EMERGENCY SERVICES CONSULTING INTERNATIONAL

Scio Township, Michigan

FIRE DEPARTMENT STAFFING NEEDS AND DEPLOYMENT ASSESSMENT

May 2018

Emergency Services Consulting International

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ACKNOWLEDGEMENTS

Emergency Services Consulting International (ESCI) would like to acknowledge that without the assistance and support of the Scio Township elected officials, administrative team, and personnel of the Scio Township Fire Department this project could not have been successfully completed.

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EXECUTIVE SUMMARY

Emergency Services Consulting International (ESCI) was engaged by the Scio Township Fire Department (STFD) to conduct an assessment of the department's current and future staffing and deployment needs. As with other surrounding communities in the Ann Arbor suburban region, the STFD has experienced a loss of participation by paid-on-call firefighters and has insufficient career staff to make up the deficit; particularly during weekday response. As call volume has increased and with several large housing developments and new businesses preparing to begin building in the Township, safe and effective service delivery has been increasingly compromised by the lack of manpower.

The beginning is the most important part of the work.

An evaluation of the current conditions and capabilities of STFD was conducted, and the results used to provide an evaluation of the organization, staffing, and service delivery capabilities. This report serves as the culmination of the project and provides an evaluation of service level and financial impact of additional staffing. Additionally, a narrative example for the Assistance to Firefighters SAFER Grant application is provided.

Using organizational, operational, staffing, and geographic information system (GIS) models, an evaluation of existing fire and rescue operations and recommendations for improvement in current services delivered to the community. The evaluation and analysis of data and other information is based on National Fire Protection Association (NFPA) standards, the Center for Public Safety Excellence/Commission on Fire Accreditation International (CPSE/CFAI) *Standards of Cover*, 6th edition, health and safety requirements, federal and state mandates relative to emergency services, and generally accepted best practices within the emergency services community; where applicable.

Each section in the following report provides the reader with general information about that element, as well as observations and analyses of any significant issues or conditions. Observations are supported by data provided by each organization and collected as part of the review and interview process. Finally, specific recommendations are included to address identified issues or to take advantage of opportunities that may exist.

It is important to bear in mind that these were the current conditions at the time of the data collection and on-site visit. The agency is continuing to change and improve over the time required to write the report, therefore not every current condition remains as stated here.

Major Findings

- Scio Township Fire Department is unable to meet NFPA 1720 standards for staffing and deployment. The current staffing of two firefighters per shift is half the recommended staffing for an engine company and does not allow for the department to satisfy Michigan statute regarding on scene personnel requirements for interior firefighting operations without the assistance of neighboring agencies. The department's dependence on mutual aid response for interior firefighting and other operations requiring more than two personnel dramatically impact the department's ability to provide effective fire and rescue services and potentially increase the likelihood of accidents and injuries due to low staffing levels.
- The practice of relying on paid-on-call personnel responding from home or work to increase staffing levels for emergency response is no longer a viable option for the department. Based on staffing and run report records, additional staffing from unscheduled staff to incident scenes is nearly nonexistent.

- The current staffing and deployment model used by the fire department prevents effective interoperability with neighboring agencies, reducing the likelihood of the seamless integration of resources on emergency scenes, and the potential for automatic aid agreements that could dramatically enhance on scene staffing levels.
- The current organizational design of the fire department is ineffective as it does not align with national recommendations for rank and structure, is ambiguous in regard to which position is in charge during daily operations and emergency scenes, and does not align with neighboring agencies. This reduces the department's efficiency, effectiveness, and firefighter safety.
- The department should investigate options for increasing staffing levels and modify its current organizational design to align with national consensus standards.

Summary

The Scio Township Fire Department possesses multiple opportunities for improvements to organizational design and deployment. Key areas of improvement included: a lack of adequate operational, training, prevention, and administrative staff; response metrics that exceed national consensus standards; and standard operational guidelines for medium and high-risk mutual and automatic aid responses.

ESCI thanks the Board of Trustees, the Township Manager, Director of Fire Services, Interim Fire Chief, and personnel from the Scio Township Fire Department for their outstanding cooperation in the preparation of this report. All involved were candid in their comments and provided a tremendous amount of essential information.

EVALUATION OF CURRENT CONDITIONS

Organizational Overview

The Organizational Overview component provides a review of the organization, discussing the agency's configuration and the services that it provides. Data provided by the Scio Township Fire Department (STFD) leadership and Washtenaw County emergency services partners was combined with information collected in the course of ESCI's fieldwork to develop the following overview.

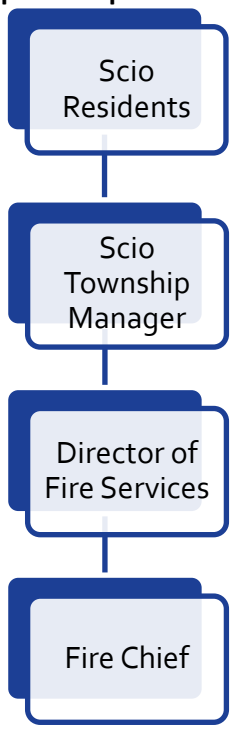
The purpose of this section is two-fold. First, it verifies ESCI's understanding of the agency's composition and operation. This provides the foundation from which the *Staffing Needs and Deployment Assessment* is developed.

Secondly, the overview serves as a reference for any reader who may not be entirely familiar with the details of the agency's operations. Where appropriate, ESCI includes recommended modifications to current observations based on industry standards and best practices.

Governance

The very basis of any service provided by governmental or quasi-governmental agencies lies within the policies that give that agency the responsibility and authority upon which to act. In most governmental agencies, including Scio Township, those policies lie within the charters, ordinances, and other governing documents adopted by the agency. The following figure provides a general overview of Scio's governing structure and lines of authority elements.

Figure 1: Scio Township Fire Department Governing Structure



DISCUSSION

Scio Township is a legally established government under the laws of the State of Michigan and as such is recognized as a "local government." The authorities of Scio Township are provided under the Constitution of the State of Michigan, and as such Scio Township has the ability to establish and operate the fire-rescue services. Scio Township established Scio Township Fire Department in 1998. The Township Board consists of seven elected members: the Township Supervisor—the official head of government, the Clerk, and Treasurer, and four Trustees. The Supervisor convenes a formal Board meeting twice per month. The Township's daily operations are under the direction of a Township Manager who reports directly to the Township Board.

Organizational Design

The structural design of an emergency services agency is vitally important to its ability to deliver service in an efficient and timely manner while providing the necessary level of safety and security to the employees of the organization, whether career, paid-on-call, or volunteer. During an emergency, an individual's ability to supervise multiple personnel is diminished due to the risk consequences associated with emergency incidents. As a result, industry standards recommend a span of control of four to six personnel under high-risk situations. This is an operational concept carried forward from military history and has shown to be effective in emergency services situations.

Additionally, employees tend to be more efficient when they know to whom they report and have a single point of contact for supervision and direction. A recent research project conducted by the Columbia University, Northwestern University, and University of Queensland, Australia, found that,

> …when there are tasks that require teamwork, people get more done when there are leaders and followers. Without a clear chain of command, members often become sidetracked with grabbing power and lose track of the task at hand.[1]

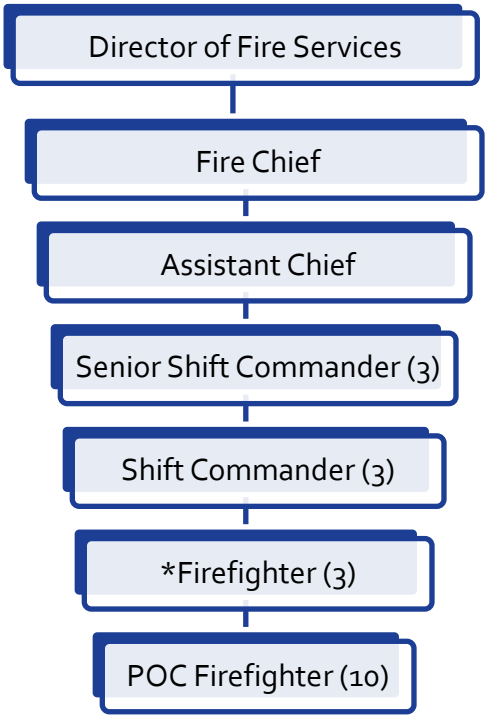
Organizational Structure

To operate effectively, the structure of a fire department needs to be clearly defined in the form of an organizational chart. The chart institutionalizes the agency's hierarchy, identifies roles and, most importantly, reporting authority. An organizational chart also helps to assure that communication flows appropriately and limits opportunities to circumvent the reporting structure.

At the initiation of the report, Scio had not formally adopted an organizational chart that achieved this purpose; however, since that time, work commenced to adopt an effective operational structure and is illustrated in the next figure.

[1] "Why Hierarchies are Good for Productivity," Inc. September 2012, p 26.

Figure 2: STFD Organizational Structure



* Future Position

DISCUSSION

While not formally adopted, the operating structure observed by the ESCI during the site visit is representative of most other fire departments across the United States. The department operates in a traditional top-down manner and lines of authority are clear. However, the position of Shift Commander does not have a defined correlating rank and in interviews with many members of the department there is much confusion about specific roles and responsibilities. Typically, the shift commander is a "function" of a single individual holding the rank of a promoted position. The formal adoption of an organizational structure, such as the structure suggested by NFPA 1720, would provide several benefits to the organization and its membership, as well as enhance the interoperability of the STFD with neighboring agencies who currently operate using the NFPA 1720 model.

The lines of authority of the department should be carefully protected against communications external to the chain of command except in unusual circumstances. When the chain of command is violated, it can cause a great deal of disruption to the organization. Additionally, since the initiation of the report, Scio Township Fire Department has contracted with ESCI's Human Capital Division to conduct a formal job task analysis of all positions within the organization and establish a reporting structure resulting from a formal promotional process.

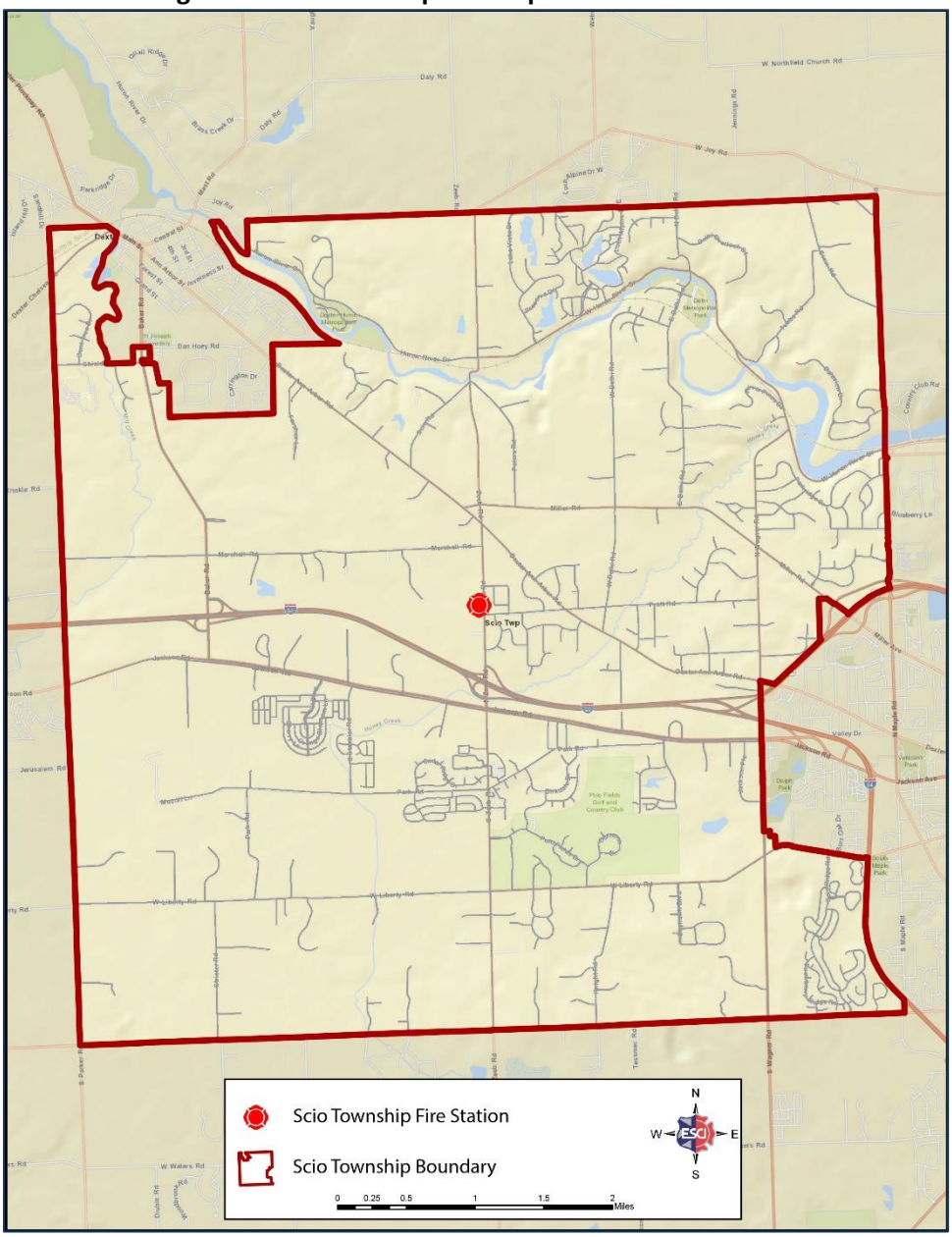
History, Formation, and General Description of the Scio Township Fire Department

The Scio Township Fire Department was formed in 1988 after separating from the Dexter Area Fire Department. The current fire station was constructed in 1986 by Scio Township and operated by Dexter Area Fire Department. At the time of this report, the Scio Township Fire Department operates a three-platoon career department augmented by paid-on-call staff. The department is under the direction of the Fire Services Director who in turn is responsible to the Township Manager.

Service Area Population and Demographics

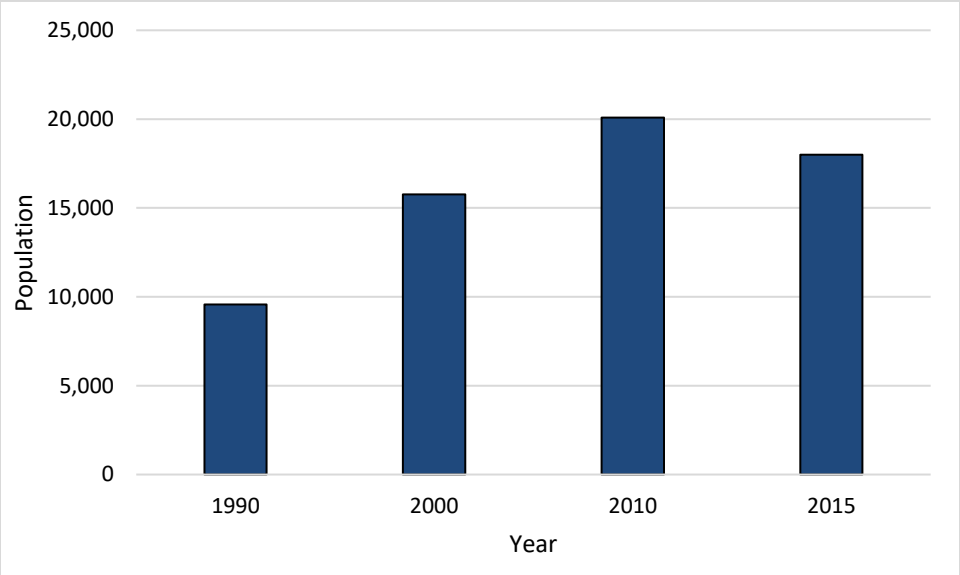
The size and composition of a fire department's service area affects the type and number of personnel, fire stations, and vehicles needed to provide services efficiently. Sometimes complex decisions need to be made regarding deployment strategies employed to properly position resources based on land area, geography, risk, and similar factors. The following is a summary of the Scio service area and service infrastructure resources.

Figure 3: Scio Township Fire Department Service Area



In the following figure, the historical population totals for Scio Township based upon U.S. Census data is displayed.

Figure 4: Scio Township Historical Population



DISCUSSION

Scio Township Fire Department serves a 34 square mile jurisdiction from a single fire station located in the geographical center of the Township serving areas that can be defined urban, suburban, and rural as classified by NFPA 1720. Decisions on deployment define the response capability of the fire department. These decisions need to weigh multiple considerations including risk exposure, response times, access challenges, deployment, community expectations, personnel safety, and fire department capacity while maintaining balance with the organization's financial considerations. Finally, these decisions are strategic and are in the purview of the STFD Board in consultation with the Fire Services Director and Fire Chief. Ultimately these individuals are responsible to the public to provide the level of service the citizens desire and for which they are willing to pay.

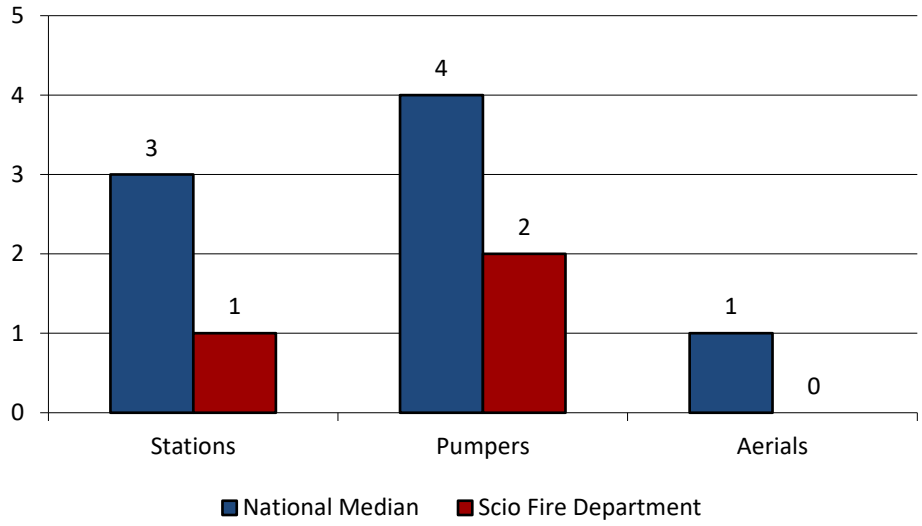
A full range of options should be considered to properly establish an appropriate deployment model. On the one end of the spectrum would be the current arrangement with one fire station covering the entire jurisdiction. This single station deployment model requires the department to house enough apparatus and personnel to support all calls simultaneously within the Township. Obviously to reach an incident on the outer edges of the service area requires the time to travel from the single station. On the other extreme is one station serving a one (1) square mile area. The time to arrive on the scene would be very short, but the apparatus and personnel would need to be replicated in each station to be able to provide the service, but at a significantly higher cost. The governing body's responsibility as representatives of the citizens is to determine how quickly an effective crew should arrive to handle the emergency. This process must provide an analysis of the risk tolerance of the community, types of risks, accessibility obstacles, and financial capability. There are standards and industry accepted norms that can help with the decision but ultimately it is the governing body's decision. This report will describe factors that should be considered to define the desired response performance.

The area served by Scio Township Fire Department is in transition as the economy improves and businesses have begun to relocate to the area. The fire department provides traditional fire-based services to the community, including first responder emergency medical service, but does not offer ambulance transport. Scio's most recent ISO grading resulted in a split rating of Class 5/8b. It is reasonable to expect any changes in the response area make-up will have an impact on this and should be considered in future planning efforts.

Current Service Delivery Infrastructure

The Scio Township Fire Department operates from a single station located in the center of the community with two fire engines (pumpers). The following figure provides a graphical representation of the number of stations, engines (pumpers), and aerials operated by STFD. The graphic does not serve as a definitive answer as to the numbers of stations, engines, and aerials required as part of a fire department's operation, but it is intended to serve as a frame of reference for the reader and policy makers to understand resource inventories of similarly sized communities.

Figure 5: Comparison of Resources to Similar Sized Communities



Generally, similar sized communities utilize three stations, with four fire engines and one aerial (ladder) units to serve their communities. There are a variety of factors that typically establish the number of stations a community utilizes to provide fire protection services. More often than not, the inventory of fire stations and associated fleet have evolved over a period of time where different volunteer fire departments have existed and eventually morphed into a common system. In these types of situations, no data analysis has been conducted to determine the number or location of fire stations. Without the supporting data analysis, policy makers have been reluctant to reduce or even reallocate the quantity of stations necessary to provide services.

