CENTER FOR PUBLIC SAFETY MANAGEMENT, LLC

DEPARTMENT OF PUBLIC SAFETY OPERATIONS ANALYSIS

PLYMOUTH, MICHIGAN

CPSM®

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ICMA

Exclusive Provider of Public Safety Technical Services for
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THE ASSOCIATION & THE COMPANY

The International City/County Management Association (ICMA) is a 100-year-old, nonprofit professional association of local government administrators and managers, with approximately 9,000 members spanning thirty-two countries.

Since its inception in 1914, ICMA has been dedicated to assisting local governments in providing services to their citizens in an efficient and effective manner. Our work spans all the activities of local government — parks, libraries, recreation, public works, economic development, code enforcement, Brownfields, public safety, etc.

ICMA advances the knowledge of local government best practices across a wide range of platforms including publications, research, training, and technical assistance. Its work includes both domestic and international activities in partnership with local, state, and federal governments as well as private foundations. For example, it is involved in a major library research project funded by the Bill and Melinda Gates Foundation and is providing community policing training in Panama working with the U.S. State Department. It has personnel in Afghanistan assisting with building wastewater treatment plants and has had teams in Central America providing training in disaster relief working with SOUTHCOM.

The **ICMA *Center for Public Safety Management* (ICMA/CPSM)** was one of four Centers within the Information and Assistance Division of ICMA providing support to local governments in the areas of police, fire, EMS, emergency management, and homeland security. In addition to providing technical assistance in these areas we also represent local governments at the federal level and are involved in numerous projects with the Department of Justice and the Department of Homeland Security. In each of these Centers, ICMA has selected to partner with nationally recognized individuals or companies to provide services that ICMA has previously provided directly. Doing so will provide a higher level of services, greater flexibility, and reduced costs in meeting members' needs as ICMA will be expanding the services that it can offer to local governments. For example, The Center for Productivity Management (CPM) is now working exclusively with SAS, one of the world's leaders in data management and analysis. And the Center for Strategic Management (CSM) is now partnering with nationally recognized experts and academics in local government management and finance.

Center for Public Safety Management, LLC (CPSM) is now the exclusive provider of public safety technical assistance for ICMA. CPSM provides training and research for the Association's members and represents ICMA in its dealings with the federal government and other public safety professional associations such as CALEA. The Center for Public Safety Management, LLC maintains the same team of individuals performing the same level of service that it has for the past seven years for ICMA.

CPSM's local government technical assistance experience includes workload and deployment analysis using our unique methodology and subject matter experts to examine department organizational structure and culture, identify workload and staffing needs, and identify and disseminate industry best practices. We have conducted more than 315 such studies in 42 states and 224 communities ranging in size from 8,000 population (Boone, Iowa) to 800,000 population (Indianapolis, Ind.).

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SECTION 1. EXECUTIVE SUMMARY

The Center for Public Safety Management, LLC (CPSM) was commissioned to review the operations of the Plymouth Police Department as well as the operations of Northville Fire Department which provides fire services to the City on a contractual basis. CPSM also looked at the EMS operations provided by Huron Valley EMS.

CPSM made these reviews to determine the best course of action for the City of Plymouth to provide Public Safety Services to the community. CPSM considered four options: continuing "as is" with police services directly provided by Plymouth and fire services continuing from Northville; Plymouth assuming oversight and administration of a stand-alone fire department as well as the existing police department; merging police and fire into a Department of Public Safety through the City of Plymouth; and looking at contracting with another entity for fire services. While our analysis covered all aspects of the department's operations, areas of focus of this study include: identifying appropriate staffing of the department given the workload, community demographics, and crime levels; the effectiveness of the organizational structure; and efficiency and effectiveness of division/unit processes.

We analyzed the department workload using operations research methodology and compared that workload to staffing and deployment levels. We reviewed other performance indicators that enabled us to understand the implications of service demand on current staffing. Our study involved data collection, interviews with key operational and administrative personnel, focus groups with line-level department personnel, on-site observations of the job environment, data analysis, comparative analysis, and the development of alternatives and recommendations.

Based upon CPSM's detailed assessment of the City of Plymouth, it is our conclusion that the police department, overall, provides exceptional quality law enforcement services. The existing contract agreement between Plymouth and Northville provides fire services but the culture of the two organizations is in conflict. CPSM found the staff, assigned to the Plymouth station, is professional and dedicated to the mission of the department; descriptions of the department and city in charrettes and one-on-one meetings consistently produced the consensus that a collegial or family atmosphere existed. The major challenge that stretches across, and contributes to many other issues within the department, is different cultures and leadership expectations between the City of Plymouth and Northville.

Another major issue that conflicts the two city response is the EMS system. Plymouth has a robust agreement with Huron Valley Ambulance which has a headquarters and maintenance facility in Plymouth. It provides excellent response to the City at no cost and has also entered into other cost-sharing arrangements such as maintaining the city's fleet with its mechanics. Northville receives its EMS services through Community Emergency Medical Services with units that are dynamically deployed in the area but not stationed in Northville. The differences are apparent because Northville purchases an ambulance for use when CEMS is not available; Huron Valley provides one at no cost to Plymouth.

The EMS issue is critical to decision making because the majority of calls to the fire/EMS are for EMS. The Township of Plymouth is reviewing a proposal for EMS transport from Huron Valley that would strengthen the ability to regularly position ambulances in the community. The Charter Township of Northville provides its own EMS service but not to the City of Northville.

Through this report, we will strive to allow the reader to look inside the department to understand its strengths and its challenges. We sincerely hope that all parties utilize the information and recommendations contained herein in a constructive manner to make a fine public safety agency even better.

Following are our General Observations that we believe identify some of the more significant issues facing the department. Additionally, we have included a master list of recommendations for consideration; we believe these recommendations will enhance organizational effectiveness. Oftentimes, these types of recommendations require a substantial financial commitment on the part of a jurisdiction. In the case of the Plymouth Police Department and Northville Fire Department, some of the recommendations may require contract negotiations. It is important to note that in this report we will examine specific sections and units of the department; we will offer a detailed discussion of our observations and recommendations for each.

The list of recommendations is not extensive. We found the Plymouth Police Department well positioned and managed for change. Should the City of Plymouth choose to implement any or all recommendations, it must be recognized that this process will not take just weeks or even months to complete, but years. The recommendations are intended to form the basis of a long-term plan. The Plymouth Police Department is very stable; staff are hired and do not leave. While this affords the City an opportunity, it also creates a challenge for institutional memory and experience should the city embark on the public safety approach. Firefighting, as an example, is not so much what you have studied but what skills you have developed to mitigate an emergency.

GENERAL OBSERVATIONS AND RECOMMENDATIONS

Public Safety departments are a unique consolidation as evidenced that the majority of such departments exist in Michigan with few others in the other states. A challenge for public safety departments is achieving functionally cross-trained staffs. Across the United States, approximately 130 cities utilize the public safety concept in some form. At least one union has dedicated a web space to discourage public safety, postulating that the police and fire disciplines are incompatible. Make no mistake, merging the police and fire operations is difficult and, at initiation, expensive. Managing a fully functional, cross-trained public safety department takes special skill sets because the leader must deal with two distinct personality cultures that such departments incorporate: police tend to be trained as individualistic and capable of handling situations alone while fire departments tend to train and function as teams dependent upon each other. Fortunately, several community colleges near Plymouth graduate students with police and fire eligible certifications and degrees. CPSM and ICMA have taken no position on public safety but seek to provide comparison to best practices of each discipline drawn from around the world.

Most criticism of the public safety model centers on concerns that skills and competency in either the police or fire discipline are compromised. CPSM has found departments that have concentrated resources in one discipline or the other; in Plymouth there is an added dimension with on-call firefighters. CPSM was impressed with the caliber of policing taking place. In the fire discipline, the Northville department operates across two cities and the firefighters assigned seem to view themselves as two different departments. The Plymouth assigned staff culture is more management-engaged while Northville expressed less concern for concepts found in best service delivery models. In our ride-alongs and interviews with staff and surrounding agencies, the concerns on public safety were expressed. CPSM would note that these are not unique to Plymouth; CPSM has heard the same concerns expressed by traditional departments when commenting on 30-year public safety departments. The focus of the department and city should not be on addressing every one of these concerns; it should remain on providing the best possible customer service to citizens of Plymouth using the chosen model.

Plymouth will be competing in a job market that is at nearly full employment and that shows numerous unfilled police employment opportunities. CPSM is working with communities across Michigan and the United States who report numerous vacancies in the police department with no or insufficient candidates to fill those vacancies. In Plymouth the challenge would go one further step with the requirement that candidates also be trained as firefighters. Paid on call firefighters are also becoming more difficult to find because of the education requirements and time commitment required of these individuals. Plymouth has a good compliment currently assigned to its station that indicated a desire to remain; the challenge will be continued recruiting and maintaining that capability.

CPSM has undertaken extensive discussions with its team about how to best recommend initiating change within the Plymouth choices. We looked at four options available to the City of Plymouth:

1. Continue as currently deployed. The Police Department would remain under direct supervision and administration of the City Manager and City of Plymouth while fire services would continue to be provided by contract from the City of Northville.
2. Create a new, separate fire department in Plymouth to compliment the existing police department.

3. Create a Department of Public Safety that would merge the existing police department and add the fire services division.
4. Contract for fire services from another entity.

Continue as Currently Deployed

CPSM looked at the option to continue services as currently deployed. Should the City of Plymouth decide on this course of action, the contract with Northville should be strengthened to include specific performance measures, reporting standards, metric achievement, and focus on outcomes for service rather than simply a standard service model agreement. The standards listed in the Commission on Fire Accreditation International (CFAI) as administered through the Center for Public Safety Excellence provide a good reporting methodology. That process requires the creation of a self-assessment, development of short and long term strategic plans, creation and administration of stated standards of coverage performance, and regular review by peers.

Interviews with elected officials and administration indicated that there are problems with the existing provision of services. Plymouth has an exceptionally high expectation and culture of "best" service delivery. This "best" can be first noticed by calling the city; the menu is enthusiastic, upbeat, and dynamic. This expectation of excellence was found by CPSM throughout the organization and during interaction with city personnel and elected officials. The City of Northville, a smaller governmental unit, appears to not have as robust of an approach to the same demand for excellence at all levels; this creates conflict. The conflict was prominent during interviews with personnel assigned to the two cities. Plymouth staff understands that they are expected to deliver a robust and best service and were frustrated when that enthusiasm and ideal was not the same as when working with their Northville colleagues.

EMS will be an issue in any extension agreement. Plymouth receives excellent service from Huron Valley Ambulance at no cost to the city. Huron Valley also provides maintenance services for Plymouth equipment as well as an ambulance to the fire department for use in Plymouth. Northville uses Community Health for EMS. Huron Valley is bidding on a service proposal to Plymouth Charter Township which would minimize the footprint of Community Health's service area. Northville Charter Township Fire Department provides Fire and EMS services.

If the existing contract is to be continued, it should provide metric-based management and consideration should be given to forming an authority that would provide equal representation from both communities. If not changed, the department will continue to operate as two entities united only by name.

Extending the existing contract would not significantly increase costs paid by the City of Plymouth.

Elected officials did not view the existing arrangement favorably.

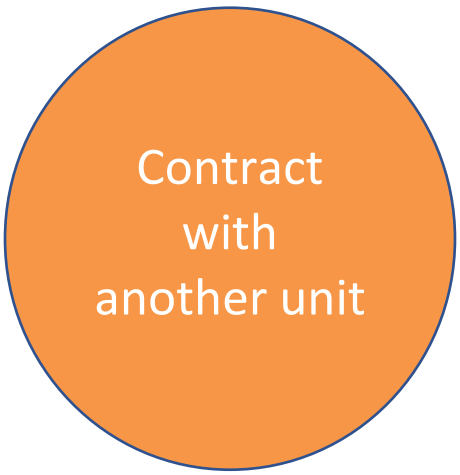
Create a Separate Fire Department

CPSM considered the option of providing a stand-alone and separate fire department in Plymouth. While this is an option because the City of Plymouth leases its equipment with regular replacement, owns its stations, has a robust paid-on-call team assigned, and has an excellent management team to support a fire department, it is not the ideal.

Creating a stand-alone department would require hiring full-time administrators for a department which responds to a limited number of calls. Because the EMS provider is located in Plymouth with an excellent service center, the fire department would be largely limited to a small number of fire calls for service. First responder services would usually be delivered by the already-dispatched police officers so dispatching additional responders would be duplicative and high risk.

In addition to hiring a separate chief and full-time staff for each shift (requiring a minimum of five full-time employees along with associated benefits), the best operation model would also require a full-time fire marshal to create a robust fire prevention program to eliminate or significantly reduce calls for service. The cost of a separate department would be in the range of an additional $420,000 per year.

A challenge that is to be acknowledged will be the continued ability to attract quality paid on call staff to the City. Throughout the United States, this is becoming more and more challenging because of the demands for training, education, and a life-work balance. Most of the calls for service in Plymouth come during daytime hours which is usually when paid-on-call are least available. How to staff for calls for service to meet demand may require additional full-time fire fighters to cover these hours, like a model used in the nearby city of Novi. These would be added costs and, coupled with legacy costs such as retirement, benefits, etc,, would be more expensive than the option of renegotiating the existing contract with Northville.



Contract with Others

CPSM considered the option of contracting with another governmental unit for fire protection. Plymouth Charter Township has its own Fire Department that used to provide service to Plymouth prior to Plymouth establishing the relationship with Northville. Northville Charter Township has its own fire department that also provides EMS services which would be an added expense for Plymouth. Other governmental units would require longer response times for second and additional units, thus being impractical.

CPSM did not feel this was a viable option.

Create a Public Safety Department

The fourth option that CPSM looked at was the creation of a public safety department with a police and fire division. CPSM envisions that there would be a director of public safety with a deputy director charged with fire day-to-day administration of fire but who could also function as director during absences caused by vacation, sick, leave, and training.

Ideally, the full-time police officers would be cross-trained in fire and medical first responder skills. Because of the immediate response of Huron Valley Ambulance, adding paramedic services should be limited; medical first responders or EMT's can assess patients, begin many life-saving procedures, and package patients for transport. Huron Valley usually arrives at the same time or just after Plymouth Police at this time; their units are paramedic staffed at no cost to the community; studies show that paramedic skills are negatively impacted when there are too many paramedics and not enough patients. The location of medical facilities also reduces the likelihood paramedic skills would be maximized.

There is capacity in the police department to handle this dual-role. The forensic analyses for both police workload and fire workload shows neither entity is approaching the saturation lines for deployment (usually more than 60% of available time spent on calls for service). The existing fire paid-on-call staff would be assumed into the new organization and it should be communicated that they are critical to the continued operations. POC expressed concerns they would be "eliminated" in a public safety model; nothing is further from the truth. The existing full-time employees would be first-due in any call for service with the paid on-call responding to create the full complement needed to handle various emergencies such as fire, major EMS calls, hazmat, etc. Ideally, they would see opportunity to further engage with the public safety department at special events and free full-time, paid public safety officers to roles more suited for their training.

Challenges to creating a department of public safety:

1. Communicating and building a team of police, paid-on-call, and staff.
2. Building acceptance through performance with nearby communities and departments. Automatic and mutual aid agreements should be developed with all surrounding agencies.
3. Training and contractual agreements with the existing police officers.
4. Development of policy, procedure, community risk assessment, and development of a standard of response coverage that integrates with emergency management situations.
5. Continued recruitment of full-time and paid-on call staff.
6. Future station configurations.

Costs

1. Additional administrative position (deputy director)
2. Full-time fire marshal to oversee inspections, investigations, fire prevention. City expressed a willingness to add this position under the existing agreement with Northville.

3. Initial training cost for police officers. This cost can vary considerably, depending on whether the training is conducted on overtime or during regular shift hours.

Plymouth Police Recommendations.

- Plymouth is one of the rare communities CPSM has recently worked with which doesn't have a recruitment and retention problem. People who are hired typically stay. This is a credit to the overall leadership within the department and its culture. Employees who were interviewed for this study commented on the family type culture. Should the City decide to pursue a public safety model retention of employees will be critical. The City will invest significant resources in their training. Losing fully trained employees will financially impact the City. During interviews many employees commented on the excellent pay and benefits package. The City should continue to its retention efforts.
- The Chief of Police is deploying resources using crime and traffic crash data and this practice should continue. While Plymouth has an extremely low crime and traffic crash rate, the residents deserve the highest level of crime prevention, crime detection and traffic safety. The Chief, his staff and the officers should be commended for their crime fighting strategies. This practice should continue.
- The data associated with individual and general police officer activities is comprehensive. Most police departments do a poor job of tracking and documenting individual officer's daily activities. Plymouth is the exception. Tracking the performance of individual employees is an important component in the overall management and leadership of any organization. While some employees may find the inputting of this data as annoying or "busy work", this data provides an accurate picture of who is doing what. This greatly assists the Chief, City Administration, and others in assessing individual and overall employee performance. The police department should be commended for this effort.
- Implement more frequent property room audits.
- Ensure complaints or issues, involving Plymouth Township dispatching services are followed up on and the resolution is reported back to the Plymouth Police Department.

Education and Training

- The department should continue to explore opportunities for additional training of its personnel. All employees receive mandated MCOLES training and, many officers, have received additional advanced police training. This practice should continue. It is also important to provide additional training opportunities for personnel to develop additional knowledge, skills and abilities. One of the the few complaints from employees were the limited opportunities.
- Implement a policy for daily training

Detective Bureau

- Participate in area detective meetings to share crime trend information, suspect information and intelligence
- Develop a system which tracks the status of cases submitted to the Wayne County Prosecutors Office.
- If a Department of Public Safety is created, a fire marshal position should be added; incorporating it in the Detective Bureau would add depth when investigating fire-related calls for service.

Plymouth Fire Recommendations

The following recommendation have been categorized into five separate groupings:

Organizational Structure and System Design

- Plymouth should assign a Fire Captain (lieutenant) or Acting Captain to serve as the officer in charge (OIC) of that facility while on-duty and is responsible for the supervision of all emergency response activities and administrative-personnel oversite.
- Plymouth should establish a departmental training steering committee that provides input regarding training topics, employee development, delivery techniques and overall program effectiveness. Ideally, Plymouth should develop a yearly competency testing for all personnel and base training on needs that are identified in the testing processes.

Dispatching Procedures and Radio Communications

- Plymouth should incorporate a prioritized dispatching process for fire and EMS responses which enables responding units to alter their mode of response on the basis of the incident severity.
- Plymouth should inject into the dispatching process the ability to eliminate units from responding on those non-emergent or minor EMS calls that could be handled by the ambulance provider. All units and staff should be tracked and recorded in reporting logs.
- Plymouth should install fire station alarm alerting systems at all fire stations that can be heard throughout the station living areas, the bay area and adjacent outside areas whenever an alarm is sounded. Fire stations should also be able to receive pre-alerts when emergency medical dispatching is implemented.
- When units are dispatched, the number of responders and times should be captured in the RMS system to enable workload audits.
- RMS should also identify mutual aid, automatic aid, and to which governmental area is aid being provided.
- Run cards or response protocols should be established for all properties and hazards using Standards of Response and All-Hazard Risk Management practices.

Operations and Deployment

- Insure that there are at least 3 on-duty patrol officers who are properly trained and available for fire response. During shift briefings the three should determine what functions they will provide on any fire call requiring personnel beyond that assigned to the fire operations. In other words, will they tag and dress the hydrants, perform internal attack, external, rapid intervention, etc.
- Insure that all Commanders and Sergeants are certified to the level of Firefighter 1 & 2, and are fully trained in structural firefighting tactical command, and incident management.
- Plymouth should evaluate the opportunity to engage in box alarm systems such as the MABAS (Mutual Aid Box Alarm System) used in large metro areas like Chicago and Phoenix. The MABAS type system would extend to its current working relationship with surrounding departments.
- All policies, procedures, rules and regulations should be incorporated in a new public safety department model.

Support Functions

- Plymouth should formalize its policy regarding pre-incident fire planning and require that all critical occupancies and target hazards have a completed pre-incident fire plan in accordance with NFPA-1610. These plans should be readily accessible on the mobile data terminals and are updated on a regular basis. Part of the pre-plan should include identification of resources needed to handle incidents at all properties in the community. Dispatch should follow the protocols and identified pre-planning when alerting units (first alarm, first due, and subsequent alarms).
- Plymouth should insure that the fire investigations unit is properly trained and equipped to conduct a fire investigation to determine the cause and origin of any fire and to determine fire loss estimates.
- The Plymouth Fire investigation Unit should prepare an annual report regarding all structure, vehicle and outside fires to determine the frequencies of fires in the community and the annual fire loss. The investigative unit should also review all fires in the community to identify any trends or patterns that may become the impetus for an orchestrated code enforcement or public education effort.
- All Plymouth fire stations should be equipped with bio-hazard decontamination and disposal areas along with areas for personnel and equipment clean-up.

As noted previously, key specific recommendations follow and are discussed in detail throughout the report. These recommendations are offered to enhance the operation of either the existing operations or a Plymouth Department of Public Safety. The recommendations listed here are meant to ensure that fire and law enforcement resources are optimally deployed, operations are streamlined for efficiency, and services provided are cost-effective, all while maintaining a high level of service to the citizens of the City.

CPSM staff would like to thank Chiefs Al Cox of the Plymouth Police Department and Stephen Ott of the Northville Fire Department and the entire staff of the Departments for their gracious cooperation and assistance in completing this project.

SECTION 2. METHODOLOGY

Data Analysis

CPSM used numerous sources of data to support our conclusions and recommendations for the Plymouth Public Safety decision process. Information was obtained from the FBI Uniform Crime Reporting (UCR) Program, Part I offenses, along with numerous sources of internal information. UCR Part I crimes are defined as murder, rape, robbery, aggravated assault, burglary, larceny-theft, and larceny of a motor vehicle. Internal sources included data from the computer-aided dispatch (CAD) system for information on calls for service (CFS).

Interviews

This study relied extensively on intensive interviews with personnel. On-site and in-person interviews were conducted with all division commanders regarding their operations.

Focus Groups

A focus group is an unstructured group interview in which the moderator actively encourages discussion among participants. Focus groups generally consist of eight to ten participants and are used to explore issues that are difficult to define. Group discussion permits greater exploration of topics. For the purposes of this study, focus groups were held with a representative cross-section of employees within the department.

Community Focus

In addition to departmental focus groups, CPSM interviewed persons in the community with which we interracted. Here, we solicited input from community members concerning their feelings toward the department, specific to its strengths, weaknesses, opportunities present for improvement, and threats to operational effectiveness.

Elected Officials Group

Additionally, CPSM interviewed elected officials from the city. Here, we solicited input from community members concerning their feelings toward the department, specific to its strengths, weaknesses, opportunities present for improvement, and threats to operational effectiveness.

Document Review

CPSM consultants were furnished with numerous reports and summary documents by the Department. Information on strategic plans, personnel staffing and deployment, monthly and annual reports, operations manuals, intelligence bulletins, evaluations, training records, and performance statistics were reviewed by project team staff. Follow-up phone calls were used to clarify information as needed.

Operational/Administrative Observations

Over the course of the evaluation period, numerous observations were conducted. These included observations of general patrol, investigations, support services such as records, communications, property and evidence, firefighting, and administrative functions. CPSM representatives engaged all facets of department operations from a "participant observation" perspective.

Staffing Analysis

In virtually all CPSM studies, we are asked to identify appropriate staffing levels. That is the case in this study as well. In the following subsections, we will extensively discuss workload, operational and safety conditions, and other factors to be considered in establishing appropriate staffing levels. Staffing recommendations are based upon our comprehensive evaluation of all relevant factors.

SECTION 3. COMMUNITY AND DEPARTMENT OVERVIEW

COMMUNITY OVERVIEW

Plymouth was settled in 1825, was incorporated in 1867 and became a city in 1932.

It was George Starkweather, the first child born to settlers in present Plymouth Township who later in 1871 recognized the importance of a railroad to a community and decided that the North Village of Plymouth would become the new center of town. He built a new store on the corner of Liberty and Starkweather and opened a road through is property for other new stores to locate. This area is presently known as "Old Village' or "Lowertown."

The railroad continues to be a predominant feature in Plymouth to this day; it is one of the reasons a second fire station was constructed in order to deploy equipment on both sides of the major track line. This track line can effectively divide the community when trains switch or stop to accommodate other rail traffic.

A meeting of the settlers was held on February 26, 1827 to select an official name for the community. The downtown area was known unofficially as "Podunk" and the north end of town at Main and Mill was known as "Joppa." At the meeting, the name "Peking" was proposed in honor of the Chinese city, since there was much interest in China in this country at the time. When the dust settled, the first choice was "LeRoy" but if that name was already in use, the second choice was "Plymouth" which was proposed for its historical ties to Plymouth, Massachusetts, the area from which some of the local settlers had come.

Territorial Governor Cass approved the nae "Plymouth" in April 1827 at which time Plymouth was established as a super township comprising the areas which are now Plymouth, Canton, and Northville. The south part of the area – Township Two South – was referred to as "South Plymouth." It became a separate township named Canton in 1834, again in response to the interest in China.

Community centers developed at both ends of Plymouth Township during the mid-1800's. The Village of Plymouth was incorporated by an act of the state legislature in March 1867. That same year, another legislative act established the Village of Northville. This resulted in a significant loss of political power to Plymouth Township, which then had two competing village governments working through the same Township Board.

Plymouth Township Divided

On a Saturday morning in March of 1898, some 100 residents of Plymouth Township met in the Opera House in the Village of Northville to decide whether Northville should set up its own township. Arguments for separation included the inconvenient travel distance required of Northville residents in dealing with the township board offices in Plymouth Township and the preferential maintenance attention which the bridges in the south part of the township received compared to the bridges in the north end of the township. The distance problem was supported by the fact that only 12 south-end residents attended the north-end meeting.

When the vote was taken, it was 40 to 30 in favor of splitting Northville Township from Plymouth Township. This final split reduced Plymouth Township from its original size of 72 square miles to its present size of 15.9 square miles. The Township of Northville and Plymouth are the only Michigan case of half-sized townships resulting from a split rather than annexation by a city.

This history has affected the City of Plymouth at several points. Plymouth had its own fire department until it contracted with the Township of Plymouth for services. Decisions by Plymouth Township led the City of Plymouth to seek the existing contractual arrangement with the City of Northville.

The City Commission consists of seven residents who then elect a mayor to lead the meetings and perform other ceremonial functions. Members of the City Commission may serve a maximum of three consecutive terms of office. City Commissioners are elected at large on a citywide basis.

Plymouth operates under a Commission/Manager form of government. This form of government combines the political leadership of elected officials in the form of the Plymouth City Commission with the managerial experience of an appointed city manager.

The City Commission serves as the legislative body for the city. Its responsibilities include enacting laws that govern the city, adopting the annual budget, and appropriating funds to provide city services. The City Commission also establishes policies executed through the administration. Most transactions require only a quorum or simple majority be present.

The City Manager is responsible for the business, financial, and property transactions of the city, as well as preparation of the annual budget, appointment and supervision of personnel, enforcement of city ordinances, and the organization and general management of city departments.

Plymouth is typical of many cities and towns across the United States in that it operates its own public works department, library, parks and recreation, and several internal functions including finance and human resources. Plymouth operates its own Police Department; fire is currently provided under contract with the City of Northville; EMS is provided through Huron Valley Ambulance Service.

The community is very well maintained as viewed by the CPSM team as it evaluated the community. The downtown is robust and includes a number of restaurants and other features that are normally not found in a smaller community such as Plymouth. The CPSM team was impressed that the downtown was busy in evening hours and a number of special events continue to draw extensive visitor crowds from surrounding areas as well as out-state.

DEPARTMENT OVERVIEW

A nationwide survey conducted by Michigan State University for the Bureau of Justice' COPS office showed 130 public safety departments across the country. The majority of those public safety agencies were located in Michigan with a scattering of this service delivery model found across other states. In the northeast, the public safety model is prohibited by state law in some states, the product of active union involvement.

The City of Plymouth directly administers its police department while fire services are provided under contract from the City of Northville and EMS is provided through Huron Valley Ambulance, a private provider. Plymouth receives an ambulance rig at no charge from Huron Valley. If the City were required to purchase this unit, it could expect to spend more than $250,000.

Public Safety Departments are unique. To put the numbers into perspective, there are 31,300 fire departments and 18,000 police departments in the United States. There are only 130 public safety departments and not all are fully cross-trained. Public Safety comes in several models: administrative consolidation where just administrators are cross-trained and operate separate police and fire departments; limited cross trained departments that may have combined administration and some service delivery functions cross-staffed; fully cross-trained and functional departments in which all full-time staff are trained; and combination departments with full-time cross trained staff augmented by paid-on-call or volunteer members that are trained in fire service delivery.

Starting a public safety department is expensive because of the need to cross-train individuals in both disciplines, provide personal protective equipment, field train, and then maintain competencies. Past decisions by the Northville administration will require all turn-out gear to be replaced at one time which costs about $4-$7,000 per person (depending on breathing apparatus cycles). Plymouth has anticipated this one-time cost thus the equipment expense is mitigated should the City pursue Public Safety; in the future, replacement should be replaced on regular cycles and not one-time. Plymouth will need to cross-train its police officers in firefighting techniques but, under Michigan practices, training can be contracted and conducted in house without the need to send staff away to colleges or other education centers. CPSM would suggest two sessions – one for days and one to accommodate night staff. The presentation at two sessions would limit the need for overtime pay to police officers attending the training. In the future, a hiring standard should be that candidates have completed both fire and police training to Michigan Standards and are eligible for certification. At least four Michigan Community Colleges graduate candidates possessing both eligibilities.

Plymouth is now served by a paid-on-call firefighter who administers the department day-to-day for Northville. CPSM would see no need to change this existing deployment system. For major calls, the paid-on-call staff are dispatched to the station and deploy with prescribed equipment. If Plymouth adopted the public safety model, it would have at least two full-time trained personnel to dispatch with the one assigned paid-on-call at the station and, depending on administration schedules, additional responders from command and detective units. Other paid-on-call would be alerted and respond to the station in the same manner currently utilized.

The paid-on-call expressed concern that they would be eliminated or minimized in any Public Safety consolidation; nothing is further from reality. The need for paid-on-call will remain for major EMS calls to assist Huron Valley and for fire calls that involve structures or large volume of fire, as well as many other emergency incidents. The response model should be customized for the level of service and resources needed to adequately handle a given situation. The response model should be review on a regular basis to ensure the highest level of service is being proved to the residents, business owners and visitors of Plymouth.

If Plymouth were to separate the police and fire departments, it would still need the same level of policing but would no longer be able to rely on those mobile deployed personnel for fire. NFPA 1720 standards that are used as a guideline for fire deployment in volunteer or public safety agencies would require up to15 firefighters on duty (minimum) per shift. Currently, Plymouth has four assigned (five with the commander) per shift so 12 additional would be needed on each of three shifts or 30 total (because of vacations, sick time and other leave, 33-35 would be necessary). Therefore, a public safety department and use of paid-on-call is critical to providing services to the City at little to no cost increase.

CPSM suggests that paid-on-call staff should be involved in department operations and be used to supplement full-time staff at the many special events in the community. Raising the value of paid on call is a low-cost investment with significant benefits during major emergencies. Paid on call and full-time staff should regularly train to build comradery and consistency in service delivery. Paid on call should be encouraged to ride along with Plymouth full-time staff in order to expose both parts of the department to demands of service.

Plymouth experiences few structure fires and enjoys a low crime rate with high clearance success. Those factors fit nicely with the public safety concept because capacity has to be available to successfully handle calls for service in each of the disciplines.

Uniform Crime Report/Crime Trends

While communities differ from one another in population, demographics, geographical landscape, and social-economic distinctions, comparisons to other jurisdictions can be helpful in illustrating how crime rates in the City of Plymouth measure against those of other local Michigan agencies as well as the state and the nation.

The FBI's Uniform Crime Reporting (UCR) Program assembles data on crime from police departments across the United States; the reports are utilized to measure the extent, fluctuation, and distribution of crime. For reporting purposes, criminal offenses are divided into two categories: Part 1 offenses and Part 2 offenses. In Part 1 offenses, representing the most serious crimes, the UCR indexes incidents in two categories: violent crimes and property crimes. Violent crimes include murder, rape, robbery, and aggravated assault. Property crimes include burglary, larceny, and motor vehicle theft. Crime rates are expressed (indexed) as the number of incidents per 100,000 population to allow for comparison.

Data acquired by CPSM from the FBI for use in this reporting reflects that which is most currently available (calendar year 2016). As indicated in Table 3-1, in 2016, the Plymouth Department reported a UCR Part I violent crime rate of 56 (indexed) and a property crime rate of 993 (indexed). The number of actual offenses in 2016 are shown as part of Table 3-1.

In comparing Plymouth Department data with other Michigan cities, one can see Plymouth reports below-average rates for both violent and property crime. CPSM observed a vibrant downtown with activity during daytime and night hours, regular patrols through the community, and found that residents expressed little safety worries when interviewed on the street. The low

crime rates are ideal for a public safety department. Capacity has to be available in police and fire to answer calls when departments are combined; if the departments are at capacity, combination only exacerbates the problems.

TABLE 3-1: Reported Crime Rates in 2016, by City

City	State	Population	Crime Rates		
			Violent	Property	Total
Addison Township	MI	6,532	77	811	888
Center Line	MI	8,332	480	2,352	2,832
Clawson	MI	12,053	91	614	705
Ecorse	MI	9,213	1,617	3,723	5,340
Farmington	MI	10,553	47	1,109	1,156
Flat Rock	MI	9,917	202	1,432	1,634
Grosse Pointe Park	MI	11,160	116	1,927	2,043
Harper Woods	MI	13,764	908	7,360	8,268
Highland Park	MI	10,810	1,739	2,794	4,533
Holly	MI	6,186	226	1,633	1,859
Huntington Woods	MI	6,360	31	676	708
Melvindale	MI	10,348	532	2,310	2,841
Milan	MI	6,012	183	1,663	1,846
New Baltimore	MI	12,409	169	774	943
Northfield Township	MI	8,617	151	1,253	1,404
Northville	MI	6,019	33	930	964
Richmond	MI	5,882	272	1,564	1,836
River Rouge	MI	7,480	1,056	2,487	3,543
Riverview	MI	12,127	305	1,583	1,888
Rochester	MI	13,050	61	506	567
Saline	MI	9,158	109	579	688
South Lyon	MI	11,801	59	424	483
Sumpter Township	MI	9,265	76	1,004	1,079
Walled Lake	MI	7,132	84	757	841
Wixom	MI	13,796	159	1,674	1,834
Woodhaven	MI	12,478	80	2,076	2,156
Plymouth	**MI**	**8,865**	**56**	**993**	**1,049**
Michigan		**9,928,300**	**459**	**1,910**	**2,369**
Nation		**323,127,513**	**386**	**2,451**	**2,837**

Note: Rates are indexed per 100,000 population. Source: FBI Uniform Crime Report

Figure 3-1 shows the trend in Part 1 crime in Plymouth over the ten-year period of 2007-2016. The figure shows that violent crime (already at extremely low levels) decreased slightly and property crime was reduced each year prior to a slight uptick in 2016. The highest property crime rate occurred in 2009, with the lowest seen in 2015.

FIGURE 3-1: Plymouth Reported Violent and Property Crime Rates, by Year

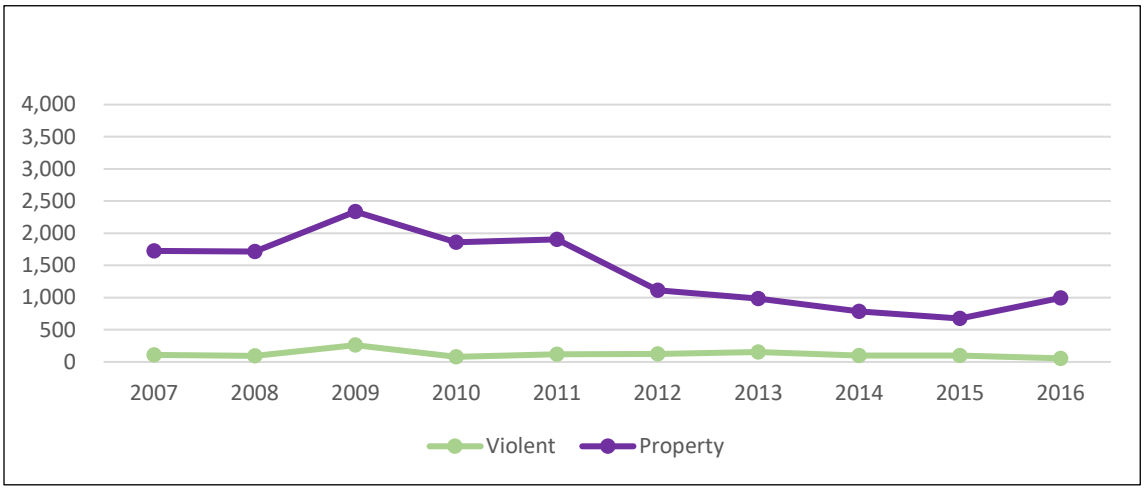


Figure 3-2 displays a comparison of combined violent and property crime rates for both Plymouth and the State of Michigan for the period of 2007 through 2016. Plymouth remains well below the State averages. It also shows that the indexed crime rate in Plymouth is lower than the state average.

FIGURE 3-2: Plymouth and Michigan Rates, by Year

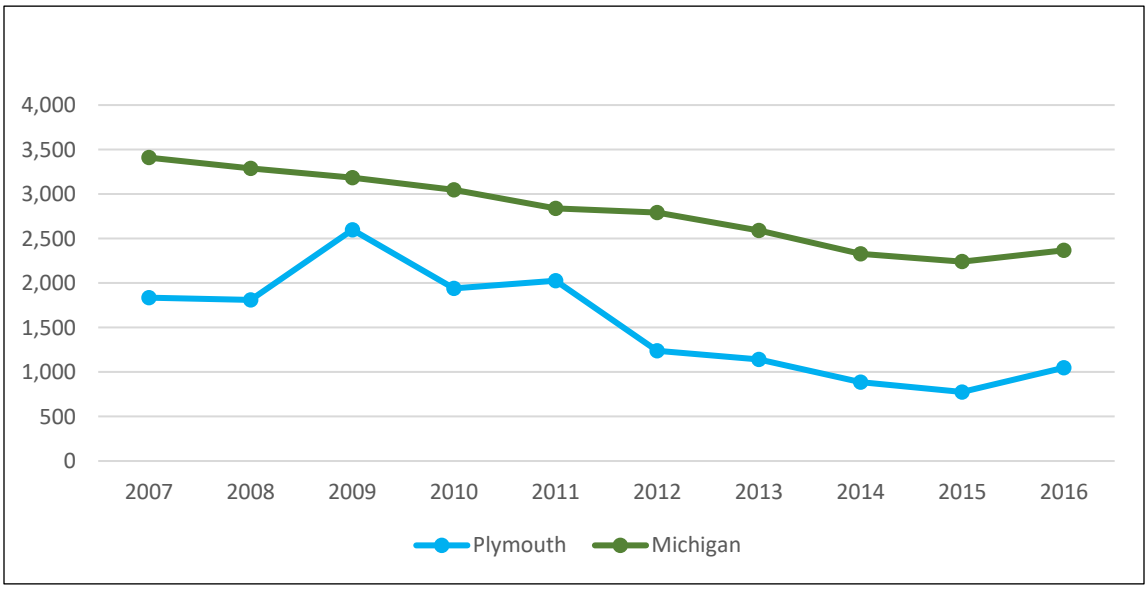


Table 3-2 compares Plymouth crime rates to both the state and national rates year by year for the period 2007 through 2016. Again, these data are indexed per 100,000 population. This information is provided for illustration purpose only.

