


FIRE STATION LOCATION STUDY

*Prepared for
WAREHAM FIRE DISTRICT*

*by
PYROTECH Consultants, Inc.*

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WAREHAM FIRE DISTRICT
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EXECUTIVE SUMMARY

Introduction

The Wareham Fire District, is a public, tax supported entity that provides fire protection and water for a major portion of the Town of Wareham. The Town is a coastal community located in the Southeastern corner of Massachusetts on Buzzards Bay. The District's population is approximately 18,000 year-round residents and a summertime population estimated to be 30-40,000 people. The District encompasses approximately 35 square miles. Significant portions of the area are used for agricultural purposes, and some of the area is forested. The community includes a 90 bed hospital, nursing homes, an industrial park, schools, mobile homes, single and multi-family dwellings. There is also a commercial center and two large shopping areas. The community includes some light manufacturing, trucking terminals, and a research firm. Two interstate highways join in the community. The Town is bisected by a low-use rail line.

There are significant amounts of moving and open water, both fresh and salt located throughout the area. During storm surges and high tides, the department relocates apparatus to serve neighborhoods that may be cut off by high water.

The Wareham Fire District delivers emergency services consisting of fire suppression, first responder emergency medical and hazardous materials from five fire stations. The locations of the stations are shown on a series of maps which are included in the following report. Apparatus consists of five engines, five brush breakers, one aerial ladder, one rescue squad and one tanker. The tanker is required because some of the areas do not have fire hydrants. The Department also has two boats and specialized ice rescue equipment.

Fire Department staffing consists of one dispatcher and two fire fighters on duty at all times at Headquarters (Station 5). Additional staffing is provided by calling back off-duty career fire fighters and alerting call fire fighters. Currently there are 12 career and 74 call personnel.

The District is experiencing some growth, however it is not significant at this time.

Purpose and Method of Study

The purpose of this study is to evaluate existing station locations and apparatus, and to make recommendation to the Wareham Fire District on future fire station locations and apparatus needs.

Specific items to be addressed by the study are:

1. Assist the District in establishing response/travel time goals.
2. Analyze the coverage of the existing fire stations.
3. Pinpoint Existing deficiencies for fire station coverage within the District.
4. Evaluate alternative fire station locations within the District.
5. Conduct a "Clean Sheet" study approach to the District as if no stations or apparatus existed. This will take into account the housing density of the District.
6. Develop optimum and minimally acceptable numbers and locations of fire stations using a "Clean Sheet" approach.
7. Develop optimum an minimally acceptable recommendation including existing and/or proposed new stations. Include station closings, if warranted.
8. Evaluate the response capabilities of all surrounding fire stations located in the other seven contiguous communities and districts that provide Mutual Aid to the District.
9. Describe the wild fire interface potential and identify coverage requirements for local brush breaker/forestry equipment.
10. The study will consider the increase in summertime population.
11. Develop apparatus needs using a "Clean Sheet" approach.
12. Evaluate engine company and ladder coverage requirements.
13. Make recommendations on the number and types of fie apparatus required.
14. Recommend locations on where to located fire apparatus both within existing and proposed fire station locations.
15. Comment on the implications of recommendation on Insurance Services Office requirements.
16. Provide fire station location software and files to the Wareham Fire District and train at least two department employees in its use.
17. Prepare and present a final written report with recommendations and alternatives.

The consultants used a state of the art computerized geo-based information system to accurately model the existing street and roadway system to determine the best location for fire stations and fire department resources. All existing fire stations were placed in the model and several scenarios were run using a 5 minute travel time.

Simulated responses were run to locations selected by the Wareham Fire Department to show the travel time and distance from the closest fire stations, and the time required for minimum complement of apparatus and personnel.

Key Observations

1. During the "clean sheet" analysis it became clear that Headquarters Station is located optimally to serve the key populated areas. Moving the station in any direction decreased the coverage to the populated areas.
2. Staffing of Stations 1,2,3,4 and Headquarters (5) with career personnel could provide 95% coverage of the District and contract areas in less than 5 minutes. Closing Station 3 has no negative impact since adequate coverage is provided by Stations 2 and 5.
3. Staffing of Stations 4,5,7,9 with career personnel could provide 82% coverage of the District and contract areas in less than 5 minutes. This configuration will provide better coverage to the occupied areas.
4. Scenario 7 which uses Stations 2,4,7, and 8 as call stations with a 3.5 minute delay and Station 5 (career) with no delay will provide 49.3% coverage in less than 5 minutes.
5. Scenario 8 which uses Stations 2,4,7 and 10 as call stations with a 3.5 minute delay and Station 5 (career) with no delay will provide 50.4 coverage in less than 5 minutes.
6. With the current configuration of stations, personnel, and run assignments the "on scene" staffing for 5 and 10 minute travel times are shown below:

5 minutes or less	4 personnel on the scene for 4% of the area
10 minutes or less	10 personnel on the scene for 28% of the area
7. Scenario 10 is one of the best options with little or not cost. This uses Stations 1,2, and 4 (call) with a 3.5 minute delay, Station 20 (Onset) with a 2.5 minute delay and Station 5 (career) with no delay. Coverage is 51.8 percent in less than 5 minutes.
8. Scenario 10 using Stations 1,2 and 4 (call) with a 3.5 minute delay, Station 20 (Onset) with a 2.5 minute delay and Station 5 with no delay and staffed with two fire fighters results in 10 fire fighters on scene in less than 10 minutes for 28 percent of the District and contract area.
9. Changing Scenario 10 by adding two additional fire fighters at Station 5 (4 career per shift) will result in 10 fire fighters on scene in less than 10 minutes for 46 percent of the District and contract area.
10. The study revealed that the adjacent mutual aid stations could not provide timely first due assistance with the exception of Onset.

