

***WINFIELD
FIRE PROTECTION DISTRICT***



***Response Time Analysis
and
Fire Station Distribution
(An Addendum to the Strategic Plan)***

***Conducted by:
Illinois Fire Chiefs Association
Consulting Service***





Terms of Use

This report is the property of the Winfield Fire Protection District and the Illinois Fire Chiefs Association. No part of this document may be reproduced, stored in a retrieval system, or transmitted in any form or by any means, electronically or mechanically. Photocopying or scanning of this document without prior written permission of the Winfield Fire Protection District and the Illinois Fire Chiefs Association is strictly prohibited.





TABLE OF CONTENTS

BACKGROUND..... 6

FIRE DISTRICT COVERAGE AREA..... 6

METHODS OF EVALUATING 6

 INSURANCE SERVICE OFFICE 7

 NATIONAL FIRE PROTECTION ASSOCIATION 8

 CENTER FOR PUBLIC SAFETY EXCELLENCE 9

RESPONSE TIME ANALYSIS..... 11

 GENERAL OBSERVATIONS..... 11

 IMPACT OF RAILROAD TRAFFIC..... 12

Recommendations for Rail Traffic Issues.....13

RELOCATING FIRE STATION #1 14

 WINFIELD FPD STATION #2..... 14

 FOREST PRESERVES..... 14

ALARM PROCESSING TIME, TURNOUT TIME AND TRAVEL TIME..... 14

 COMPUTER RESPONSE MAPPING 16

Findings.....19

DISPATCH SERVICES..... 20

 REVIEW OF CURRENT RESPONSE TIME DATA 21

Recommendations for Improving Response Times.....25

Recommendations for Fire Station Distribution26

GUIDE TO IMPLEMENTING RECOMMENDATIONS..... 28

GLOSSARY 30





EXHIBITS

- Exhibit 1** Base Map for the Winfield Fire Protection District
- Exhibit 2** ISO Distances from Winfield Station #1
- Exhibit 3** ISO Distances from Winfield Station #2
- Exhibit 4** ISO Distances from Winfield Proposed Station #1
- Exhibit 5** ISO Distances from Wheaton Station #1
- Exhibit 6** Response Coverage @ 35 mph from Winfield Station #1
- Exhibit 7** Response Coverage @ 35 mph from Winfield Station #2
- Exhibit 8** Response Coverage @ 35 mph from Winfield Proposed Station #1
- Exhibit 9** Response Coverage @ 35 mph from Wheaton Station #1
- Exhibit 10** Response Coverage from Winfield Stations #1 & #2 for 4 minutes (88.4% coverage)
- Exhibit 11** Response Coverage from Winfield Station #2 & Winfield Proposed Station #1 for 4 minutes (95.4% coverage)





TABLE OF FIGURES

Figure 1: Time elements relating to flashover and EMS intervention. 11

Figure 2: Winfield FPD responses for 2010 12

Figure 3: CPSE Emergency Operations Cascade of Response Time Elements.... 16

Figure 4: NFPA Table 4.3.2 Staffing and Response Time 18

Figure 5: Winfield FPD Alarm Processing Time for Fire & EMS 22

Figure 6: Winfield FPD Turnout Times from Station #1 23

Figure 7: Winfield FPD 1st Engine & Ambulance Travel Times from Station #1 ... 23

Figure 8: Winfield Engine/Ambulance Response Times 24





BACKGROUND

In the fall of 2010, the Winfield Fire Protection Board of Trustees, Officers and Staff collaborated with the Illinois Fire Chiefs Association Consulting Service to create a strategic plan. Following the presentation of the plan, the Board of Trustees requested a more detailed analysis of response times and fire station distribution. Several factors currently impact response times within the Winfield Fire Protection District and the goal of this study is to provide a series of recommendations to improve response times and optimize fire station locations.

FIRE DISTRICT COVERAGE AREA

The Winfield Fire Protection District protects approximately 30,000 residents and the district boundaries are 13 square miles. Over 40% of the area the district protects is forest preserve land, which occupies the majority of their western boundaries.

Major east to west roads are: Geneva Road, High Lake/Jewell Road, Manchester/Grays Mill Road and Roosevelt Road. Major north to south roads are: Winfield Road and County Farm Road.

The Union Pacific Railroad and the Metra commuter train run on three tracks, adjacent to each other, through the center of the fire district, from east to west. Rail traffic, at the Winfield Road crossing averages 120 to 180 trains per day. The response time delays that occur at the Winfield Road Crossing were a catalyst for this study.

METHODS OF EVALUATING

The current standards available to the fire service have been the product of collaborative efforts involving organizations such as the Insurance Services Office (ISO), National Fire Protection Association (NFPA), and the Center for Public Safety Excellence (CPSE).

The Consulting Team would like to thank Fire Chief Phillip DiMenza, Deputy Chief Bryan Lewis, Administrative Assistant Robin Youngberg and the officers and firefighters of the Winfield Fire Protection District for their cooperation and assistance in





Response Time Analysis & Station Distribution Study

gathering the information necessary for this study. We would also like to thank Scott Klein from the MIS Department at Du-Comm for compiling the response time data.

Insurance Service Office

Over the past 100 years, there have been various methods used to evaluate fire departments and districts. The majority of these originated with the insurance industry due to the devastating fires of the late 1880s. Ratings started with the National Board of Fire Underwriters and the American Insurance Association, the most recent being the Insurance Services Offices, Inc. (ISO) grading schedule. A series of insurance industry criteria have been applied to limit large fire loss and to prevent conflagration.

Over the last decade, there has been an increased concern by fire professionals that the insurance industry criterion, by itself, is unrealistic (CPSE, 1997, p. 8). When cities are graded on the current ISO schedule, on a 1-10 scale, there may be unrealistic expectations about what a fire department can do in reducing loss of life using only the insurance company criteria. The ISO grading system measures the fire defenses of a community by reviewing the following three areas:

1. Fire Alarm: The receipt and handling of fire alarms.
2. Fire Department: A review of apparatus and equipment, distribution of companies, company personnel, and training.
3. Water Supply: A review of the adequacy of the water supply, type, installation, inspection, and condition of public fire hydrants.

ISO states that their regulations are not intended to design fire departments for cities. However, in a real practical way, they can, for two reasons:

1. Fire Departments have been intensely influenced by ISO criteria in past years; therefore the rating process is ingrained into our society.
2. Insurance grading still remains a strong political influence because the general public and/or elected officials do not understand the limitations of the fire protection operations. If the public perceives it pays lower insurance rates because of the fire department design, then pressure will not develop to alter the fire protection system to be more cost effective.





National Fire Protection Association

In March 1895, a small group of men convened a meeting to create standards for the installation of sprinkler systems. Out of that group grew the National Fire Protection Association (NFPA), which has become the agency promoting consensus standards to address fire-related safety issues (NFPA Journal, 1995). NFPA consensus standards are developed to establish widely accepted standards of care and requirements for certain practices. Standards are an attempt by an industry or profession to self-regulate by establishing minimal operating, performance, and/or safety standards, which establish a recognized standard of care.

These standards are written by consensus committees composed of industry representatives, fire service representatives, and other affected parties. The NFPA has many standards that affect fire departments. The standards should be followed by fire departments to protect fire and rescue personnel from unnecessary workplace hazards since they establish the standard of care that may be used in civil lawsuits against fire and rescue departments (NFPA Journal, 1995). In most cases, compliance with NFPA standards is voluntary. However in some cases, federal or state OSHA agencies have incorporated wording from NFPA standards into regulations. In these cases, the compliance with the standards is mandatory.

Regardless of whether compliance with an NFPA standard is voluntary or mandatory, fire and rescue departments must consider the impact of "voluntary" standards on private litigation. In some states, a department may be liable for the negligent performance of its duties. Even in states that protect rescue workers under an immunity statute, most state laws do not protect fire or rescue departments for grossly negligent acts. Essentially, negligence involves the violation of a standard of care that results in injury or loss to some other individual or organization.

