit 61
Figure 37: Unit Utilizations in the Oakland Park System 62
RESPONSE TIME CONTINUUM 62
Fire 62
Figure 38: Example of Traditional Time Temperature Curve 63
Figure 39: Modern vs. Legacy Flashover Timeline 64
EMS 64
Figure 40: Cascade of Events for Sudden Cardiac Arrest with Shockable Rhythm 65
Description of First Arriving Unit Performance 65
Table 29: Response Performance of First Arriving Units 65
Figure 41: P2/P3 Intervals for First Arrived Units on EMS Incidents 66
Figure 42: Chute Intervals for First Arrived Units on EMS Incidents 66
Figure 43: Drive Intervals for First Arrived Units on EMS Incidents 67
Figure 44: Response Intervals for First Arrived Units on EMS Incidents 67
Figure 45: P2/P3 Intervals for First Arrived Units on FIRE Incidents 68
Figure 46: Chute Intervals for First Arrived Units on FIRE Incidents 68
Figure 47: Drive Intervals for First Arrived Units on FIRE Incidents 69
Figure 48: Response Intervals for First Arrived Units on FIRE Incidents 69
FIRST ARRIVING UNIT RESPONSE INTERVALS BY FIRST DUE STATION 70
Comparison of First Due Zone Stats 70
Table 30: Comparison of Incident Counts by FDZs as Taken from Data Tables as Supplied to FITCH and as Reported by Broward County 70
Table 31: Performance Intervals of Vehicles First Arrived at Scene by First Due Station at the 50th Percentile (Average) on Priority 6 EMS Incidents. 71

Table 32: Performance Intervals of Vehicles First Arrived at Scene by First Due Station at the 90th Percentile on Priority 6 EMS Incidents. 71
Table 33: Performance Intervals of Vehicles First Arrived at Scene by First Due Station at the 50th Percentile (Average) on Priority 2 FIRE Incidents. 71
Table 34: Performance Intervals of Vehicles First Arrived at Scene by First Due Station at the 90th Percentile on Priority 2 FIRE Incidents. 71
Figure 49: Performance Intervals for Vehicles First Arrived at Scene on FIRE Incidents by First Due Station 72
Figure 50: Chute Intervals for Vehicles First Arrived at Scene on FIRE Incidents by First Due Station 72
Figure 51: Drive Intervals for Vehicles First Arrived at Scene on FIRE Incidents by First Due Station 72
Figure 52: Response Intervals for Vehicles First Arrived at Scene on FIRE Incidents by First Due Station 73
EFFECTIVE RESPONSE FORCE CAPABILITIES 73
Table 35: Drive Interval at 90th %-tile for ERF by First Due Station for Priority 1 Incidents 73
Table 36: Drive Interval at 90th %-tile for ERF by First Due Station for Priority 2 Incidents 73
Figure 53: Effective Response Force Capability by First Due Station for Priority 1 Incidents 74
RELIABILITY FACTORS 74
Table 37: First Due Compliance by Station 74
Figure 54: Reliability by First Due Station 75
SIMULTANEOUS INCIDENTS 75
Table 38: Simultaneous Incidents by First Due Station. 75
Figure 55: Master Incident Record Showing Four Simultaneities 76
COMMUNITY RISK ASSESSMENT AND RISK LEVELS 77
PROBABILITY/CONSEQUENCE OF FIRE EVENT RISK 77
Figure 56: Probability and Consequence Matrix for Fire Risk 77
Table 39: Summary of Risk Matrix 78
Table 40: NFIRS Reported Fire Data - 2012 thru 2014 78
OVERALL EVALUATION, OBSERVATIONS, AND COMPARATIVE ANALYSIS 79
OVERALL EVALUATION 79
GENERAL OBSERVATIONS 79
Response Time 79
Impact of Adaptive Staffing 79
Table 41: Response Interval of All Vehicles Assigned to FIRE Incidents in First Due Zones Served by Station 20 82
Table 42: Response Interval of First Arrived Vehicles on EMS Incidents in First Due Zones Served by Station 20 82
Table 43: Response Intervals of All Vehicles Assigned to FIRE Incidents in All First Due Zones Comprising Oakland Park 82
Table 44: Response Interval of First Arrived Vehicles on EMS Incidents in All First Due Zones Comprising Oakland Park 82
GIS Modeling 84
Figure 57: Oakland Park Stations Only - 5 Minute Drive Time 84
Figure 58: Oakland Park Stations Only - 6 Minute Drive Time 85
Figure 59: Marginal Utility of Existing Fire Stations - 5 Minutes 85
Figure 60: Travel Time - 5-Minute Performance 86
Figure 61: Marginal Utility of Existing Fire Stations - 6 Minutes 86
Figure 62: Travel Time - 6-Minute Performance 87
Figure 63: Marginal Utility of Optimized Locations - 5 minutes 88
Figure 64: Optimized Travel Time - 5 Minute Performance 88
Figure 65: Marginal Utility of Optimized Locations - 6 minutes 89
Figure 66: Optimized Travel Time - 6 Minute Performance 89

COMPARATIVE ANALYSIS 90
Figure 67: Benchmark & Comparative Response Time Components for Oakland Park 90
atTable 45: Comparative Chute Times - Oakland Park v. Broward Aggregate 91

CONCLUSION & SERVICE ENHANCEMENTS 92

NEAREST UNIT RESPONSES FOR LIFE THREATENING EVENTS 92
PLACE INTO THE CITY'S CIP PROGRAM THE REPLACEMENT OF STATION 9 AND STATION 20 TO OPTIMIZED LOCATIONS 93
DEVELOP CAPABILITY FOR PEAK HOUR UNITS (PHU), AND DEPLOY AN EMS PHU WHEN WORKLOAD DEMANDS 93

ATTACHMENTS –

Attachment A – Welch t-Test
Attachment B – Stakeholder Feedback on Draft Report

EXECUTIVE SUMMARY

The City engaged Fitch and Associates (FITCH) to undertake an objective analysis of the operations and staffing of the Oakland Park Fire Rescue Department.

Comprehensive data based quantitative and geospatial analyses were utilized to objectively evaluate the historical community demand for services by type and severity. Occupancy level data were obtained from the Insurance Services Office (ISO) and was utilized to assess occupancy level risk within the community. The overall risk profile is similar or better than comparable communities, the city's loss experience from fire, as reported to the U.S. Fire Administration, compares favorably against state and national experience.

FITCH's opinion is that overall, the City is well-served by its fire department. A policy that maintains the existing resources and levels of service is well justified.

Notwithstanding the above, there are several opportunities for the City to provide service level enhancements should they desire. This includes maximizing the use of nearest unit response in life-threatening situations; consider relocating Stations 9 and / or 20 to optimize response times; and contemplate future use of peak-hour units for EMS when demands for service exceed current resources.

© Fitch & Associates, LLC

COMMUNITY PROFILE & CHARECTERISTICS

Population and Demographics

The City of Oakland Park encompasses approximately 8 square miles and is located on the eastern portion of central Broward County. Bordering Fort Lauderdale to the north, and with the Atlantic Ocean less than 3 miles away, the City is in close proximity to major attractions including the Broward Center for Performing Arts, Broward Convention Center, Fort Lauderdale-Hollywood International Airport (FLL) and Port Everglades.

Oakland Park's population is estimated at 43,319. Its diverse community is comprised of 62.6% white and 25.6% black. Hispanic and Latino residents of any race represent 25.6% of the population. As of 2010 20.1% of the population was under 18 years old, compared to 22.4% in Broward County overall, and those over age 65 years old were only 9.7% compared to 14.3% for Broward County[1].

The City is primarily residential in nature, with just over 40% of its land use dedicated to residential properties. The City also has a significant proportion devoted to commercial, light industrial and community facility uses. This is reflected in the City's tax base which is comprised of 59.12% residential, 24.69% commercial, 14.74% industrial use and 1.45% other miscellaneous. Over the past 10 years, the city's taxable property values have increased from 1.9 billion to $2.5 billion representing an annual growth rate of approximately 3.2% per year.[2]

Financial Overview

The fire department's resources have remained relatively stable over the past five years. In the current budget, the department has an authorized strength of 67 full-time personnel. The fiscal year 2017 adopted budget totals $9,686,629, which includes $8,542,346 for personnel services and $644,408 for normal operating cost. The capital budget for fiscal year 2017 is $499,875.[3]

The Department is funded through use of a special fire assessment fees, ambulance transport fees and general fund revenues.

Topography

One concern cited by some emergency personnel involved the potential impact of the Florida East Coast (FEC) rail line running north and south through the eastern portion of the city. The city currently has no

---

[1] Accessed from Census Bureau Quick Facts at https://www.census.gov/quickfacts/table/PST045215/12011,1250575 on March 7, 2017.

[2] City of Oakland Park (2015). *Comprehensive Annual Financial Report.* Accessed at http://www.oaklandparkfl.gov/DocumentCenter/Home/View/2905 February 15, 2017

[3] City of Oakland Park (2016). *Adopted Budget FY 2017.* Accessed at http://www.oaklandparkfl.gov/DocumentCenter/Home/View/3569 February 15, 2017.

fire stations positioned east of the FEC tracks. This rail line has been identified as a route for the future Brightline passenger rail service running between Miami and West Palm Beach – initially slated to begin service sometime later in 2017. During meetings with stakeholders, some raised questions regarding the potential impact future rail traffic may have on emergency vehicle responses. While an exact assessment specific to Oakland Park is not possible at this juncture, the following discussion examines this question more generally based on national research.

A study from the Federal Railroad Administration[4] found that it was very difficult to determine the impact of a delayed response and convert it into a quantifiable impact. The report indicated impacts on communities from delayed response due to blocked crossings, while sometimes severe, are less than the impacts of traffic delays and congestion caused by blocked crossings. While the report acknowledged some anecdotal reports of problems resulting from delays in emergency response due to blocked highway-railroad crossings, detailed information is not available to estimate the costs or impacts of such delays nationally or even at a local level. Noting that many freight trains are longer than one mile, at 20 MPH, such a train would take 3 minutes to clear a crossing. Case studies from the report found some communities mitigate the potential impact of potential railroad crossing delays by ensuring fire and EMS resources exist on both sides of the railroad track.

While Oakland Park does not have a city resource located east of these tracks, the opportunity to mitigate any potential impact by incorporating external resources is discussed in more detail under the Recommendations section of this report.

[4] Federal Railroad Administration (2006). Impact of Blocked Highway/Rail Grade Crossings On Emergency Response Services.

SERVICES PROVIDED

Service Delivery Programs

Rapid access to the city emergency services begins with the Broward County Regional 911 System. Fitch recently completed a comprehensive review of the county's 911 operations, and some of the data utilized in this analysis was derived from that study.

Overall that recent study found the 911 system performs well, but there are areas that were identified for further improvement. One specific area of interest to this study involves furthering the use of automatic aid through nearest unit response for life threatening fire rescue emergencies. This concept was discussed in detail in *FITCH's* full report on the Broward County 911 system which can be found on Broward County's website at
http://www.broward.org/CommunicationsTechnology/Documents/BrowardCountyAssessmentRegional911-FinalReport12222016.pdf

Fire Suppression

Fire suppression services are provided from one of three fire stations located throughout the city. Fire station 9 is the busiest of these facilities, and houses on a 24-hour basis a battalion chief, fire apparatus with a minimum of three personnel, and a paramedic level EMS transport unit with a minimum of two personnel. Fire station 87 also houses a three-person fire apparatus and a two-person paramedic level EMS transport unit. Fire station 20 utilizes a cross staffed crew of three personnel to operate either a fire apparatus or paramedic level EMS transport unit depending on the type of incident which they are assigned. This adaptive / cross staffing of two apparatus with a single three-person crew was one issue of particular interest in the study. The findings from that analysis are addressed later in the report. The department's assigned staffing for each of its 24-hour shifts involves 17 personnel, with a minimum staffing level of 14 at all times.

The department reported its annual total call volume was 8,184 in 2015. This reflects a 9.63% increase from 2011, or an annualized increase of 2.4%.

As part of the county's large metropolitan area encompassing approximately 1.9 million citizens, Oakland Park takes advantage of partnering with other fire rescue agencies in the delivery of services. Historically, this has involved a robust mutual aid system, utilization of regional communications, specialized services, and even logistical support. Overall, the department's active participation in this collaborative approach has served its residents well.

The department has received a Class 3 rating from the Insurance Services Office's (ISO) Public Protection Classification survey placing it in the top 8.7% of over 48,000 rated fire agencies across the nation. As noted in its January 2016 evaluation by ISO, the City was only 1.49 points short of achieving a Class 2

rating. The best opportunities to improve its rating to a Class 2 a in the areas of the water supply system, number of on-duty personnel and improvements to the Department's training program.

Emergency Medical Services

The department provides Advanced Life Support (ALS) level service by use of paramedics deployed on all front-line apparatus. Through the use of Broward County's 911 system, emergency medical incidents are processed utilizing emergency medical dispatch (EMD). The system allows for calls to be categorized based on their severity, and provides callers with pre-arrival instructions in that brief time-period before paramedics arrive on the scene.

The city contracts with their own medical director who oversees the paramedic program. Personnel operate through use of written medical protocols and there is an identified continuous quality improvement process when medical issues arise. These issues are initially addressed by the on-duty battalion chief or EMS captain. The medical director's quality improvement process focuses on sentinel events, and all such incidents are forwarded to both medical director and the EMS captain for review. It was noted that the department does not currently report cumulative statistics on certain key performance measures, such as cardiac arrest resuscitation rates. Broward County is fortunate to have several trauma centers available in those instances where injury severity requires that level of service.

Rescue & Hazardous Materials

Oakland Park's demand for specialized services, specifically hazardous materials and technical rescue responses, it quite limited. In 2015, there were only 34 hazardous materials incidents, and only a single incident classified as heavy rescue. For several decades Broward County has funded regional services through the use of select municipal partners, and directly. These specialized teams provide both hazardous materials and technical rescue specialized services to all municipalities. Oakland Park has taken advantage of these countywide regional services and utilizes these regional teams when required.

For the remaining analysis of service demands required of Oakland Park Fire Rescue we limit the review to the two primary services – fire suppression and EMS.

Current Deployment Strategy

Fire Stations & Apparatus

The City currently operates three fire stations geographically dispersed across the city. Stations 9, 20 and 87, along with a brief summary of each facility and its associated apparatus, is presented below.

Fire Station #9

STATION				
	Year Built	# Bays	# Sleeping Quarters	Diesel Exhaust System
Station #9	1967	2 drive-thru	8	Yes
APARATUS				
	Unit #	Year	Make	Model
Battalion 9	327	2016	Ford	F350
Quint 9	358	2013	E-One	HP78
Rescue 9	361	2016	Braun	Super Chief

Fire Station #20

STATION				
	Year Built	# Bays	# Sleeping Quarters	Diesel Exhaust System
Station #20	1968	3 useable back-ups	7	Yes
APARATUS				
	Unit #	Year	Make	Model
Rescue 20	359	2016	Braun	Super Chief
Engine 20*	357	2006	Pierce	Enforcer

*A single 3-person crew provides adaptive/cross-staffing of both the rescue and engine, depending on the type of incident they are dispatched.

Fire Station #87

STATION				
	Year Built	# Bays	# Sleeping Quarters	Diesel Exhaust System
Station #87	1982	2 drive-thru	7	Yes
APARATUS				
	Unit #	Year	Make	Model
Squirt 87	356	2006	Pierce	Aerial (61 ft.)
Rescue 87	360	2016	Braun	Super Chief
Rescue boat*				Jon Boat

*The rescue boat is not staffed on a regular basis, but deployed when the incident type requires it use.

Current Staffing Strategy

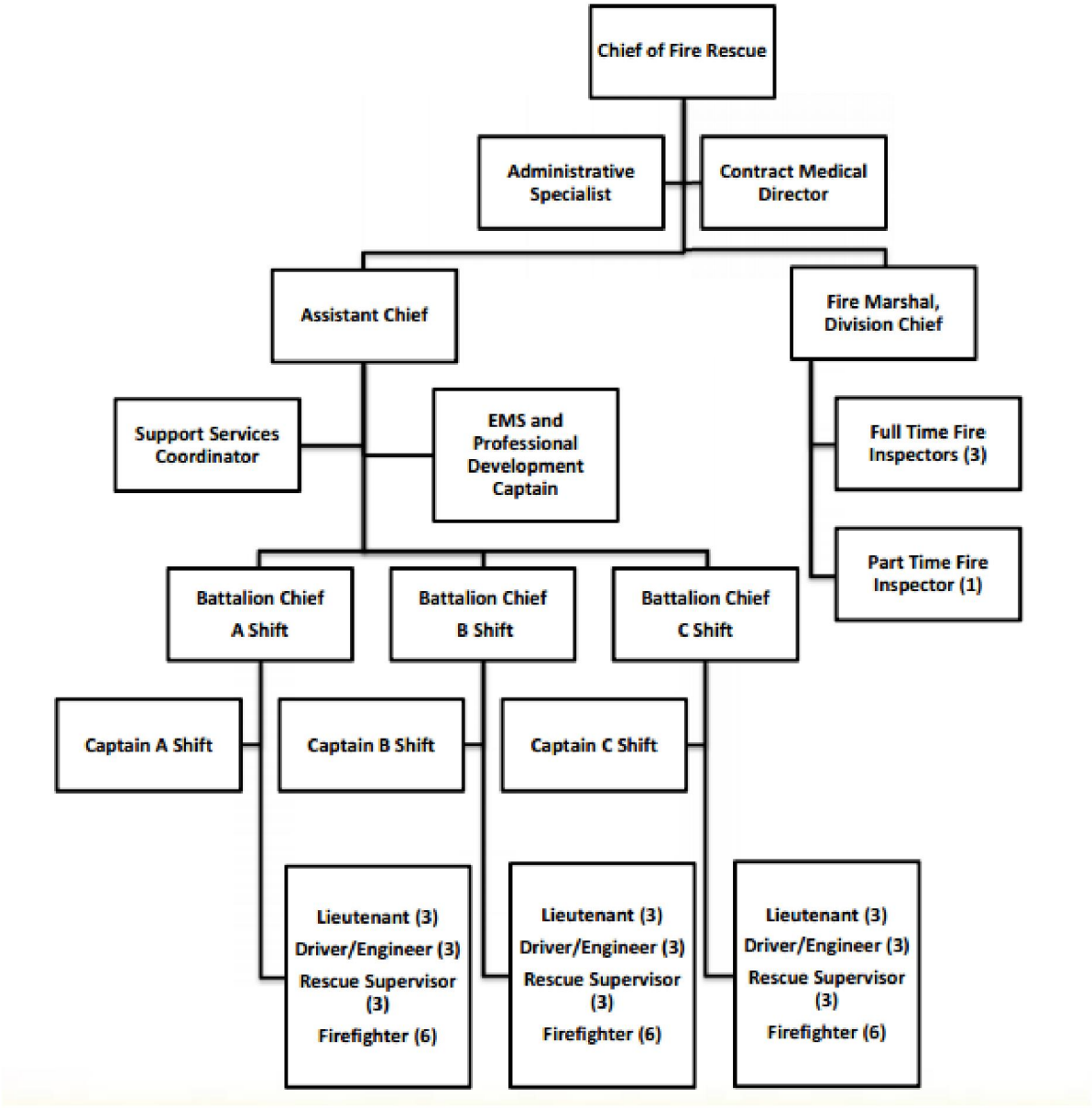
Organizational Structure

The agency is led by a fire chief who reports directly to the city manager. The fire chief is assisted by a single assistant fire chief and a fire marshal who serves at the rank of division chief. Currently operating with an 'acting' fire chief, not all 40-hour management positions are currently filled. The department should seek to fill each of these positions as soon as practical.

The agency operates under a traditional 24/48-hour work schedule and includes 17 personnel assigned to each of three platoons. Shift staffing includes a battalion chief, fire captain, three lieutenants, three driver engineers, three rescue supervisors, and six firefighter positions. Fire prevention has three full-time inspectors and one part-time fire inspector. The department's current organizational structure is shown below.

© Fitch & Associates, LLC

Figure 1: Oakland Park Fire Organizational Chart[5]



Training

Personnel must be certified at a Firefighter II Level and certified as a Paramedic from the State of Florida prior to employment. As required by the state, personnel receive ongoing continuing medical education to ensure their competency in emergency medical care. Fire training encompasses various activities designed to meet requirements from National Fire Protection Association (NFPA) and ISO. Various modalities are utilized, including training delivered by company officers and multi-company drills conducted at either the Broward Fire Academy or Coral Springs training facilities. The department also

[5] Oakland Park FY 2017 Annual Budget.

makes good use of inter-agency training opportunities partnering with other fire rescue agencies throughout the county.

The department previously had a 40-hour training officer position that was eliminated during the economic recession. This has reportedly resulted in challenges to accomplish mandatory training needs, including night drills, multi-company drills, etc. A strong training program facilitates the competent delivery of public safety services, and enhances personnel safety. As noted above, ISO identified training as one area that has a greater likelihood of improving the department's overall rating. For an agency this size, a dedicated training officer is justified. The City would benefit from re-establishment of this position.

Inspections

Under the supervision of its fire marshal, three full-time fire inspectors and one part-time fire inspector inspect and maintain files on all properties subject to inspections. The department ensures building fire protection systems and features are inspected and functioning properly prior to approving any certificate of occupancy. The department reports high level of compliance with their plan review turnaround goals and annual fire inspections – 87% for fire inspections on an annual basis. The department also delivers a variety of fire safety programs throughout the year focusing on elementary children, as well as providing opportunities at career days for middle and high school students.

As resources permit, greater emphasis on community education programs, and enhancing compliance with goals towards fire inspections and plan reviews, will further benefit the community's risk profile.

Logistics

The department utilizes the Broward Sheriff's Office Fire Rescue Logistics warehouse, or a private vendor, for most of their day-to-day supply needs. Supplies are delivered directly to the city several times a week.

Fleet services are provided through the city's public works department through the use of a five-member fleet maintenance team. Fire apparatus and rescue ambulances receive preventive maintenance service every three months as recommended by the manufacturer. Administrative and fire inspector vehicles are serviced every four months.

METHODOLOGY

Data was obtained from Broward County's Office of Regional Communications and Technology (ORCAT). This data was used to inform descriptive statistics described here, as well as integrated into geographic information system (GIS) analysis.

Data extracted by ORCAT from the Computer Aided Dispatch (CAD) system was provided to the consultant as an Excel file with nine worksheets. The first worksheet in this Excel file contained the 8,217 master incident records that logged FIRE responses in the Oakland Park jurisdiction for CY2015. These records were imported into the consultant's database that was custom designed to facilitate the analyses required for this report. A sample record from the consultant's Master Incident data table is presented below.

© Fitch & Associates, LLC

Figure 2: Sample Record from the Master Incident Data Table

Broward E911 Consolidated Communications System
Oakland Park Fire Rescue
Master Incident Records

Date	Time	Mo	Day	Day Name	Day of Wk	Hr of Day	Hour of Yr
07/21/2015	01:38:26	7	21	Tue	3	1	4,826

Incident_PK	EventNumber	City	FDZ	Disp_Loc	Response_Agency	MA out
16322877	FOP150721004451	OP	09G 09	Central	Oakland Park Fire	0

Priority	Signal	Signal_Description	Resp_Cat	Alarm	1° Code	1° ID
1	S25RS	RESIDENTIAL FIRE	FIRE	2	17908	E9

451 NE 32ND ST				Oakland Park				
MapX	937924	MapY	667527	MapRef	598	Rept_Dist	12C4	Loc 33773

Dispositions	
1	4653
2	
3	
4	
Add'l	

Radio_Chn	Avg Talk /Incident	Avg Talk /Xmit/Rcv	Xmit/Rcv's / Incident	Support Duration
BCF-D1	112.75 sec	8.662 sec	13.02	104.086

07/21/2015 01:38:38...07/21/2015 02:20:41

	Timestamps	Dispatch Intervals	
Time_Pickup_TS	07/21/2015 01:37:57	00:00:31	P2 Intake
Time_Create_TS	07/21/2015 01:38:26	00:00:10	P3 Assgn
Transmit_TS	07/21/2015 01:38:28	00:00:41	P2/P3
Time_Dispatch_TS	07/21/2015 01:38:38		
Time_Enroute_TS	07/21/2015 01:40:05		
Time_Arrival_TS	07/21/2015 01:44:05		
Time_Closed_TS	07/21/2015 02:20:41		

Dispatched from Station FDZ Simultaneous With Incident in Same Sta FDZ: [EventNumbers]	
1	
2	
3	
4	
5	
6	
Count	0

Cancelled			Veh Tallies DS	AR	TR	MA	
OP Veh	1	OP	7	5	0	0	outbound
Incident	0	X	1	0	0	0	inbound
		totals	8	5	0	1	1st Due Unit

Portal to Vehicles Assigned Data Table

Unit	OP	In	out	DS_TS	AR_TS	1st	CX	Tr	AV_TS	Task
E9	1	0	0	07/21/2015 01:38:37		0	0	0	07/21/2015 02:17:29	00:38:52
FM9	1	0	0	07/21/2015 01:43:54		0	0	0	07/21/2015 02:05:35	00:21:41
GP1OP	0	1	0	07/21/2015 01:38:37		0	1	0		00:09:11
B9	1	0	0	07/21/2015 01:38:37	07/21/2015 01:44:05	1	0	0	07/21/2015 02:20:41	00:42:04
Q9	1	0	0	07/21/2015 01:38:37	07/21/2015 01:45:45	0	0	0	07/21/2015 02:15:33	00:36:56
E20	1	0	0	07/21/2015 01:38:37	07/21/2015 01:46:30	0	0	0	07/21/2015 02:13:41	00:35:04
R20	1	0	0	07/21/2015 01:38:37	07/21/2015 01:47:39	0	0	0	07/21/2015 02:05:30	00:26:53
R9	1	0	0	07/21/2015 01:38:37	07/21/2015 01:49:49	0	0	0	07/21/2015 02:05:51	00:27:14

The next eight worksheets in this Excel file contained 90,978 records. Each record logged a single status change for a unit assigned to a response. Attempting to conduct analyses directly from the status change data table, as received, would have been especially inefficient. The workaround was to first segregate the status change records by Event Number from the Master Incident records, and then further segregate the status change records by unit assigned to the incident. In this manner, a Vehicles Assigned data table was created in the consultant's database. A sample record from consultant's Vehicles Assigned data table is presented below.

Figure 3: Sample Record from the Vehicles Assigned Data Table

Broward E911 Consolidated Communications System
Oakland Park Fire Rescue
Vehicles Assigned Table

Date	Time	Mo	Day	Day Name	Day of Wk	Hr of Day	Hour of Yr
07/21/2015	01:38:37	7	21	Tue	3	1	4,826

Incident_PK	EventNumber	Manpower_PK
16322877	FOP150721004451	181977648

Priority	Signal Type	Signal_Description	Resp_Cat	City	FDZ	FDSta
1	S25RS	RESIDENTIAL FIRE	FIRE	OP	09G	09

Unit ID	OP Unit	OP Sta	1° Code	1° ID	Mutual Aid Out	Mutual Aid In	CX	Trans	Arrvd	OP Arrvd	Arrvd	
B9	1	09	17908	E9	0	0	0	0	1	5	1	1st
											0	2nd
											0	3rd

Status Timestamps	
DS_TS	07/21/2015 01:38:37
EN_TS	07/21/2015 01:40:05
C1 TS	
AR_TS	07/21/2015 01:44:05
ME_TS	
MH TS	
CX_TS	
CL TS	
AV_TS	07/21/2015 02:20:41
DS During R220 In-Prog	

Incident Intervals		Cptd	
Chute	00:01:28	0	1
Drive	00:04:00	0	2
Crew	00:05:28	0	3
AtScene	00:36:36	0	4
HDrive			5
HDrop			6
Task	00:42:04	0	7
P2/P3	00:00:41	0	8

	elapsed [sec]	
4	2,196	
avg	1,530	00:25:29
± sd	513	
sum	7,648	02:07:28

R220 Adaptive Interval

Vehicles Arrvd AtScene this Incident

Unit	DS_TS	AR_TS	Arrvd	1st
B9	07/21/2015 01:38:37	07/21/2015 01:44:05	1	1
Q9	07/21/2015 01:38:37	07/21/2015 01:45:45	1	0
E20	07/21/2015 01:38:37	07/21/2015 01:46:30	1	0
R20	07/21/2015 01:38:37	07/21/2015 01:47:39	1	0
R9	07/21/2015 01:38:37	07/21/2015 01:49:49	1	0

In this report, the term "incident" will refer to a request for service that resulted in the creation of a record in the Master Incident data table. The term "response" will refer to the assignment of a unit to the incident. Multiple units may be assigned to a single incident. Each "response" created a record in the Vehicles Assigned data table.