Recommendations

1. Close Fire Station 3 and relocate Tanker 1 to Headquarters, and Forestry 3 to Station Number 2.
2. Expand the cooperation with Onset so that they assist with first response to Station 1, Station 4, Cranberry Highway area. Specify engine or ladder or both for each response area.
3. **Brush Breakers**
Present: Maintain Breakers at Stations 1,2,4, and Headquarters
Future: Maintain minimum of three Breakers located at Stations 2,4 and Headquarters.
4. **Apparatus**
Maintain single engines at Stations 1, 2 and 4, and two engines at Headquarters (Station 5).
First engine at Headquarters will be staffed by career personnel. The second engine will be staffed by call personnel and will serve as a reserve engine.
5. When Tanker 1 is due for replacement consideration should be given to a new combination Engine/Tanker that will be stationed at Headquarters.

The recommendations contained in this report are made for the purpose of improving the delivery of fire and rescue services to the citizens of the Wareham Fire District. The study and recommendations are not based on the past or present performance of the Wareham Fire Department. The recommendations should have no negative impact on Insurance Services Office travel distance and equipment requirements.

The consultants are grateful for the assistance provided by the members of the Wareham Fire Department, and the special efforts of Fire Chief John Bergeron, Assistance Chief Robert McDuffy Captains Edwin Brundage, Jr. and Barry Cattabriga, Fire Fighter Robert Bourne, and Administrative Assistant Skippy Terteria.

REPORT

The following is the detailed report of the study that was conducted for the Wareham Fire District Fire Department. The report contains a description of how the study was conducted, the methodology, the results and the recommendations. Color maps which visually depict the results are included in Attachment A Graphic Results.

INTRODUCTION

There are several items to be considered in determining the location of fire stations. The first is to specify the acceptable amount of time that it should take for fire apparatus to reach each area of the District after being alerted to an emergency. This is usually called response time. A definition of response time is the total amount of time that it takes for fire apparatus to reach the incident scene from the station after being notified of the emergency. Response time includes several components. These are:

- Dispatch Time The amount of time that it takes to receive and process an emergency call.
- Reaction Time The amount of time that it takes a fire and/or ems crew to react after receiving dispatch information and prepare to leave the station.
- Travel Time The amount of time that it takes a piece of fire apparatus to travel from the fire station to the incident scene. (wheel start to wheel stop).

Pyrotech Consultants, Inc. used a computer program and computer model of the District's street network to conduct the study. The computer model was calibrated to reflect the actual travel times of fire apparatus on the streets. The use of the computer program and the computer model enabled the consultants to analyze the amount of time it takes fire apparatus to travel from a fire station location to a point of service delivery. The consultants used the computer program and model to analyze several fire station scenarios for the best fire station locations. The criteria used is the amount of time that it takes for fire or other emergency apparatus to travel from a present or proposed fire station location to an area specified in the study. For example we are able to show the area that can be covered from each station within a 5.0 minute travel time. This segment of time that was used for the analysis is the travel time (wheel start to wheel stop). A complete description of the computer program, the street network and the methods used are explained in detail in the report. Graphical representation of the area and the fire station locations analyzed is provided in Attachment A.

THE PRESENT SYSTEM

The Wareham Fire District Fire Department currently operates out of five fire stations. These are designated as Stations 1, 2, 3, 4 and Headquarters (5). The following table list the location of each fire station and the apparatus and personnel that is assigned.

WAREHAM FIRE DEPARTMENT FIRE STATION LOCATIONS 1996

STATION	ADDRESS	APPARATUS	PERSONNEL
Headquarters (5)	273 Main Street	Engine 5 Engine 6 Forestry 8 Ladder 3 Squad 7	1 Dispatcher* 2 Fire Fighters* Call Fire Fighters
1	1 Minot Avenue	Engine 12 Forestry 1	Call Fire Fighters
2	2368 Cranberry Highway	Engine 4 Forestry 6	Call Fire Fighters
3	5 Tihonet Road	Tanker 1 Forestry 3	Call Fire Fighters
4	281 Glen Charlie Road	Engine 11 Forestry 4	Call Fire Fighters

*per shift

System Performance

There are presently 280 road miles served by the Wareham Fire District. With the existing configuration of five fire stations as shown above it takes approximately 8.5 minutes travel time to cover the protected area assuming all of the stations are staffed for immediate response. This 280 road mile figure serves as the base line which was used to determine the percent coverage provided by each of the station scenarios that were examined during the study.

Headquarters (Fire Station 5) is the only fire station in the system that is staffed 24 hours per day by career personnel. This means that the response from Headquarters is almost immediate. All other stations rely on call personnel. Call personnel must respond to the nearest fire station when alerted which means a delay in response from all other stations. Early in the study it was agreed that the average delay for call personnel to reach a station is 3.5 minutes for Wareham. The delay for neighboring community call stations are shown for each scenario where used.

The existing configuration of fire stations for the Wareham Fire District incorporates Stations 1,2,3 and 4 as call stations and Headquarters (Station 5) as the only staffed station in the system.

Using a target travel time of 5 minutes and the existing configuration of fire stations with a 3.5 minute delay for Stations 1,2,3, and 4 the results show that only 119 road miles of the 280 total road miles can be covered. This is approximately 42.5 percent of the total.

PROJECT GOAL AND OBJECTIVES

Goal

Conduct a computerized fire station location study to evaluate existing station locations and distribution of apparatus for the purpose of making recommendations on future fire station locations and apparatus needs.