Figure 6 that follows provides a graphical representation of the cost per capita Scio Township expends in providing fire protection services. The graphic also serves to provide a comparison of cost per capita with other fire departments in Michigan. Overall, the cost per capita for providing fire protection services to the Township are consistent with other Michigan fire departments. As with the previous analysis, this data does not serve as an answer to establishing funding levels for fire departments, but does serve as a point of reference for planning purposes. The funding of an emergency services operation should be established in conjunction with an effective risk analysis with an understanding of citizen expectations.

Figure 6: Costs per Capita

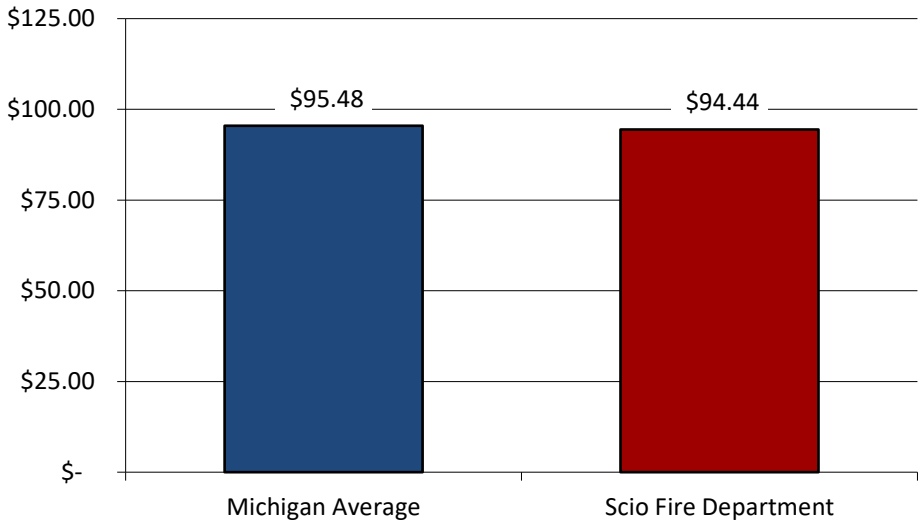


Figure 6 provides a graphical representation of costs per capita for Scio Township's provision of fire services. The Township is in-line with other fire departments within the State of Michigan.

Figure 7: Comparison of Incidents per 1,000

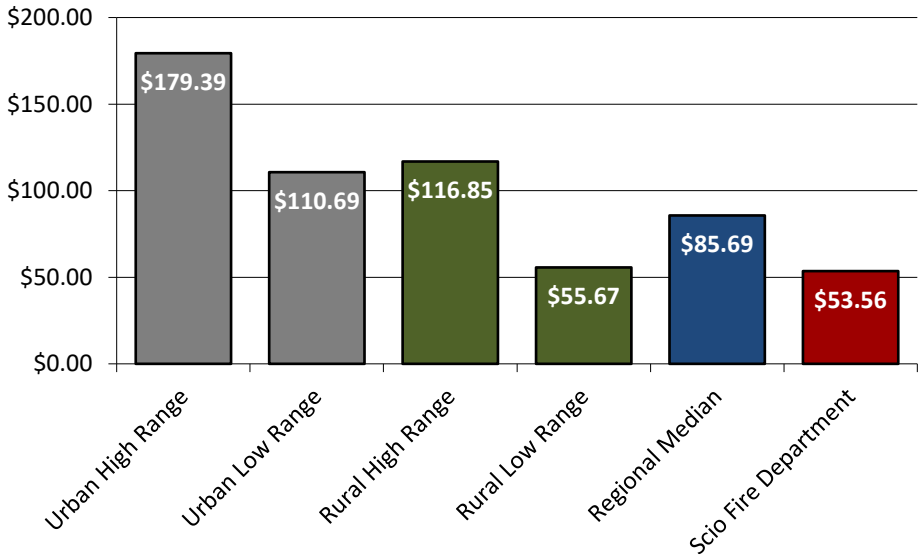
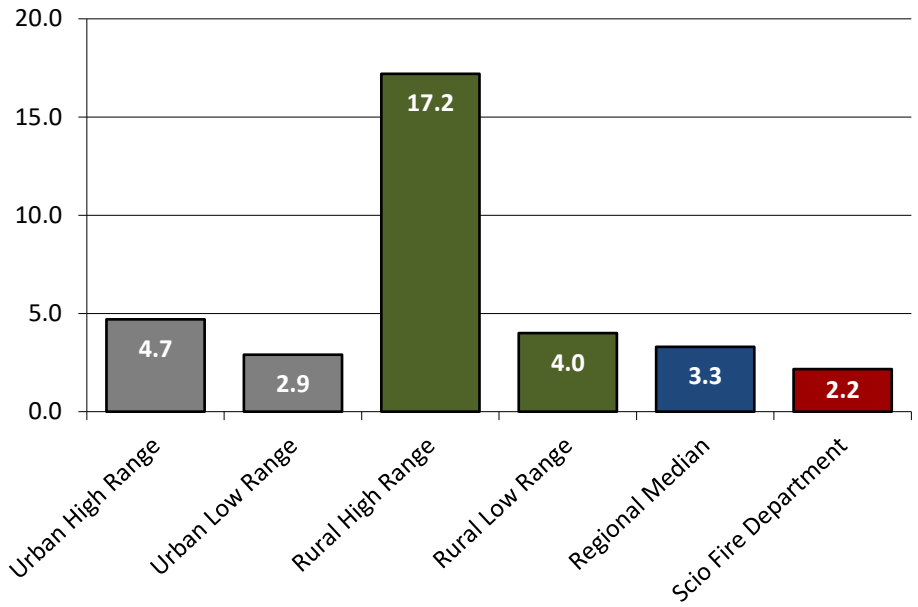


Figure 7 reflects NFPA's data collection from fire departments across the nation. Scio is lower than both the urban and rural categories. The department is also lower than regional departments at incidents per 1,000 at only 53.6 incidents per population. This regional number represents departments in the Midwestern region of the country and may differ due the fact that Scio does not provide EMS transport services as reported in some comparably-sized jurisdictions. This figure does not lend itself to decision-making relative to specific types of services to provide the community, but is intended to help understand the emergency response workload of the department and its personnel.

Figure 8: Comparison of Fires per 1,000 Population



Scio's incidents of 2.2 fires per 1,000 in population is slightly below other agencies within the Midwestern region. The rate is also slightly below the "low" range of fires for other departments protecting urban populations and below the "low" range of departments protecting rural population.

Financial Overview

Revenue and expenses of the Scio Township Fire Department are budgeted and maintained in a self-contained fund (Fund 206) with its own millage, other revenues, expenditures, and fund balance. While a detailed historical analysis and future projection of revenue and expenditure line items is not within the scope of this project, some understanding of the fund is required to project and fully appreciate the impact that adding additional staff will have, with or without grant funding.

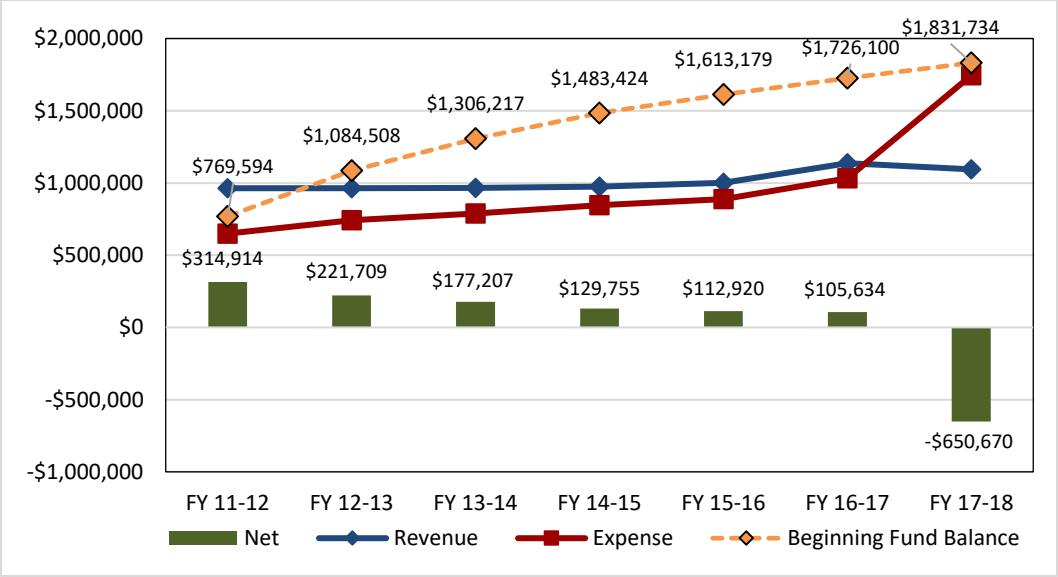
Figure 9: Historical Revenue, Expense, and Fund Balance—Fund 206

Financial Element	FY 11–12 Actual	FY 12–13 Actual	FY 13–14 Actual	FY 14–15 Actual	FY 15–16 Actual	FY 16–17 Estimated	FY 17–18 Amended
Revenue	$964,397	$963,692	$966,235	$974,913	$1,000,380	$1,136,783	$1,094,030
Expense	$649,483	$741,983	$789,029	$845,158	$887,460	$1,031,149	$1,744,700
Net	$314,914	$221,709	$177,207	$129,755	$112,920	$105,634	-$650,670
Beginning Fund Balance	$769,594	$1,084,508	$1,306,217	$1,483,424	$1,613,179	$1,726,100	$1,831,734
Ending Fund Balance	$1,084,508	$1,306,217	$1,483,424	$1,613,179	$1,726,100	$1,831,734	$1,181,064

In Figure 9, total revenue and expense are shown for FY 12 through FY 16 actual with estimated and amended values for FY 17 and FY 18; respectively. Expenses have grown at a steady rate of approximately 8% annually from FY 11–12 through FY 15–16 actual, driven primarily by increases in personal services costs of 8.3% in the wage category and 8.7% in the benefit category. During that same time frame, overall revenue only grew at an average annual rate of 1%. While revenues during the period exceeded expenses leading to annual net increases in fund balance, the gap between revenue and expense has been decreasing as shown in the following figure.

Thus, while beginning fund balance has continued to increase from $769,594 in FY 11–12 to $1,613,179 in FY 15–16, the rate of increase has been decreasing steadily. As long as revenue (shown in blue) has exceeded expense (shown in red) there has been an annual net gain (green bars) and fund balance (gold dashed line) has increased. However, with the increase in expenditures well above revenue, as shown in amended FY 17–18 budget a negative net will result in the use of fund balance to cover expenditures. If the expenditures are recurring, such as through the addition of staff, revenue will need to be increased at some future point to maintain the minimum fund balance necessary for operation of the fund (typically at least 25% of recurring expenditure budget in any given fiscal year). At this point, the fund has sufficient fund balance to cover expenses exceeding recurring revenues for several years before either a reduction in expense or an increase in revenue is required to maintain the health of the fund.

Figure 10: Revenue versus Expense, Net Gain or Loss and Fund Balance—Fund 206



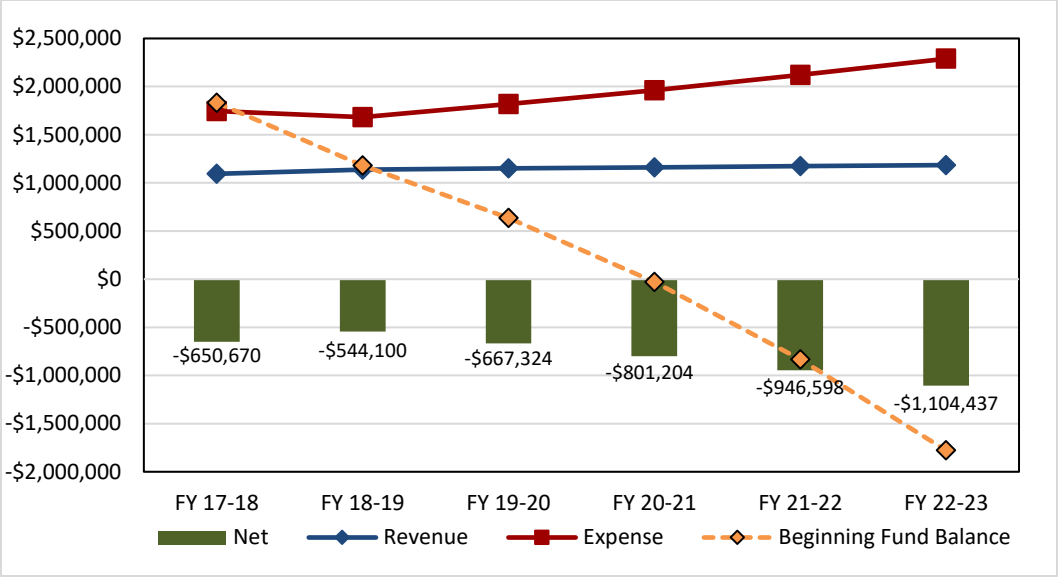
In the following figure, a forecast of revenue, expense, and fund balance has been made through FY 22–23 using the proposed FY 18–19 budget as a basis for the projection. Using the historical annual revenue and expense increases of 1% and 8%; respectively, the projection shows that fund balance is rapidly depleted.

Figure 11: Forecast Revenue versus Expense, Net Gain or Loss and Fund Balance Based on FY 18–19 Budget as Proposed—Fund 206

Financial Element	FY 17–18 Amended	FY 18–19 Proposed	FY 19–20 Forecast	FY 20–21 Forecast	FY 21–22 Forecast	FY 22–23 Forecast
Revenue	$1,094,030	$1,138,520	$1,149,905	$1,161,404	$1,173,018	$1,184,748
Expense	$1,744,700	$1,682,620	$1,817,230	$1,962,608	$2,119,617	$2,289,186
Net	-$650,670	-$544,100	-$667,324	-$801,204	-$946,598	-$1,104,437
Beginning Fund Balance	$1,831,734	$1,181,064	$636,964	-$30,361	-$831,564	-$1,778,163
Ending Fund Balance	$1,181,064	$636,964	-$30,361	-$831,564	-$1,778,163	-$2,882,600
Min Fund Bal (25% of Opex)	$436,175	$420,655	$454,307	**$490,652**	**$529,904**	**$572,296**

By the end of FY 19–20 fund balance is fully depleted. If a reserve requirement of 25% of expenses is maintained, FY 19–20 is the last year in which the fund is viable without changes in expenses or revenue. This trend is illustrated graphically in the following figure. Clearly, some measures to address this imbalance in revenue and expense will need to be taken no later than FY 18–19.

Figure 12: Forecast Revenue versus Expense, Net Gain or Loss and Fund Balance through FY 22–23—Fund 206



To evaluate the impact of adding additional firefighters, with or without grant funding, several assumptions need to be made regarding the current and future cost of employees. The following figure shows Article—Wages from the current Collective Bargaining Agreement (CBA) between the Township and IAFF Local 4891. For the base year of any forecast involving increased staffing, the study uses the yellow-highlighted hourly rate for a firefighter of $16.13.

Figure 13: IAFF Local 4891 CBA Article 14—Wages

ARTICLE 14
WAGES

	Effective as of Ratification and Board Approval in 2016 Through April 30, 2017.	Effective May 1, 2017 Through April 30, 2018	Effective May 1, 2018 Through April 30, 2019
Shift Commander 0-2 Years of Service in Classification	$18.32	$18.69	$19.06
Shift Commander 3-4 Years of Service in Classification	$19.28	$19.67	$20.06
Shift Commander over 5 Years of Service in Classification	$21.25	$21.68	$22.11
Firefighter	$15.50	$15.81	$16.13

Firefighters work a schedule of 24 hours on and 48 hours off which results in 2763 hours worked at a regular rate and 165 hours worked at an overtime rate as part of their normal schedule. This does not include any additional overtime worked in order to cover any sick or vacation leave, late calls, or off-duty training. This results in an annual salary of $50,359 for FY 2019. Benefits average 46.1% of annual salary and are comprised of the following components shown in the following figure. This equates to $23,216 annually in FY 2019. It is also assumed that there will on-boarding costs of approximately $5,000 in the initial year of hire. These costs include bunker gear, uniforms, entrance physical, and other initial Human Resource-related costs. Total costs to hire and equip and new firefighter in FY 2019 are estimated at $78,575.

Figure 14: Firefighter Benefit Calculation

Benefit Component	Percent of Annual Salary
FICA	7.65%
Health Insurance	21.3% (average of current firefighters)
Life Insurance	$40 annually
Pension	7.94%
Dental Insurance	$2,000 annually
Long-Term Disability Insurance	$336 annually
Workers Compensation	5.65%
Average Total Benefit Rate	**46.10%**

Staffing

Administrative and Support Staffing

The size and structure of an organization's staffing is dependent upon the specific needs of the agency. These needs must directly correlate to the needs of the community and a structure that works for one entity may not necessarily work for another agency. This section provides an overview of Scio's staffing configuration.

Fire department staffing can be divided into two distinctly different groups. The first group is what the citizens typically recognize and is commonly known as the operations unit, which can be generally classified as the emergency response personnel. The second group typically works behind the scenes to provide the support needed by the operation's personnel to deliver effective emergency response and is commonly known as the administrative section.

Figure 15: Administrative and Support Staff Positions

ADMINISTRATION & OTHER SUPPORT STAFF	
Director of Fire Services	1
Fire Chief	1[1]
Assistant Chief	1[2]
Fire Marshal	0
Administrative Assistant	0
Percent Administrative & Support	15.4%

[1]Director of Fire Services Operating as Fire Chief

[2]Assistant Fire Chief is a volunteer position

DISCUSSION

One of the primary responsibilities of a fire department's administration is to ensure that the operational section of the organization has the ability and means to respond to and mitigate emergencies in a safe and efficient manner. An effective administration and support services system is critical to the success of any emergency services provider.

Like any other part of a municipal fire department, administration and support need appropriate resources to function properly. By analyzing the administrative and support positions within an organization, we can create a common understanding of the relative resources committed to this function compared to industry best practices and similar organizations. The appropriate balance of administration and support compared to operational resources and service levels is a key factor to ensuring the department can accomplish its mission.

Typical responsibilities of the administration and support staff include planning, organizing, directing, coordinating, and evaluating the various programs within the department. This list of functions is not exhaustive and other functions may be added. It is also important to understand these functions do not occur in a linear fashion and can most often occur concurrently. This requires the Fire Chief and administrative support staff to focus on many different areas at the same time.

A review of staffing ratios revealed that the current level of administrative and support staffing represents 15.4 percent of Scio's total staffing and 7.7 percent when FTEs are examined. This ratio represents the department's current administrative staffing levels compared to the existing operations staffing level of 11 emergency response personnel. At the time of ESCI's site visit, the department employed six career firefighters and five paid-on-call personnel.

The department had also begun the process of hiring an additional five paid-on-call personnel. The addition of these personnel will further reduce the percentage of administrative personnel to 11.1 percent or 5.6 percent when FTEs are considered. It is our experience that typically, effective administrative staffing ratios range from 12 to 15 percent of agency totals. After reviewing the functions and responsibilities assigned to the work group, ESCI concludes that the number of full-time employees (FTEs) assigned is ineffective and the addition of an FTE position for a Fire Inspector and Administrative Assistant will be beneficial to the effective operation of the department. The incorrect staffing of the administrative and support functions creates a situation in which important organizational activities, at best, are delayed, but in worst case scenarios get completely missed.

Administration

The administrative function within the department is currently established with the position of Fire Services Director, although at some point in the future these responsibilities will return to the Fire Chief. Some of the typical responsibilities of the Director include planning, organizing, directing, and budgeting for all aspects of the department's operations. The current number of positions assigned to this activity are marginally sufficient to meet these expectations.