In establishing the standard of care for fire and rescue operations, the courts will frequently look to the "voluntary" standards issued by NFPA and other organizations. Although "voluntary" in name, these standards can become in effect, the legally enforceable standard of care for fire or rescue departments. Accordingly, fire and rescue departments should pay close attention to applicable standards.





The NFPA mission today is accomplished by advocating scientifically based consensus codes and standards, research, and education for fire and related safety issues. NFPA's codes and standards are developed by technical committees staffed by over 6,000 volunteers, and are adopted and enforced throughout the world (NFPA Journal, 1995). Therefore, applicable NFPA standards and codes will be applied within this study.

Center for Public Safety Excellence

Although ISO and NFPA standards are extremely valuable for the purpose for which they were created, the fire service needed to elevate its level of performance and professionalism. This was done by creating a process where citizens, elected and appointed officials, and fire and emergency service personnel would assess all the activities and programs relative to modern Fire/EMS service. On October 27, 1988, the International City/County Management Association (ICMA) and the International Association of Fire Chiefs (IAFC) Executive Boards signed a Memorandum of Understanding (MOU) that committed both organizations to the development of a voluntary national fire service accreditation system titled, Center for Public Safety Excellence (CPSE).

The cornerstone of the CPSE is the voluntary role of self-assessment. This self-conducted performance evaluation will result in increasing the efficiency and effectiveness of fire service agencies, provided that the findings from performing the self-assessment are applied to planning and implementation activities. There are four major reasons why an in-depth evaluation of fire service agencies is critical today (CPSE Assessment Manual, 2006):

1. To assist organizations trying to cope with change.
2. To provide for periodic organizational evaluations which ensure effectiveness (outcomes) and efficiency (cost).
3. To raise the level of performance and professionalism within the organization and ultimately within the profession.
4. To provide an organizational benchmark when there is a change in leadership.





Response Time Analysis & Station Distribution Study

One of the major issues which the fire service has struggled with in the past decade is defining levels of service. This concept has evolved in concert with the other components of the accreditation model because it is essential to determine whether a fire agency is prepared to provide a level of service commensurate with its responsibilities and risks.

Risk assessment of a community includes determining and defining the different risk levels between a single-family dwelling, a multiple-family dwelling and an industrial building by placing each in a separate category and determining the appropriate fire resources to respond. Fire stations, staffing and apparatus have to be distributed in the community to provide an initial response force capable of dealing with all of them (CPSE Assessment Manual, 2006).

Firefighters encounter a wide variety of fire conditions between each category of risk. When determining fire station location, apparatus placement and staffing levels, we usually target the particular point of a fire's growth that marks a significant shift in its threat to life and property. This shift or "flashover point" is the event that level of service objectives are intended to prevent from occurring. Similarly, from an emergency medical perspective, a six-minute time frame is used as a level of service measurement, since brain damage is very likely to occur in cardiac/respiratory arrest patients after six minutes without oxygen flow to the brain. Therefore, level of service measurements include response times as a key factor in the mitigation of critical events.

Response time is broken down into key activities to identify the terms and descriptions utilized when diagnosing the measurement of time during an emergency event. The purpose is to clearly establish the set of events upon which policy and procedure questions are based. Based on the concept of the Utsein Model and Criteria, the CPSE produced a similar baseline operation for fire and emergency medical services agencies when defining their policies relative to the concentration and distribution of fire companies, emergency medical service units, hazardous materials response, and other resources that are routinely dispatched to the scene of emergency events (CPSE Assessment Manual, 2006). **Figure 1** identifies the measureable events





that constitute the individual segments of an emergency response and the importance of time with respect to intervention and the initiation of corrective action.

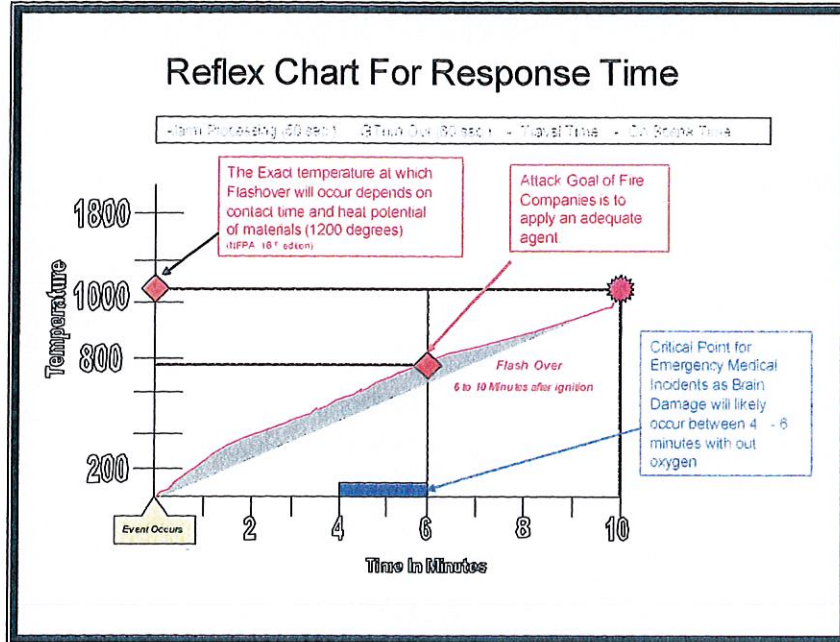


Figure 1: Time elements relating to flashover and EMS intervention.

There are many components to the CPSE self-assessment program. The aforementioned components of the assessment review will be applied in this study.

RESPONSE TIME ANALYSIS

General Observations

Currently, the Winfield Fire Protection District protects approximately 13 square mile area with an estimated fixed population of 30,000. At the present time, one fire station is staffed and provides fire protection, EMS, tactical rescue, fire/arson investigation, fire prevention and inspectional services. As exhibited in Figure 2, the Winfield FPD responded to 1531 emergency calls over the twelve-month period in calendar year 2010.





Type of Call	Responses
EMS	957
Automatic Alarm	89
Investigation	143
Wires down	31
Other	49
Structure Fire	8
Vehicle accident	5
Appliance	0
Brush/Grass Fire	23
Mutual Aid (Fire)	226
TOTAL	1531

Figure 2: Winfield FPD responses for 2010

The area served by the Fire District has several unique features, all of which present station distribution challenges. Currently, the entire District is served by Fire Station #1, located at 27W530 Highlake Road, which is very near to being in the center of the District boundaries. Fire Station #2, which is not staffed, is located at the northeast corner of Winfield and Roosevelt Roads.

Impact of Railroad Traffic

The Consulting Team identified the rail traffic, at the grade level railroad crossing on Winfield Road (one of two primary north/south roads), as a significant impediment to response time and the efficient and effective delivery of emergency services. Volume at the Winfield Road crossing is 120 to 180 trains per day and Winfield Fire Protection District Station #1 is located one block northwest of the crossing.

The three rails, at the Winfield Road crossing, are owned by the Union & Pacific Railroad and are referred to as the UP West Line. The UP West Line is part of an intricate system for freight train traffic and is also used by Metra commuter trains.

In 2008, The Village of Winfield Downtown Marketing and Capacity Study identified the train traffic congestion as problematic.

The central location of the rail line station (crossing) is seen by residents and businesses as both an advantage and a disadvantage. The blocking of Winfield Road for trains is a major concern expressed thus far in community outreach activities.





A major concern of residents and business owners is the stopping of traffic flow when the gates at Winfield Road and the Union Pacific Railroad crossing are down for trains. Of particular interest is the extended period of down time when westbound freight traffic is stopped waiting for signal clearance west of the intersection, located at mile post 27.5 (westbound freight trains encounter a signal west of the grade crossing at mile post 28.4).

Because most freight trains are longer than a mile, and the distance to the signal is less than a mile, trains that encounter a stop signal back up across the existing grade crossing for long periods of time.