Time intervals are presented using the [hh:mm:ss] format. The terms "average" and "standard deviation" have their commonly accepted meanings. Time intervals reported at the 90th percentile are calculated using a ranked 90th protocol. All of the instances between the 90th and 91st percentiles are collected and averaged. This methodology was used expressly because it avoids giving undue weight to long duration outliers that may be atypical and may not reflect normal operations in the jurisdiction.

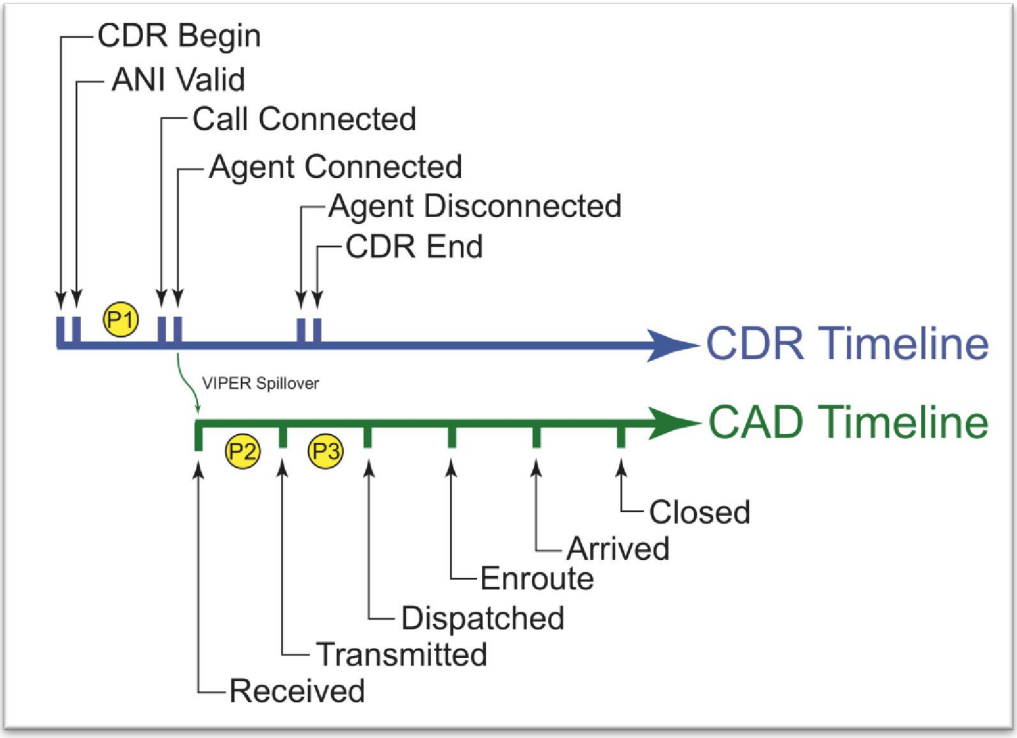
TECHNOLOGY LIMITATIONS

Relationship of CAD and CDR Timelines

Access to data in the Broward system is complicated because there is no single source for all of the timestamps required to describe the overall performance of the system. The telephony server and the Computer Aided Dispatch system contain the primary data tables for the system. The relationship of these two data tables is diagrammed in Figure 4.

The upper timeline in Figure 4, below, shows the names and relative sequence of the timestamps that comprise a Call Detail Record, CDR, for an incident in the telephony server. The lower timeline in the Figure below shows the names and relative sequence of the timestamps that comprise the record of an incident in the CAD server.

Figure 4: Relationship Between Timelines in the CAD and CDR Data Tables



The processing of an incident begins when a call rings in to the 911 trunk line at [CDR Begin]. The answer delay interval P1, as defined to *FITCH* by Broward County, extends from when the calling phone number is validated at [ANI Valid] until a dispatcher is identified as available at [Call Connected]. The intake dispatcher picks up the call at [AGENT CONNECTED]. The spillover of data from the telephony server (the CDR timeline) to the CAD server (the CAD timeline) occurs at this time point. The beginning of the spillover process is logged in the telephony data tables as the [AGENT CONNECTED] timestamp. The end of the spillover process is logged into the CAD data tables as the [Received] timestamp.

Even if a [Received] timestamp is logged into the CAD, it still may not be reliable. *FITCH* learned that the CAD [Received] timestamps is overwritten every time the Intake dispatcher rebids or asks the 911-system software to verify and update a caller's location. It is common for multiple rebids to be requested on an incoming 911 call. Each rebid introduces an increasing offset between the caller's actual ring-in and the [Received] timestamp.

The intake processing interval, P2, extends from the [Received] timestamp to the [Transmit] timestamp when the intake dispatcher releases the incident to the assignment workstations. The assignment processing interval, P3, extends from the [Transmit] timestamp until the [Dispatch] timestamp. The combined P2/P3 interval extends from the [Received] timestamp until the [Dispatched] timestamp.

Dispatch Processing Intervals

A major deficiency of information technology in the BSO Communications system is that for more than half the combined LAW and FIRE incidents, the incident record in the CAD server cannot be linked to a unique incident record in the CDR server. The consequence is that there is an inability to reliably link phone records in the telephony served to incident records in the CAD server and establish a seamless start-to-finish timeline for each incident. These limitations apply to the Oakland Park incidents that flow through the Broward County Communications Center.

As shown in Figure 4, above, the [Received] timestamp in the CAD is a misnomer. This timestamp logs when an incident record is initiated into the CAD server, NOT when the caller rang-in at the 911 PSAP. At best, there is a systematic offset between ring-in and the [Received] timestamp. The amount of this offset is not constant, but can vary from incident to incident depending on the number of ANI rebids requested by the Intake dispatcher.

The technology issues noted in this report are currently being addressed by the County.

Credibility of P2/P3 Statistics

The credibility of P2/P3 statistics derived from timestamps in the CAD is in question. Counter-intuitively, the missing [Received] timestamps pose more of a problem than the ones that are present. The missing [Received] timestamps erode the credibility of the P2/P3 intervals that can be calculated from the [Received] timestamps that are available.

An assumption about the P2/P3 intervals that would be convenient is that the numbers automatically serve as a metric for the system as a whole, that the variability in the P2/P3 intervals that they calculate, properly reflects the variability in all the P2/P3 intervals, even the ones not able to be calculated. This assumption is not warranted.

The why/how behind the missing timestamps is unknown. The first consequence is that a reverse bias would then be imposed on the P2/P3 intervals calculated from the remaining timestamps. The second consequence is that the calculated P2/P3 timestamps are statistically biased and do not accurately represent the properties of the system as a whole.

Preliminary investigation of the why/how behind the missing timestamps indicates that operator intervention by the intake dispatchers may play a major role in the missing timestamps. This is a problem, as human intervention is almost guaranteed to be biased and not statistically random. Even more confounding, the degree of bias is then almost guaranteed to be operator specific, thereby introducing a time dependent variability to the bias, depending on which dispatcher is on duty at what hour-of-day. The extent to which the bias skews the P2/P3 interval to longer or shorter durations is unknown.

The Broward County E911 Consolidated Communications Center logs 8,217 FIRE related incidents as occurring within the Oakland Park jurisdiction for CY2015. Of these incident records, 2,907 (35.4%) lack a [Received] timestamp. How many of the remaining [Received] timestamps are subject to increased offsets due to multiple ANI rebids is not known.

Field Response Intervals

The credibility of field response intervals must be viewed with caution because of a similar problem with missing timestamps. The conduct of field operations is recorded into the CAD as a progression of timestamps that log each status change for each vehicle involved in the response. The logging of most of these intermediate status change timestamps is triggered by a manual input from an operator. When a timestamp is not logged, it is due to an act of omission by an operator. Again, human intervention is almost guaranteed to be biased and not statistically random. The consultant estimates 24% of the Vehicle Assigned records in the CAD are missing one or more of the intermediate status change timestamps needed to calculate the complete set of field response intervals for an incident. Another 2% of the Vehicle Assigned records contain errors that lead to the calculation of negative response intervals, which means that one of the two timestamps that delimit the response interval must be drastically in error.

The why/how behind the missing status change timestamps is unknown. What specific bias was operating to select which status change timestamps went missing is unknown. The first consequence is that a reverse bias would then be imposed on the field response intervals calculated from the remaining timestamps. The second consequence is that the calculated field response intervals are statistically biased and do not accurately represent the properties of the system as a whole. The extent to which the bias skews the response intervals to longer or shorter durations is unknown. Table 1 presents a tally of the identifiable error conditions in the Vehicles Assigned data tables that relate to operations in Oakland Park.

Table 1: Error Conditions Identified in the Vehicles Assigned Data Table

Identifiable Error Conditions	Instances
Unit dispatched with no termination status change: AV or CL or CX	88
Downstream status changes logged; no dispatched status	14
Enroute to hospital logged; no arrived at hospital logged	454
Arrived hospital logged; no enroute hospital logged	74
Enroute hospital logged, no arrived at scene logged	141
Arrived hospital logged, no arrived at scene logged	124
Arrived at scene logged, no enroute logged	1,162
Dispatched, no enroute logged, no arrived logged (corrected for CL & CX)	2,961
Downstream status changes logged, but one response interval < 00:00:00	345
Total Error Conditions	5,363
Total Vehicles Assigned Response Records	20,584
Percent Records with Error Conditions	26.1%

The error conditions tallied in Table 1 are so egregious that they become readily identifiable by simple inspection of the Vehicles Assigned data table. More subtle error conditions may remain undetected.

COMMUNITY RESPONSE HISTORY

Relationship to Broward County

Oakland Park has a population of almost 43,000 with a population density of about 5,700 per square mile. The City is embedded in a highly urbanized area of Broward County. Emergency services are dispatched by the Broward Sheriff's Office through the Broward E911 Consolidated Communications Center. The number of incidents requiring FIRE responses in Oakland Park compared to the rest of Broward County is presented in Figure 5.

Figure 5: FIRE Incidents in Broward County by Jurisdiction

Municipality	Fire Incidents	Rate per 100,000 Pop.
Miramar FR	11,804	9,672
North Lauderdale FR	5,045	12,298
Lighthouse Point FR	1,411	13,641
Pembroke Pines FR	21,580	13,945
Davie FR	14,023	15,244
Margate-Coconut Creek FR	16,568	15,602
Sunrise FR	14,534	17,212
Tamarac FR	11,223	18,573
Oakland Park FR	**8,178**	**18,879**
Lauderhill FR	14,198	21,227
Hollywood FR	30,929	21,972
Hallandale FR	8,394	22,617
Pompano Beach FR	28,028	28,072
Fort Lauderdale FR	54,316	32,815

In the context of the number of FIRE incidents, Oakland Park is small compared to the surrounding municipalities. The relative size of Oakland Park relative to its environs manifests in terms of Mutual Aid InBound and OutBound.

© Fitch & Associates, LLC

Mutual Aid OutBound

For purposes of this report, Mutual Aid OutBound was defined as Oakland Park units responding to incidents outside of the Oakland Park jurisdiction. No attempt was made to address the inter-municipality arrangements that may govern these responses.

Table 2: Mutual Aid OutBound

Unit ID	Dispatched	Arrived At Scene	Time-on-Task [hh:mm:ss]
B9P	4	0	00:03:20
E87	1	1	00:31:36
E9	2	1	00:02:58
Q87	3	1	00:10:11
Q9	2	0	00:31:21
R220	3	2	01:21:17
R87	19	13	08:29:20
R9	4	3	01:08:26
SQ87	1	1	00:18:04
Totals MA OutBound	39	22	12:36:23
All OP Units			7,179:03:43
MA OutBnd / All OP [%]			0.18 %

Timestamps for mutual aid outbound vehicle records are especially unreliable because of a very large portion of absent timestamps. Mutual Aid OutBound imposes a negligible burden on emergency service operations in Oakland Park. Time-on-Task for MA OutBound amounts to only 0.18% of Time-on-Task for all emergency services in Oakland Park.

Mutual Aid InBound

For purposes of this report, Mutual Aid InBound was defined as ex-Oakland Park units responding to incidents within the Oakland Park jurisdiction. The ex-Oakland park units most often responded in conjunction with Oakland Park units. No attempt was made to address the inter-municipality arrangements that may govern these responses.

Table 3: Contribution of Mutual Aid InBound to Total Time-on-Task for Oakland Park Incidents

Unit ID MA InBound	Vehicle Assigned Records	Time-on-Task [hh:mm:ss]	MA InBound as % of Total Time-on-Task
Ex-OP all	785	352:47:49	4.90%
OP	19,799	7,179:03:43	

© Fitch & Associates, LLC
June 2017

Mutual Aid InBound makes a modest, but definitive, contribution to the conduct of emergency services within Oakland Park. The 20 largest ex-OP contributors to Mutual Aid InBound are listed in the Table below.

Table 4: Twenty Largest Contributors to MA InBound

Unit ID MA InBound	Vehicle Assigned Records	Time-on-Task [hh:mm:ss]
SMF	4	22:22:51
R35	36	21:58:25
R37	34	21:41:00
CN26	15	19:36:30
GP1OP	168	17:37:19
R16	22	14:09:46
R237	17	11:03:49
REDX	1	10:51:57
R53	14	08:50:57
R29	15	08:44:26
BC17	6	08:20:30
C57	1	07:26:31
E23	5	07:26:13
B16	8	06:03:07
E35	11	05:40:22
HM17	3	05:28:55
R246	6	05:27:21
I509	3	05:16:14
D2	32	05:15:55
B2	4	04:59:53
Sub-Total	372	219:09:50
Other ex-OP	413	132:37:59
ex-OP all	785	352:47:49

Response History

Table 5: Incidents Dispatched by Category in Oakland Park

Category	Incident Records	Incident per Day	Percentage
EMS	6,129	16.84	74.9%
FIRE	1,305	3.68	16.0%
CX	500	1.42	6.1%
XX (Unaccounted)	244	0.47	3.0%
Total	8,178	22.41	100.0%

In the above table, "CX" designates incident records in the Master Incident table where all units assigned to the response were cancelled before any of them arrived at scene. "Unaccounted" refers to

incident records in the Master Incident table where the [Signal_Type] field is blank: no signal description was logged for the incident. The data in Table 5 is presented graphically in Figure 6, below.

Figure 6: Incidents Dispatched by Category

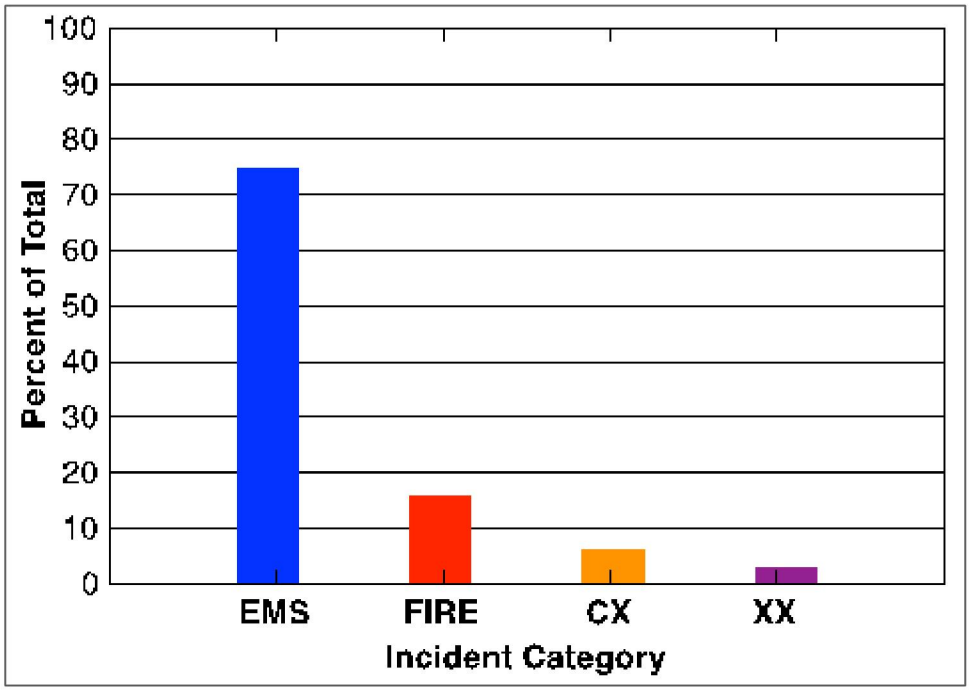
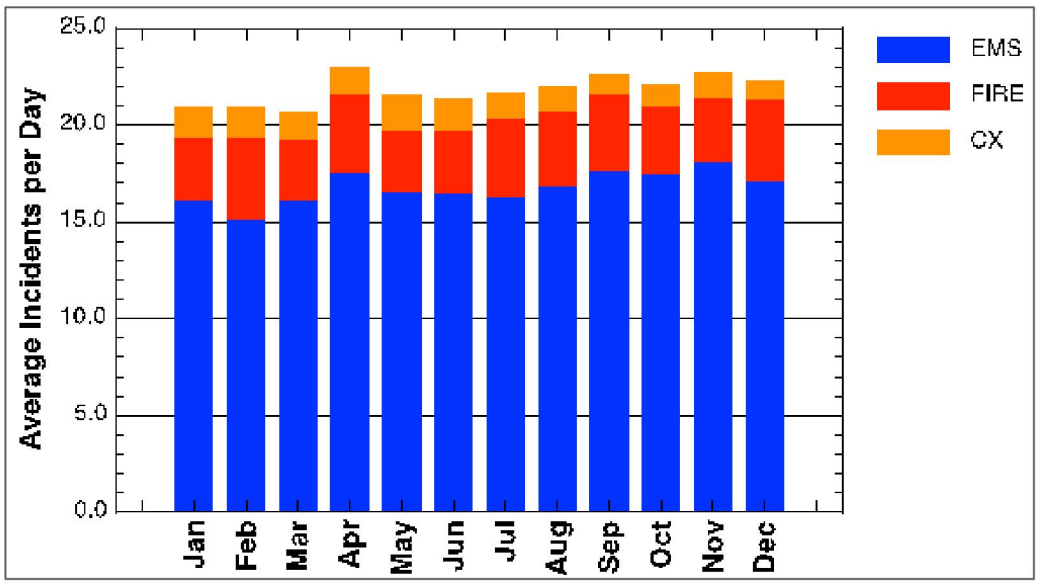


Table 6: Average Incidents per Day by Month-of-Year

	EMS	EMS wTr	Patients Transported	FIRE	CX
Jan	16.10	11.29	12.71	3.19	1.68
Feb	15.14	10.29	11.50	4.18	1.68
Mar	16.06	10.97	11.68	3.19	1.42
Apr	17.50	11.67	12.33	4.07	1.43
May	16.55	10.35	11.35	3.13	1.90
Jun	16.50	11.63	12.57	3.20	1.67
Jul	16.29	10.94	12.23	4.03	1.32
Aug	16.81	11.23	12.48	3.90	1.29
Sep	17.67	12.47	13.17	3.93	1.10
Oct	17.48	11.97	12.71	3.48	1.13
Nov	18.03	12.10	12.60	3.37	1.33
Dec	17.10	11.90	12.74	4.19	1.06

Figure 7: Average Incident per Day by Month-of-Year



The data presented in Table 6 and in Figure 7, above, show that no strong seasonality drive requests for emergency services in Oakland Park. What is sometimes seen in south Florida municipalities is a wintertime spike in emergency medical incidents associated with the influx of an aged population of "snow birds". This does not appear to affect Oakland Park.

Table 7: EMS and FIRE Response Intervals by Priority and by Month-of-Year

Month	Response Intervals at the 90th %-tile				
	EMS		FIRE		
	Priority 1	Priority 6	Priority 1	Priority 2	Priority 6
Jan	07:25	08:14	08:49	09:12	12:53
Feb	08:31	08:09	09:26	09:54	14:42
Mar	08:04	08:24	10:45	09:13	12:47
Apr	08:14	07:42	10:28	07:53	10:20
May	06:59	07:49	07:46	09:05	12:20
Jun	08:30	07:57	09:01	08:03	11:18
Jul	08:28	07:55	09:03	07:52	16:19
Aug	10:35	07:54	11:26	07:37	10:55
Sep	08:21	08:10	10:58	08:46	10:54
Oct	07:18	08:02	09:46	08:39	12:30
Nov	08:04	08:59	10:07	08:47	12:24
Dec	07:19	08:06	09:33	10:23	12:37
Jan - Dec	08:07	08:08	10:11	08:58	12:20

© Fitch & Associates, LLC

Figure 8: EMS Response Intervals at the 90th %-tile on Priority 6 Incidents

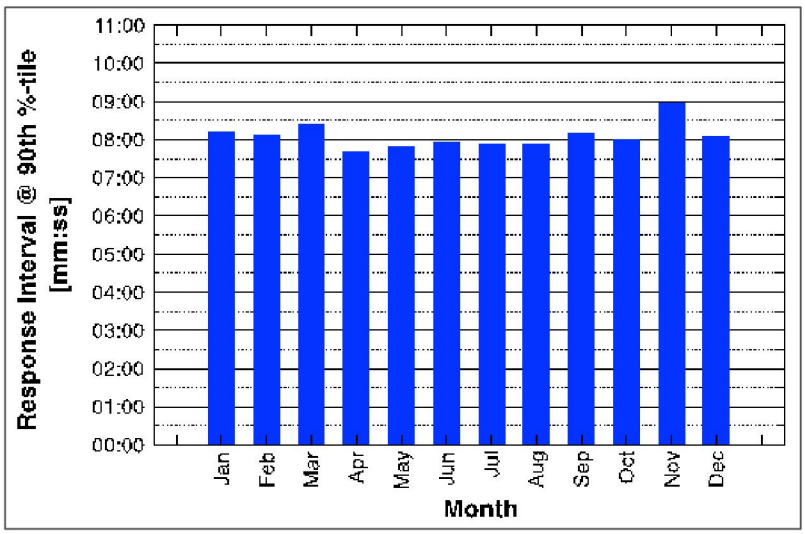
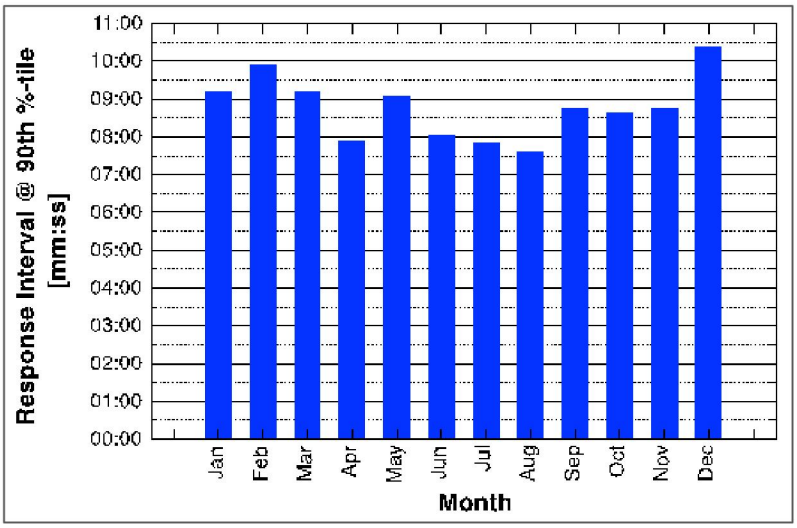


Figure 9: FIRE Response Intervals at the 90th %-tile on Priority 2 Incidents



Both EMS and FIRE response intervals at the 90th percentile show a slight seasonality, with longer response intervals being observed in the winter months.