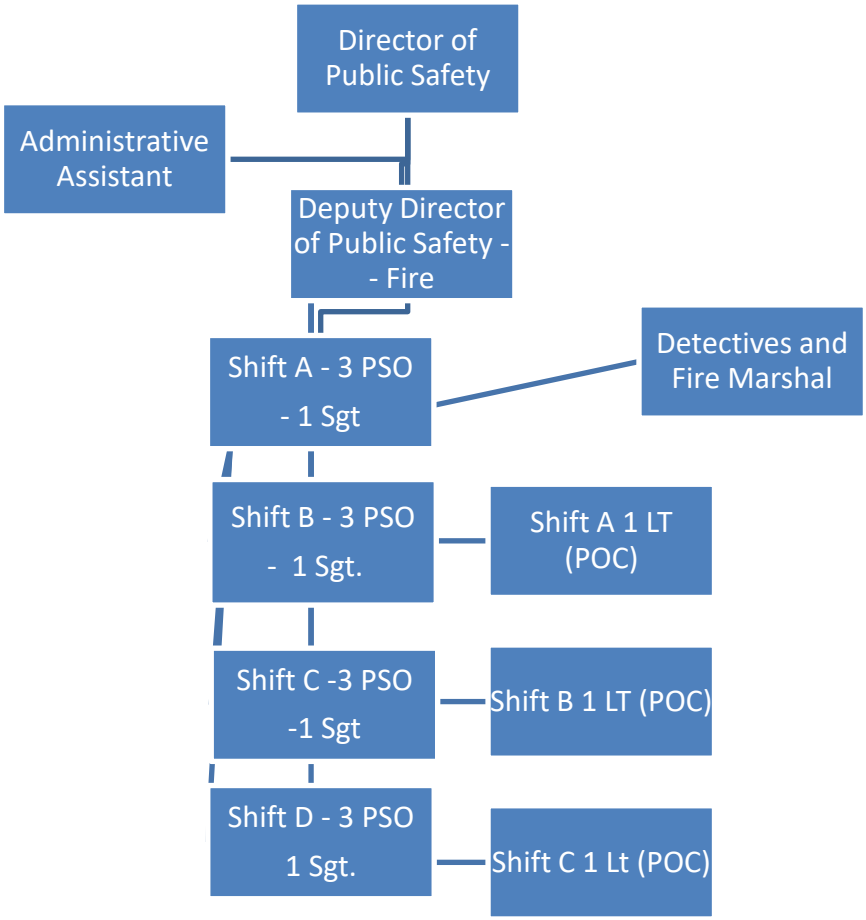
Table 3-3 compares Plymouth crime clearance rates to the state and national averages. These clearance rates are based upon the department's reporting to the UCR. As can be seen, the department's clearance of Plymouth is quite high, exceeding both State and National averages. This reflects well on the detective unit of Plymouth Police Department.

TABLE 3-2: Reported Plymouth, State, and National Crime Rates, by Year, 2007-2015

Year	Plymouth				Michigan				National			
	Population	Violent	Property	Total	Population	Violent	Property	Total	Population	Violent	Property	Total
2007	9,046	111	1,725	1,835	10,451,398	510	2,899	3,409	306,799,884	442	3,045	3,487
2008	8,622	93	1,717	1,809	10,376,520	491	2,798	3,289	309,327,055	438	3,055	3,493
2009	8,430	261	2,337	2,598	10,345,739	478	2,705	3,183	312,367,926	416	2,906	3,322
2010	9,132	77	1,862	1,938	10,307,062	468	2,579	3,046	314,170,775	393	2,833	3,225
2011	9,125	121	1,907	2,027	10,359,533	421	2,416	2,837	317,186,963	376	2,800	3,176
2012	9,047	122	1,116	1,238	10,366,035	429	2,363	2,792	319,697,368	377	2,758	3,135
2013	8,949	156	983	1,140	10,384,874	424	2,164	2,589	321,947,240	362	2,627	2,989
2014	8,912	101	785	886	10,410,762	406	1,922	2,327	324,699,246	357	2,464	2,821
2015	8,889	101	675	776	10,318,255	402	1,837	2,240	327,455,769	368	2,376	2,744
2016	8,865	56	993	1,049	9,928,300	459	1,910	2,369	323,127,513	386	2,451	2,837

TABLE 3-3: Reported Plymouth, State, and National Clearance Rates in 2016

Crime	Plymouth (2016)			Michigan (2015)			National (2016)		
	Crimes	Clearances	Rate	Crimes	Clearances	Rate	Crimes	Clearances	Rate
Murder Manslaughter	0	0	NA	622	243	39%	15,566	9,246	59%
Rape	2	2	100%	6,637	1,738	26%	111,241	40,603	37%
Robbery	2	1	50%	7,795	1,244	16%	306,172	90,627	30%
Aggravated Assault	1	1	100%	26,438	10,735	41%	744,132	396,622	53%
Burglary	12	1	8%	40,092	3,517	9%	1,393,570	182,558	13%
Larceny	65	12	18%	130,781	22,602	17%	5,211,566	1,063,159	20%
Vehicle Theft	11	5	45%	18,715	1,423	8%	714,041	94,967	13%



Proposed Organizational Chart

SECTION 4. ADMINISTRATIVE

STRATEGIC PLANNING

Plymouth Public Safety should create and follow a department strategic plan that integrates with city master plans. The strategic plan should include establishing a "Standard of Response Coverage" that outlines what levels of service will be provided, a comprehensive all-hazard risk assessment, and a report card on compliance efforts. Strategic planning is an organizational management initiative that is used to set priorities, focus energy and resources, strengthen operations, ensure that employees and other stakeholders are working toward common goals, establish agreement around intended outcomes/results, and assess and adjust the organization's direction in response to a changing environment. It is a disciplined effort that produces fundamental decisions and actions that shape and guide what an organization is, who it serves, what it does, and why it does it, with a focus on the future. Effective strategic planning articulates not only where an organization is headed, and the actions needed to make progress, but also how it will know if it is successful.

The department has expressed to CPSM that it realizes the importance of a strategic plan and is working toward that goal. CPSM recommends that the organization continue its effort to develop a strategic plan. CPSM also has a team that can assist the department with crafting the first strategic plan which should include identified components from this report for implementation. If the City of Plymouth continues with the existing contract from Northville, it should require a strategic plan, risk assessment, and standard of coverage with regular reports on meeting milestones.

The strategic plan and metrics should be regularly reported to the city council and in annual reports.

RECRUITMENT AND RETENTION

General Differences in Police and Fire Personnel

Police function and train as independent persons capable of performing the task. Fire functions and trains as a team with group participation and decision making. For that reason, finding individuals who function in both realms is an added challenge. A recent study reported by the U. S. Fire Administration showed that paid on call and volunteer firefighters enter the service with money being the least motivational factor for consideration. Service to community is the most important. No companion study has been conducted by the Bureau of Justice at this time but CPSM has found police often want a balance of work-life but value overtime less than members of the fire service.

Recruitment

POC and Internship Programs

Studies have found that new recruits often know by the time they graduate high school that they want to become police officers or firefighters. The department should regularly recruit from

local schools and at the many community events that it is looking for paid-on-call staff. While full-time personnel come to Plymouth and remain for careers, paid-on-call have opportunities at several local departments. Recruiting and maintaining a robust paid-on-call component in the public safety department will be critical to the long-term operations of a public safety department.

SECTION 5. OPERATIONS DIVISION

The Plymouth Police Department provides the community with a full range of police services, including responding to emergencies and calls for service (CFS), performing directed activities, and solving problems. The department is service-oriented, and thus provides an extremely high level of service to the community. Essentially, every call for service from the public gets a police response and every criminal case gets investigated. The department embraces this approach and considers every request for service from the public important and deserving of a police response.

CPMS was very impressed by the close relationship between the police department and the community. Many police departments publicly promote the concept of "community policing," but with little substance. It is clear to use that the Plymouth Police Department has a true partnership with the community which is an integral part of the agency's overall strategy. This relationship was not only evident during or discussions with community members but it was very visible during ride-a-longs.

PATROL DEPLOYMENT AND STAFFING

Uniformed patrol is considered the "backbone" of American policing. Bureau of Justice Statistics indicate that more than 95 percent of police departments in the U.S. in the same size category as the Plymouth Police Department provide uniformed patrol. Officers assigned to this important function are the most visible members of the department and command the largest share of resources committed by the department. Proper allocation of these resources is critical to have officers available to respond to calls for service and provide law enforcement services to the public.

Deployment

Although some police administrators suggest that there are national standards for the number of officers per thousand residents that a department should employ, that is not the case. The International Association of Chiefs of Police (IACP) states that ready-made, universally applicable patrol staffing standards do not exist. Furthermore, ratios such as officers-per-thousand population are inappropriate to use as the basis for staffing decisions.

According to *Public Management* magazine, "A key resource is discretionary patrol time, or the time available for officers to make self-initiated stops, advise a victim in how to prevent the next crime, or call property owners, neighbors, or local agencies to report problems or request assistance. Understanding discretionary time, and how it is used, is vital. Yet most police

departments do not compile such data effectively. To be sure, this is not easy to do and, in some departments may require improvements in management information systems."[1]

Essentially, "discretionary time" on patrol is the amount of time available each day where officers are not committed to handling CFS and workload demands from the public. It is "discretionary" and intended to be used at the discretion of the officer to address problems in the community and be available in the event of emergencies. When there is no discretionary time, officers are entirely committed to service demands, do not get the chance to address other community problems that do not arise through 911, and are not available in times of serious emergency. The lack of discretionary time indicates a department is understaffed. Conversely, when there is too much discretionary time, officers are idle. This is an indication that the department is overstaffed.

Staffing decisions, particularly for patrol, must be based on actual workload. Once the actual workload is determined the amount of discretionary time is determined and then staffing decisions can be made consistent with the department's policing philosophy and the community's ability to fund it. The Plymouth Police Department is a full-service police department, and its philosophy is to address essentially all requests for service in a community policing style. It is necessary to look at workload to understand the impact of this style of policing in the context of community demand.

To understand *actual workload* (the time required to complete certain activities) it is critical to review total reported events within the context of how the events originated, such as through directed patrol, administrative tasks, officer-initiated activities, and citizen-initiated activities. Analysis of this type allows for identification of activities that are really "calls" from those activities that are some other event.

Understanding the difference between the various types of police department events and the resulting staffing implications is critical to determining deployment needs. This portion of the study looks at the total deployed hours of the police department with a comparison to current time spent to provide services.

In general, a "Rule of 60" can be applied to evaluate patrol staffing. This rule has two parts. The first part states that 60 percent of the sworn officers in a department should be dedicated to the patrol function (patrol staffing) and the second part states that no more than 60 percent of their time should be committed to calls for service. This commitment of 60 percent of their time is referred to as the patrol saturation index.

The Rule of 60 is not a hard-and-fast rule, but rather a starting point for discussion on patrol deployment. Resource allocation decisions must be made from a policy and/or managerial perspective through which costs and benefits of competing demands are considered. The patrol saturation index indicates the percentage of time dedicated by police officers to public demands for service and administrative duties related to their jobs. Effective patrol deployment would exist at amounts where the saturation index was less than 60.

This Rule of 60 for patrol deployment does not mean the remaining 40 percent of time is downtime or break time. It reflects the extent that patrol officer time is saturated by calls for service. The time when police personnel are not responding to calls should be committed to management-directed operations. This is a more focused use of time and can include supervised allocation of patrol officer activities toward proactive enforcement, crime

[1] John Campbell, Joseph Brann, and David Williams, "Officer-per-Thousand Formulas and Other Policy Myths," *Public Management* 86 (March 2004): 22–27.

prevention, community policing, and citizen safety initiatives. It will also provide ready and available resources in the event of a large-scale emergency.

From an organizational standpoint, it is important to have uniformed patrol resources available at all times of the day to deal with issues such as proactive enforcement, community policing, and emergency response. Patrol is generally the most visible and available resource in policing, and the ability to harness this resource is critical for successful operations.

From an officer's standpoint, once a certain level of CFS activity is reached, the officer's focus shifts to a CFS-based reactionary mode. Once a threshold is reached, the patrol officer's mindset begins to shift from one that looks for ways to deal with crime and quality-of-life conditions in the community to one that continually prepares for the next call for service. After a point of CFS saturation, officers cease proactive policing and engage in a reactionary style of policing. The outlook becomes "Why act proactively when my actions are only going to be interrupted by a call for service?" Uncommitted time is spent waiting for the next call. The saturation threshold is generally considered to be 60 percent.

Rule of 60 – Part 1

The existing deployment models in the Plymouth Police Department provide excellent staffing coverage with workload remaining below 60 percent levels. When looking at expanding the department to cross-trained public safety, this workload level provides availability to respond to the limited calls for service that would be generated. Police already respond on medical calls which is the major demand from the fire department.

Rule of 60 – Part 2

The second part of the "Rule of 60" examines workload and discretionary time and suggests that no more than 60 percent of time should be committed to calls for service. In other words, ICMA suggests that no more than 60 percent of available patrol officer time be spent responding to the service demands of the community. The remaining 40 percent of the time is the "discretionary time" for officers to be available to address community problems and be available for serious emergencies. This Rule of 60 for patrol deployment does not mean the remaining 40 percent of time is downtime or break time. It is simply a reflection of the point at which patrol officer time is "saturated" by CFS.

This ratio of dedicated time compared to discretionary time is referred to as the "Saturation Index" (SI). It is CPSM's contention that patrol staffing is optimally deployed when the SI is in the 60 percent range. An SI greater than 60 percent indicates that the patrol manpower is largely reactive and overburdened with CFS and workload demands. An SI of somewhat less than 60 percent indicates that patrol manpower is optimally staffed. SI levels much lower than 60 percent, however, indicate patrol resources that are underutilized, and signals an opportunity for a reduction in patrol resources or reallocation of police personnel.

Departments must be cautious in interpreting the SI too narrowly. For example, one should not conclude that SI can never exceed 60 percent at any time during the day, or that in any given hour no more than 60 percent of any officer's time be committed to CFS. The SI at 60 percent is intended to be a benchmark to evaluate overall service demands on patrol staffing. When SI levels exceed 60 percent for substantial periods of a given shift, or at isolated and specific times during the day, then decisions should be made to reallocate or realign personnel to reduce the SI to levels below 60. Lastly, this is not a hard-and-fast rule, but a benchmark to be used in evaluating staffing decisions.

The CPSM data analysis in the second part of this report provides a rich overview of CFS and staffing demands experienced by the Plymouth Police Department. The analysis here looks specifically at patrol deployment and how to maximize the personnel resources of the department to meet the demands of calls for service while also engaging in proactive policing to combat crime, disorder, and traffic issues in the community. What is not reflected is the need to have available time in case of fires since police will respond to larger fire calls.

Figures 5-1 through 5-8 represent workload, staffing, and the "saturation" of patrol resources in the Plymouth Department of Public Safety during the two months (seasons) on which we focused our workload analysis. By "saturation" we mean the amount of time officers spend on patrol handling service demands from the community. In other words, how much of the day is "saturated" with workload demands. This "saturation" is the comparison of workload with available manpower over the course of an average day during the months selected.

The figures represent the manpower and demand during weekdays and weekends during the months of August 2016 and February 2017. Examination of these figures permits exploration of the second part of the Rule of 60. Again, the Rule of 60 examines the relationship between total work and total patrol, and to comply with this rule, total work should be less than 60 percent of total patrol.

In Figures 5-2, 5-4, 5-6, and 5-8, the patrol resources available are denoted by the dashed green line at the top. The 100 percent value indicates the total police officer hours available during the 24-hour period. This amount varies during the day consistent with the staffing of the shifts, but at any given hour the total amount of available manpower will equal 100.

The red dashed line fixed at the 60 percent level represents the saturation index (SI). As discussed above, this is the point at which patrol resources become largely reactive as CFS and workload demands consume a larger and larger portion of available time. The solid black line represents total workload experienced by the RPDPS.

Figures 5-1 and 5-2 present the patrol workload demands and SI for weekdays in summer 2016. As the figures indicates, the 60 percent threshold is surpassed at times and may be better managed with staggered patrol times; all staff should not start at the same time nor end at the same time.

FIGURE 5-1: Deployment and Workload, Weekdays, Summer

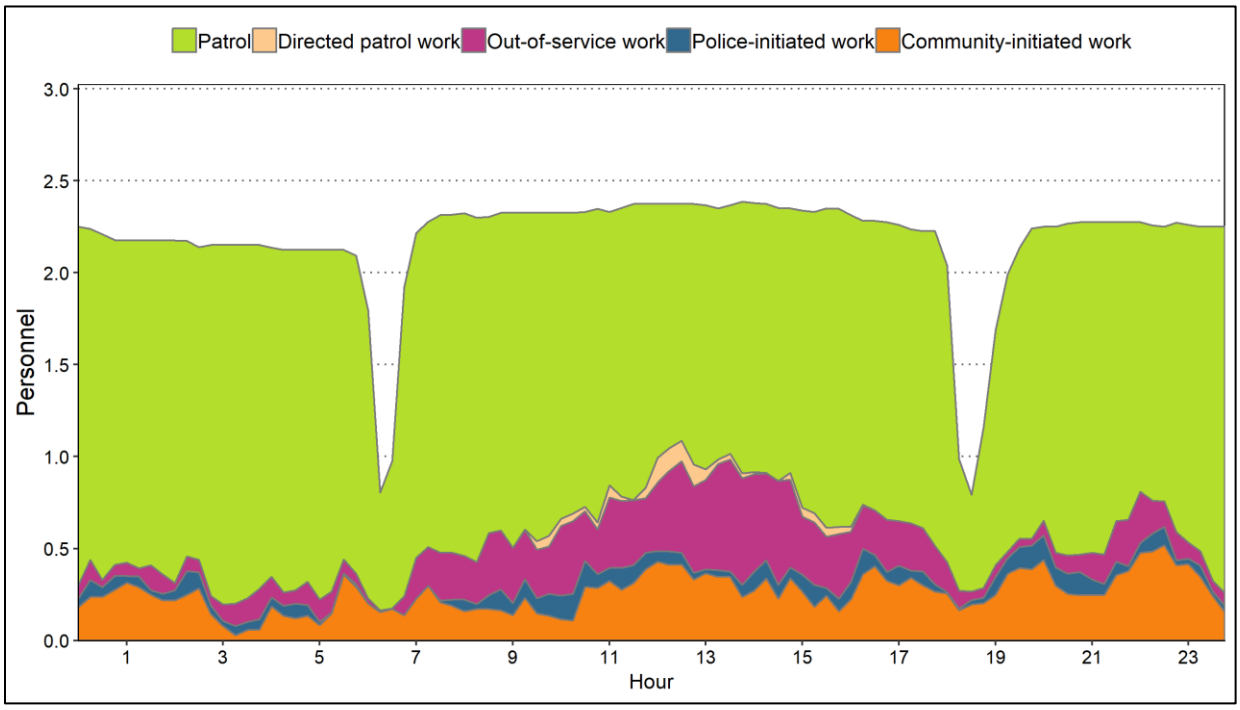


FIGURE 5-2: Workload Percentage by Hour, Weekdays, Summer

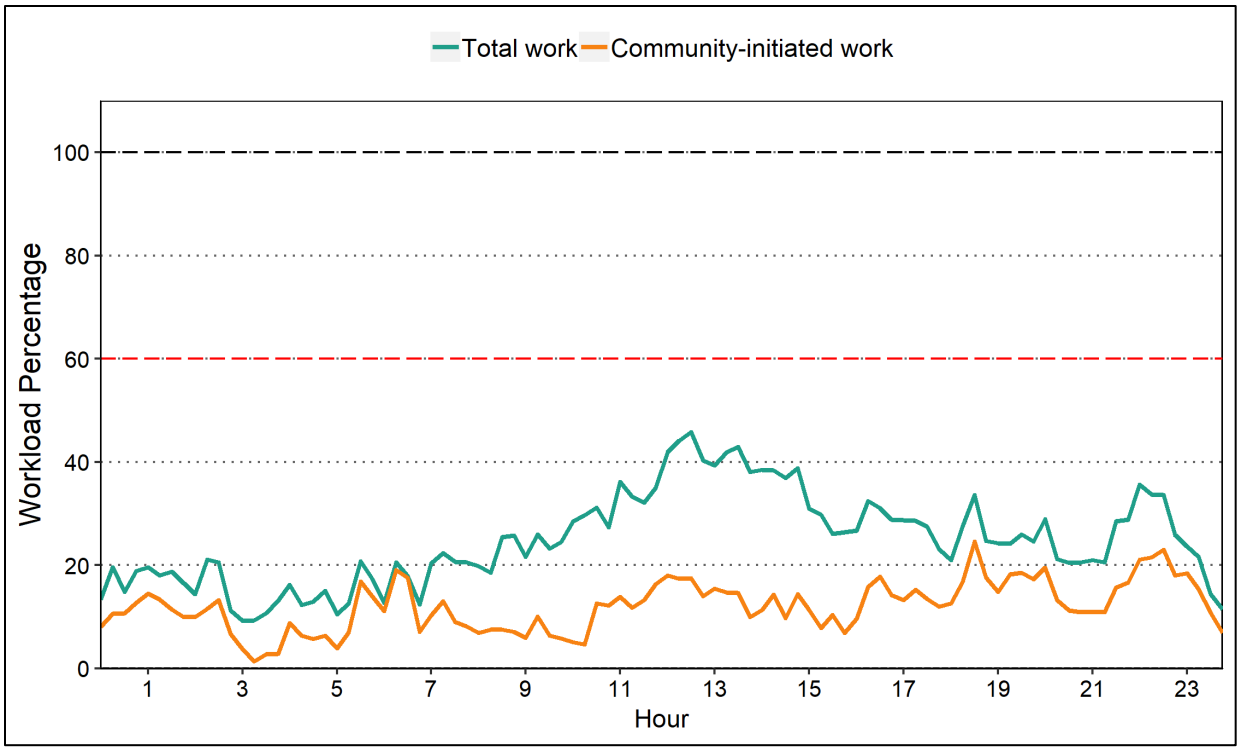


FIGURE 5-3: Deployment and Workload, Weekends, Summer

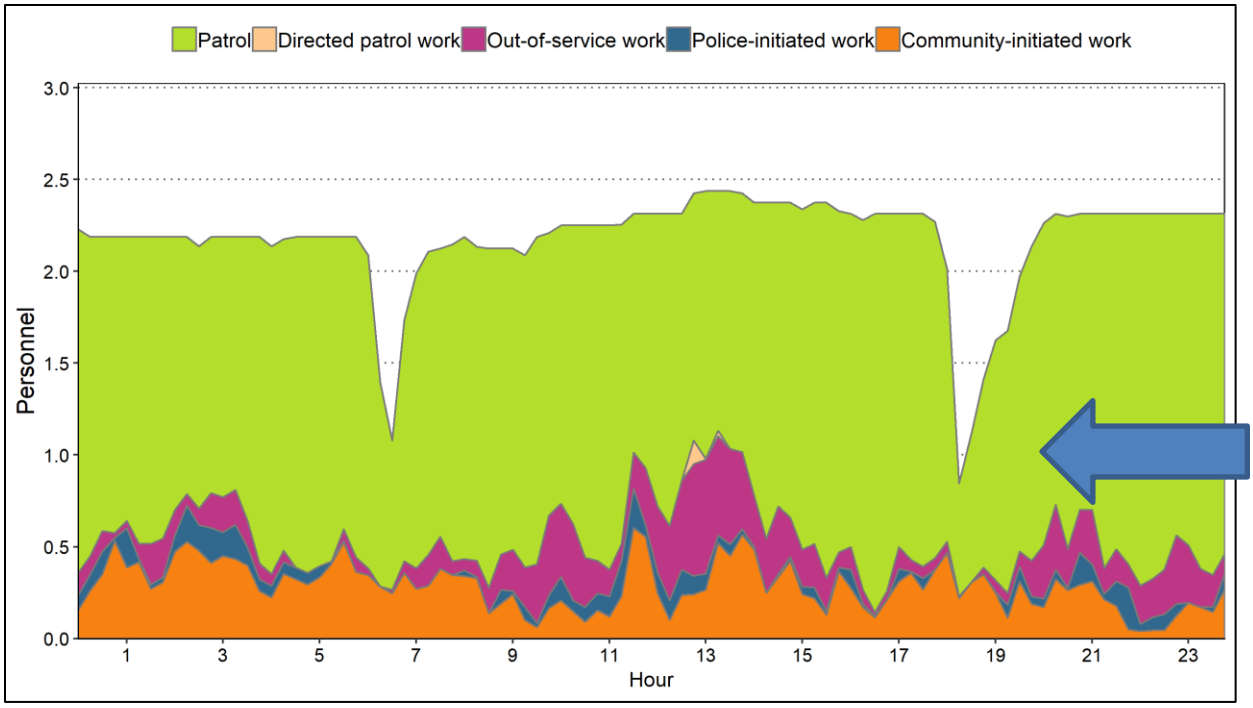
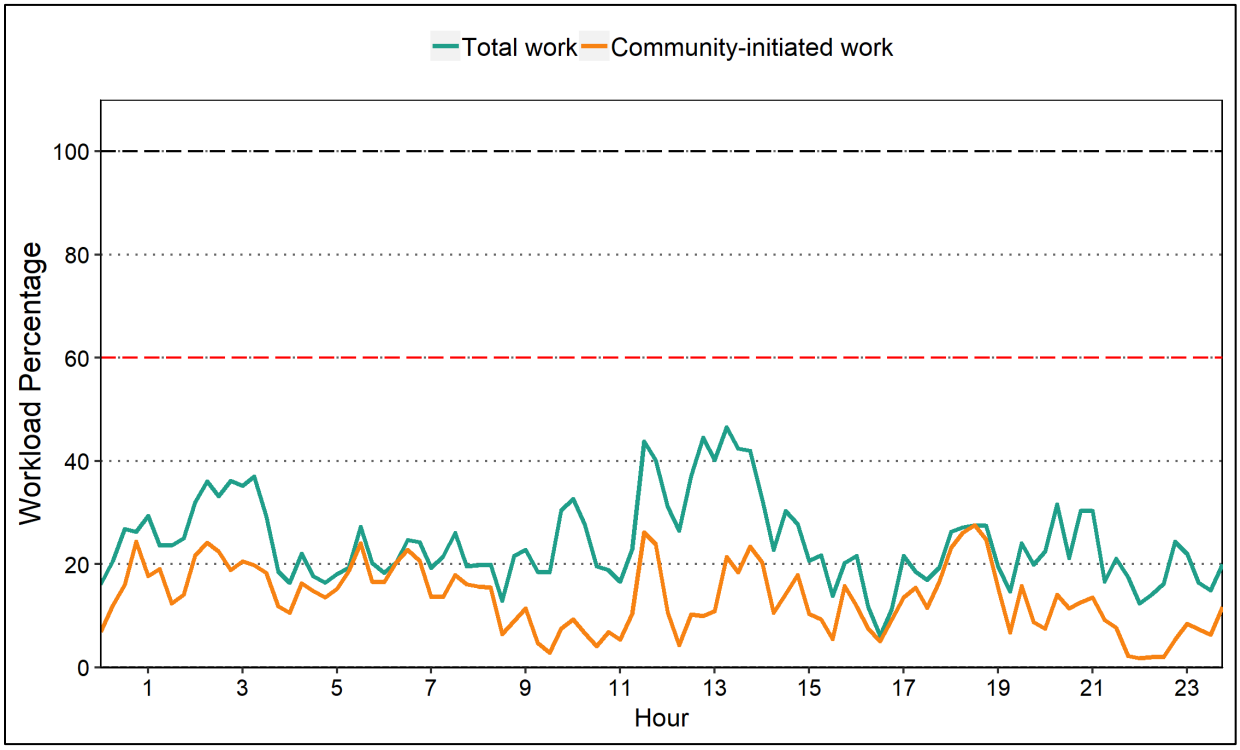


FIGURE 5-4: Workload Percentage by Hour, Weekends, Summer



Figures 5-3 and 5-4 present the patrol workload demands and SI for weekends in summer.

FIGURE 5-5: Deployment and Workload, Weekdays, Winter

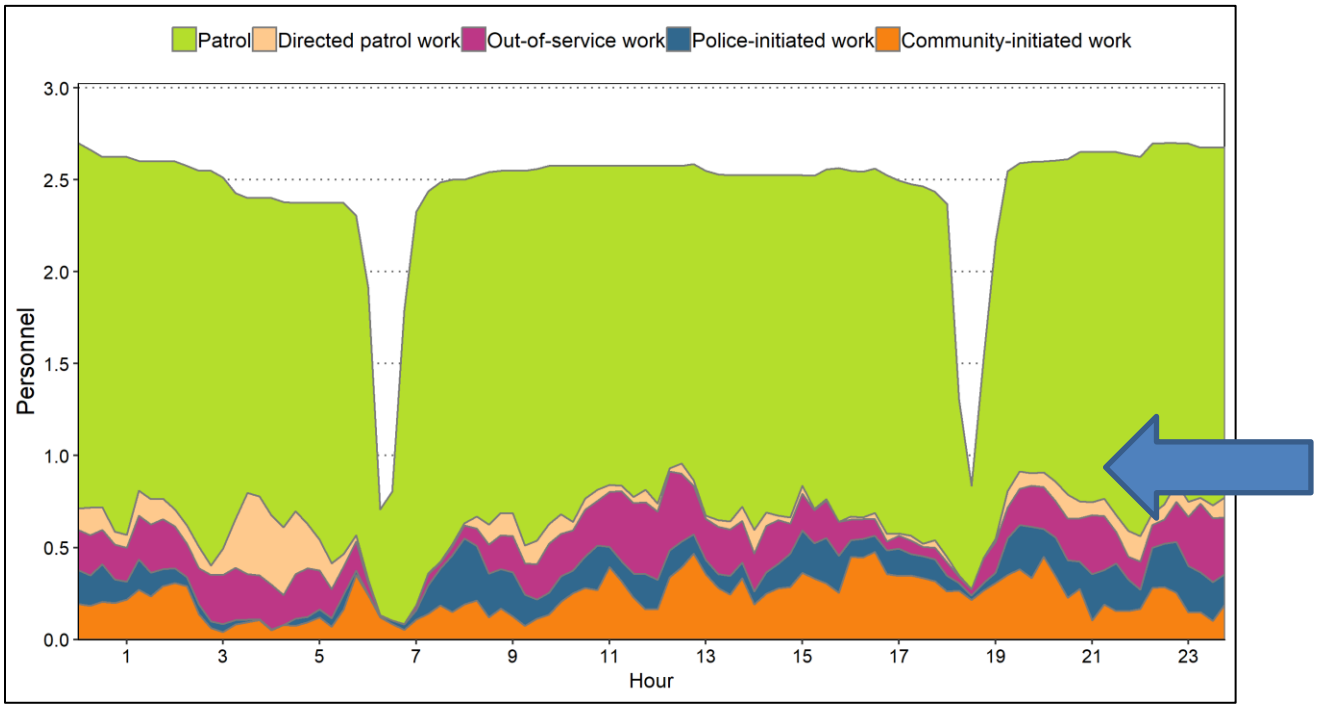
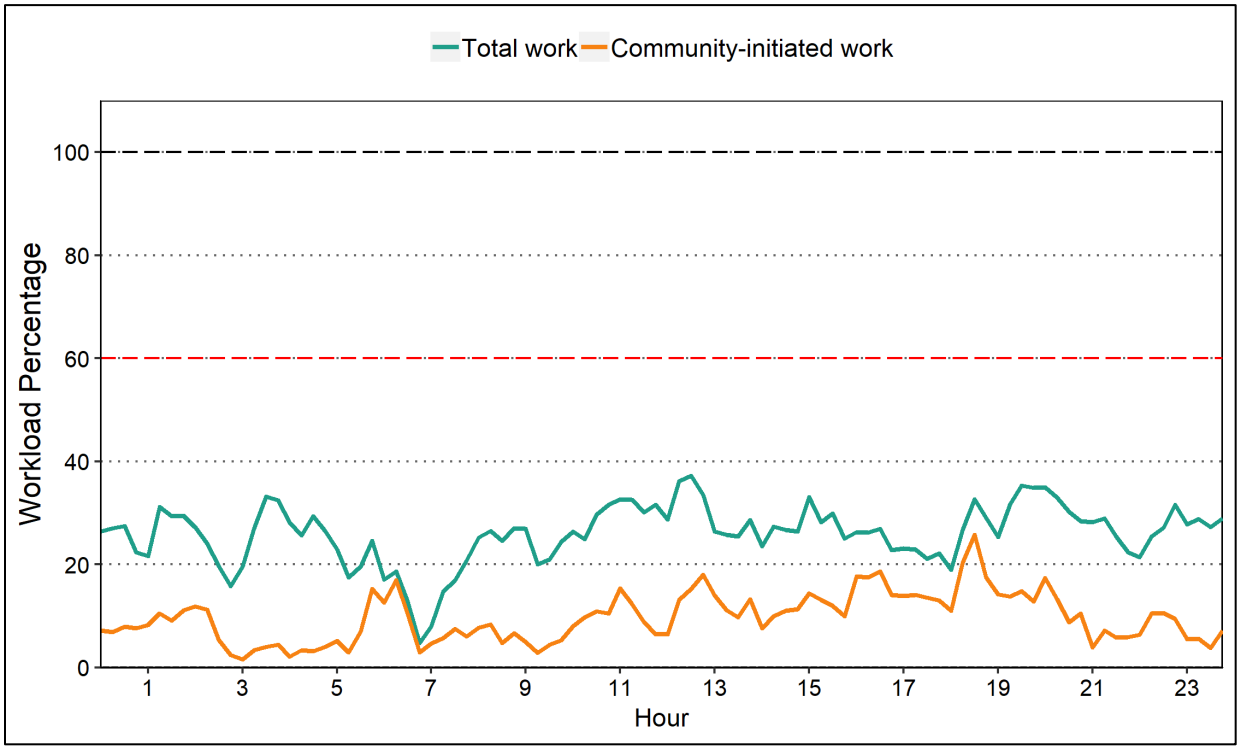


FIGURE 5-6: Workload Percentage by Hour, Weekdays, Winter



Figures 5-5 and 5-6 present the patrol workload demands and SI for weekdays in winter.

FIGURE 5-7: Deployment and Workload, Weekends, Winter

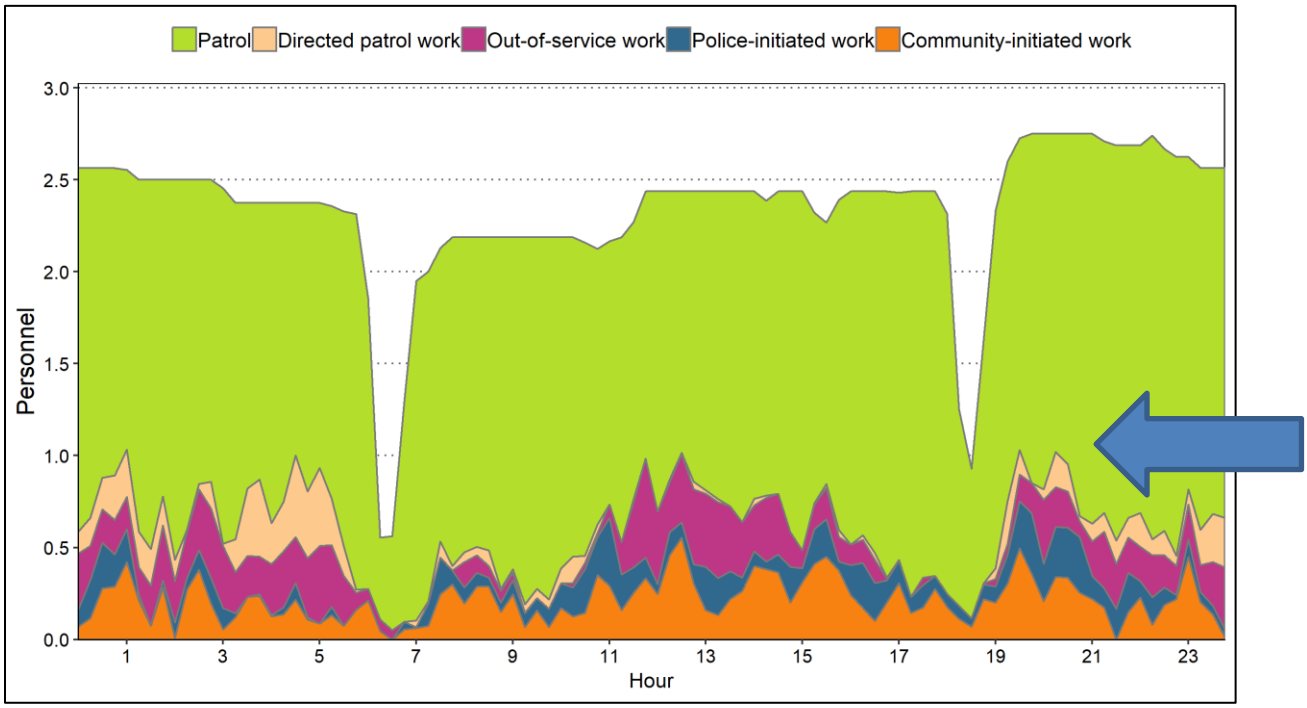
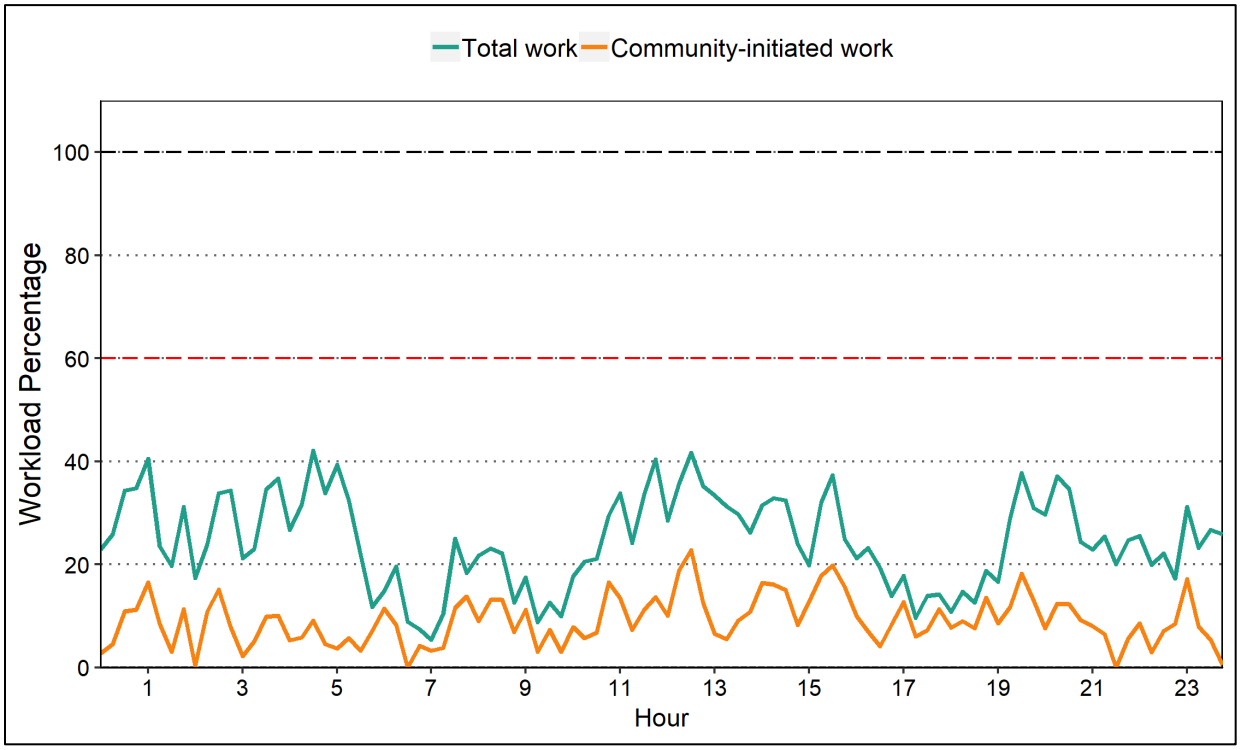


FIGURE 5-8: Workload Percentage by Hour, Weekends, Winter



Workload v. Deployment – Weekends, Winter

Figures 5-7 and 5-8 present the patrol workload demands and SI for weekends in winter.