Project Objectives

1. Assist the District in establishing response/travel time goals.
2. Analyze the coverage of the existing fire stations.
3. Pinpoint Existing deficiencies for fire station coverage within the District.
4. Evaluate alternative fire station locations within the District.
5. Conduct a "Clean Sheet" study approach to the District as if no stations or apparatus existed. This will take into account the housing density of the District.
6. Develop optimum and minimally acceptable numbers and locations of fire stations using a "Clean Sheet" approach.
7. Develop optimum an minimally acceptable recommendation including existing and/or proposed new stations. Include station closings, if warranted
8. Evaluate the response capabilities of all surrounding fire stations located in the other seven contiguous communities and districts that provide Mutual Aid to the District.
9. Describe the wild fire interface potential and identify coverage requirements for local brush breaker/forestry equipment
10. The study will consider the increase in summertime population.
11. Develop apparatus needs using a "Clean Sheet" approach.
12. Evaluate engine company and ladder coverage requirements.
13. Make recommendations on the number and types of fie apparatus required.
14. Recommend locations on where to located fire apparatus both within existing and proposed fire station locations.
15. Comment on the implications of recommendation on Insurance Services Office requirements.
16. Provide fire station location software and files to the Wareham Fire District and train at least two department employees in its use.
17. Prepare and present a final written report with recommendations and alternatives.

METHODOLOGY

Computer Analysis

The consultants use a geo-based computer program that calculates and displays the street network data. The computer output displays the actual street network of the area under study with the various aspects of the study detailed in color. The computer program is an integrated program that accurately models an emergency vehicles response over a street/highway network using actual speeds and distances.

Unlike grid and concentric circle analysis, the computer program simulates the real road network of the area being analyzed. A high degree of accuracy is insured by using actual travel distances, vehicle speeds, factoring time delays for roadway conditions (congestion, turning radius, weather, hills, etc.) accounting for one way or unusable roadways and implementing user defined risk factors.

Street Network

The street network that is used as a basis for the study is taken from maps and data that are produced by the U.S. Census Bureau. These are actual scaled maps that have data attached to them. Each street segment is assigned a travel speed. The speeds modeled by the map were compared with actual travel times to determine the accuracy of the network that was used for the study.

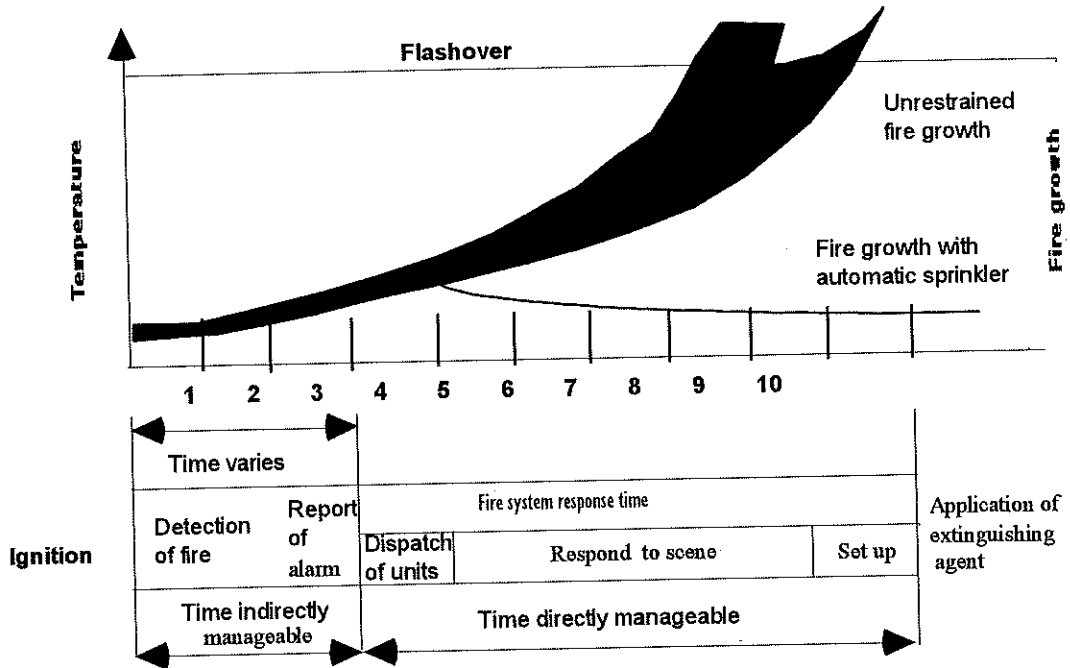
Response Time

There are two types of information that can be used to assist local communities in establishing the minimum amount of time that it should take fire department resources to reach an incident or victim. These are fire growth and fire suppression time requirements and emergency medical time requirements.

Fire Suppression Response Goals

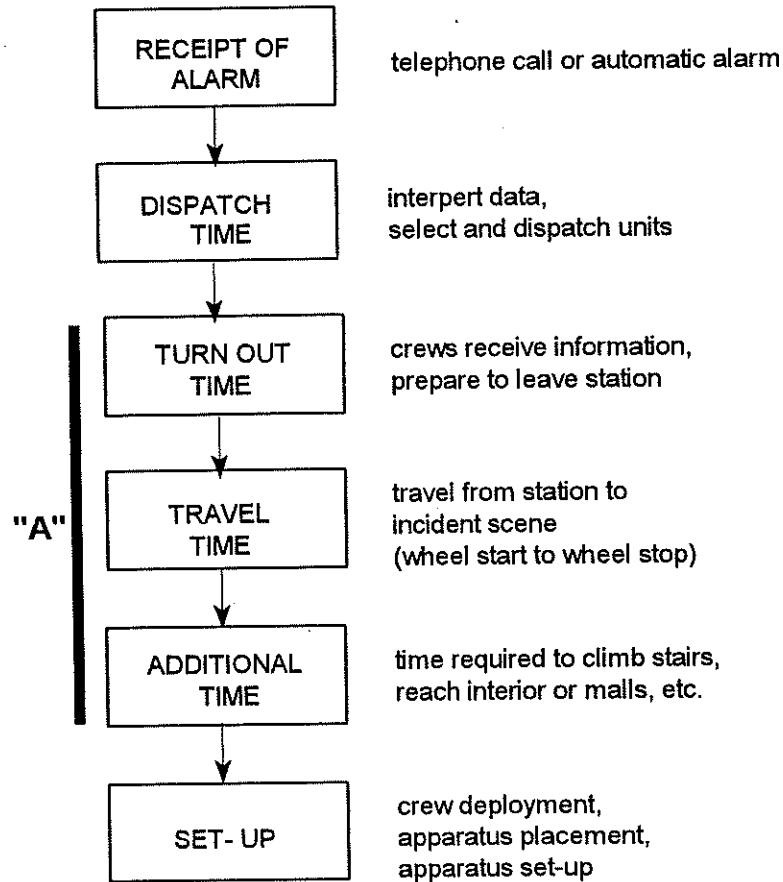
Fire growth can expand at a rate of 50 times its volume per minute. The time segment between fire ignition and the start of fire suppression activities is critical and has a direct relationship to fire loss.