Table 8: Average Incidents per Day by Day-of-Week

	EMS	FIRE	CX
Mon	15.15	3.65	1.46
Tue	17.79	3.67	1.52
Wed	17.15	3.71	1.21
Thu	17.21	4.10	1.25
Fri	15.91	3.45	1.53
Sat	17.77	3.75	1.50
Sun	16.46	3.23	1.44

Figure 10: Average Incidents per Day by Day-of-Week

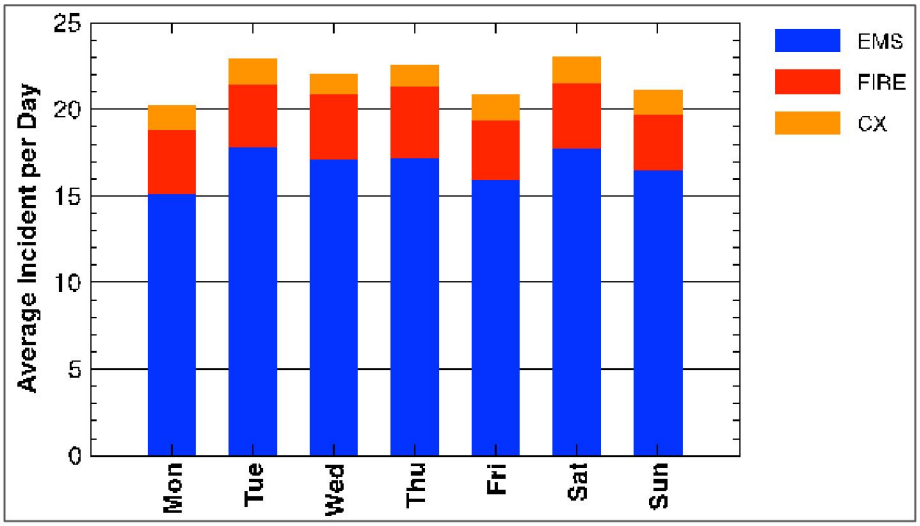


Table 9: Average Incidents per Hour by Hour-of-Day

Hour	EMS	FIRE	CX
0000	0.47400	0.10140	0.05480
0100	0.42740	0.06850	0.05480
0200	0.34520	0.06300	0.02740
0300	0.32880	0.07120	0.02740
0400	0.30960	0.04930	0.03840
0500	0.33150	0.06580	0.01640
0600	0.39450	0.11230	0.04660
0700	0.54520	0.13700	0.03840
0800	0.76710	0.13970	0.04660
0900	0.81100	0.17260	0.05210
1000	0.92050	0.20550	0.05750
1100	0.90680	0.20000	0.05750
1200	0.92330	0.21370	0.10140
1300	0.97260	0.21370	0.06300
1400	0.92050	0.21640	0.08220
1500	0.91510	0.24930	0.09320
1600	0.90960	0.20270	0.07120
1700	0.87400	0.26030	0.09320
1800	0.87120	0.22190	0.10410
1900	0.87950	0.16710	0.07670
2000	0.80000	0.16710	0.06030
2100	0.78360	0.15340	0.04660
2200	0.70410	0.12880	0.05480
2300	0.66030	0.07120	0.05210

Figure 11: Average Incidents per Hour by Hour-of-Day

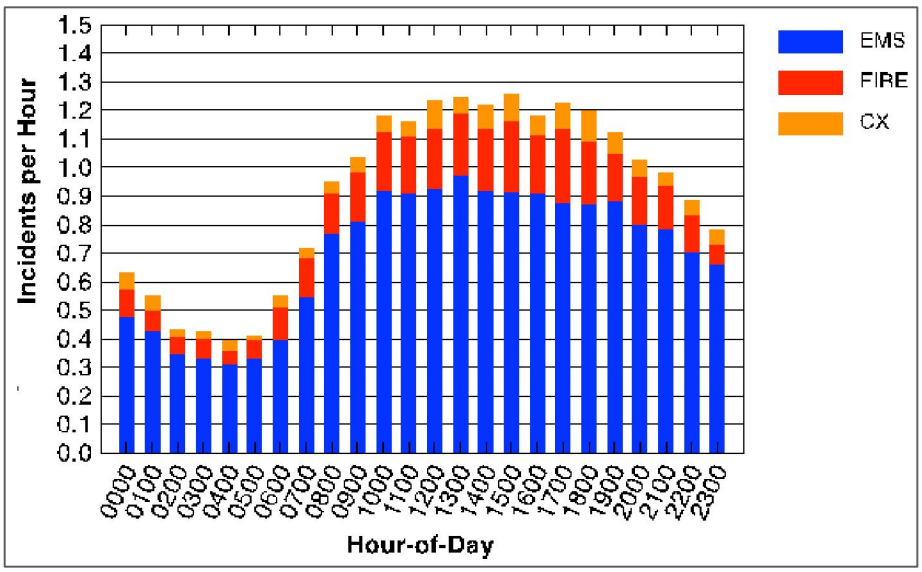


Table 10: Average Time-on-Task per Hour-of-Day

	Time-on-Task [x.xxx hours]		
Hour	EMS	FIRE	CX
0000	0.458	0.103	0.009
0100	0.371	0.070	0.013
0200	0.329	0.203	0.011
0300	0.337	0.079	0.008
0400	0.268	0.046	0.007
0500	0.335	0.104	0.011
0600	0.385	0.439	0.006
0700	0.495	0.224	0.021
0800	0.724	0.133	0.022
0900	0.794	0.149	0.024
1000	0.886	0.183	0.026
1100	0.889	0.149	0.025
1200	0.848	0.184	0.044
1300	0.927	0.174	0.030
1400	0.869	0.161	0.043
1500	0.920	0.291	0.031
1600	0.896	0.338	0.043
1700	0.821	0.251	0.045
1800	0.833	0.256	0.030
1900	0.842	0.136	0.023
2000	0.762	0.206	0.021
2100	0.754	0.130	0.020
2200	0.641	0.102	0.015
2300	0.593	0.080	0.012

Figure 12: Average Time-on-Task per Hour-of-Day

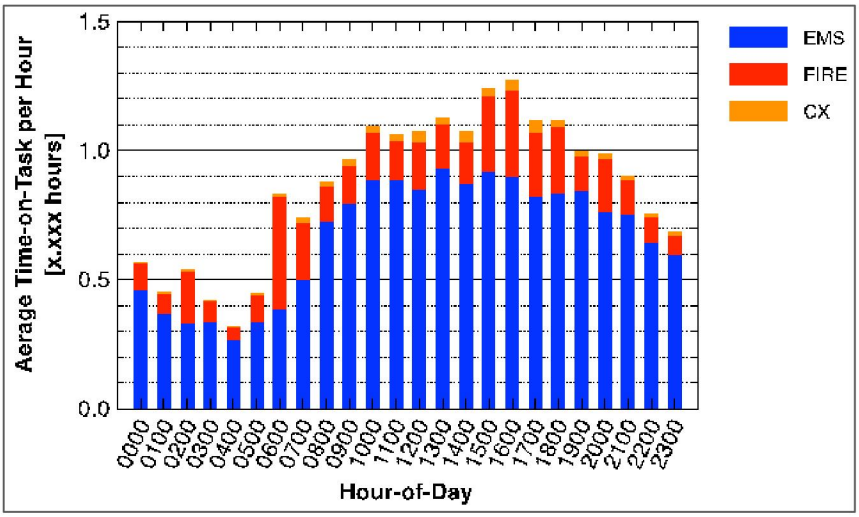


Table 11: All Hazards Time-on-Task by Stations and Unit

Station	Unit	Annual Responses	Annual Time-on-Task	Average Time-on-Task per Response
Sta 09	B9	2,178	474:48:22	00:13:04
	B9P	141	11:05:13	00:04:43
	C9	18	09:48:29	00:32:41
	E9	532	125:46:06	00:14:11
	E9P	3	00:04:04	00:01:21
	EMS9	225	39:49:51	00:10:37
	EMS9P	1	00:04:26	00:04:26
	FM9	63	35:12:45	00:33:32
	I9	1	00:19:29	00:19:29
	Q9	3,726	857:36:39	00:13:48
	Q9P	22	00:45:02	00:02:02
	R9	3,256	1,868:27:04	00:34:25
	R9P	16	00:19:57	00:01:14
	Sta 9 Totals	**10,182**	**3,424:07:27**	**00:20:10**
Sta 20	C20	2	01:10:04	00:35:02
	E20	1,607	398:39:48	00:14:53
	E20P	12	00:26:31	00:02:12
	Q20	14	01:29:29	00:06:23
	R20	778	401:16:07	00:30:56
	R220	1,632	877:52:01	00:32:16
	R220P	11	00:12:09	00:01:06
	Sta 20 Totals	**4,056**	**1681:06:09**	**00:24:52**
Sta 87	E87	412	104:13:09	00:15:10
	E87P	1	00:01 :25	00:01:25
	Q87	1,464	373:03:24	00:15:17
	Q87P	2	00:01:20	00:00:40
	R87	2,456	1,302:09:25	00:31:48
	R87P	6	00:09:49	00:01:38
	SQ87	1,214	293:52:48	00:14:31
	SQ87P	6	00:18:47	00:03:07
	Sta 87 Totals	**5,561**	**2,073:50:07**	**00:22:22**

Time intervals in Table 12, below, are calculated as the difference between two timestamps. In many of the incident records, the timestamps required to delimit the time intervals are absent. The number of absent timestamps is not consistent across all four time intervals. Consequently, the incident count is reported as a min-max. The consultant estimates that fully 30% of the incident records in the CAD are missing one or more of the timestamps required to log the complete progression of the response.

Table 12: Average P2/P3, Chute, & Travel Intervals by Category for Priority 6 Incidents

Incident Category	Incidents min - max	Dispatch P2/P3	Chute	Drive	Response
EMS	7158 - 8096	00:01:03	00:01:10	00:04:23	00:05:27
FIRE	550 - 783	00:01:36	00:02:16	00:07:15	00:08:31

The data summarized in Table 12, above, was obtained from the individual response interval reports presented below.

Figure 13: P2/P3 Intervals from EMS Incidents

Interval	Category	Units	Start_Date	End_Date
P2P3	EMS	OP Units	01/01/2015	12/31/2015

Priority	Count	Rcvd to Assgn	
		Average	90th %tile
1	1,681	00:01:14	00:02:08
2	27	00:01:41	00:02:07
3	0		
4	0		
5	0		
6	8,096	00:01:03	00:01:49
7	1	00:05:11	00:05:11
8	0		
9	30	00:03:02	00:04:38
Total	9,835		

Figure 14: Chute Intervals from EMS Incidents

Interval	Category	Units	Start_Date	End_Date
Chute	EMS	OP Units	01/01/2015	12/31/2015

Priority	Count	Assgn to Enroute	
		Average	90th %tile
1	1,879	00:01:14	00:02:08
2	53	00:01:09	00:02:05
3	9	00:01:02	00:01:21
4	0		
5	0		
6	7,946	00:01:10	00:02:00
7	1	00:01:14	00:01:14
8	0		
9	20	00:01:39	00:03:03
Total	9,908		

Figure 15: Drive Intervals from EMS Incidents

Interval	Category	Units	Start_Date	End_Date
Drive	EMS	OP Units	01/01/2015	12/31/2015

Priority	Count	Enroute to Arrvd	
		Average	90th %tile
1	1,555	00:04:11	00:06:28
2	43	00:05:16	00:09:42
3	6	00:04:50	00:05:55
4	0		
5	0		
6	7,158	00:04:23	00:06:40
7	1	00:07:35	00:07:35
8	0		
9	12	00:04:16	00:06:22
Total	8,775		

Figure 16: Response Intervals from EMS Incidents

Interval	Category	FDZ	Start_Date	End_Date
Response	EMS	OP Units	01/01/2015	12/31/2015

Priority	Count	Assgn to Arrvd	
		Average	90th %-tile
1	1,696	00:05:22	00:08:07
2	54	00:05:11	00:10:41
3	9	00:06:15	00:07:29
4	0		
5	0		
6	7,991	00:05:27	00:08:08
7	1	00:08:49	00:08:49
8	0		
9	18	00:04:27	00:07:08
Total	9,769		

Figure 17: P2/P3 Intervals from FIRE Incidents

Interval	Category	Units	Start_Date	End_Date
P2P3	FIRE	OP Units	01/01/2015	12/31/2015

Priority	Count	Rcvd to Assgn	
		Average	90th %tile
1	912	00:01:19	00:02:12
2	526	00:01:17	00:02:17
3	97	00:02:03	00:03:18
4	0		
5	1	00:01:09	00:01:09
6	652	00:01:36	00:02:48
7	6	00:07:06	00:11:15
8	0		
9	11	00:05:40	00:13:36
Total	2,205		

Figure 18: Chute Intervals from FIRE Incidents

Interval	Category	Units	Start_Date	End_Date
Chute	FIRE	OP Units	01/01/2015	12/31/2015

Priority	Count	Assgn to Enroute	
		Average	90th %tile
1	924	00:01:35	00:02:43
2	1,218	00:01:29	00:02:31
3	154	00:01:03	00:01:54
4	0		
5	1	00:00:19	00:00:19
6	783	00:01:20	00:02:16
7	4	00:01:44	00:02:43
8	0		
9	12	00:00:53	00:01:10
Total	3,096		

Figure 19: Drive Intervals from FIRE Incidents

Interval	Category	Units	Start_Date	End_Date
Drive	FIRE	OP Units	01/01/2015	12/31/2015

Priority	Count	Enroute to Arrvd	
		Average	90th %tile
1	661	00:05:04	00:08:24
2	816	00:04:33	00:07:19
3	139	00:05:39	00:08:58
4	0		
5	1	00:01:23	00:01:23
6	550	00:07:15	00:10:50
7	4	00:05:49	00:08:00
8	0		
9	8	00:06:52	00:08:38
Total	2,179		

Figure 20: Response Intervals from FIRE Incidents

Interval	Category	Units	Start_Date	End_Date
Response	FIRE	OP Units	01/01/2015	12/31/2015

Priority	Count	Assgn to Arrvd	
		Average	90th %tile
1	705	00:06:42	00:10:11
2	902	00:05:56	00:08:58
3	183	00:06:43	00:10:32
4	0		
5	1	00:00:05	00:00:05
6	577	00:08:31	00:12:20
7	4	00:07:33	00:09:29
8	0		
9	12	00:04:02	00:09:48
Total	2,384		

Figure 21: Average Dispatch, Chute, Drive, & Response Intervals for EMS and FIRE Responses.

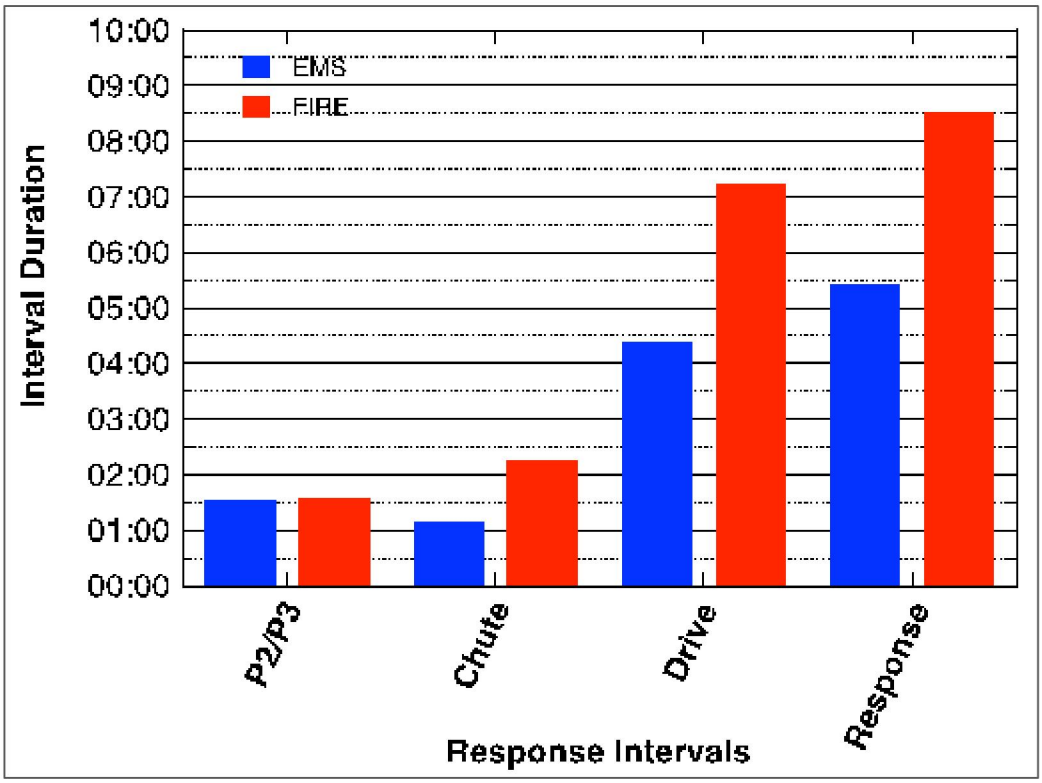


Figure 22: Distribution of Chute Intervals for First Arrived Units

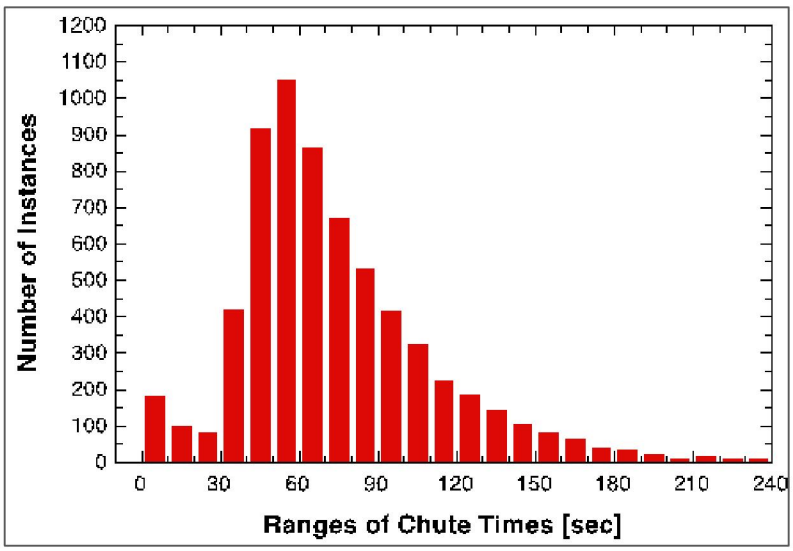


Figure 23: Distribution of Drive Intervals for First Arrived Units

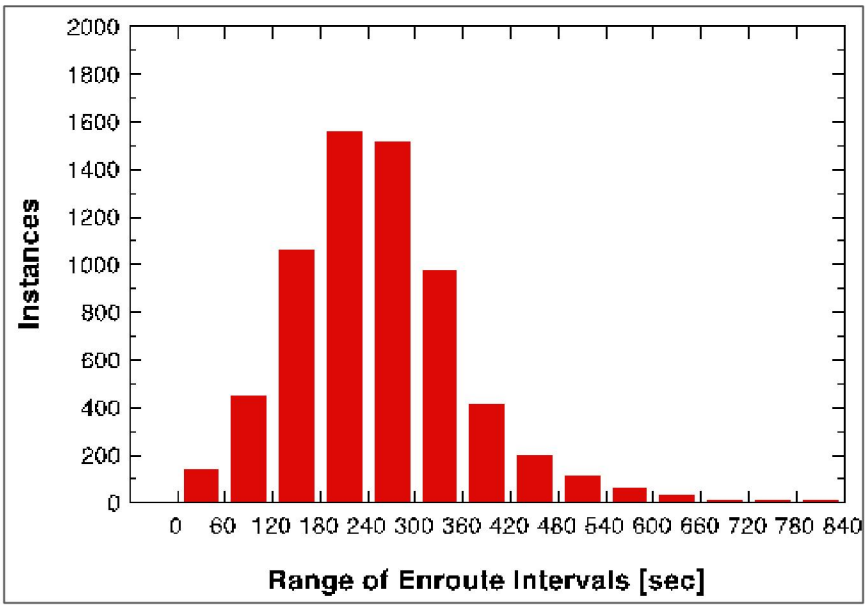


Table 13: Vehicles Arrived at Scene & Total Time-on-Task

Category	Incident Records	Vehicles Arrvd At Scene	Avg Veh Arrvd At Scene per Incident	Annual Time-on-Task [hh:mm:ss]	Avg T-on-T per Veh [hh:mm:ss]
EMS	6,129	10,043	1.64	5,488:04:41	00:32:47
FIRE	1,305	2,42	1.95	1,270:04:05	00:29:58

Table 14: Vehicles Cancelled Enroute

Category	Incident Records	Vehicles Assigned & Cancelled	Avg Veh Assigned & Cancelled per Incident	Annual Time-on-Task [hh:mm:ss]	Avg T-on-T per Veh [hh:mm:ss]
Veh CX	5,165	3,415	0.66	197:04:22	00:03:27

© Fitch & Associates, LLC
June 2017

FIRE RELATED SERVICES

The following evaluation of fire related services are done from both a temporal dimension and a geographic dimension.

Temporal Analysis

Temporal analyses were conducted to evaluate patterns in community demands for fire related services. These measures examined the frequency of requests for service in CY2015 by month-of-year, by day-of-week, and by hour-of-day.as shown below.

Table 15: Average FIRE Related Incidents per Day by Month-of-Year

Month	Incidents	Average Incidents per Day	Annual Distribution
January	99	3.19	7.43%
February	117	4.18	8.78%
March	99	3.19	7.43%
April	122	4.07	9.16%
May	97	3.13	7.28%
June	96	3.20	7.20%
July	125	4.03	9.38%
August	121	3.90	9.08%
September	117	3.93	8.78%
October	108	3.48	8.11%
November	101	3.37	7.58%
December	130	4.19	9.76%
Total	1,332	3.65	100.00%

© Fitch & Associates, LLC

Figure 24: Average FIRE Related Incidents per Day by Month-of-Year.

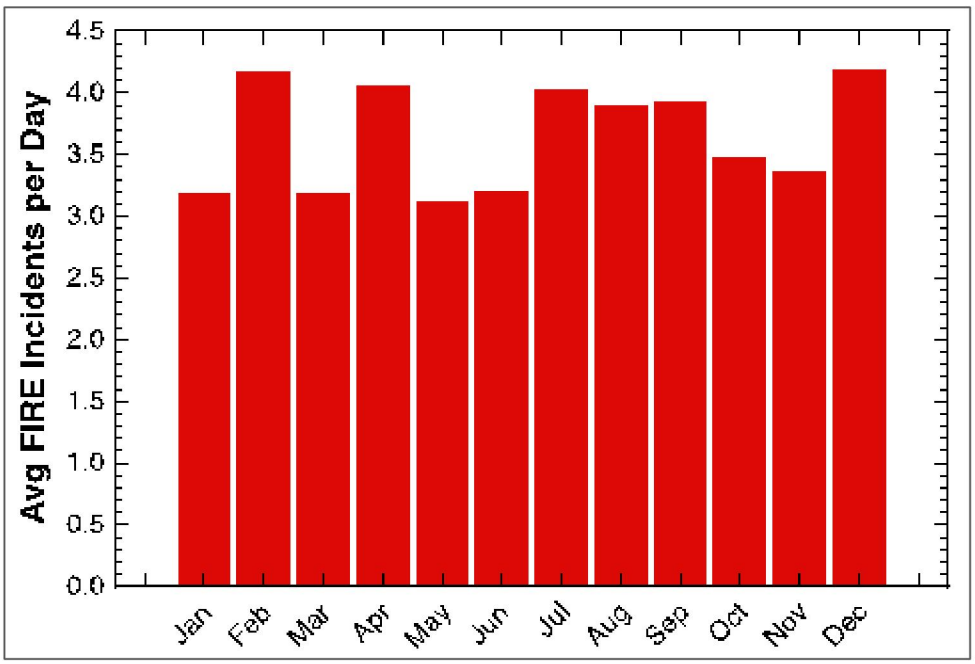


Figure 25: Response Intervals for FIRE Incidents at the 90th %-tile by Month-of-Year

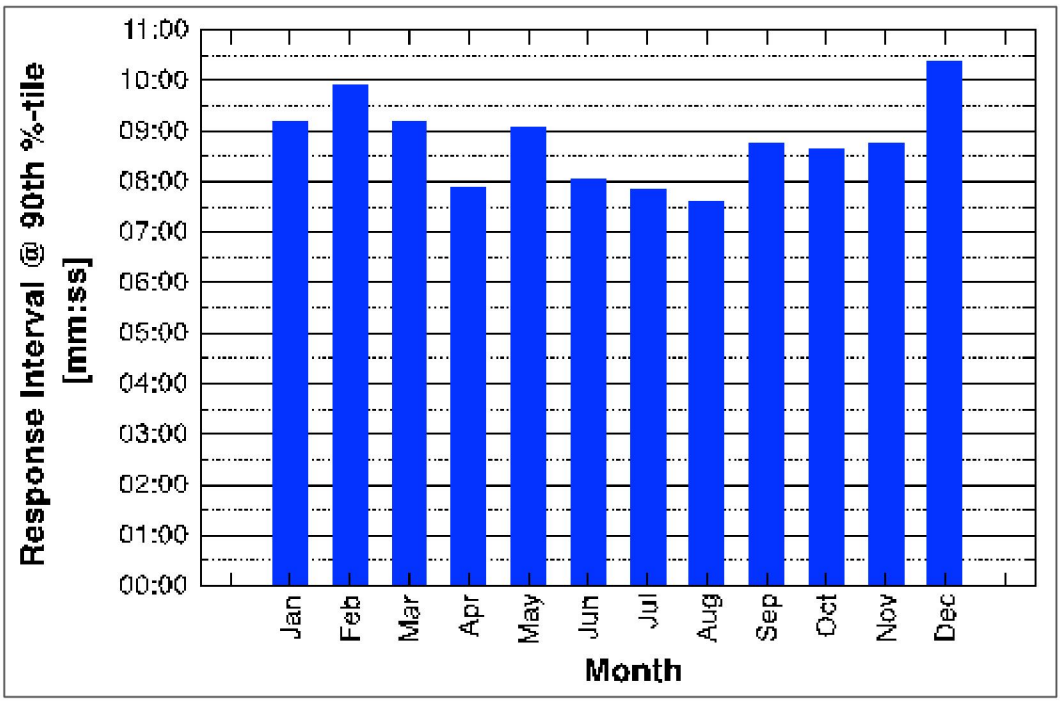


Figure 26: Average FIRE Related Incidents per Day by Day-of-Week

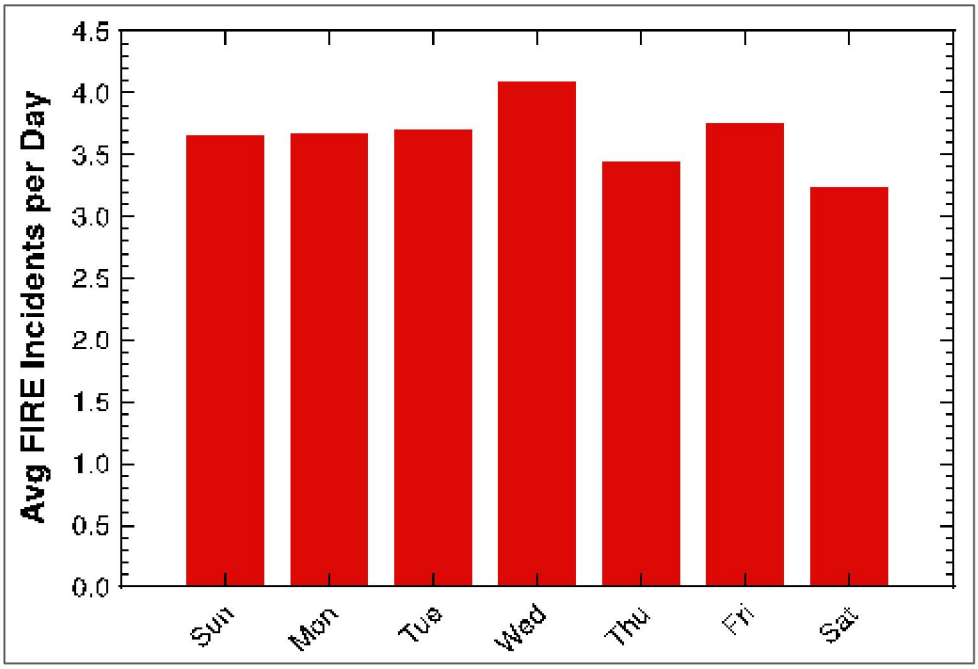


Table 16: Total and Average FIRE Incidents per Hour by Hour-of-Day

Hour-of-Day	Incident Count	Average Incidents per Hour	Percentage
0	37	0.1014	2.78
1	25	0.0685	1.88
2	23	0.0630	1.73
3	26	0.0712	1.95
4	18	0.0493	1.35
5	24	0.0658	1.80
6	41	0.1123	3.08
7	50	0.1370	3.75
8	51	0.1397	3.83
9	63	0.1726	4.73
10	75	0.2055	5.63
11	73	0.2000	5.48
12	78	0.2137	5.85
13	78	0.2137	5.85
14	79	0.2164	5.93
15	91	0.2493	6.83
16	74	0.2027	5.55
17	95	0.2603	7.13
18	81	0.2219	6.08
19	61	0.1671	4.58
20	61	0.1671	4.58
21	56	0.1534	4.20
22	47	0.1288	3.53
23	26	0.0712	1.95
	1,333		

Figure 27: Total and Average FIRE Incidents per Hour by Hour-of-Day

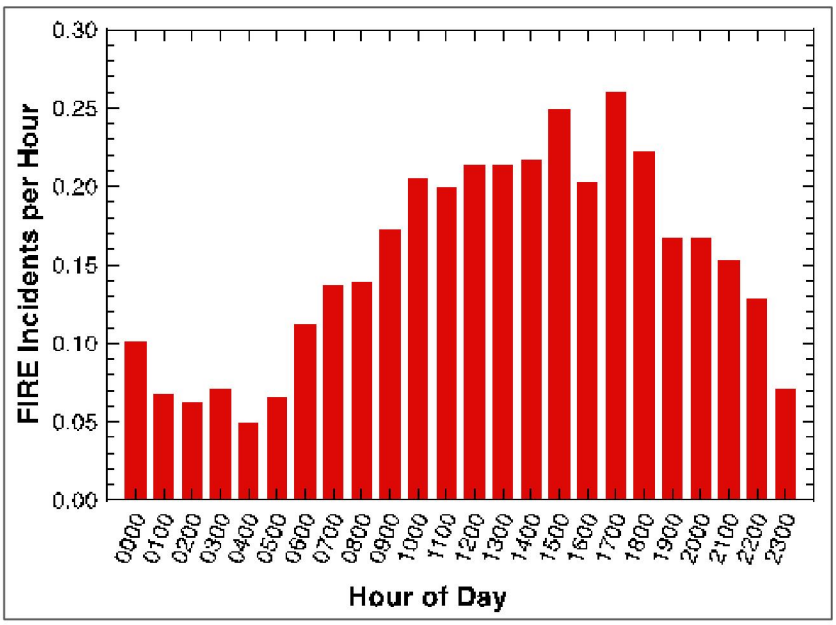


Table 17: FIRE Related Signal Types (Non-Emergency Medical)

Signal Type	Signal Description	Incident Count	Percentage Demand
S25CF	COMMERCAL STRUCTURE FIRE	89	6.56%
S25EH	ELECTRICAL / UTILITY HAZARD	103	7.54%
S25EV	ELEVATOR RESCUE	48	3.54%
S25HM	HAZ-MAT	34	2.51%
S25HR	HEAVY RESCUE	1	0.07%
S25OT	OTHER TYPE OF FIRE	101	7.44%
S25RS	RESIDENTIAL FIRE	50	3.68%
S25SI	SMOKE INVESTIGATION	10	0.74%
S25VF	VEHICLE FIRE	77	5.67%
S49F	FIRE ALARM	352	25.94%
S4H	ACCIDENT HIGHWAY	318	23.43%
S55	EXPLOSION	2	0.15%
S68	FIRE /MEDICAL SERVICE	172	12.68%
Total FIRE Related Incidents with Veh Arrvd At Scene		1,357	

Table 18: Oakland Park Units Arrived At Scene on FIRE Incidents

OP Units Arrvd At Scene	Incident Count	Time-on-Task		Percent of Total	
		Sum for all OP Units [hh:mm:ss]	Avg per OP Unit [hh:mm:ss]	Per Count	Per Sum T-on-T
1	684	228:21:17	00:20:01	51.12%	20.19%
2	373	316:35:10	00:25:27	27.88%	27.92%
3	181	240:11:44	00:26:32	13.53%	21.24%
4	59	108:28:35	00:28:03	4.41%	9.59%
5	16	42:48:38	00:29:11	1.20%	3.79%
6	12	48:05:39	00:40:04	0.90%	4.25%
7	12	102:41:12	01:13:20	0.90%	9.08%
8	1	44:39:00	05:34:52	0.07%	3.95%

Eight OP units arrived at scene in response to a singular event, a commercial structure fire at 5235 North Dixie Highway. A total of 36 units arrived at scene for this incident, 28 of which were ex-Oakland Park units.