In March of 2011, Metra and Union Pacific made major progress on a \$132 million project to improve rail traffic flow, reduce down-time, increase safety for pedestrians and end a curfew for freight trains. Grade improvements and safety devices have been installed at most crossing along the UP West Line. According to Union Pacific, the plan will reduce passenger and freight train delays by 50%, reduce congestion, improve train traffic flow and reduce grade crossing gate downtime by 11%.

Even with the rail line system improvements, the traffic circulation is negatively impacted and delays are created when train traffic is present at the Winfield Road crossing. As rail traffic creates traffic congestion and delays for commuters, it also severely impacts the ability of fire and paramedic units to respond within acceptable levels of time; particularly, for areas south of the crossing.

Recommendations for Rail Traffic Issues

Recommendation RTI-1: The Winfield Fire Protection District Administrative Staff should consider developing a community risk matrix. This will assist and enhance the Fire District's response time during "peak train traffic times".

Recommendation RTI-2: Winfield Fire Protection District Administrative Staff should consider increasing the requests for mutual aid change-of-quarters ambulance companies during times when Fire Station #1 is unoccupied during high rail traffic times or until the point in time when the Fire District can staff Fire Station #2.





RELOCATING FIRE STATION #1

The Consulting Team was asked to complete computer mapping for an alternate location for Winfield Fire Protection District Station #1, on County Farm Road, north of Parkway Drive. The advantage to this location would be fourfold; delays for rail traffic would be eliminated by the County Farm Road railroad underpass, response times to the northeast section of the District would be greatly improved, access to a four-lane highway would help improve travel times and fire station distribution would be enhanced. Furthermore, the new fire station would address current space needs; such as a training room, additional apparatus bays, additional offices and parking.

Winfield FPD Station #2

Winfield Fire Protection District Station #2, located at Winfield and Roosevelt Road, if staffed, would dramatically improve response times to the southern portion of the District and would lessen the impact of response time delays caused by the Winfield Road rail crossing.

Forest Preserves

Approximately 40% of the western boundary of the District is forest preserve land with small areas of residential dwellings near each of the preserves. Travel times to those residential units are prolonged by large open areas of land and limited highway access. Several residential areas are located at the very western boundaries of the District.

ALARM PROCESSING TIME, TURNOUT TIME AND TRAVEL TIME

An effective response force is defined as the minimum amount of staffing and equipment that must reach a specific emergency zone within a maximum prescribed travel or driving time and is capable of initial fire suppression, EMS and /or mitigation. Key components in understanding response coverage are the times for: alarm notification, processing, turnout, and travel, arrival on scene, initiation of action, and termination of incident. Each of these components is measurable and can be used to





objectively and quantitatively analyze the relationship between existing and new fire station locations.

National Fire Protection Association Standard 1710 (*Standard for the Organization and Deployment of Fire Suppression and Emergency Medical Operations, 2004 edition*) recommends the fire department should establish time objectives that include tracking **Response Time** which is the sum of **Turnout Time + Travel Time**. The Standard also recommends that the department should identify a performance objective of not less than 90 percent for the achievement of each response time objective.

In support of NFPA 1710, but more detailed in their calculation of response time, the Center for Public Safety Excellence (CPSE) identifies a third element in the calculation of the overall response time (**Figure 3**). The Commission recommends that the sum of the response time include the Alarm Processing Time, which is the time it takes for the dispatcher to answer the 911 emergency call to the point at which the responding agency is notified (i.e., "toned out"). In many incidents, dispatchers are not moving the information in a timely manner to the responding agency which increases the chance of losing lives and property. Dispatch processing time and turnout time can add an additional two to three minutes.

Consequently, the unit's response time may be two to three minutes longer from the point when the call for assistance was received. Therefore, the Commission identifies **Response Time** to include the **Alarm Process Time + Turnout Time + Travel Time** to the point when the unit arrives on the scene.





Response Time Analysis & Station Distribution Study

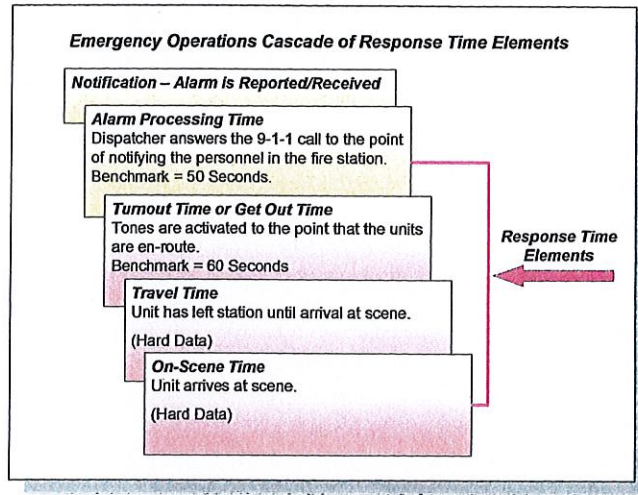


Figure 3: CPSE Emergency Operations Cascade of Response Time Elements

The travel time criteria is one of the most frequently used methods of determining a fire station location. Policymakers and administrators require a gauge to measure the effectiveness of the overall response times, and a method to make decisions regarding the standards of coverage. Because the economic cost is highly sensitive to travel times, a small change in response time requirements may cause a significant change in cost. Policymakers must therefore consider carefully the balance between the economic cost, the fire suppression costs and benefits, and the social costs of response time requirements.

Computer Response Mapping

Computer response mapping is provided to illustrate Insurance Services Office (ISO) distances, plus the road distances reached by responding apparatus traveling from Winfield FPD Station #1, Winfield FPD Station #2, and Wheaton FD Station #1 at average speeds of 35 mph. As requested, the Consulting Team evaluated an alternative fire station location (County Farm Road, north of Parkway Drive) that would improve the Fire District’s ability to access primary routes while improving the overall travel time to the emergency incident. A mathematical matrix (Arcview Network Analyst) was used to calculate the travel time on each segment of a road-street network map within the District’s response area.





The following information should be kept in mind as the computer-generated maps are reviewed:

- The computer maps are based on digitized representations of streets and roads within the Winfield Fire Protection District as prepared for the United States Census Bureau ("Tiger Maps"). The mapping is generally precise for the purposes at hand. In some cases, there may be newer build-out areas not covered in the Census material.
- In the Tiger Map system, the original computerization divided all streets and roads into segments of specific lengths (called "links"). In some cases these links are not necessarily directly useable in the fire-mapping programs. At times, either when determining ISO distances or speed-time calculations, the computer-mapping program for fire coverage analysis may utilize a whole link where it should be using only a part. This is especially true when there are long "links", such as on major roads and highways, where there tend to be fewer intersecting streets. In these instances, there can be occasional distance or time errors. These occur because the fire coverage area mapping software, except in cases where the consultant recognizes these obvious errors and makes the adjustment manually, cannot re-divide the original links. The errors are not significant in the analysis of fire coverage and distance/time maps because the distance and time segments typically used in the mapping are relatively short, with many intersecting streets, and normally coincide quite closely with Tiger Map links. Small errors may occur, and generally happen randomly and across the entire mapping area.
- The overall result is that the errors tend to be canceled out, and there is little if any, effect on the main analysis. In the case of larger distances and/or time intervals, or the utilization of long links when only short distance/time intervals are desired, mapping distances and times are approximate. For the most part and based on our experience with many applications, the impacts of any discrepancies which might occur are considered to be insignificant.