Fire Prevention

NFPA 1730: Standard on Organization and Deployment of Fire Prevention Inspection and Code Enforcement, Plan Review, Investigation, and Public Education Operations provides criteria for establishing and operating an effective fire prevention program. Scio does not have an established a fire prevention bureau. At the time of this report, STFD did not conduct organized fire prevention initiatives. It is recommended STFD implement a formal fire prevention program in accordance with NFPA 1730. This effort can be initiated using on-duty "shift" personnel. However, to maximize the effectiveness of a fire prevention program STFD should evaluate the feasibility of creating a full-time Fire Inspector position. It is also recommended STFD conduct a Community Risk Assessment with a subsequent Community Risk Reduction Plan in accordance with NFPA 1300.

Training

The National Fire Protection Association (NFPA) has provided criteria through which volunteer and combination fire departments should operate an effective training program. Scio does not have a formally established training program, but does utilize "on-duty" personnel for all training activities. At the time of this report, STFD conducted various levels of training. However, the training records provide a minimal understanding of the efficiency and effectiveness of the training program. It is recommended STFD implement a quality documentation program, allowing the department to ensure compliance with NFPA 1001: Standard for Firefighter Professional Qualifications, Michigan Part 74 firefighter training standards, and ISO requirements. It is also recommended the training program utilize NFPA 1410: Standard on Training for Emergency Scene Operations as the foundation for all training activities.

Emergency Management

Washtenaw County currently provides for overall management and delivery of emergency management activities. The Director of Fire Services position is responsible for emergency management activities of the department as part of "other duties" assigned. This is a typical arrangement within fire departments across the United States as the emergency management function does not specifically fall under the "fire discipline" and quite often involves other aspects of a community's risk exposure (i.e., public works, law enforcement, economic exposure).

Human Resources

The field of human resources management has become a highly specialized field requiring individuals with a significant amount of knowledge, skills, and abilities. Outside of a catastrophic event occurring within the department or community, the human resources function is the largest risk faced by a department. The effective management of a human resources program can protect the department and community from a variety of litigious situations that have the potential to devastate the department financially and/or operationally. Many fire departments across the United States do not perform the human resources function at any level due to the fact they are small and operate independently of a governmental unit. Other fire departments operating as part of a larger governmental unit have human resources support through the larger system of governmental services.

Administrative Support

Scio does not utilize an administrative assistant to support the Director of Fire Services. The value of an administrative support position cannot be overstated as it would free Scio personnel to address other areas of operation. It is recommended Scio Township evaluate the feasibility of providing the fire department with an Administrative Assistant position. Initially, the addition of this position could result from sharing these responsibilities with another Township department or from a part-time staff member.

Recommendations

- Establish a formal review process of all fire department activities.
- Implement a formal fire prevention program in accordance with NFPA 1730.
- Establish the position of Fire Inspector to implement a formal fire prevention and inspection program.
- Conduct a Community Risk Assessment with a subsequent Community Risk Reduction Plan in accordance with NFPA 1300.
- Conduct a formal job task analysis of all existing positions.
- Implement a quality documentation program allowing the department to ensure compliance with NFPA 1001.
- Utilize NFPA 1410: Standard on Training for Emergency Scene Operations as the foundation for all training activities.
- Evaluate the feasibility of providing the fire department with an Administrative Assistant position.

Emergency Response Staffing

It takes an adequate and properly trained staff of emergency responders to put the appropriate emergency apparatus and equipment to its best use in mitigating incidents. Insufficient staffing at an operational scene decreases the effectiveness of the response and increases the risk of injury to all individuals involved.

Tasks that must be performed at a fire can be broken down into two key components—life safety and fire flow. Life safety tasks are based on the number of building occupants, and their location, status, and ability to take self-preservation action. Life safety related tasks involve search, rescue, and evacuation of victims. The fire flow component involves delivering sufficient water to extinguish the fire and create an environment within the building that allows entry by firefighters.

The number and types of tasks needing simultaneous action will dictate the minimum number of firefighters required to combat different types of fires. In the absence of adequate personnel to perform concurrent action, the command officer must prioritize the tasks and complete some in chronological order, rather than concurrently. These tasks include:

- Command
- Scene safety
- Search and rescue
- Fire attack
- Water supply
- Pump operation
- Ventilation
- Back-up/rapid intervention

The first 15 minutes is the most crucial period in the suppression of a fire. How effectively and efficiently firefighters perform during this period has a significant impact on the overall outcome of the event. This general concept is applicable to fire, rescue, and medical situations. Critical tasks must be conducted in a timely manner in order to control a fire or to treat a patient. STFD is responsible for assuring that responding companies are capable of performing all of the described tasks in a prompt, efficient, and safe manner. The next figure lists STFD's emergency response staffing configuration.

Figure 16: Emergency Response Staff

EMERGENCY SERVICE STAFF	
Shift Commanders (no rank)	6
Firefighter (paid-on-call)	10
Total Operational Staff	2
Fire Department Total	**18**

DISCUSSION

Considerable ongoing national discussion and debate around large incidents of significant consequence have brought attention to the matter of firefighter staffing. Frequently, this discussion is set in the context of firefighter safety. While there are published standards regarding firefighter staffing, they generally speak in terms of the number of firefighters assigned to a particular response apparatus, often characterized as a preferred standard of "a minimum of four personnel per company." ESCI notes that the more critical issue is the number of firefighting personnel assembled in a reasonable amount of time at the scene of an emergency that can perform the required critical tasks to mitigate the emergency, regardless of the type or number of vehicles upon which they arrive.

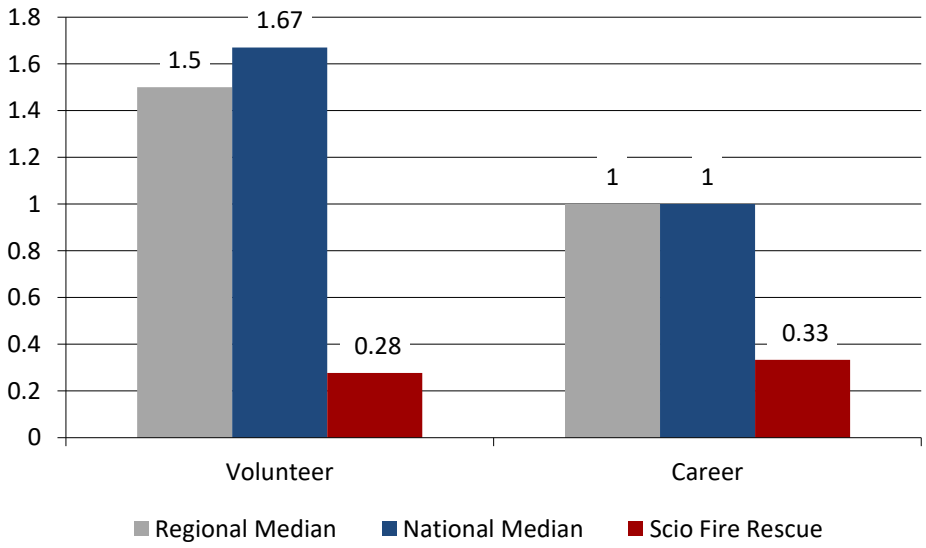
It is important to understand that the assembly of firefighters on an incident, also called an "Effective Firefighting Force" or "Effective Response Force," is a determination that is made at the community level based on risk, capability, and citizen expectations.

There is no mandated requirement for specific staffing levels, though there are standards discussed in detail in this report. In the Service Delivery section, resource concentration is evaluated in detail.

Another means of comparison is measuring the number of firefighters on staff per 1,000 population of the service area. The following figure illustrates current Scio paid-on-call and full-time staffing on a per 1,000 population-basis, with both national and regional medians presented as a comparison. Current paid-on-call staffing levels are significantly lower than the regional and national medians for similar combination fire departments. Additionally, the full-time staffing levels are lower than national and regional medians.

Scio operates a paid-on-call system utilizing personnel to cover work periods from 7 AM to 7 PM to ensure additional personnel is available in support of career staff during time periods when other paid-on-call staff are unavailable. It is important for the Township leaders to understand that under the current staffing levels and methodologies, STFD cannot initiate an initial interior fire attack and maintain "2-in/2-out" as required under MIOSHA-STD R 408.17451. *Management of Emergency Operations*. It is recommended that Scio Township either implement a staffing model ensuring STFD is in compliance Michigan state law, or ensure policies are in place ensuring interior operations are not initiated until "2-in/2-out" requirements are met. Changes in the current staffing model can be accomplished through the addition of full-time personnel or an increase in the usage of "paid-on-call" personnel.

Figure 17: Scio Current Staffing Levels Paid-on-Call (Volunteer) per 1,000 Population



Recommendations

- Evaluate the feasibility of adding either full-time or paid-on-call staff to ensure compliance with Michigan "2-in/2-out" law.
- Implement policy ensuring interior firefighting operations are not initiated until "2-in / 2-out" requirements are met.

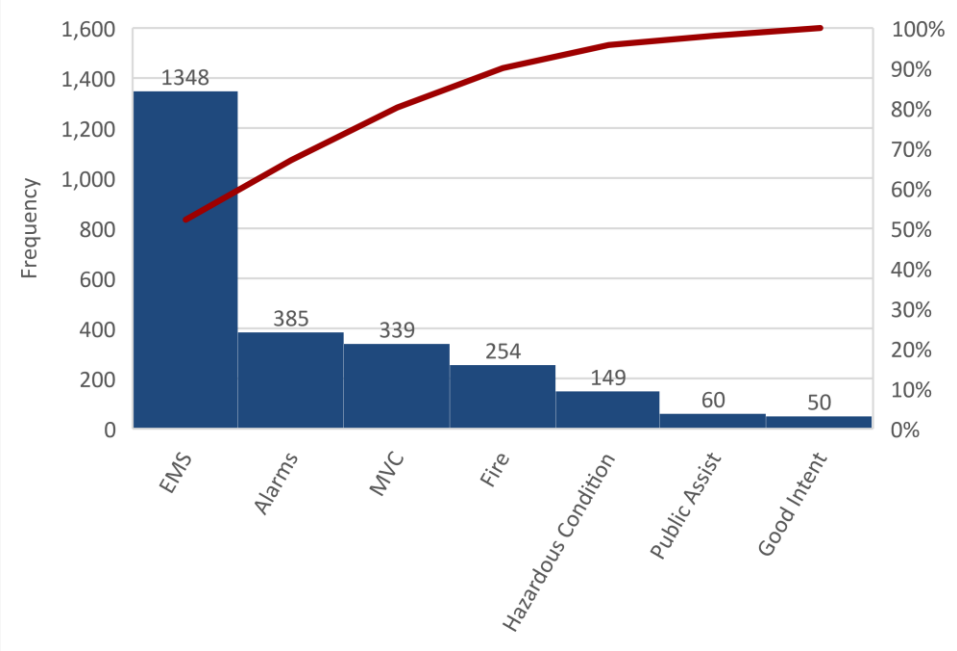
Service Delivery and Performance

The delivery of fire suppression, rescue, and emergency medical services is no more effective than the sum of its parts. It requires efficient notification of an emergency and rapid response from well-located facilities, in appropriate apparatus, with a sufficient number of well-trained personnel, following a well-practiced plan of action. This section of the report provides an analysis of the current service delivery components of Scio Township Fire Department.

Demand

In the demand analysis, ESCI reviews current and historical service demand by incident type and temporal variations for Scio Township Fire Department. GIS software is used to provide a geographic display of demand within the study area. National Fire Incident Records System (NFIRS) data, incident response data, and apparatus response data collected by the department is used in this section of the report. The following figures demonstrate historical service demand for STFD.

Figure 18: Historical Service Demand by Incident Type, 2015–2017



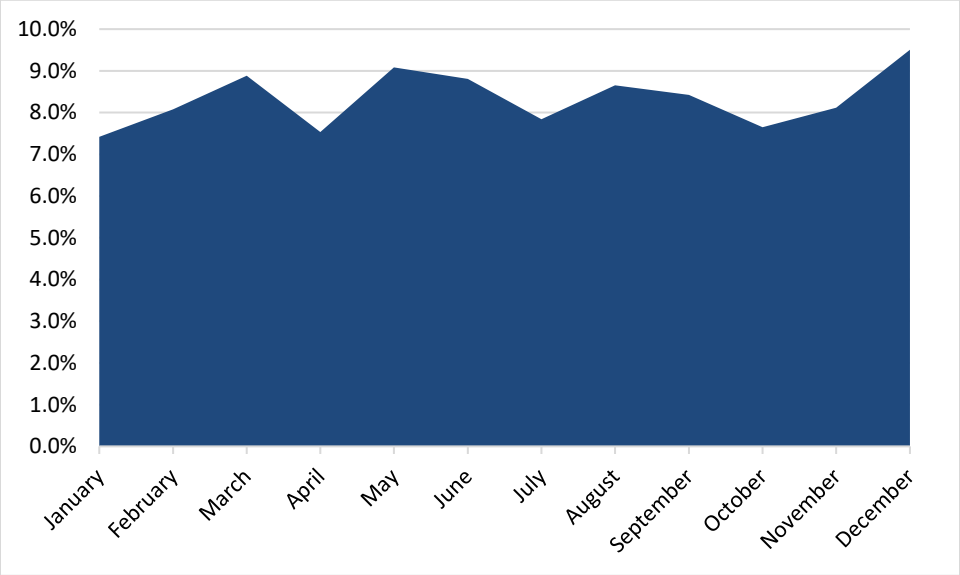
This analysis demonstrates that EMS calls for service represent the largest portion (52.1 percent) of service demand. The data displayed in this figure reflects a nationwide trend for an all-hazard fire jurisdiction. Next, calls for alarms, motor vehicle collisions (MVC), and responses for fire represent the majority of call types experienced by the department. Finally, hazardous conditions, public assists, and good intent calls make up the remainder of the call volume.

Next, call volume is analyzed based on varying timeframes to determine if service demand patterns are present for Scio Township.

Temporal Variation

It is useful to evaluate service demand temporally in order to understand any trends that may occur during certain periods of time and potentially implement changes to the current deployment model to fit the demand. The following figures display 2015 through 2017 service demand within the STFD study area; summarized by various measures of time.

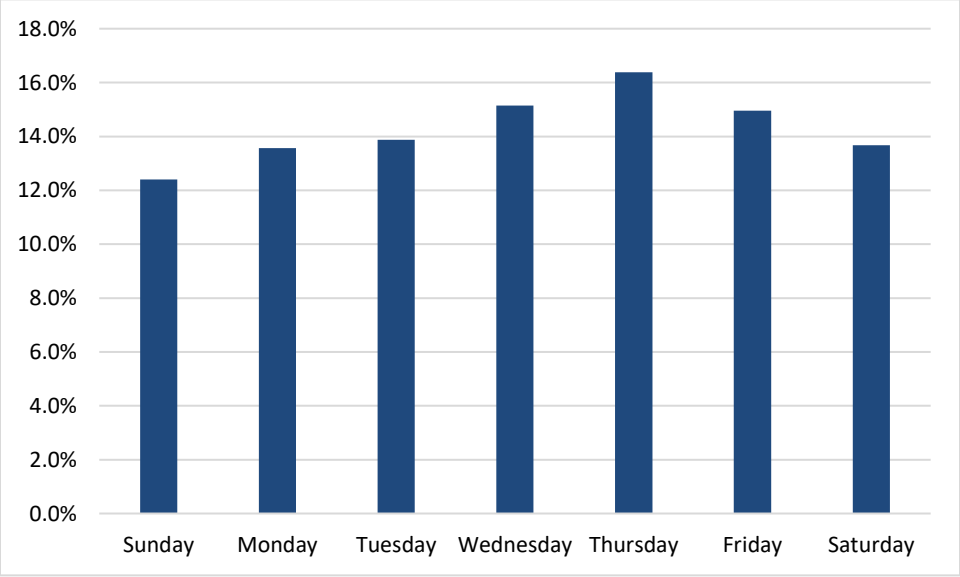
Figure 19: STFD Service Demand by Month, 2015–2017



The analysis of temporal variation by month reveals a fairly consistent pattern of service demand with monthly totals rising and falling slightly month to month. The peak demand appears to occur in December with the lowest levels of demand occurring in January. However, although this figure presents the relative percentages in which monthly demand occurred, the range from the highest to the lowest levels of service demand over a three-year period accounted for a total of 54 calls, 246 calls in December versus 192 calls in January.

Next, service demand by the day of week was analyzed for patterns in temporal variation.

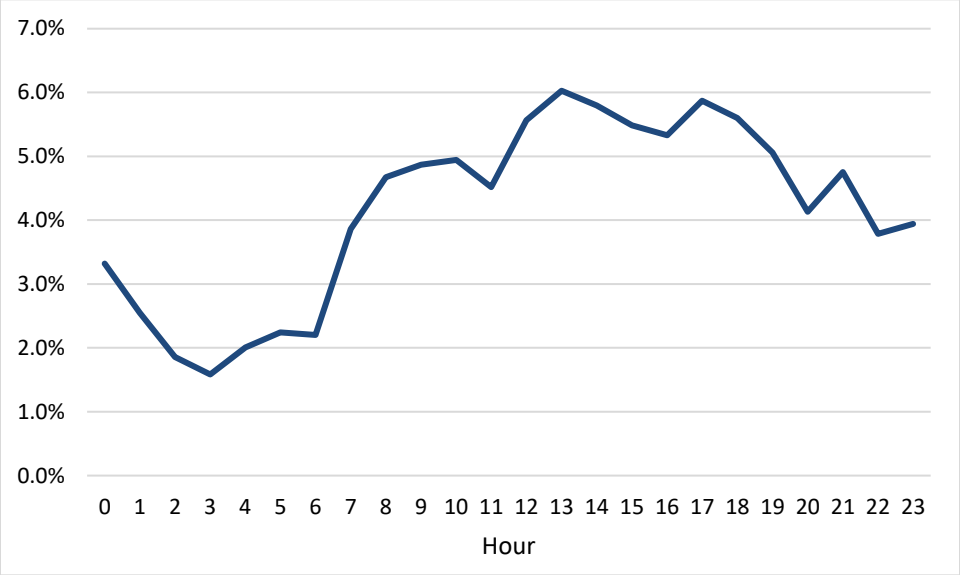
Figure 20: STFD Service Demand by Day of the Week



When demand by day is examined, incidents appear to follow a pattern of raising gradually from the low on Sunday at 12.4%, to a high on Thursday 16.4%. Demand on Friday and Saturday then declines back to the low on Sunday. This pattern may be related to an increase in demand due to commercial activities during the week and would suggest that activity on the weekends is lower than during mid-week. The range from high to low over the three-year period is 103 incidents with 424 occurring on Thursdays and 321 on Sundays.

Finally, temporal variation by hour of day is presented for review.

Figure 21: STFD Service Demand by Hour of the Day



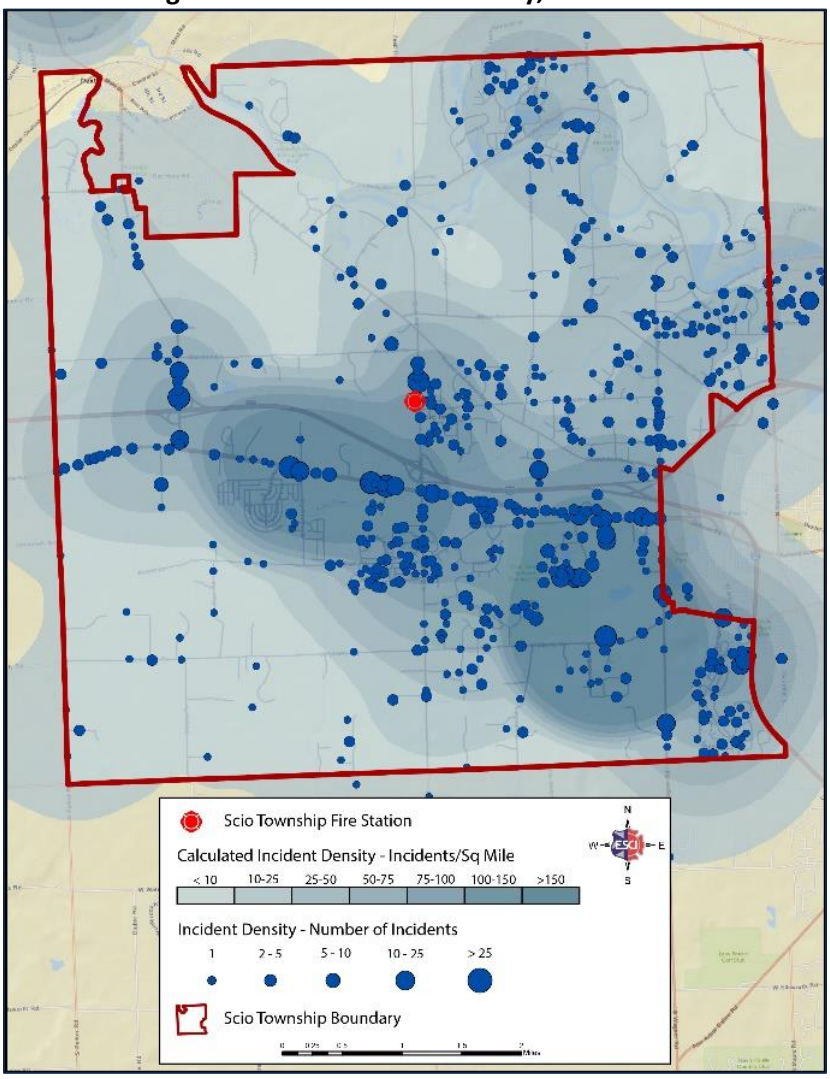
When service demand is plotted by the hour of day, the pattern illustrated follows a diurnal pattern of peak activity occurring midday and the lowest activity levels between midnight and 6 AM. The sharp rise and fall of this pattern suggests that service demand in Scio Township is closely related to human activity and normal work week patterns.