Table 19: Time-on-Task for FIRE Incidents by Stations and Unit

Station	Unit	Annual Responses	Annual Time-on-Task	Average Time-on-Task per Response
Sta 09	B9	1,175	265:10:42	00:13:32
	B9P	53	03:00:22	00:03:24
	C9	17	09:28:03	00:33:24
	E9	88	31:40:32	00:21:35
	EMS9	85	17:48:31	00:12:34
	FM9	51	31:40:23	00:37:15
	I9	1	00:19:29	00:19:29
	Q9	666	210:25:50	00:18:57
	Q9P	11	00:30:39	00:02:47
	R9	528	153:56:01	00:17:29
	R9P	1	00:01:27	00:01:27
	Sta 9 Totals	**2,676**	**724:01:59**	**00:16:14**
Sta 20	E20	807	200:51:13	00:16:25
	E20P	6	00:19:22	00:03;13
	Q20	4	00:36:49	00:09;12
	R20	134	42:33:28	00:19:03
	R220	110	31:20:33	00:17:05
	Sta 20 Totals	**1,061**	**295:41:25**	**00:16:43**
Sta 87	E87	95	39:29:32	00:24:56
	Q87	313	1403:42:52	00:19:52
	R87	483	126:08:07	00:15:40
	SQ87	264	95:48:35	00:21:29
	SQ87	3	00:11:22	00:03:47
	Sta 87 Totals	**1,158**	**364:07:41**	**00:18:52**

Geographic Analysis - Fire

Geographic analysis of demand for fire services was evaluated through the use of a heat map, indicating those areas of the city requiring the greatest demand. Figure 28 shows an interesting pattern where the three main hotspots are located at the intersection between I-95 and three major thoroughfares. Because of the large number of vehicle accidents that occur on the highway, 23.4% of all fire incidents in 2015, the heat map was revised to exclude those incidents and the bias they may represent. Without such Highway vehicle accidents, the heat map reflects that shown in Figure 29.

Figure 28: Fire Heat Map – Including Highway Vehicle Accidents

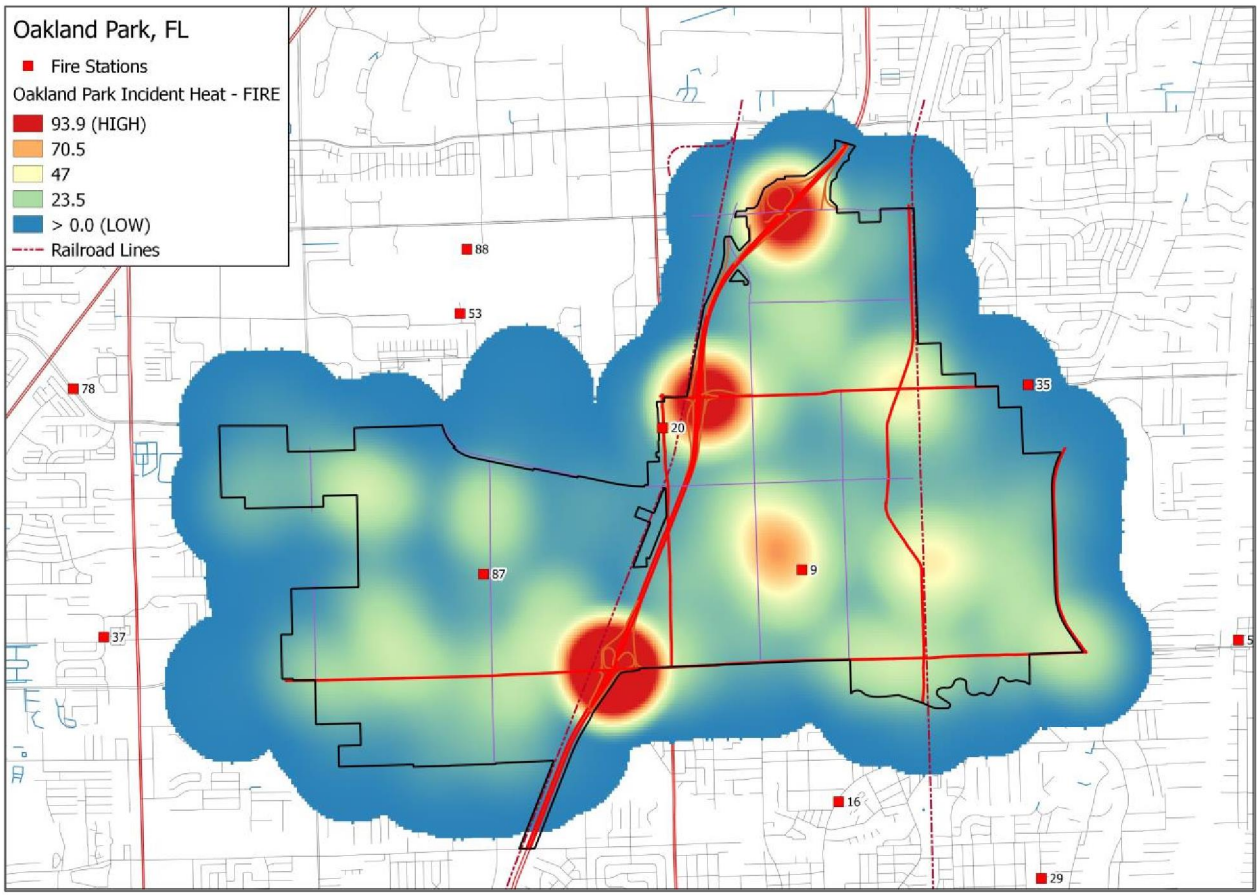
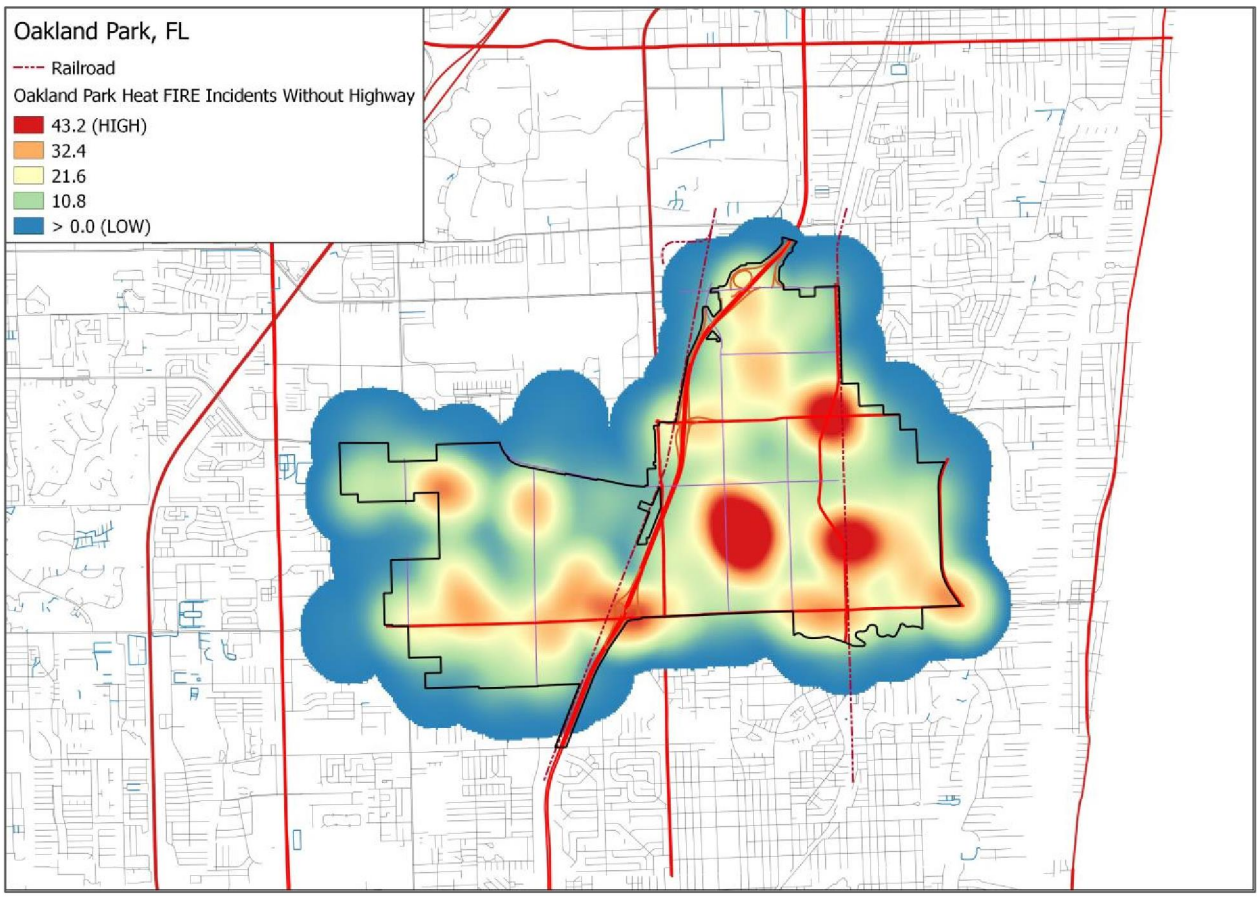


Figure 29: Fire Heat Map – Without Highway Vehicle Accidents



EMERGENCY MEDICAL RELATED SERVICES

Similar to the analysis done for fire related services, EMS services are evaluated from the temporal and geographic perspective.

Temporal Analysis

Temporal analyses were conducted to evaluate patterns in community demands for emergency medical related services. These measures examined the frequency of requests for service in CY2015 by month-of-year, by day-of-week, and by hour-of-day.as shown below.

Table 20: Average EMS Related Incidents per Day by Month of Year

Month	Incidents	Average Incidents per Day	Annual Distribution
January	499	16.10	8.15%
February	424	15.14	6.92%
March	498	16.07	8.13%
April	525	17.50	8.57%
May	513	16.55	8.38%
June	495	16.50	8.08%
July	505	16.29	8.25%
August	521	16.81	8.51%
September	530	17.67	8.66%
October	542	17.48	8.85%
November	541	18.03	8.84%
December	530	17.10	8.66%
Total	6,123		100.00%

Figure 30: Average Emergency Medical Incidents per Day by Month-of-Year

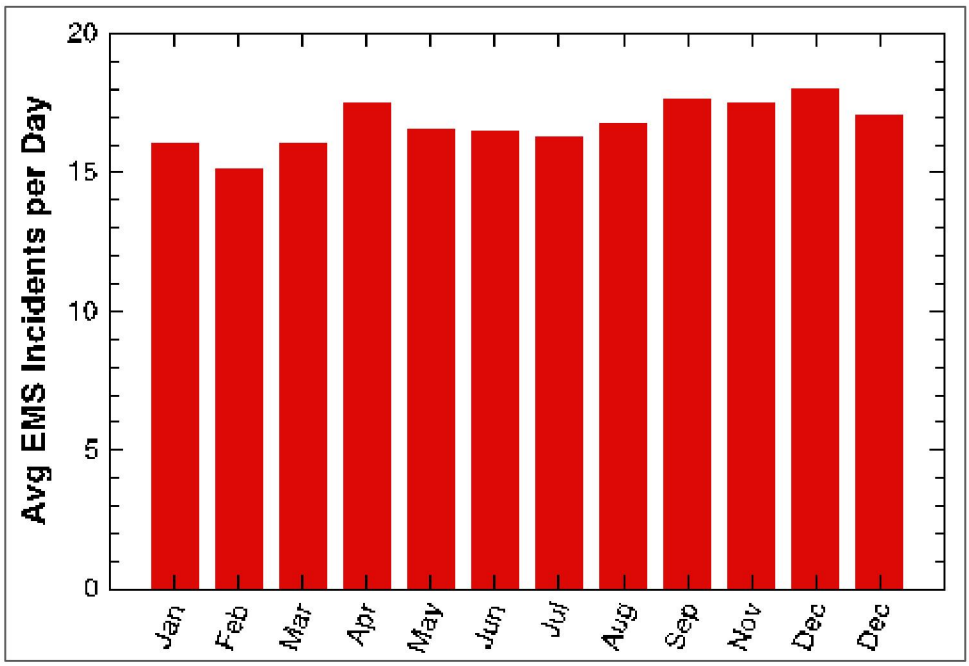


Table 21: Average EMS Related Incidents per Day by Day of Week

Month	Incidents	Average Incidents per Day	Distribution
Sunday	788	15.154	12.90%
Monday	925	17.788	15.15%
Tuesday	892	17.154	14.61%
Wednesday	895	17.212	14.66%
Thursday	827	15.906	13.54%
Friday	924	17.769	15.13%
Saturday	856	16.462	14.02%
Total	6,107		

Figure 31: Average EMS *Incidents per Day by Day-of-Week*

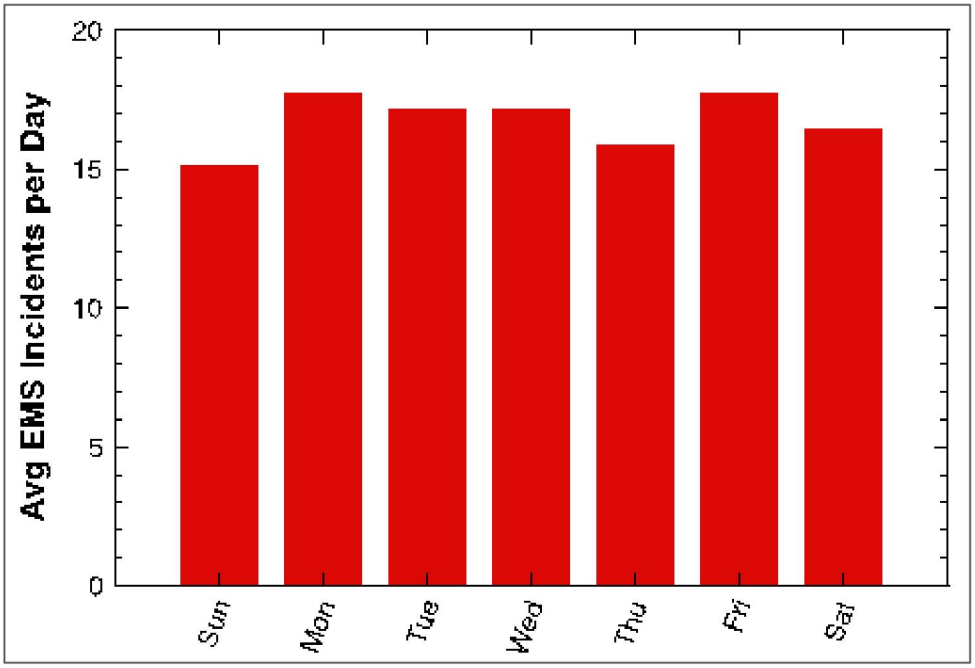


Table 22: Average EMS Incidents per Hour by Hour-of-Day

Hour-of-Day	Annual EMS Incidents	Average EMS Incidents per Hour-of-Day	Percentage
0000	173	0.4740	2.81%
0100	156	0.4274	2.53%
0200	126	0.3452	2.05%
0300	120	0.3288	1.95%
0400	113	0.3096	1.83%
0500	121	0.3315	1.96%
0600	144	0.3945	2.34%
0700	199	0.5452	3.23%
0800	280	0.7671	4.55%
0900	296	0.8110	4.81%
1000	336	0.9205	5.45%
1100	331	0.9068	5.37%
1200	337	0.9233	5.47%
1300	355	0.9726	5.76%

1400	336	0.9205	5.45%
1500	334	0.9151	5.42%
1600	332	0.9096	5.39%
1700	319	0.8740	5.18%
1800	318	0.8712	5.16%
1900	321	0.8795	5.21%
2000	292	0.8000	4.74%
2100	286	0.7836	4.64%
2200	293	0.8041	4.76%
2300	241	0.6603	3.91%

Figure 32: Average EMS Incidents per Hour by Hour-of-Day

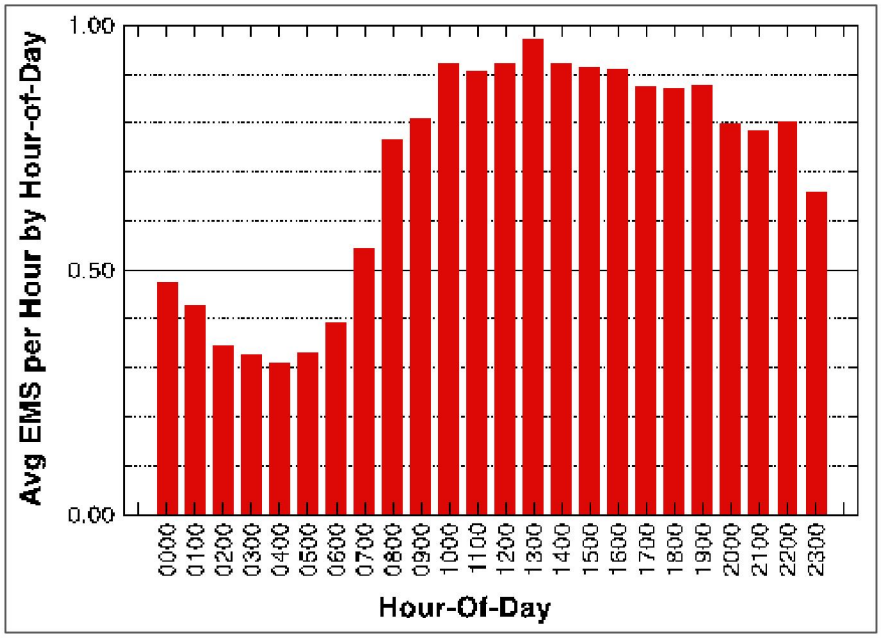


Table 23: EMS Time-on-Task by Stations and Unit, with-Transports & non-Transport Combined

Station	Unit	Annual Responses	Annual Time-on-Task[hh:m:ss]	Average Time-on-Task per Response [hh:m:ss]
Sta 09	B9	1,036	217:17:48	00:12:35
	B9P	89	08:04:55	00:05:26
	C9	1	00:20:26	00:20:26
	E9	443	93:33:19	00:12:40
	E9P	3	00:04:04	00:01:21
	EMS9	143	22:37:02	00:09:29
	EMS9P	1	00:04:26	00:04:26
	FM9	13	04:25:12	00:20:24
	Q9	3,068	649:29:42	00:12:42
	Q9P	11	00:14:23	00:01:18
	R9	2,739	1,719:56:38	00:37:40
	R9P	15	00:18:30	00:01:14
	Sta 9 Totals	**7,562**	**2,716:33:25**	**00:21:33**
Sta 20	C20	2	01:10:04	00:35:02
	E20	817	184:42:53	00:13:33
	E20P	6	00:07:09	00:01:11
	Q20	10	00:52:40	00:05:16
	R20	647	362:16:28	00:33:35
	R220	1,529	847:52:32	00:33:16
	R220P	11	00:12:09	00:01:06
	Sta 20 Totals	**3,022**	**1,397:13:55**	**00:27:44**
Sta 87	E87	320	65:56:42	00:12:21
	E87P	1	00:01:25	00:01:25
	Q87	1,159	272:14:25	00:14:05
	Q87P	2	00:01:20	00:00;40
	R87	1,996	1,183:34:28	00:35:34
	R87P	6	00:09:49	00:01:38
	SQ87	958	200:54:15	00:12:34
	SQ87P	3	00:07:25	00:02:28
	Sta 87 Totals	**4,445**	**1,722:59:48**	**00:23:15**

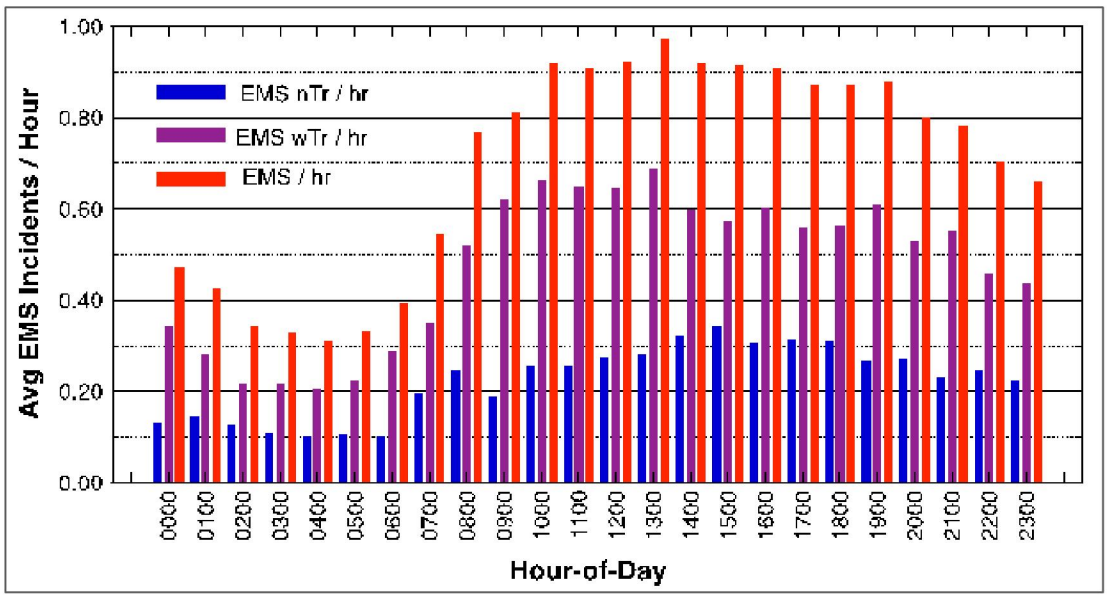
Table 24: EMS Time-on-Task by Stations and Unit, with Transports

Station	Unit	Annual Responses	Annual Time-on-Task [hh:mm:ss]	Average Time-on-Task per Tr Response[hh:mm:ss]
Sta 09	B9	6	05:29:04	00:54:50
	E9	14	08:15:41	00:35:24
	Q9	137	83:23:16	00:36:31
	R9	1,769	1,478:06:59	00:50:08
	Sta 9 Totals	**1,926**	**1,575:15:00**	**00:49:04**
Sta 20	C20	1	01:06:11	01:06:11
	E20	33	16:14:05	00:29:31
	R20	372	306:19:32	00:49:24
	R220	883	719:42:14	00:48:54
	Sta 20 Totals	**1,289**	**1,043:22:02**	**00:48:33**
Sta 87	E87	6	03:48:46	00:38:07
	Q87	7	04:31:01	00:38:43
	R87	1,167	969:26:29	00:49:50
	SQ87	11	07:27:54	00:40:43
	Sta 87 Totals	**1,191**	**985:14:10**	**00:49:38**

Table 25: Average Transport & non-Transport EMS Incidents per Hour by Hour-of-Day

Hr-of-Day	Average EMS Incidents/hr	Average EMS nTr Incidents/hr	Average EMS wTr Incidents/hr	Transport Percentage
0	0.474	0.132	0.342	72.3 %
1	0.427	0.145	0.282	66.0 %
2	0.345	0.126	0.219	63.5 %
3	0.329	0.110	0.219	66.7 %
4	0.310	0.104	0.205	66.4 %
5	0.332	0.107	0.225	67.8 %
6	0.395	0.104	0.290	73.6 %
7	0.545	0.195	0.351	64.3 %
8	0.767	0.247	0.521	67.9 %
9	0.811	0.189	0.622	76.7 %
10	0.921	0.258	0.663	72.0 %
11	0.907	0.258	0.649	71.6 %
12	0.923	0.277	0.647	70.0 %
13	0.973	0.282	0.690	71.0 %
14	0.921	0.323	0.597	64.9 %
15	0.915	0.342	0.573	62.6 %
16	0.910	0.307	0.603	66.3 %
17	0.874	0.315	0.559	63.9 %
18	0.871	0.310	0.562	64.5 %
19	0.879	0.268	0.611	69.5 %
20	0.800	0.271	0.529	66.1 %
21	0.784	0.233	0.551	70.3 %
22	0.704	0.247	0.458	65.0 %
23	0.660	0.225	0.436	66.0 %

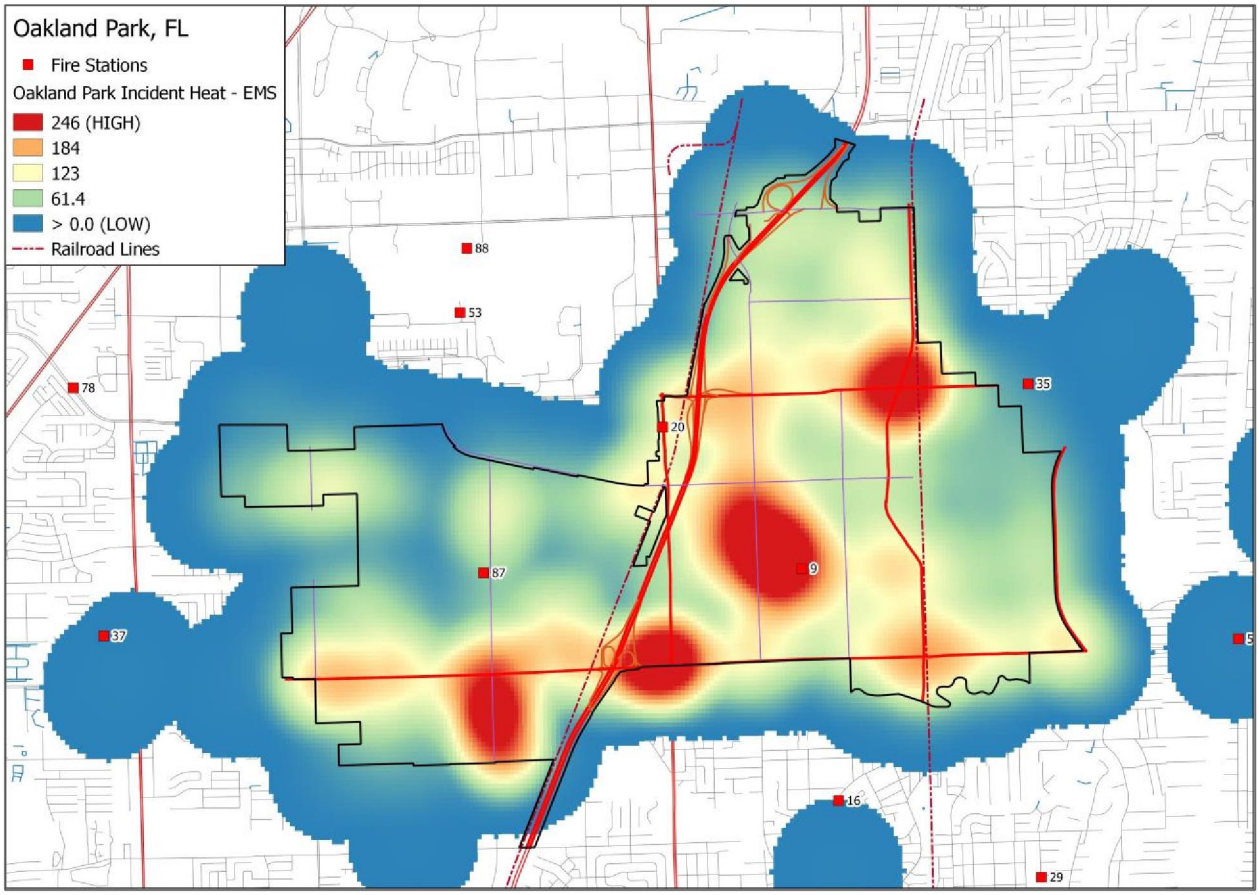
Figure 33: Average Transport & Non-Transport EMS per Hour by Hour-of-Day



Geographic Analysis – EMS

Geographic Analysis The relative demand for EMS services is reflected in the Figure below. Four hotspots are easily identifiable in this graphic. The most significant of these is in the area immediately adjacent and around Fire Station 9. Incidents of highway vehicle accidents do not impact this heat map as that category of call are only reflected in the fire related response data

Figure 34: EMS Heat Map



REVIEW OF SYSTEM PERFORMANCE

The first step in determining the current state of Oakland Park's deployment model is to establish baseline measures of performance. This analysis is crucial to the ability to discuss alternatives to the status quo and in identifying opportunities for improvement. This portion of the analysis will focus efforts on elements of response time and the cascade of events that lead to timely response with the appropriate apparatus and personnel to mitigate the event. Response time goals should be looked at in terms of total reflex time, or total response time, which includes the dispatch or call processing time, turnout time, and travel time, respectively.