SECTION 6. INVESTIGATION SECTION

INVESTIGATIONS

The department currently has one lieutenant and a detective assigned to investigate crimes and, on occasion, process crime scenes. The detective position is a 3 year assignment. The lieutenant and detective have received training in the wide variety of areas including, but not limited to, processing crime scenes, victim, witness and suspect interviews. When a serious or violent crime occurs which requires specialized training, the department relies on the Michgan State Police Crime Lab for evidence identification, collection and processing.

These personnel have received training in all of the important areas of investigation and, when an incident or crime is beyond the scope of their skills they properly rely on outside agencies for help.. At major scenes the department's resources are stretched too thin. CPSM recommends continuing to partner with other local agencies, like the Michigan State Police, to assist at or completely process the scene. This will allow department to focus on the follow up investigation.

Plymouth currently utilize a non-structured, ad hoc method of gathering and disseminating criminal intelligence with area departments. The lieutenant exchanges information by making telephone contact with or exchanging emails with his peers.

Intelligence gathering and sharing is imperative to the success of any crime fighting strategy and therefore it should be more structured. Research shows that criminals do not stop their criminal behavior when they cross a jurisdictional boundary. They frequently commit crimes in multiple cities. Frequently several jurisdictions may have a piece of the puzzle and by coming together they can assemble a complete picture.

- ***Participate in area detective meetings to share crime trend information, suspect information and intelligence***

  CPSM recommends Plymouth participate in monthly detective meetings for area departments. These meetings should be designed to share information on current open and solved cases where the suspect is believed to be committing crimes in other cities.

  These face to face meetings not only serve as a means of exchanging information, but they also bring together significant experience and expertise which can assist in solving crimes.

PROPERTY AND EVIDENCE

The intake, processing, storage, and disposal of evidence and property are important functions of any law enforcement agency. It is especially true for weapons, narcotics and dangerous drugs, currency, and valuable jewelry. Too frequently, law enforcement agencies across the country have faced the consequences of mismanaged property and evidence sections. This has resulted in terminations and arrests of police employees from janitors to police chiefs for thefts of narcotics, cash, jewelry, and guns. In some cases, audits that revealed unaccounted-for property and evidence led to the termination of police executives. Controlling access to the property and evidence areas, inventory control, and regular audits are critical to the effective management of the property and evidence function.

Property management software should allow the officer who initially processes the property/evidence to do so electronically and print out bar codes; one to attach to the item, and the second to attach to the electronically generated copy of the report once the Property and Evidence Section staff assign it a storage area. This can reduce the time involved in the intake of property/evidence.

RECOMMENDATIONS

Institute partial Property Room audits to every 6 months.

CPSM recommends conducting frequent partial audits. Biannual audits should be unannounced, involve a command member from an outside agency and the Chief of Police or his designee, preferably someone who doesn't have access to the property room . Unannounced audits allow the evaluators to determine the current status of the property room without giving employees time to prepare.

The outside agency command member should select 5 items from the property room records from each of the following categories: firearms, narcotics, money and random pieces of evidence. The person responsible for the day to day control of the property room should locate those items and present them for inspection. The items should be properly tagged according to department policy. If any irregularities exist they should be noted in the final report.

Next, 5 items from each of the above categories should be selected from the shelves. The property technician must produce the property record from the tracking system. This shows that the item belongs in the property room and was stored in the correct location. If any irregularities exist they should be noted in the final report.

At the conclusion of the audit a report should be generated. It should be reviewed and signed by everyone who participated in the audit. The memo should be forwarded to the Director and retained.

CASE MANAGEMENT

Develop a system which tracks the status of cases submitted to the Wayne County Prosecutors Office.

The department utilizes the Courts & Law Enforcement Management Information System (CLEMIS) as their report management system (RMS). CPSM is very familiar with this system and we believe it is an excellent system for managing law enforcement data, report status, and information. CLEMIS is, by a large margin, the most widely used system in Southeast Michigan. CLEMIS's professional administration and robust systems provide subscribing agencies with many tools to share date and intelligence. For agencies within Oakland county, CLEMIS provides a submission and tracking system for criminal cases submitted to the Oakland County Prosecutors Office. This allows law enforcement agencies to track the status of a case.

Unfortunately, the Wayne County Prosecutors Office does not utilize CLEMIS. Instead of submitting and tracking cases electronically, the Wayne County Prosecutors Office still uses a paper system. Agencies are required to fax their arrest warrant requests. This system doesn't provide for a means for tracking the status of the request.

The Wayne County Prosecutors Office receives thousands of warrant requests each year. It is not hard to imagine or understand how some of these requests may be unnecessarily delayed or lost. Examples of this can be seen in recent news articles where the Prosecutors Office acknowledged a backlog of hundreds, if not, thousands of felony warrant requests. While there is no reason to believe or evidence to suggest Plymouth personnel are not properly following up on warrant requests, an internal system should be put in place to track their warrant requests.

DISPATCH

Police and Fire dispatching is contracted with Township of Plymouth. During our meeting with various members of the police and fire personnel, several employees expressed concern over the lack of follow through on issues involving dispatchers. From time to time, police personnel have brought various issues to the attention of the Plymouth Township Dispatch Supervisor. While the supervisor has been receptive to the feedback, often times there is no apparent follow through or follow up on the complaint.

- ***Ensure complaints or issues are followed up on and the resolution is reported back to the Plymouth Police Department.***

During discussions with the chief, it was noted that the dispatch center does not assign units to respond on calls. Rather, the dispatch center alerts the appropriate station and provides information on the nature and location of the call. Which units actually respond is then determined by the Department, based on its General Orders, the needs of the call, the determination of the officer in charge, and the units and personnel that are available. An all-hazard risk assessment should be conducted on all properties in Plymouth and run cards or protocols established in dispatch using the Computer Aided Dispatch system.

The existing contract utilizes three stations – two in Plymouth and one in Northville. However, the existing Record Management System does not delineate from which station responders are leaving (or equipment). Should the City of Plymouth remain under contract, metrics and reporting should be created to better account for resource management. This was also found in a reference to operation of "eight light duty command vehicles." The fire chief indicated that this references the fact that officers and inspectors, each of whom is issued a radio and a personal call sign, will sometimes speak on the radio and get referenced in the CAD data. The "vehicles" involved would be these individuals' personal vehicles. So, for example, if Inspector 1726 drove by a reported car fire on the way to the station, s/he might get on the radio and advise dispatch that the vehicle is fully involved. S/He would then continue to the station, get equipment and respond on one of the trucks. In addition, just because someone who is assigned a personal call sign is not reflected as having a run, it does not mean that they were not there. It only means that there was no reason for that person to contact dispatch using their personal call sign. For accountability and workload metrics in the future, this should be corrected, particularly if the City of Plymouth extends the existing contract.

CPSM found reference to 19 structure fires during the time period covered by the study. The chief indicated that there are not that many in Plymouth or Northville in a given year so some could be mutual aid. Dispatch should be clarified to better report these discrepancies, particularly since it may impact overall response times. Mutual aid and automatic aid responses are likely to take longer simply because of travel. Mutual aid response is typically limited to one vehicle. An NFIRS (National Fire Incident Reporting System) report for a mutual aid call, will not typically include information such as loss values, leaving this to the report of the primary jurisdiction.

With respect to structure fires in the City of Plymouth, it is also important to note that there are assets responding to that call that are not stationed at the Plymouth stations. An engine from station 1 automatically responds, as do units from the Plymouth Township Fire Department. While NFD tries to account for station 1 assets on the report, the numbers will not reflect units responding from Plymouth Township or other mutual aid Departments. In addition, if needed, additional units from station 1 will respond and "fill in" at station 2 and handle any additional calls. The same works in reverse if the structure fire is in the City of Northville. Aerial 1722 automatically responds on such calls, and this would be reflected in the NFIRS report prepared at station 1 following the call.

Information on call duration reported to CPSM also had some irregularities. NFIRS reports were not always consistent about including report preparation and equipment rehab. Separate categories should be created to reflect:

1. Time call received.
2. Dispatch time (when units were alerted and whether they were first due, second, first alarm, second alarm, mutual aid, etc.)
3. Turnout time (time it took from alert to when wheels roll on vehicles)
4. Travel time (time from when wheels turned to when units arrive on scene)
5. Scene time (time to patient side and time spent on the scene)
6. Time at hospital (if medical call)
7. Time units returned to station.
8. Rehab time for equipment
9. Report time

SECTION 8. STATION COVERAGE

Recommendations made in various fire standards provide for coverage that needs to be evaluated for each individual community. Much of the response referred to in standards such as NFPA or the International Code Council are based on the amount of time between the alarm being raised and the ability to muster crews on a fire scene. The standards do not take into account the amount of time that occurs between ignition and the raising of the alarm which is critical to successful outcome and is managed either through wired alarm systems, sprinkler systems, or other monitoring. CPSM looked at the response times using special geographic information and found that stations are ideally located in Plymouth to achieve the necessary travel times.

The major issue that CPSM would raise is that plans should be made to consolidate police and fire into one building. CPSM reviewed numerous locations around Plymouth but none are available for purchase as police stations. The downtown area is robust and dynamic; the existing station and parking will continue to be an issue, particularly as more operations are consolidated.

Two options may be considered:

1. Locate parking underground at the city hall. Many cities with busy downtowns have found parking is better located underground versus occupying valuable surface real estate. CPSM did not look at ground water tables which may prohibit putting parking underground.
2. Station 2 could be expanded with the purchase of surrounding properties to accommodate police and fire operations. However, the railroad line does concern CPSM because if trains back up, stop for switching, or are otherwise blocking crossings, plans should be developed for automatic aid when calls for service are received.

Time is critical when attempting to intervene in medical calls for service involving (heart) beating, breathing, and bleeding. The American Heart Association estimates that for every minute between onset of Sudden Cardiac Arrest and application of an Automatic External Defibrillation (or CPR), the likelihood of patient save is reduced by 10%. In other words, 10 minutes from the witnessed event to intervention results in death (under normal circumstances).

Plymouth has AED's in its patrol cars which is one of the top priorities established by the American Heart Association and other initiatives. Having Plymouth (now police) trained as medical first responders or at some level of EMT would alleviate some of the critical medical concerns should trains divide the community. Automatic and mutual aid could minimize fire risks.

SECTION 9. MISCELLANEOUS

TRAINING

It is the responsibility of the Plymouth Police Department to provide relevant, current training to its members on an ongoing basis. Consistent with this responsibility, the Department should utilize a briefing training system. The goal of shift briefing training is to keep officers up to date between formal retraining programs.

The "Every Day Is A Training Day" program serves as a useful means of training personnel. Each day during the regularly scheduled briefing, a training topic can be covered. Examples include policy reviews, legal updates, and critical incident reviews. Policy reviews of low frequency high risk tasks should be a priority for this type of training. Examples are policies on officer involved shootings, use of tasers, use of force, and emergency driving. This type of training is usually limited to ten minutes or less. As with other types of training, the Training Coordinator may recommend this method as a means of accomplishing the desired training and require that all other standards of training, review, and documentation are complied with.

RECOMMENDATIONS

- ***Implement a policy for daily training***

SECTION 10. FIRE DIVISION

TRAINING AND SAFETY

Closely aligned with a more predictable and stabilized assignment process, it is necessary that Plymouth developed a very structured training and development process for its personnel who are assigned fire and EMS duties. The utilization of tasks books, formal training classes, on-line training curriculums, skills assessments, internships and annual proficiency reviews are recommended to be a part of this process. In structuring this training and development process, CPSM recommends that the Department establish a training steering committee to guide this process.

Full-time and paid on call staff should regularly train together in order to build a cohesive firefighting force. Both divisions should work special events and become "team." In public safety departments, having the POC and full-time staff operate as one team prevents fractioned operations and improves overall performance as well as comradery. One need only look at Novi to find that the full-time staff operate on days; POC evenings and under separate negotiated agreements. It is not ideal.

Recommendation: Plymouth should establish a departmental training steering committee that provides input regarding training topics, employee development, delivery techniques, and overall program effectiveness.

In addition to on-line skills development it is essential that all public safety officers are proficient and can demonstrate hands-on skills competency in a real fire environment. Actual live fire training is difficult to organize and schedule but is essential in developing and maintaining the necessary skills to operate effectively during real-time situations. It is therefore essential that live-fire training drills be carried out for all public safety officers and paid-on-call regularly. These drills should be conducted in a monitored and organized manner, in which full protective clothing and breathing apparatus is worn. Though these are simulated fire environments it is essential that the full array of safety considerations is incorporated into the drill.

Recommendation: Plymouth should develop an annual schedule that provides live-fire tactical training that incorporates basic firefighting tactics, incident command, pump practices, scene safety and other fire operations.

SECTION 11. SUMMARY

Throughout this report, we have endeavored to provide the reader with insight into options for the City of Plymouth. CPSM feels that either the existing agreement (renegotiated to provide a series of fire metrics) or creation of a Public Safety Department are the best options. Engaging input of elected officials indicates that the Public Safety model may be the best long-term solution for Plymouth.

Northville Fire Department has made great strides to integrate the existing department with other surrounding departments (Plymouth and Northville Townships, Novi, Canton). CPSM commends the fire chief for getting involved with surrounding chiefs and departments. Plymouth Public Safety will need to involve itself in these chief meetings and build relationships with surrounding agencies. Major incidents can quickly demand more resources than any individual community can afford; having pre-plans, prior working relationships, command and control decisions, and other protocols assists in bringing stability to times of chaos of major incidents.

The existing police department enjoys a very high level of support from the Council, Administration, and citizens. CPSM feels this professionalism could be of great benefit to whichever direction the City chooses.

We further recognize that implementing many of these recommendations, should the public safety department choose to do so, will take weeks, months, and in some cases, years. We would make ourselves available to consult as necessary and appropriate.

CPSM would point out that there are several areas to be considered in a council decision:

- Negotiating contracts to provide pay for cross-training to existing police officers. CPSM did not address this cost because it can vary greatly. Existing police are likely to request additional compensation for certification as firefighters.
- Future relocation of police and fire into a single building. CPSM spent time driving the community but most likely spaces are already targeted for development. The diverse and robust downtown district is less than ideal for locating a public safety facility. Parking is likely to be impacted, particularly during combined training and when responding to incidents. Conflict with merchants and property owners may develop.
- Plymouth already has its equipment under lease-purchase schedules, already owns its buildings, and turnout gear replacement is planned. These major costs normally associated with public safety are, therefore, eliminated when considering this option.
- Moving towards Public Safety enables the City to continue demanding its high standards are met and reporting is evaluated.
- Recruitment and retention of paid on call may be the most difficult challenge for creation of Public Safety. POC staff should be involved and made part of the solution in partnership with full-time team members.

CPSM believes the council has three of the four options available because of its excellent administration and history of providing services. All would meet the basic needs of Plymouth.

Budgetarily, there would be little/no change for the City for two of the four options. Plymouth already lease-purchases its equipment (unlike Northville which replaces at end-of-life). Plymouth

paid-on-call should not increase significantly unless more are added but the cost is minimal. The major expense – replacing turn-out gear – has already been anticipated and provided. Buildings are owned by the City of Plymouth. The major cost moving forward would be contractual negotiations with existing police officers.

Additionally, a comprehensive data analysis report will follow. While the more pertinent aspects of that analysis are embedded in the operational assessment, readers are encouraged to review the data analysis report in its entirety.

CENTER FOR PUBLIC SAFETY MANAGEMENT, LLC

POLICE DATA ANALYSIS REPORT

PLYMOUTH, MICHIGAN

CPSM®

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INTRODUCTION

This is the preliminary data analysis report on police patrol operations for the Plymouth, Michigan, Police Department, which was conducted by the Center for Public Safety Management, LLC (CPSM). This analysis focuses on three main areas: workload, deployment, and response times. These three areas are related almost exclusively to patrol operations, which constitute a significant portion of the police department's personnel and financial commitment.

All information in this preliminary report was developed using the computer-aided dispatch (CAD) data provided by Oakland County's Courts and Law Enforcement Management Information System (CLEMIS) and originally recorded by the Plymouth Community Communications Center. The purposes of this report are to provide the City of Plymouth with CPSM's preliminary findings and to allow the police department to review and bring to our attention any dispatch information that may be inconsistent with other internal records of the agency.

CPSM collected data for a one-year period of July 1, 2017, through June 30, 2018. The majority of the first section of the report, concluding with Table 8, uses call data for the one-year period. For the detailed workload analysis, we use two eight-week sample periods. The first period is from July 7 through August 31, 2017, or summer, and the second period is from January 4 through February 28, 2018, or winter.

WORKLOAD ANALYSIS

When CPSM analyzes a set of dispatch records, we go through a series of steps:

We first process the data to improve accuracy. For example, we remove duplicate patrol units recorded on a single event as well as records that do not indicate an actual activity. We also remove incomplete data, as found in situations where there is not enough time information to evaluate the record.

At this point, we have a series of records that we call "events." We identify these events in three ways:

We distinguish between patrol and nonpatrol units.

We assign a category to each event based upon its description.

We indicate whether the call is "zero time on scene" (i.e., patrol units spent less than 30 seconds on scene), "police-initiated," or "community-initiated."

We then remove all records that do not involve a patrol unit to get a total number of patrol-related events.

At important points during our analysis, we focus on a smaller group of events designed to represent actual calls for service. This excludes events with no officer time spent on scene and directed patrol activities.

In this way, we first identify a total number of records, then limit ourselves to patrol events, and finally focus on calls for service.

As with similar cases around the country, we encountered a number of issues when analyzing Plymouth's dispatch data. We made assumptions and decisions to address these issues.

796 events (about 6.3 percent) involved patrol units spending zero time on scene.

The computer-aided dispatch (CAD) system used approximately 70 different event descriptions, which we condensed into 16 categories for our tables and 11 categories for our figures (shown in Chart 1). Table 20 in the appendix shows how each call description was categorized.

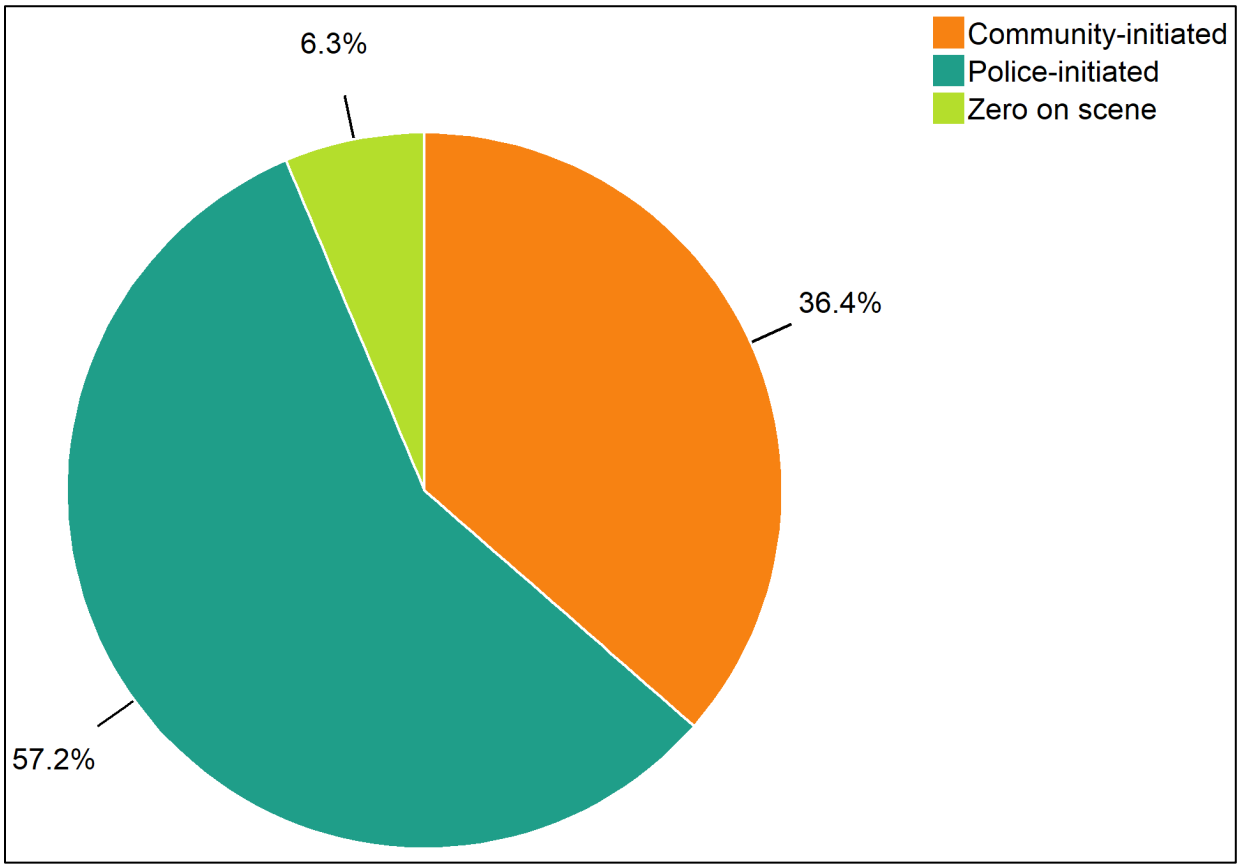
Between July 1, 2017, and June 30, 2018, the communications center recorded approximately 12,574 events that were assigned call numbers, and which included an adequate record of a responding patrol unit as either the primary or secondary unit. When measured daily, the department reported an average of 34.4 patrol-related events per day, approximately 6.3 percent of which (2.2 per day) had fewer than 30 seconds spent on the call.

In the following pages, we show two types of data: activity and workload. The activity levels are measured by the average number of calls per day, broken down by the type and origin of the calls, and categorized by the nature of the calls (crime, traffic, etc.). Workloads are measured in average work hours per day.

CHART 1: Event Descriptions for Tables and Figures

Table Category	Figure Category
Alarm	Alarm
Prisoner-arrest	Arrest
Assist citizen	Assist
Assist other agency	
Check	Check
Crime-person	Crime
Crime-property	
Directed patrol	Directed patrol
Disturbance	Disturbance
Animal	General noncriminal
Miscellaneous	
Investigation	Investigation
Suspicious incident	Suspicious incident
Accident	Traffic
Traffic enforcement	
Traffic stop	

FIGURE 1: Percentage Events per Day, by Initiator



Note: Percentages are based on a total of 12,574 events.

TABLE 1: Events per Day, by Initiator

Initiator	No. of Events	Events per Day
Community-initiated	4,580	12.5
Police-initiated	7,198	19.7
Zero on scene	796	2.2
Total	**12,574**	**34.4**

Observations:

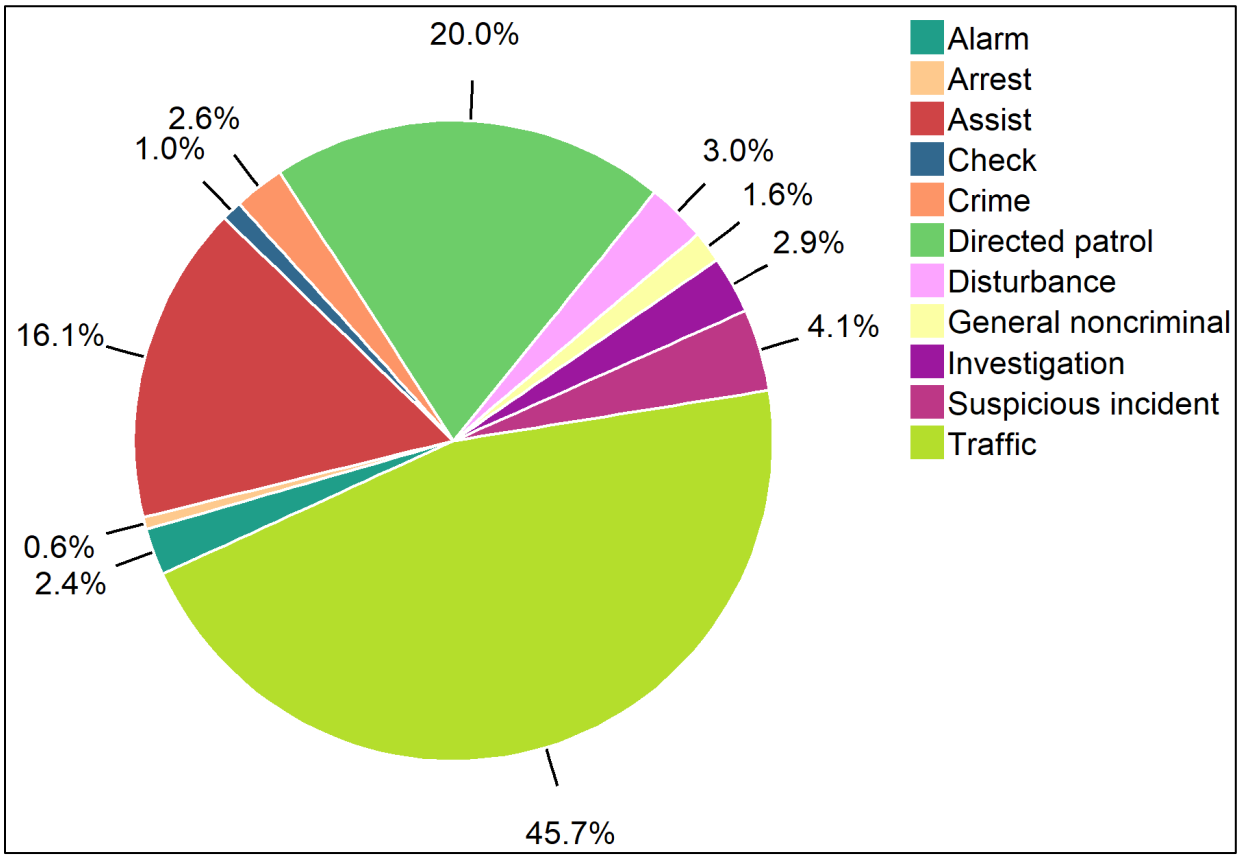
36 percent of all events were community-initiated.

57 percent of all events were police-initiated.

6 percent of the events had zero time on scene.

On average, there were 34 events per day or 1.4 per hour.

FIGURE 2: Percentage Events per Day, by Category



Note: The figure combines categories in the following table according to the description in Chart 1.

TABLE 2: Events per Day, by Category

Category	No. of Events	Events per Day
Accident	304	0.8
Alarm	296	0.8
Animal	102	0.3
Assist citizen	1,075	2.9
Assist other agency	951	2.6
Check	127	0.3
Crime-person	74	0.2
Crime-property	249	0.7
Directed patrol	2,514	6.9
Disturbance	377	1.0
Investigation	366	1.0
Miscellaneous	99	0.3
Prisoner-arrest	78	0.2
Suspicious incident	520	1.4
Traffic enforcement	455	1.2
Traffic stop	4,987	13.7
Total	**12,574**	**34.4**

Note: Observations below refer to events shown within the figure rather than the table.

Observations:

The top three categories accounted for 82 percent of events:

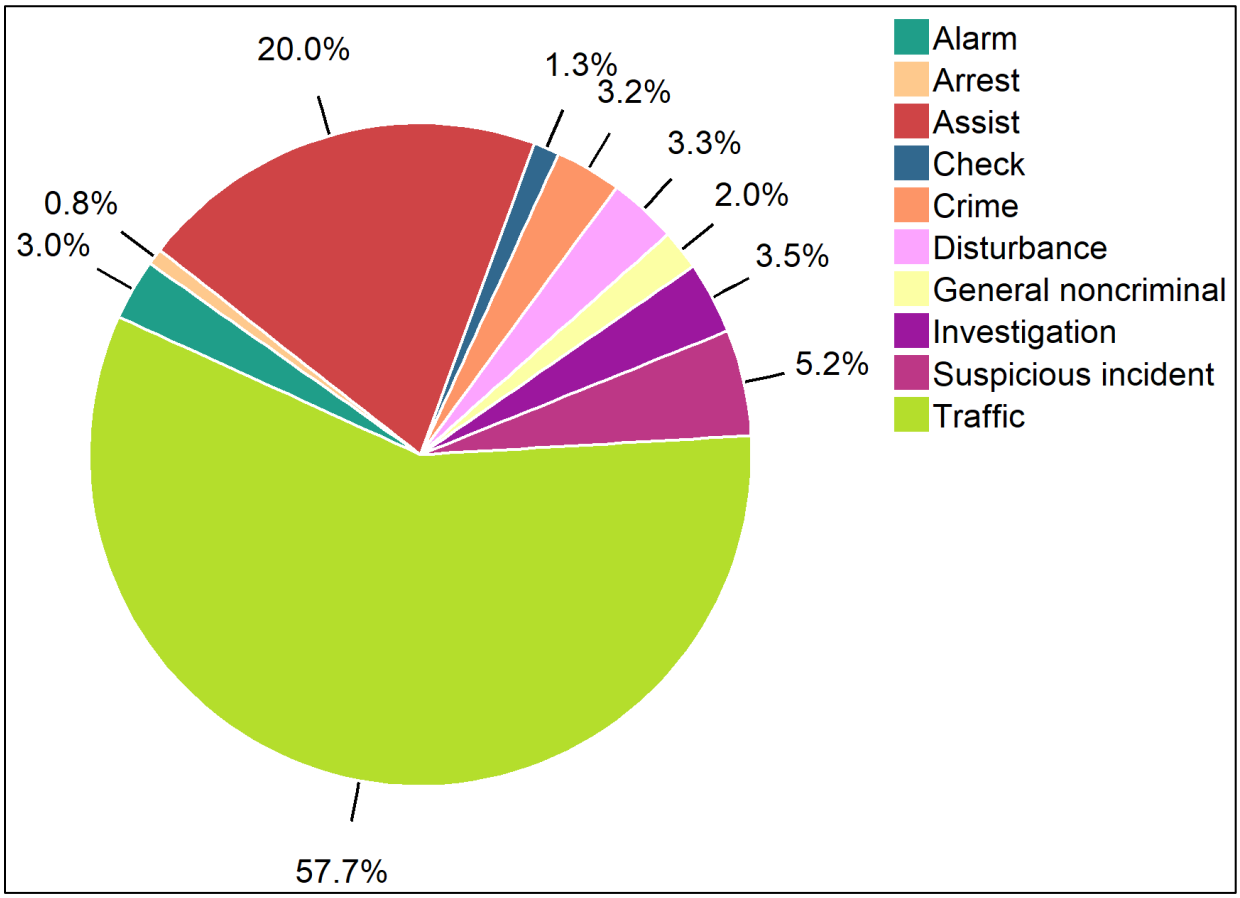
46 percent of events were traffic-related.

20 percent of events were directed patrol activities.

16 percent of events were assists.

3 percent of events were crimes.

FIGURE 3: Percentage Calls per Day, by Category



Note: The figure combines categories in the following table according to the description in Chart 1.

TABLE 3: Calls per Day, by Category

Category	No. of Calls	Calls per Day
Accident	302	0.8
Alarm	294	0.8
Animal	98	0.3
Assist citizen	1,040	2.8
Assist other agency	940	2.6
Check	126	0.3
Crime-person	72	0.2
Crime-property	246	0.7
Disturbance	331	0.9
Investigation	349	1.0
Miscellaneous	96	0.3
Prisoner-arrest	78	0.2
Suspicious incident	512	1.4
Traffic enforcement	445	1.2
Traffic stop	4,965	13.6
Total	**9,894**	**27.1**

Note: The focus here is on recorded calls rather than recorded events. We removed 2,514 directed patrol events and another 166 events with zero time on scene.

Observations:

On average, there were 27.1 calls per day or 1.1 per hour.

The top three categories accounted for 83 percent of calls:

58 percent of calls were traffic-related.

20 percent of calls were assists.

5 percent of calls were suspicious incidents.

3 percent of calls were crimes.

FIGURE 4: Calls per Day, by Initiator and Month

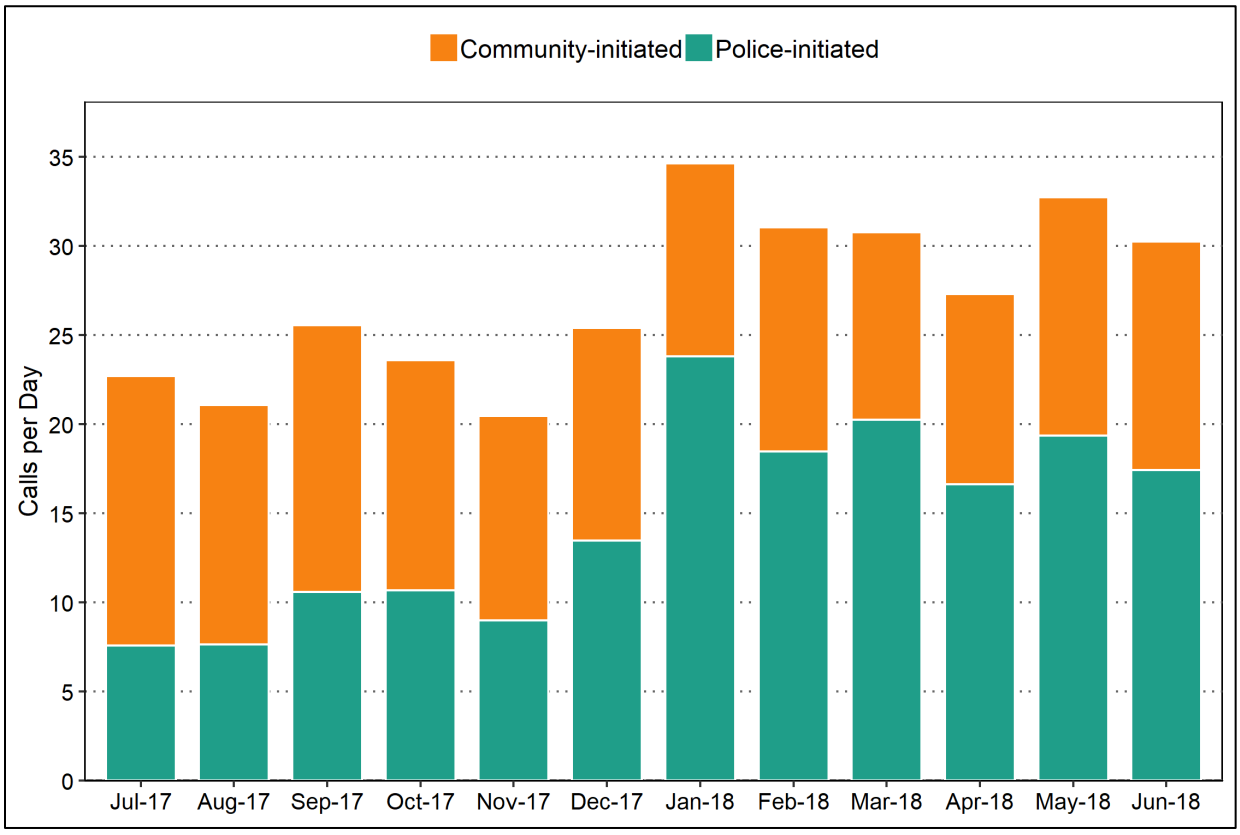


TABLE 4: Calls per Day, by Initiator and Months

Initiator	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Community	15.1	13.4	15.0	12.9	11.5	11.9	10.8	12.6	10.5	10.7	13.4	12.8
Police	7.6	7.6	10.6	10.7	9.0	13.5	23.8	18.5	20.3	16.6	19.4	17.4
Total	**22.7**	**21.1**	**25.6**	**23.6**	**20.5**	**25.4**	**34.6**	**31.0**	**30.8**	**27.3**	**32.7**	**30.2**

Observations:

The number of calls per day was lowest in November.

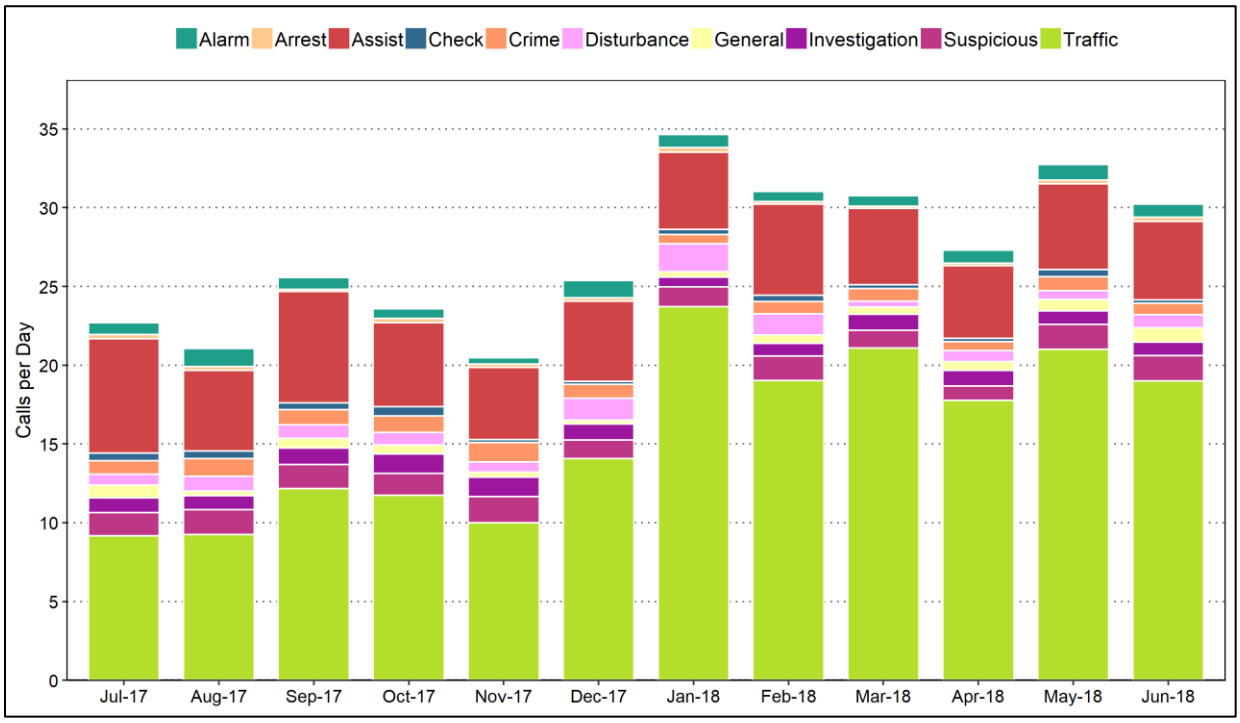
The number of calls per day was highest in January.