The following diagram provides an illustration of fire growth over time, and the sequence of events that take place during this time.



Note that the time segment between the ignition of a fire and the reporting of a fire will vary and is indirectly manageable by the fire department. The amount of time between ignition and detection of a fire will vary depending upon the means of detection. Heat and smoke detectors along with automatic extinguishing systems provide the fastest means and most reliable means of detecting fires. The use of sight and/or smell may take somewhat longer depending upon circumstances. The fire department can manage this time by requiring the installation of automatic alarm and/or extinguishing systems.

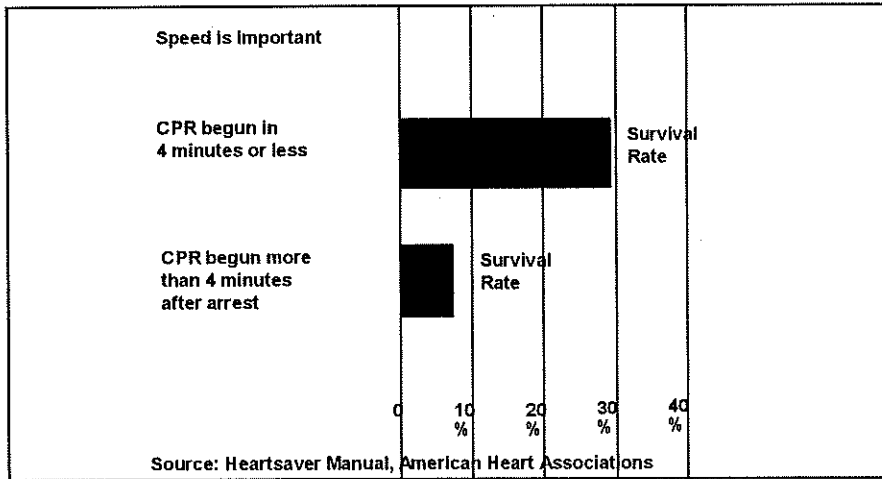
The following shows the steps in the Fire System Response Time sequence.



Fire System Response Time is manageable. The receipt of the alarm and the dispatch of units is manageable by the way that alarms are received and the way that dispatch activities are handled. Enhanced 911 systems and computer aided dispatch systems will minimize the time required to receive and handle alarms. The time segment "A" "Respond to the scene " includes turnout time, travel time, and additional time. Turn out time may be managed so some degree by decreasing the time required for crews to receive alarm information. Travel time is one of the most manageable segments of time in the entire sequence. This is the amount of time that it takes for a piece of fire apparatus or ambulance to travel from a fire station to an incident scene (wheel start to wheel stop). Travel time can be managed by selecting fire station locations based on the amount of time that it takes to travel from the fire station to the incident scene. The maximum amount of time required to travel from a fire station to an incident scene is usually determined by the community since there are no national standards for travel time. For this study a 5.0 minute travel time was used.

Emergency Medical Response Goals

The delivery of emergency medical services by First Responders is time critical. Several publications state that when cardiopulmonary resuscitation (CPR) is started within 4 minutes, the victim's chances of leaving the hospital alive are four times greater than if the victim did not receive CPR until after 4 minutes.



The sooner that trained emergency personnel are notified the greater the chance for survival.

Response - Travel Time Standard

At the beginning of the project it was agreed that the travel time standard for this study would be 4.0 minutes for the District and the area beyond the District Limits that is served by the Wareham Fire Department.

Definitions:

Response Time: The total amount of time that it takes for fire apparatus to reach the incident scene from the station after they have been notified of the emergency.

Travel Time: The amount of time that it takes for a piece of fire apparatus to travel from the fire station to the incident scene or demand zone. The amount of time from wheel start to wheel stop.

Turn Out Time: The amount of time that it takes a fire crew to react after receiving dispatch information and prepare to leave the station.

Dispatch Time: The amount of time that it takes to receive and process an emergency call. This includes receiving the call, determining what the emergency is, where the emergency is located, determining what resources are required to handle the call and notifying the units that are to respond.

Set Up Time: The amount of time required for fire department units to set up, connect hose lines, position ladders, etc. and prepare to extinguish the fire.

How the results of the Fire Station Location Program were used.

The results produced by the fire station location program were used to assist in determining the best location of fire stations and the allocation of resources based on response/travel time in order to answer the following questions.

- Where should fire stations be located in order to deliver fire and rescue services in the least amount of time?
- What are the best locations for personnel and apparatus in order to provide optimum levels of resource in a minimum amount of time for the area being served?

Other areas that were examined are:

- Evaluate the present fire station locations in terms of area covered, travel distance/travel time, overlap of response areas.
- Determine those areas which are not adequately covered.
- "What if" scenarios using new locations, moving or eliminating old locations can be used to determine the best fire station locations to cover the entire town while meeting travel time or travel distance requirements.
- Provide a list of recommendations supported by the computer analysis, both maps and data, that will detail the best locations for fire stations in the District.
- Examine the data and maps from the fire station location study to determine the amount and type of resource that is available within a certain time period for each part of the study area.

Criteria for Determining Fire Station Locations

The basic criteria used for determining new fire station locations for this study is elapsed time. More specifically the element of travel time was used. Travel time is the amount of time that it takes fire apparatus to travel from a fire station or proposed fire station location to a potential incident scene. More simply stated, this is the time from wheel start to wheel stop.