Cascade of Events

The cascade of events is the sum of the individual elements of time beginning with a state of normalcy and continuing until normalcy is once again returned through the mitigation of the event. The elements of time that are important to the ultimate outcome of a structure fire or critical medical emergency begin with the initiation of the event. For example, the first on-set of chest pain begins the biological and scientific time clock for heart damage irrespective of when 911 is notified. Similarly, a fire may begin and burn undetected for a period of time before the fire department is notified. The emergency response system does not have control over the time interval for recognition or the choice to request assistance.

Therefore, OPFD utilizes quantifiable "hard" data points to measure and manage system performance. These elements include alarm processing, turnout time, travel time, and the time spent on-scene. An example of the cascade of events and the elements of performance utilized by OPFD is provided below.

Detection

Is the element of time between the time an event occurs and someone detects it and the emergency response system has been notified. This is typically accomplished by calling the 911 Primary Safety Answering Point (PSAP).

Call Processing

This is the element of time measured between when communication center answers the 911 call, processes the information, and subsequently dispatches OPFD.

Turnout Time

This is the element of time that is measured between the time the fire department is dispatched or alerted of the emergency incident and the time when the fire apparatus or ambulance is enroute to the call.

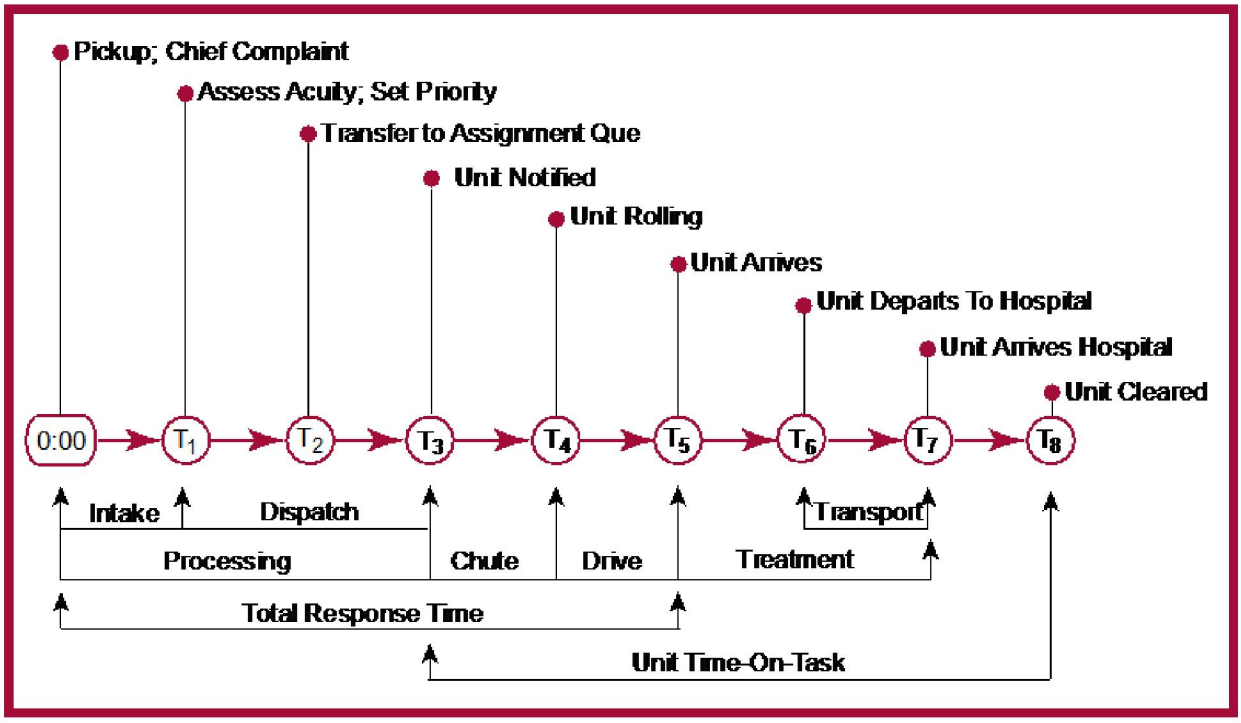
Travel Time

The travel time is the element of time between when the unit went enroute, or began to travel to the incident, and their arrival on-scene.

Total Response Time

The total response time, or total reflex time, is the total time required to arrive on-scene beginning with dispatch center answering the phone request for service and the time that the units arrive on-scene.

Figure 35: Progression of Response Intervals



Comparison of Workloads by Demand Zone

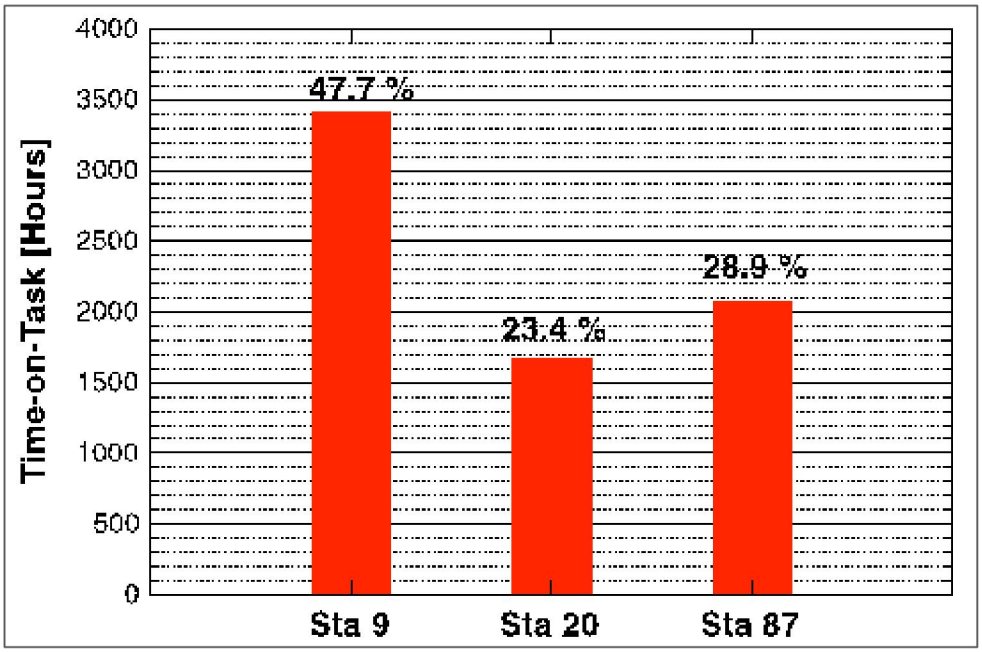
Table 26: Vehicle Responses and Workload by Station Demand Zone

Station	Vehicle Responses	% Vehicle Responses	Time-on-Task [hh:mm:ss]	Percent Tm-on-Task
Sta 09	10,182	51.43 %	3,424:07:27	47.70 %
Sta 20	4,056	20.49 %	1,681:06:09	23.42 %
Sta 87	5,561	28.09 %	2,073:50:07	28.89 %

In many systems, assessment of the relative contribution of each station towards the total effort can often be made based on counts of incidents. This does not work in Oakland Park because the response to many incidents involved vehicles from multiple stations, some of which are ex-Oakland Park. An assessment of relative contribution can be made using counts of vehicle responses. A better assessment

of relative activity is based on Time-on-Task. This metric correctly accounts for the participation of vehicles in long duration events.

Figure 36: Workloads by First Due Station Demand Zones



As noted both in Table 26 and Figure 36 above, Station 9 provides the greatest contribution to handling emergencies within the city, while Station 20 provides the least.

Table 27: Time-on-Task by Station, Unit, and Response Category

Station	Unit	Annual Responses	EMS	EMS Avg Tm-on-Task	FIRE	FIRE Avg Tm-on-Task	CX	CX Avg Tm-on-Task
Sta 09	B9	2,178	744	00:15:06	902	00:15:52	532	00:05:29
	B9P	141	63	00:06:12	28	00:03:53	50	00:03:17
	C9	18	1	00:20:26	13	00:39:03	4	00:15:04
	E9	532	335	00:16:06	82	00:22:53	113	00:01:59
	E9P	3	3	00:01:21	---	-----	---	-----
	EMS9	225	94	00:12:05	62	00:13:46	69	00:05:47
	EMS9P	1	1	00:04:26	---	-----	---	-----
	FM9	63	12	00:17:41	45	00:41:40	6	00:04:13
	I9	1	---	-----	---	-----	1	00:19:29
	Q9	3,726	2,409	00:15:26	589	00:20:53	723	00:02:37
	Q9P	22	6	00:01:32	7	00:03:57	9	00:00:53
	R9	3,256	2,625	00:39:03	406	00:21:17	220	00:03:31
	R9P	16	7	00:00:29	1	00:01:27	8	00:01:53
Sta 20	C20	2	2	00:35:02	---	-----	---	-----
	E20	1,607	610	00:16:53	618	00:20:14	378	00:02:54
	E20P	12	5	00:01:22	3	00:05:43	4	00:00:37
	Q20	14	5	00:09:15	3	00:12:10	6	00:01:06
	R20	778	600	00:35:45	105	00:22:28	72	00:03:31
	R220	1,632	1,407	00:35:54	86	00:20:20	135	00:02:24
	R220P	11	7	00:01:19	---	-----	4	00:00:42
Sta 87	E87	412	255	00:14:36	84	00:27:46	73	00:02:40
	E87P	1	1	1	---	-----	---	-----
	Q87	1,464	931	00:16:45	278	00:21:34	253	00:02:51
	Q87P	2	---	-----	---	-----	2	00:00:40
	R87	2,456	1,873	00:37:29	386	00:18:20	195	00:04:02
	R87P	6	6	00:01:38	---	-----	---	-----
	SQ87	1,214	737	00:15:30	224	00:24:31	253	00:02:49
	SQ87P	6	2	00:02:03	1	00:04:09	3	00:03:30

Comparison of Workloads by Unit Hour Utilization (UHU)

Another measure, time on task, is necessary to evaluate best practices in efficient system delivery and consider the impact workload has on personnel. Unit Hour Utilization (UHU) determinants were developed by mathematical model. This model includes both the proportion of calls handled in all major service areas and total unit time on task for these service categories in aggregate by each unit. The resulting UHU's represent the percentage of the work period (24 hours) that is utilized responding to requests for service. Historically, the International Association of Fire Fighters (IAFF) has recommended that 24-hour units utilize 0.30, or 30% workload as an upper threshold.[6] In other words this recommendation would have personnel spend no more than eight (8) hours per day on emergency incidents. These thresholds take into consideration the necessity to accomplish non-emergency

[6] International Association of Firefighters. (1995). Emergency *Medical Services: A Guidebook for Fire-Based Systems.* California, DC: Author. (p. 11)

activities such as training, health and wellness, public education, and fire and community risk reduction inspections.

The 4th edition of the IAFF EMS Guidebook no longer specifically identifies an upper threshold. However, *FITCH* recommends that an upper unit utilization threshold of approximately 0.30, 0r 30%, would be considered best practice. In other words, units and personnel assigned on 24-hour shifts should not exceed 30%, or eight (8) hours, of their workday responding to calls. These recommendations are also validated in the literature. For example, in their review of the City of Rolling Meadows, the Illinois Fire Chiefs Association utilized a UHU threshold of 0.30 as an indication to add additional resources.[7] Similarly, in a standards of cover study facilitated by the Center for Public Safety Excellence for the Castle Rock Fire and Rescue Department utilizes a UHU of 0.30 as the upper limit in their standards of cover due to the necessity to accomplish other non-emergency activities.[8]

Both the following table and figure reflect that Rescue 9 is the busiest unit in the city with a UHU of 21.3%, followed by Rescue 82 and then Rescue 220. This pattern is typical as most of the workload in related to EMS incidents. Overall, the data reflects that the department has capacity in its ability to absorb greater levels of workload without any additional resources for the near future.

[7] Illinois Fire Chiefs Association. (2012). An *Assessment of Deployment and Station Location: Rolling Meadows Fire Department.* Rolling Meadows, Illinois: Author. (pp. 54-55)

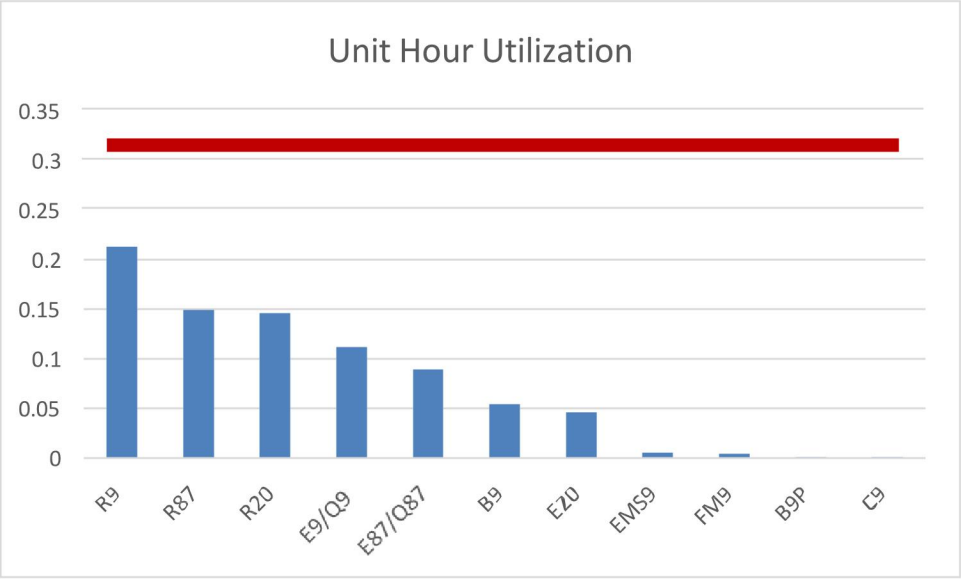
[8] Castle Rock Fire and Rescue Department. (2011). Community *Risk Analysis and Standards of Cover.* Castle Rock, Colorado: Author. (p. 58)

Table 28: All Responses UHU by Unit

Station	Unit	Annual Responses	Annual Time-on-Task	Unit Hour Utilization [UHU]
9	B9	2,178	474:48:22	0.054
	B9P	141	11:05:13	0.001
	C9	18	09:48:29	0.001
	E9P	3	00:04:04	0
	EMS9	225	39:49:51	0.005
	EMS9P	1	00:04:26	0
	FM9	63	35:12:45	0.004
	I9	1	00:19:29	0
	E9/Q9	4,258	983:22:45	0.112
	Q9P	22	00:45:02	0
	R9	3,256	1868:27:04	0.213
	R9P	16	00:19:57	0
20	C20	2	01:10:04	0
	E20	1,607	398:39:48	0.046
	E20P	12	00:26:31	0
	Q20	14	01:29:29	0
	R20	2410	1279:08:08	0.146
	R220P	11	00:12:09	0
87	E87P	1	00:01:25	0
	E87/Q87	3,090	771:09:21	0.089
	Q87P	2	00:01:20	0
	R87	2,456	1302:09:25	0.149
	R87P	6	00:09:49	0
	SQ87P	6	00:18:47	0

© Fitch & Associates, LLC
June 2017

Figure 37: Unit Utilizations in the Oakland Park System



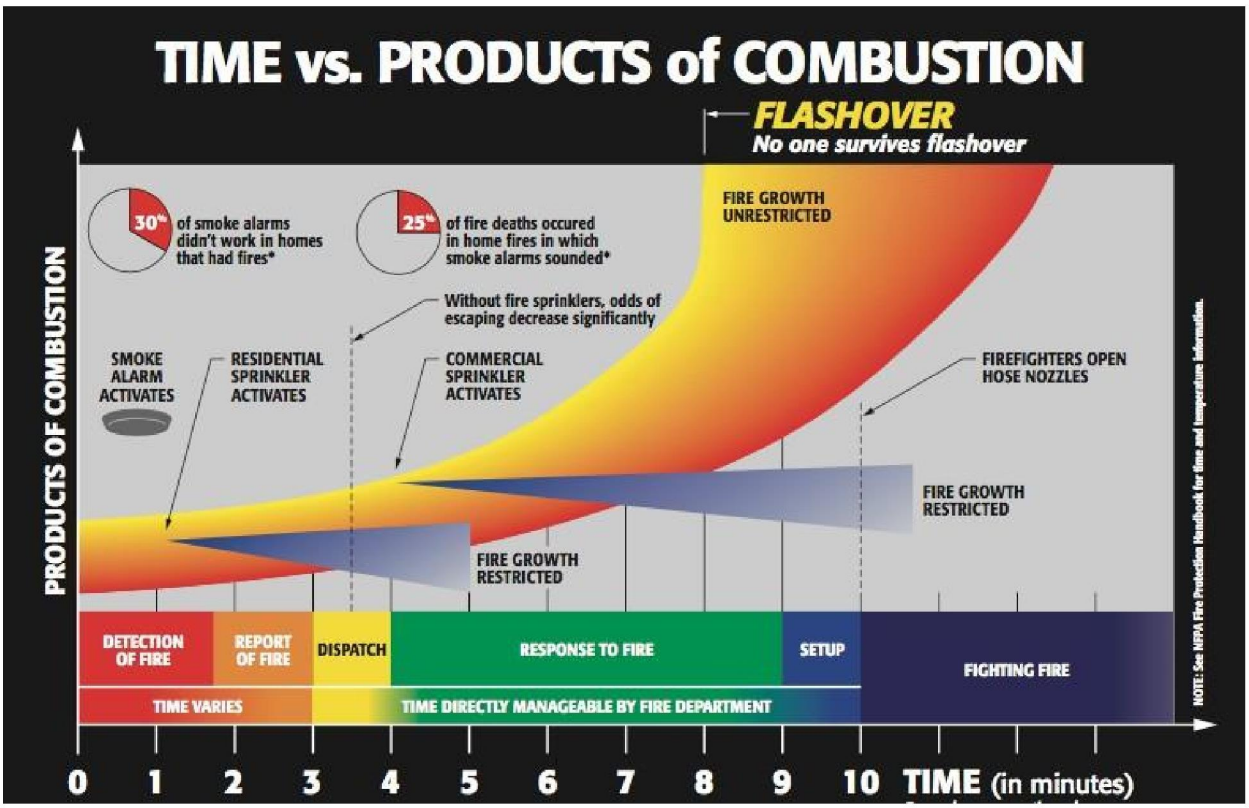
Response Time Continuum

Fire

The number one priority with structural fire incidents is to save lives followed by the minimization of property damage. A direct relationship exists between the timeliness of the response and the survivability of unprotected occupants and property damage. The most identifiable point of fire behavior is Flashover.

Flashover is the point in fire growth where the contents of an entire area, including the smoke, reach their ignition temperature, resulting in a rapid-fire growth rendering the area un-survivable by civilians and untenable for firefighters. Best practices would result in the fire department arriving and attacking the fire prior to the point of flashover. A representation of the traditional time temperature curve and the cascade of events is provided below.

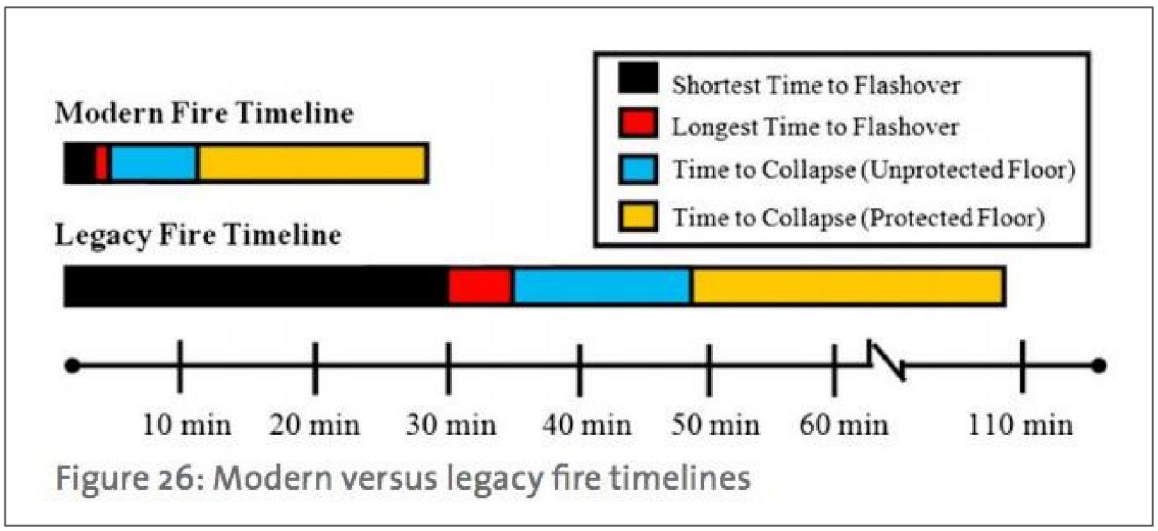
Figure 38: Example of Traditional Time Temperature Curve[9]



Recent studies by Underwriter's Laboratories (UL) have found that in compartment fires such as structure fires, flashover occurs within 4 minutes in modern fire environment. In addition, the UL research has identified an updated time temperature curve due to fires being ventilation controlled rather than fuel controlled as represented in the traditional time temperature curve. While this ventilation controlled environment continues to provide a high risk to unprotected occupants to smoke and high heat, it does provide some advantage to property conservation efforts as water may be applied to the fire prior to ventilation and the subsequent flashover. An example of UL's modern versus legacy flashover timeline in provided below.

[9] Derived from U.S. Fire Administration accessed at https://www.usfa.fema.gov/downloads/pdf/coffee-break/time-vs-products-of-combustion.pdf on March 30, 2017

Figure 39: Modern vs. Legacy Flashover Timeline[10]



EMS

The effective response to Emergency Medical Service (EMS) incidents also has a direct correlation to the ability to respond within a specified period of time. However, unlike structure fires, responding to EMS incidents introduces considerable variability in the level of clinical acuity. From this perspective, the association of response time and clinical outcome varies depending on the severity of the injury or the illness. Research has demonstrated that the overwhelming majority of requests for EMS services are not time sensitive between 5 minutes and 12 minutes. The 12-minute upper threshold is only the upper limit of the available research and is not a clinically significant time measure, as patients were not found to have a significantly different clinical outcome when the 12-minute threshold was exceeded.[11]

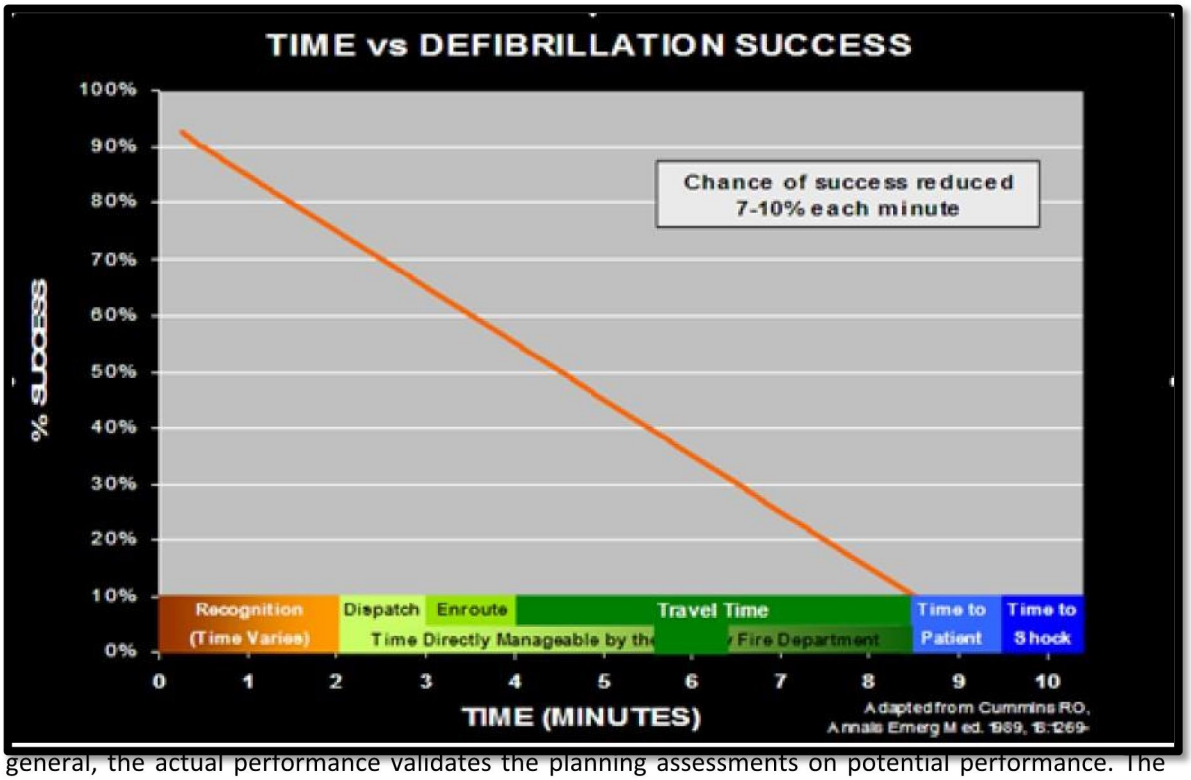
Out of hospital sudden cardiac arrest is the most identifiable and measured incident type for EMS. In an effort to demonstrate the relationship between response time and clinical outcome, a representation of the cascade of events and the time to defibrillation (shock) is presented below. The American Heart Association (AHA) has determined that brain damage will begin to occur between four and six minutes and become irreversible after 10 minutes without intervention.