The month with the most calls had 69 percent more calls than the month with the fewest calls.

July 2017 had the most community-initiated calls, with 44 percent more than March 2018 which had the fewest.

January 2018 had the most police-initiated calls, with 214 percent more than July and August 2017 which had the fewest.

FIGURE 5: Calls per Day, by Category and Month



Note: The figure combines categories in the following table according to the description in Chart 1.

TABLE 5: Calls per Day, by Category and Month

Category	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Accident	0.9	1.0	0.7	0.7	0.8	1.0	0.6	1.0	0.6	0.7	0.8	1.2
Alarm	0.8	1.2	0.8	0.6	0.4	1.1	0.8	0.6	0.7	0.8	1.0	0.8
Animal	0.5	0.1	0.3	0.5	0.1	0.1	0.2	0.3	0.2	0.1	0.3	0.7
Assist citizen	4.1	2.4	4.0	3.0	2.2	2.9	2.4	3.2	2.5	2.3	2.8	2.5
Assist other agency	3.2	2.8	3.1	2.4	2.4	2.2	2.5	2.6	2.4	2.3	2.6	2.5
Check	0.5	0.5	0.4	0.6	0.2	0.2	0.3	0.4	0.2	0.2	0.5	0.2
Crime-person	0.2	0.3	0.2	0.2	0.3	0.2	0.1	0.1	0.2	0.2	0.3	0.3
Crime-property	0.6	0.9	0.7	0.9	1.0	0.7	0.5	0.7	0.6	0.4	0.6	0.5
Disturbance	0.7	0.9	0.8	0.8	0.7	1.4	1.8	1.3	0.4	0.7	0.6	0.8
Investigation	0.9	0.9	1.0	1.2	1.2	1.0	0.6	0.8	1.0	1.0	0.9	0.9
Miscellaneous	0.4	0.2	0.3	0.1	0.2	0.2	0.2	0.2	0.2	0.4	0.5	0.2
Prisoner-arrest	0.3	0.2	0.1	0.3	0.2	0.2	0.3	0.2	0.1	0.2	0.2	0.3
Suspicious incident	1.5	1.6	1.5	1.4	1.7	1.2	1.3	1.5	1.1	0.9	1.6	1.6
Traffic enforcement	1.4	1.3	1.5	1.4	0.8	1.5	1.2	1.1	1.0	1.0	1.5	1.0
Traffic stop	6.9	7.0	9.9	9.6	8.5	11.6	21.9	17.0	19.5	16.1	18.7	16.7
Total	**22.7**	**21.1**	**25.6**	**23.6**	**20.5**	**25.4**	**34.6**	**31.0**	**30.8**	**27.3**	**32.7**	**30.2**

Note: Calculations were limited to calls rather than events.

Observations:

The top three categories averaged between 76 and 88 percent of calls throughout the year:

Traffic calls averaged between 9.2 and 23.7 calls per day throughout the year.

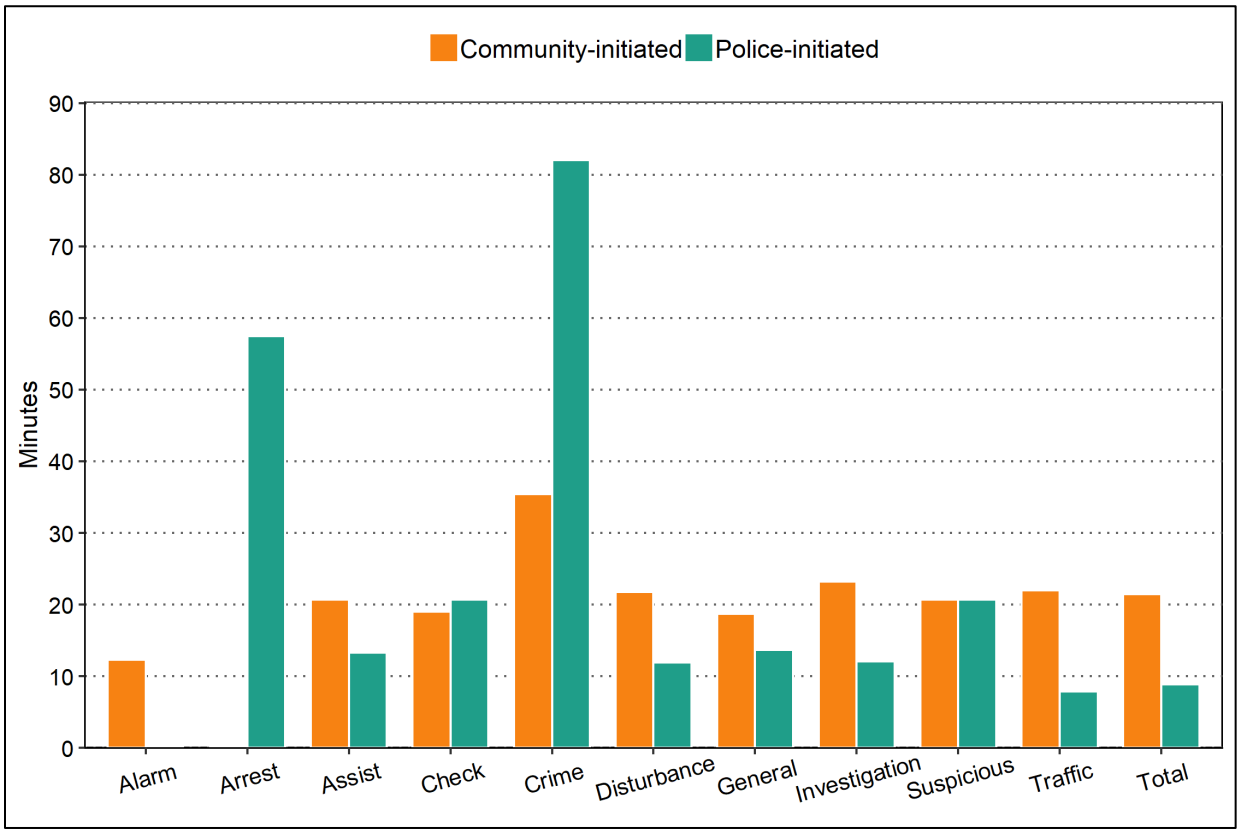
Assist calls averaged between 4.6 and 7.3 calls per day throughout the year.

Suspicious incidents averaged between 0.9 and 1.7 calls per day throughout the year.

Crimes averaged between 0.6 and 1.2 calls per day throughout the year.

Crimes accounted for 2 to 6 percent of total calls.

FIGURE 6: Primary Unit's Average Occupied Times, by Category and Initiator



Note: The figure combines categories using weighted averages from the following table according to the description in Chart 1.

TABLE 6: Primary Unit's Average Occupied Times, by Category and Initiator

Category	Community-Initiated		Police-Initiated	
	Minutes	Calls	Minutes	Calls
Accident	28.3	297	31.1	5
Alarm	12.3	294	NA	0
Animal	17.9	97	11.5	1
Assist citizen	19.6	996	12.8	44
Assist other agency	21.8	937	20.5	3
Check	19.0	122	20.7	4
Crime-person	45.9	72	NA	0
Crime-property	32.3	243	82.0	3
Disturbance	21.7	240	11.9	91
Investigation	23.2	325	12.1	24
Miscellaneous	19.6	95	15.8	1
Prisoner-arrest	NA	0	57.5	78
Suspicious incident	20.7	483	20.7	29
Traffic enforcement	17.1	379	52.5	66
Traffic stop	NA	0	7.3	4,965
Weighted Average/Total Calls	**21.5**	**4,580**	**8.9**	**5,314**

Note: The information in Figure 6 and Table 6 is limited to calls and excludes all events that show zero time on scene. A unit's occupied time is measured as the time from when the unit was dispatched until the unit becomes available again. The times shown are the average occupied minutes per call for the primary unit, rather than the total occupied minutes for all units assigned to a call. Observations below refer to times shown within the figure rather than the table.

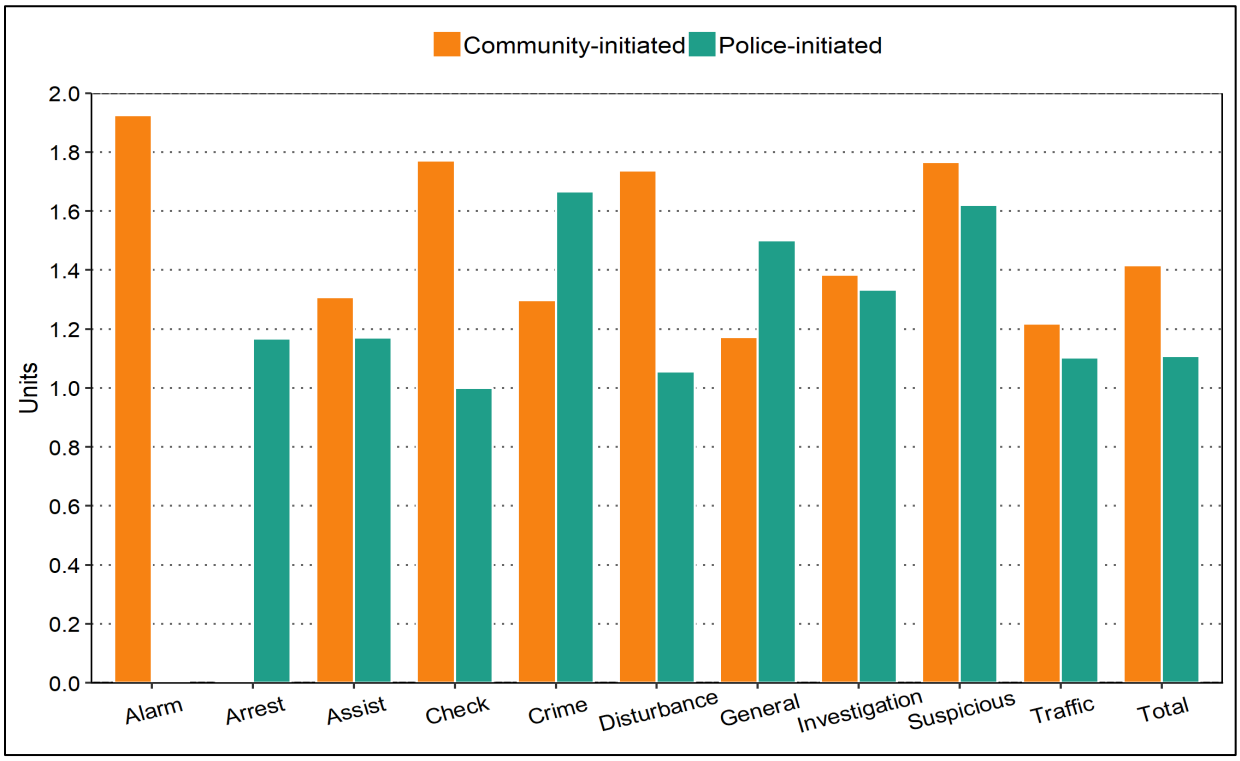
Observations:

A unit's average time spent on a call ranged from 8 to 82 minutes overall.

The longest average times were for police-initiated crime calls.

The average time spent on crime calls was 35 minutes for community-initiated calls. The average of 82 minutes for police-initiated calls was limited to only 3 calls and is not reliable.

FIGURE 7: Number of Responding Units, by Initiator and Category



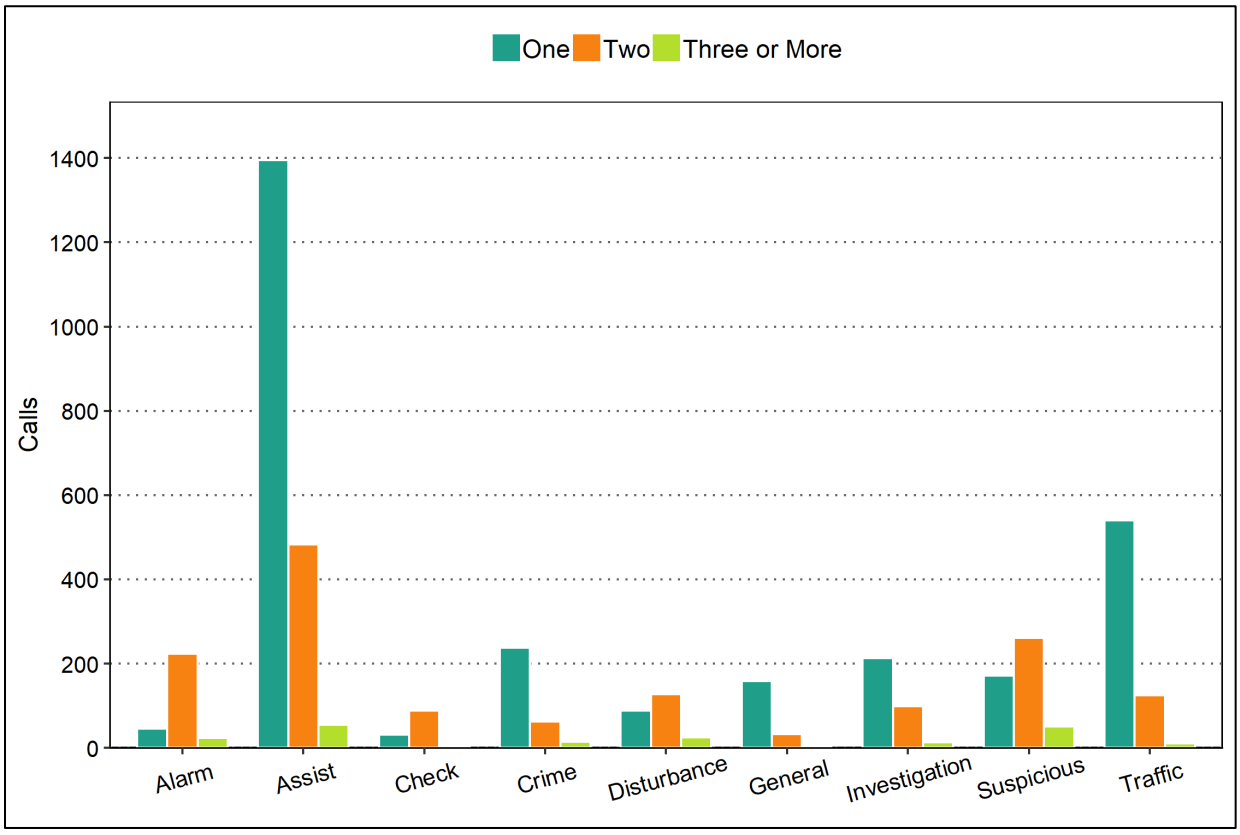
Note: The figure combines categories using weighted averages from the following table according to the description in Chart 1.

TABLE 7: Average Number of Responding Units, by Initiator and Category

Category	Community-Initiated		Police-Initiated	
	No. of Units	Calls	No. of Units	Calls
Accident	1.2	297	1.4	5
Alarm	1.9	294	NA	0
Animal	1.2	97	2.0	1
Assist citizen	1.2	996	1.1	44
Assist other agency	1.5	937	1.7	3
Check	1.8	122	1.0	4
Crime-person	1.6	72	NA	0
Crime-property	1.2	243	1.7	3
Disturbance	1.7	240	1.1	91
Investigation	1.4	325	1.3	24
Miscellaneous	1.1	95	1.0	1
Prisoner-arrest	NA	0	1.2	78
Suspicious incident	1.8	483	1.6	29
Traffic enforcement	1.2	379	1.7	66
Traffic stop	NA	0	1.1	4,965
Weighted Average/Total Calls	**1.4**	**4,580**	**1.1**	**5,314**

Note: The information in Figure 7 and Table 7 is limited to calls and excludes all events that show zero time on scene. Observations refer to the number of responding units shown within the figure rather than the table.

FIGURE 8: Number of Responding Units, by Category, Community-initiated Calls



Note: The figure combines categories using weighted averages from the following table according to the description in Chart 1.

TABLE 8: Number of Responding Units, by Category, Community-initiated Calls

Category	Responding Units		
	One	Two	Three or More
Accident	230	60	7
Alarm	46	224	24
Animal	75	22	0
Assist citizen	842	139	15
Assist other agency	553	344	40
Check	31	88	3
Crime-person	39	24	9
Crime-property	199	38	6
Disturbance	88	127	25
Investigation	213	99	13
Miscellaneous	84	11	0
Suspicious incident	171	261	51
Traffic enforcement	310	65	4
Total	**2,881**	**1,502**	**197**

Observations:

The overall mean number of responding units was 1.4 for community-initiated calls and 1.1 for police-initiated calls.

The mean number of responding units was as high as 1.9 for alarms that were community-initiated.

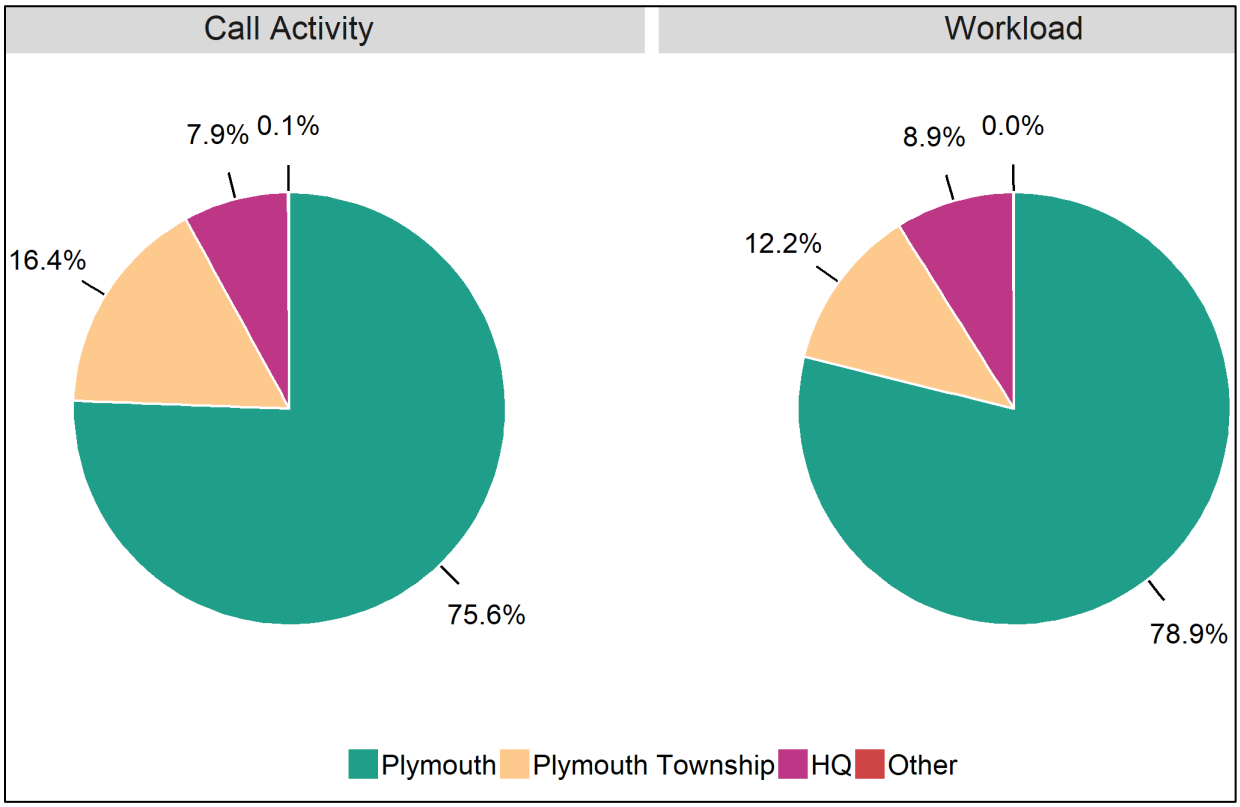
63 percent of community-initiated calls involved one responding unit.

33 percent of community-initiated calls involved two responding units.

4 percent of community-initiated calls involved three or more responding units.

The largest group of calls with three or more responding units involved assists.

FIGURE 9: Percentage Calls and Work Hours, by Location



Note: The "other" category includes 9 calls located outside Plymouth and Plymouth Township.

TABLE 9: Calls and Work Hours by Location, per Day

Location	Per Day	
	Calls	Work Hours
Plymouth	20.49	6.60
Plymouth Township	4.46	1.02
HQ	2.14	0.74
Other	0.02	0.00
Total	**27.11**	**8.37**

Observations:

While excluding calls at police headquarters, the majority of calls occurred in the city of Plymouth which accounted for 76 percent of total calls and 79 percent of the total workload.

Calls within Plymouth Township accounted for 16 percent of total calls and 12 percent of the total workload.

FIGURE 10: Percentage Calls and Work Hours, by Category, Summer 2017

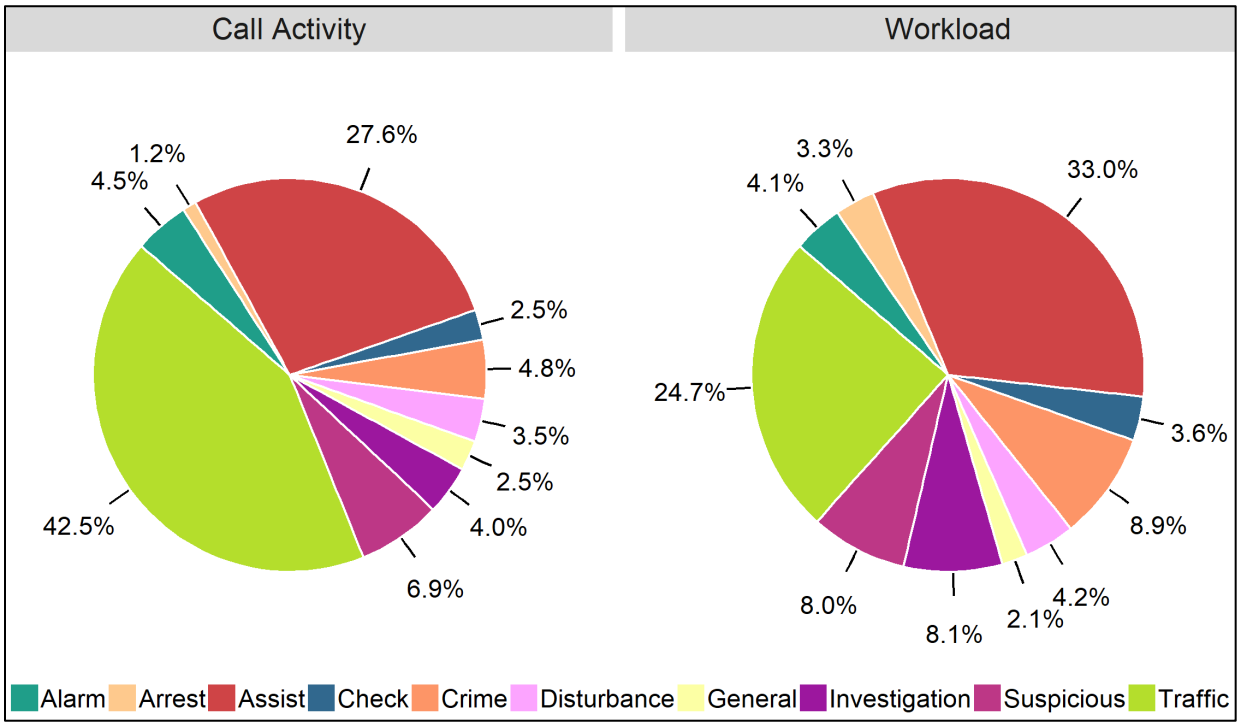


TABLE 10: Calls and Work Hours per Day, by Category, Summer 2017

Category	Per Day	
	Calls	Work Hours
Accident	0.9	0.5
Alarm	1.0	0.3
Animal	0.2	0.1
Assist citizen	3.2	1.1
Assist other agency	2.8	1.5
Check	0.5	0.3
Crime-person	0.3	0.3
Crime-property	0.8	0.4
Disturbance	0.8	0.3
Investigation	0.9	0.6
Miscellaneous	0.3	0.1
Prisoner-arrest	0.2	0.3
Suspicious incident	1.5	0.6
Traffic enforcement	1.3	0.5
Traffic stop	7.0	1.0
Total	**21.7**	**7.9**

Note: Workload calculations focused on calls rather than events.

Observations, Summer:

Total calls averaged 22 per day or 0.9 per hour.

Total workload averaged 8 hours per day, meaning that on average 0.3 officers per hour were busy responding to calls.

The top three categories constituted 77 percent of calls and 66 percent of workload.

Traffic calls constituted 42 percent of calls and 25 percent of workload.

Assist calls constituted 28 percent of calls and 33 percent of workload.

Suspicious incidents constituted 7 percent of calls and 8 percent of workload.

Crimes constituted 5 percent of calls and 9 percent of workload.

FIGURE 11: Percentage Calls and Work Hours, by Category, Winter 2018

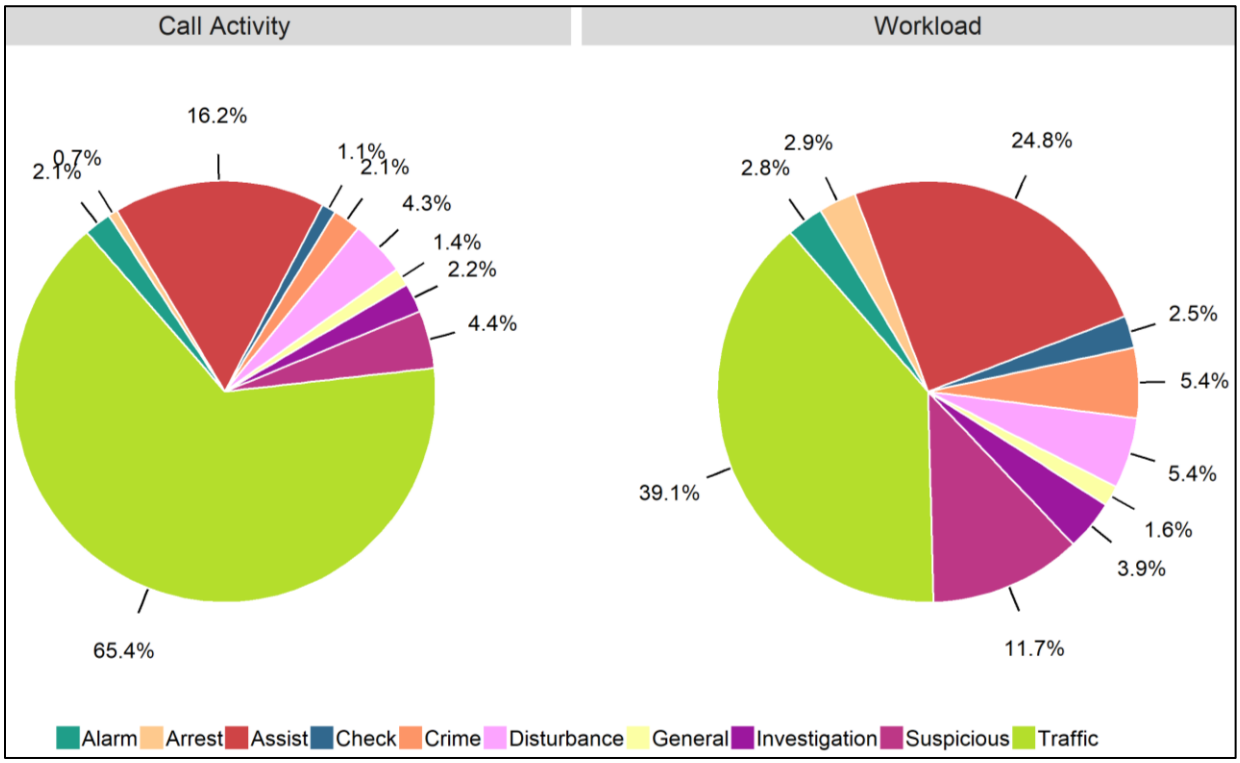


TABLE 11: Calls and Work Hours per Day, by Category, Winter 2018

Category	Per Day	
	Calls	Work Hours
Accident	0.8	0.4
Alarm	0.7	0.2
Animal	0.2	0.1
Assist citizen	2.8	0.8
Assist other agency	2.5	1.3
Check	0.4	0.2
Crime-person	0.1	0.2
Crime-property	0.6	0.3
Disturbance	1.4	0.5
Investigation	0.7	0.3
Miscellaneous	0.2	0.1
Prisoner-arrest	0.2	0.2
Suspicious incident	1.4	1.0
Traffic enforcement	1.2	0.5
Traffic stop	19.4	2.4
Total	**32.6**	**8.5**

Note: Workload calculations focused on calls rather than events.

Observations, Winter:

The average number of calls per day was higher in winter 2018 than in summer 2017.

The average daily workload was also higher in winter 2018 than in summer 2017.

Total calls averaged 33 per day or 1.4 per hour.

Total workload averaged 8 hours per day, meaning that on average 0.4 officers per hour were busy responding to calls.

The top three categories constituted 86 percent of calls and 76 percent of workload.

Traffic calls constituted 65 percent of calls and 39 percent of workload.

Assist calls constituted 16 percent of calls and 25 percent of workload.

Suspicious incidents constituted 4 percent of calls and 12 percent of workload.

Crimes constituted 2 percent of calls and 5 percent of workload.

NONCALL ACTIVITIES

In the period from July 1, 2017, through June 30, 2018, the dispatch center recorded activities that were not assigned a call number. We focused on those activities that involved a patrol unit. We also limited our analysis to noncall activities that occurred during shifts where the same patrol unit was also responding to calls for service. Each record only indicates one unit per activity. There were a few problems with the data provided and we made assumptions and decisions to address these issues:

- We excluded activities that lasted less than 30 seconds. These are irrelevant and contribute little to the overall workload.
- Another portion of the recorded activities lasted more than eight hours. As an activity is unlikely to last more than eight hours, we assumed that these records were inaccurate.
- After these exclusions, 2,656 activities remained. These activities had an average duration of 35 minutes.

In this section, we report noncall activities and workload by type of activity. In the next section, we include these activities in the overall workload when comparing the total workload against available personnel in summer and winter.

TABLE 12: Activities and Occupied Times by Description

CAD Description	Description	Occupied Time	Count
USBC	Business check	7.2	108
USBU	Back up	7.5	135
USCT	Court	38.9	90
USDT	Detail	40.6	327
USFP	Foot patrol	37.4	84
USFW	Follow up	25.6	219
USLC	ICC inspection	5.4	43
USRD	Radar	26.3	424
USRW	Report writing	71.1	113
USSC	Subdivision check	29.1	34
USSD	Station detail	71.3	184
USSW	Special watch	20.9	159
USVM	Vehicle maintenance	37.0	57
Miscellaneous*	Miscellaneous	55.1	34
Administrative - Weighted Average/Total		**33.9**	**2,011**
USBR	Break	39.3	67
USMB	Meal break	40.1	578
Personal - Weighted Average/Total		**40.0**	**645**
Weighted Average/Total Activities		**35.4**	**2,656**

Note: *The "miscellaneous" status code aggregates 34 records with various status codes, such as "USTR", "USVC" and "USJT".

Observations:

The most common administrative activity description was associated with radar.

Most personal activities were associated with meal breaks.

The description with the longest average time was the report writing.

The average time spent on administrative activities was 34 minutes and for personal activities, it was 40 minutes.

FIGURE 12: Activities per Day, by Month

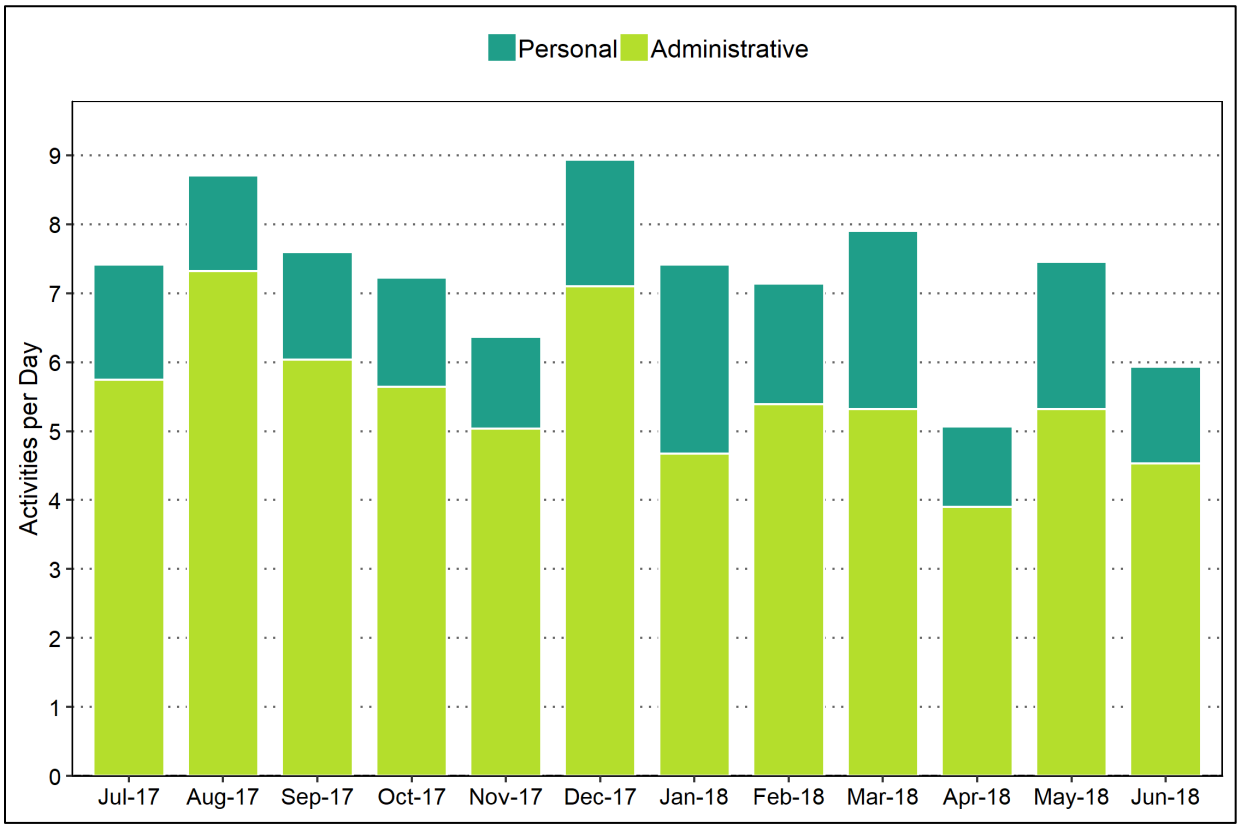


TABLE 13: Activities per Day, by Month

Activities	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Personal	1.7	1.4	1.6	1.6	1.3	1.8	2.7	1.8	2.6	1.2	2.1	1.4
Administrative	5.7	7.3	6.0	5.6	5.0	7.1	4.7	5.4	5.3	3.9	5.3	4.5
Total	**7.4**	**8.7**	**7.6**	**7.2**	**6.4**	**8.9**	**7.4**	**7.1**	**7.9**	**5.1**	**7.5**	**5.9**

Observations:

The number of noncall activities per day was lowest in April 2018.

The number of noncall activities per day was highest in December 2017.

FIGURE 13: Activities per Day, by Day of Week

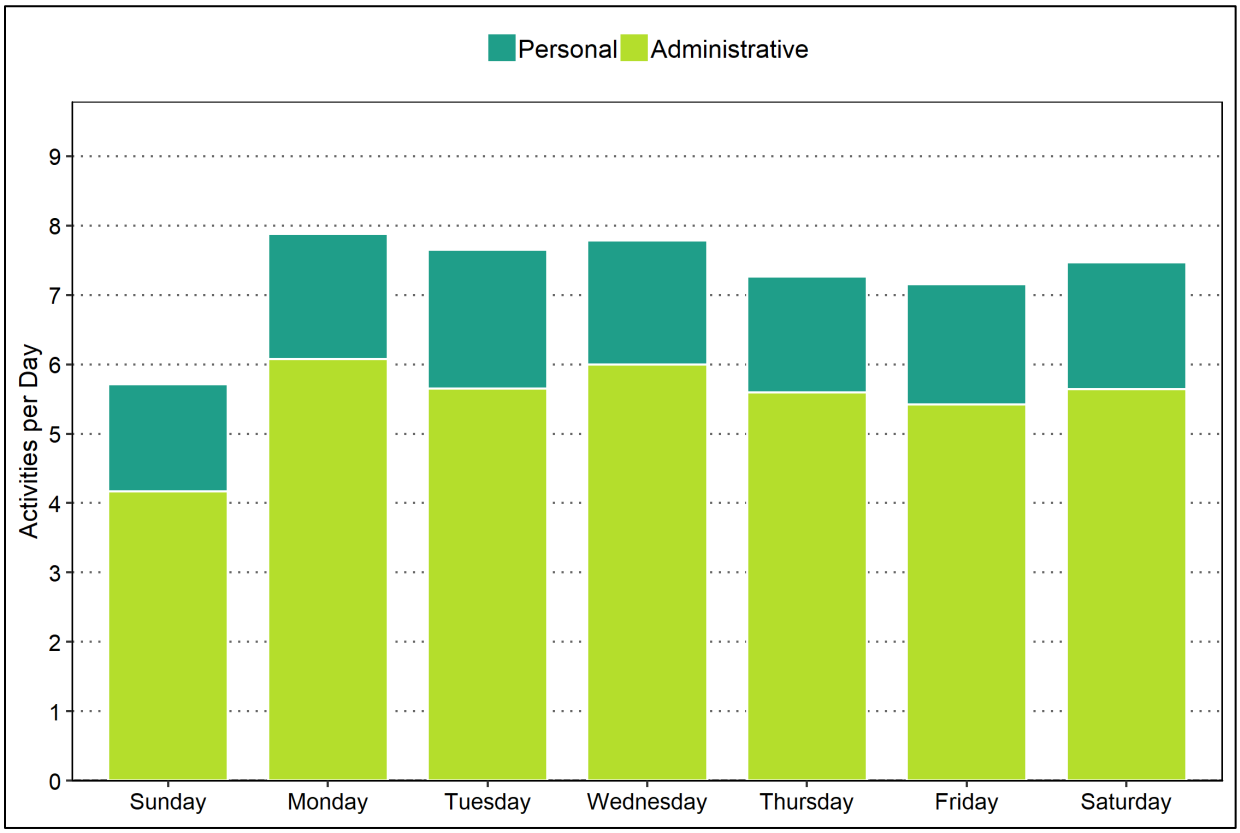


TABLE 14: Activities per Day, by Day of Week

Day of Week	Personal	Administrative	Activities per Day
Sunday	1.5	4.2	5.7
Monday	1.8	6.1	7.9
Tuesday	2.0	5.7	7.7
Wednesday	1.8	6.0	7.8
Thursday	1.7	5.6	7.3
Friday	1.7	5.4	7.2
Saturday	1.8	5.6	7.5
Weekly Average	**1.8**	**5.5**	**7.3**

Observations:

The number of noncall activities per day was lowest on Sundays.

The number of noncall activities per day was highest on Mondays.