The purposes of this study. a 5.0 minute travel time to reach areas served by the Wareham Fire Department.

The rationale for using the 5.0 minute travel time is the timely delivery of fire or initial emergency medical service. A 5.0 minute travel time coupled with dispatch time, reaction time, and set up time will result in a total response time in excess of 6.5 minutes.

Providing service to all areas serviced by the Wareham Fire Department within a 5.0 minute travel time is not feasible from either a financial or practical standpoint. There will always be areas that cannot be reached within the time specified due to the terrain, configurations of streets and road, and other conditions.

ANALYSIS AND FINDINGS

For the purposes of this study the following locations were given a Fire Station Number.

Existing Stations

Fire Station 1 1 Minot Avenue
Fire Station 2 2368 Cranberry Highway
Fire Station 3 5 Tihonet Road
Fire Station 4 281 Glen Charlie Road
Fire Station 5 273 Main Street

Additional Study Locations

Fire Station 6 273 Main Street (used for study purposes)
Fire Station 7 Intersection of Great Neck Road & Dowd Avenue
Fire Station 8 Intersection Fearing Hill Road & Blakmore Road
Fire Station 9 Intersection Fearing Hill Road & Main Street
Fire Station 10 Intersection of Blackmore Road & Barlow Avenue

Mutual Aid Stations

Fire Station 20	Onset Headquarters	5 East Central Avenue
Fire Station 30	Plymouth Station 4	Bourne & Rogers Roads
Fire Station 40	Carver	Church Street & Route 58
Fire Station 50	Middleboro	566 Wareham Street
Fire Station 60	Marion	Point Road & Creek Road
Fire Station 70	Rochester	4 Pine Street
Fire Station 80	Bourne	Main Street & Wallace Avenue

STATION LOCATION STUDY

The following scenarios were run on the computer using the calibrated street model for the Wareham Fire District. Accompanying this report is a series of color street maps that show the coverage provided by each scenario listed below.

Note: Color maps for each of the scenarios listed below are included in Attachment A of this report. Viewing of the maps will aid in understanding the results of each scenario.

Scenario 1

Existing locations for Fire Stations 1,2,3,4, and 5

8.5 minute travel time

No delays for any stations

Total Roadway Miles	Percent of Roadway Miles
280	100

Results and Comments

1. This scenario was run to show minimum travel time (8.5 minutes) required to reach all areas of the District and contract areas using all of the existing fire stations.
2. The scenario assumes that all of the stations are staffed.
3. The purpose of this scenario was to provide baseline data for the study.

Scenario 2

Existing locations for Fire Stations 1,2,3,4, and 5

5 minute travel time

Stations 1,2,3,4 delayed 3.5 minutes (delay based on call fire fighters responding to station)

Station 5 no delay (fire fighters on duty in the station)

Total Roadway Miles	Percent of Roadway Miles
119	42.5

Results and Comments

1. This scenario delays the response of Stations 1,2,3 and 4 by 3.5 minutes. The 3.5 minute delay is the average time that it takes for the call fire fighters to travel to the station and respond with the apparatus.
2. There is no delay for Station 5 because there are 2 fire fighters on duty.
3. This scenario reflects the actual coverage provided by the Wareham stations.
4. Review of the map shows:
 - a. Extensive overlap between Stations 2,3 and Headquarters.
 - b. Significant lack of coverage in the built up areas of Station 4.
 - c. Lack of coverage in the country club area of Great Neck.
 - d. Lack of coverage in the Indian Neck Road area.
 - e. Lack of coverage in the Barlow Avenue area.

Scenario 3

Existing locations for Fire Stations 2,4,5 and 20

Stations 2 & 4 delayed 3.5 minutes

Station 20 delayed 2.5 minutes

Station 5 no delay

5 minute travel time

Total Roadway Miles	Percent of Roadway Miles
145	51.7

Results and Comments

1. This scenario shows the coverage provided by Wareham Stations 2,4 and 5, plus the Onset Station.
2. This shows no loss of coverage in the Station 3 area.
3. The number of road miles covered has is increased over the previous scenario due to the 2.5 minute delay out of Onset as opposed to the 3.5 minute delay out of Fire Station 1.
4. There is no improvement in the:
 - b. Fire Station 4 area.
 - c. Country club area of Great Neck.
 - d. Indian Neck Road area.
 - e. Barlow Avenue area.

Scenario 4

Existing locations for Fire Stations 1,2,4 and 5

Stations 1,2, & 4 delayed 3.5 minutes

Station 5 no delay

5 minute travel time

Total Roadway Miles	Percent of Roadway Miles
126	45

Results and Comments

1. Fire Station 3 was removed.
2. No loss of coverage in any area when Station 3 is removed.
3. Used Fire Station 1 instead of Onset results in a slight decrease in coverage because Station 1 is currently delayed 1 minute more than the Onset Station.

Scenario 5

Existing locations for Fire Stations 1,2,3,4 and 5

No delay

5 minute travel time

Total Roadway Miles	Percent of Roadway Miles
268	95.7

Note: Scenario 6 provides more road mileage coverage in occupied areas than Scenario 5

Results and Comments

1. This scenario shows the performance with all stations staffed.
2. There is an exceptional amount of overlap between Stations 3 and 5.
3. There is full coverage in the Station 4 area.
4. Some increase in coverage in the country club area of Great Neck and the Indian Neck Road area.
5. No improvement in the Barlow Avenue area.
6. Not all built up areas are fully covered despite the 95.7 percent coverage of roadway miles.

Scenario 6

Existing locations for Fire Stations 4 and 5

Proposed locations 7 and 9

No delay

5 minute travel time

Total Roadway Miles	Percent of Roadway Miles
230	82.14

Note: Scenario 6 provides more road mileage coverage in occupied areas than Scenario 5

Results and Comments

1. This was a clean sheet approach to providing coverage for the protected area.
2. Stations 1 and 2 were removed, Stations 7 and 9 were added.
3. Significant increase in coverage in for the built up areas with small pockets not covered in the Barlow Avenue area and the Indian Neck Road area.
4. If all four stations in the Scenario were staffed on a full time basis, this scenario provides the best overall coverage for the built up areas.
5. This scenario using 4 stations and full time staff will provide better coverage than Scenario 5 which used 5 stations.