Modern sudden cardiac arrest protocols recognize that high quality Cardio-Pulmonary Resuscitation (CPR) at the Basic Life Support (BLS) level is a quality intervention until defibrillation can be delivered in shockable rhythms.

[10](Kerber, 2012). *Analysis of Changing Residential Fire Dynamics*. Underwriter Laboratories, Northbrook, IL.

[11] See Blackwell, T.; Kaufman, J. (2002). Response time effectiveness: Comparison of response time and survival in an urban emergency medical services system. Academic Emergency Medicine. 9:4, 288-295.

Figure 40: Cascade of Events for Sudden Cardiac Arrest with Shockable Rhythm[12]



In general, the actual performance validates the planning assessments on potential performance. The historical travel time performance for each fire station demand zone is provided below.

Description of First Arriving Unit Performance

Priority 6 EMS and Priority 2 FIRE are the types of incidents that occur most frequently. Statistics developed using these incident types have the greatest numbers of instances and, thereby, have the greatest reliability for making comparisons.

Table 29: Response Performance of First Arriving Units

Interval	EMS Priority = 6		FIRE Priority = 2	
	average	90th %-tile	average	90th %-tile
P2/P3	00:01:02	00:01:47	00:01:14	00:02:14
Chute	00:01:09	00:01:58	00:01:25	00:02:22
Drive	00:04:05	00:06:07	00:04:15	00:06:33
Response	00:05:08	00:07:28	00:05:32	00:08:14

Note: Statistics calculated for sequential time intervals are not expected to be exactly additive.

[12] Derived from Cummins, RO; Eisenberg, M.; Larsen, M. (1993). *Predicting survival from out-of-hospital cardiac arrest: A graphic model.* Annals of Emergency Medicine. 22:11, 1652-1658.

Figure 41: P2/P3 Intervals for First Arrived Units on EMS Incidents

Interval	Category	Units	Start_Date	End_Date
P2P3	EMS 1st	OP Units	01/01/2015	12/31/2015

Priority	Count	Rcvd to Assgn	
		Average	90th %tile
1	465	00:01:15	00:02:12
2	8	00:01:43	00:02:07
3	0		
4	0		
5	0		
6	3,550	00:01:02	00:01:47
7	1	00:05:11	00:05:11
8	0		
9	8	00:03:10	00:04:15
Total	4,032		

Figure 42: Chute Intervals for First Arrived Units on EMS Incidents

Interval	Category	Units	Start_Date	End_Date
Chute	EMS 1st	OP Units	01/01/2015	12/31/2015

Priority	Count	Assgn to Enroute	
		Average	90th %tile
1	713	00:01:12	00:02:03
2	24	00:01:11	00:02:05
3	5	00:01:35	00:03:01
4	0		
5	0		
6	4,596	00:01:09	00:01:58
7	1	00:01:14	00:01:14
8	0		
9	9	00:01:39	00:02:40
Total	5,348		

Figure 43: Drive Intervals for First Arrived Units on EMS Incidents

Interval	Category	Units	Start_Date	End_Date
Drive	EMS 1st	OP Units	01/01/2015	12/31/2015

Priority	Count	Enroute to Arrvd	
		Average	90th %tile
1	721	00:03:44	00:05:38
2	24	00:05:05	00:09:42
3	5	00:04:55	00:07:07
4	0		
5	0		
6	4,663	00:04:05	00:06:07
7	1	00:07:35	00:07:35
8	0		
9	8	00:03:21	00:04:57
Total	5,422		

Figure 44: Response Intervals for First Arrived Units on EMS Incidents

Interval	Category	Units	Start_Date	End_Date
Response	EMS 1st	OP Units	01/01/2015	12/31/2015

Priority	Count	Assgn to Arrvd	
		Average	90th %tile
1	806	00:04:49	00:07:02
2	34	00:04:30	00:10:41
3	7	00:06:20	00:07:29
4	0		
5	0		
6	5,173	00:05:08	00:07:28
7	1	00:08:49	00:08:49
8	0		
9	13	00:03:25	00:06:21
Total	6,034		

Figure 45: P2/P3 Intervals for First Arrived Units on FIRE Incidents

Interval	Category	Units	Start_Date	End_Date
P2P3	FIRE 1st	OP Units	01/01/2015	12/31/2015

Priority	Count	Rcvd to Assgn	
		Average	90th %tile
1	195	00:01:22	00:02:18
2	172	00:01:14	00:02:14
3	60	00:01:53	00:03:15
4	0		
5	0		
6	151	00:01:33	00:02:40
7	3	00:07:06	00:11:15
8	0		
9	3	00:08:06	00:13:36
Total	584		

Figure 46: Chute Intervals for First Arrived Units on FIRE Incidents

Interval	Category	Units	Start_Date	End_Date
Chute	FIRE 1st	OP Units	01/01/2015	12/31/2015

Priority	Count	Assgn to Enroute	
		Average	90th %tile
1	265	00:01:32	00:02:48
2	509	00:01:25	00:02:22
3	118	00:01:01	00:01:51
4	0		
5	1	00:00:19	00:00:19
6	264	00:01:16	00:02:08
7	3	00:01:24	00:02:09
8	0		
9	6	00:00:55	00:01:10
Total	1,166		

Figure 47: Drive Intervals for First Arrived Units on FIRE Incidents

Interval	Category	Units	Start_Date	End_Date
Drive	FIRE 1st	OP Units	01/01/2015	12/31/2015

Priority	Count	Enroute to Arrvd	
		Average	90th %tile
1	269	00:04:15	00:07:44
2	510	00:04:15	00:06:33
3	122	00:05:46	00:09:00
4	0		
5	1	00:01:23	00:01:23
6	259	00:06:25	00:09:50
7	3	00:05:43	00:08:00
8	0		
9	6	00:06:42	00:08:38
Total	1,170		

Figure 48: Response Intervals for First Arrived Units on FIRE Incidents

Interval	Category	Units	Start_Date	End_Date
Response	FIRE 1st	OP Units	01/01/2015	12/31/2015

Priority	Count	Assgn to Arrvd	
		Average	90th %tile
1	289	00:05:47	00:09:18
2	567	00:05:32	00:08:14
3	164	00:06:51	00:10:34
4	0		
5	1	00:01:42	00:01:42
6	273	00:07:31	00:11:02
7	3	00:07:08	00:09:29
8	0		
9	7	00:01:56	00:04:21
Total	1,304		

First Arriving Unit Response Intervals by First Due Station

Comparison of First Due Zone Stats

Broward County ORCAT personnel provided two outputs of data to the consultant that were relevant to Oakland Park FIRE operations. The first contained all Broward FIRE incident records. The second was a truncated file containing only Event Numbers and First Due Zones for Broward County FIRE incidents. The consultant then merged the FDZ file into the FIRE incident records and filtered for the incidents specific to Oakland Park. In this way 8,164 records in the consultant's Oakland Park data table were associated with First Due Zones.

The table below, shows a comparison of incidents counts by FDZ in the data table available to the consultant and FIRE incident counts for Oakland Park, as reported by Broward County.

Table 30: Comparison of Incident Counts by FDZs as Taken from Data Tables as Supplied to FITCH and as Reported by Broward County

First Due Zone	Incident Count	
	per Broward[1]	per FITCH
09A	124	124
09B	542	546
09C	372	373
09D	699	706
09E	441	442
09F	295	295
09G	724	726
09H	545	547
20A	609	610
20B	175	176
20D	550	553
20E	94	95
20F	224	224
20G	84	84
20H	32	32
20I	291	293
87C	84	84
87D	62	63
87E	418	418
87F	297	297
87G	459	460
87H	807	810
87J	208	204
Total	**8,136**	**8,164**

© Fitch & Associates, LLC

The discrepancies between the two counts of incidents by FDZ are minor. How they came about is unknown. The consultant feels that an exact reconciliation is not warranted because the discrepancies are unlikely to materially affect the results of response time statistics as calculated in this report.

Table 31: Performance Intervals of Vehicles First Arrived at Scene by First Due Station at the 50th Percentile (Average) on Priority 6 EMS Incidents.

First Due Station	Performance Intervals [hh:mm:ss]				
	P2/P3	Chute	Enroute	Response	Min – Max Sample Size
Sta 09	00:01:00	00:01:06	00:04:02	00:05:00	1754 - 2553
Sta 20	00:01:03	00:01:10	00:04:08	00:05:14	792 - 1119
Sta 87	00:01:04	00:01:14	00:04:07	00:05:16	1002 - 1489

Table 32: Performance Intervals of Vehicles First Arrived at Scene by First Due Station at the 90th Percentile on Priority 6 EMS Incidents.

First Due Station	Performance Intervals [hh:mm:ss]				
	P2/P3	Chute	Enroute	Response	Min – Max Sample Size
Sta 09	00:01:44	00:01:50	00:06:09	00:07:21	1754 - 2553
Sta 20	00:01:48	00:02:02	00:06:01	00:07:29	792 - 1119
Sta 87	00:01:55	00:02:03	00:06:06	00:07:38	1002 - 1489

Table 33: Performance Intervals of Vehicles First Arrived at Scene by First Due Station at the 50th Percentile (Average) on Priority 2 FIRE Incidents.

First Due Station	Performance Intervals [hh:mm:ss]				
	P2/P3	Chute	Enroute	Response	Min – Max Sample Size
Sta 09	00:01:17	00:01:26	00:03:54	00:05:09	68 - 278
Sta 20	00:01:36	00:01:19	00:04:43	00:05:52	32 - 99
Sta 87	00:01:08	00:01:27	00:04:32	00:05:56	71 - 188

Table 34: Performance Intervals of Vehicles First Arrived at Scene by First Due Station at the 90th Percentile on Priority 2 FIRE Incidents.

First Due Station	Performance Intervals [hh:mm:ss]				
	P2/P3	Chute	Enroute	Response	Min – Max Sample Size
Sta 09	00:02:19	00:02:21	00:06:32	00:07:52	68 - 278
Sta 20	00:02:01	00:02:26	00:06:50	00:08:06	32 - 99
Sta 87	00:02:00	00:02:23	00:06:26	00:08:21	71 - 188

The sample sizes are highly variable from one statistic determination to the next due to the very high number of timestamps that are missing from the CAD data tables.

Figure 49: Performance Intervals for Vehicles First Arrived at Scene on FIRE Incidents by First Due Station

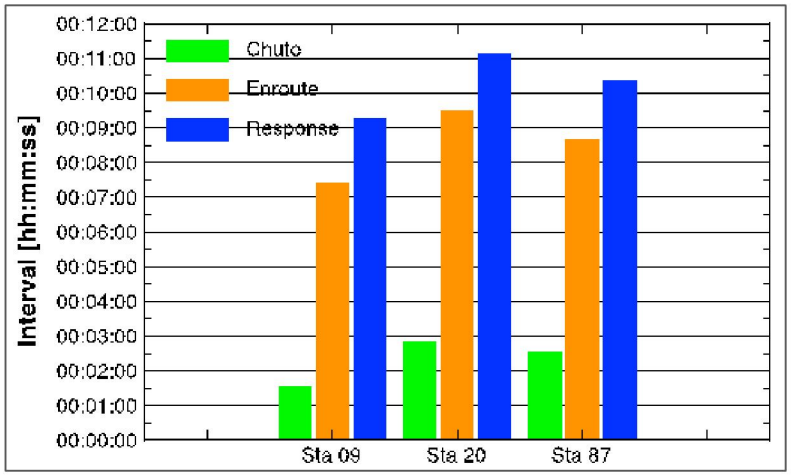


Figure 50: Chute Intervals for Vehicles First Arrived at Scene on FIRE Incidents by First Due Station

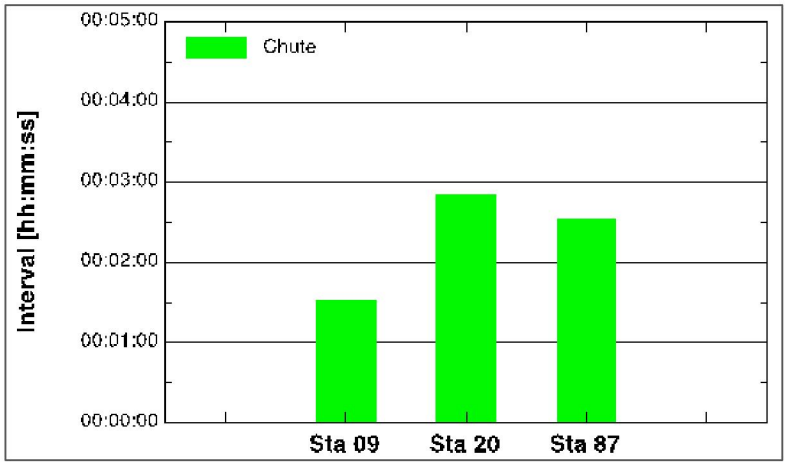


Figure 51: Drive Intervals for Vehicles First Arrived at Scene on FIRE Incidents by First Due Station

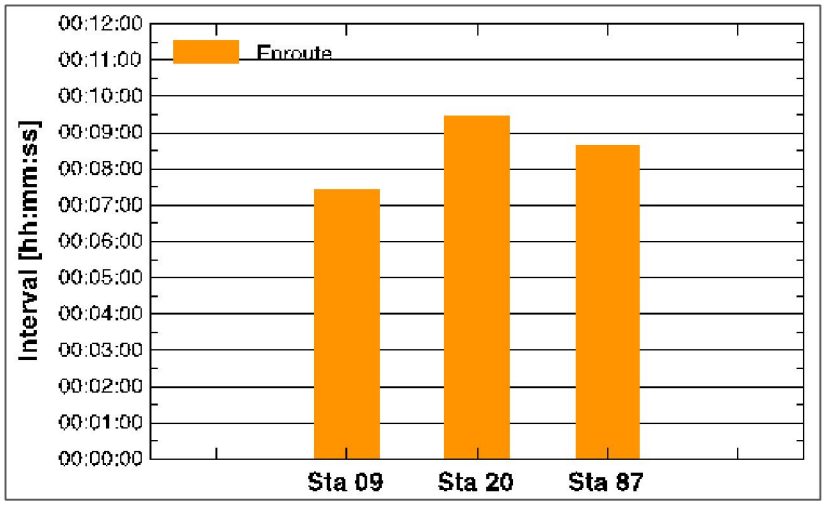
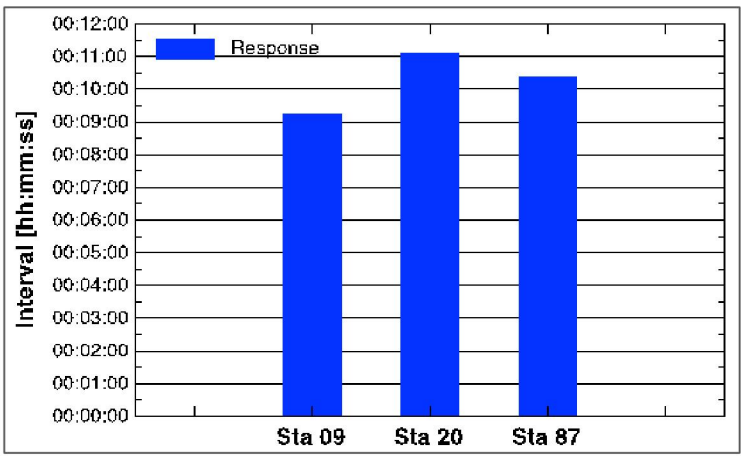


Figure 52: Response Intervals for Vehicles First Arrived at Scene on FIRE Incidents by First Due Station



Effective Response Force Capabilities

The assembly of an effective fire force for structure fires is a standard practice in the fire service. To evaluate that capacity, the following analysis examines the time required to assemble the first 3 arriving units.

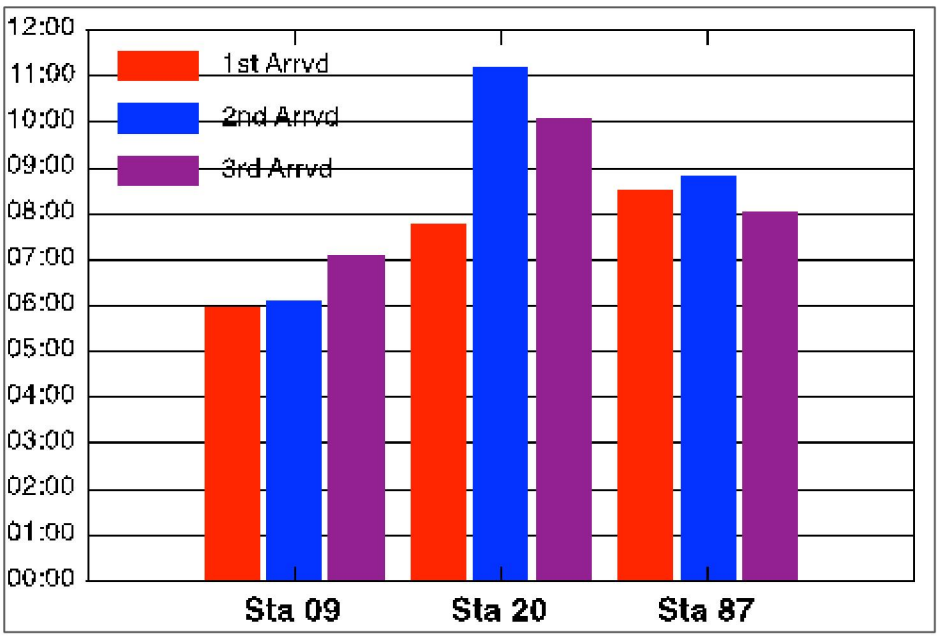
Table 35: Drive Interval at 90th %-tile for ERF by First Due Station for Priority 1 Incidents

Order of Arrival	Drive Interval					
	Average [hh:mm:ss]			At 90th %-tile [hh:mm:ss]		
	Sta 09	Sta 20	Sta 87	Sta 09	Sta 20	Sta 87
1st Arrvd	00:03:32	00:04:36	00:05:01	00:05:58	00:07:48	00:08:31
2nd Arrvd	00:04:16	00:06:05	00:05:49	00:06:07	00:11:11	00:08:49
3rd Arrvd	00:04:46	00:06:17	00:06:20	00:07:05	00:10:05	00:08:04

Table 36: Drive Interval at 90th %-tile for ERF by First Due Station for Priority 2 Incidents

Order of Arrival	Drive Interval					
	Average [hh:mm:ss]			At 90th %-tile [hh:mm:ss]		
	Sta 09	Sta 20	Sta 87	Sta 09	Sta 20	Sta 87
1st Arrvd	00:03:54	00:04:43	00:04:32	00:06:32	00:06:50	00:06:26
2nd Arrvd	00:04:13	00:05:34	00:05:19	00:06:52	00:09:20	00:08:04
3rd Arrvd	00:03:50	00:05:37	00:06:09	00:06:52	00:08:01	00:08:50

Figure 53: Effective Response Force Capability by First Due Station for Priority 1 Incidents



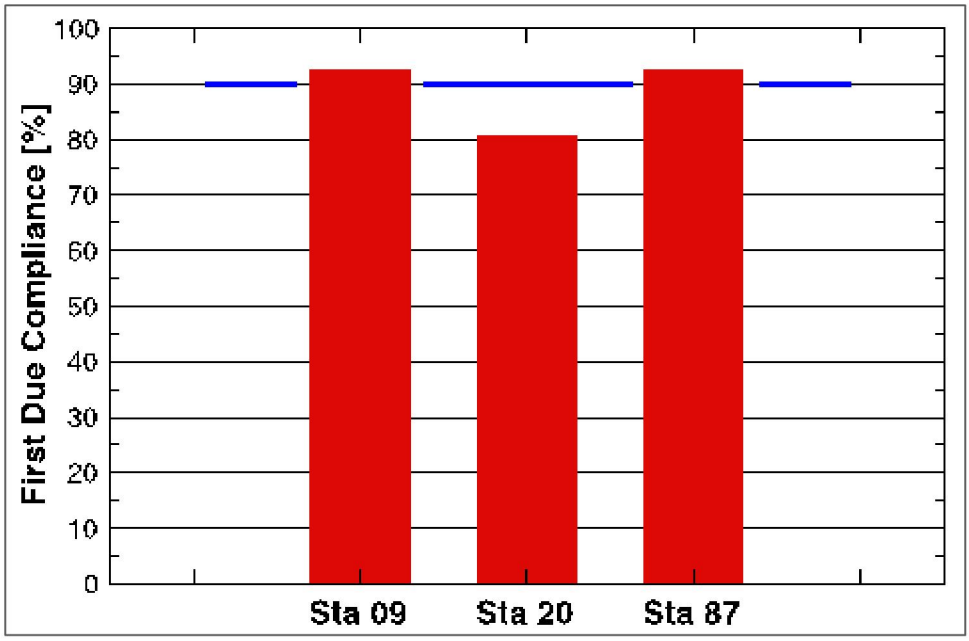
Reliability Factors

The reliability of the distribution model is a factor of how often the response model is available and able to respond to the call within the assigned demand zone. If at least one unit from the first due station is able to respond to a call, we consider the station is able to respond to the call within the assigned demand zone. Utilizing the Fire Station Demand Zones (FDZ), analyses reveal that both Station 9 and Station 87 were capable of meeting their demand for services at greater than the 90th percentile. Station 20 performed slightly lower at 80.6% of the time. This analysis utilized all dispatched calls within the jurisdiction and the performance included all assigned units to the specific FDZ.

Table 37: First Due Compliance by Station

First Due Station	Incident Count	Incidents with Units from 1st Due Sta	Percentage Compliance
Sta 09	3,759	3,480	92.6%
Sta 20	2,067	1,665	80.6%
Sta 87	2,336	2,162	92.6%

Figure 54: Reliability by First Due Station



Simultaneous Incidents

Simultaneous incidents were identified in the CAD by stepping through each incident record, noting its duration, and then searching this time interval for incidents that were initiated during the interval. When simultaneity was discovered, the event number of the initiating incident was written as a notation into the incident record of the subsequent incident. In this way, a tabulation of all simultaneities was constructed. A single incident was discovered that was simultaneous with four preceding incidents (line 7 in Table below). The record from the consultant's Master Incident table corresponding to line 7 is presented Figure 55 immediately following.

Table 38: Simultaneous Incidents by First Due Station.

	Sta 09	Sta 20	Sta 87
Incidents	3,677	1,958	2,290
With Simultaneous = 0	2,717	1,649	1,877
With Simultaneous = 1	802	282	373
With Simultaneous = 2	149	25	38
With Simultaneous = 3	18	2	2
With Simultaneous = 4	1	0	0
With Simultaneous >0	970	309	413
% Simultaneous >0	26.4%	15.8%	18.0%

© Fitch & Associates, LLC
June 2017

Figure 55: Master Incident Record Showing Four Simultaneities

Broward E911 Consolidated Communications System
Oakland Park Fire Rescue
Master Incident Records

Date	Time	Mo	Day	Day Name	Day of Wk	Hr of Day	Hour of Yr
03/27/2015	18:12:57	3	27	Fri	6	18	2,059

Incident_PK	EventNumber	City	FDZ	Disp_Loc	Response Agency	MA out
15765544	FOP150327001855	OP	09H	Central	Oakland Park Fire	0
			09			

Priority	Signal	Signal Description	Resp Cat	Alarm	1° Code	1° ID
7	S25EH	ELECTRICAL / UTILITY HAZARD	FIRE	1	17909	B9

E OAKLAND PARK BLVD/NE 16TH AV				Oakland Park				
MapX	942803	MapY	667327	MapRef	640	Rept_Dist	12C9	Loc 33497

Dispositions	
1	4653
2	
3	
4	
Add'l	

Radio Chn	Avg Talk /Incident	Avg Talk /Xmit/Rcv	Xmit/Rcv's / Incident	Support Duration
BCF-D1	112.75 sec	8.662 sec	13.02	104.086

	Timestamps	Dispatch Intervals	
Time_Pickup_TS	03/27/2015 18:12:15	00:00:43	P2 Intake
Time_Create_TS	03/27/2015 18:12:57	00:05:02	P3 Assgn
Transmit_TS	03/27/2015 18:12:58	00:05:45.	P2/P3
Time_Dispatch_TS	03/27/2015 18:18:00		
Time_Enroute_TS	03/27/2015 18:20:08		
Time_Arrival_TS	03/27/2015 18:26:29		
Time_Closed_TS	03/27/2015 19:24:02		

03/27/2015 18:18...03/27/2015 19:24:02

Dispatched from Station FDZ Simultaneous With Incident in Same Sta FDZ; [EventNumbers]	
1	FOP150327001851
2	FOP150327001852
3	FOP150327001854
4	FOP150327001853
5	
6	
Count	4

Cancelled			Veh Tallies DS	AR	TR	MA	
OP Veh	0	OP	2	2	0	0	outbound
Incident	0	X	0	0	0	0	inbound
		totals	2	2	0	1	1st Due Unit

Portal to Vehicles Assigned Data Table

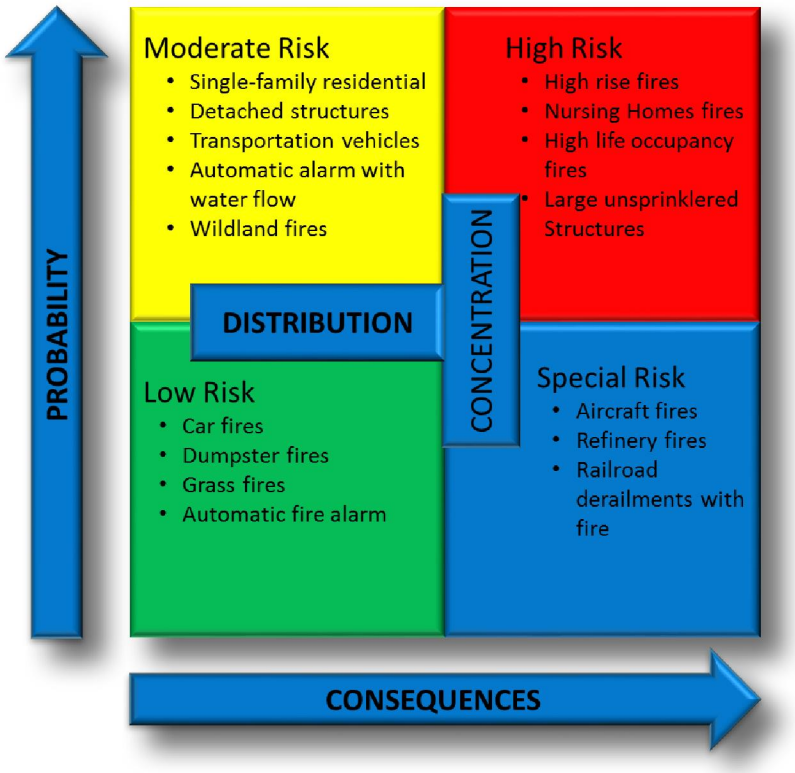
Unit	OP	in	out	DS_TS	AR_TS	1st	CX	Tr	AV_TS	Task
B9	1	0	0	03/27/2015 18:17:59	03/27/2015 18:26:29	1	0	0	03/27/2015 19:24:02	01:06:03
Q9	1	0	0	03/27/2015 18:17:59	03/27/2015 18:26:50	0	0	0	03/27/2015 19:23:41	01:05:42

COMMUNITY RISK ASSESSMENT AND RISK LEVELS

Probability/Consequence of Fire Event Risk

The relatively low frequency of fire related events required the Department to rely more heavily on the consequences of the events than the probability of the event occurring. For example, according to the Department's NFIRS reports submitted to USFA, there were only 51 fire incidents with any reported property loss over the three-year period from 20012 through 2014. The resulting probability and consequence matrix is presented below.

Figure 56: Probability and Consequence Matrix for Fire Risk



Community Risks - Fire

Occupancy risk was evaluated across the jurisdiction utilizing the most recent ISO batch report as well as internal data provided by the department. The risk matrices utilized are presented here. The risk matrix utilized with the ISO data evaluated Fire Flow, Height and Square Footage.