FIGURE 14: Activities per Day, by Hour of Day

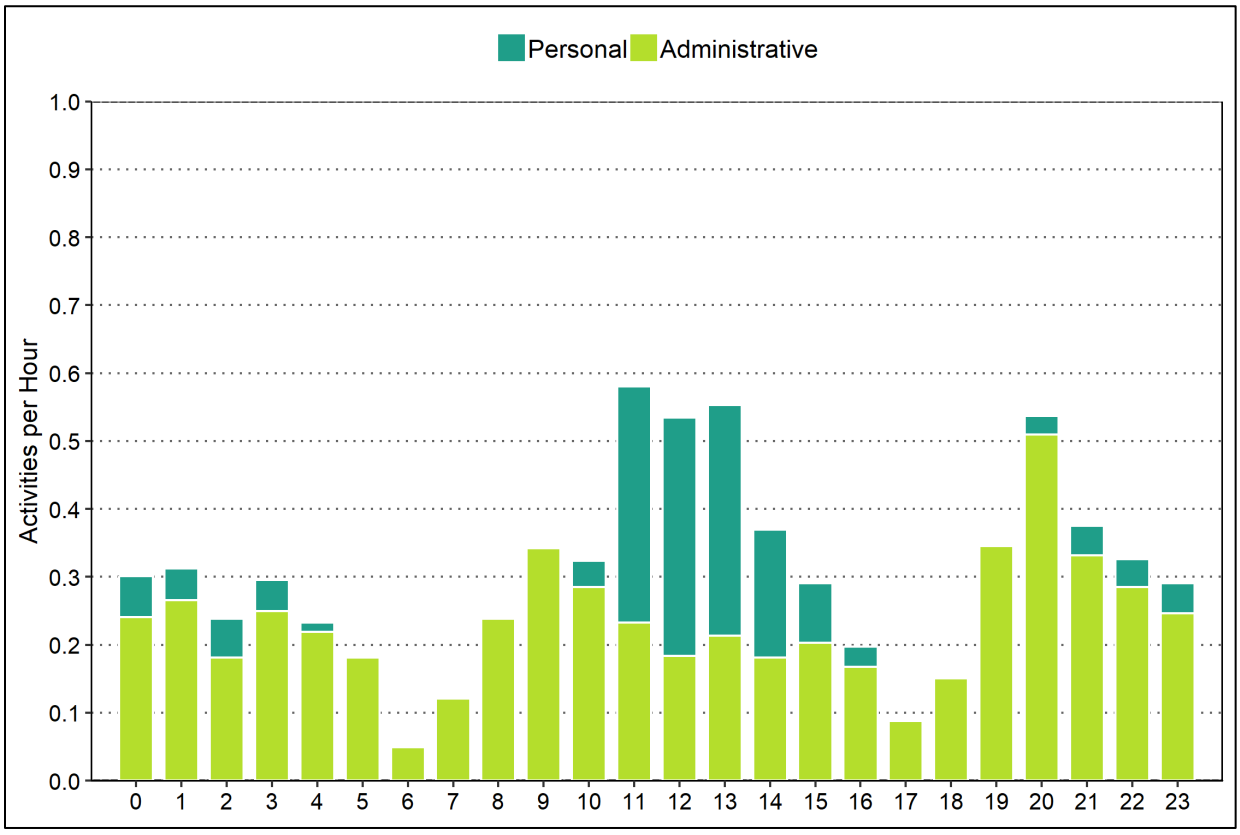


TABLE 15: Activities per Day, by Hour of Day

Hour	Personal	Administrative	Total
0	0.06	0.24	0.30
1	0.05	0.27	0.31
2	0.06	0.18	0.24
3	0.05	0.25	0.30
4	0.01	0.22	0.23
5	0.00	0.18	0.18
6	0.00	0.05	0.05
7	0.00	0.12	0.12
8	0.00	0.24	0.24
9	0.00	0.34	0.35
10	0.04	0.28	0.32
11	0.35	0.23	0.58
12	0.35	0.18	0.53
13	0.34	0.21	0.55
14	0.19	0.18	0.37
15	0.09	0.20	0.29
16	0.03	0.17	0.20
17	0.00	0.09	0.09
18	0.00	0.15	0.15
19	0.00	0.35	0.35
20	0.03	0.51	0.54
21	0.04	0.33	0.38
22	0.04	0.28	0.33
23	0.04	0.25	0.29
Hourly Average	**0.07**	**0.23**	**0.30**

Observations:

The number of activities per hour was highest between 11:00 a.m. and noon.

The number of activities per hour was lowest between 6:00 a.m. and 7:00 a.m.

DEPLOYMENT

□ For this study, we examined deployment information for eight weeks in summer (July 7 through August 31, 2017) and eight weeks in winter (January 4 through February 28, 2018). The department's main patrol force consists of patrol officers, patrol sergeants and limited specialists (for commercial vehicle and parking enforcement), operating on 12-hour shifts starting at 6:30 a.m. and 6:30 p.m. The police department's main patrol force deployed an average of 2.2 officers per hour during the 24-hour day in summer 2017 and 2.4 officers in winter 2018.

□ In this section, we describe the deployment and workload in distinct steps, distinguishing between winter and summer and between weekdays (Monday through Friday) and weekends (Saturday and Sunday):

First, we focus on patrol deployment alone.

Next, we compare "all" workload, which includes community-initiated calls, police-initiated calls, directed patrol work, and out-of-service(noncall) activities.

Finally, we compare the workload against deployment by percentage.

□ Comments follow each set of four figures, with separate discussions for summer and winter.

□

FIGURE 15: Deployed Officers, Weekdays, Summer 2017

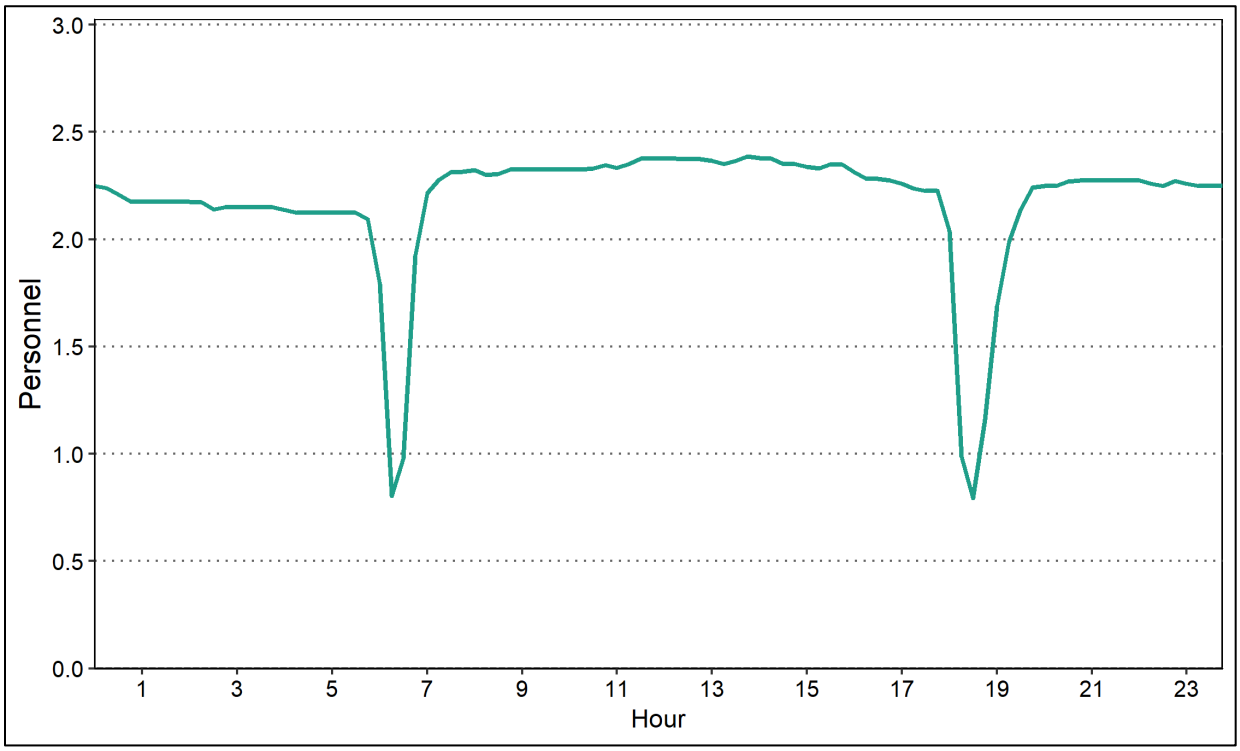


FIGURE 16: Deployed Officers, Weekends, Summer 2017

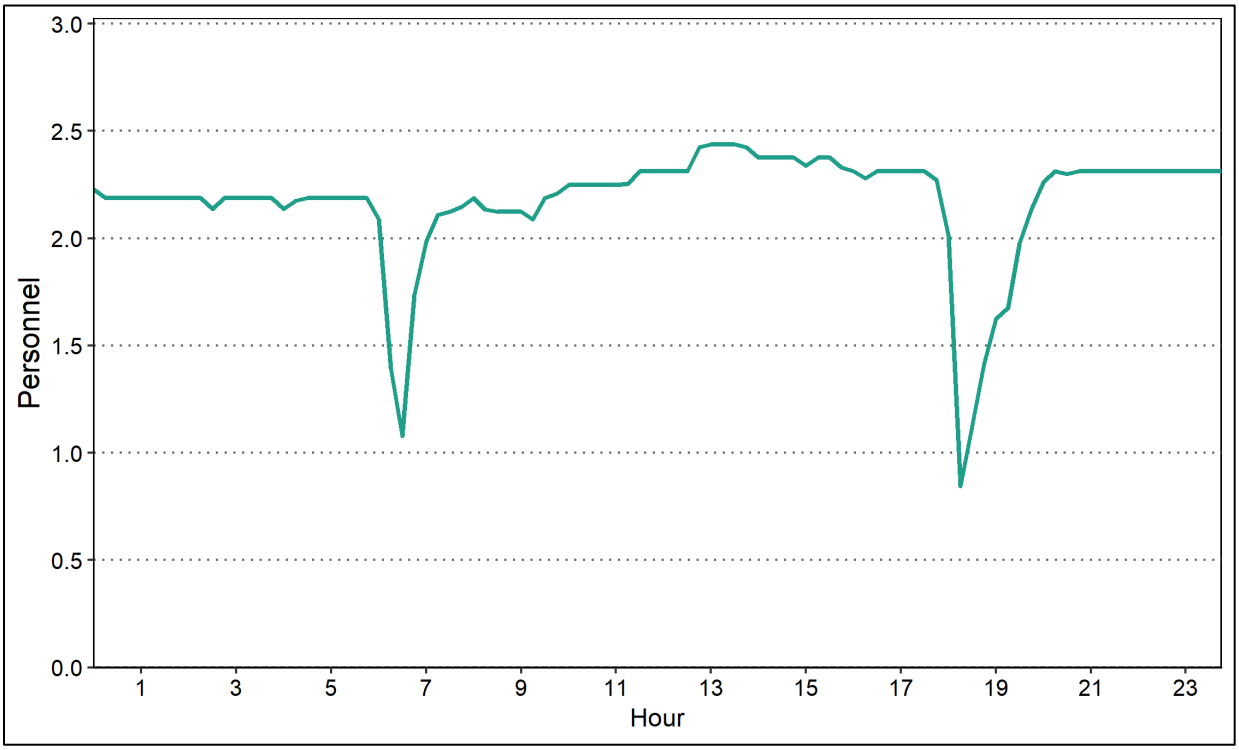


FIGURE 17: Deployed Officers, Weekdays, Winter 2018

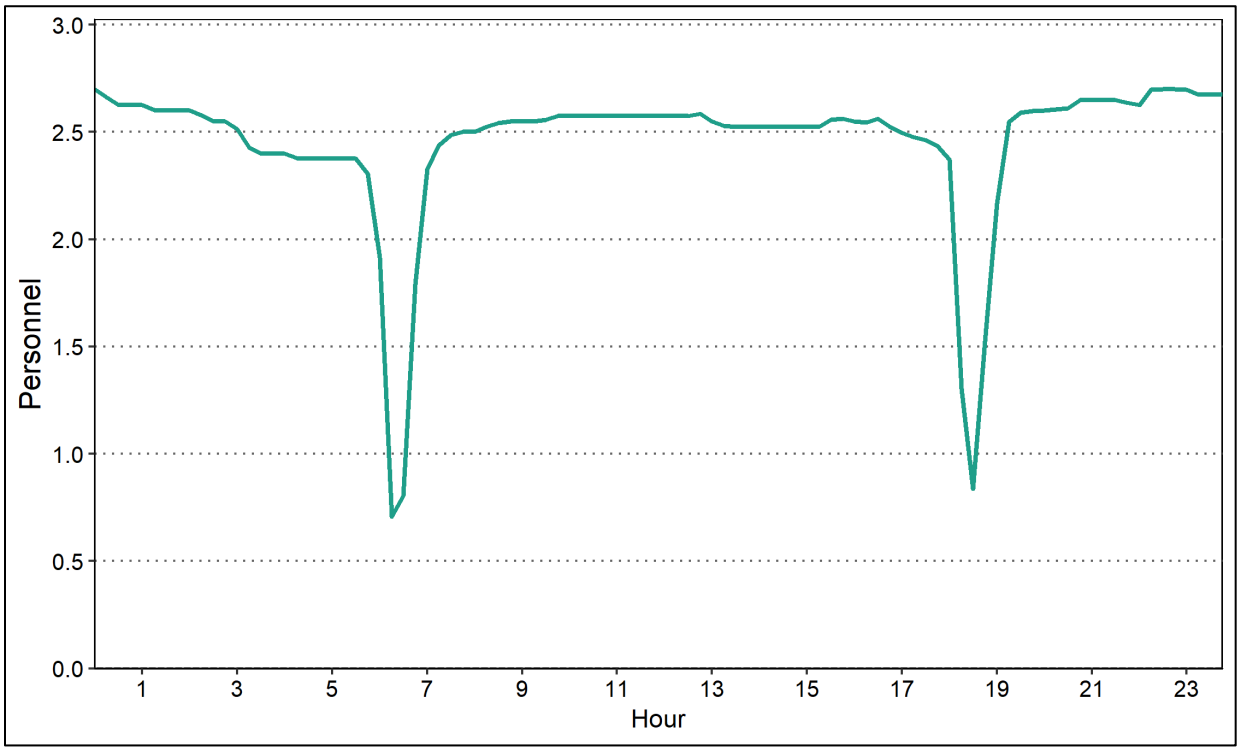
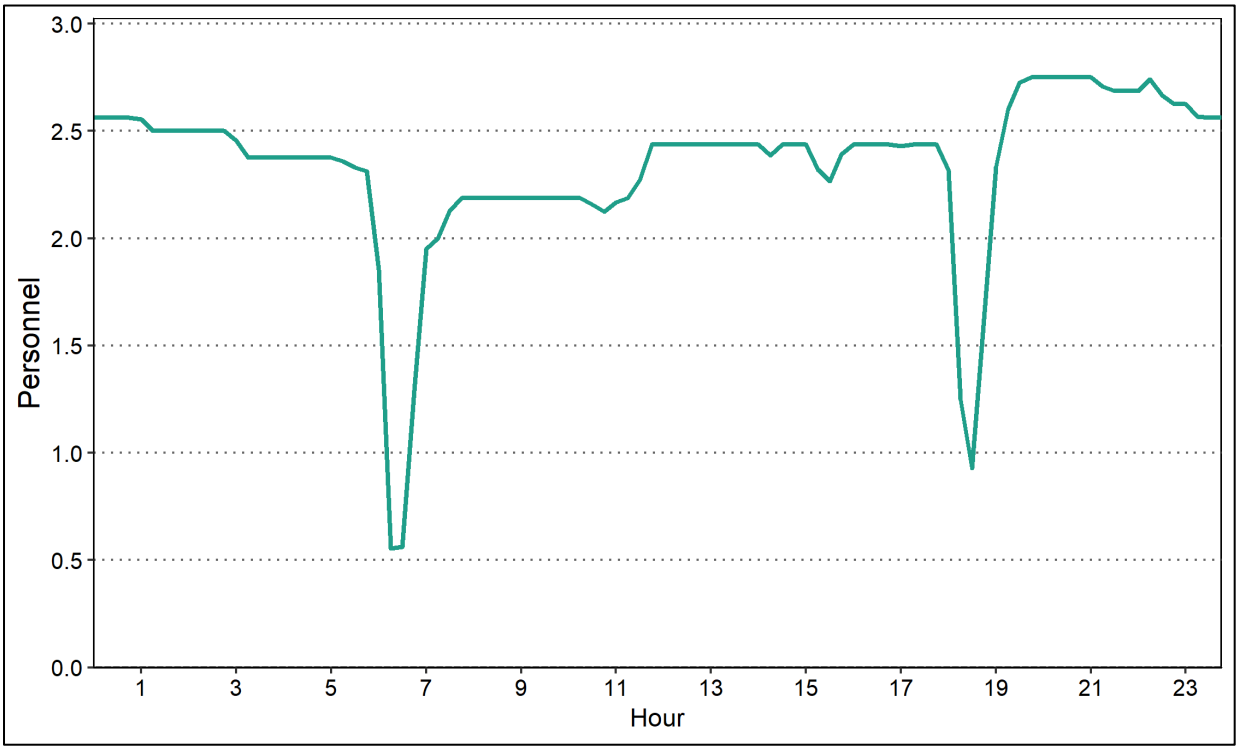


FIGURE 18: Deployed Officers, Weekends, Winter 2018



Observations:

For summer (July 7 through August 31, 2017):

- The average deployment was 2.2 officers per hour during the week and 2.2 officers per hour on the weekend.
- Average deployment varied from 0.8 to 2.4 officers per hour on weekdays and 0.8 to 2.4 officers per hour on weekends.
- Drops in average deployment occur during the change between shifts at 6:30 a.m. and 6:30 p.m.

For winter (January 4 through February 28, 2018):

- The average deployment was 2.4 officers per hour during the week and 2.3 officers per hour on the weekend.
- Average deployment varied from 0.7 to 2.7 officers per hour on weekdays and 0.6 to 2.8 officers per hour on weekends.
- Drops in average deployment occur during the change between shifts just as in summer.

FIGURE 19: Deployment and All Workload, Weekdays, Summer 2017

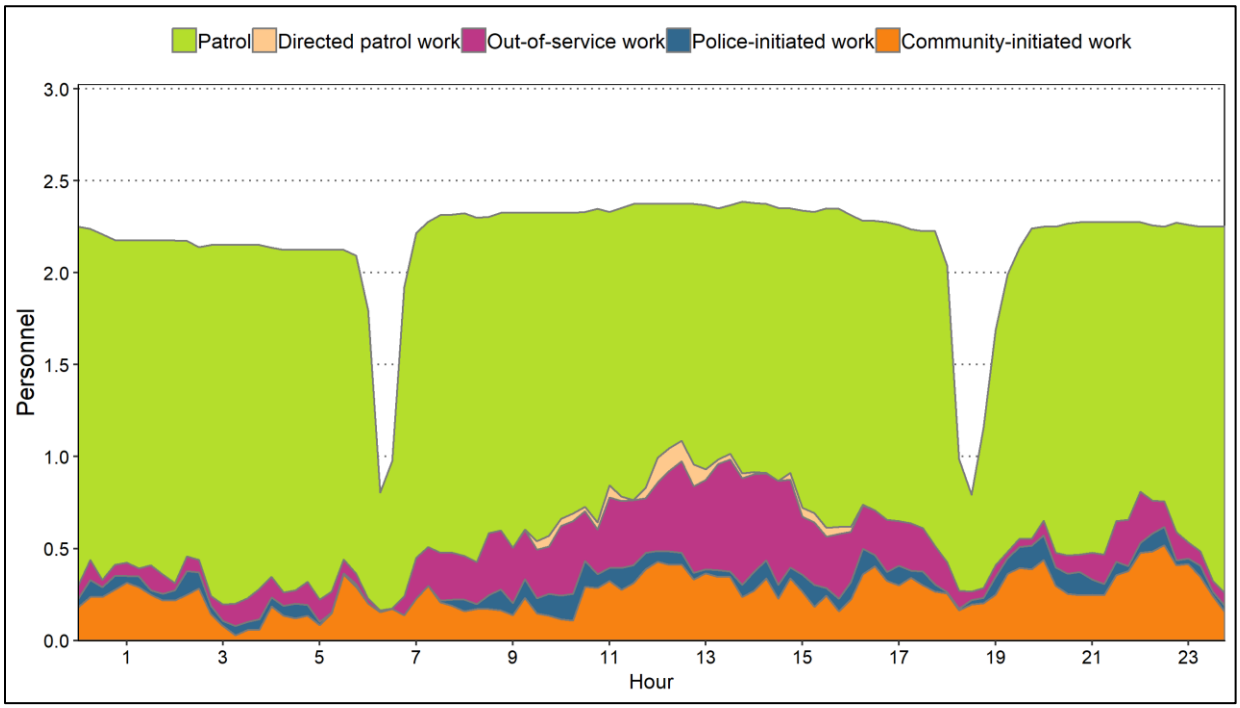


FIGURE 20: Deployment and All Workload, Weekends, Summer 2017

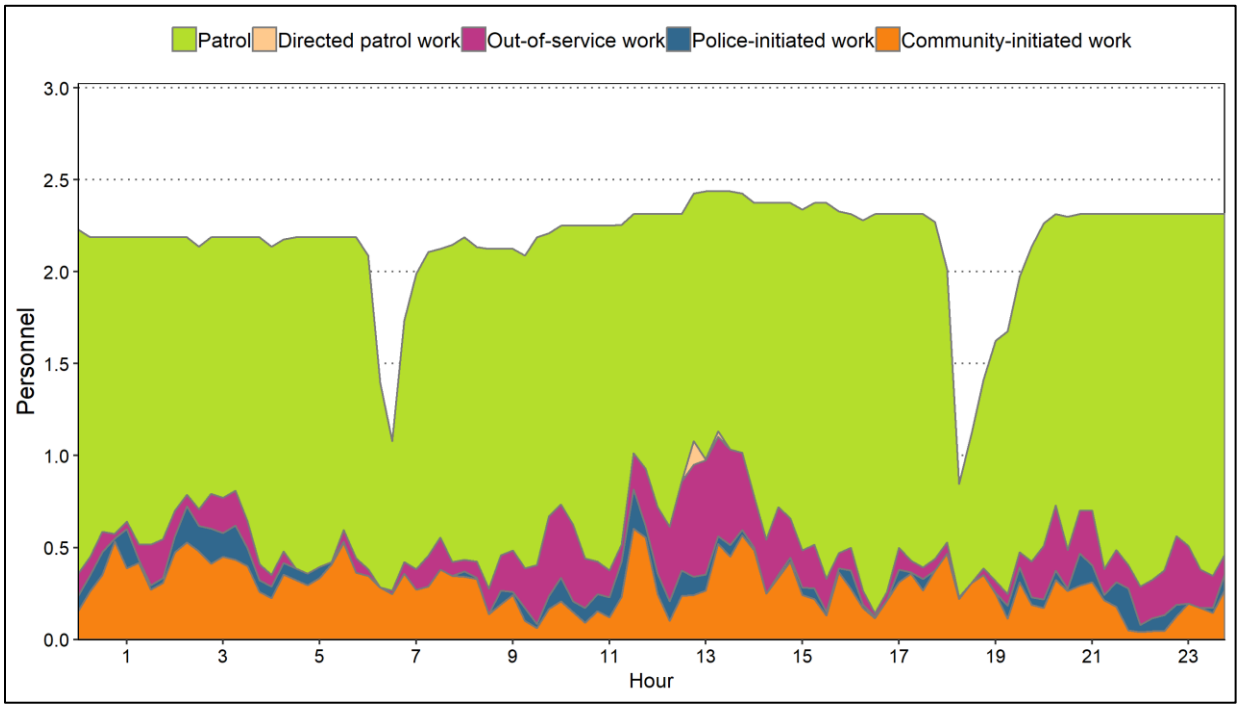


FIGURE 21: Deployment and All Workload, Weekdays, Winter 2018

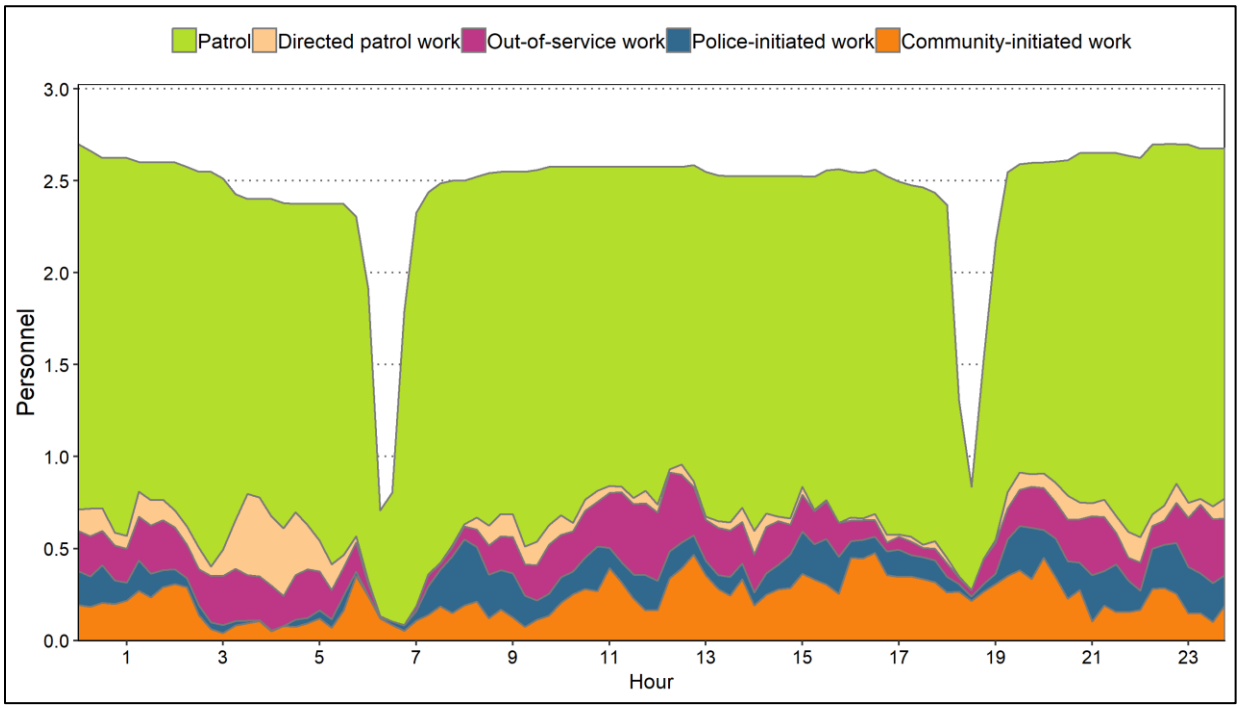
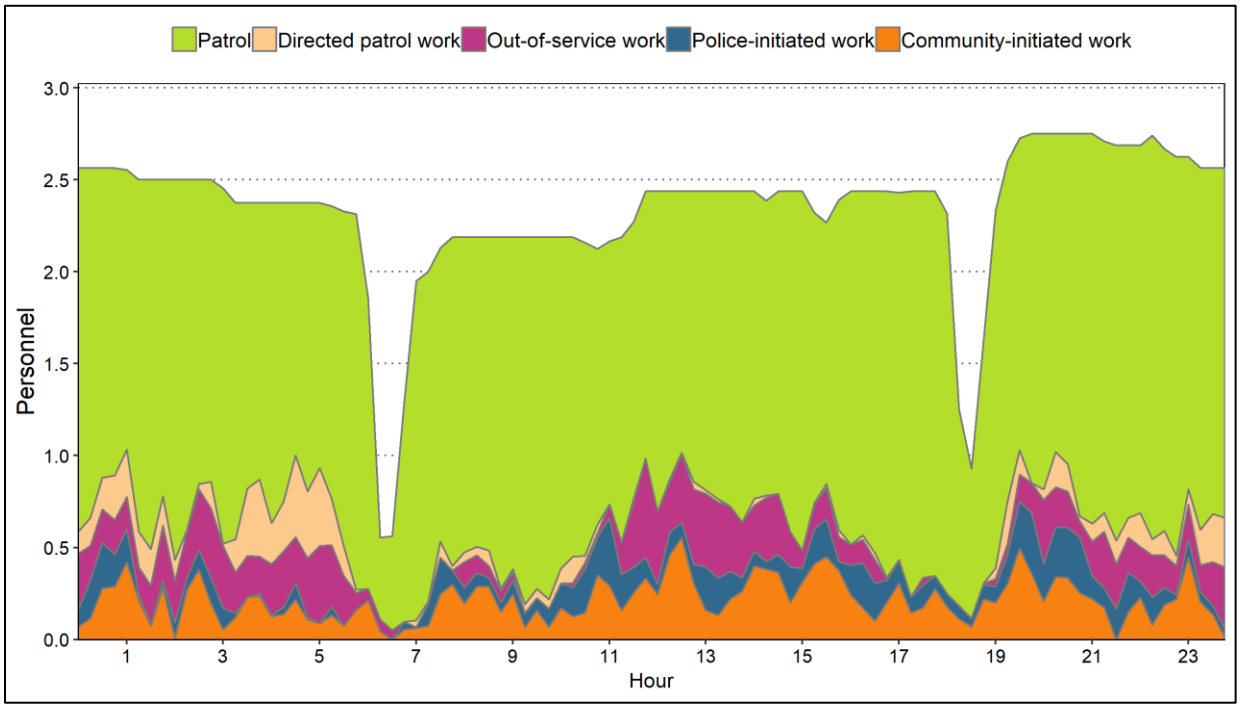


FIGURE 22: Deployment and All Workload, Weekends, Winter 2018



Note: Figures 19 to 22 show deployment along with all workload from community-initiated calls and police-initiated calls, directed patrol work and out-of-service work.

Observations:

Summer:

Community-initiated work:

The average other-initiated workload was 0.3 officers per hour during the week and 0.3 officers per hour on weekends.

This was approximately 12 percent of hourly deployment during the week and 13 percent of hourly deployment on weekends.

All work:

The average workload was 0.5 officers per hour during the week and 0.5 officers per hour on weekends.

This was approximately 25 percent of hourly deployment during the week and 24 percent of hourly deployment on weekends.

Winter:

Community-initiated work:

The average other-initiated workload was 0.2 officers per hour during the week and 0.2 officers per hour on weekends.

This was approximately 9 percent of hourly deployment during the week and 9 percent of hourly deployment on weekends.

All work:

The average workload was 0.6 officers per hour during the week and 0.6 officers per hour on weekends.

This was approximately 26 percent of hourly deployment during the week and 25 percent of hourly deployment on weekends.

Directed patrol workload:

Directed patrol work increased significantly in 2018 when compared against 2017.

In the summer of 2017, the average workload was 0.01 officers per hour during the week and 0.00 officers per hour during the weekend.

In the winter of 2018, the average workload was 0.09 officers per hour during the week and during the weekend.

Nevertheless, due to an increase in deployed personnel, the overall increase in the percentage of hourly deployment was modest.

FIGURE 23: Percentage of Workload, Weekdays, Summer 2017

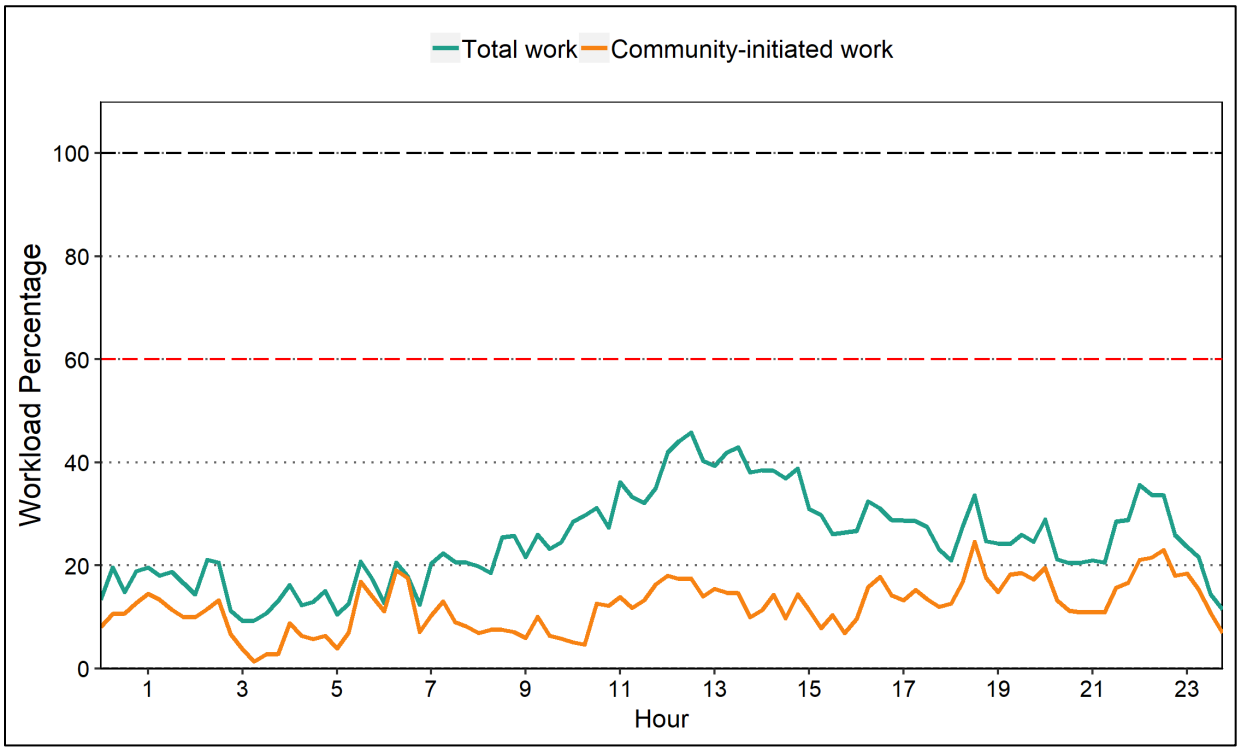


FIGURE 24: Percentage of Workload, Weekends, Summer 2017

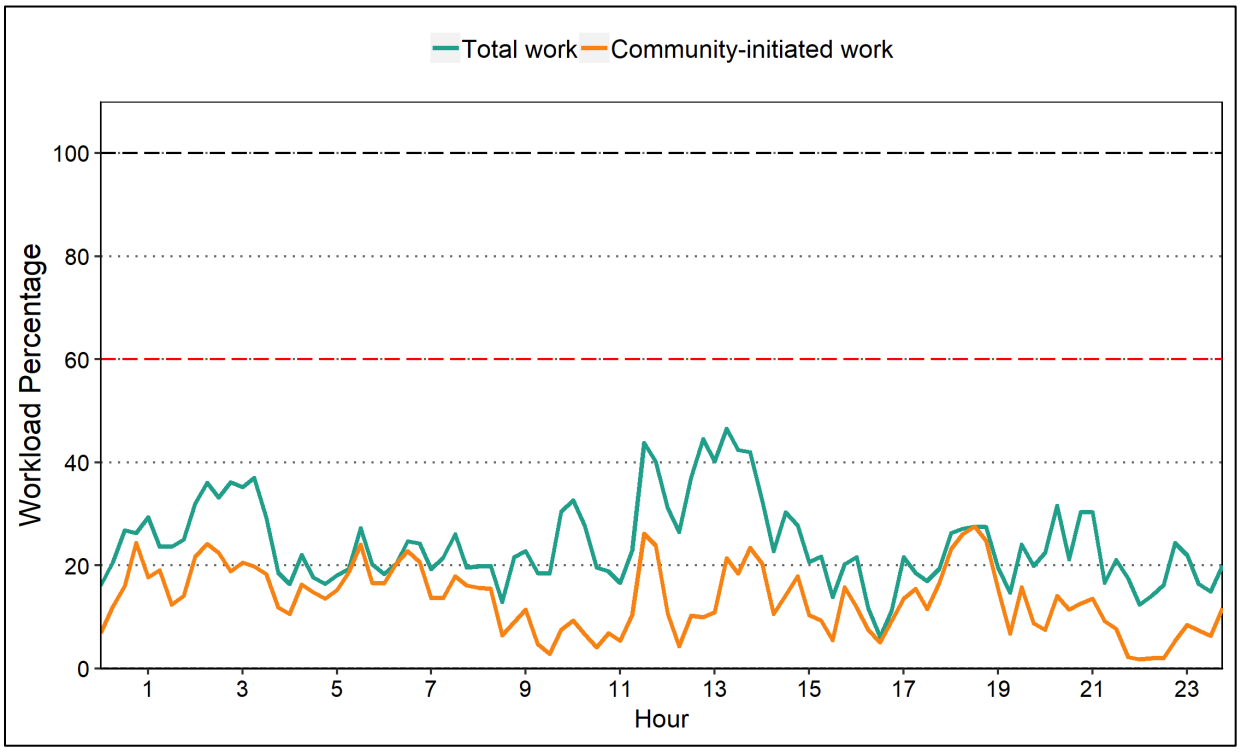


FIGURE 25: Percentage of Workload, Weekdays, Winter 2018

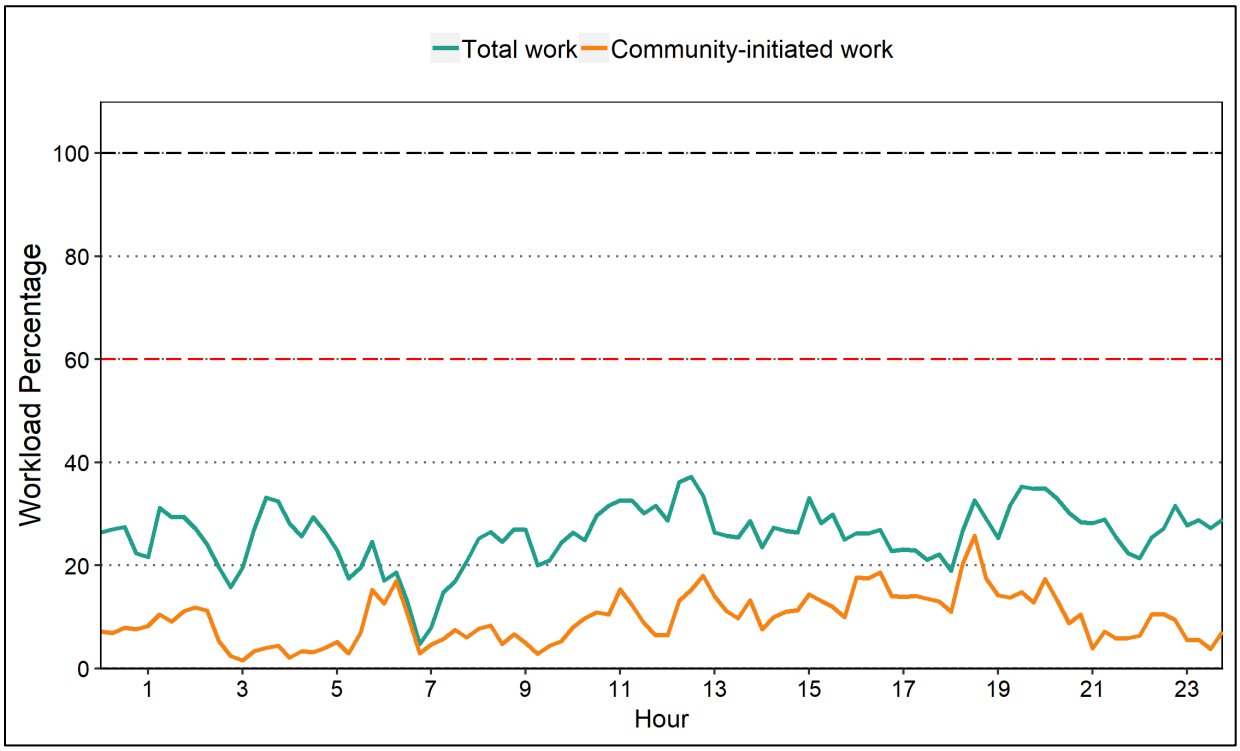
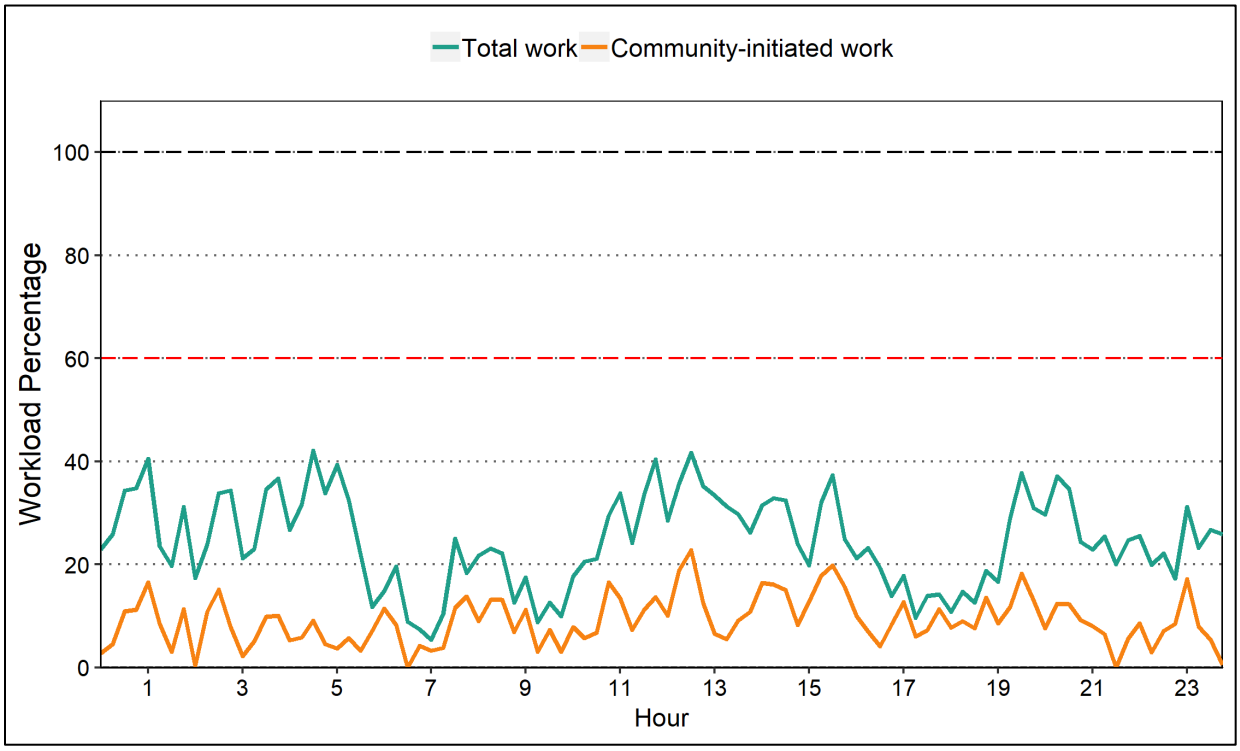


FIGURE 26: Percentage of Workload, Weekends, Winter 2018



Observations:

Summer:

Community-initiated work:

During the week, workload reached a maximum of 25 percent of deployment between 6:30 p.m. and 6:45 p.m.