Based on the temporal variation patterns occurring during 2015 through 2017, Scio Township should anticipate its greatest service demand needs Monday through Friday from 8 AM through 5 PM.

Geographic Service Demand

In addition to the temporal analysis of service demand, it is useful to examine the geographic distribution of service demand. Using dispatch center incident location data provided by STFD, ESCI plotted incident locations and calculates the mathematical density of 2015 to 2017 service demand in the STFD service area.

Figure 22: STFD Incident Density, 2015–2017

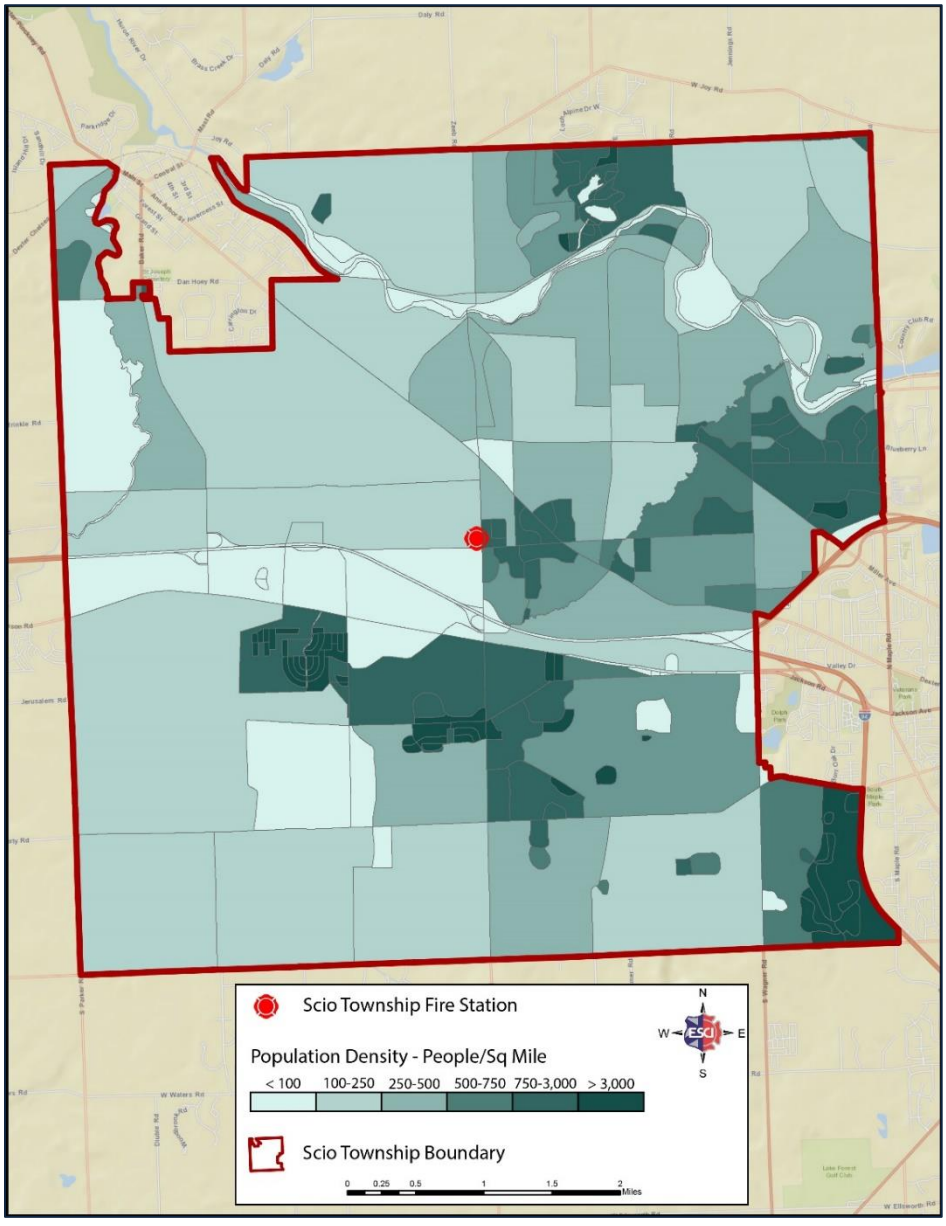


In this figure, incident density is displayed using two methods, calculated incident density, or hot spot analysis, and through a display of incident locations. The incident density analysis compares incident points based on their locations relative to each other and generates a range of densities that would occur should those density patterns extend over a square mile. This type of analysis provides insight to where areas of high and low incident frequency are located, relative to each other, and helps the reader understand where to focus resources. The second method provides the locations that incidents occurred, as well as relative frequency with larger circles representing higher service demand to the same location. A comparison of these two methods plotted together provides insight in to why hot spots are occurring in certain areas. Based on this analysis, the areas of greatest service demand occurred along Jackson Road and to its south, primarily in the southeast of the Township bordering the City of Ann Arbor. Generally speaking, demand appears greatest along the Township's eastern border and extends westward following major roadways out of Ann Arbor and towards the City of Dexter.

Distribution

The analysis of resource distribution presents an overview of the current deployment of fire department facilities, equipment, and personnel within the STFD service area. In the following figure, population density by census block is illustrated to provide an understanding of where concentrations of people are located. This is important to understand as often areas with the greatest levels of population density incur higher levels of service demand than sparsely populated areas.

Figure 23: Scio Township Population Density, 2010 U.S. Census Blocks



The major areas of population density in Scio generally extend westward from its border with Ann Arbor to the north and south of Jackson Road. A comparison of 2010 census block population densities and incident density reveal that the majority of service demand tends to occur in densely populated areas. With this trend in mind, as future development occurs in the township, the fire department should anticipate that increases to population density will most likely result in increased service demand to those areas. Scio Township Fire Department should consider monitoring development trends to ensure that current infrastructure can keep pace with future demand.

The next section evaluates Scio's performance based upon national evaluation standards and criteria. There are two standards commonly used in the fire service to determine an agency's response distribution. The first, and most common, standard is the Insurance Service Organization's (ISO) application of road miles from a fire station and water supply measurement. The second standard comes from the National Fire Protection Association's (NFPA) 1720: Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Volunteer Fire Departments. When used in tandem, these two standards help emergency services leaders understand current service level capabilities and plan for future impacts. The following section provides an analysis of both the ISO and NFPA standards.

ISO Criteria

A jurisdiction's ISO rating is an important factor when considering fire station and apparatus distribution, as it can affect the cost of fire insurance for individuals and businesses. ISO ranks fire departments relative to their ability to provide protection to the community they serve through an analysis process that yields a final score that ranges from a 10 (indicating no fire department coverage) to a 1 (the highest level of fire department coverage). To receive maximum credit for station and apparatus distribution, ISO recommends that in urban areas, all "built upon" areas in a community be within 1.5 road miles of an engine company. Additionally, ISO states that a structure must be within five miles of a fire station to receive any fire protection rating for insurance purposes.

The next figure displays the STFD response zone with the 1.5-mile travel distance displayed. Scio Township has slightly more than 30 miles of roadway and 16 percent of the roads fall within the 1.5-mile travel distance.

Figure 24: STFD Engine Company Distribution—ISO Criteria

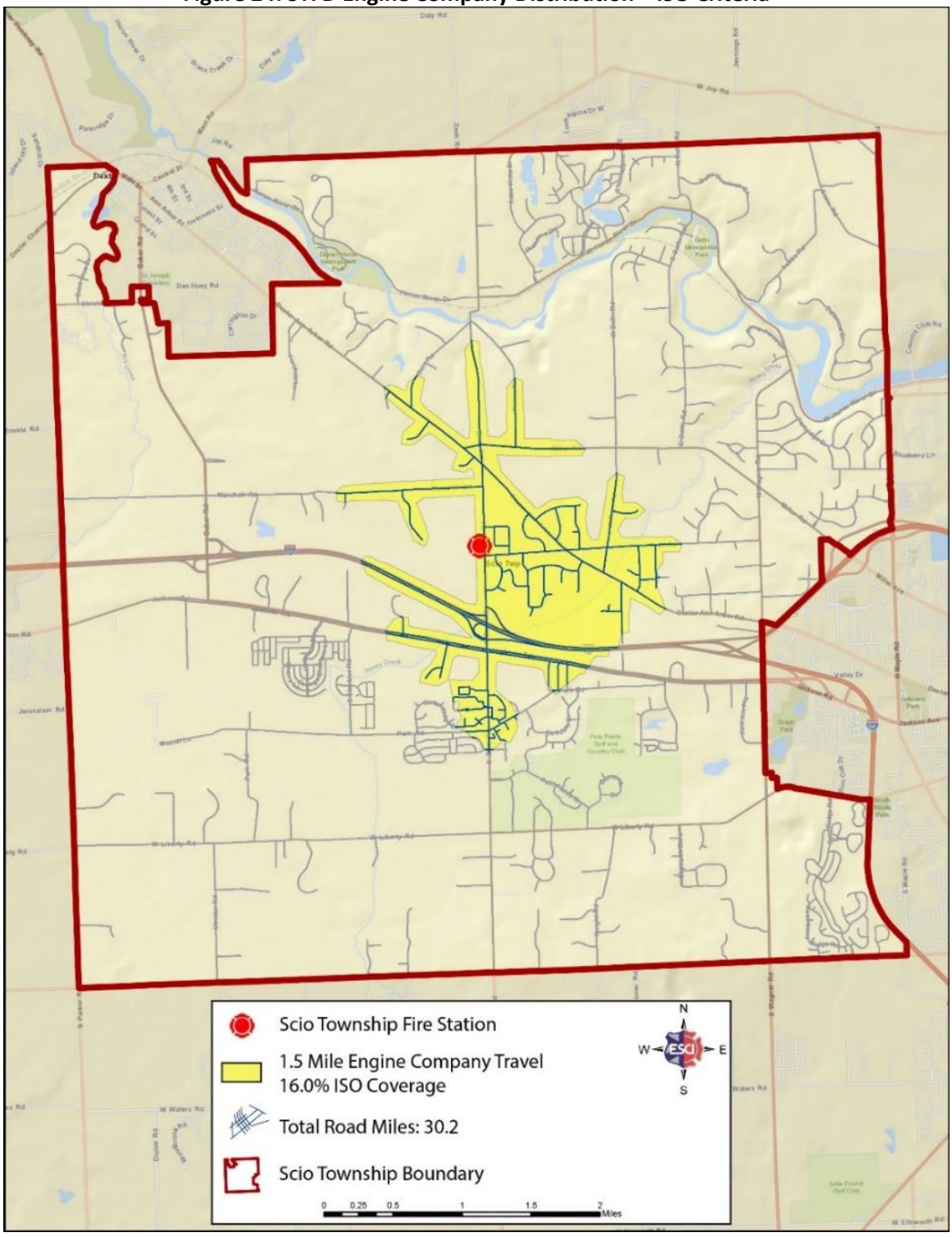


Figure 25 displays the 5-mile zone for Scio Township to be eligible for an ISO rating. Nearly all of the Township (92 percent) falls within this area. Several factors contribute to the overall rating assessed by ISO such as staffing, water supply, and equipment carried. This figure is not determinative as to whether ISO will assess higher or lower scores but is intended to provide an understanding of the current travel distance capabilities of STFD.

Figure 25: STFD 5-Mile Distribution—ISO Criteria

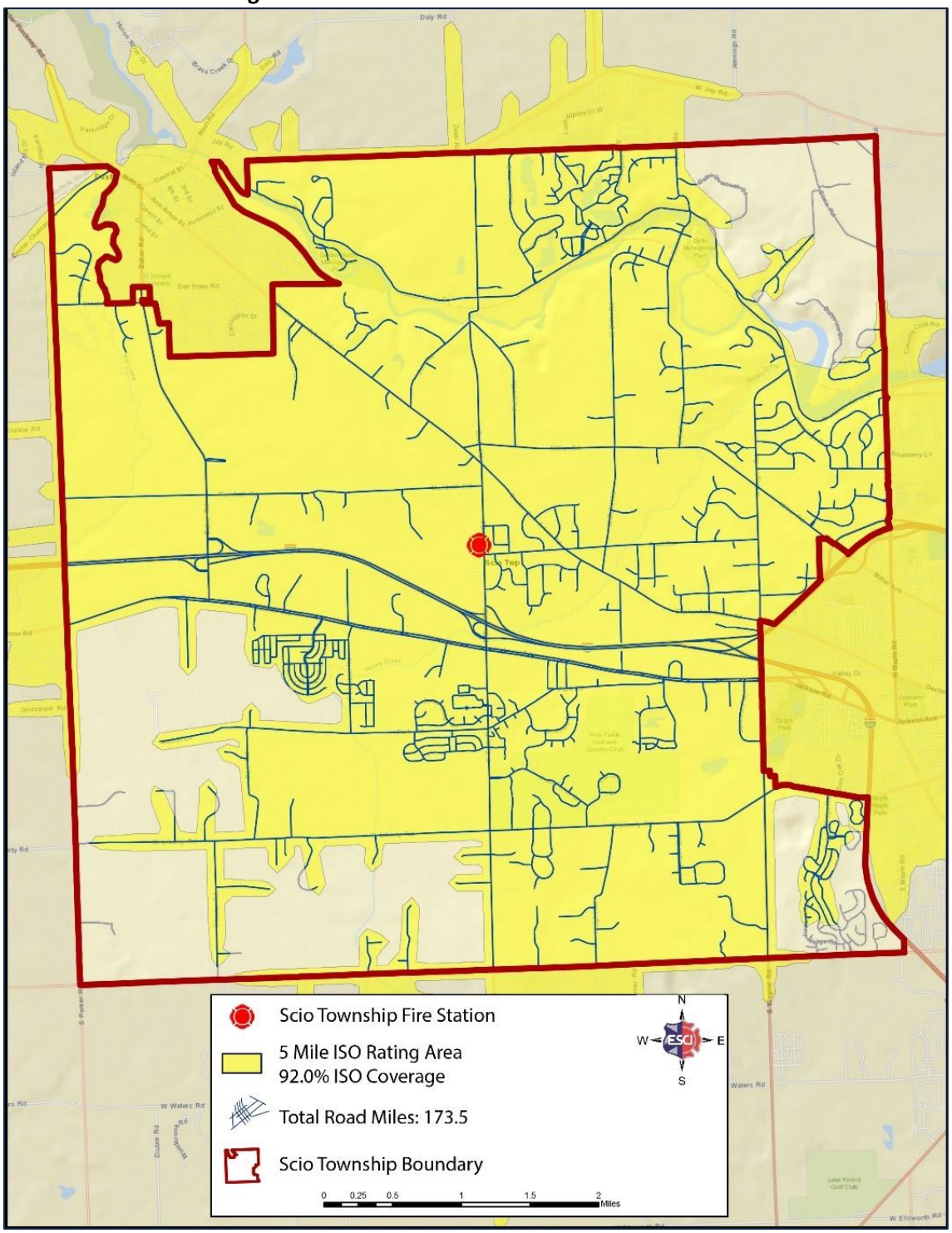
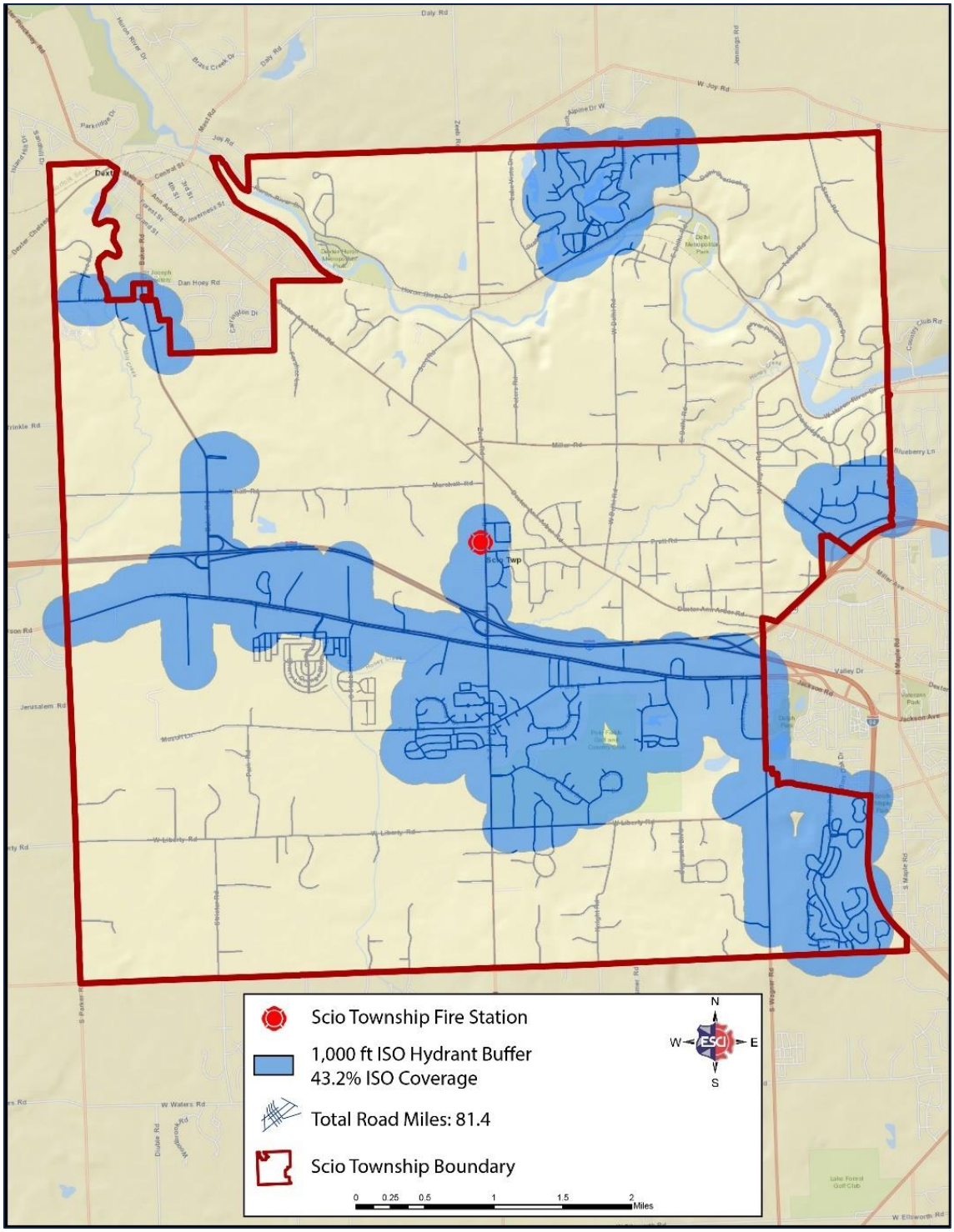


Figure 26 provides an understanding of the Scio Township within 1,000 feet of a fire hydrant. Slightly more than 43 percent of the community is within 1,000 feet of a hydrant. The areas outside of this boundary requires STFD to address water supply through extended hose lays and shuttled water. This is significant in that the movement of water using tanker operations is highly resource intensive.