Response Time Analysis & Station Distribution Study

- The U.S. Census Feature Classification Code describes street and road characteristics, and a mathematical matrix (ArcView Network Analyst) enables a calculation for driving time on each segment of a road-street network. Road segments are rated as follows: interstate highway segment classified at a 55-mph average speed; a primary, limited access road at 45 mph; a secondary connecting road at 33 mph, and local neighborhood roads at 25 mph. Considering local street speed limits, the size and weight of fire vehicles, and accident liability considerations, careful review of response speed limits is essential. Very little research if any, demonstrates that more speed results in less fire loss.
- ISO calls for an engine company within 1.5 miles of every built-on area, and a ladder company within 2.5 miles of any area with five or more buildings of three stories of 35 feet or more in height. Typically, structures more than five miles from a fire station and areas without fire hydrants have extra insurance costs assigned to them.
- NFPA Standard 1710 (*Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Volunteer Fire Departments, 2004 edition*) identifies staffing and response time as shown in **Figure 4**. It must be understood that NFPA identifies response time from the moment the fire department is toned out to when the first-arriving engine company (or ambulance) is on the scene. It does *not* include call-handling time.

Demand Zone	Demographics	Staffing & Response time	Percentage
Special risks	Authority Having Jurisdiction (AHJ)	AHJ	90
Urban	1000 people/1 sq. mi.	15/9	90
Suburban	500-1000 people/1 sq. mi.	10/10	80
Rural	Less than 500 people/1 sq. mi.	6/14	80
Remote*	Less than/= Travel Distance 8 mi.	4	90

Figure 4: NFPA Table 4.3.2 Staffing and Response Time

*Upon assembling the necessary resources at the emergency scene, the fire department should have the capability to safely initiate an initial attack within 2 minutes, 90 percent of the time.





WINFIELD FIRE PROTECTION DISTRICT

Response Time Analysis & Station Distribution Study

- NFPA 1710 (*Standard for the Organization and Deployment of Fire Suppression Operation, Emergency Medical, and Special Operations to the Public by Career Fire Departments, 2001 edition*) calls for a travel time of no more than 240 seconds for the first-due engine company with a minimum of four personnel, plus the entire first alarm assignment (15 personnel minimum) within 540 seconds, to 90% of the time, for annual fire calls.

The following maps are included as part of this report:

- **Exhibit 1** Base Map for the Winfield Fire Protection District
- **Exhibit 2** ISO Distances from Winfield Station #1
- **Exhibit 3** ISO Distances from Winfield Station #2
- **Exhibit 4** ISO Distances from Winfield Proposed Station #1
- **Exhibit 5** ISO Distances from Wheaton Station #1
- **Exhibit 6** Response Coverage @ 35 mph from Winfield Station #1
- **Exhibit 7** Response Coverage @ 35 mph from Winfield Station #2
- **Exhibit 8** Response Coverage @ 35 mph from Winfield Proposed Sta. #1
- **Exhibit 9** Response Coverage @ 35 mph from Wheaton Station #1
- **Exhibit 10** Response Coverage from Winfield Stations #1 & #2 for 4 minutes (88.4% coverage)
- **Exhibit 11** Response Coverage from Winfield Station #2 & Winfield Proposed Station #1 for 4 minutes (95.4% coverage)

Findings

As presented, the Computer Response Mapping (CRM) is one tool to assess travel times for a given community. From the CRM findings, we are able to identify the percentage of street/road links covered in the different combinations of station locations for the Winfield Fire Protection District.

The Computer Response Mapping (CRM) used the street/road links covered in different station scenarios using an average speed of 35 miles-per-hour travel for four-minute intervals. As explained in the elements of response, the Consulting Team will use the acceptable and recommended standard of coverage of a four-minute travel





time (not including alarm processing and turnout times) for suburban areas that are within an incorporated city with a population greater than 9,000 persons, or which consist of a census tract having a population density greater than 2,000 persons per square mile. Within the Suburban Zone, "the emergency provider shall respond to all Code-3 (with lights and siren) calls within 5 minutes at a 90 percent fractal of the time, and the balance of the alarm shall arrive within 10 minutes 24 seconds." (CPSE)

DISPATCH SERVICES

Incoming emergency calls for the Winfield Fire Protection District are received and dispatched by DuPage Public Safety Communications Center (Du-Comm). Du-Comm, located at 600 Wall Street in Glendale Heights, Illinois, is a multi-agency dispatch center providing dispatch services for a total of 34 fire and police agencies.

Du-Comm has a total of 53 telecommunicators and with a minimum of nine call-taker/dispatcher (CTD) positions per shift with the ability to call back additional personnel during peak times, if needed. Administrative staffing includes an Executive Director, Deputy Director, 6 Operations Managers, a Training Manager, 3 full-time Technicians, finance and secretarial personnel.

Du-Comm has an enhanced E911 system and uses Motorola Premier Printrak Computer Aided Dispatch (CAD) software to track and document all emergency calls. The CAD software has the capability to dispatch and track calls for police, fire and medical units.

The Winfield Fire Protection District recently had a Zetron fire station alerting system installed in their Fire Station #1. The Zetron system should dramatically improve turnout time for fire and EMS units and allow for early notification for incoming emergency calls from Du-Comm.





Review of Current Response Time Data

Response times are one of the most frequently used methods of measuring system performance. In review of the dispatch data, the Winfield Fire Protection District has the ability to track the five elements of response from the point of alarm notification through alarm processing time, turnout time, en-route time, on-scene time, and when companies are available, as identified in **Figures 5 and 6**.

It is important in the measurement of response time that recognition is given to the passage of time within each element. The degree of loss of life and property depends on the reduction of time within each element.

Winfield FPD uses Firehouse software as a records management system to document and record emergency calls. A key component of this software enables the District to produce statistical reports to assist in the assessment of the level of service being provided. Dispatch records on emergency incidents are essential to providing an accurate report of the department's activities.

Dispatch information from Du-Comm can be obtained from the dummy terminal located in each fire station or via phone line by the fire officer-in-charge. The officer is responsible for completing the District's run sheet and for manually entering the information into the Firehouse software program.

It is important to note that the Consulting Team has found that when critical information has to be manually re-entered into another management information system, there tends to be an increase in human error due to not documenting the exact time stamped on the run cards, thereby resulting in unreliable data. The Winfield Fire Protection District is currently working with Du-Comm to allow their record management system (Firehouse) to integrate with the Motorola Premier Printrak CAD. According to Du-Comm MIS Department manager, Scott Klein, the integration should be completed by July of 2011.

From data that was available, Winfield FPD was asked to extrapolate the dispatch data from the Firehouse software management information system. The information obtained enabled the Consulting Team to determine, with some high degree





Response Time Analysis & Station Distribution Study

of predictability, the turnout time and travel time performance for both the first responding engine company and EMS units.

Using a fractal response time report, the Consulting Team assessed the data using both NFPA 1710 and the CPSE response objectives to determine the strengths or weaknesses of the current standards of coverage.

The Consulting Team reviewed the time it takes for a call-taker/dispatcher (CTD) to process the emergency 9-1-1 call. NFPA and CPSE identify a performance measurement of 60 seconds or less, 90% of the time, for the CTD to process the alarm. This segment of time is referred to as the Alarm Processing Time and is one of the five elements that can be assessed and, if needed, improved with procedural changes and CTD training. From the data obtained from Du-Comm and exhibited in **Figure 5**, the Consulting Team found that the benchmark of 60 seconds or less, 90% of the time is not being met.

Alarm Processing Time at 60 Seconds or less 90% of the time. ALL Emergency Calls
37.4% at 60 Seconds or less
83.6% at 2 Minutes or less

Figure 5: Winfield FPD Alarm Processing Time for Fire & EMS

The Consulting Team reviewed the time it takes for responding crews to acknowledge receipt of the call from the dispatch center until the beginning of the travel time. This segment of time is referred to as the Get-Out Time or Turnout Time. From data obtained from Winfield FPD and exhibited in **Figure 6**, the Consulting Team found that the benchmark of 60 seconds or less, 90% of the time is not being met. It must be understood that the benchmark is difficult to obtain during evening hours. From the Consulting Team's experience, we are finding that after 6:00 p.m. turnout times average 1 minute 20 seconds. However, until the standard is adjusted, the 60 seconds or less, 90% benchmark for evening hours will be a goal to work towards.