Scenario 7

Existing locations for Fire Stations 2,4 and 5

Proposed locations 7 and 8

Stations 2,4,7,8 delayed 3.5 minutes

Station 5 no delay

5 minute travel time

Total Roadway Miles	Percent of Roadway Miles
138	49.3

Results and Comments

1. Added Stations 7 and 8. Removed Stations 1 and 3.
2. No loss in coverage in the Station 3 area.
3. Almost no loss in coverage in the Station 1 area.
4. Significant increase in coverage in the country club area of Great Neck.
5. Slight increase in coverage in the Indian Neck Road area.
6. Slight increase in coverage in the Blackmore Pond Road area.
7. No improvement in the Station 4 area.
8. No improvement in the Barlow Avenue area.
9. No significant overall percentage gain in roadway miles covered from the existing configuration.

Scenario 8

Existing locations for Fire Stations 2,4 and 5

Proposed locations 7 and 10

Stations 2,4,7,10 delayed 3.5 minutes

Station 5 no delay

5 minute travel time

Total Roadway Miles	Percent of Roadway Miles
141	50.3

Results and Comments

1. Station 7 and 10 added. Deleted Stations 1 and 3.
2. No loss in coverage in the Station 3 area.
3. Almost no loss in coverage in the Station 1 area.
4. Significant increase in coverage in the country club area of Great Neck.
5. Slight increase in coverage in the Indian Neck Road area.
6. No improvement in the Station 4 area.
7. Significant increase in the Barlow Avenue area.
8. No significant overall percentage gain in roadway miles covered from the existing configuration.

Scenario 9

Existing locations for Fire Stations 2,4,5 and 20

Proposed locations 7 and 10

Stations 2,4,7,10 delayed 3.5 minutes

Station 20 delayed 2.5 minutes

Station 5 no delay

5 minute travel time

Total Roadway Miles	Percent of Roadway Miles
158	56.42

Results and Comments

1. Stations 7 and 10 added. Deleted Stations 1 and 3. Used Onset (Station 20).
2. No loss in coverage in the Station 3 area.
3. No loss in coverage in the Station 1 area.
4. Significant increase in coverage in the country club area of Great Neck.
5. Slight increase in coverage in the Indian Neck Road area.
6. No improvement in the Station 4 area.
7. Significant increase in the Barlow Avenue area.
8. Gain in overall percentage gain in roadway miles covered from the existing configuration.

Scenario 10

Mutual Aid

Existing locations for Fire Stations 1,2,3,4,5,20,30,40,50,60,70,80

Stations 1,2,3,4 3.5 minute delay

Station 20 2.5 minute delay

Station 40 5 minute delay

Station 50 and 60 8 minute delay

Station 70 4.5 minute delay

Stations 5,30,80 no delay

5 minute travel time

Total Roadway Miles	Percent of Roadway Miles
145	51.8

Results and Comments

1. Stations 20 through 80 are mutual aid stations from neighboring communities.
2. Only Onset (Station 20) provides significant first in response.
3. Due to delay times and/or distance Stations 30,40,50,60,70, and 80 are not useful for first in response.

Scenario 11

Existing locations for Fire Stations 1,2,4,5 and 20

Stations 1,2,4 3.5 minute delay

Station 20 2.5 minute delay

Station 5 no delay

Total Roadway Miles	Percent of Roadway Miles
145	51.8

Results and Comments

1. This scenario shows the coverage provided by Wareham Stations 1,2,4 and 5, plus the Onset Station.
2. This shows no loss of coverage in the Station 3 area.
3. There is no improvement in the:
 - b. Fire Station 4 area.
 - c. Country club area of Great Neck.
 - d. Indian Neck Road area.
 - e. Barlow Avenue area.

Note:

The following scenarios 11A through 11H were run to show the number of personnel arriving on scene for a specified period of time. The configuration of fire stations are the same as used in Scenario 11. Station 6 was added to simulate the response of a second engine and the ladder from Headquarters which are delayed 3.5 minutes because they are staffed by call personnel.

The following scenarios use 4 and 10 fire fighters on scene for a specified period of time. These scenarios are designed to show the degree of coverage by number of personnel for a specified period of time. i.e. less than 5, 8 and 10 minutes.

Scenario 11A

Objective 4 fire fighters on scene in less than 5 minutes
2 fire fighters assigned to Station 5

Results and Comments

1. This scenario will provide 4 fire fighters in less than 5 minutes to only 4 percent of the protected area.

Scenario 11B

Objective 10 fire fighters on scene in less than 5 minutes
2 fire fighters assigned to Station 5

Results and Comments

1. The objective of this scenario cannot be met.

Scenario 11C

Objective 10 fire fighters on scene in less than 8 minutes
2 fire fighters assigned to Station 5

Results and Comments

1. This scenario will provide 10 fire fighters in less than 8 minutes to only 8 percent of the protected area.

Scenario 11D

Objective 10 fire fighters on scene in less than 10 minutes
2 fire fighters assigned to Station 5

Results and Comments

1. This scenario will provide 10 fire fighters in less than 10 minutes to only 28 percent of the protected area.

Scenario 11E

Objective 4 fire fighters on scene in less than 5 minutes
4 fire fighters assigned to Station 5

Results and Comments

1. This scenario will provide 4 fire fighters in less than 5 minutes to only 33 percent of the protected area.

Scenario 11F

Objective 10 fire fighters on scene in less than 5 minutes

4 fire fighters assigned to Station 5

Results and Comments

1. This cannot be met.

Scenario 11G

Objective 10 fire fighters on scene in less than 8 minutes

4 fire fighters assigned to Station 5

Results and Comments

1. This scenario will provide 10 fire fighters in less than 8 minutes to only 19 percent of the protected area.

Scenario 11H

Objective 10 fire fighters on scene in less than 10 minutes

4 fire fighters assigned to Station 5

Results and Comments

1. This scenario will provide 10 fire fighters in less than 10 minutes to only 46 percent of the protected area.

SIMULATED RESPONSE ANALYSIS

After examining the data from each of the five scenarios it became apparent that additional data was required in order to formulate recommendations related to the closing of fire stations. The additional data was derived by simulating responses from the fire stations in the downtown area. The objective was to provide a personnel resource consisting of a minimum of 10 persons within the 4 minute travel time. Also, the objective was to demonstrate the maximum resource in the minimum amount of time.