Figure 26: Hydrant Distribution—ISO Criteria



The following figure displays the predicted ability for STFD to travel throughout its service area based upon travel time in minutes.

Figure 27: STFD Predicted Travel Time Capability—Current Station Location

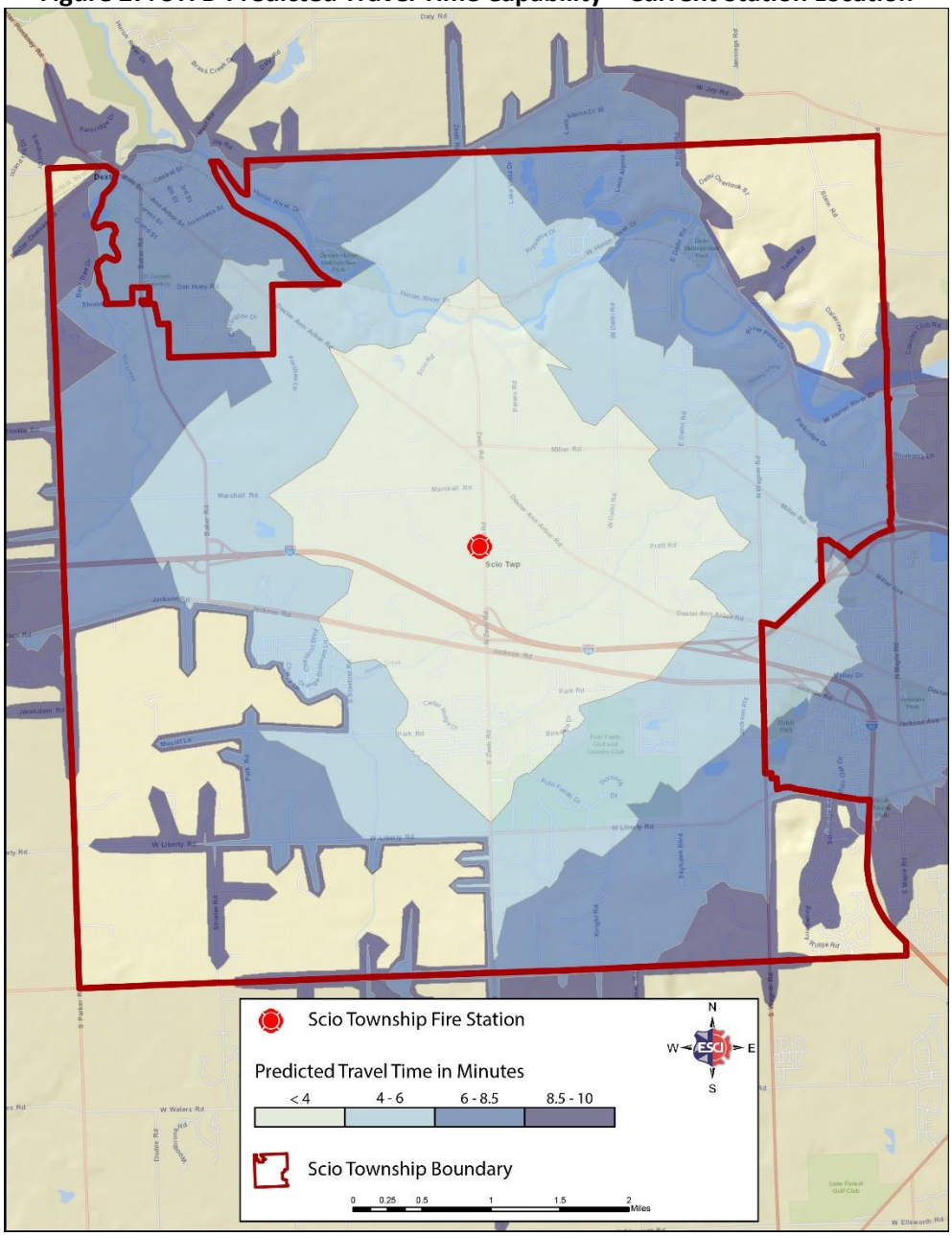


Figure 27 provides a graphical understanding of the predicted travel time for the existing Scio Township fire station. A significant majority of the Township can be reached in less than eight and a half minutes of travel time. It is also worth noting that the entire Township can be reached with a drive time of ten minutes or less. Understanding the predicted drive times of STFD emergency response units is critical in establishing expected service levels for the department.

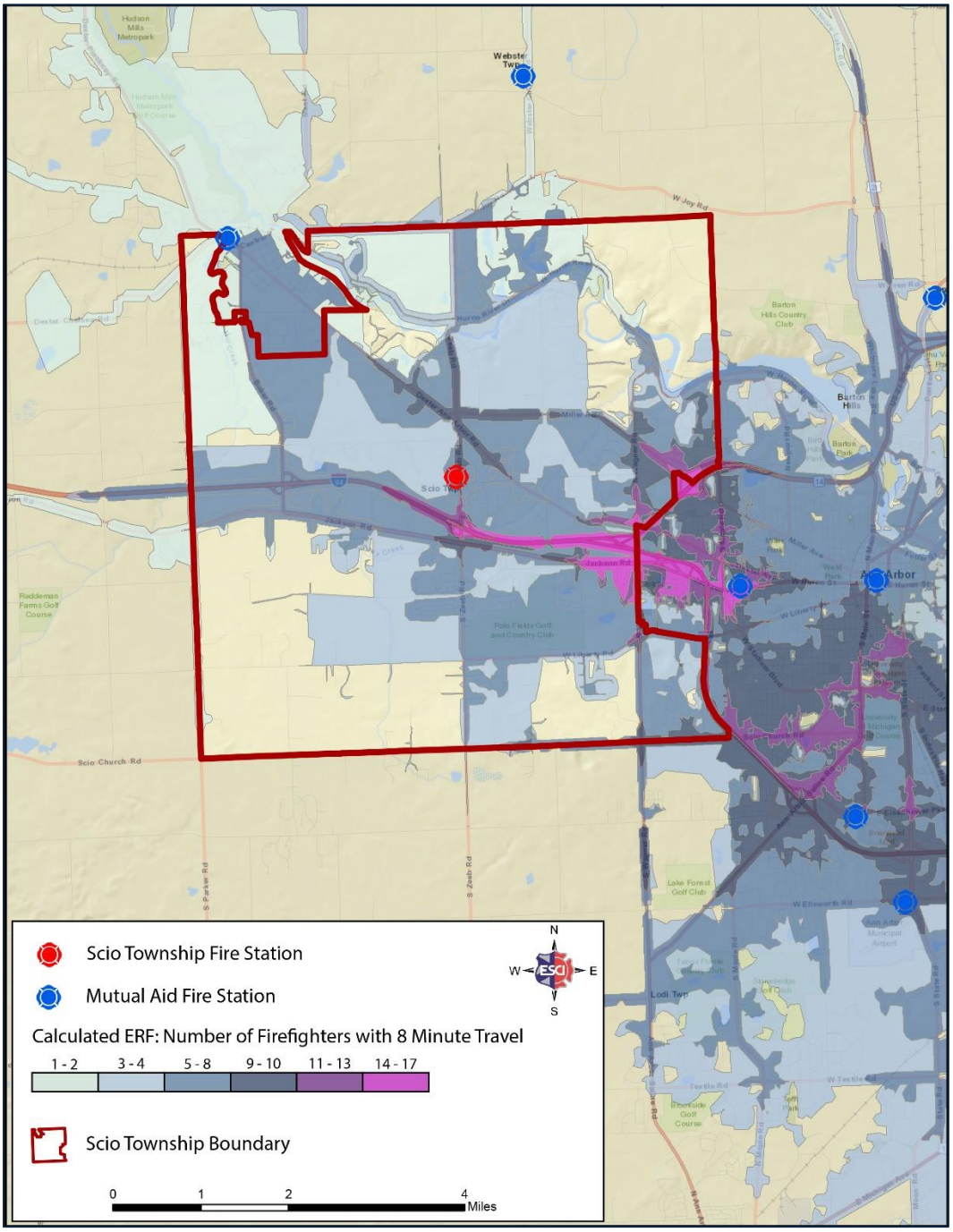
Concentration

Accepted firefighting procedures call for the arrival of the entire initial assignment or Effective Response Force (ERF) to provide sufficient apparatus and personnel to effectively deal with an emergency based on its level of risk within a reasonable amount of time. This is to ensure that enough people and equipment arrive in a timely manner to safely control a fire or mitigate any emergency before there is substantial damage or injury. In this analysis, ESCI examines the ability of STFD to assemble multiple resources across the study area.

It is important to note that in a paid-on-call system in which emergency responders must return to the station to then respond to an emergency there are many variables to the response capabilities of the department. This factor is true nearly all of STFD's aid partners, as each of them also operates paid-on-call systems. The only aid partner potentially providing assistance to STFD that is not a paid-on-call system is Ann Arbor.

As a result, ESCI utilized "expected" response normally provided by STFD and its neighboring departments to project the ability of the department to assemble an effective response force. In the following figure, the minimum staffing of each fire station capable of reaching within the Scio Township boundaries is displayed with the range of firefighters capable of reaching a given location illustrated in varying colors. In this figure, eight minutes was used as the travel time from each facility. This figure was used for several reasons: as a suburban fire department as categorized by NFPA 1720, STFD is provided 10 minutes from the initial notification to arrive on scene of a working fire. As the station is staffed, NFPA 1720 allows for a 90 second turnout time for firefighters. Because Scio Township has no established automatic aid agreements with neighboring agencies, some amount of time must be allotted to fulfill the mutual aid request, and in this scenario, it is assumed that it will take 30 seconds and happen immediately after notification. As stated earlier, the impact of potential paid-on-call responders from additional locations was not taken in to consideration as historically participation is relatively low and locations at any given time unknown, thus only minimum staffing at each fire station was considered. Finally, eight minutes is the career fire department standard for assembling an ERF (NFPA 1710). The results of the analysis are displayed in the following figure.

Figure 28: Scio Township Effective Response Force



Assuming all mutual aid partners are available to respond, Scio Township possesses a narrow avenue of territory in which firefighters could respond in sufficient numbers to effectively mitigate a working residential fire. Should a commercial fire occur, or these displayed resources be unavailable at the time of the incident, Scio Township will be unable to effectively and safely staff a working fire within the acceptable time frame to achieve a positive outcome.

Reliability

A review of workload by station and response unit can reveal much about response performance and a department's ability to assemble adequate resources to mitigate simultaneous incidents. Although fire stations and response units may be distributed in a manner to provide quick response, that level of performance can only be obtained when the response unit is available in its primary service area.

Understanding an organization's call volume (i.e., workload) is a significant factor in planning for future operations and meeting the expectations of the community. However, to truly understand an organization's workload, it is imperative to understand the amount of time units and stations are committed to emergency incidents. During the time periods units are committed to responding to and mitigating an incident, they are unavailable to respond to additional incidents or calls for service. Additionally, in a paid-on-call system, whenever employees are committed to an incident they are taken away from their full-time careers and family.

At the time of this report, the data maintained by STFD did not allow for a comprehensive analysis of the department's workload and reliability to be completed. It is recommended STFD implement effective processes and procedures to ensure future efforts to conduct a reliability analysis can be accomplished. It is critical that STFD have the ability to understand the incidents in which paid-on-call staff do not successfully respond for assistance, enumerate concurrent calls, or mutual-aid departments arrive prior to STFD units.

Response Performance

Perhaps the most publicly visible component of an emergency services delivery system is response performance. Most citizens and policymakers alike want to know how quickly they can expect to receive services. In the performance summary, ESCI examines emergency response performance for the STFD service area using incident data from Huron Valley Ambulance dispatch center, provided by STFD leadership. Non-emergency incidents, mutual or auto aid incidents outside the STFD service area, data outliers, and invalid data are removed from the data set whenever possible.

ESCI measured total response time from the time from the receipt of the alarm at the 911 center to when the first apparatus arrived on the scene of the emergency. ESCI calculated both average and 90th percentile data for these emergency incidents. The use of percentile measurement of total response time performance follows the recommendations of the NFPA standards and the Center for Public Safety Excellence (CPSE/CFAI) Standards of Cover document.

Fire department leaders and policy makers often use "average" response performance measures since the term is commonly used and widely understood. The most important reason for not using average for performance standards is that it may not accurately reflect the performance for the entire data set and can be easily skewed by data outliers. Percentile measurements are a better measure of performance since they show that the large majority of the data set has achieved a particular level of performance.

A department's total response time is composed of several components. These components, while not necessarily required by NFPA 1720, are critical pieces to the total response time and are presented as described below.

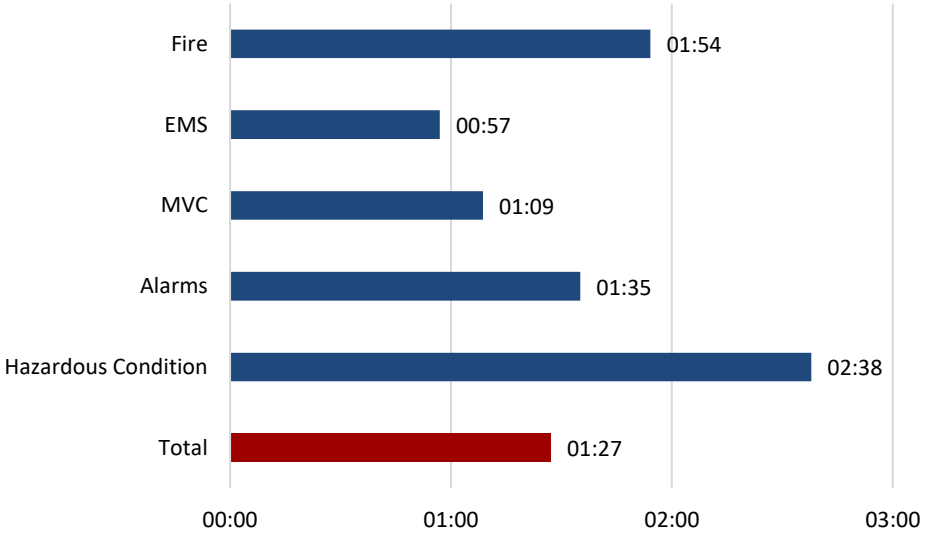
- Call Processing Time—The amount of time between when a dispatcher answers the 911 call and resources are dispatched.
- Turnout Time—The time interval between when units are notified of the incident and when the apparatus are en route.
- Travel Time—The amount of time the responding unit actually spends travelling to the incident.
- Total Response Time—Total Response Time equals the combination of "Processing Time," "Turnout Time," and "Travel Time."

In the flowing sections, each component will be examined individually to develop the key factors in Scio's total response time from 2015 through 2017.

CALL PROCESSING TIME

Understanding the individual components of an agency's total response time allows for the identification of deficiencies and potential areas for improvement. The call processing time performance criteria is applicable to NFPA 1710 and NFPA 1720 organizations as the dispatch center is staffed and capable of achieving the criteria for both organization types. The NFPA 1221: Standard for the Installation, Maintenance, and Use of Emergency Services Communications Systems standard specifies that call-processing time should not exceed 64 seconds (measured at the 90th percentile).

Figure 29: Call Processing at 90th Percentile, 2015–2017



Understanding the individual components of an agency's total response time allows for the identification of deficiencies and potential areas for improvement. The call processing time performance criteria is applicable to NFPA 1710 and NFPA 1720 organizations as the dispatch center is staffed and capable of achieving the criteria for both organization types. The NFPA 1221: Standard for the Installation, Maintenance, and Use of Emergency Services Communications Systems standard specifies that call-processing time should not exceed 64 seconds (measured at the 90th percentile).

The previous figure provides an understanding of the Huron Valley Ambulance's (HVA) performance by incident type. Relative to "total" calls dispatched the communications center is able to process calls in 1:27. The communications center is also successful in processing calls in less than 90 seconds for emergency medical service (EMS) and motor vehicle crashes (MVC) incidents. However, fire and hazardous conditions significantly exceed the benchmark. It is recommended STFD work with HVA communications leadership to ensure compliance with NFPA 1221.

TURNOUT TIME

Unlike call processing times, turnout time, or the time from initial notification of an alarm until the unit goes enroute, is a component in which STFD has a great deal of control to influence. NFPA 1720 provides specific guidelines for staffed combination and volunteer fire department turn out times, 90 seconds at the 90th percentile, and this is an area that deserves some attention. The following figure provides STFD's turnout times at the 90th percentile.

Figure 30: Turnout at 90th Percentile, 2015–2017

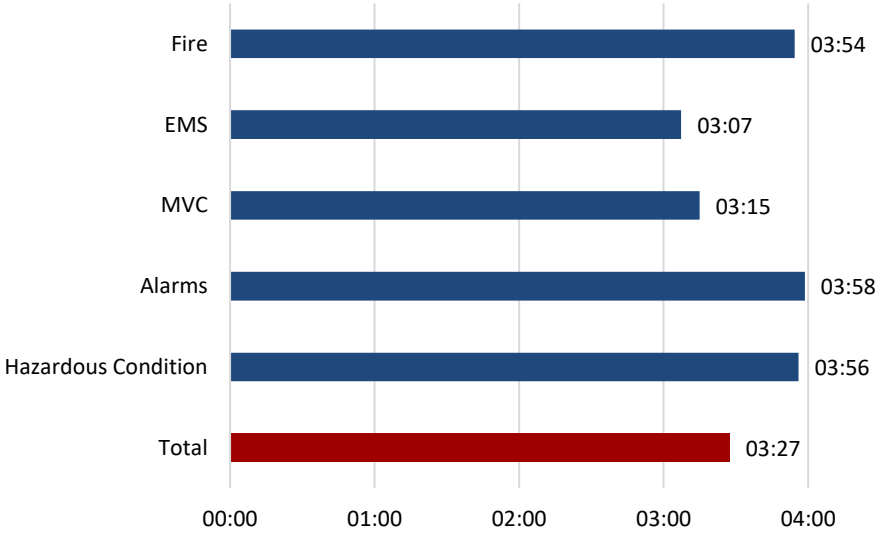
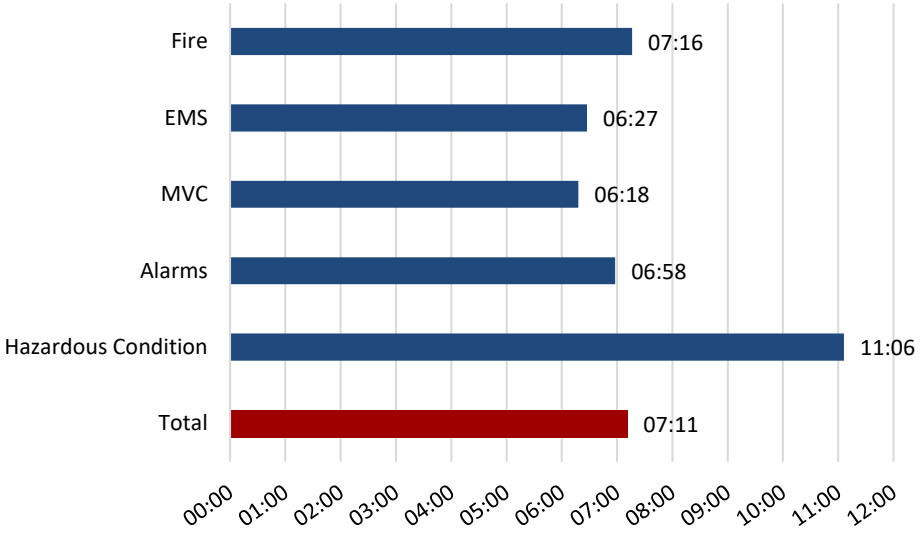


Figure 30 provides an understanding of STFD's turnout time performance by incident type at the 90th percentile. In total, STFD achieved a 3:27 turnout time 90 percent of the time. For staffed combination and volunteer fire stations, NFPA 1720 As a combination department, STFD's "career" staff have the ability to achieve turnout times established within NFPA 1710, which is 60 seconds or less for rescue calls and 80 seconds for fire and special operations calls, 90 percent of the time. STFD's performance is more than double for all metrics and nearly triple for fire related incidents. STFD should consider further examination in to these protracted turnout times to determine what improvements can be made.