Table 39: Summary of Risk Matrix

Risk Class	Fire Flow		Number of Stories		Square Footage		Total Risk Score
	Value	Scale	Value	Scale	Value	Scale	Scale
High	3	≥ 1500 gpm	5	≥ 4	5	>= 100,000 sq.ft.	10 or more
Moderate	2	> 499 and < 1500 gpm	3	> 1 and < 4	3	> 10,000 sq.ft. and < 100,000 sq.ft.	6-9
Low	1	≤ 499 gpm	1	1	1	<= 10,000 sq.ft.	5 or less

Due to the relatively higher demands for personnel and apparatus required for fire events that have a large square footage, higher elevation (stories), and greater required fire flows these occupancies garnished the highest numeric values. Applying this methodology to all 1,564 independently rated occupancies within the city, 19 were categorized and rated as high, 315 as moderate and the remainder of 1,230 were rated low.

A review was conducted on 3 years of National Fire Incident Reporting (NFIRS) data as submitted to the US Fire Administration for years 2012 thru 2014. Fire related incident data for Oakland Park is summarized below.

Table 40: NFIRS Reported Fire Data - 2012 thru 2014

	2012	2013	2014	Average	State Average Based on Population	National Average Based on Population
Fire Incidents with Reported Property Loss	12	19	20	17.0	15.9	15.3
Total Reported Property Loss	$62,700	$132,700	$198,750	$131,383	--	--
Average Reported Loss / Incident	$5,225	$6,984	$9,938	$7,382	$40,322	$64,221

Overall, the city's risk profile reflects no exceptional challenges. Evaluation of risk on independently rated properties reflects few that meet a high-risk rating. Historical fire data reflects a low incidence and severity of property loss, as well as civilian or firefighter injuries. There was loss of life from fire in 2013 (2) and again in 2015 (1) as reported by the Department. The Department did not report any fire related injuries during the period examined. Overall, the fire related fatalities and injuries are comparable or less than national experience based on population.[13]

[13] Ahrens, M. (2016). Trends and Patterns of U.S. Fire Loss. National Fire Protection Association.

OVERALL EVALUATION, OBSERVATIONS, AND COMPARATIVE ANALYSIS

Overall Evaluation

The city is well served by its fire rescue department. The agency is organized to address those elements found in modern and contemporary fire rescue agencies delivering the fire, EMS and specialized services needed by Oakland Park's citizens. The department has made good use of the resources it is been provided, as well as those available from regional partners – especially other fire rescue agencies. Based on the community's risk profile, historical demand, and compact municipal boundaries, services are provided in a timely, effective, and efficient manner.

The following discussion will highlight these specific areas

General Observations

Response Time

The department should continue monitoring call the receipt and processing times as handled by the Broward Sheriff's Office. However in establishing performance goals for the department these generally focus on chute times of their own personnel, and the travel time required to reach emergency incident locations. These should be monitored at a 90% compliance level.

As noted previously, current travel times for apparatus is relatively strong at the 90th percentile - approximately 6:07 for EMS incidents and 6:33 for fire incidents. In exploring methods to maintain the same level of service, or even improve performance, the following discussion is insightful.

Impact of Adaptive Staffing

Collisions between Incidents

The duration over which an incident involving unit R220 may have an impact on operations in the rest of the system extends from when R220 is initially assigned until R220 returns to quarters. Adaptive staffing cannot be undone until R220 is back in quarters.

As the BSO CAD is currently configured, there is no timestamp that logs when a unit returns to quarters. The last timestamp available in the CAD for an incident in-progress is status change code "USAV", which logs when unit R220 is available for reassignment at some unspecified remote location in the field. For purposes of calculating a total R220 duration for these analyses, a "Return Drive" interval was added to the USAV timestamp. The length of the "Return Drive" interval was calculated on a per incident basis as being 1.5 time the outbound drive time of unit R220 for that particular incident. Run "hot" on the response leg, run "cold" on the return leg.

There is no simple "back-of-the-envelope" method to estimate the impact of "collisions" between incidents involving responses using unit R220 and all other incidents in Oakland Park that were initiated while the R220 incident was in-progress. Enumeration of these collisions required conducting an exact tally that was obtained by stepping through the CAD one incident at a time.

The logic used in the search algorithm was the following:

1. Step through each record in the Vehicles Assigned data table;
2. Identify whether the incident involved unit R220;
3. Acquire the duration of the incident involving unit R220;
4. Search this duration in the Vehicle Assigned table for all vehicle assignments initiated during the R220 duration;
5. Set the needed flags in the found set to show vehicle assignments occurring while a R220 incident is in-progress;
6. Return to stepping through the Vehicle Assigned data table.

In this manner, 1,794 vehicle assignments occurred while R220 incidents were in-progress. Another 10,571 vehicle assignments occurred while no R220 incidents were in-progress. These tallies are across all of Oakland Park.

Metrics of Comparisons

The consultant chose response times as the metric to judge the impact of R220 incidents in-progress on the conduct of operations in the rest of Oakland Park.

For judging the possible impact on FIRE incidents, the response time for *all* units arrived at scene was used to embrace the complexity of FIRE all hazard responses. This metric reflects the urgency of assembling the complex "package" of multiple units that constitute an Effective Response Force.

For judging the possible impact on EMS incidents, the response time of first arrived at scene is the more applicable metric. This metric reflects the urgency of stabilizing the patient.

Oakland Park experiences a small number of incidents with individual unit response times in excess of 16 minutes. The consultant believes that such incidents are atypical, do not reflect routine operations within Oakland Park, and can be considered long duration outliers. Including all long duration outliers in the response statistics has two consequences. First, inclusion moves the average response time to a longer value. Second, inclusion dramatically increases the standard deviations about the averages. The consultant's concern was that such atypical events would obscure any real affects the R220 incidents may have on operations in the rest of Oakland Park.

The source of the concern arises from the mathematics needed to determine the probability that two distributions of response time are the same or different. The methodology used to make this decision is the t-Test. The magnitude of the t-value in the t-Test is highly dependent on the standard deviations of the distributions being examined. When the standard deviations "blow up" because of long duration

outliers, the ability of the t-Test to see that two distributions really are different is lost. As standard deviations get larger, all distributions of response times become indistinguishable regardless of whether real and systematic differences actually exist.

The ability to perceive a difference between two data sets can be lost when the standard deviation (variance) in the dataset gets magnified by the outliers.

The methodology used to limit the influence of long duration outliers on the analyses of the Oakland Park data was implemented as a dynamic filter:

1. Collect the set of response time under consideration;
2. Sort in ascending order;
3. Find the median response time;
4. When response times > 3 X median, exclude as long duration outliers,

Hence, the exclusion criterion for each set of response times was dynamically calculated from the data contained in that specific set of response times.

The t-Test is a standard statistical method for assigning a probability to whether two distributions are the same or different. The method for calculating t-values and the table for correlating p-value with t-values are presented in Attachment A. The p-value is the probability, expressed as a decimal, that two distributions are actually different. In the context of Oakland Park, small p-values mean that R220 incidents have very low probabilities of actually having impacted the conduct of other emergency services operations in the rest of Oakland Park.

Specifically, the Welch version of the t-Test was implemented for these analyses. This version applies to the probability whether two distributions are the same or different when the two distributions have non-equal population sizes and non-equal standard deviations. The Welch-Satterwaithe equation was used to calculate the degrees of freedom in these systems. The t-values and the Z-values calculated in these ways were then taken to the t-Table in Attachment A, and a “two-tails” p-value was determined by linear interpolation between the published table entries.

Results of t-Tests

Table 41: Response Interval of All Vehicles Assigned to FIRE Incidents in First Due Zones Served by Station 20

	All Vehicles Assigned to FIRE Incidents						
	Raw Count	Median [sec]	Filtered Count	Average Response Time [sec]	Std Dev ± [sec]	t-Value & Z	p-Value
No R220 In-Progress	673	718	580	723	±523	t=1.598 Z=90	p = 0.001
With R220 In-Progress	81	864	73	830	±541		

Table 42: Response Interval of First Arrived Vehicles on EMS Incidents in First Due Zones Served by Station 20

	First Arrived Vehicles Assigned to EMS Incidents						
	Raw Count	Median [sec]	Filtered Count	Average Response Time [sec]	Std Dev ± [sec]	t-Value & Z	p-Value
No R220 In-Progress	535	698	514	713	± 396	t=3.588 Z=217	p = 0.001
With R220 InThe accomplishment-Progress	158	912	156	870	± 501		

Table 43: Response Intervals of All Vehicles Assigned to FIRE Incidents in All First Due Zones Comprising Oakland Park

	All Vehicles Assigned to FIRE Incidents						
	Raw Count	Median [sec]	Filtered Count	Average Response Time [sec]	Std Dev ± [sec]	t-Value & Z	p-Value
No R220 In-Progress	2,143	394	2,094	412	±180	t=1.287 Z=400	p=0.200
With R220 In-Progress	321	384	316	397	±195		

Table 44: Response Interval of First Arrived Vehicles on EMS Incidents in All First Due Zones Comprising Oakland Park

	First Arrived Vehicles Assigned to EMS Incidents						
	Raw Count	Median [sec]	Filtered Count	Average Response Time [sec]	Std Dev ± [sec]	t-Value & Z	p-Value
No R220 In-Progress	5,184	298	5,084	298	±108	t=2.257 Z=1085	p=0.026
With R220 In-Progress	889	304	888	309	±138		

© Fitch & Associates, LLC
June 2017

Assessment of Results

As explained above, the average response time of all vehicles arrived at scene is the most appropriate metric to assess the impact of adaptive staffing of unit R220 on the conduct of FIRE responses in all of the First Due Zones served by Station 20. This data is presented above.

Based on the data above, there is a 99.9% probability that adaptive staffing of unit R220 has no effect on the conduct of simultaneous Fire incidents in the First Due Zones served by Station 20.

In contrast, the average response time of vehicles first arrived at scene is the most appropriate metric to assess the impact of adaptive staffing of unit R220 on the conduct of EMS responses in all of the First Due Zones served by Station 20. This data is presented above.

Based on the data above, there is a 99.9% probability that adaptive staffing of unit R220 has no effect on the conduct of simultaneous emergency medical incidents in the First Due Zones served by Station 20.

For adaptive staffing of unit R220 to NOT have an effect on Fire response in the First Due Zones served by Station 20, then units must be coming into the Station 20 First Due Zones from Station 09 and Station 87. The question then becomes whether adaptive staffing manifests as an increased response time on fire incidents in Oakland Park taken as a whole.

In order to broaden the scope of this analysis, as indicated above, parallel analyses were conducted, but considering all of the First Due Zones that comprise Oakland Park. The results for Fire and EMS incidents are presented above.

Based on the data above, having unit R220 running an incident in-progress appears to ***decrease*** the average response time of all FIRE units arrived at scene by 15 seconds. Based strictly on the mathematics, there is a 20.0% probability that this decrease is real, and an 80.0% probability that this decrease is due to random fluctuations in the data.

The consultants can conceive of no credible mechanism by which unit R220 running an incident in-progress can ***reduce*** the response times of units on FIRE incidents in Oakland Park. The apparent reduction in response times is certainly due to random fluctuations superimposed on the data. The soundest interpretation of the data is that unit R220 running an incident in-progress has ***NO*** discernable effect on FIRE responses in Oakland Park.

Based on the data above, there is a 97.4% probability that adaptive staffing of unit R220 has no effect on the conduct of simultaneous emergency medical incidents in the rest of Oakland Park. Conversely, there remains a 2.6% probability that adaptive staffing does make a difference, but the difference is, at most, an increase of 9 seconds.

When unit R220 is running an incident in-progress, the first arrived average response times of other EMS incidents in Oakland Park appears to increase by 9 seconds. This 9-second increase is best accounted for as a random fluctuation in the response time data. There is only a 1-in-38 chance that the 9-second increase is due to a real and systematic difference due to unit R220 running an incident in-progress.

The consultant concludes that adaptive staffing of R220 has no statistically valid impact on the response times of all vehicles arrived at scene for fire incidents in either the First Due Zones served by Station 20 or in Oakland Park taken as a whole.

GIS Modeling

We first explore the system contemplating only the impact of Oakland Park stations. As noted in Figures 57 and 58 below, a 5-minute drive time would provide strong coverage, but certain areas in the northeast and eastern part of the city are not covered in this drive time performance. A 6-minute drive time essentially provides complete coverage of the city.

Figure 57: Oakland Park Stations Only - 5 Minute Drive Time

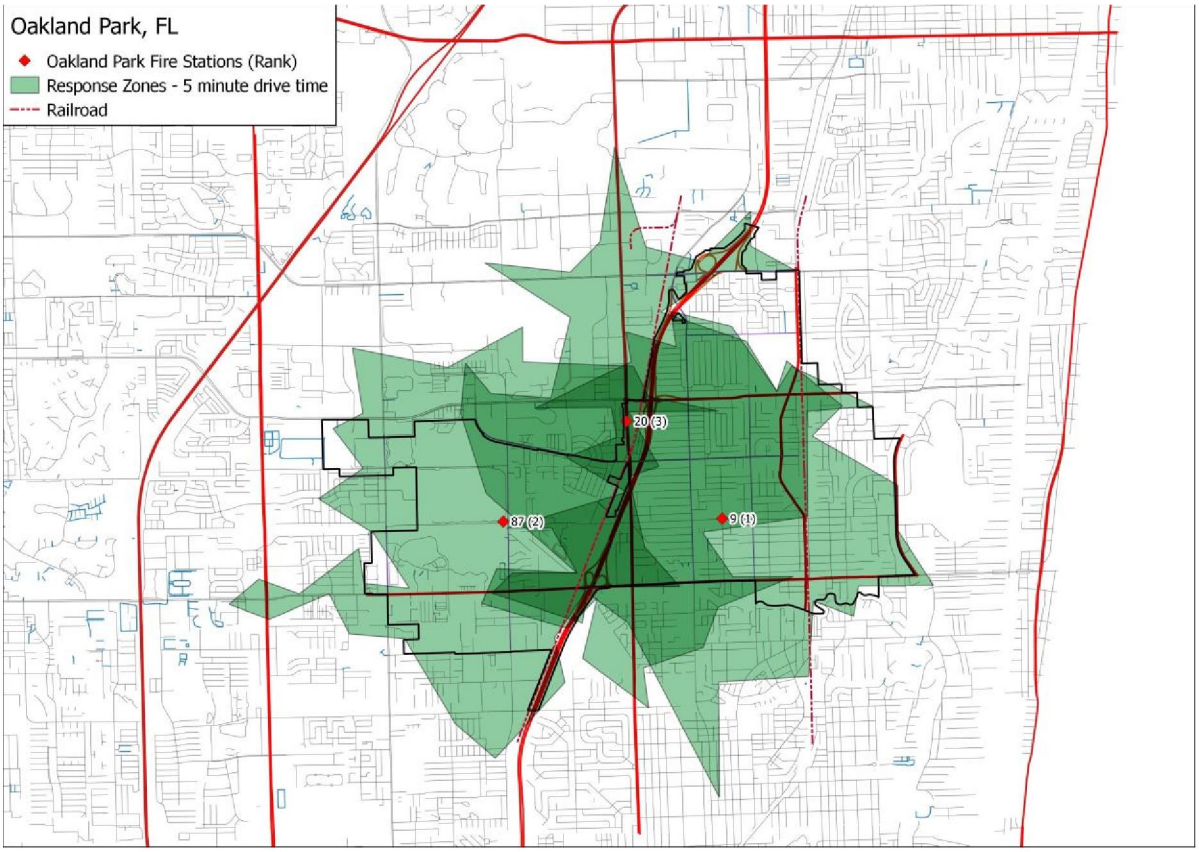
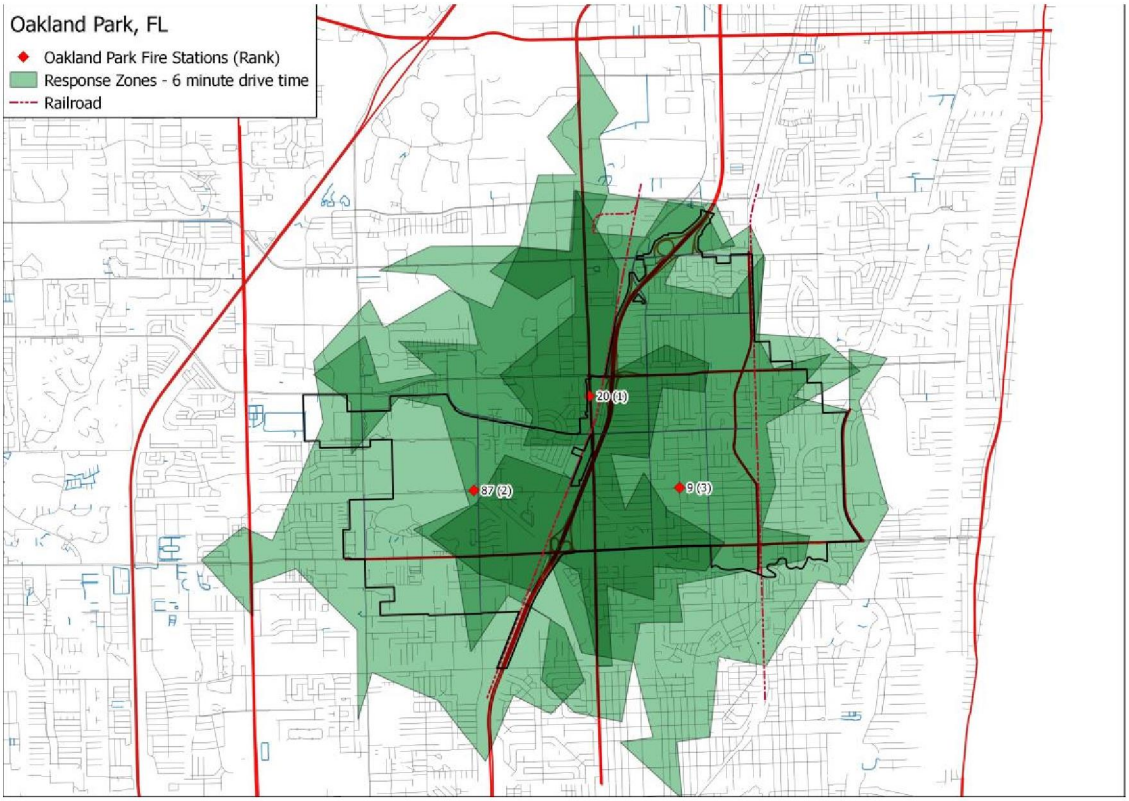


Figure 58: Oakland Park Stations Only - 6 Minute Drive Time

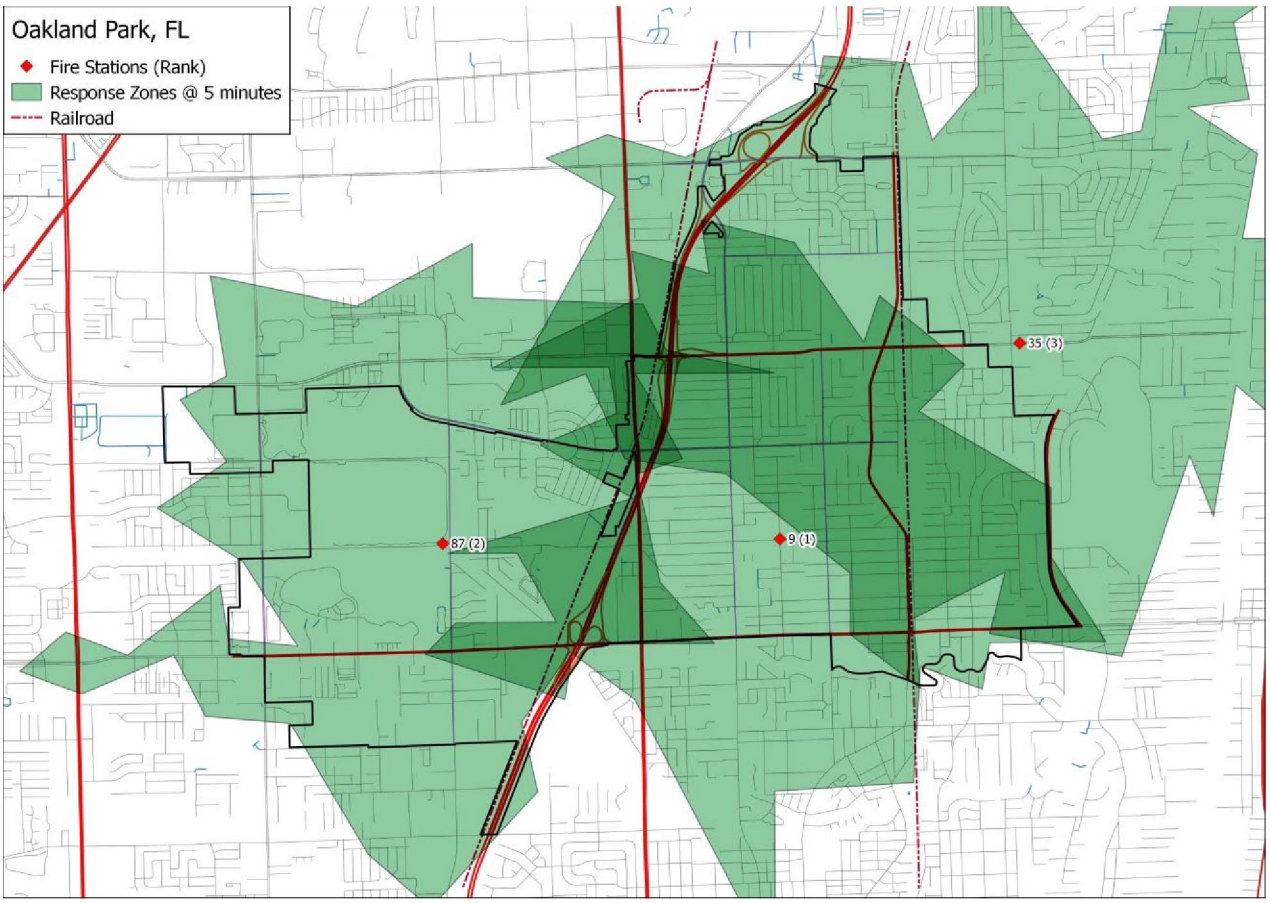


GIS modeling was also conducted exploring alternate travel times utilizing both Oakland Park and adjacent fire station locations. Figures 59 and 60 reflect travel time from these station locations at a performance level of five minutes. As noted in the table below, for this analysis both Oakland Park and adjacent municipalities' fire stations were allowed to 'respond' to Oakland Park's incidents.

Figure 59: Marginal Utility of Existing Fire Stations - 5 Minutes

Rank	Station Number	Post Capture	Total Capture	Percent Capture
1	9	5501	5501	66.99%
2	87	1776	7277	88.61%
3	35	820	8097	98.60%
4	78	67	8164	99.42%
5	37	25	8189	99.72%
6	46	6	8195	99.79%
7	54	5	8200	99.85%
8	29	2	8202	99.88%
9	16	1	8203	99.89%
10	88	1	8204	99.90%

Figure 60: Travel Time - 5-Minute Performance

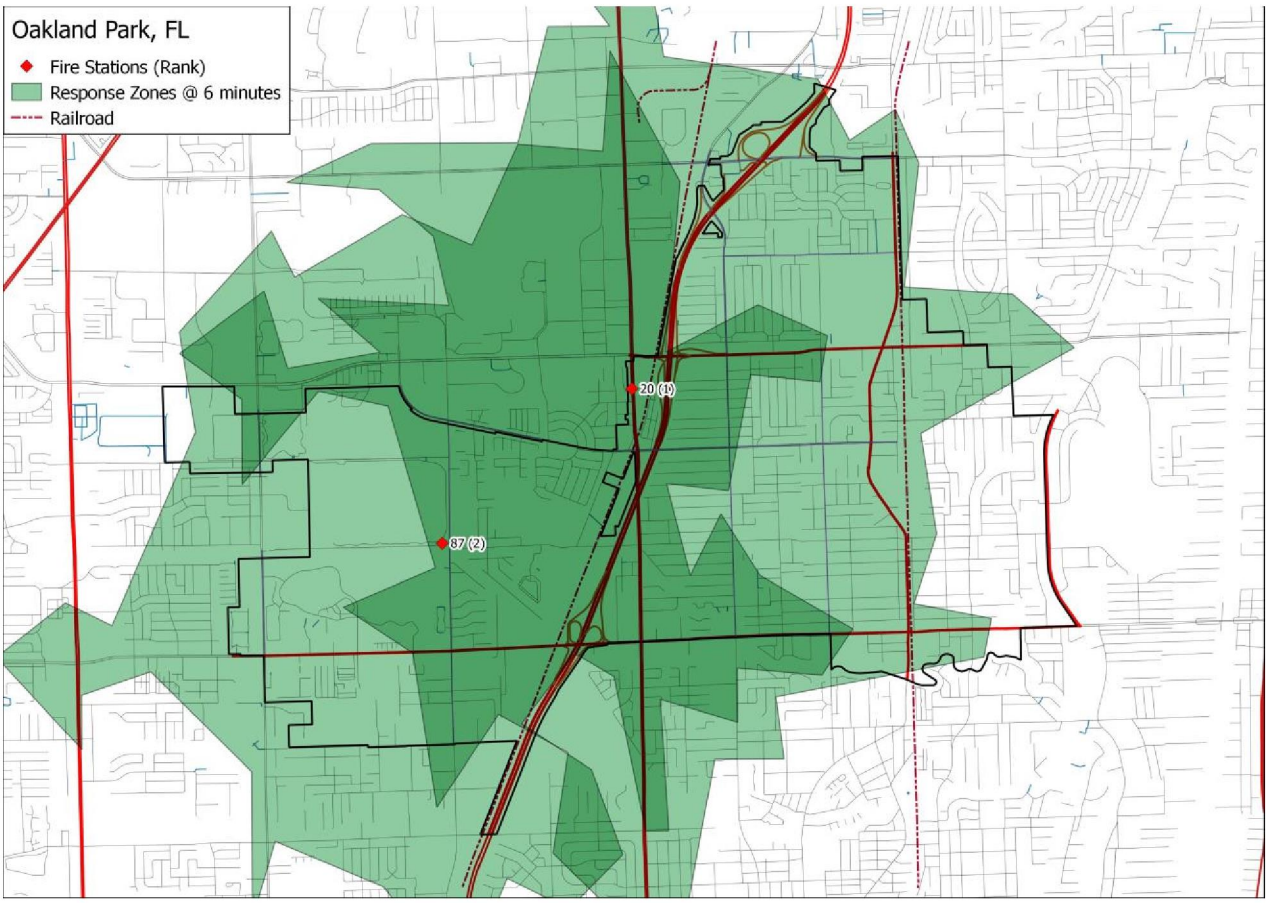


Figures 60 and 61 reflect the same information at a performance level of six minutes. As noted in each of the tables, a three-station configuration employing two existing Oakland Park stations and fire station 35 from Fort Lauderdale would allow the city's performance to cover over 99% of all incidents.

Figure 61: Marginal Utility of Existing Fire Stations - 6 Minutes

Rank	Station Number	Post Capture	Total Capture	Percent Capture
1	20	6639	6639	80.85%
2	87	928	7567	92.15%
3	35	613	8180	99.61%
4	78	11	8191	99.74%
5	46	8	8199	99.84%
6	54	6	8205	99.91%
7	29	2	8207	99.94%

Figure 62: Travel Time - 6-Minute Performance



The differences between the five-minute and six-minute performance level, as noted in the maps and tables, employ different Oakland Park fire stations. At the five-minute level, fire stations 9 and 87 from Oakland Park are utilized along with station 35 from Fort Lauderdale.