Response Time Analysis & Station Distribution Study

Engine Company	Turn Out Time of 60 Seconds or Less 90% of the time. (6:00 AM to 5:59 PM)	Turn Out Time of 60 Seconds or less 90% of the time. (6:00 PM to 5:59 AM)
Station 1 Ambulance Calls	32.8% (737 calls)	19.7% (420 calls)
Station 1 Engine Calls	40% (565 calls)	28.6% (349 calls)

Figure 6: Winfield FPD Turnout Times from Station #1

The Consulting Team reviewed the fire suppression and EMS calls during calendar year 2010 for the first-due engine and ambulance from fire station 1. **Figure 7** is a summary Travel Time report that indicates that area of coverage within the Fire District is not meeting the recommended benchmark of 90%. In essence, the data reflects that the current fire station location is not meeting the service level demands of the entire response area. The Winfield response data is not within the standard of coverage benchmark of 90% response within the recommended time frame standards.

	NFPA 1710 Four-minute Travel Time at 90% of the time.	CPSE Accreditation Six-minute, 30 seconds Travel Time at 90% of the time.
Station 1 Ambulance (1119 calls)	Four Minutes at 79.7%	Six-minute, 30 seconds at 92.1%
	Eight Minutes at 94.3%	
Station 1 Engine (824 calls)	Four Minutes at 75.8%	Six-minute, 30 seconds at 91.1%
	Eight Minutes at 94.1%	

Figure 7: Winfield FPD 1st Engine & Ambulance Travel Times from Station #1

The information obtained from **Figure 7** is important in the assessment for determining future fire station locations and should become an assessment tool for evaluating future response performance, when used on a quarterly basis. But more importantly, the quarterly report will become the evidence needed to support or refute concerns by anyone regarding response inequity within the Fire District.





Response Time Analysis & Station Distribution Study

The graph in Figure 8 details the response time distribution for the ambulance and engine from January 1, 2010 to December 31, 2010.

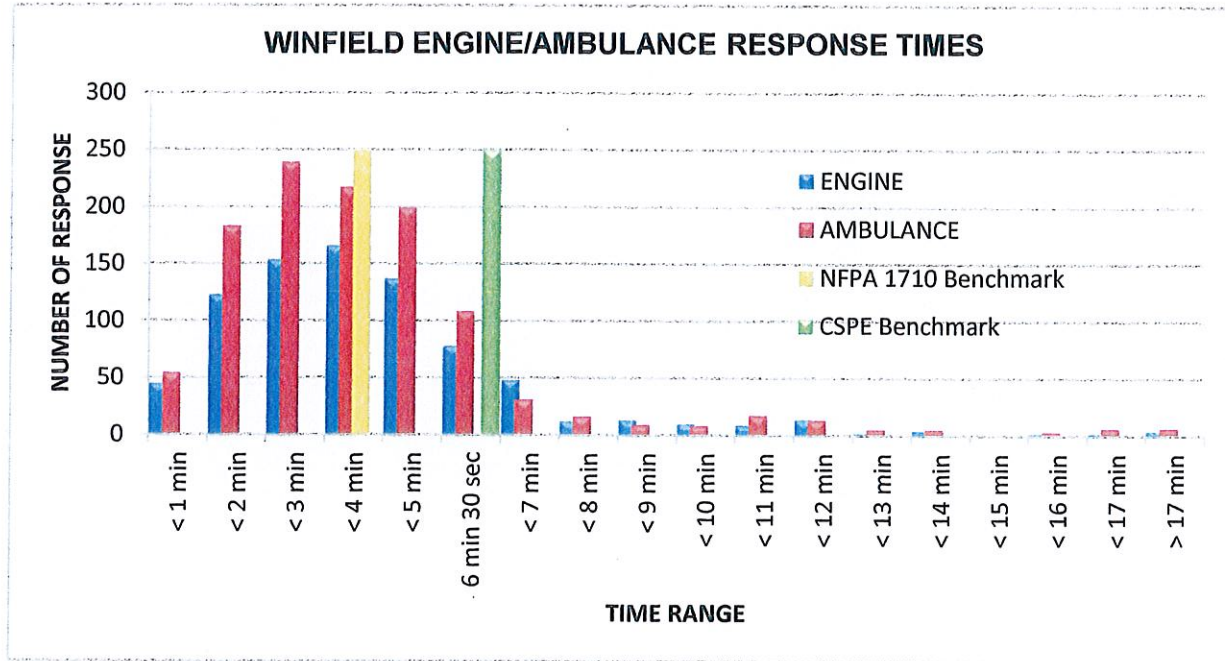


Figure 8: Winfield Engine/Ambulance Response Times

The Winfield FPD does not meet the minimum threshold for travel time according to NFPA 1710. However, it does exceed the benchmark of the CPSE Accreditation model for travel time. It is important for the administrative staff to familiarize themselves with the evaluation standards of both NFPA and CPSE. Any efforts for quality improvement or benchmarking for excellence should assess the appropriateness of both standards relative to the Winfield FPD.

In regard to the performance measurements of both the Alarm Processing Time and Turnout Time, weaknesses need to be identified and an action plan should be developed to improve the performance measurements to ensure that the 60 second or less, 90% of the time benchmark can be met.

The consulting team analyzed the response time data and has the following recommendations.





Recommendations for Improving Response Times

Recommendation RT-1: The Winfield Fire Protection District Administrative Staff should establish performance measurement criteria standards, response time standards and related performance measurement criteria for both fire and EMS response times. Further, regular reporting and review of the response times should be established to assist in identifying weaknesses within each response time element.

Recommendation RT-2: The Winfield Fire Protection District Administrative Staff should continue to work with Du-Comm to insure that alarm processing times are within the 60 second benchmark. As indicated, the Zetron fire station alerting system should greatly enhance alarm processing time.

Recommendation RT-3: The Winfield Fire Protection District Administrative Staff should pursue agreements, policies and procedures so that Du-Comm can "simultaneously dispatch" the primary response agency and auto-aid companies to emergency calls within the Winfield Fire Protection District response area; especially for areas south of the Union Pacific Railroad tracks.

DETERMINING FIRE STATION LOCATIONS

The Consulting Team assessed fire station locations that would best serve the entire District with respect to a four-minute travel time from any location within the District boundaries. Based on the computer response mapping, and current arterial and secondary roadway configuration, the best-fit scenario would be to relocate Fire Station #1 to County Farm Road, near Parkway Drive and provide staffing for Fire Station #2.

The benefits of the new location for Fire Station #1 would be fourfold; it would eliminate railroad traffic delays with the Winfield Road railway underpass, it would significantly improve response times to the northeast portions of the District, travel times would improve because of the four lane highway and station distribution would be more uniform. Furthermore, a new Fire Station #1 would provide much needed space needs for the Fire District; additional apparatus space, offices, a larger classroom, and more ample parking.





Response Time Analysis & Station Distribution Study

A careful analysis of the market value of the current Fire Station #1, the costs to construct a new station, public reaction to closing the existing station and financing would have to be explored before proceeding with a new fire station.

Staffing Fire Station #2; especially with the amount of railroad traffic that frequently blocks southern access at the Winfield Road crossing, is imperative. Fire Station #2, when staffed, would significantly improve response times to the southern portions of the District because of its location south of the Union Pacific railroad tracks.

If staffing of Fire Station #2 is not financially feasible, an alternative would be to negotiate an intergovernmental agreement with the Wheaton Fire Department to provide coverage, from their Fire Station #1, to the areas south of the Union Pacific Railroad tracks.