TRAVEL TIME

Travel time represents the amount of time from when a unit begins traveling from its location until it arrives on the incident scene. Several factors, such as traffic and weather, can influence travel time and this element often accounts for the largest period of time when examining total response time. The following figure presents STFD's travel time at the 80th percentile.

Figure 31: Travel at 80th Percentile, 2015–2017



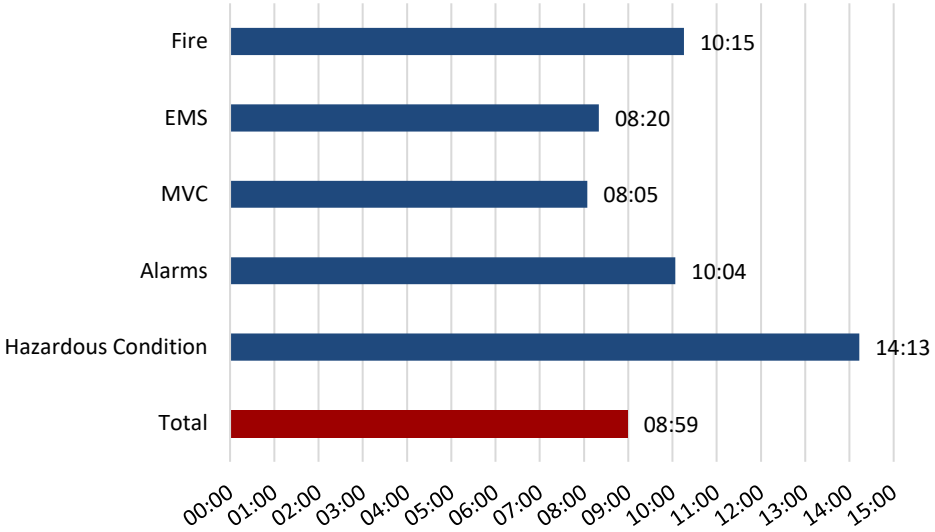
Overall, travel performance for all incidents at the 80th percentile was 7 minutes, 11 seconds. As illustrated in the figure, when travel times were examined by incident type, MVCs and EMS calls represented the quickest response times while calls involving hazardous conditions, such as fuel spills and overpressure/overheating without fire, appear excessive when compared to other incident types. STFD may consider examining how responses to these incidents are classified to separate emergency versus nonemergency responses and whether or not this impacts travel times to these incidents.

Finally, the total response time is examined, and the performance compared to NFPA 1720 standards.

TOTAL RESPONSE TIME

In this section, total response time by incident type and overall performance is illustrated. NFPA 1720 guidelines require that career and combination departments in suburban areas, those with population densities from 500 to 1,000 people per square mile, have the ability to respond 10 firefighters to fire incident scenes within 10 minutes of initial notification of the alarm, 80 percent of the time. Guidelines for responses to EMS incidents and other call types are not defined by NFPA 1720 and establishing performance standards for these incident types is left to the organization providing services. In the following figure, total response time performance is displayed.

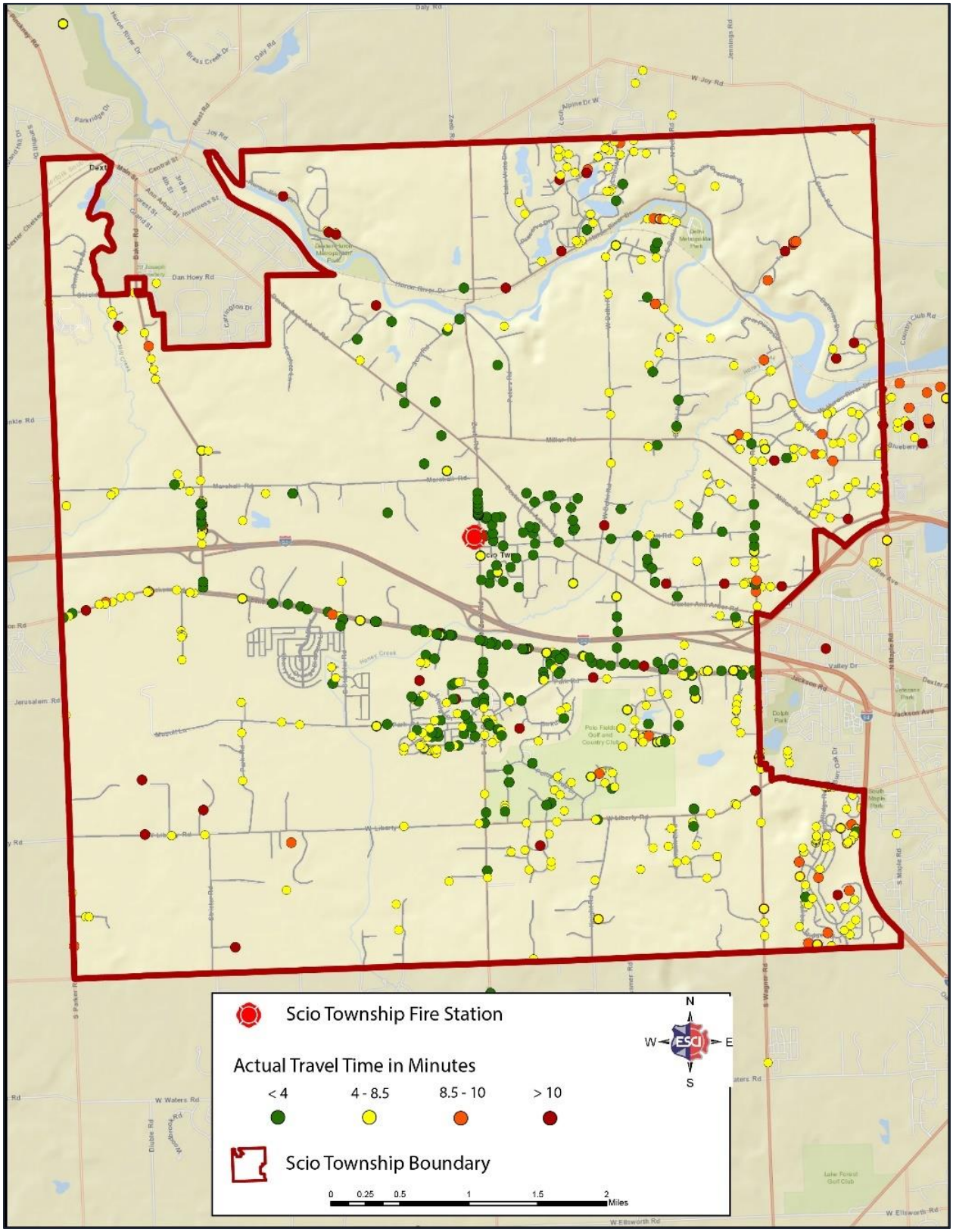
Figure 32: Total Response Time at 80th Percentile, 2015–2017



Scio Township's total response time performance at the 80th percentile for fire was 10 minutes, 15 seconds and for all incident types was 8 minutes, 59 seconds. Responses to EMS and MVC incidents represent the quickest total response performance, while responses to hazardous condition type incidents were the slowest at 14 minutes, 13 seconds. Based upon NFPA 1720 standards, Scio Township is close to meeting national response performance standards but should consider further examination in to variations in response performance by incident type.

The following figure presents a graphical representation of response performance by Scio Township Fire Department. In this figure, green dots represent response times of 4 minutes or less, yellow dots are times from 4 to 8.5 minutes, orange dots represent response times from 8.5 to 10 minutes, and red dots are response times greater than 10 minutes.

Figure 33: STFD Response Performance, 2015–2017 Emergency Incidents



The following figure displays NFPA 1720 standards based on population density.

Figure 34: NFPA 1720 Staffing/Deployment Matrix

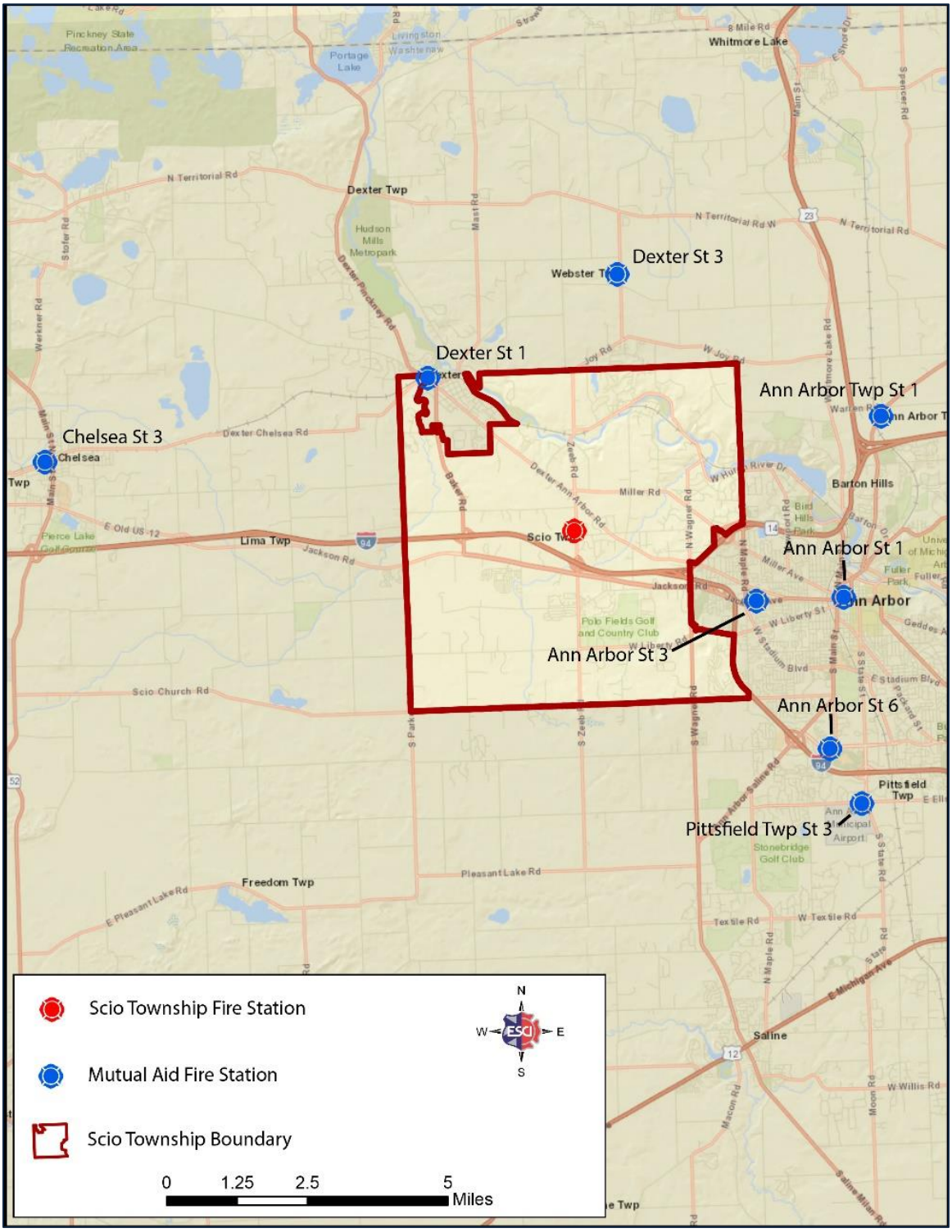
Demand Zones	Demographics	Min. Staff to Respond	Response Time (minutes)	Performance Objective
Urban	More than 1,000 people per sq. mi.	15	9	90%
Suburban	500 to 1,000 people per sq. mi.	10	10	80%
Rural	Less than 500 people per sq. mi.	6	14	80%
Remote	Travel Distance 8 miles or more	4	Dependent upon travel distance	90%
Special Risk	AHJ determines	Based on risk	AHJ determined	90%

Mutual and Automatic Aid Systems

There are existing mutual aid/automatic aid agreements in place between fire agencies within Washtenaw County. Mutual aid is typically employed on an "as needed" basis where units are called for and specified one by one through an incident commander. An enhanced aid agreement within the fire service is known as an "automatic aid" agreement which differs from mutual aid agreements in that under certain mutually agreed upon criteria, resources from the assisting agency are automatically dispatched as part of the initial response. These agreements facilitate closest unit dispatch to emergencies in previously established boundary areas and allow for the dispatch of additional apparatus and personnel to specific predefined emergencies.

The following figure displays the mutual aid agencies support STFD. It is recommended STFD work to ensure all mutual aid agreements are current. It is also recommended STFD ensure any future written automatic aid agreements are properly executed an implemented.

Figure 35: Scio Township Mutual Aid Stations



FUTURE DELIVERY SYSTEM MODELS

Although the preceding sections of this report focused primarily on the conditions that currently exist within the Scio Township Fire Department jurisdiction, the intent of this study is to combine that evaluation with a look into the future and provide policy makers with information necessary to carry the system forward. This portion of the report provides comments and recommendations related to the deployment of facilities, apparatus, and personnel with a focus on future service delivery and an improvement in overall efficiency within the system.

Development of Response Standards and Targets

ESCI emphasizes the importance of establishing response performance metrics by STFD. Once implemented, these standards establish measurable goals for service delivery, which then form the foundation upon which planning for deployment of resources is based. Absent these processes, the organization is not able to determine where it needs to go, nor is it able to know when it is achieving its goals and meeting the community's expectations.

Response standards have to be developed by each individual community, based on the expectations of elected officials and citizens balanced against the financial realities of what a community is able and willing to afford. For this reason, ESCI cannot establish these standards for STFD but rather will provide guidance and examples of what we consider to be acceptable metrics.

In the design of an operational structure for a fire department, interested parties attempt to identify some standard or "rule" that establishes staffing levels within a fire department. However, the reality is no single staffing standard exists within the United States that mandates staffing levels of a fire department. There are however NFPA standards addressing the number of firefighters that should be on-scene to accomplish specific tasks safely and effectively. These standards are known as NFPA 1710: Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments, and NFPA 1720: Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Volunteer Fire Departments, and apply to either career organizations or volunteer organizations respectively. As a combination department, STFD can identify which standard it desires to follow. It is important to reiterate that this standard is not mandatory, but the reality is that not adhering to these standards will have implications should a significant event occur and staffing levels be called into question. Many fire departments in the United States recognize the NFPA standards as being the "consensus standard," as they are developed through the experiences of other fire departments, and industry experts, who have gone through various response, safety, and staffing challenges.

As part of the process for determining which standard to apply the issue surrounds the term "substantial." If a department is substantially volunteer (combination) then the organization could be recognized as falling under NFPA 1720, and if the department is substantially career then NFPA 1710 is the standard. There is no clear-cut line in determining an exact number of what "substantial" means. The reality is that this is a policy decision on the part of the Township leadership.

At the time of this study STFD does not report response times in a manner consistent with either NFPA standard. This is not a difficult issue for STFD to correct with the usage of a quality records management system capable of producing these results. ESCI recommends that STFD establish response performance objectives in compliance with NFPA 1720.

Whether the department utilizes NFPA 1710 or NFPA 1720, the reality is that time is the driving consideration in determining the success in mitigating an emergency incident. The longer a fire is allowed to grow before some form of suppression efforts is introduced into the equation the more difficult it becomes to suppress the fire. The same is true of patients in cardiac arrest or victims of traumatic injury.

Critical Tasks, Risk, and Staffing Performance

The ultimate goal of any emergency service delivery system is to provide sufficient resources (personnel, apparatus, and equipment) to the scene of an emergency in time to take effective action to minimize the impacts of the emergency. This need applies to fires, medical emergencies, and any other emergency situation to which the fire department responds.

As the actual, or potential, risk increases for any particular emergency, the need for additional numbers of personnel and apparatus also increases. With each type of incident and corresponding risk, specific critical tasks need to be accomplished.

The fire service assesses the relative risk of properties and occurrences based on a number of factors. Properties with high fire risk often require greater numbers of personnel and apparatus to effectively mitigate the fire emergency. Staffing and deployment decisions should be made with consideration of the level of risk involved. The level of risk categories used by Commission for Public Safety Excellence (CPSE) relate as follows:

- Low risk—Areas and properties used for agricultural purposes, open space, low-density residential, and other low intensity uses.
- Moderate risk—Areas and properties used for medium density single family residences, small commercial and offices uses, low intensity retail sales, and equivalently sized business activities.
- High risk—Higher density business and structures, mixed use areas, high density residential, industrial, warehousing, and large mercantile structures.

The Center for Public Safety Excellence (CPSE) has a sample critical tasking analysis for the number of personnel required on scene for various levels of risk. This information is shown in the following figure, illustrating an example of critical tasking only and is not intended to conclusively define the actual personnel necessary based on risk.

Figure 36: Sample of Critical Task Staffing by Risk[2]

Firefighter Personnel Needed Based On Level of Risk				
	Structural Maximum Risk	**Structure Significant Risk**	**Structure Moderate Risk**	**Non-Structure Low Risk**
Attack line	4	4	2	2
Back-up line	4	2	2	(2)
Support for hose lines	4	3	2	
Search and rescue	4	4	2	
Ventilation	4	2	2	
Rapid intervention team	4	4	2	
Pump Operator	2	1	1	1
2nd apparatus/ladder operator	1	1	(1)	
Command	2	1	1	1#
Safety	2	1	1#	
Salvage	4			
Rehabilitation	2			
Division/group supervisors	(2)			
Total	37–39	23	14–16	3–6

() indicates tasks may not be required at all such incidents

# indicates task may, at times, be completed concurrently with other position

The first 15 minutes is the most crucial period in the suppression of a fire. How effectively and efficiently firefighters perform during this period has a significant impact on the overall outcome of the event. This general concept is applicable to all emergencies.

Critical tasks must be conducted in a timely manner to control a fire or to treat a patient. Three scenarios of commonly encountered emergencies are routinely utilized by fire departments when conducting field validation and critical tasking: a moderate risk structure fire, a traffic collision with a trapped victim, and a cardiac arrest. Each scenario is conducted using standard operating procedures and realistic response times based on actual system performance. Each scenario is normally run multiple times with a variety of fire companies to validate and verify observations and times.

To further validate the analysis process, results are compared with records from actual working fires and similar incidents from previous years. Overall results are reviewed to determine if the actions taken within the early minutes of an incident resulted in a stop loss or not and if additional resources were required. The critical task analysis process demonstrates the rate in which the current deployment plan results in stopping loss, a high percentage of time within initial critical time goals.

[2] Based on examples provided in the publication "Creating and Evaluating Standards of Response Coverage for Fire Departments," 4th edition; Commission on Fire Accreditation International, Inc. (now Center for Public Safety Excellence).

Again, critical tasks are those activities that must be conducted in a timely manner by firefighters at emergency incidents in order to control the situation, stop loss, and to perform necessary tasks required for a medical emergency. The leadership of STFD is responsible for assuring that responding companies are capable of performing all of the described tasks in a prompt, efficient, and safe manner.

All Risk Critical Resource Tasking

Fire departments respond to many incidents other than structure fires, including hazardous materials (dangerous goods) releases, motor vehicle collisions, basic and advanced life support medical emergencies, and non-structural fires. Personnel responding to these types of incidents should be assigned tasks similar to structure fires.

The following figures are provided as an example for these types of incidents, although ESCI recommends STFD conduct its own field validation exercises with its crews, including automatic aid resources, to verify the critical tasking analysis provided. After field validation is complete, department leadership may find that the critical tasking can be adjusted appropriately upward or downward for each incident type.

Figure 37: Sample Non-Structure Fire Critical Tasking

Task	Personnel
Command	1
Pump Operator	1
Primary Attack Line	2
Total	**4**

Figure 38: Sample Hazardous Materials Incident Critical Tasking

Task	Personnel
Command	1
Pump Operator	1
Primary Attack Line	2
Back-Up Line	2
Support Personnel	7
Total	**13**

Figure 39: Sample Motor Vehicle Collision with Entrapment Critical Tasking

Task	Personnel
Command	1
Pump Operator	1
Primary Attack Line	2
Extrication	3
Patient Care	2
Total	**9**

Figure 40: Sample Emergency Medical Incident Critical Tasking

Task	Personnel
Command	1
Patient Care	2
Total	**3**

The previously mentioned minimum staffing criteria can be used as a planning tool in setting specific service level objectives for each of the incident types.