Upon expanding the travel time to six minutes, the respective catchment areas for each station adjust, and the model then reflects a preference to utilize Oakland Park stations 20 and 87. This allows a small portion of the city, just east of the FEC tracks, to lose coverage at the six-minute performance level. The addition of Fort Lauderdale station 35 back into the model would take performance at six minutes to nearly 100% coverage, including this area east of the FEC tracks.

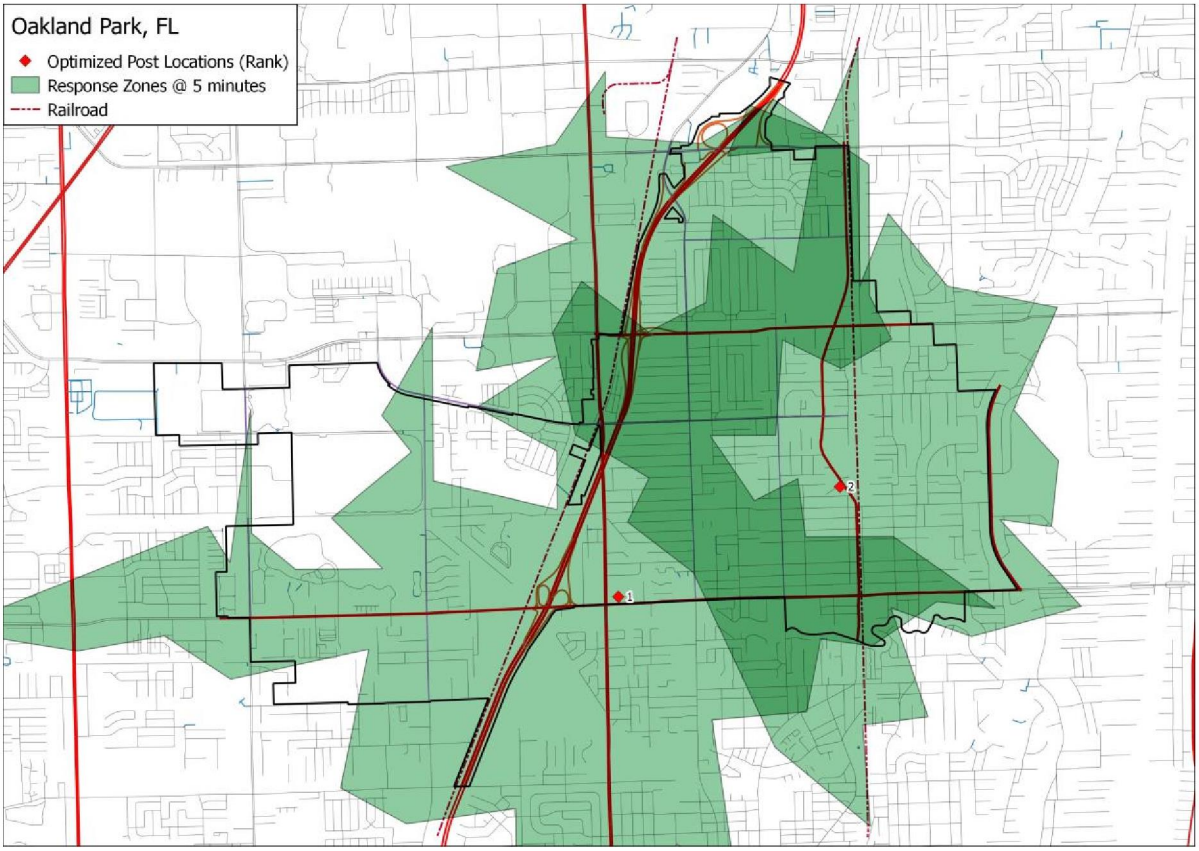
GIS Modeling was also employed to optimize performance at both the 5-minute and 6-minute performance levels of travel time.

The optimized model reflected below, with associated GPS coordinates. Reflects that at 5 minutes, greater than 90% coverage can be achieved with only 2 fire stations. These locations are reflected in the map below.

Figure 63: Marginal Utility of Optimized Locations - 5 minutes

Rank	Latitude	Longitude	Post Capture	Total Capture	Percent Capture
1	26.166821	-80.153448	6514	6514	79.32%
2	26.175745	-80.133222	1073	7587	92.39%
3	26.184669	-80.173674	460	8047	97.99%
4	26.166821	-80.163561	126	8173	99.53%
5	26.166821	-80.133222	13	8186	99.68%
6	26.122203	-80.153448	6	8192	99.76%
7	26.184669	-80.183787	5	8197	99.82%
8	26.202516	-80.133222	4	8201	99.87%
9	26.175745	-80.102883	3	8204	99.90%
10	26.175745	-80.153448	1	8205	99.91%

Figure 64: Optimized Travel Time - 5 Minute Performance

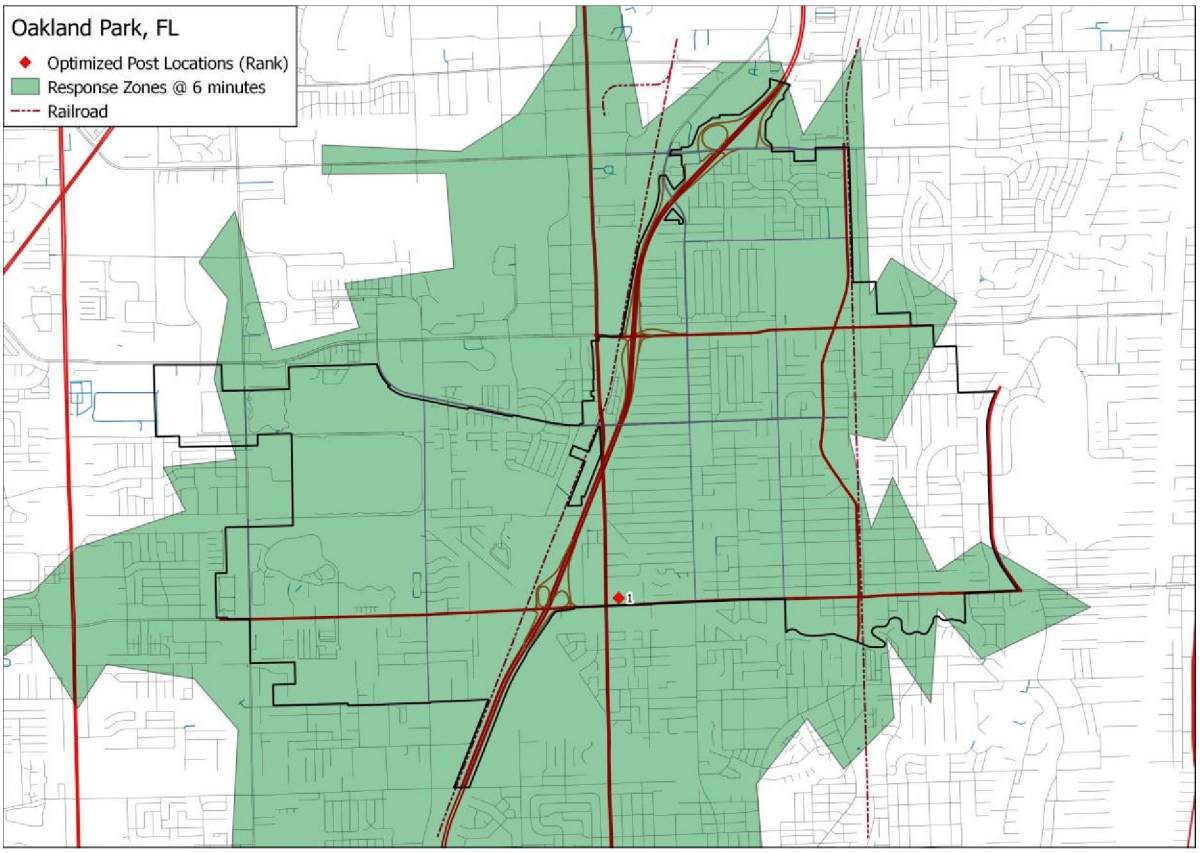


Upon modeling an optimized 6-minute travel time performance, it was determined a single fire station location as reflected below would provide the majority of the community coverage of nearly 95% within the 6-minute travel time. Those areas outside the green shading in Figure 66 would still receive coverage, though slightly beyond the 6-minute target. It is important to note these models consider only geographic coverage, and not that required to handle overall demand. Based on Oakland Park's compact municipal boundaries, this finding is not surprising.

Figure 65: Marginal Utility of Optimized Locations - 6 minutes

Rank	Latitude	Longitude	Post Capture	Total Capture	Percent Capture
1	26.166821	-80.153448	7772	7772	94.64%
2	26.193592	-80.133222	351	8123	98.92%
3	26.193592	-80.183787	72	8195	99.79%
4	26.166821	-80.112996	6	8201	99.87%
5	26.122203	-80.153448	6	8207	99.94%
6	26.166821	-80.133222	1	8208	99.95%

Figure 66: Optimized Travel Time - 6 Minute Performance



Overall assessment of the GIS modeling reflects there are potential future opportunities to allow the system greater performance and efficiency. However, it is likely this would need to occur when the city is able to consider replacement and or relocation of fire stations – all done in concert with other municipal partners should Oakland Park elect to develop a robust partnership with others, for example Fort Lauderdale.

Comparative Analysis

Overall, the aggregate current performance for the Department is consistent with baseline recommendations for Urban and Suburban densities from the Commission on Fire Accreditation International (CFAI). The average and 90th percentile compliance in travel time is shown below, along with that of other industry benchmarks.

Figure 67: Benchmark & Comparative Response Time Components for Oakland Park

Call Category	Average Travel Time	90th Percentile Travel Time	CFAI[14] 90th Percentile Urban Travel Time	CFAI[15] 90th Percentile Suburban Travel Time	CFAI[16] 90th Percentile Rural Travel Time	NFPA 1710[17] 90th Percentile BLS Travel Time	NFPA 1710[18] 90th Percentile ALS Travel Time	USFA[19] 90th Percentile Turnout and Travel
Fire	4:15	6:33	5:12	6:30	13:00	4:00	–	10:59
EMS	4:05	6:07	5:12	6:30	13:00	–	8:00	10:59

While the Broward County 911 Report did not include travel times, there was comparative information regarding chute times. These are summarized below comparing Oakland Park personnel against all Broward County fire rescue agencies. Overall, Oakland Park compares well on this metric.

[14] CFAI. (2009). Fire & *emergency service self-assessment manual*, (8th ed.). Chantilly, Virginia: Author.
[15] Ibid.
[16] Ibid.
[17] National Fire Protection Association. (2016). NFPA 1710, *Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments*. Boston, MA: National Fire Protection Association.
[18] National Fire Protection Association. (2016). NFPA 1710, *Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments*. Boston, MA: National Fire Protection Association.
[19] USFA. (August 2006). Structure fire response times: Topical fire research series, 5(7). Emmitsburg, Maryland: Author.

atTable 45: Comparative Chute Times - Oakland Park v. Broward Aggregate

	Chute Time (sec.)		
	Target at 90th (per NFPA 1710-2016)	Average	90th %
Oakland Park - EMS	60	70	120
Broward Aggregate - EMS	60	111	174
Oakland Park - Fire	80	136	151
Broward Aggregate - FIRE	80	138	197

CONCLUSION & SERVICE ENHANCEMENTS

Having considered the descriptive statistics of current system performance, risk profile as assessed by ISO independent evaluations, historical experience of the community, national fire experience, and GIS modeling of current performance, *FITCH's* opinion is that overall, the city is well-served by its fire department. As such, a policy that focuses on continuation of the existing service levels is well-justified.

Notwithstanding that assessment, there are also opportunities for the city to provide service level enhancements should they desire. The following discussion outlines these various opportunities. It is important to note the following opportunities can be implemented individually, collectively, or not at all. Through different mechanisms, each has the opportunity to enhance the current service levels, though policy-makers should consider potential impacts – operational and financial – in determining which they may wish to further pursue.

Nearest Unit Responses for Life Threatening Events

Broward County's Charter provides language that led to the development of a regional 911 system. The origin of that charter language was intended to facilitate the response of the closest fire rescue vehicle to any life-threatening emergency, regardless of jurisdictional boundaries.[20] GIS modeling, marginal utility analysis, and historical use of Fort Lauderdale resources when appropriate, all reflect the value to city residents that mutual aid and automatic aid can provide. In particular, GIS modeling demonstrates the greatest benefit is derived from Fort Lauderdale's Station #35 located at 1969 E. Commercial Blvd.

In concert with Broward County's current efforts to more fully deploy nearest unit response in life threatening emergencies, the city should consider strengthening its' relationship with Fort Lauderdale to appropriately use Station 35. This enhancement can be a cost-effective approach to improve responses in the eastern part of the city, especially areas east of the railroad tracks.

[20] Broward County Charter, Section 5.03 (A.), states "The County Commission with cooperation from Municipalities shall establish a countywide communications infrastructure for fire and emergency medical services. The County shall provide funding for the communications infrastructure and all service providers will utilize the elements of the communications infrastructure. The communications infrastructure shall facilitate closest unit response for life-threatening emergencies and support for regional specialty teams."

Place Into the City's CIP Program the Replacement of Station 9 and Station 20 to Optimized Locations

As noted in the GIS analysis, the city could optimize fire station placement and have a concurrent improvement in overall response time performance, as defined by travel time at the 90th percentile. Recognizing the age and condition of fire stations, specifically station 9 and station 20, there is an opportunity for the city to replace and relocate these two facilities.

With current travel time performance at the 90th percentile just over six minutes, the redeployment of stations 9 & 20, with continuing use of the existing station 87, is expected to reduce the 90th percentile travel performance significantly. Upon identification of potential future sites, further GIS analysis can better quantify these improvements.

Recognizing the timeframe to identify potential land for new stations, determine funding, engage design and construction professionals, the City should consider placing into their capital improvement plan (CIP) preliminary funding for site selection and procurement of land for use as future fire stations.

Develop Capability for Peak Hour Units (PHU), and Deploy an EMS PHU When Workload Demands

Typical of most fire rescue systems in Florida, Oakland Park deploys their resources utilizing a classic 24-hour shift. However, an increasing number of agencies are addressing growing demands for service through utilization of peak hour units (PHU), typically utilized during the busiest 12-hours of each day

As reflected in Figure 11, the busiest 12-hours of each day is from 8:00AM until 8:00PM. While reflecting 50% of a 24-hour period, this timeframe aligns with approximately 66% of the total emergency activity (63.2% for EMS and 67.5% for fire activity). The deployment of a single PHU can best be accomplished by the addition of four (4) new firefighter paramedic positions. Each individual is typically assigned a schedule that includes working an average 42-hour weekly schedule, encompassing three 12-hour shifts one week and four 12-hour shifts the alternate week. Experience in other Florida cities, including St. Petersburg, show these units have a significant impact on the system overall, while being well received by fire personnel once the system design is understood and assignment to these units occur in consultation with the labor organization. In order to accommodate normally scheduled time off, minimal amounts of overtime will also be required beyond the four additional FTEs.

While previous sections of this assessment demonstrate the strength of current system performance, EMS demands are continuing to increase. Therefore, depending on the current labor agreements in place, it may be necessary to amend existing provisions to allow for this efficient approach to be implemented when service demands increase to a level that justify their use.

Attachment A

Welch t-test

FITCH

Attachment A. Welch t-Test

Welch's t-Value Equation for Unequal Populations with Unequal Variances

N_1 = Number of samples in distribution 1

$\overline{X}_1$ = Mean of distribution 1

σ_1 = Standard deviation of distribution 1

N_0 = Number of samples in distribution 2

$\overline{X}_0$ = Mean of distribution 2

σ_0 = Standard deviation of distribution 2

Z = Degrees of Freedom (Welch-Satterwaite equation)

$$t = \frac{\overline{X}_1 - \overline{X}_0}{\sqrt{\frac{\sigma_1^2}{N_1} + \frac{\sigma_0^2}{N_0}}}$$

Degrees of Freedom for Unequal Populations with Unequal Variances

Z = Degrees of Freedom (Welch-Satterwaite equation)

$$Z = \frac{\left(\frac{\sigma_1^2}{N_1} + \frac{\sigma_0^2}{N_0}\right)^2 (N_1 - 1)(N_0 - 1)}{\left(\frac{\sigma_1^2}{N_1}\right)^2 (N_1 - 1) + \left(\frac{\sigma_0^2}{N_0}\right)^2 (N_0 - 1)}$$

p-Values Tabulated as a Function of t-Values and Z

t Table

cum. prob	$t_{.50}$	$t_{.75}$	$t_{.80}$	$t_{.85}$	$t_{.90}$	$t_{.95}$	$t_{.975}$	$t_{.99}$	$t_{.995}$	$t_{.999}$	$t_{.9995}$
one-tail	0.50	0.25	0.20	0.15	0.10	0.05	0.025	0.01	0.005	0.001	0.0005
two-tails	1.00	0.50	0.40	0.30	0.20	0.10	0.05	0.02	0.01	0.002	0.001
df											
1	0.000	1.000	1.376	1.963	3.078	6.314	12.71	31.82	63.66	318.31	636.62
2	0.000	0.816	1.061	1.386	1.886	2.920	4.303	6.965	9.925	22.327	31.599
3	0.000	0.765	0.978	1.250	1.638	2.353	3.182	4.541	5.841	10.215	12.924
4	0.000	0.741	0.941	1.190	1.533	2.132	2.776	3.747	4.604	7.173	8.610
5	0.000	0.727	0.920	1.156	1.476	2.015	2.571	3.365	4.032	5.893	6.869
6	0.000	0.718	0.906	1.134	1.440	1.943	2.447	3.143	3.707	5.208	5.959
7	0.000	0.711	0.896	1.119	1.415	1.895	2.365	2.998	3.499	4.785	5.408
8	0.000	0.706	0.889	1.108	1.397	1.860	2.306	2.896	3.355	4.501	5.041
9	0.000	0.703	0.883	1.100	1.383	1.833	2.262	2.821	3.250	4.297	4.781
10	0.000	0.700	0.879	1.093	1.372	1.812	2.228	2.764	3.169	4.144	4.587
11	0.000	0.697	0.876	1.088	1.363	1.796	2.201	2.718	3.106	4.025	4.437
12	0.000	0.695	0.873	1.083	1.356	1.782	2.179	2.681	3.055	3.930	4.318
13	0.000	0.694	0.870	1.079	1.350	1.771	2.160	2.650	3.012	3.852	4.221
14	0.000	0.692	0.868	1.076	1.345	1.761	2.145	2.624	2.977	3.787	4.140
15	0.000	0.691	0.866	1.074	1.341	1.753	2.131	2.602	2.947	3.733	4.073
16	0.000	0.690	0.865	1.071	1.337	1.746	2.120	2.583	2.921	3.686	4.015
17	0.000	0.689	0.863	1.069	1.333	1.740	2.110	2.567	2.898	3.646	3.965
18	0.000	0.688	0.862	1.067	1.330	1.734	2.101	2.552	2.878	3.610	3.922
19	0.000	0.688	0.861	1.066	1.328	1.729	2.093	2.539	2.861	3.579	3.883
20	0.000	0.687	0.860	1.064	1.325	1.725	2.086	2.528	2.845	3.552	3.850
21	0.000	0.686	0.859	1.063	1.323	1.721	2.080	2.518	2.831	3.527	3.819
22	0.000	0.686	0.858	1.061	1.321	1.717	2.074	2.508	2.819	3.505	3.792
23	0.000	0.685	0.858	1.060	1.319	1.714	2.069	2.500	2.807	3.485	3.768
24	0.000	0.685	0.857	1.059	1.318	1.711	2.064	2.492	2.797	3.467	3.745
25	0.000	0.684	0.856	1.058	1.316	1.708	2.060	2.485	2.787	3.450	3.725
26	0.000	0.684	0.856	1.058	1.315	1.706	2.056	2.479	2.779	3.435	3.707
27	0.000	0.684	0.855	1.057	1.314	1.703	2.052	2.473	2.771	3.421	3.690
28	0.000	0.683	0.855	1.056	1.313	1.701	2.048	2.467	2.763	3.408	3.674
29	0.000	0.683	0.854	1.055	1.311	1.699	2.045	2.462	2.756	3.396	3.659
30	0.000	0.683	0.854	1.055	1.310	1.697	2.042	2.457	2.750	3.385	3.646
40	0.000	0.681	0.851	1.050	1.303	1.684	2.021	2.423	2.704	3.307	3.551
60	0.000	0.679	0.848	1.045	1.296	1.671	2.000	2.390	2.660	3.232	3.460
80	0.000	0.678	0.846	1.043	1.292	1.664	1.990	2.374	2.639	3.195	3.416
100	0.000	0.677	0.845	1.042	1.290	1.660	1.984	2.364	2.626	3.174	3.390
1000	0.000	0.675	0.842	1.037	1.282	1.646	1.962	2.330	2.581	3.098	3.300
z	0.000	0.674	0.842	1.036	1.282	1.645	1.960	2.326	2.576	3.090	3.291
	0%	50%	60%	70%	80%	90%	95%	98%	99%	99.8%	99.9%
	Confidence Level										

Attachment B

Stakeholder Feedback on Draft Report

FITCH

Stakeholder Feedback on Draft Report

Page	Feedback	Fitch Response
7	Stakeholder recommended removal or clarification of NFIRS comparison data to that of Oakland Park's loss experience. State that 'previous management directed not to estimate property / content loss in all structure / vehicle fires . . .'	Data utilized was limited to incident records with a dollar loss reported. Found that Oakland Park fire reports do provide dollar losses for all 3 years examined.
10	Related to adaptive staffing of Station 20, it was recommended to adjust the analysis to reflect those times when adaptive staffing was in place versus when it was not in place due to increased available staffing.	Fitch's analysis only examined when operating in an 'adaptive' deployment, and not when full staffing of 5 personnel was in place.
10	Asked that Fitch provide "comparisons on departments in Tri-County area who have Class 1 or 2 departments with regard to staffing, training, etc." as related to the City's ISO rating.	No change - such analysis was not within the scope of this study.
15	Generally questioned if the department has "adequate staffing to account for vacation and sick usage without incurring overtime costs or employee fatigue? How many employees do we need per shift per day?" Specifically requested Fitch provide "data on overtime and to calculate a staffing factor for the agency.	Staffing, as used within the report, refers to daily minimum staffing required for each day. It does not reflect the full-time equivalents (FTEs) necessary to be funded in the budget to achieve the daily minimum staffing. The scope of work did not specify the calculation of a staffing factor, nor was Fitch provided the requisite data to perform such an analysis.

Stakeholder Feedback on Draft Report

Page	Feedback	Fitch Response
24	Referring to Table 1, questioned if with a reported 26.1% of CAD records containing an 'error condition', "can an accurate recommendation be made . . .?" Specifically asked to "provide [the] overall effect error conditions have on data" and to "provide error conditions from [the] Regional 911 Report"	The requested error conditions are stated in Table 1. Nearly all the error conditions identified in Table 1 reflect the failure to capture a time stamp(s) within the response sequence. In those circumstances, the related incident cannot be considered in calculating certain descriptive statistics. However, the majority of descriptive data was not impacted by these issues. Even if all incidents with an error condition were rejected, the sample size based on the population is 73.9%. With no basis to assume a sampling bias in selecting the 15,221 incidents, the statistical inferences drawn within the report remain valid.
27	Referring to Table 4, questioned impact of mutual aid and ability to achieve a timely transport vehicle on-scene. Question if adaptive response impacted mutual aid. Specifically requested that Fitch "provide NIST study on EMS response specifically time-to-task analysis, effects on patient care, overall patient care."	The NIST studies are based on simulated data, while this analysis is reporting descriptive statistics based on actual performance of Oakland Park fire rescue resources as captured by CAD. Fitch did not specifically evaluate time-to-task on EMS calls. Fitch did evaluate response time impacts from adaptive response, but intermediate tasks were not evaluated separately. This question was not asked, nor is there any basis to believe intermediate tasks would be impacted.
55	Referring to Table 26 and Figure 36, noted that Station 9 is the primary back-up to Station 20's primary response area. Questioned what impact does adaptive staffing have on the workload distribution and would a 'fully staffed' Station 20 change the workload distribution.	The data reported in Table 26 and Figure 36 reflect the geographic distribution of incidents, not the primary station which handled the incident. There is no impact on workload among stations.

© Fitch & Associates, LLC

Stakeholder Feedback on Draft Report

Page	Feedback	Fitch Response
71	Referring to Figure 53, generally question if response time variance for Station #20 is due to adaptive staffing, the impact of staggered response times, would Station #20 be able to increase their ability to handle calls within their primary response area. Specifically requested that Fitch "provide NIST study on EMS response specifically time-to-task analysis, effects on patient care, overall patient care."	The NIST studies are based on simulated data, while the report utilizes data based on actual performance of Oakland Park fire rescue resources as captured by CAD. Empirical data does not support an identifiable outcome that can be attributed to adaptive staffing.
77	It questions how the adaptive response analysis is impacted if 26.5% of CAD records have missing data, the Station was 'fully staffed' for 102 days of the year, and the impact of mutual aid and the reported response times and workload for Station #20.	The adaptive staffing analysis utilized a t-test to differentiate response times for when R220 was already on a call versus when they were not. The sample size was statistically valid, therefore the loss of some data from CAD would not impact the analysis unless there is evidence of a selection bias - none was identified. The use of unit 'R220' already excludes the 102 days in which Station #20 was 'fully staffed'. The impacts from mutual aid and 'extended response times' were addressed in the analysis as response time was the dependent variable. In summary, none of these issues affect the validity of the adaptive staffing analysis.
82-87	Questions how GIS modeling is impacted when units are already on calls, and from adaptive staffing.	Actual performance was aligned with the modeled performance of the system based on a 6-minute travel time and three fire stations. Therefore, the GIS modeling reflects travel time, as supported and calibrated by actual performance.

Stakeholder Feedback on Draft Report

Page	Feedback	Fitch Response
N/A	Cites the RFP from the City and comparisons of staffing levels and utilization and training operations.	See response above related to p. 15 and staffing levels. Final report edited to reflect increased discussion of fire prevention, training and management structure. The report does provide community comparisons across various factors - see Figure 5; Figure 67; Table 40; Table 45
91	Regarding the future option for peak hour units (PHUs), questions if the 4 personnel provides full staffing and the cost for this option.	The 4-person staffing related to operation of a PHU does not include a relief factor. As noted in the report text, this would most efficiently be covered by overtime. The opportunity dealing with PHUs suggests the City work with labor to ensure the capability to deploy UHUs at some future time. There should be no cost to ensure the capability. The cost to deploy, at some future date, will depend on future labor, operating and capital costs yet to be determined.
N/A	Complete report as requested in contractual agreement. Specifically:	
	Question 4 Unit Utilization including effects of adaptive response.	Fully addressed in report. Specifically see current deployment strategy on p. 11; response history starting on p. 27; and adaptive staffing analysis starting on p. 77
	Question 5 Review of Management structure with considerations.	See current staffing structure / organizational structure beginning on p. 15. Final reported edited to expand discussion.
	Question 6 Assessment of Training programs and identify current future capabilities	See current staffing structure / organizational structure beginning on p. 15. Final reported edited to expand discussion.
	Question 7 Conduct an Analysis of the effects from mutual aide	See section on mutual aid starting on p. 26 and nearest unit response starting on p. 90
	Question 10 Alternate Fire Rescue service delivery methods	See sections on nearest unit response starting on p. 90 and peak hour units starting on p. 91
	Question 14 Assist in developing reporting tools, charts etc.	Feedback provided to Fire Chief under separate cover to address recommended periodic reporting.

Stakeholder Feedback on Draft Report

Page	Feedback	Fitch Response
57-59	Questions if unit hour utilization (UHU) is accurate based on the 26.1% error conditions noted in the report.	UHU calculations only require two time stamps - when dispatched and when available/cleared. Examination of Table 1 reflects less than one-half of one percent (0.00496) of vehicle data records could not be utilized in the UHU calculations. This is an acceptable error rate for a UHU analysis.

FITCH

& ASSOCIATES