The following tables show simulated responses to actual locations. The data in the tables show the stations used, the apparatus and staffing for each station, the minimum required resources for each location, and the time and distance for each piece of apparatus to travel from their respective station to the specified location.

TABLE 1

2 Fire Fighters assigned to Engine 6

ALARM TYPE: Structure

LOCATION: 0 Swifts Beach

REQUIRED RESOURCES: Engine, Engine, Ladder

STATION	APPARATUS NAME	APPARATUS TYPE	TRAVEL DISTANCE	TRAVEL TIME	ASSIGNED FIRE FIGHTERS	TOTAL FIRE FIGHTERS
5	Engine 6	Engine	2.51	4.73	2	2
6	Engine 5	Rescue	2.48	8.14	3	5
6	Ladder 3	Engine	2.48	8.14	3	8

TABLE 1A

4 Fire Fighters assigned to Engine 6

ALARM TYPE: Structure

LOCATION: 0 Swifts Beach

REQUIRED RESOURCES: Engine, Engine, Ladder

STATION	APPARATUS NAME	APPARATUS TYPE	TRAVEL DISTANCE	TRAVEL TIME	ASSIGNED FIRE FIGHTERS	TOTAL FIRE FIGHTERS
5	Engine 6	Engine	2.51	4.73	4	4
6	Engine 5	Rescue	2.48	8.14	3	7
6	Ladder 3	Engine	2.48	8.14	3	10

TABLE 2

2 Fire Fighters assigned to Engine 6

ALARM TYPE: Structure

LOCATION: 62 Burgess Point

REQUIRED RESOURCES: Engine, Engine, Ladder, Tanker

STATION	APPARATUS NAME	APPARATUS TYPE	TRAVEL DISTANCE	TRAVEL TIME	ASSIGNED FIRE FIGHTERS	TOTAL FIRE FIGHTERS
5	Engine 6	Engine	4.47	8.85	2	2
1	Engine 12	Engine	3.71	11.06	3	5
1	Forestry 1	Tanker	3.71	11.06	4	9
20	Ladder 21	Ladder	4.56	12.41	4	13
6	Forestry 6		4.51	12.44	4	17

TABLE 2A

4 Fire Fighters assigned to Engine 6

ALARM TYPE: Structure

LOCATION: 62 Burgess Point

REQUIRED RESOURCES: Engine, Engine, Ladder, Tanker

STATION	APPARATUS NAME	APPARATUS TYPE	TRAVEL DISTANCE	TRAVEL TIME	ASSIGNED FIRE FIGHTERS	TOTAL FIRE FIGHTERS
5	Engine 6	Engine	4.47	8.85	4	4
1	Engine 12	Engine	3.71	11.06	3	7
1	Forestry 1	Tanker	3.71	11.06	4	11
20	Ladder 21	Ladder	4.56	12.41	4	15
6	Forestry 6		4.51	12.44	4	19

TABLE 3

2 Fire Fighters assigned to Engine 6

ALARM TYPE: Structure

LOCATION: 55 Hideaway

REQUIRED RESOURCES: Engine, Engine, Ladder, Tanker

STATION	APPARATUS NAME	APPARATUS TYPE	TRAVEL DISTANCE	TRAVEL TIME	ASSIGNED FIRE FIGHTERS	TOTAL FIRE FIGHTERS
4	Engine 11	Engine	0.93	5.86	3	3
4	Forestry 4	Tanker	0.93	5.86	4	7
5	Engine 6	Engine	6.06	11.72	2	9
1	Forestry 1	Tanker	4.21	12.28	4	13
20	Ladder 21	Ladder	5.29	13.90	4	17

TABLE 3A

4 Fire Fighters assigned to Engine 6

ALARM TYPE: Structure

LOCATION: 55 Hideaway

REQUIRED RESOURCES: Engine, Engine, Ladder, Tanker

STATION	APPARATUS NAME	APPARATUS TYPE	TRAVEL DISTANCE	TRAVEL TIME	ASSIGNED FIRE FIGHTERS	TOTAL FIRE FIGHTERS
4	Engine 11	Engine	0.93	5.86	3	3
4	Forestry 4	Tanker	0.93	5.86	4	7
5	Engine 6	Engine	6.06	11.72	4	11
1	Forestry 1	Tanker	4.21	12.28	4	15
20	Ladder 21	Ladder	5.29	13.90	4	19

TABLE 4

2 Fire Fighters assigned to Engine 6

ALARM TYPE: Structure

LOCATION: 15 Glen Charlie

REQUIRED RESOURCES: Engine, Engine, Ladder

STATION	APPARATUS NAME	APPARATUS TYPE	TRAVEL DISTANCE	TRAVEL TIME	ASSIGNED FIRE FIGHTERS	TOTAL FIRE FIGHTERS
5	Engine 6	Engine	2.61	4.45	2	2
1	Engine 12	Engine	0.76	5.00	3	5
20	Ladder 21	Ladder	1.84	6.62	4	9