Response Time Performance Objectives

The process of setting response time performance objectives will include two primary questions:

1. What are the expectations of the community and elected officials regarding initial response times of the fire department to an emergency incident? What is the public's perception of quality emergency services where response time is concerned?
2. What response time performance would be reasonable and effective in containing fire, stopping the loss, and saving lives when considering the common types of incidents and fire risks faced by Scio Township Fire Department?

To initiate the process of considering the expectations of the customer, the historical travel time and loss history needs to be examined from the data that was submitted by STFD. Then, historical service levels are compared to known and anticipated service demand and community growth projections. Considering these projections, suggested response time standards are created to ensure the department is meeting local service demand expectations in accordance with relevant industry standards and best practices.

The first example is the "first due" response of a single unit utilizing standard reflex time from dispatch to arrival 80 to 90 percent of the time based upon the demand zone type:

Figure 41: First Due Response Standard Example

First Due, Single Unit Response	
Urban (>1,000 per square mile)	9 minutes to 90 percent of incidents
Suburban (500–1,000 per square mile)	10 minutes to 80 percent of incidents
Rural (<500 per square mile)	14 minutes to 80 percent of incidents

The next example represents a first alarm response to a moderate risk structure fire, utilizing standard reflex time from dispatch to arrival 90 percent of the time:

Figure 42: First Alarm Response Standard Example

First Alarm, Response of 3 Engines, 1 Truck, and 1 Battalion Chief	
Urban (>1,000 per square mile)	11 minutes to 90 percent of incidents
Suburban (500–1,000 per square mile)	19 minutes to 90 percent of incidents
Rural (<500 per square mile)	23 minutes to 90 percent of incidents

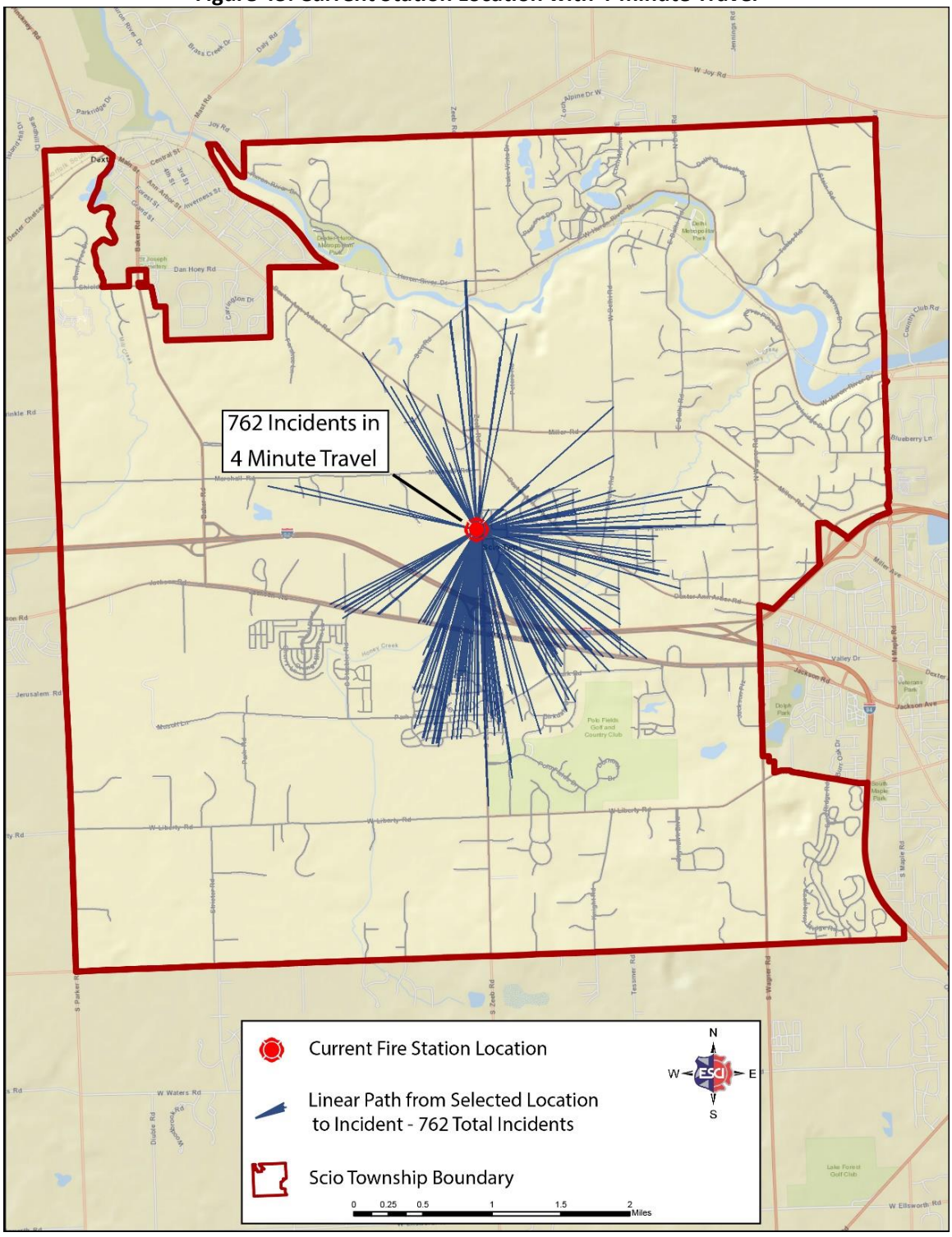
This discussion provides the department and Township with the information necessary to begin the process of establishing response standards and targets. Currently STFD does not evaluate response performance based upon a demand zone type. It is recommended that STFD begin the process of establishing demand zones as soon as possible in order to assist with future planning needs.

Analysis of Recommended Future Deployment Coverage

Consideration has been given to the location of the existing STFD fire station and potential need for future fire stations. ESCI analyzed the response coverage for a four-minute response from the existing station, and an analysis of where the best location might be for future stations. The completed analysis is discussed in this section. The following figures show the four-minute coverage of the Township. This is a computer predictive analysis based on achieving roadway speeds. Further, using the location data of incidents from the previous three years, ESCI calculated what percentage of the incidents could have been reached with a four-minute travel time.

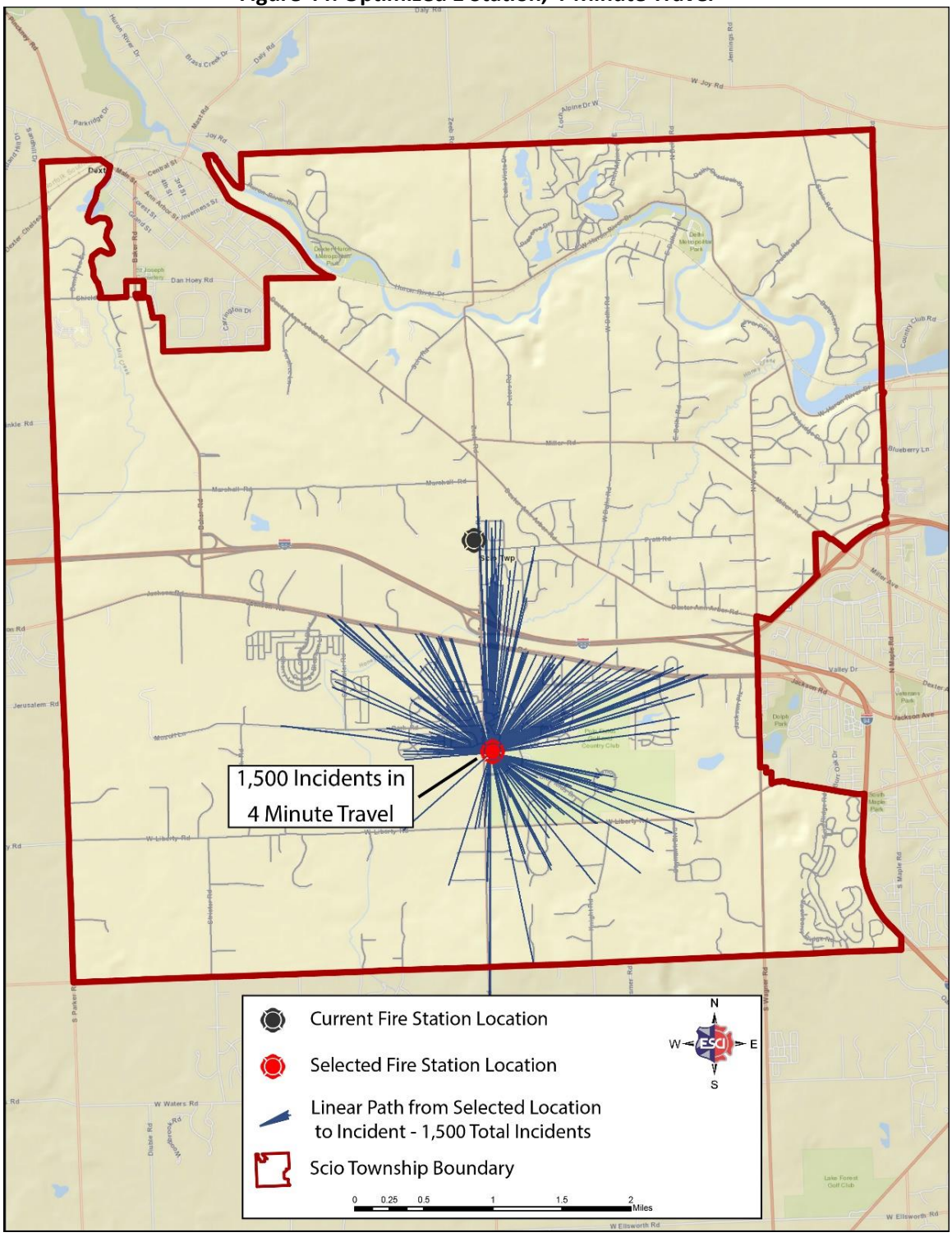
These maps are produced at posted roadway speeds. Slowing for a number of turns can cause the computer prediction to be more optimistic than actual performance. If the department's safety policies require slowing at all intersections or stopping for red lights, this will cause the actual results to be slower. Also, the use of traffic control systems for emergency response will cause the predicted to be closer to the actual performance. Therefore, ESCI recommends that STFD conduct its own analysis to verify how travel times differ for actual driving while complying with all safety policies. Additionally, there are other situations that may affect the accuracy of the predictions that do not occur on a regular frequency such as auto accidents, weather caused issues, or construction zones.

Figure 43: Current Station Location with 4-minute Travel



Based on the locations of incidents occurring from 2015–2017, Figure 43 demonstrates Scio's predicted ability to respond within a four-minute drive time. Using the current fire station location as the starting point, Scio could have traveled to 762 calls in four-minutes or less.

Figure 44: Optimized 1 Station, 4-Minute Travel



This figure provides an understanding of the potential impact should the Township decide to relocate the existing fire station to the location identified. This move would increase the ability of STFD to respond to 1,500 incidents, an increase of 738 calls, within a four-minute drive time.

Figure 45: Current Station with New Station Added

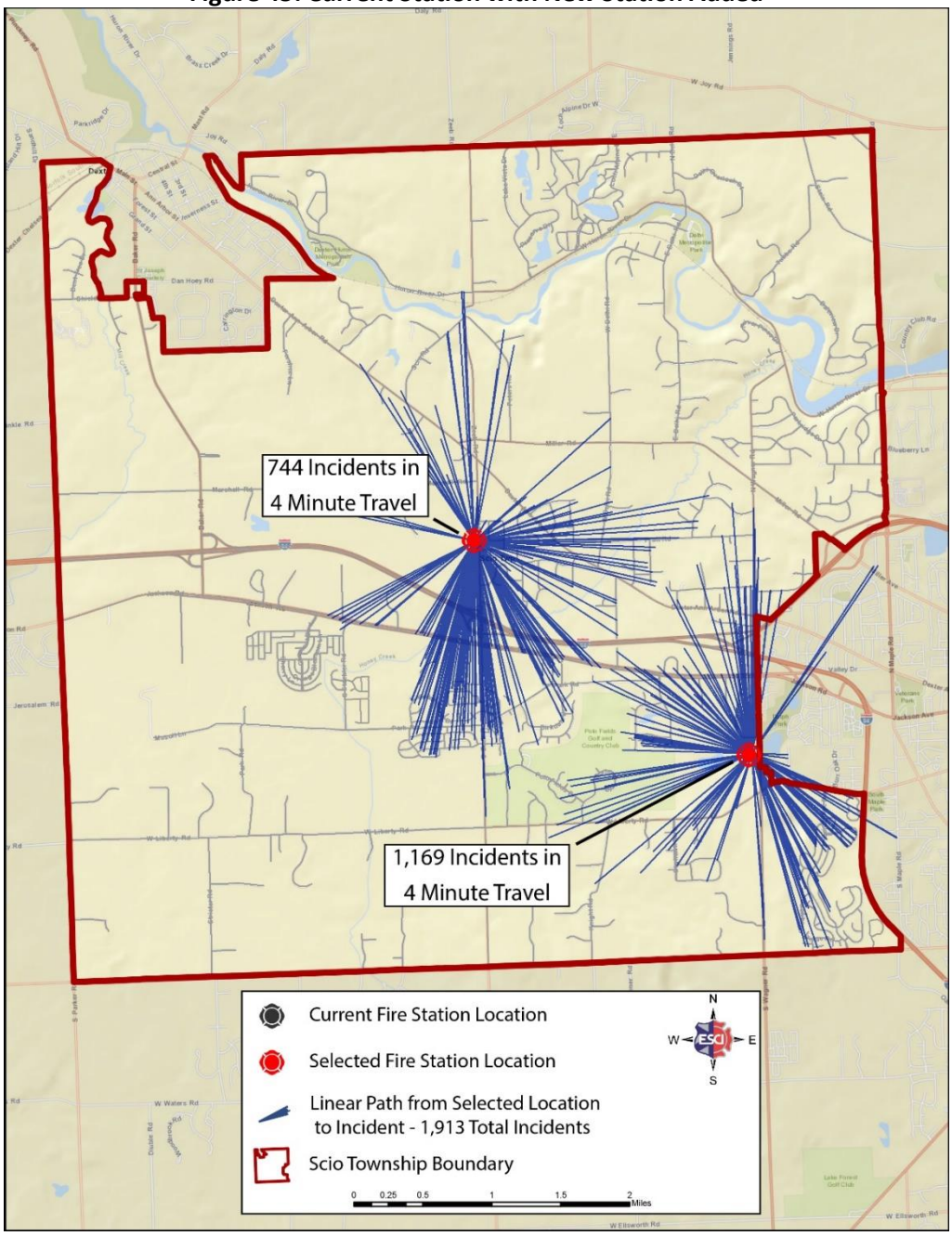


Figure 45 demonstrates the ability of STFD to reach a total of 1,913 incidents with a four-minute drive time with the addition of a fire station in the southeast portion of the Township. This location was selected solely with the usage of GIS software. In this scenario, the software selected this location when given the parameters of using a four-minute drive and reaching a maximum number of incidents with the largest service area. It is not common to recommend that a community construct a fire station so close to a municipal boundary. Should Scio Township determine this scenario to be a prime opportunity to increase the level of service to Township residents, a unique opportunity exists to construct and share the facility with Ann Arbor Fire Department. Other agencies have used similar deployment models with high degrees of success.

Figure 46: Two Stations Optimized

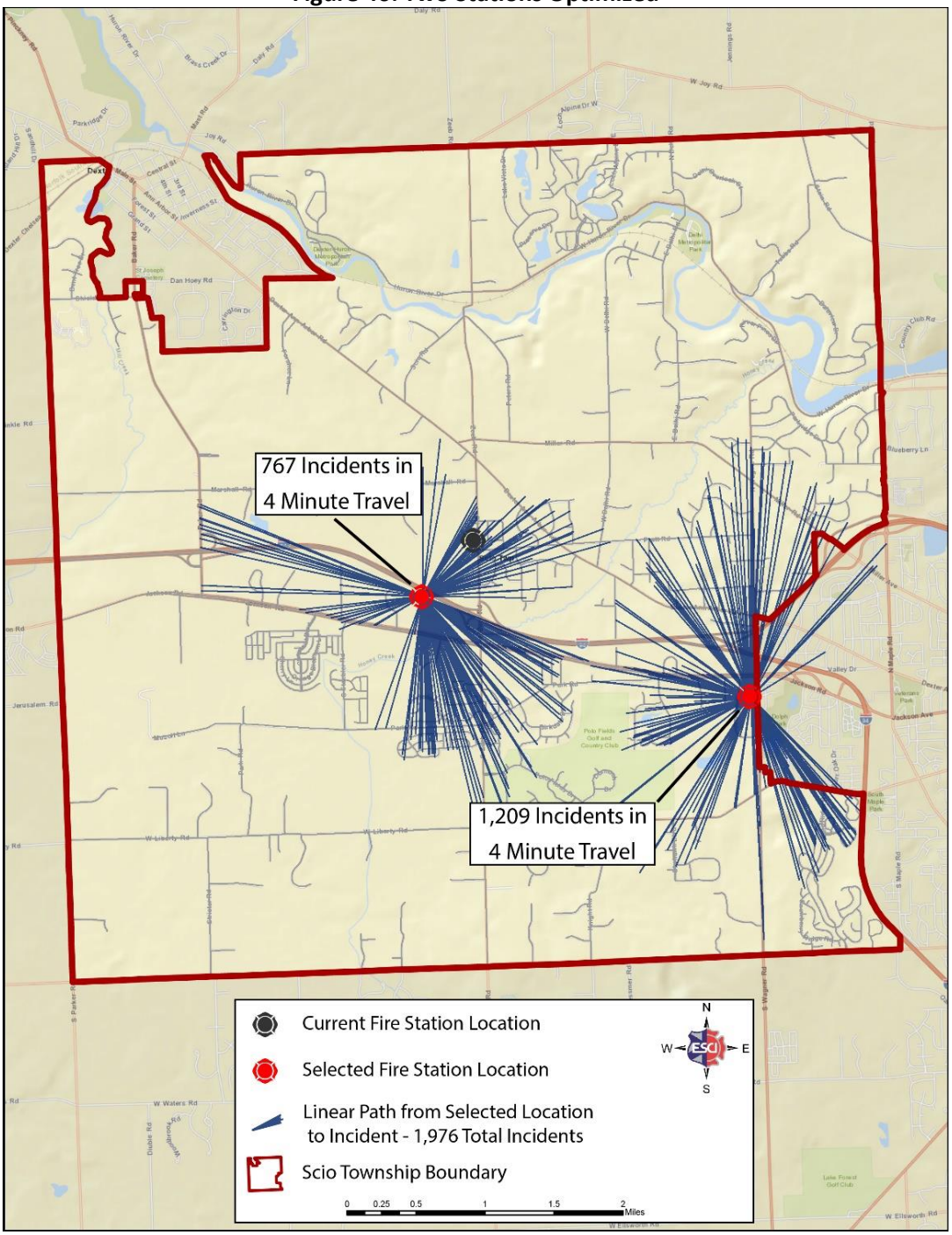
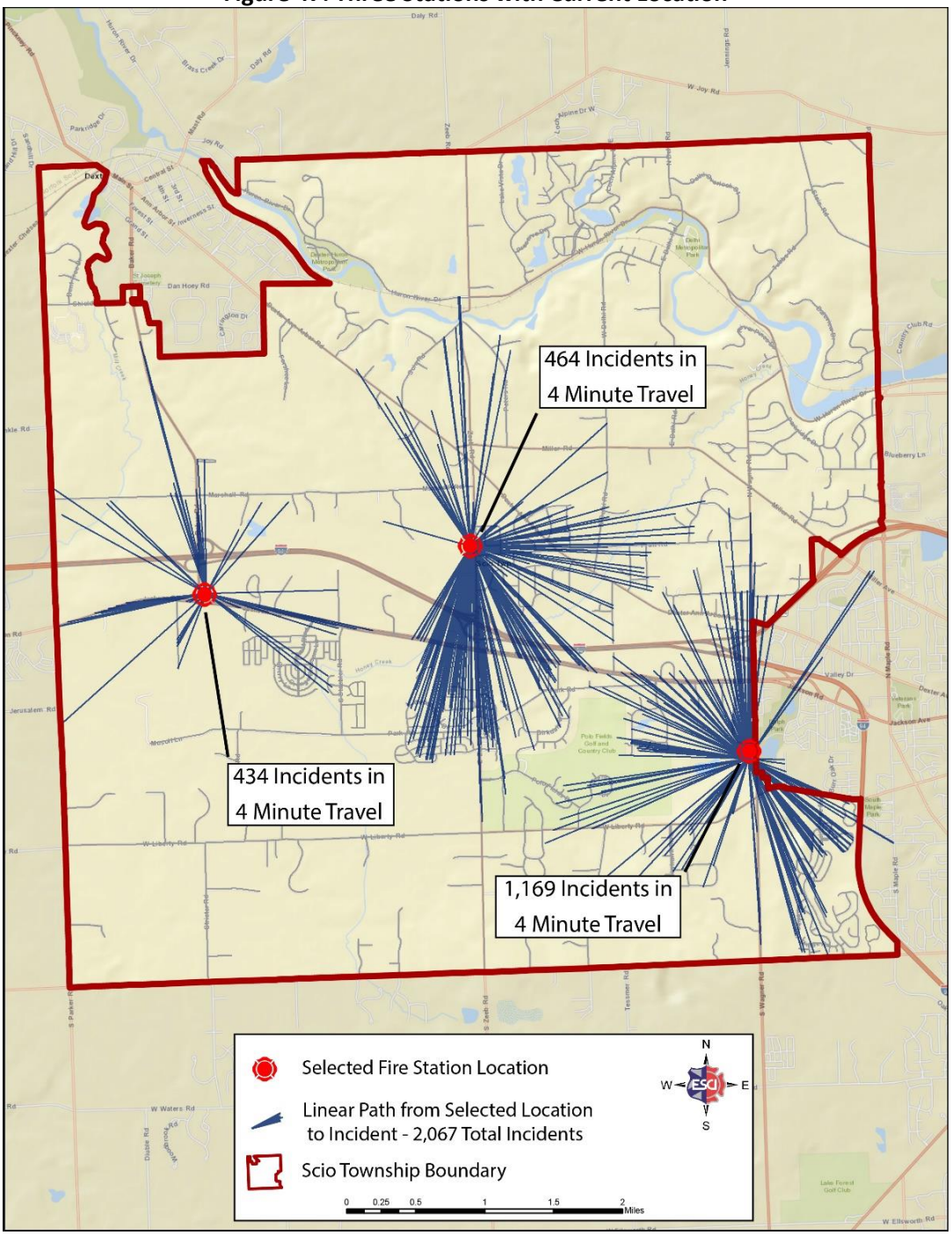