On weekends, workload reached a maximum of 28 percent of deployment between 6:30 p.m. and 6:45 p.m.

All work:

During the week, workload reached a maximum of 46 percent of deployment between 12:30 p.m. and 12:45 p.m.

On weekends, workload reached a maximum of 46 percent of deployment between 1:15 p.m. and 1:30 p.m.

Winter:

Community-initiated work:

During the week, workload reached a maximum of 26 percent of deployment between 6:30 p.m. and 6:45 p.m.

On weekends, workload reached a maximum of 23 percent of deployment between 12:30 p.m. and 12:45 p.m.

All work:

During the week, workload reached a maximum of 37 percent of deployment between 12:30 p.m. and 12:45 p.m.

On weekends, workload reached a maximum of 42 percent of deployment between 4:30 a.m. and 4:45 a.m. and between 12:30 p.m. and 12:45 p.m.

RESPONSE TIMES

□ We analyzed the response times to various types of calls, separating the duration into dispatch delay and travel time, to determine whether response times varied by call type. Response time is measured as the difference between when a call is received and when the first unit arrives on scene. This is further divided into dispatch delay and travel time. Dispatch delay is the time between when a call is received and when the first unit is dispatched. Travel time is the remaining time until the first unit arrives on scene.

□ We begin the discussion with statistics that include all calls combined. We started with 1,217 calls for summer and 1,828 calls for winter. We limited our analysis to community-initiated calls, which amounted to 789 calls for summer and 659 calls for winter. After excluding calls without valid arrival times and excluding calls located at the Plymouth Police Department's headquarters, we were left with 378 calls in summer and 295 calls in winter for our analysis. For the entire year, we began with 9, 948 calls, limited our analysis to 4,580 community-initiated calls, and further focused our analysis on 2,149 calls after excluding those lacking valid arrival times (about 2,159 calls) or those located at the Plymouth Police Department's headquarters (about 272 calls). Among the 2,159 calls lacking valid arrival times, 1,906 calls had no recorded arrival time and the other 253 calls show response time less than 15 seconds.

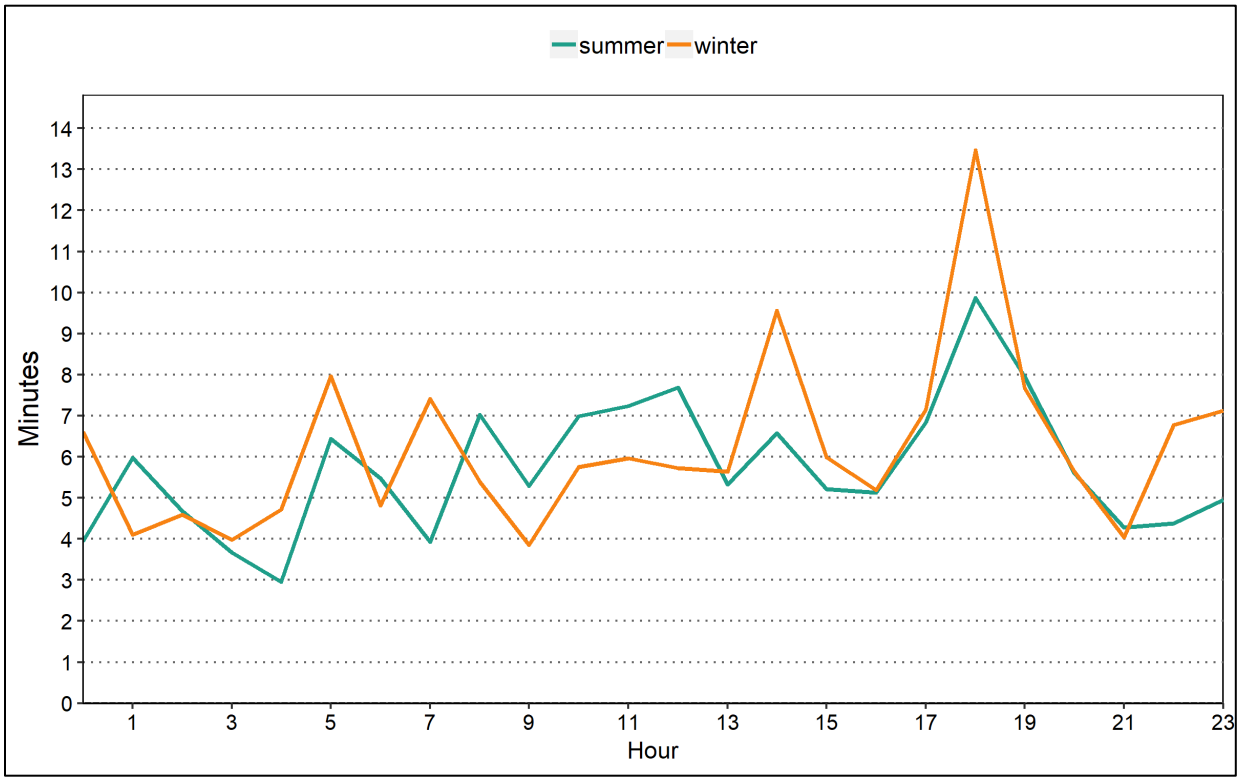
□ Our initial analysis does not distinguish calls based on priority; instead, it examines the difference in response to all calls by time of day and compares summer and winter periods. We then present a brief analysis of response time for high-priority calls alone.

□

ALL CALLS

This section looks at all calls without considering their priorities. In addition to examining the differences in response times by both time of day and season (summer vs. winter), we show differences in response times by category.

FIGURE 27: Average Response Time and Dispatch Delays, by Hour of Day, Summer 2017 and Winter 2018



Observations:

Average response times varied significantly by the hour of the day.

In summer, the longest response times were between 6:00 p.m. and 7:00 p.m. with an average of 9.9 minutes.

In summer, the shortest response times were between 4:00 a.m. and 5:00 a.m. with an average of 3.0 minutes.

In winter, the longest response times were between 6:00 p.m. and 7:00 p.m. with an average of 13.5 minutes.

In winter, the shortest response times were between 9:00 a.m. and 10:00 a.m. with an average of 3.9 minutes.

FIGURE 28: Average Response Time by Category, Summer 2017

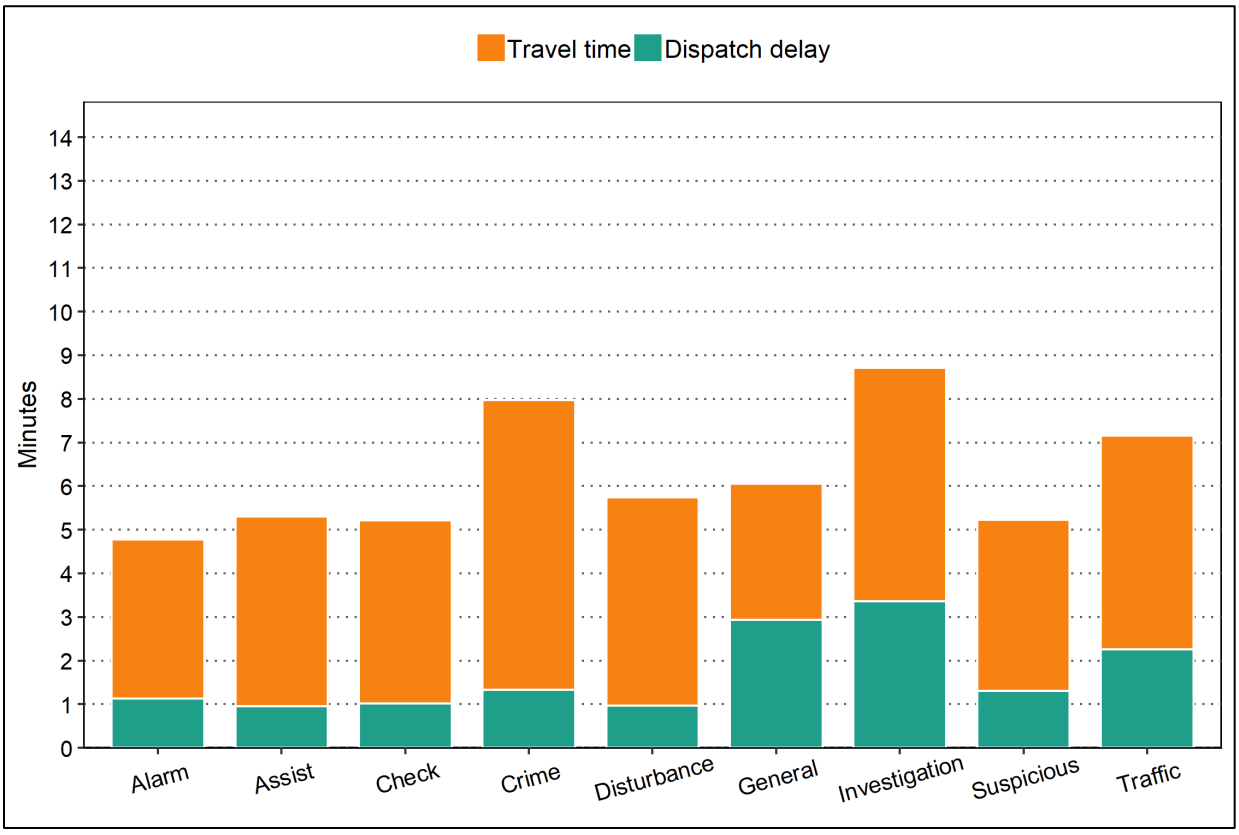


FIGURE 29: Average Response Time by Category, Winter 2018

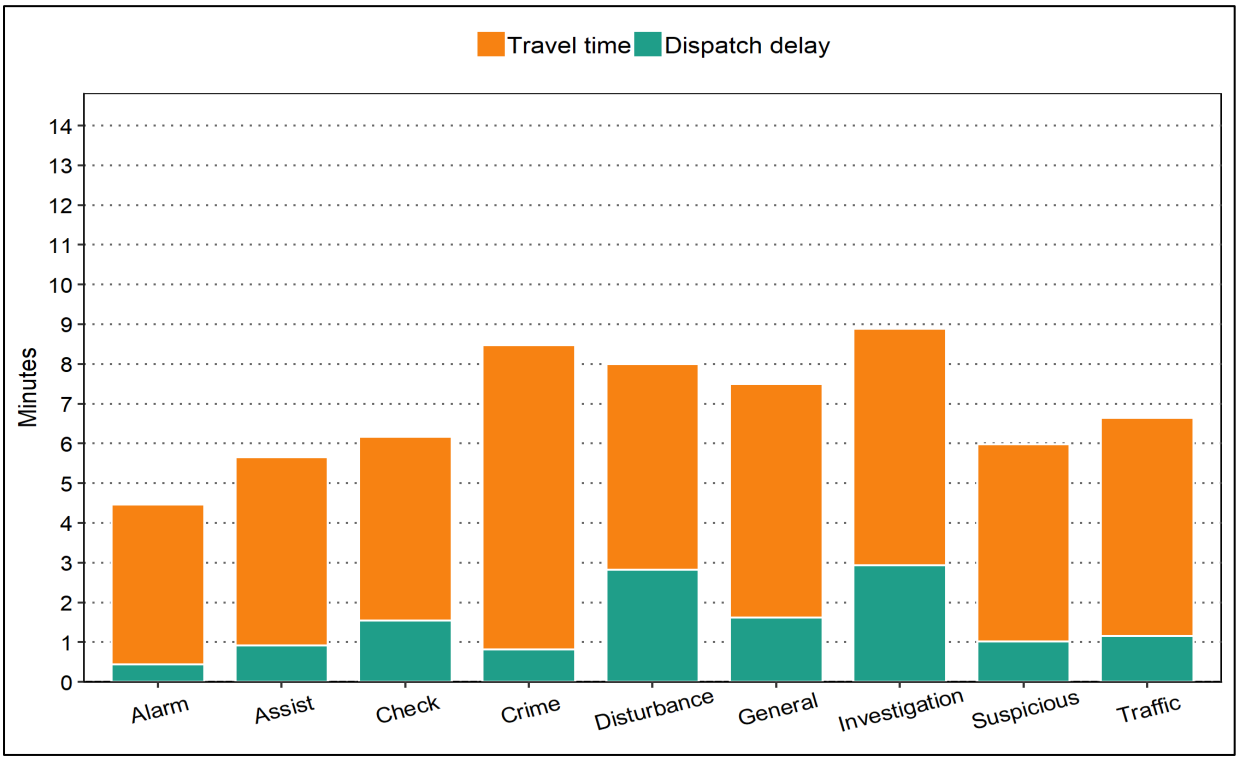


TABLE 16: Average Response Time Components, by Category and Season

Category	Summer			Winter		
	Dispatch	Travel	Response	Dispatch	Travel	Response
Accident	1.5	4.9	6.4	1.6	4.9	6.5
Alarm	1.1	3.6	4.8	0.4	4.0	4.5
Animal	3.8	3.2	7.0	1.8	6.2	8.0
Assist citizen	1.8	5.3	7.1	2.0	4.4	6.4
Assist other agency	0.7	4.0	4.7	0.6	4.8	5.4
Check	1.0	4.2	5.2	1.5	4.6	6.2
Crime-person	1.7	4.5	6.2	2.3	2.2	4.5
Crime-property	1.2	7.5	8.6	0.6	8.4	9.0
Disturbance	1.0	4.8	5.7	2.8	5.2	8.0
Investigation	3.4	5.4	8.7	2.9	6.0	8.9
Miscellaneous	0.0	2.9	2.9	0.7	3.6	*4.2
Suspicious incident	1.3	3.9	5.2	1.0	5.0	6.0
Traffic enforcement	3.0	4.9	7.9	0.6	6.2	6.9
Total Average	**1.4**	**4.5**	**5.9**	**1.2**	**5.1**	**6.3**

Note: The total average is weighted according to the number of calls per category. *There was only one call in the "miscellaneous" category for winter.

Observations:

In summer, the average response time for most categories was between 5 minutes and 8 minutes.

In summer, the average response time was as short as 5 minutes (for alarms) and as long as 9 minutes (for investigations).

In winter, the average response time for most categories was between 4 minutes and 9 minutes.

In winter, the average response time was as short as 4 minutes (for alarms) and as long as 9 minutes (for investigations).

The average response time for crimes was 8 minutes in summer and winter.

TABLE 17: 90th Percentiles for Response Time Components, by Category

Category	Summer			Winter		
	Dispatch	Travel	Response	Dispatch	Travel	Response
Accident	2.7	8.4	11.2	3.5	7.0	10.0
Alarm	2.8	6.5	8.1	0.9	7.6	7.9
Animal	7.1	5.6	9.9	3.4	7.9	10.0
Assist citizen	6.2	10.6	12.6	4.6	8.1	12.3
Assist other agency	1.3	6.9	7.6	1.1	9.7	10.3
Check	2.1	7.9	8.4	3.3	10.0	10.5
Crime-person	3.8	10.5	13.6	2.6	4.0	6.5
Crime-property	3.6	14.6	14.7	0.9	19.8	20.1
Disturbance	1.7	7.3	10.2	5.6	8.0	17.1
Investigation	12.9	12.4	23.1	3.9	10.0	17.3
Miscellaneous	0.1	3.9	4.0	0.7	3.6	4.2*
Suspicious incident	3.8	9.3	10.2	2.0	7.4	8.7
Traffic enforcement	11.6	8.7	16.1	2.0	9.1	11.2
Total Average	**3.6**	**9.1**	**11.2**	**2.5**	**9.6**	**11.0**

Note: A 90th percentile value of 11.2 minutes means that 90 percent of all calls are responded to in fewer than 11.2 minutes. For this reason, the columns for dispatch delay and travel time may not be equal to the total response time. * There was only one call in the "miscellaneous" category for winter.

Observations:

In summer, the 90th percentile value for response time was as short as 6 minutes (for general noncriminal calls) and as long as 23 minutes (for investigations).

In winter, the 90th percentile value for response time was as short as 8 minutes (for alarms) and as long as 17 minutes (for crimes and investigations).

FIGURE 30: Average Response Time Components, by Location

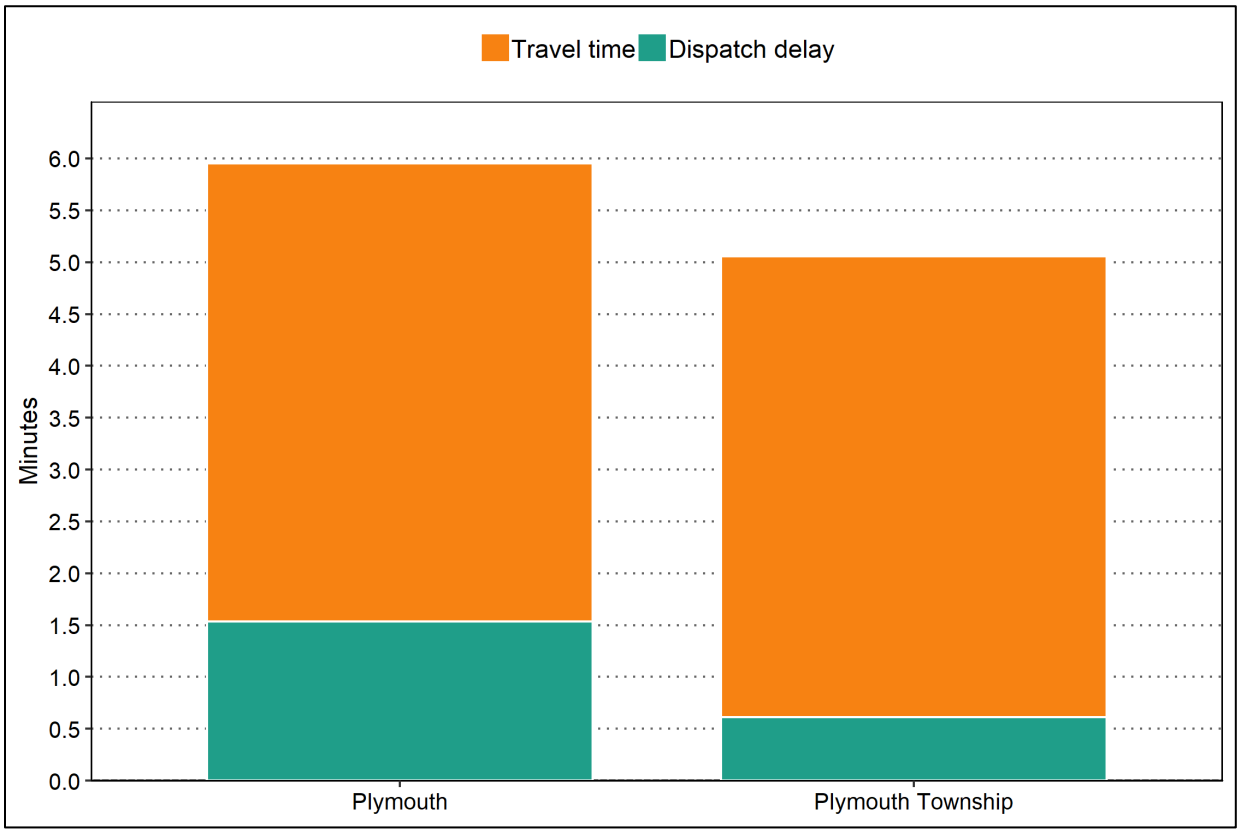


TABLE 18: Average Response Time Components, by Location

Location	Dispatch	Travel	Response	Calls
Plymouth	1.5	4.4	6.0	2,059
Plymouth Township	0.6	4.4	5.1	90
Weighted Average/ Total	**1.5**	**4.4**	**5.9**	**2,149**

Observations:

When compared with calls in Plymouth Township, calls in Plymouth had the slightly longer dispatch delays but similar travel times.

HIGH-PRIORITY CALLS

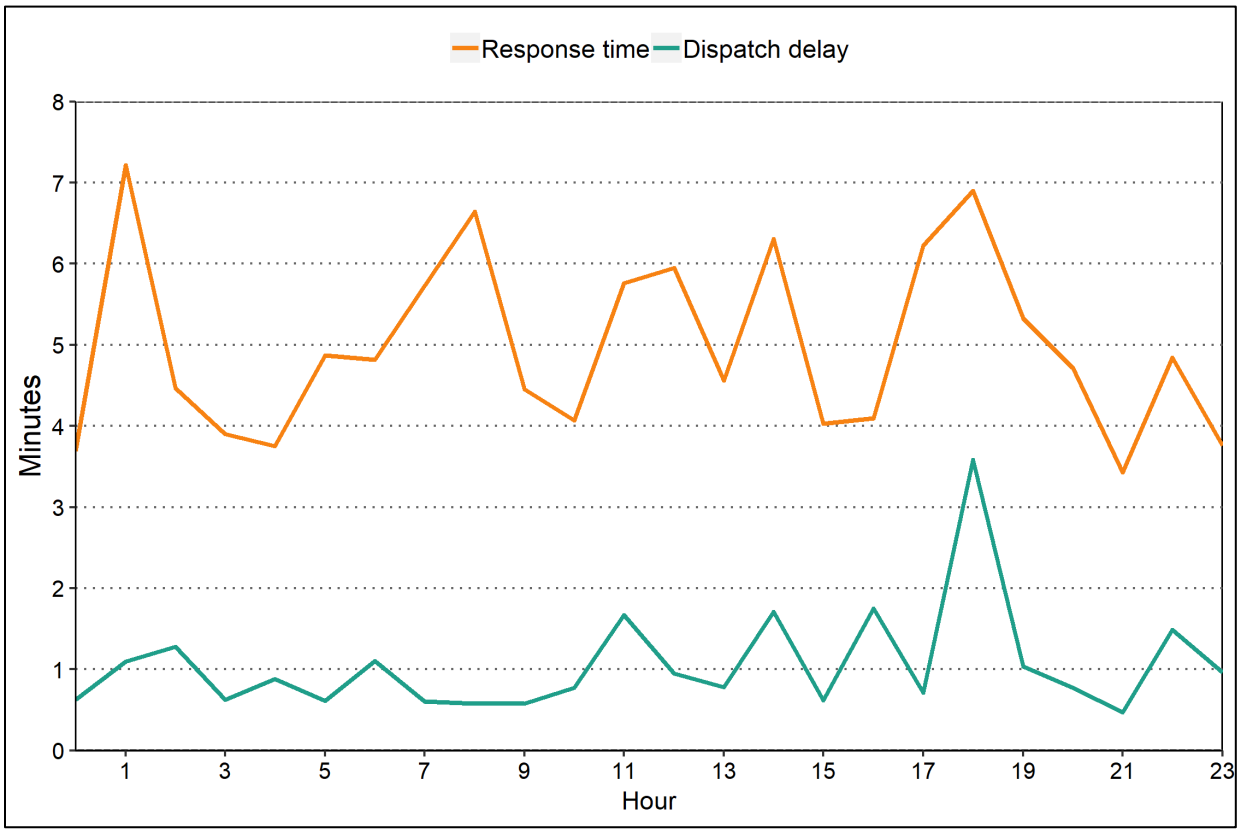
The department assigned priorities to calls with priority 0 and 1 as the highest priority. Table 19 shows average response times by priority. Figure 31 focuses on priority 0 and 1 calls only.

TABLE 19: Average Dispatch, Travel, and Response Times, by Priority

Priority	Dispatch Delay	Travel Time	Response Time	Calls
0	2.2	4.7	6.9	48
1	0.9	4.1	5.0	484
2	1.4	3.7	5.1	631
3	1.6	5.1	6.7	544
4	2.0	5.0	7.0	416
6	2.5	4.8	7.3	22
9*	0.1	3.2	3.2	4
Weighted Average/Total	**1.5**	**4.4**	**5.9**	**2,149**

Note: The total average is weighted according to the number of calls within each priority level. *All four priority 9 calls are described as PBT calls.

FIGURE 31: Average Response Times and Dispatch Delays for High-priority Calls, by Hour



Observations:

High-priority calls (0 and 1) had an average response time of 5.2 minutes, lower than the overall average of 5.9 minutes for all calls.

Average dispatch delay was 1.0 minutes for high-priority calls, compared to 1.5 minutes overall.

For high-priority calls, the longest response times were between 6:00 p.m. and 7:00 p.m. with an average of 6.9 minutes.

For high-priority calls, the shortest response times were between 9:00 p.m. and 10:00 p.m. with an average of 3.4 minutes.

Average dispatch delay for high-priority calls was consistently 1.7 minutes or less, except between 6:00 p.m. and 7:00 p.m.

APPENDIX A: CALL TYPE CLASSIFICATION

Call descriptions for the department's calls for service from July 1, 2017, to June 30, 2018, were classified into the following categories.

TABLE 20: Call Type, by Category

Call Type Code	Call Type	Table Category	Figure Category
ALARM	ALARM INTRUSION	Alarm	Alarm
HOLDUP	HOLDUP ALARM		
PANIC	PANIC ALARM		
PRISTR	PRISONER TRANSPORT	Prisoner-arrest	Arrest
WARR	WARRANT ARREST		
ASSIST	ASSIST CITIZEN	Assist citizen	Assist
AMO	ASSIST MOTORIST		
VEHREL	CITY - VEHICLE RELEASE		
CIVIL	CIVIL MATTER		
PBT	PBT		
LOCK	VEHICLE LOCKOUT		
AFD	ASSIST FIRE DEPT	Assist other agency	
AOD	ASSIST OTHER DEPT		
LCCINS	CITY - LCC INSPECTION	Check	Check
LCCINS	TWP - LCC INSPECTION		
WELFAR	WELFARE CHECK		
AB	ASSAULT & BATTERY	Crime-person	Crime
FA	FELONY ASSAULT		
HARASS	HARASSMENT CALL		
INTIM	INTIMIDATION THREATS		
ROB	ROBBERY		
CSC	SEXUAL ASSAULT		
BE	B&E	Crime-property	
EMBEZ	EMBEZZLEMENT		
FRAUD	FRAUD		
LARC	LARCENY		
LFA	LARCENY FROM AUTO		
MDOP	MALICIOUS DESTRUCTION		
DRUG	NARCOTICS CRIME		
RETAIL	RETAIL FRAUD		
TRES	TRESPASSING		
UDAA	UNAUTHORIZED DRIVING AWAY OF AUTOMOBILE		
COMMP	CITY - COMMUNITY POLICING	Directed patrol	Directed patrol
DE	DIRECTED PATROL		

Call Type Code	Call Type	Table Category	Figure Category
COMMP	TWP - COMMUNITY POLICING		
MISC	ALL MISC COMPLAINTS	Disturbance	Disturbance
SKATE	CITY - SKATEBOARDING COMPLAINT		
DISORD	DISORDERLY		
FAMTRO	FAMILY TROUBLE		
FIREWK	FIREWORKS		
JUV	JUVENILE COMPL		
NEIGH	NEIGHBOR TROUB		
NOISE	NOISE COMPLAINT		
SALES	SOLICITOR COMPL		
ANIMAL	ANIMAL COMPLAINT	Animal	General noncriminal
FPRINT	CITY - FINGERPRINTS	Miscellaneous	
911	911 WELFARE CHECK	Investigation	Investigation
BOMB	BOMB THREAT		
FOUND	FOUND PROPERTY/CHILD		
INFO	INFORMATION - G		
MISS	MISSING PERSON		
ORD	ORDINANCE VIOLATION - ALL 7300 MICR CODES		
RUN	RUNAWAY		
SUICID	SUICIDAL PERSON		
DEATH	UNATTENDED DEATH		
SUSP	SUSPICIOUS PERSON/VEH/CIRCUMSTANCE	Suspicious incident	Suspicious incident
PIA	PERSONAL INJURY ACCIDENT	Accident	Traffic
PPDA	PP PDA		
PDA	PROPERTY DAMAGE ACCIDENT		
ABAN	ABANDONED AUTO	Traffic enforcement	
TICKSO	CITY - TICKET SIGN OFF		
TA	CITY - TRAFFIC ARREST		
DWLS	DRIVING WHILE LIC SUSP		
OWI	OPERATING WHILE INTOX		
PARK	PARKING COMPLAINT		
RD	RECKLESS DRIVING		
HAZARD	ROAD HAZARD		
TA	TWP - TRAFFIC ARREST		
IMP	VEHICLE IMPOUND		
VEHINS	VEHICLE INSPECTION		
TSTOP	TRAFFIC STOP	Traffic stop	

APPENDIX B: UNIFORM CRIME REPORT INFORMATION

This section presents information obtained from Uniform Crime Reports (UCR) collected by the Federal Bureau of Investigation (FBI) and the Michigan State Police. The tables and figures include the most recent information that is publicly available at the national level. This includes crime reports for 2007 through 2016, along with clearance rates for 2016. Crime rates are expressed as incidents per 100,000 population. The most recent clearance rates for Michigan were from 2015.

TABLE 21: Reported Crime Rates in 2016, by City

City	State	Population	Crime Rates		
			Violent	Property	Total
Addison Township	MI	6,532	77	811	888
Center Line	MI	8,332	480	2,352	2,832
Clawson	MI	12,053	91	614	705
Ecorse	MI	9,213	1,617	3,723	5,340
Farmington	MI	10,553	47	1,109	1,156
Flat Rock	MI	9,917	202	1,432	1,634
Grosse Pointe Park	MI	11,160	116	1,927	2,043
Harper Woods	MI	13,764	908	7,360	8,268
Highland Park	MI	10,810	1,739	2,794	4,533
Holly	MI	6,186	226	1,633	1,859
Huntington Woods	MI	6,360	31	676	708
Melvindale	MI	10,348	532	2,310	2,841
Milan	MI	6,012	183	1,663	1,846
New Baltimore	MI	12,409	169	774	943
Northfield Township	MI	8,617	151	1,253	1,404
Northville	MI	6,019	33	930	964
Richmond	MI	5,882	272	1,564	1,836
River Rouge	MI	7,480	1,056	2,487	3,543
Riverview	MI	12,127	305	1,583	1,888
Rochester	MI	13,050	61	506	567
Saline	MI	9,158	109	579	688
South Lyon	MI	11,801	59	424	483
Sumpter Township	MI	9,265	76	1,004	1,079
Walled Lake	MI	7,132	84	757	841
Wixom	MI	13,796	159	1,674	1,834
Woodhaven	MI	12,478	80	2,076	2,156
Plymouth	**MI**	**8,865**	**56**	**993**	**1,049**
Michigan		**9,928,300**	**459**	**1,910**	**2,369**
Nation		**323,127,513**	**386**	**2,451**	**2,837**

FIGURE 32: Reported Violent and Property Crime Rates, by Year

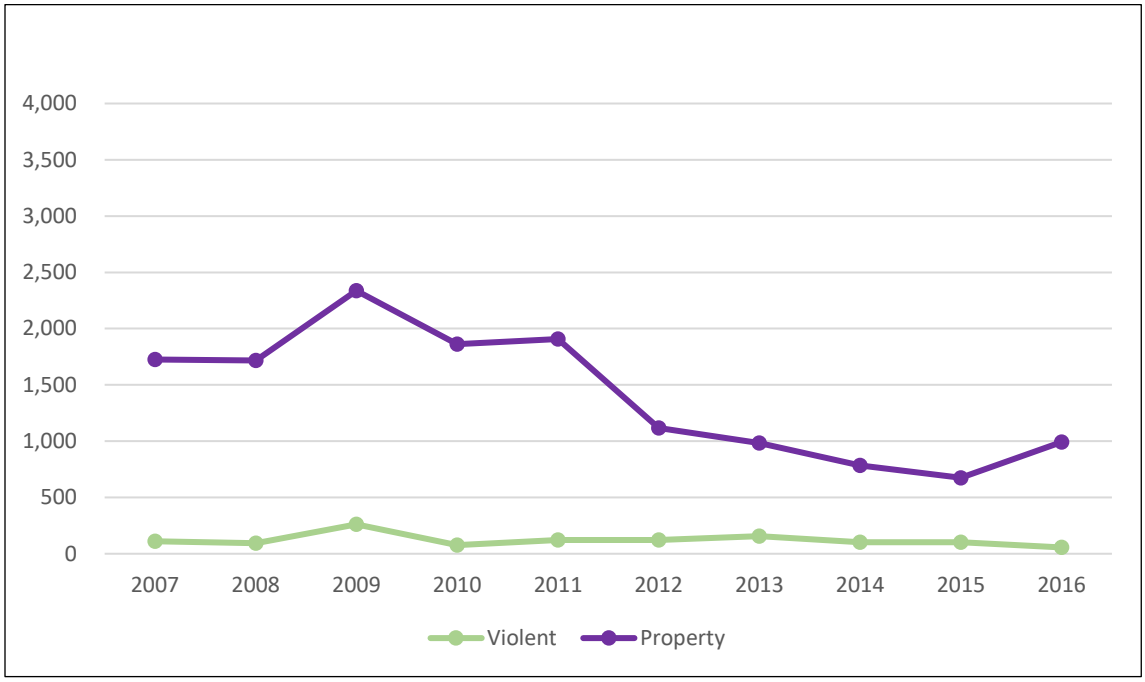


FIGURE 33: Reported City and State Crime Rates, by Year

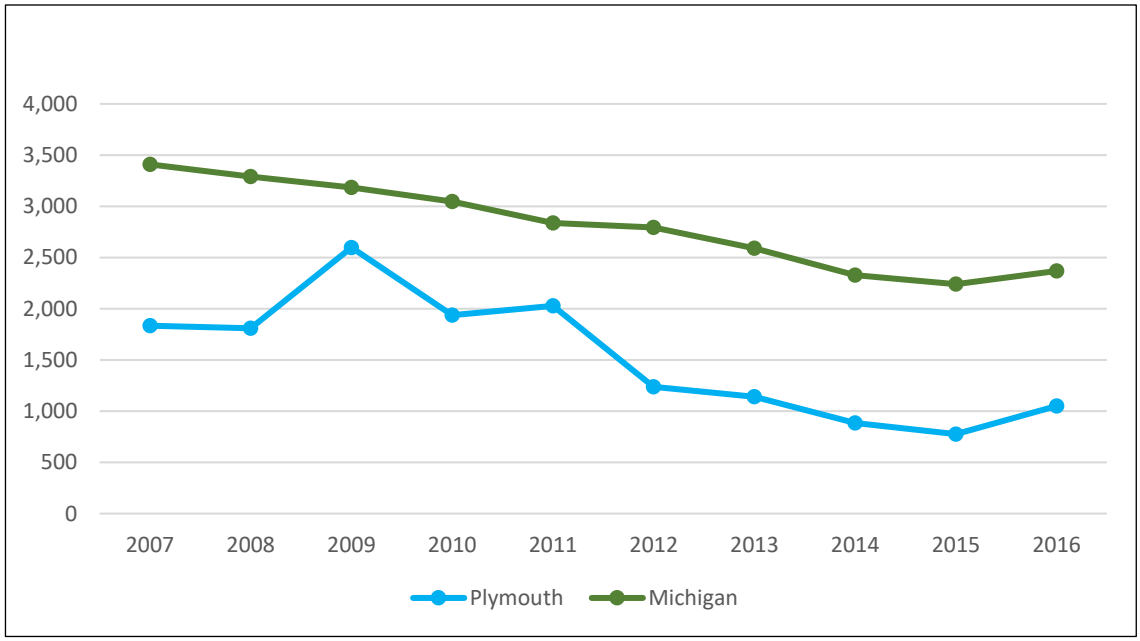


TABLE 22: Reported Plymouth, Michigan, and National Crime Rates, by Year

Year	Plymouth				Michigan				National			
	Population	Violent	Property	Total	Population	Violent	Property	Total	Population	Violent	Property	Total
2007	9,046	111	1,725	1,835	10,451,398	510	2,899	3,409	306,799,884	442	3,045	3,487
2008	8,622	93	1,717	1,809	10,376,520	491	2,798	3,289	309,327,055	438	3,055	3,493
2009	8,430	261	2,337	2,598	10,345,739	478	2,705	3,183	312,367,926	416	2,906	3,322
2010	9,132	77	1,862	1,938	10,307,062	468	2,579	3,046	314,170,775	393	2,833	3,225
2011	9,125	121	1,907	2,027	10,359,533	421	2,416	2,837	317,186,963	376	2,800	3,176
2012	9,047	122	1,116	1,238	10,366,035	429	2,363	2,792	319,697,368	377	2,758	3,135
2013	8,949	156	983	1,140	10,384,874	424	2,164	2,589	321,947,240	362	2,627	2,989
2014	8,912	101	785	886	10,410,762	406	1,922	2,327	324,699,246	357	2,464	2,821
2015	8,889	101	675	776	10,318,255	402	1,837	2,240	327,455,769	368	2,376	2,744
2016	8,865	56	993	1,049	9,928,300	459	1,910	2,369	323,127,513	386	2,451	2,837

TABLE 23: Reported Plymouth, Michigan, and National Crime Clearance Rates

Crime	Plymouth (2016)			Michigan (2015)			National (2016)		
	Crimes	Clearances	Rate	Crimes	Clearances	Rate	Crimes	Clearances	Rate
Murder Manslaughter	0	0	NA	622	243	39%	15,566	9,246	59%
Rape	2	2	100%	6,637	1,738	26%	111,241	40,603	37%
Robbery	2	1	50%	7,795	1,244	16%	306,172	90,627	30%
Aggravated Assault	1	1	100%	26,438	10,735	41%	744,132	396,622	53%
Burglary	12	1	8%	40,092	3,517	9%	1,393,570	182,558	13%
Larceny	65	12	18%	130,781	22,602	17%	5,211,566	1,063,159	20%
Vehicle Theft	11	5	45%	18,715	1,423	8%	714,041	94,967	13%

This is the data analysis report on police patrol operations for the Plymouth, Michigan Police Services Division, which was conducted by the Center for Public Safety Management, LLC (CPSM). This analysis focuses on three main areas: workload, deployment, and response times. These three areas are related almost exclusively to patrol operations, which constitute a significant portion of the police department's personnel and financial commitment.