In summary of our findings to determine the best fire station locations, the Consulting Team found that the current locations of Winfield FPD Fire Stations #1 and #2 (if staffed) provide acceptable levels of response time coverage to the central areas of the District. However, the outlining areas of the district; particularly, the northeastern area exceeds a four minute response. In recognizing that there are acceptable levels of risk that the governing body must contend with in providing public safety, the Consulting Team strongly believes that the Winfield Fire Protection District can greatly reduce their level of risk by manning each fire station with at least three personnel assigned to 24-hour shifts and by aggressively pursuing auto-aid agreements with all neighboring fire and EMS providers.

Based on the concerns relative to the Fire District, and the need to provide acceptable response times, the Consulting Team has three options for fire station distribution.

Recommendations for Fire Station Distribution

Recommendation FS-1: Winfield Fire Protection District Trustees and Administrative Staff must consider staffing Fire Station #2, to help improve response times to the southern portions of the District; especially in light of the high volume of rail traffic at the Winfield Road crossing.





Recommendation FS-2: An option to staffing Winfield FPD Fire Station #2 is to consider an intergovernmental agreement with the Wheaton Fire Department to respond from their Fire Station #1, for areas south of the Union Pacific Railroad tracks.

Recommendation FS-3: Winfield Fire Protection District Trustees and Administrative Staff should consider selling their Fire Station #1 and building a new Fire Station #1 on County Farm Road, near Parkway Drive. The new location would eliminate railroad delays with the County Farm Road railway underpass, significantly improve response times in the northeast section of the District, improve travel times because of the four-lane highway and provide better fire station distribution.





GUIDE TO IMPLEMENTING RECOMMENDATIONS

The Consulting Team offers the following recommendations to assist the Fire Department’s officials with implementing the objectives of this study. This proposal can be used as a short- and long-term guide for the direction of the District.

Category A: High Priority to be implemented within 12 months.

Category B: Moderate Priority to be implemented within 12 to 24 months.

Category C: Low Priority to be implemented within 24 to 36 months.

Category D: To be considered within a 48 month period.

Recommendations for Rail Traffic Issues	Category
Recommendation RTI-1: The Winfield Fire Protection District Administrative Staff should consider developing a community risk matrix. This will assist and enhance the Fire District’s response time during “peak train traffic times”.	B
Recommendation RTI-2: The Winfield Fire Protection District Administrative Staff should consider increasing the requests for mutual aid change-of-quarters ambulance companies during times when Fire Station #1 is unoccupied during high rail traffic times or until the point in time when the Fire District can staff Fire Station #2.	A

Recommendations for Improving Response Times	Category
Recommendation RT-1: The Winfield Fire Protection District Administrative Staff should establish performance measurement criteria standards, response time standards and related performance measurement criteria for both fire and EMS response times. Further, regular reporting and review of the response times should be established to assist in identifying weaknesses within each response time element.	A
Recommendation RT-2: The Winfield Fire Protection District Administrative Staff should continue to work with Du-Comm to insure that alarm processing times are within the 60 second benchmark. As indicated, the Zetron fire station alerting system should greatly enhance alarm processing time.	A





WINFIELD FIRE PROTECTION DISTRICT

Response Time Analysis & Station Distribution Study

<p>Recommendation RT-3: The Winfield Fire Protection District Administrative Staff should pursue agreements, policies and procedures so that Du-Comm can “simultaneously dispatch” the primary response agency and auto-aid companies to emergency calls within the Winfield Fire Protection District response area; especially for areas south of the Union Pacific Railroad tracks.</p>	<p>A</p>
--	----------

Recommendations for Fire Station Distribution	Category
<p>Recommendation FS-1: Winfield Fire Protection District Trustees and Administrative Staff <u>must</u> consider staffing Fire Station #2, to help improve response times to the southern portion of the District; especially in light of the high volume of rail traffic at the Winfield Road crossing.</p>	<p>A</p>
<p>Recommendation FS-2: An option to staffing Winfield FPD Fire Station #2 is to consider an intergovernmental agreement with the Wheaton Fire Department to respond from their Fire Station #1, for areas south of the Union Pacific Railroad tracks.</p>	<p>A</p>
<p>Recommendation FS-3: Winfield Fire Protection District Trustees and Administrative Staff should consider selling their Fire Station #1 and building a new Fire Station #1 on County Farm Road, near Parkway Drive. The new location would eliminate railroad delays with the County Farm Road railway underpass, significantly improve response times to the northeast section of the District, improve travel times because of the four-lane highway and provide better fire station distribution.</p>	<p>C</p>





GLOSSARY

Term	Definition
Alarm Processing Time	The time interval from the point at which a request or alarm is received and transmitted to emergency responders. The benchmark is 60 seconds.
Automatic Aid	Planned first alarm response of engine and/or ladder-service companies between two or more jurisdictions by prior agreement, so that each department operates substantially as one department.
Center for Public Safety Excellence (CPSE)	The CPSE is a non-profit organization dedicated to the improvement of fire and emergency service agencies through self-assessment and accreditation.
Demand Zone	An area used to define or limit the management of a risk situation.
Distribution	The station and resource locations needed to assure rapid response deployment to minimize and terminate emergencies.
Engine Company	A fire engine (pumper) with equipment and personnel, which may be paid or volunteer.
First Due Response	That distance prescribed for an engine company, 1½ distance miles; for ladder company, 2½ miles.
Flash Over	A critical stage of fire growth where the likelihood of survival and the chance of saving lives drops dramatically. In this stage, greater amounts of water are needed to reduce burning material below its ignition temperature.
Get Out or Turnout Time	The time point at which responding units acknowledge receipt of the call from the dispatch center. Total get out time begins at this point and ends at the beginning of travel time. For staffed fire stations the benchmark is 60 seconds.
Initiation of Action	The point at which operations to mitigate the event begins.





Response Time Analysis & Station Distribution Study

Insurance Services Office(ISO)

ISO is a leading source of information about risk. The organization supplies data, analytics, and decision-support services for professionals in many fields, including insurance, finance, real estate, health services, government, and human resources. Their products help customers measure, manage, and reduce risk.

Ladder Company

A ladder truck with equipment and personnel assigned.

Ladder Truck

Fire apparatus with numerous ladders of varying lengths and types, forcible entry tools and salvage equipment. It may have a hydraulic aerial ladder or elevating platform, generally following NFPA 1901 specifications.

National Fire Protection Association (NFPA)

Established in 1896, NFPA serves as the world's leading advocate of fire prevention and is an authoritative source on public safety. The mission of the NFPA is to reduce the worldwide burden of fire and other hazards on the quality of life by providing and advocating scientifically-based consensus codes and standards, research, training, and education.

Occupancy Risk

An assessment of the relative risk to life and property resulting from a fire inherent in a specific occupancy or in generic occupancy class.

On-Scene Time

The point at which the responding units arrive on the scene.

Pumper (Engine)

Fire apparatus used to deliver water to a fire at pressures necessary for good fire streams; having a pump, equipment and hose; and usually conforming to NFPA 1901 specifications.

Quint

Quint apparatus are equipped with the following five (5) components: water tank, hose, multiple ground ladders, a fire pump and an aerial device such as a ladder or platform.

Standards of Cover

Those adopted written policies and procedures that determine the distribution, concentration, and reliability of fixed and mobile response forces for fire, emergency medical services, hazardous materials, and other forces of technical response.

Total Response Time

CPSE definition: *Alarm Processing Time + Turnout time +*

Travel Time = Total Response Time.

NFPA definition: *Get Out Time + Travel Time = Total*

Response Time.





Response Time Analysis & Station Distribution Study

Travel Time

The point at which units are in route to the call through when units arrive on the scene. Travel time is based on 38 mph or 55.7 feet per second.

Turnout Time

The time point at which responding units acknowledge receipt of the call from the dispatch center through the point that the apparatus goes in service. The benchmark is 60 seconds.