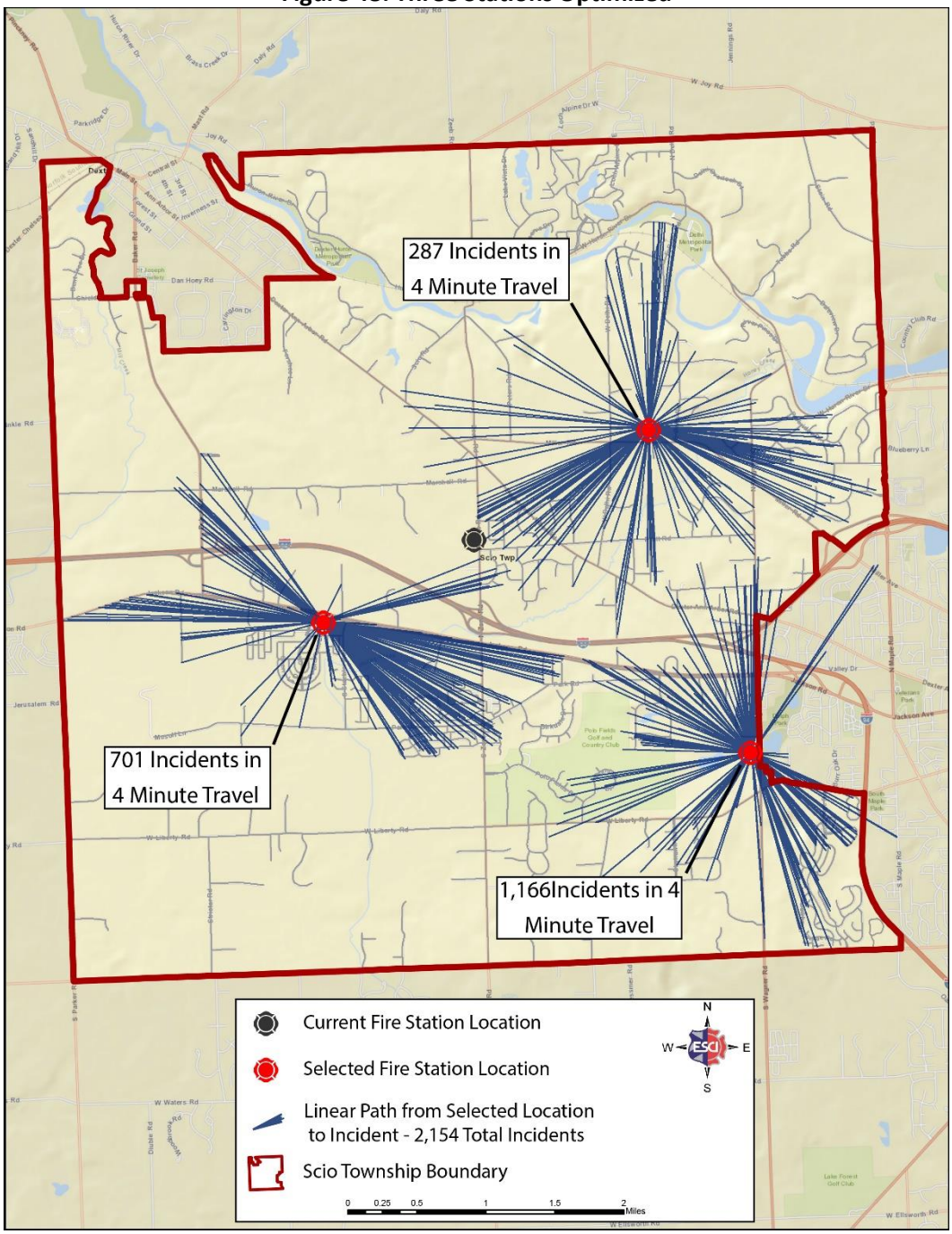
Figure 46 provides an understanding of the best locations for a two-station deployment model when the GIS software was tasked with reaching a maximum amount of calls with a four-minute drive time. In this scenario, the department was only able to reach an additional 64 calls compared to the deployment model in Figure 45. It is also noteworthy that the station previously located on the municipal boundary with Ann Arbor shifts slightly north, but remains on the municipal boundary. As a result, ESCI would not recommend this deployment model.

Figure 47: Three Stations with Current Location



When given the parameters of reaching a maximum number of calls with a four-minute drive from three fire stations, with one the existing station, the GIS software identified the locations in Figure 47. Using this three-station model, the department would be able to reach 2,067 incidents within four minutes. What is important to note is that this deployment model only results in the department reaching an additional 154 incidents in the desired drive time when compared to the deployment model in Figure 45.

Figure 48: Three Stations Optimized



When given the parameter of selecting the best locations using a three-station deployment model, the GIS software selected the locations in Figure 48. In this scenario, STFD would be able to reach 2,154 calls within the desired four-minute drive time. This would result in STFD only being able to reach an additional 241 incidents in the desired drive time. As a result, this deployment model is not considered to be in the best interest of the Township and its residents.

Conclusion

The results of the station analysis provide Scio Township with several models of station deployment configurations based upon historical incident data from 2015 through 2017. These models are intended to assist Township leadership in the decision-making process and provide projections to service demand impact based upon the model selected. Several factors must be considered when deciding the appropriate course of action, such as community expectations, timeliness of information, and limitations inherent to the development of these models. Should the Township decide to proceed with changes to the fire station deployment model at some point in the future, ESCI recommends that all factors relevant to the discussion be considered prior to making a final decision. Additional considerations may include automatic aid agreements, co-located facilities, changes to staffing, and future development in the Township.

Analysis of Recommended Future Staffing Level

The evaluation of staffing needs presented in this report reveal several personnel deficiencies within the Scio Township Fire Department. While many of these staffing needs cannot be corrected overnight, a plan should be developed to address current staffing needs and progress made toward the goal of hiring sufficient staff at defined points in the future. This may include intermediate steps such as part-time or paid-on-call employees, interlocal agreements with neighboring agencies, or other options as deemed appropriate.

The following contains ESCI's staffing recommendations for Scio Township Fire Department.

Recommendations

1. Establish a baseline daily staffing level of four persons per shift or three persons per apparatus should additional fire stations become a future consideration. This can be accomplished utilizing paid-on-call staff or the addition of career staff. A primary concern for STFD is the inability to rapidly assemble firefighters in adequate numbers to meet MIOSHA "2 in/2 out," as well as an effective response force. Additionally, a three-person engine company would provide staffing consistency when requesting or responding to mutual aid requests.

2. Replace the current organizational structure of two "shift commanders" per shift with an organizational structure that provides clear lines of authority and responsibility. While several rank and title options are available, ESCI recommends that the structure imposed complies with industry best practices, such as those provided by NFPA 1720.

3. Consider hiring a full-time Fire Chief to manage and lead the organization. ESCI recommends that the Township develop a process to establish minimum qualifications for this position and select the candidate that best meets all aspects of the position.

4. Evaluate the feasibility of establishing a full-time position to manage the department's fire prevention and inspection program.

5. Consider establishing a part-time Fire Safety Inspector position and develop a formal fire prevention and inspection program.

6. Create a full-time Administrative Assistant position for the fire department to provide support and consistency to administrative and operational activities.

In order for Scio Township to address the recommendations presented, several years are likely required to create and fund these positions. To assist Scio Township in the completion of a future Staffing for Adequate Fire and Emergency Response (SAFER) application for hiring operational firefighters, findings from this report are presented in the SAFER grant format from the most recent application cycle.

Project Description

Scio Township Fire Department is requesting federal assistance in hiring six (6) full-time firefighter positions to provide additional engine company staffing on a 24-hour basis. These positions are required so that the fire department can meet OSHA 29 CFR 1910.134(g)(4) "2 in/2 out" as adopted and required by the State of Michigan R 408.17451, Rule 7451(1)(e). With only two firefighters per day currently staffing a single engine company, marginal success in paid-on-call staff response, particularly during the work day, and reluctance by neighboring agencies to establish a formal automatic aid agreement, these positions are required to ensure firefighter safety of the first arriving unit in Scio Township, compliance with the "2 in/2 out" rule and increase the likelihood of positive mitigative outcomes and the community's quality of life.

The economic feasibility of sustaining these positions will be possible in the future; however, current revenue is insufficient to fund these positions without federal assistance. The need for these firefighter positions, as well as the economic feasibility of the Township maintaining these firefighter positions was also verified herein by ESCI.

Benefits achieved through the successful award of this grant include: meeting regulatory requirements ("2 in/2 out"), enhanced firefighter safety and efficiency, the ability to assist medical transport units without taking the engine company out of service, parity with neighboring mutual aid partners which could lead to the establishment of an automatic aid agreement with the City of Ann Arbor, enabling the department to increase its public safety education outreach and inspection programs using on duty firefighters without the need to potentially take the only unit out of service and increase the community's quality of life through additional education and inspections while enhancing responders' ability to accomplish critical tasks on emergency scenes, resulting in more effective and efficient operations. Finally, if awarded this grant the Township will have an enhanced ability to protect its critical infrastructure within Scio Township's primary response area as critical tasking will be accomplished more effectively with the addition of on scene personnel, additional apparatus may also respond as more firefighters are available, and with the assistance of mutual aid partners, the Township's ability to establish an effective response force for the most common types of emergency incidents will be achievable.

IMPACT TO DAILY OPERATIONS

Currently, the department employs six firefighters who are divided in to three crews, two persons each, on a 24 hours on/48 hours off schedule. Due to the current staffing model, Scio is unable to initiate any type of response efforts which require a "2 in/2 out" operation, such as structure fires, confined space, or hazardous materials technical operations. Additionally, should something happen to one of the firefighters on shift, the other will be alone until either another firefighter is called in or the end of their shift. This presents a dangerous situation for the department and the community as the lone firefighter would have to either respond to an emergency call alone or take the Township's only engine company out of service. The addition of two more firefighters per shift would eliminate this issue and the department would have the ability to adequately staff emergency apparatus with at least three firefighters and respond to calls even if an on-duty firefighter was forced to miss work due to an injury or illness.

COST BENEFIT ANALYSIS

The addition of six positions to the Scio Township Fire Department will benefit the department by establishing a staffing level that allows for the department to be in compliance with Michigan's "2-in/2-out" law for interior firefighter operations during an initial fire attack prior to the arrival of mutual/automatic aid partners. With the current staffing level Scio Township Fire Department must delay initial interior operations and property owners may lose additional property while the department waits to assemble the requisite "2-in/2-out." The department also benefits in creating a safer work environment in which firefighters can operate within the "immediately dangerous to life and health environment."

Under current staffing arrangements firefighters operate in an environment in which many different emergency activities must be accomplished with a limited number of resources. This reality means that a limited number of firefighters can be placed in a position of having to "multi-task" until additional help can arrive. Firefighters attempting to accomplish too many tasks in a short period of time can create a scenario where when one-thing goes wrong it begins a cascading series of events in which someone gets hurt or killed ("if its predictable its preventable").

These added positions reduce the potential for initial attack firefighters attempting to accomplish too many tasks with a limited amount of resources. This fact benefits the community in that reduced potential for firefighter injuries or death also reduce the potential fiscal impact of increased workers compensation claims. Any increase in workers compensation claims or death benefits payouts will have a negative fiscal impact on the citizens of the community served.

Surrounding communities and mutual aid partners benefit from this request by ensuring an effective number of firefighters are responding to requests for service with a staffing level similar to the requesting agency's staffing levels. This allows incident commanders to make decisions consistent with their own agency's strategic concepts without having to account for a unit that is "one-off" from their own capabilities.

If awarded this grant, Scio Township will have the ability to hire the additional six firefighters and provide for a budgeted daily staffing of four firefighters on the engine company with a minimum staffing of three. Should funding be approved and firefighters hired in the 2019 fiscal year, the estimated cost savings the Township would experience are: $331,090 in 2019; $343,561 in 2020; and $166,582 in 2021 for a total of $841,233 in grant funding.

Following the conclusion of the grant period, employee costs for the six requested positions will be $495,100 in 2022, with an estimated annual increase of 4% for salary and fringe benefits. The immediate benefits to the department and the community will be the ability to provide a safe and effective crew size to initiate interior firefighting operations and rescues and meet NFPA 1720 staffing standards. Additionally, the three-year period will allow the Township the time needed to establish the modifications to revenue sources to ensure that adequate funding is available to meet operational needs. Finally, the Township's engine company staffing will provide parity with the City of Ann Arbor, which will likely result in the establishment on an automatic aid agreement and future collaborative opportunities.

Financial Impact

For the Township to determine the financial impact, both short- and long-term, of hiring additional firefighters and making use of SAFER Act grant funding, the following analysis was performed. Several assumptions were used to develop the financial projections and are outlined below.

- Firefighters will be hired at the starting rate and will work a schedule of 24 hours on duty followed by 48 hours off duty.
- Under this schedule, firefighters are scheduled to work a total of 2,928 hours per year of which 2,763 are paid at a straight-time rate and 165 hours (which is considered scheduled or built-in overtime versus sick/vacation coverage, etc.) which are paid at an overtime (OT) rate of 1.5 times the regular rate.
- Firefighters must be paid at an overtime rate after 53 hours in any 7-day work cycle (106 hours worked in any 14-day work cycle and so on) pursuant to FLSA law.
- Additional overtime worked due to sick/vacation coverage, late calls, etc., is not included in the following analysis.
- To fill a single 24-hour firefighter position on an engine it takes a minimum of three people on a straight 24/48 schedule who will earn no less than 165 hours of "built-in" overtime to maintain that one staffed position.
- This schedule is the most cost-effective schedule used to fill any given "seat" on an apparatus, but staffing level can be reduced at the cost of service level; this is a policy decision that must be made by the Township.
- Article 14—Wages of the Township Collective Bargaining Agreement (CBA) with the firefighters (IAFF Local 4891), states that the current hourly wage for a starting firefighter is $16.13 (overtime rate is $24.20).
- The new firefighter will also earn an average of $1,800 annually pursuant to the CBA in additional holiday pay and $100 per year for each year of service in longevity pay.
- Total annual pay for a new firefighter will be $50,359 and is estimated to increase at 3% annually plus the addition of longevity pay.
- The average benefit rate for the five current firefighters who have not opted out of the medical insurance program is 46.1% which is the assumed rate for new firefighters and is forecast to increase at 5% annually.
- On-boarding costs are estimated at $5,000 per firefighter (bunker gear, uniforms, etc.)
- SAFER Act Grant covers 75% of customary salary and benefit costs of starting firefighter for first year of employment, 75% the second year, and 35% the third year after which the Township assumes full cost.
- SAFER Act Grant does not cover on-boarding costs.

Based upon the assumptions above, the following figure identifies first year and subsequent year projected costs for one full-time firefighter. The on-boarding cost of approximately $5,000 per firefighter will only be experienced during the initial year. Only salary and benefits costs will be experienced in the remaining years of the forecast period. Although, in actuality, there may be ongoing costs for uniform and equipment replacement, training and other associated employee costs, these are incremental and relatively minor compared with salary and benefits and are not included in the forecast estimates.

Figure 49: Projected Annual Cost for One Full-Time Firefighter

Single Firefighter Annual Cost					
Cost Item	**2019**	**2020**	**2021**	**2022**	**2023**
Salary	$50,359	$51,970	$53,729	$55,641	$57,710
Benefits	$23,216	$24,377	$25,596	$26,876	$28,219
Total Comp	$73,575	$76,347	$79,325	$82,517	$85,930
On-Boarding	$5,000	0	0	0	0
Total Cost	**$78,575**	**$76,347**	**$79,325**	**$82,517**	**$85,930**

Using the single firefighter costs by forecast year shown in Figure 49, the following figure illustrates estimated costs to the Township of hiring three (one 24-hour position) and six (two 24-hour positions) full-time firefighters, both without and with SAFER Act Grant funding. In 2019, the total costs including on-boarding, of hiring three firefighters is $235,726 versus $471,453 for six firefighters. If the T0wnship is successful in receiving grant funding, its share of the three- and six-firefighter scenarios would drop to $70,182 and $140,363; respectively. In each case, with grant funding, the total cost to the township is 25% of the total cost in 2019 and 2020, and 65% in 2021, after which it increases to 100% of the employee costs by 2022.

Figure 50: Projected Annual Cost for 3- and 6-Full-Time Firefighters with and without SAFER Act Funding

	2019	2020	2021	2022	2023
Three Firefighters					
Total Cost	$235,726	$229,041	$237,975	$247,550	$257,789
Cost w/ SAFER	$70,182	$57,260	$154,684	$247,550	$257,789
Six Firefighters					
Total Cost	$471,453	$458,082	$475,950	$495,100	$515,578
Cost w/ SAFER	$140,363	$114,521	$309,368	$495,100	$515,578

By obtaining grant funding, the Township would save either $420,617 or $841,234 in employee costs over the period FY 2019–2021 in the three- or six-firefighter scenarios; respectively. Obtaining the SAFER Act grant funding would enable the Township to hire the necessary firefighters and prepare to fully fund these added positions over the three-year period with additional Township revenue.

As in the forecast presented earlier using the proposed FY 18–19 budget as a basis for future projections, each of the cases discussed here with the addition of either three or six additional firefighters results in a situation where the Township will have depleted its fund balance below 25% of its annual operating budget by FY 19–20 with one exception. Adding three firefighters with a SAFER Grant still provides the Township with a beginning fund balance slightly more than 25% of its operating budget in FY 19–20. In all cases, the fund is forecast to have a negative fund balance in FY 20–21, even with SAFER grant funding.

CONCLUSION

The ESCI project team began collecting information for Scio Township, Michigan in the Spring of 2018. The team members recognize this report contains a large amount of information and ESCI would like to thank the department leadership, City staff members and employees for their efforts in bringing this project to fruition. ESCI would also like to thank the various individuals and external organizations for input, opinions, and candid conversations throughout this process. It is ESCI's sincere hope the information contained in this report is used to its fullest extent and that the emergency services provided to the citizens of Scio Township and the surrounding area will be improved by its implementation.

TABLE OF FIGURES