All information in this preliminary report was developed using computer-aided dispatch (CAD) data provided by the Plymouth Department. The purposes of this report are to provide the City of Plymouth with CPSM's preliminary findings and to allow the police department to review and bring to our attention any dispatch information that may be inconsistent with other internal records of the agency.

CPSM collected data for a one-year period of January 1, 2017 through December 31, 2017. The majority of the first section of the report, concluding with Table 8, uses call data for the one-year period. For the detailed workload analysis, we use two eight-week sample periods. The first period is from January 4 through February 28, 2017, or winter, and the second period is from July 7 through August 31, 2017, or summer.

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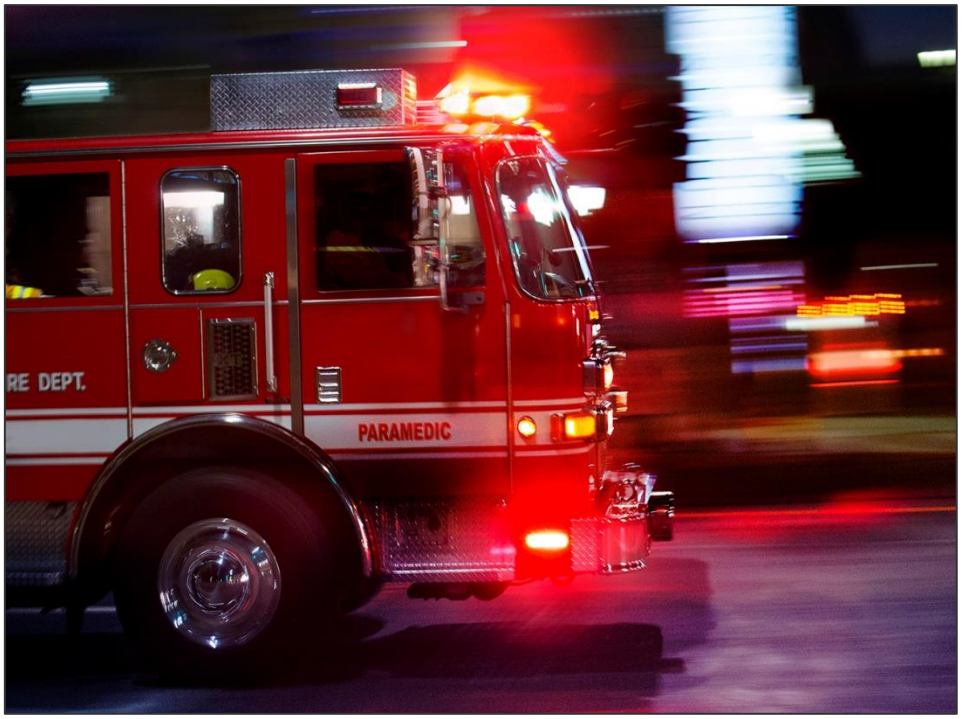
CENTER FOR PUBLIC SAFETY MANAGEMENT, LLC

FIRE SERVICES DATA ANALYSIS REPORT

PLYMOUTH, MICHIGAN



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INTRODUCTION

This data analysis was prepared as a key component of the study of the fire and EMS resources provided to Plymouth, Michigan, by Northville Fire Department (NFD), which was conducted by the Center for Public Safety Management, LLC (CPSM). This analysis examines all calls for service between July 1, 2017 and June 30, 2018, as recorded in the computer-aided dispatch (CAD) system associated with Oakland County's Courts and Law Enforcement Information System (CLEMIS) along with information provided by the NFD's National Fire Incident Reporting System (NFIRS).

This analysis is made up of four parts. The first part focuses on call types and dispatches. The second part explores time spent and workload of individual units. The third part presents an analysis of the busiest hours in the year studied. The fourth part provides a response time analysis of NFD units.

During the year covered by this study, fire and EMS first response were provided to the city of Plymouth by the Northville Fire Department. The department operated out of three stations, utilizing one aerial platform, two BLS ambulances, eight light duty command vehicles, two engines, and one pumper engine. This study focused on calls that either occurred in Plymouth or involved units from the two stations located within Plymouth.

During the study period, Northville Fire Department EMS and fire services responded to 796 Plymouth-related calls, of which 74.6 percent were EMS calls. The total combined workload (deployed time) for all NFD units was 507.8 hours. The average dispatch time for the first arriving unit was 2.6 minutes and the average response time of the first arriving unit was 8.7 minutes. The 90th percentile dispatch time was 6.7 minutes and the 90th percentile response time was 14.7 minutes.

METHODOLOGY

In this report, CPSM analyzes calls and runs. A call is an emergency service request or incident. A run is a dispatch of a unit (i.e., a unit responding to a call). Thus, a call may include multiple runs.

We received CAD data, NFIRS data for the Northville Fire Department. We first matched the NFIRS and CAD data based on incident numbers provided, then matched CAD data and ambulance data provided by Huron Valley ambulance based on the time of the incident and incident location. Then, we classified the calls in a series of steps. We first used the NFIRS incident type to identify canceled calls, motor vehicle accident (MVA), and fire category call types. EMS calls were then assigned detailed categories based on their EMS Clawson codes as provided by the ambulance data.

Finally, units with no corresponding call, and units with no enroute or arrival time, were removed. Then, calls with no responding NFD units were removed. In addition, a total of four incidents to which the command or administrative units were the sole responders are not included in the analysis sections of the report. However, the workload of administrative units is documented in Attachment II.

In this report, canceled calls are included in all analyses other than the response time analyses.

NOTES TO FIRE REPORT

Following review, Chief Stephen Ott of the Northville Fire Department noted there appears to be an assumption that the dispatch center assigns units to respond on a call. While this may be the case in larger operations, it is not the case for Northville. Rather, the dispatch center alerts the appropriate station and provides information on the nature and location of the call. Which units actually respond is then determined by the Department, based on General Orders, the needs of the call, the determination of the officer in charge, and the units and personnel that are available.

There is a reference to the Department operating three stations, but the units then identified only reflect the units housed at the two stations in Plymouth. This could be confusing to readers and should be noted; the purpose of this study was to determine the workload in Plymouth and not the entire fire department. In addition, there is a reference to operation of "eight light duty command vehicles." This references the fact that our officers and inspectors, each of whom is issued a radio and a personal call sign, will sometimes speak on the radio and get referenced in the CAD data. The "vehicles" involved would be these individuals' personal vehicles. So, for example, if Inspector 1726 drove by a reported car fire on the way to the station, he might get on the radio and advise dispatch that the vehicle is fully involved. He would then continue to the station, get his equipment and respond on one of the trucks. In addition, just because someone who is assigned a personal call sign is not reflected as having a run, it does not mean that he was not there. It only means that there was no reason for that person to contact dispatch using his personal call sign.

The report references 19 structure fires during the time period covered by the study. Rarely are there that many structure fires in Plymouth or Northville so some may be mutual aid that was not identified as such. This is important to note for several reasons. First, response times to mutual aid calls will ordinarily be longer, since units are leaving the jurisdiction. Second, a mutual aid response is typically limited to one vehicle. Third, when preparing a NFIRS report for a mutual aid call, NFD will not typically include information such as loss values, leaving this to the report of the primary jurisdiction. If someone interprets all of the information provided in the report as involving structure fires exclusively in the City of Plymouth, they could mistakenly conclude that it takes NFD longer to get there, that it responds with fewer assets, and that NFD did not collect data such as loss data.

With respect to structure fires in the City of Plymouth, it is also important to note that there are assets responding to that call that are not stationed at Plymouth stations. An engine from station 1 automatically responds, as do units from the Plymouth Township Fire Department. While NFD tries to account for station 1 assets on the report, the numbers will not reflect units responding from Plymouth Township or other mutual aid departments. In addition, if needed, NFD will send additional units from station 1 to "fill in" at station 2, and handle any additional calls. Of course, the same works in reverse if the structure fire is in the City of Northville. Aerial 1722 automatically responds on such calls, and this would be reflected in the NFIRS report prepared at station 1 following the call.

The information on call duration can also be somewhat misleading. This data measures the amount of time a unit is on a run, until the time that it clears. There is, however, a lot of additional work to be done before NFD considers the call closed out. Vehicles have to be cleaned, restocked and an apparatus check sheet completed after the vehicle returns to the station. NFD also writes reports for each call prior to leaving the station after the call. Because stations are not typically staffed, NFD considers the time on a call to consist of all the activity undertaken during the time that people are called into the station. While all of this time is not reflected in the NFIRS reports, and while there is potentially some benefit to determining the

amount of time a particular unit is devoted to the scene itself, because of the nature of the NFD operation, it tends to view the total time devoted to the call, including clean-up and report writing, as more important.

In any public safety department, these issues should be addressed and regular reporting on first, second, and subsequent units compiled, including personnel staffing those units.

AGGREGATE CALL TOTALS AND RUNS

During the year studied, Plymouth fire and EMS resources responded to 796 calls. Of these, 19 were structure fire calls and 7 were outside fire calls within the City of Plymouth's jurisdiction.

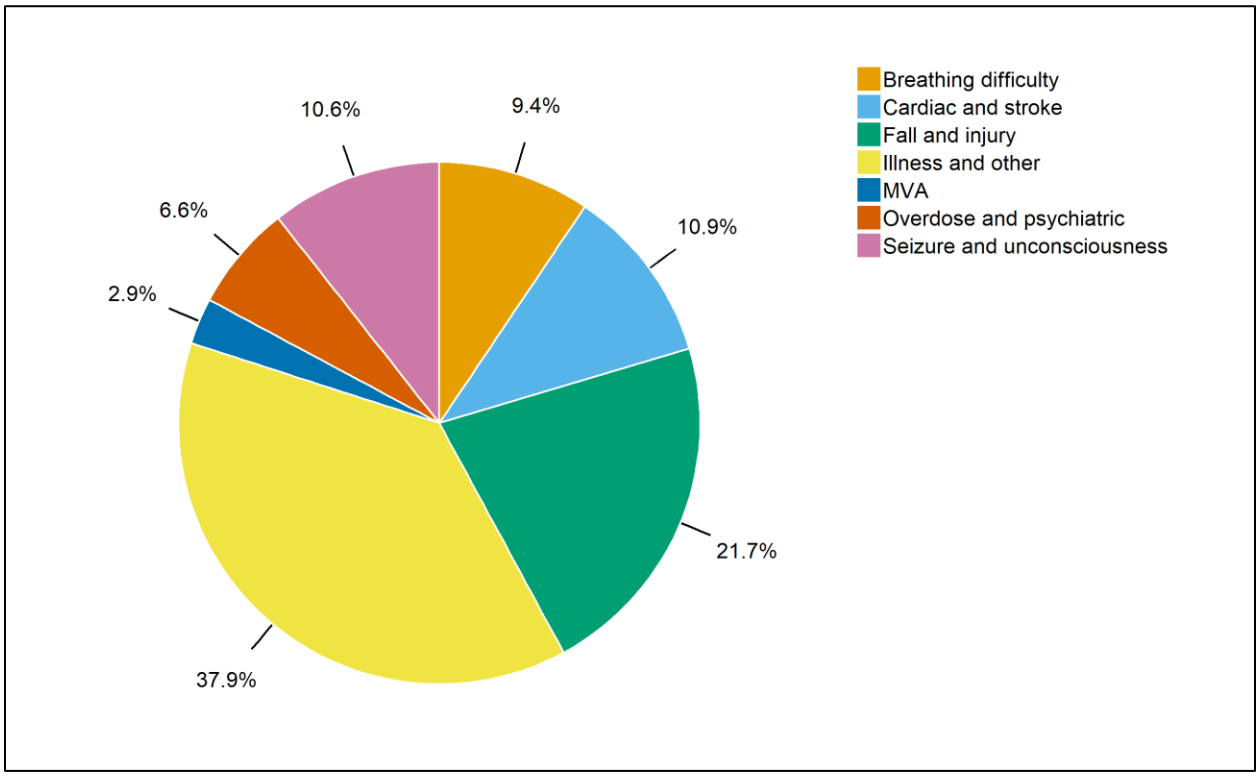
CALLS BY TYPE

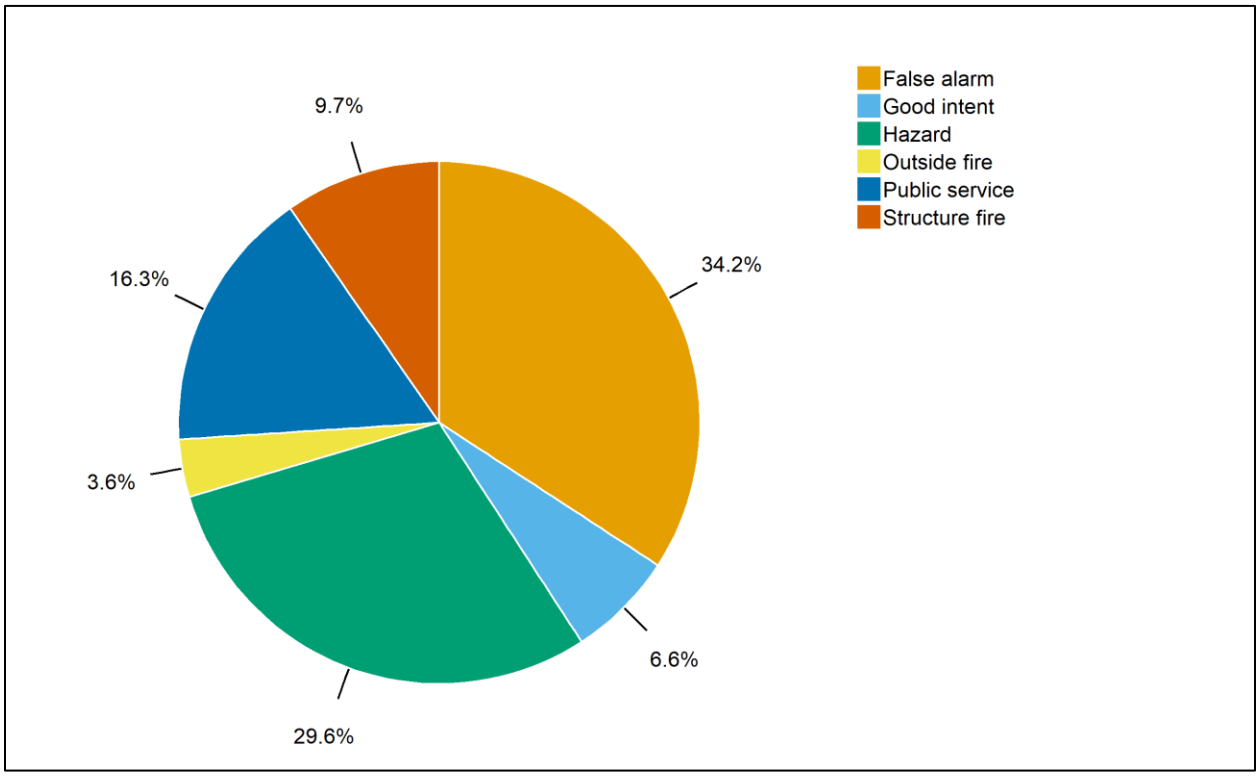
Table 1 and Figure 1 show the number of calls by call type, average calls per day, and the percentage of calls that fall into each call type category for the 12-month period studied.

TABLE 1: Call Types

Call Type	Number of Calls	Calls per Day	Call Percentage
Breathing difficulty	56	0.2	7.0
Cardiac and stroke	65	0.2	8.2
Fall and injury	129	0.4	16.2
Illness and other	225	0.6	28.3
MVA	17	0.0	2.1
Overdose and psychiatric	39	0.1	4.9
Seizure and unconsciousness	63	0.2	7.9
EMS Total	**594**	**1.6**	**74.6**
False alarm	67	0.2	8.4
Good intent	13	0.0	1.6
Hazard	58	0.2	7.3
Outside fire	7	0.0	0.9
Public service	32	0.1	4.0
Structure fire	19	0.1	2.4
Fire Total	**196**	**0.5**	**24.6**
Canceled	6	0.0	0.8
Total	**796**	**2.2**	**100.0**

FIGURE 1: EMS and Fire Calls by Type





Observations:

Overall

The department received an average of 2.2 calls, per day.

EMS calls for the year totaled 594 (75 percent of all calls), an average of 1.6 per day.

Fire calls for the year totaled 196 (25 percent of all calls), an average of 0.5 per day.

There were 44 days with no calls for service.

EMS

Illness and other calls were the largest category of EMS calls at 38 percent of EMS calls, an average of 0.6 calls per day.

Cardiac and stroke calls made up 11 percent of EMS calls, an average of 0.2 calls per day.

Motor vehicle accidents made up 3 percent of EMS calls, an average of 0.0 calls per day.

Fire

False alarm calls were the largest category of fire calls at 34 percent of fire calls, an average of 0.2 calls per day.

Structure and outside fire calls combined made up 13 percent of fire calls, an average of 0.1 calls per day, or one call every 14 days.

CALLS BY TYPE AND DURATION

Table 2 shows the duration of calls by type using four duration categories: less than 30 minutes, 30 minutes to one hour, one to two hours, and more than an hour.

TABLE 2: Calls by Type and Duration

Call Type	Less than 30 Minutes	30 Minutes to One Hour	One to Two Hours	More Than Two Hours	Total
Breathing difficulty	47	9	0	0	56
Cardiac and stroke	60	5	0	0	65
Fall and injury	112	16	0	1	129
Illness and other	178	42	4	1	225
MVA	14	3	0	0	17
Overdose and psychiatric	29	9	1	0	39
Seizure and unconsciousness	54	9	0	0	63
EMS Total	**494**	**93**	**5**	**2**	**594**
False alarm	45	19	3	0	67
Good intent	9	3	1	0	13
Hazard	31	16	6	5	58
Outside fire	4	1	1	1	7
Public service	26	2	3	1	32
Structure fire	9	1	5	4	19
Fire Total	**124**	**42**	**19**	**11**	**196**
Canceled	5	0	1	0	6
Total	**623**	**135**	**25**	**13**	**796**

Observations:

A total of 587 EMS calls (99 percent) lasted less than one hour, 5 EMS calls (1 percent) lasted one to two hours, and 2 EMS calls (less than 1 percent) lasted two or more hours.

A total of 166 fire calls (85 percent) lasted less than one hour, 19 fire calls (10 percent) lasted one to two hours, and 11 fire calls (6 percent) lasted two or more hours.

AVERAGE CALLS PER DAY AND PER HOUR

Figure 2 shows the monthly variation in the average daily number of calls handled by the NFD during the year studied. Similarly, Figure 3 illustrates the average number of calls received each hour of the day over the course of the year.

FIGURE 2: Average Calls per Day, by Month

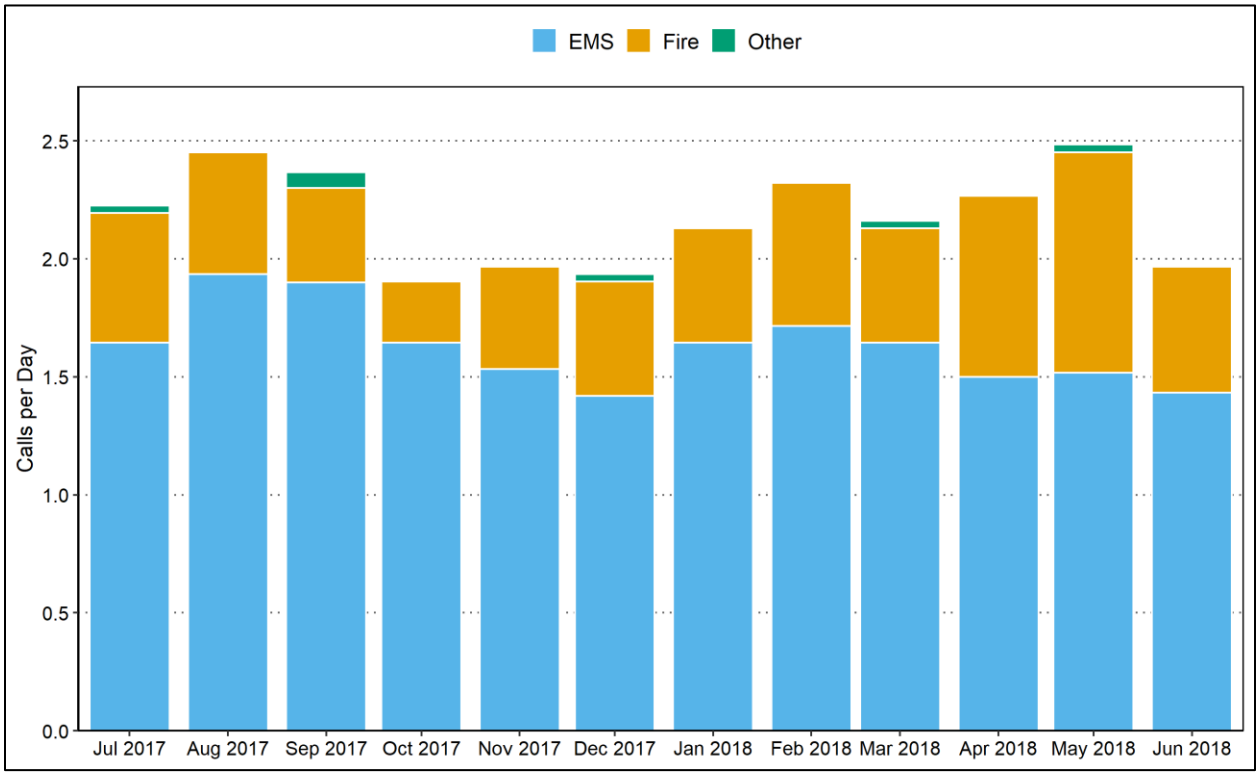
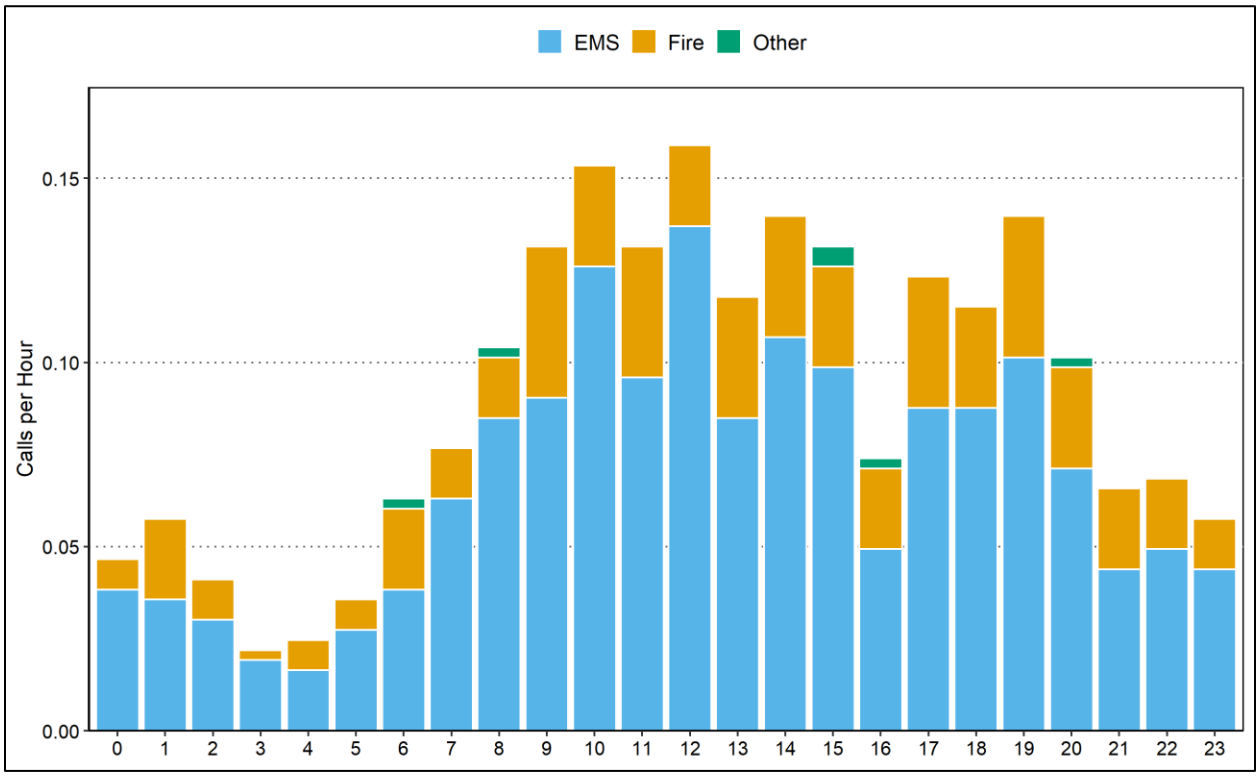


FIGURE 3: Calls by Hour of Day



Observations:

Average Calls per Month

Average EMS calls per day ranged from 1.4 in December 2017 to 1.9 in August 2017.

Average fire calls per day ranged from 0.3 in October 2017 to 0.9 in May 2018.

There were never more than 2 other calls in a single month.

Average calls per day overall ranged from 1.9 in October 2017 to 2.5 in May 2018.

Average Calls per Hour

Average EMS calls per hour ranged from 0.02 between 4:00 a.m. and 5:00 a.m. to 0.14 between noon and 1:00 p.m.

Average fire calls per hour ranged from 0.003 between 3:00 a.m. and 4:00 a.m. to 0.04 between 9:00 a.m. and 10:00 a.m.

Average calls per hour overall ranged from less than 0.02 between 3:00 a.m. and 4:00 a.m. to 0.16 between noon and 1:00 p.m.

UNITS DISPATCHED TO CALLS

Table 3 and Figures 4 and 5 detail the number of NFD calls with one, two, or three or more units dispatched overall and broken down by call type.

TABLE 3: Calls by Call Type and Number of Units Dispatched

Call Type	Number of Units			Total Calls
	One	Two	Three or More	
Breathing difficulty	52	4	0	56
Cardiac and stroke	63	2	0	65
Fall and injury	112	17	0	129
Illness and other	200	24	1	225
MVA	7	9	1	17
Overdose and psychiatric	39	0	0	39
Seizure and unconsciousness	57	6	0	63
EMS Total	**530**	**62**	**2**	**594**
False alarm	27	21	19	67
Good intent	9	2	2	13
Hazard	34	18	6	58
Outside fire	1	1	5	7
Public service	23	8	1	32
Structure fire	9	3	7	19
Fire Total	**103**	**53**	**40**	**196**
Canceled	6	0	0	6
Total	**639**	**115**	**42**	**796**
Percentage	**80.3**	**14.4**	**5.3**	**100.0**

FIGURE 4: Calls by Number of Units Dispatched – EMS

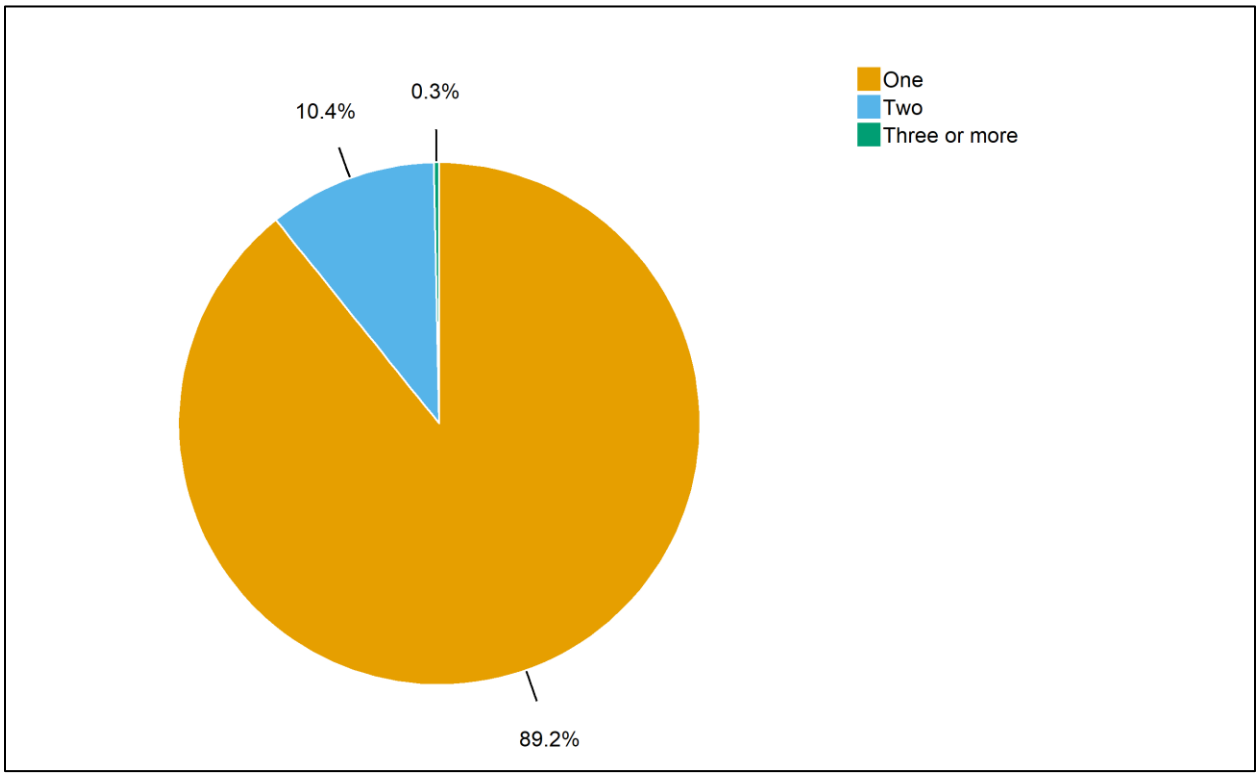
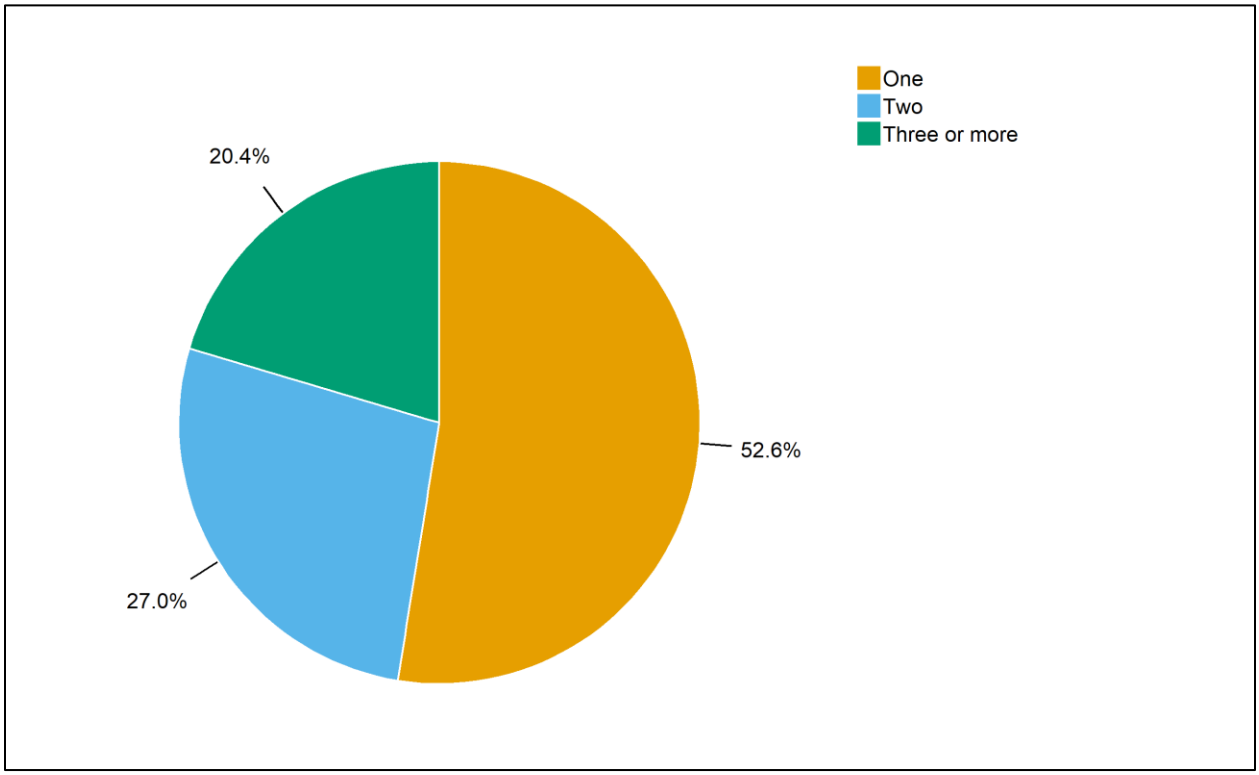


FIGURE 5: Calls by Number of Units Dispatched – Fire



Observations:

Overall

On average, 1.3 units were dispatched to all calls.

For 80 percent of calls only one unit was dispatched.

Overall, three or more units were dispatched to 5 percent of calls.

EMS

For EMS calls, one unit was dispatched 89 percent of the time, two units were dispatched 10 percent of the time, and three or more units were dispatched less than 1 percent of the time.

On average, 1.1 units were dispatched per EMS call.

Fire

For fire calls, one unit was dispatched 53 percent of the time, two units were dispatched 27 percent of the time, and three or more units were dispatched 20 percent of the time.

On average, 1.8 units were dispatched per fire call.

For outside fire calls, three or more units were dispatched 71 percent of the time.

For structure fire calls, three or more units were dispatched 37 percent of the time.

WORKLOAD: RUNS AND TOTAL TIME SPENT

The workload of each unit is measured in two ways: runs and deployed time. The deployed time of a run is measured from the time a unit is dispatched through the time the unit is cleared. Because multiple units respond to some calls, there are more runs than calls and the average deployed time per run varies from the total duration of calls.

RUNS AND DEPLOYED TIME – ALL UNITS

Deployed time, also referred to as deployed hours, is the total deployment time of all units deployed on all runs. Table 4 shows the total deployed time, both overall and broken down by type of run, for NFD units during the year studied.

TABLE 4: Annual Runs and Deployed Time by Run Type

Call Type	Avg. Deployed Min. per Run	Total Annual Hours	Percent of Total Hours	Avg. Deployed Min. per Day	Total Annual Runs	Avg. Runs per Day
Breathing difficulty	21.9	21.9	4.3	3.6	60	0.2
Cardiac and stroke	20.2	22.6	4.4	3.7	67	0.2
Fall and injury	20.1	48.8	9.6	8.0	146	0.4
Illness and other	22.9	95.6	18.8	15.7	251	0.7
MVA	20.3	9.8	1.9	1.6	29	0.1
Overdose and psychiatric	24.4	15.9	3.1	2.6	39	0.1
Seizure and unconsciousness	20.5	23.5	4.6	3.9	69	0.2
EMS Total	**21.6**	**238.2**	**46.9**	**39.2**	**661**	**1.8**
False alarm	25.2	58.3	11.5	9.6	139	0.4
Good intent	25.7	9.4	1.9	1.6	22	0.1
Hazard	53.4	80.1	15.8	13.2	90	0.2
Outside fire	119.8	45.9	9.0	7.5	23	0.1
Public service	26.1	19.1	3.8	3.1	44	0.1
Structure fire	80.7	55.2	10.9	9.1	41	0.1
Fire Total	**44.8**	**268.1**	**52.8**	**44.1**	**359**	**1.0**
Canceled	15.2	1.5	0.3	0.3	6	0.0
Total	**29.7**	**507.8**	**100.0**	**83.5**	**1,026**	**2.8**

Observations:

Overall

Total deployed time for the year was 507.8 hours.

The daily average was 83.5 minutes for all units combined.

There were 1,026 runs, including 6 runs dispatched for canceled calls. The daily average was 2.8 runs.

EMS

EMS runs accounted for 47 percent of the total workload.

The average deployed time for EMS runs was 21.6 minutes.

The deployed time for all EMS runs averaged 39.2 minutes per day.

Fire

Fire runs accounted for 53 percent of the total workload.

The average deployed time for fire runs was 44.8 minutes. The deployed time for all fire runs averaged 44.1 minutes per day.

There were 64 runs for structure and outside fire calls combined, with a total workload of 101.1 hours. This accounted for 20 percent of the total workload.

The average deployed time for outside fire runs was 119.8 minutes per run, and the average deployed time for structure fire runs was 80.7 minutes per run.