TABLE 4A

4 Fire Fighters assigned to Engine 6

ALARM TYPE: Structure

LOCATION: 15 Glen Charlie

REQUIRED RESOURCES: Engine, Engine, Ladder

STATION	APPARATUS NAME	APPARATUS TYPE	TRAVEL DISTANCE	TRAVEL TIME	ASSIGNED FIRE FIGHTERS	TOTAL FIRE FIGHTERS
5	Engine 6	Engine	2.61	4.45	4	4
1	Engine 12	Engine	0.76	5.00	3	7
20	Ladder 21	Ladder	1.84	6.62	4	11

TABLE 5

2 Fire Fighters assigned to Engine 6

ALARM TYPE: Structure

LOCATION: 120 Pinehurst

REQUIRED RESOURCES: Engine, Engine, Ladder

STATION	APPARATUS NAME	APPARATUS TYPE	TRAVEL DISTANCE	TRAVEL TIME	ASSIGNED FIRE FIGHTERS	TOTAL FIRE FIGHTERS
5	Engine 6	Engine	1.21	3.30	2	2
6	Engine 5	Engine	1.24	6.89	3	5
6	Ladder 3	Ladder	1.24	6.89	3	8

TABLE 5A

4 Fire Fighters assigned to Engine 6

ALARM TYPE: Structure

LOCATION: 120 Pinehurst

REQUIRED RESOURCES: Engine, Engine, Ladder

STATION	APPARATUS NAME	APPARATUS TYPE	TRAVEL DISTANCE	TRAVEL TIME	ASSIGNED FIRE FIGHTERS	TOTAL FIRE FIGHTERS
5	Engine 6	Engine	1.21	3.30	4	4
6	Engine 5	Engine	1.24	6.89	3	7
6	Ladder 3	Ladder	1.24	6.89	3	10

TABLE 6

2 Fire Fighters assigned to Engine 6

ALARM TYPE: Structure

LOCATION: 12 Open Hearth

REQUIRED RESOURCES: Engine, Engine, Ladder

STATION	APPARATUS NAME	APPARATUS TYPE	TRAVEL DISTANCE	TRAVEL TIME	ASSIGNED FIRE FIGHTERS	TOTAL FIRE FIGHTERS
2	Engine 4	Engine	1.21	6.35	3	3
5	Engine 6	Engine	3.01	6.77	2	5
6	Ladder 3	Ladder	2.97	10.18	3	8

TABLE 6A

4 Fire Fighters assigned to Engine 6

ALARM TYPE: Structure

LOCATION: 12 Open Hearth

REQUIRED RESOURCES: Engine, Engine, Ladder

STATION	APPARATUS NAME	APPARATUS TYPE	TRAVEL DISTANCE	TRAVEL TIME	ASSIGNED FIRE FIGHTERS	TOTAL FIRE FIGHTERS
2	Engine 4	Engine	1.21	6.35	3	3
5	Engine 6	Engine	3.01	6.77	4	7
6	Ladder 3	Ladder	2.97	10.18	3	10

RECOMMENDATIONS AND COMMENTS

Key Observations

1. During the "clean sheet" analysis it became clear that Headquarters Station is located optimally to serve the key populated areas. Moving the station in any direction decreased the coverage to the populated areas.
2. Staffing of Stations 1,2,3,4 and Headquarters (5) with career personnel could provide 95% coverage of the District and contract areas in less than 5 minutes. Closing Station 3 has no negative impact since adequate coverage is provided by Stations 2 and 5.
3. Staffing of Stations 4,5,7,9 with career personnel could provide 82% coverage of the District and contract areas in less than 5 minutes. This configuration will provide better coverage to the occupied areas.
4. Scenario 7 which uses Stations 2,4,7, and 8 as call stations with a 3.5 minute delay and Station 5 (career) with no delay will provide 49.3% coverage in less than 5 minutes.
5. Scenario 8 which uses Stations 2,4,7 and 10 as call stations with a 3.5 minute delay and Station 5 (career) with no delay will provide 50.4 coverage in less than 5 minutes.
6. With the current configuration of stations, personnel, and run assignments the "on scene" staffing for 5 and 10 minute travel times are shown below:

5 minutes or less	4 personnel on the scene for 4% of the area
10 minutes or less	10 personnel on the scene for 28% of the area
7. Scenario 10 is one of the best options with little or not cost. This uses Stations 1,2, and 4 (call) with a 3.5 minute delay, Station 20 (Onset) with a 2.5 minute delay and Station 5 (career) with no delay. Coverage is 51.8 percent in less than 5 minutes.
8. Scenario 10 using Stations 1,2 and 4 (call) with a 3.5 minute delay, Station 20 (Onset) with a 2.5 minute delay and Station 5 with no delay and staffed with two fire fighters results in 10 fire fighters on scene in less than 10 minutes for 28 percent of the District and contract area.
9. Changing Scenario 10 by adding two additional fire fighters at Station 5 (4 career per shift) will result in 10 fire fighters on scene in less than 10 minutes for 46 percent of the District and contract area.
10. The study revealed that the adjacent mutual aid stations could not provide timely first due assistance with the exception of Onset.

Recommendations

1. Close Fire Station 3 and relocate Tanker 1 to Headquarters, and Forestry 3 to Station Number 2.
2. Expand the cooperation with Onset so that they assist with first response to Station 1, Station 4, Cranberry Highway area. Specify engine or ladder or both for each response area.
3. Brush Breakers

Present: Maintain Breakers at Stations 1,2,4, and Headquarters.

Future: Maintain minimum of three Breakers located at Stations 2,4 and Headquarters.

4. Apparatus

Maintain single engines at Stations 1, 2 and 4, and two engines at Headquarters (Station 5). First engine at Headquarters will be staffed by career personnel. The second engine will be staffed by call personnel and will serve as a reserve engine.

5. When Tanker 1 is due for replacement consideration should be given to a new combination Engine/Tanker that will be stationed at Headquarters.

ATTACHMENT

A

GRAPHIC RESULTS

Copies of the multi-colored maps are available in the
Reference Section of the Wareham Free Library.

These maps were not reproduced in this packet to reduce
copying costs.