Winfield Fire Protection District Base Map

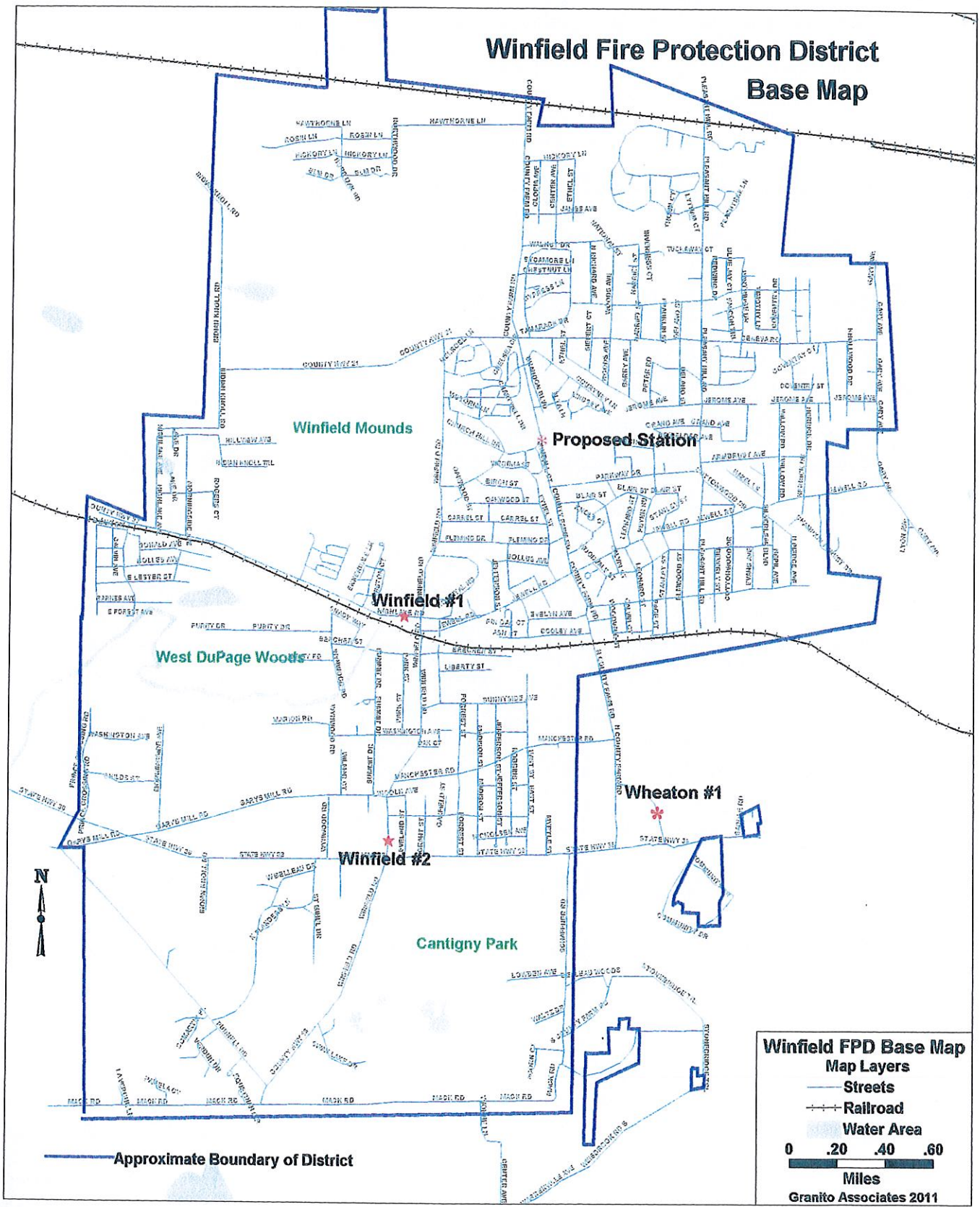
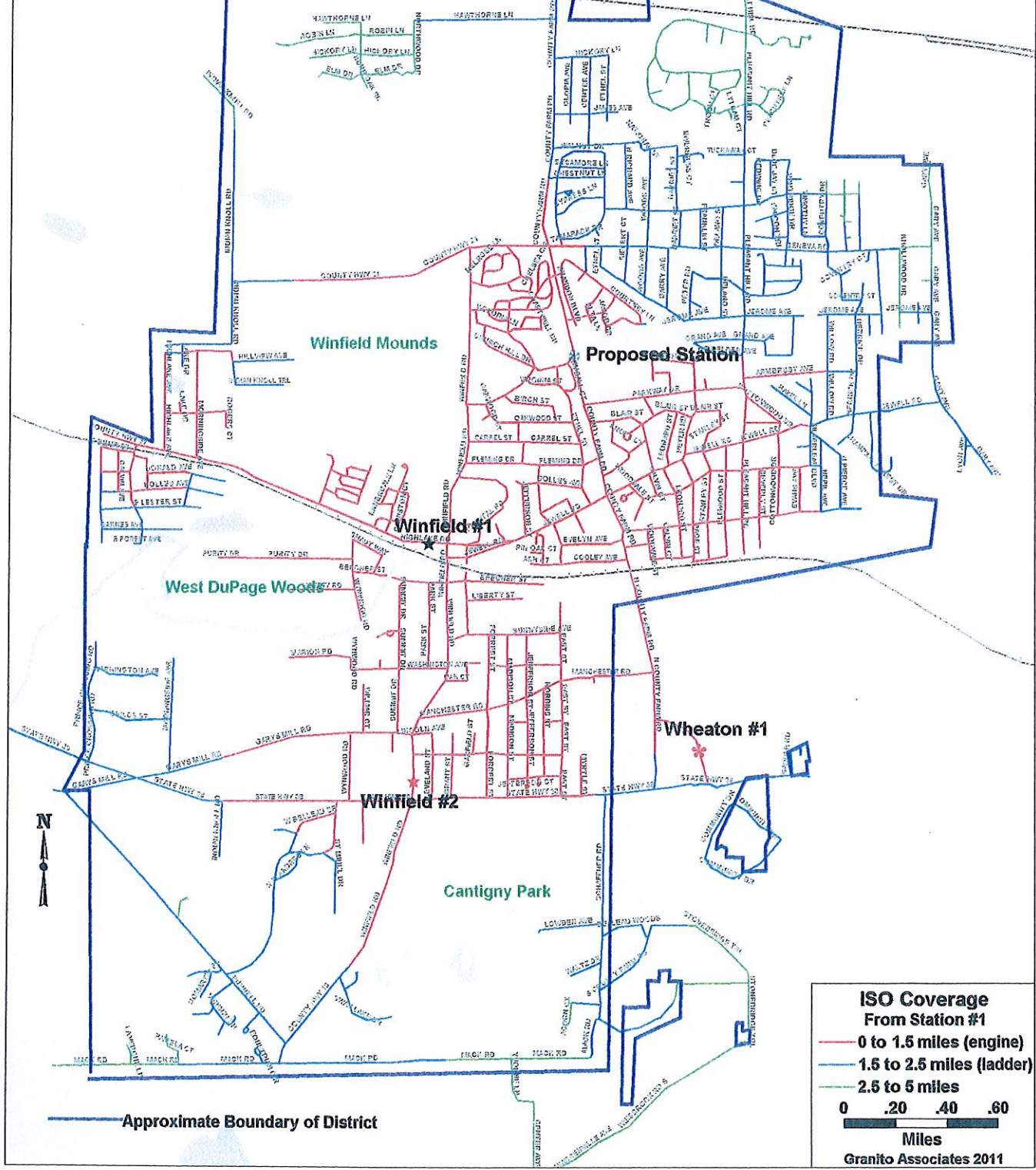