FIGURE 6: Average Deployed Minutes by Hour of Day

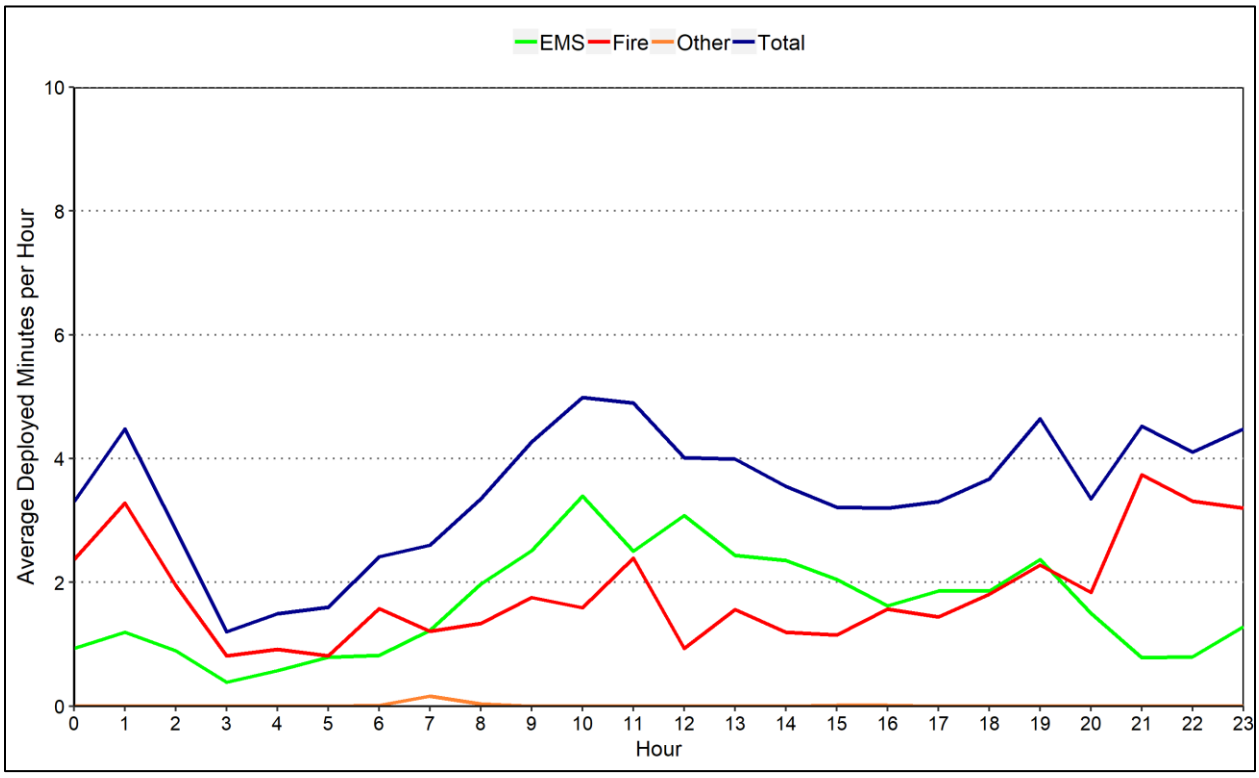


TABLE 5: Average Deployed Minutes by Hour of Day

Hour	EMS	Fire	Other	Total
0	0.9	2.4	0.0	3.3
1	1.2	3.3	0.0	4.5
2	0.9	2.0	0.0	2.8
3	0.4	0.8	0.0	1.2
4	0.6	0.9	0.0	1.5
5	0.8	0.8	0.0	1.6
6	0.8	1.6	0.0	2.4
7	1.2	1.2	0.2	2.6
8	2.0	1.3	0.0	3.3
9	2.5	1.8	0.0	4.3
10	3.4	1.6	0.0	5.0
11	2.5	2.4	0.0	4.9
12	3.1	0.9	0.0	4.0
13	2.4	1.6	0.0	4.0
14	2.4	1.2	0.0	3.6
15	2.0	1.2	0.0	3.2
16	1.6	1.6	0.0	3.2
17	1.9	1.4	0.0	3.3
18	1.9	1.8	0.0	3.7
19	2.4	2.3	0.0	4.6
20	1.5	1.8	0.0	3.3
21	0.8	3.7	0.0	4.5
22	0.8	3.3	0.0	4.1
23	1.3	3.2	0.0	4.5
Daily Avg.	**39.2**	**44.0**	**0.2**	**83.5**

Observations:

Hourly deployed time varied between 1 and 5 minutes throughout the day.

Average deployed time peaked between 10:00 a.m. and 11:00 a.m., averaging 5.0 minutes.

Average deployed time was lowest between 3:00 a.m. and 4:00 a.m., averaging 1.2 minutes.

WORKLOAD BY UNIT

Table 6 provides a summary of each unit's workload overall. Tables 7 and 8 provide a more detailed view of workload, showing each unit's runs broken out by run type (Table 7) and the resulting daily average deployed time by run type (Table 8).

TABLE 6: Call Workload by Unit

Station	Unit Id	Unit Type	Avg. Deployed Min. per Run	Total Annual Hours	Avg. Deployed Min. per Day	Total Annual Runs	Avg. Runs per Day
1	P17L3	Light duty command	4.0	0.1	0.0	1	0.0
	Total		**4.0**	**0.1**	**0.0**	**1**	**0.0**
2	P1700	Light duty command	75.7	11.4	1.9	9	0.0
	P1723	Bls ambulance	33.8	16.9	2.8	30	0.1
	P1726	Light duty command	13.2	3.5	0.6	16	0.0
	P1741	Engine (mini-pumper)	40.2	99.1	16.3	148	0.4
	P1743	Bls ambulance	23.2	234.1	38.5	606	1.7
	P1746	Light duty command	11.2	1.7	0.3	9	0.0
	P1761	Engine	42.6	56.8	9.3	80	0.2
	P17C2	Light duty command	20.2	1.0	0.2	3	0.0
	P17C3	Light duty command	20.0	8.0	1.3	24	0.1
	P17L1	Light duty command	2.7	0.0	0.0	1	0.0
	P17L5	Light duty command	13.4	2.5	0.4	11	0.0
	Total		**27.9**	**435.0**	**71.5**	**937**	**2.6**
3	P1721	Engine	56.0	27.1	4.4	29	0.1
	P1722	Aerial platform	46.5	45.7	7.5	59	0.2
	Total		**49.6**	**72.8**	**12.0**	**88**	**0.2**
Total			**29.7**	**507.8**	**83.5**	**1,026**	**2.8**

TABLE 7: Total Annual Runs by Run Type and Unit

Station	Unit Id	Unit Type	EMS	False Alarm	Good Intent	Hazard	Outside Fire	Public Service	Structure Fire	Canceled	Total
1	P17L3	Light duty command	0	0	0	0	1	0	0	0	1
	Total		**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**1**
2	P1700	Light duty command	2	2	1	1	1	0	2	0	9
	P1723	Bls ambulance	22	2	0	1	1	4	0	0	30
	P1726	Light duty command	3	7	0	2	1	2	1	0	16
	P1741	Engine (mini-pumper)	33	38	6	46	5	11	7	2	148
	P1743	Bls ambulance	565	12	2	11	3	8	5	0	606
	P1746	Light duty command	3	4	0	0	0	2	0	0	9
	P1761	Engine	4	37	6	12	4	7	10	0	80
	P17C2	Light duty command	0	2	0	0	1	0	0	0	3
	P17C3	Light duty command	9	4	1	6	0	4	0	0	24
	P17L1	Light duty command	1	0	0	0	0	0	0	0	1
	P17L5	Light duty command	11	0	0	0	0	0	0	0	11
	Total		**653**	**108**	**16**	**79**	**16**	**38**	**25**	**2**	**937**
3	P1721	Engine	4	8	2	6	3	4	2	0	29
	P1722	Aerial platform	4	23	4	5	3	2	14	4	59
	Total		**8**	**31**	**6**	**11**	**6**	**6**	**16**	**4**	**88**
Total			**661**	**139**	**22**	**90**	**23**	**44**	**41**	**6**	**1,026**

TABLE 8: Daily Average Deployed Minutes by Run Type and Unit

Station	Unit Id	Unit Type	EMS	False Alarm	Good Intent	Hazard	Outside Fire	Public Service	Structure Fire	Canceled	Total
1	P17L3	Light duty command	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Total		**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
2	P1700	Light duty command	0.2	0.1	0.1	0.1	1.0	0.0	0.4	0.0	1.9
	P1723	Bls ambulance	1.1	0.1	0.0	0.9	0.5	0.1	0.0	0.0	2.8
	P1726	Light duty command	0.1	0.2	0.0	0.1	0.0	0.1	0.0	0.0	0.6
	P1741	Engine (mini-pumper)	1.3	2.9	0.3	7.3	1.5	0.9	1.9	0.2	16.3
	P1743	Bls ambulance	34.6	1.0	0.2	1.0	0.8	0.4	0.5	0.0	38.5
	P1746	Light duty command	0.1	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.3
	P1761	Engine	0.3	2.2	0.4	1.8	1.2	1.1	2.4	0.0	9.3
	P17C2	Light duty command	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.2
	P17C3	Light duty command	0.5	0.1	0.2	0.5	0.0	0.1	0.0	0.0	1.3
	P17L1	Light duty command	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	P17L5	Light duty command	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4
	Total		**38.6**	**6.7**	**1.2**	**11.7**	**5.0**	**2.8**	**5.2**	**0.2**	**71.5**
3	P1721	Engine	0.2	0.8	0.2	1.0	1.4	0.2	0.8	0.0	4.4
	P1722	Aerial platform	0.4	2.1	0.2	0.5	1.1	0.1	3.1	0.0	7.5
	Total		**0.6**	**2.8**	**0.4**	**1.4**	**2.5**	**0.3**	**3.8**	**0.0**	**12.0**
Total			**39.2**	**9.6**	**1.6**	**13.2**	**7.5**	**3.1**	**9.1**	**0.3**	**83.5**

Observations:

P1743 (a BLS ambulance) and P1741 (an engine) recorded the most runs and work for the department.

- P1743 accounted for 59 percent of the department's overall runs and 46 percent of the department's total workload.
- P1741 accounted for 14 percent of the department's overall runs and 20 percent of the department's total workload.

P1743 made the most runs (606 or an average of 1.7 runs per day) and had the highest total annual deployed time (234.1 or an average of 38.5 minutes per day).

- EMS calls accounted for 93 percent of the unit's runs and 90 percent of its total deployed time.
- Structure and outside fire calls accounted for 1 percent of runs and 3 percent of total deployed time.

P1741 made the second most runs (148 or an average of 0.4 runs per day) and had the second highest total annual deployed time (99.1 or an average of 16.3 minutes per day).

- EMS calls accounted for 22 percent of the unit's runs and 8 percent of total deployed time.
- Structure and outside fire calls accounted for 8 percent of runs and 21 percent of total deployed time.

ANALYSIS OF BUSIEST HOURS

There is significant variability in the number of calls from hour to hour. One special concern relates to the resources available for hours with the heaviest workload. We tabulated the data for each of the 8,760 hours in the year. Table 9 shows the number of hours in the year in which there were zero to 2 calls during the hour. Table 10 shows the 10 one-hour intervals which had the most calls during the year.

TABLE 9: Frequency Distribution of the Number of Calls

Calls in an Hour	Frequency	Percentage
0	8,016	91.5
1	697	8.0
2+	47	0.5

TABLE 10: Top 10 Hours with the Most Calls Received

Hour	Number of Calls	Number of Runs	Total Deployed Hours
11/19/2017 noon to 1:00 p.m.	3	4	2.8
12/13/2017 10:00 p.m. to 11:00 p.m.	3	4	0.9
5/28/2018 9:00 a.m. to 10:00 a.m.	3	3	0.9
8/3/2017 7:00 p.m. to 8:00 p.m.	3	3	0.8
5/17/2018 2:00 p.m. to 3:00 p.m.	3	3	0.1
6/18/2018 7:00 p.m. to 8:00 p.m.	2	8	3.9
2/4/2018 midnight to 1:00 a.m.	2	6	4.9
1/13/2018 7:00 p.m. to 8:00 p.m.	2	6	1.1
5/4/2018 9:00 p.m. to 10:00 p.m.	2	4	8.1
5/4/2018 1:00 p.m. to 2:00 p.m.	2	4	2.0

Note: Total deployed hours is a measure of the total time spent responding to calls received in the hour, and which may extend into the next hour or hours. The number of runs and deployed hours only includes NFD units.

Observations:

During 47 hours (0.5 percent of all hours), two or more call occurred; in other words, the department responded to two or more calls in an hour roughly once every 8 days.

The highest number of calls to occur in an hour was 3, which happened 5 times.

The two hours with the most calls and the most runs were noon to 1:00 p.m. on November 19, 2017 and 11:00 p.m. to midnight on June 11, 2017.

The 3 calls on November 19 involved 4 individual dispatches resulting in 2.8 hours of deployed time. These 3 calls included an illness and other call, a motor vehicle accident call, and a public service call.

The 3 calls on December 13 involved 4 individual dispatches resulting in 0.9 hours of deployed time. These 3 calls included two illness and other calls and a motor vehicle accident call.

RESPONSE TIME

In this part of the analysis, we present response time statistics for different call types. We separate response time into its identifiable components. *Dispatch time* is the difference between the time a call is received and the time a unit is dispatched. Dispatch time includes call processing time, which is the time required to determine the nature of the emergency and types of resources to dispatch. *Turnout time* is the difference between dispatch time and the time a unit is en route to a call's location. *Travel time* is the difference between the time en route and arrival on scene. *Response time* is the total time elapsed between receiving a call to arriving on scene.

In this analysis, we included all calls to which at least one non-administrative unit from the city of Plymouth's fire and EMS resources responded, while excluding canceled calls. In addition, non-emergency calls and calls with a total response time of more than 30 minutes were excluded. Finally, we focused on units that had complete time stamps, that is, units with all components recorded, so that we could calculate each segment of response time.

Based on the methodology above, we excluded six canceled calls, 75 calls where no units recorded a valid on-scene time, two calls where the first arriving unit response was greater than 30 minutes, and 34 calls where one or more segments of first arriving unit's response time could not be calculated due to missing data. As a result, in this section, a total of 679 calls are included in the analysis.

RESPONSE TIME BY TYPE OF CALL

Table 11 provides average dispatch, turnout, travel, and total response time for the first arriving unit to each call in the city, broken out by call type. Figures 7 and 8 illustrate the same information. Table 12 gives the 90th percentile time broken out in the same manner. A 90th percentile time means that 90 percent of calls had response times at or below that number. For example, Table 12 shows a 90th percentile response time of 14.7 minutes which means that 90 percent of the time a call had a response time of no more than 14.7 minutes.

TABLE 11: Average Response Time of First Arriving Unit, by Call Type (Minutes)

Call Type	Dispatch	Turnout	Travel	Total	Number of Calls
Breathing difficulty	1.7	2.8	3.2	7.8	55
Cardiac and stroke	2.3	3.4	2.8	8.4	60
Fall and injury	2.7	2.6	2.5	7.9	114
Illness and other	2.1	3.8	3.3	9.3	191
MVA	1.5	1.6	1.7	4.8	13
Overdose and psychiatric	1.8	3.4	3.1	8.3	35
Seizure and unconsciousness	2.2	3.2	2.7	8.0	51
EMS Total	**2.2**	**3.3**	**3.0**	**8.4**	**519**
False alarm	4.1	3.2	2.5	9.7	62
Good intent	5.3	1.2	3.1	9.7	10
Hazard	3.1	3.9	2.4	9.3	47
Outside fire	4.1	2.6	1.7	8.3	4
Public service	3.9	2.4	2.8	9.2	23
Structure fire	5.9	0.2	3.4	9.5	14
Fire Total	**4.0**	**2.9**	**2.6**	**9.5**	**160**
Total	**2.6**	**3.2**	**2.9**	**8.7**	**679**

FIGURE 7: Average Response Time of First Arriving Unit, by Call Type – EMS

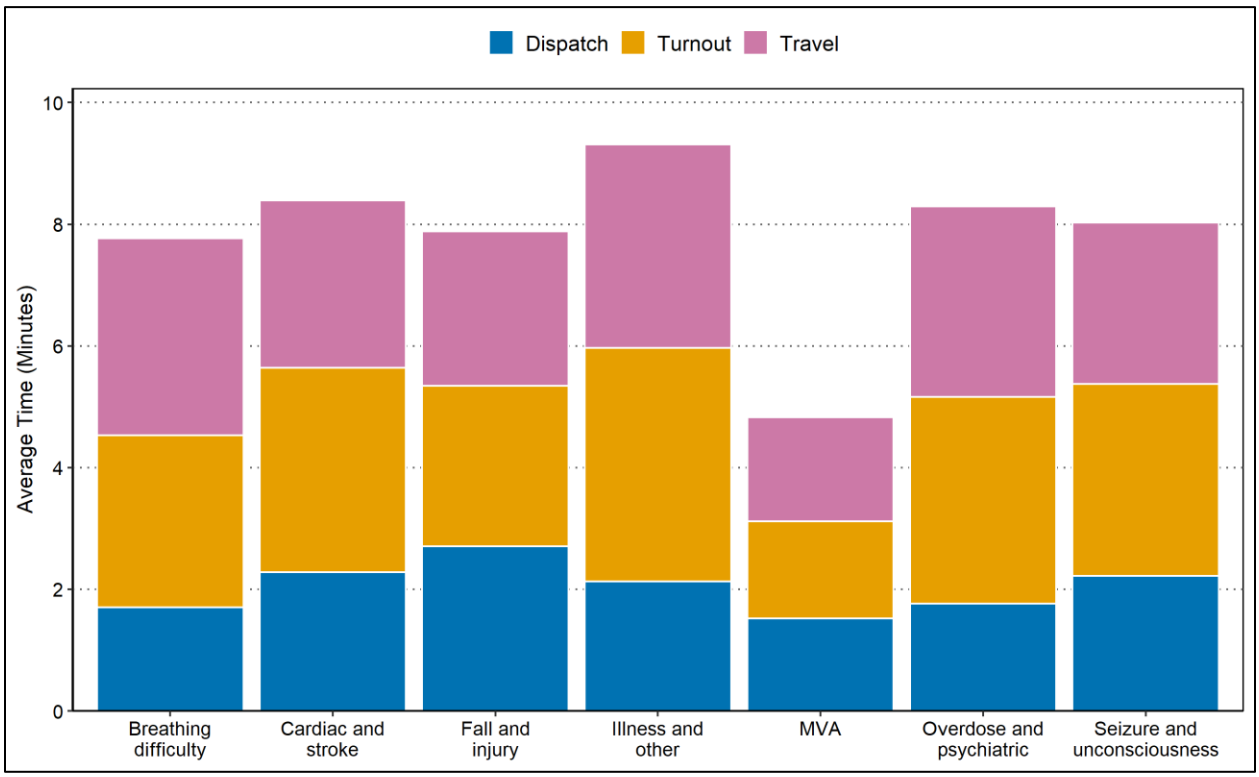


FIGURE 8: Average Response Time of First Arriving Unit, by Call Type – Fire

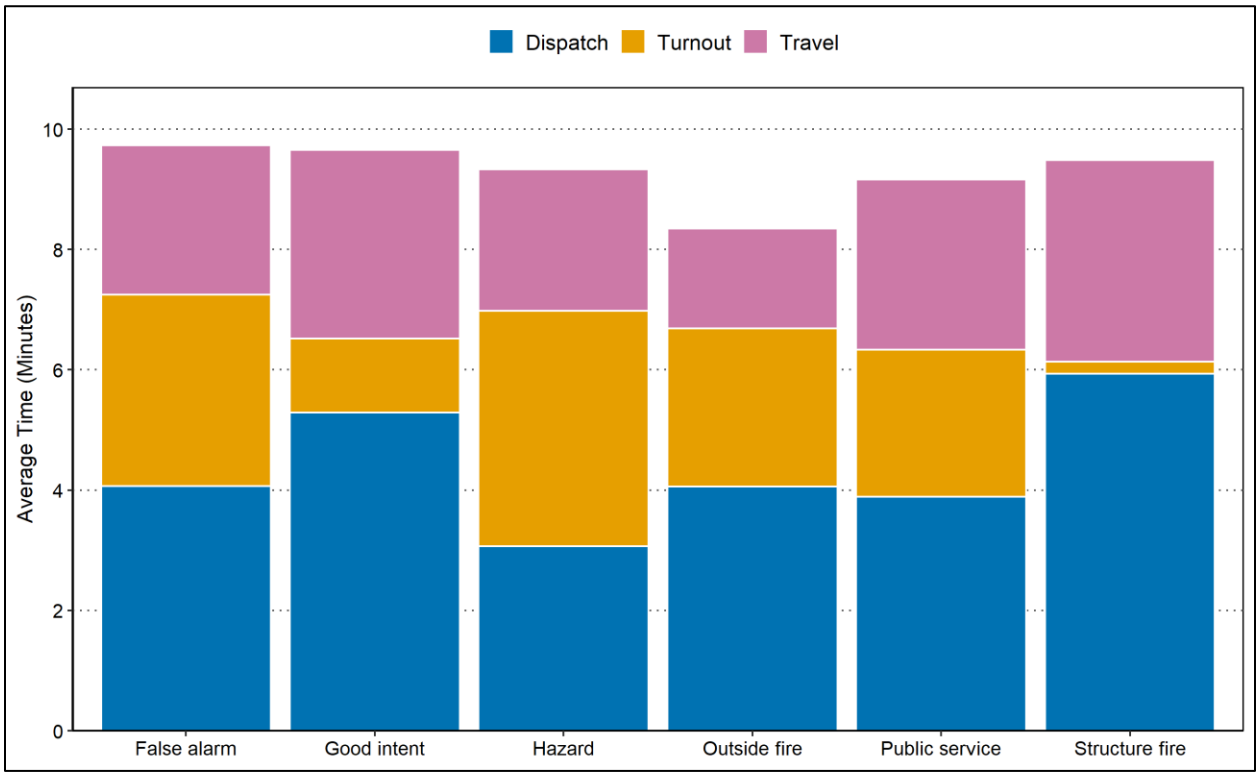


TABLE 12: 90th Percentile Response Time of First Arriving Unit, by Call Type (Minutes)

Call Type	Dispatch	Turnout	Travel	Total	Number of Calls
Breathing difficulty	2.8	8.2	5.7	12.2	55
Cardiac and stroke	3.5	7.2	5.0	12.9	60
Fall and injury	6.7	7.5	4.7	12.9	114
Illness and other	4.0	9.8	5.4	15.0	191
MVA	3.5	5.1	4.1	9.2	13
Overdose and psychiatric	5.3	9.4	6.6	15.6	35
Seizure and unconsciousness	4.4	8.0	5.8	12.9	51
EMS Total	**4.8**	**9.2**	**5.4**	**13.9**	**519**
False alarm	9.8	11.2	4.7	16.5	62
Good intent	11.0	4.2	4.9	14.3	10
Hazard	6.1	11.4	4.0	16.8	47
Outside fire	7.0	10.4	3.0	13.4	4
Public service	11.2	7.8	4.1	16.1	23
Structure fire	11.5	0.5	9.2	14.1	14
Fire Total	**9.8**	**10.3**	**4.7**	**16.1**	**160**
Total	**6.7**	**9.3**	**5.2**	**14.7**	**679**

Observations:

The average dispatch time was 2.6 minutes.

The average turnout time was 3.2 minutes.

The average travel time was 2.9 minutes.

The average total response time was 8.7 minutes.

The average response time was 8.4 minutes for EMS calls and 9.5 minutes for fire calls.

The average response time was 8.3 minutes for outside fires and 9.5 minutes for structure fires.

The 90th percentile dispatch time was 6.7 minutes.

The 90th percentile turnout time was 9.3 minutes.

The 90th percentile travel time was 5.2 minutes.

The 90th percentile total response time was 14.7 minutes.

The 90th percentile response time was 13.9 minutes for EMS calls and 16.1 minutes for fire calls.

The 90th percentile response time was 13.4 minutes for outside fires and 14.1 minutes for structure fires.

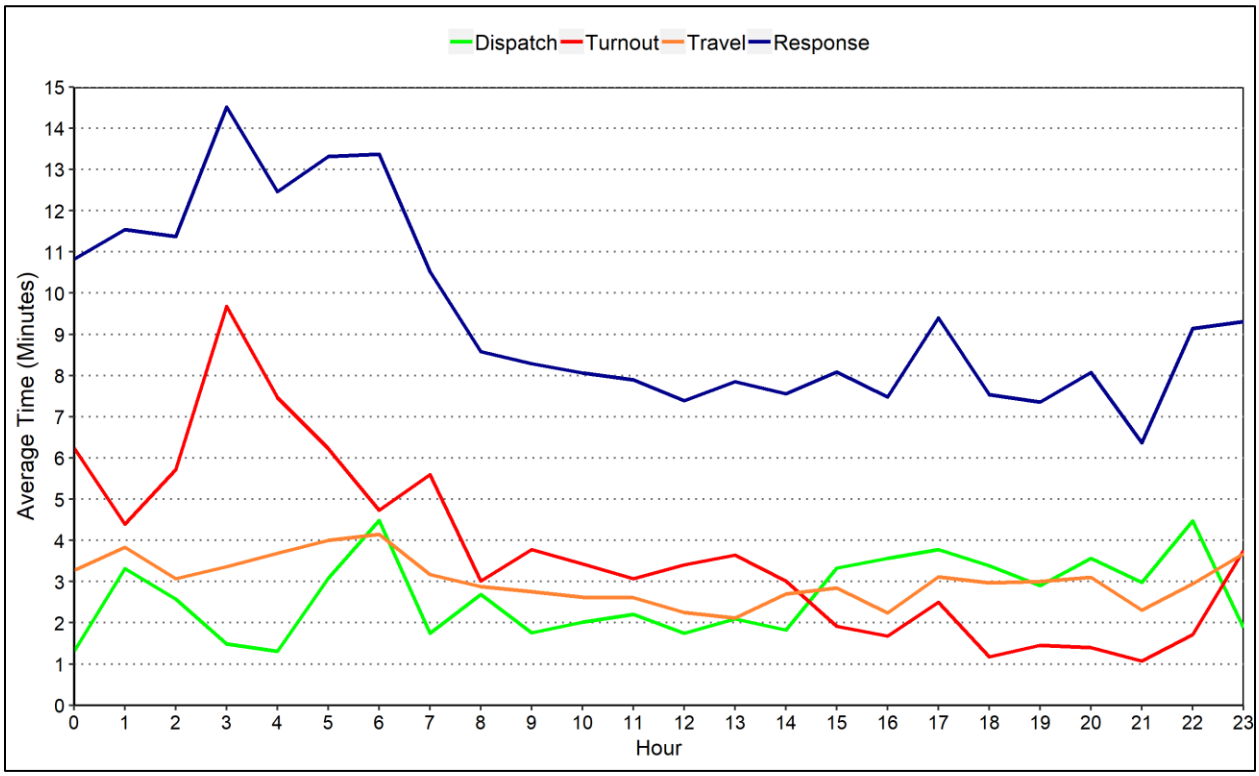
RESPONSE TIME BY HOUR

Average dispatch, turnout, travel, and total response time by hour for calls are shown in Table 13 and Figure 9. The table also shows 90th percentile response times.

TABLE 13: Average and 90th Percentile Response Time of First Arriving Unit, by Hour of Day

Hour	Dispatch	Turnout	Travel	Response Time	90th Percentile Response Time	Number of Calls
0	1.3	6.2	3.3	10.8	15.6	15
1	3.3	4.4	3.8	11.5	18.2	19
2	2.6	5.7	3.1	11.4	17.8	12
3	1.5	9.7	3.4	14.5	22.1	7
4	1.3	7.5	3.7	12.5	17.4	7
5	3.1	6.2	4.0	13.3	16.9	12
6	4.5	4.7	4.2	13.4	24.3	19
7	1.8	5.6	3.2	10.5	16.5	26
8	2.7	3.0	2.9	8.6	13.5	31
9	1.8	3.8	2.8	8.3	12.9	40
10	2.0	3.4	2.6	8.1	13.2	53
11	2.2	3.1	2.6	7.9	13.5	44
12	1.7	3.4	2.2	7.4	12.4	51
13	2.1	3.6	2.1	7.9	13.3	37
14	1.8	3.0	2.7	7.6	12.1	44
15	3.3	1.9	2.8	8.1	12.7	36
16	3.6	1.7	2.2	7.5	11.4	21
17	3.8	2.5	3.1	9.4	15.4	37
18	3.4	1.2	3.0	7.5	13.5	32
19	2.9	1.5	3.0	7.4	11.9	40
20	3.6	1.4	3.1	8.1	12.1	33
21	3.0	1.1	2.3	6.4	10.5	21
22	4.5	1.7	2.9	9.1	12.1	21
23	1.9	3.8	3.7	9.3	15.5	21

FIGURE 9: Average Response Time of First Arriving Unit, by Hour of Day



Observations:

Average dispatch time was between 1.3 minutes (midnight to 1:00 a.m. and 4:00 a.m. to 5:00 a.m.) and 4.5 minutes (6:00 a.m. to 7:00 a.m. and 10:00 p.m. to 11:00 p.m.).

Average turnout time was between 1.1 minutes (9:00 p.m. to 10:00 p.m.) and 9.7 minutes (3:00 a.m. to 4:00 a.m.).

Average travel time was between 2.1 minutes (1:00 p.m. to 2:00 p.m.) and 4.2 minutes (6:00 a.m. to 7:00 a.m.).

Average total response time was between 6.4 minutes (9:00 p.m. to 10:00 p.m.) and 14.5 minutes (3:00 a.m. to 4:00 a.m.).

90th percentile total response time by hour ranged from 10.5 minutes (9:00 p.m. to 10:00 p.m.) and 24.3 minutes (6:00 a.m. to 7:00 a.m.).

RESPONSE TIME DISTRIBUTION

Here, we present a more detailed look at how response times to calls are distributed. The cumulative distribution of total response time for the first arriving unit to EMS calls is shown in Figure 10 and Table 14. Figure 10 shows response times for the first arriving unit to EMS calls as a frequency distribution in whole-minute increments.

The cumulative percentages here are read in the same way as a percentile. In Figure 10, the 90th percentile of 13.9 minutes means that 90 percent of EMS calls had a response time of 13.9 minutes or less. In Table 14, the cumulative percentage of 53, for example, means that 53 percent of EMS calls had a response time under 8 minutes.

FIGURE 10: Cumulative Distribution of Response Time – First Arriving Unit – EMS

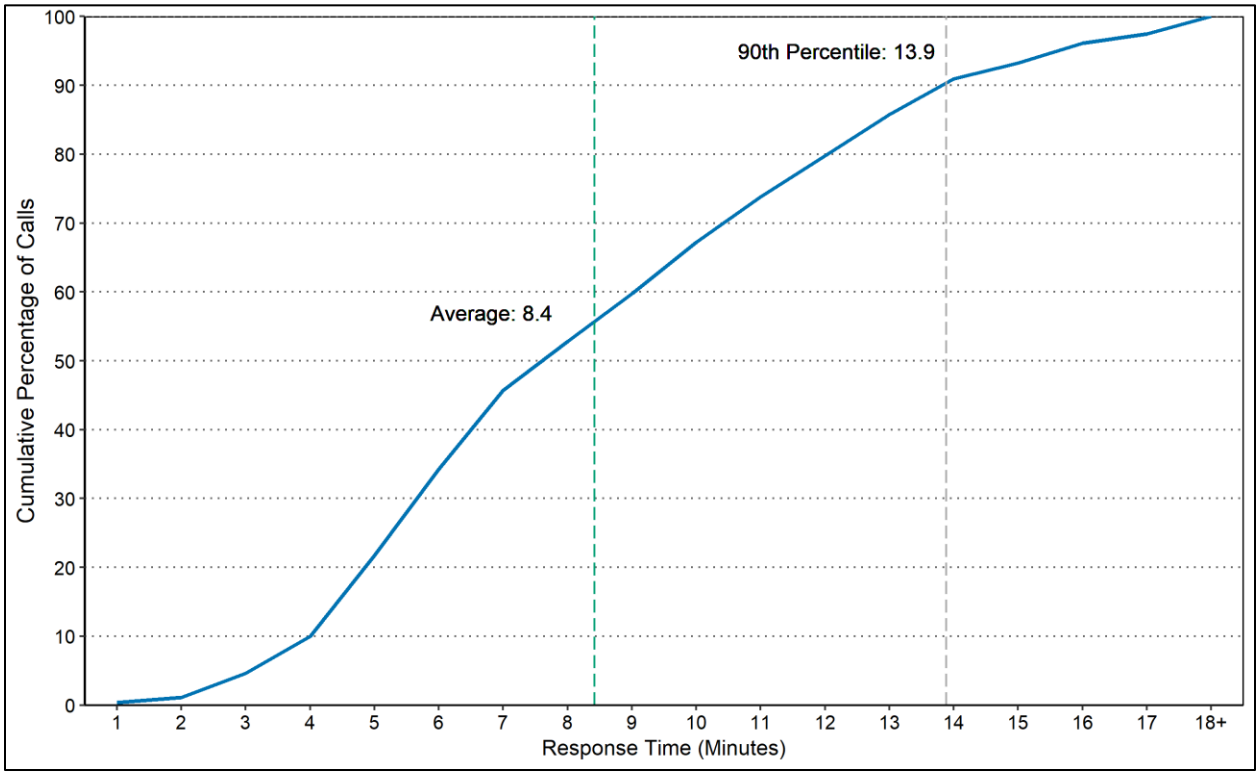


FIGURE 11: Frequency Distribution of Response Time – First Arriving Unit – Fire

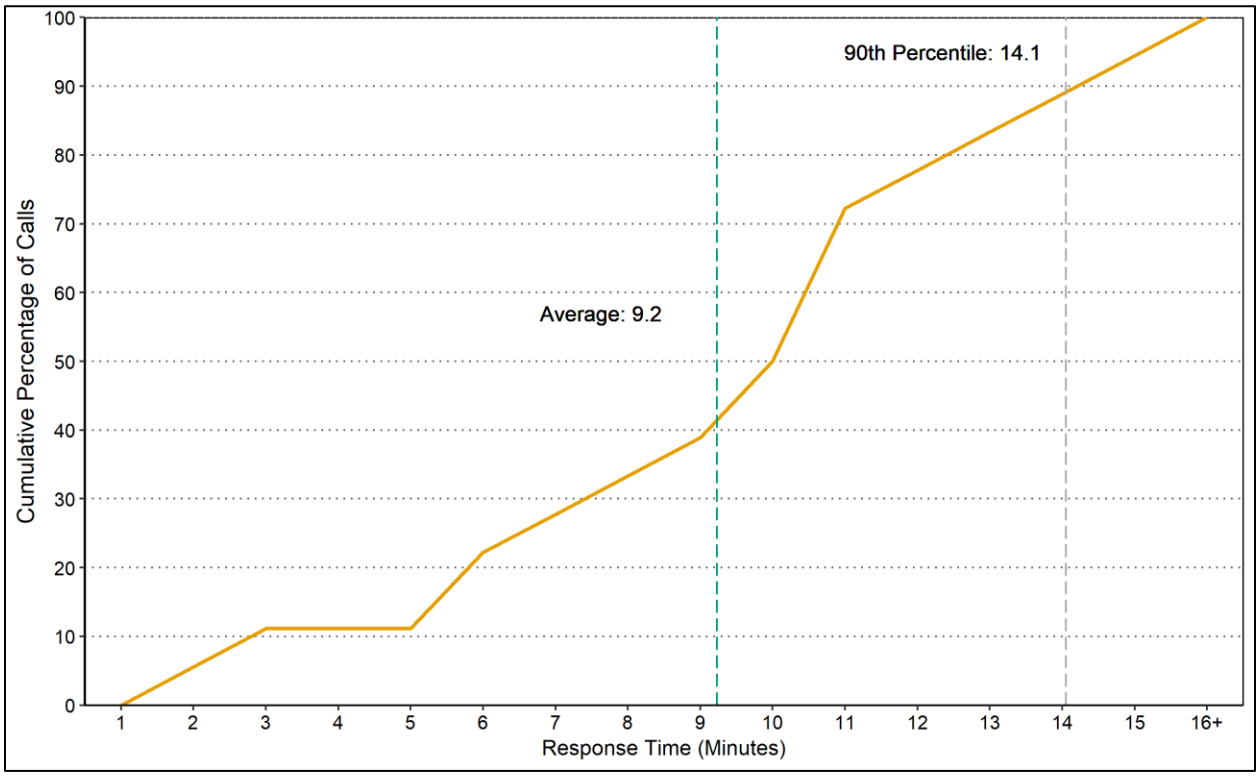


TABLE 14: Cumulative Distribution of Response Time – First Arriving Unit – EMS

Response Time (minute)	Frequency	Cumulative Percentage
1	2	0.4
2	4	1.2
3	18	4.6
4	28	10.0
5	61	21.8
6	65	34.3
7	59	45.7
8	37	52.8
9	36	59.7
10	39	67.2
11	34	73.8
12	31	79.8
13	31	85.7
14	27	90.9
15	12	93.3
16	15	96.1
17+	20	100.0

TABLE 15: Cumulative Distribution of Response Time – First Arriving Unit – Outside and Structure Fires

Response Time (minute)	Frequency	Cumulative Percentage
1	0	0.0
2	1	5.6
3	1	11.1
4	0	11.1
5	0	11.1
6	2	22.2
7	1	27.8
8	1	33.3
9	1	38.9
10	2	50.0
11	4	72.2
12	1	77.8
13	1	83.3
14	1	88.9
15	1	94.4
16+	1	100.0

Observations:

For 53 percent of EMS calls, the response time of the first arriving unit was less than 8 minutes.

For 22 percent of structure and outside fire calls, the response time of the first arriving unit was less than 6 minutes.

TABLE 16: Actions Taken Analysis for Structure and Outside Fire Calls

Action Taken	Number of Calls	
	Outside Fire	Structure Fire
Enforce codes	1	0
Extinguishment by fire service personnel	3	5
Fire control or extinguishment, other	1	0
Incident command	6	6
Investigate	3	7
Provide apparatus	0	7
Provide basic life support (BLS)	0	1
Provide equipment	0	4
Provide information to public or media	0	2
Provide manpower	0	8
Refer to proper authority	0	1
Remove hazard	0	1
Salvage & overhaul	3	3
Standby	0	1
Ventilate	0	3
Total	**17**	**49**

Note: Totals are higher than the total number of structure and outside fire calls because some calls had more than one action taken.

Observations:

Out of 7 outside fires, 3 were extinguished by fire service personnel, which accounted for 43 percent of outside fires.

Out of 19 structure fires, 5 were extinguished by fire service personnel, which accounted for 26 percent of structure fires.

ATTACHMENT II

TABLE 17: Workload of Administrative Units

Unit ID	Unit Type	Annual Hours	Annual Runs
P1727	Utility	21.2	33

ATTACHMENT III

TABLE 18: Content and Property Loss – Structure and Outside Fires

Call Type	Property Loss		Content Loss	
	Loss Value	Number of Calls	Loss Value	Number of Calls
Outside fire	$3,000	1	$1,200	1
Structure fire	$40,000	1	$15,000	1
Total	**$43,000**	**2**	**$16,200**	**2**

Note: This includes only calls with recorded loss greater than 0.

Observations:

Out of 7 outside fires, one had a recorded property loss of $3,000.

One outside fire had a content loss of $1,200.

Out of 19 structure fires, one had a recorded property loss of $40,000 along with a content loss of $15,000.

TABLE 19: Total Fire Loss Above and Below $20,000

Call Type	No Loss	Under $20,000	$20,000 plus
Outside fire	5	2	0
Structure fire	18	0	1
Total	23	2	1

Observations:

5 outside fires and 18 structure fires had no recorded loss.

No outside fires and one structure fire had $20,000 or more in loss.

The highest total loss for a structure fire was $55,000.

The highest total loss for an outside fire was $3,000.

- END -