EXHIBIT 1

Winfield Fire Protection District ISO Coverage From Station #1



ISO Coverage From Station #1

- 0 to 1.5 miles (engine)
- 1.5 to 2.5 miles (ladder)
- 2.5 to 5 miles

0 .20 .40 .60

Miles

Granito Associates 2011

EXHIBIT 2

Winfield Fire Protection District ISO Coverage From Station #2

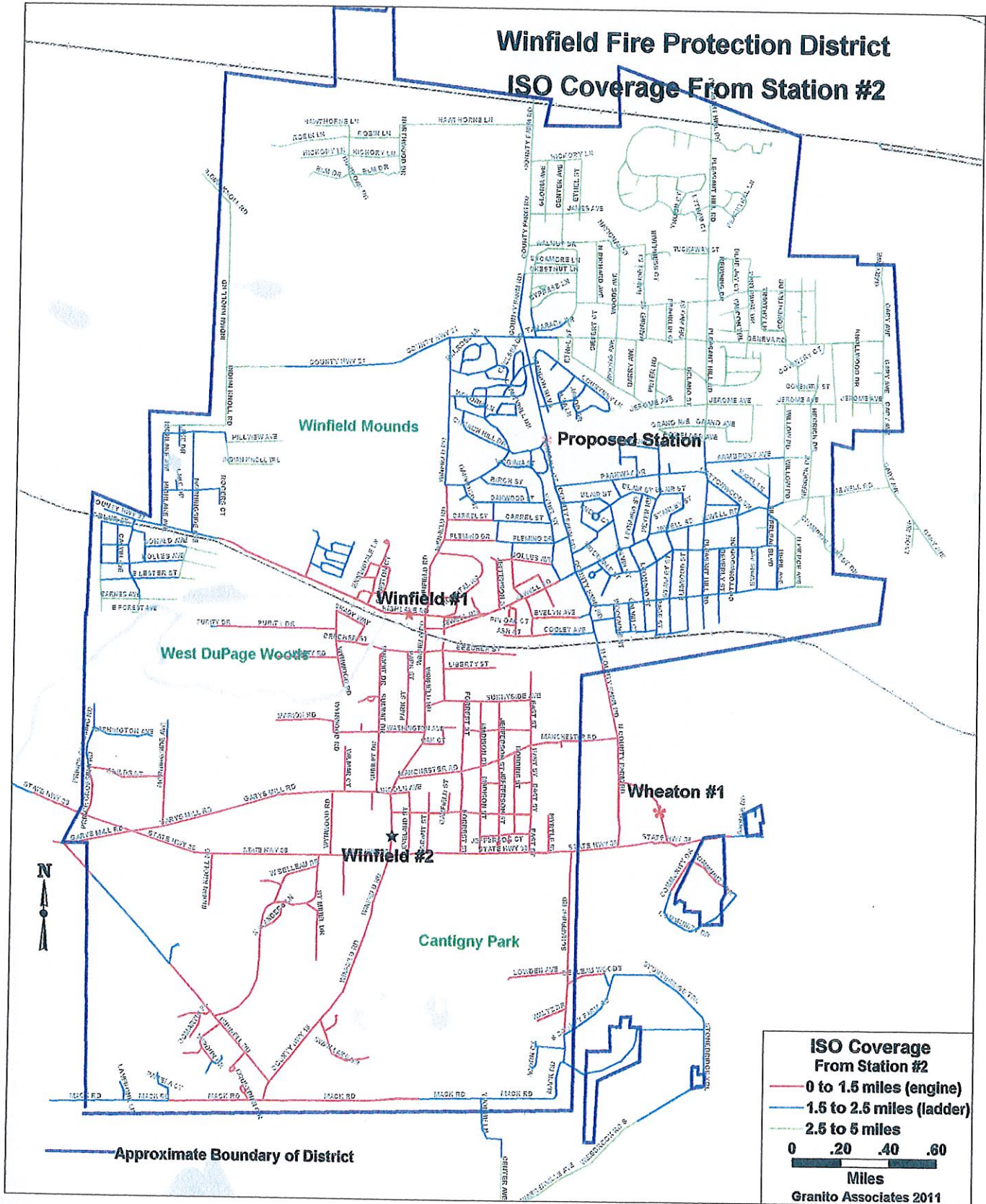


EXHIBIT 3

Winfield Fire Protection District ISO Coverage From Proposed Station

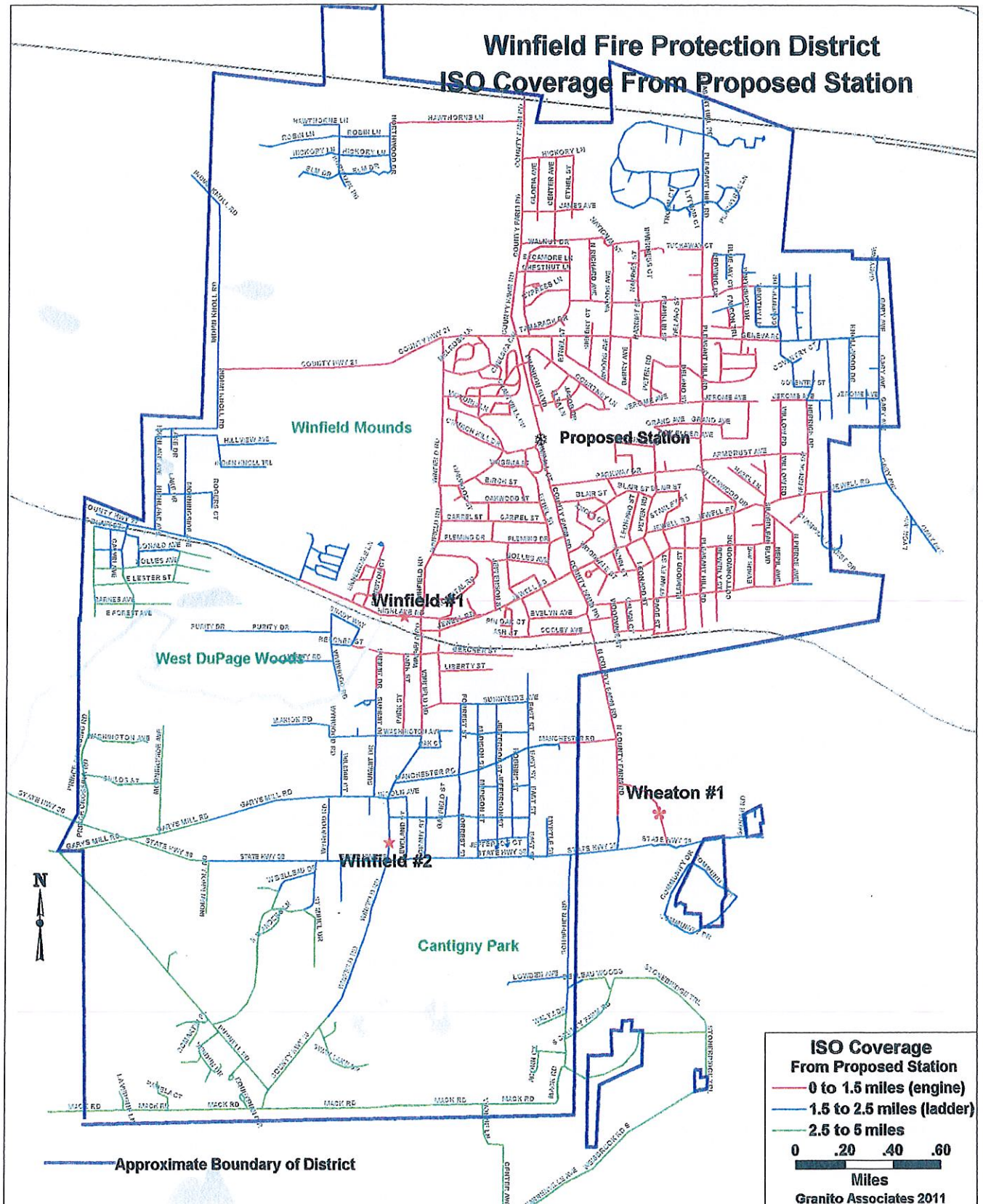


EXHIBIT 4

Winfield Fire Protection District ISO Coverage from Wheaton #1

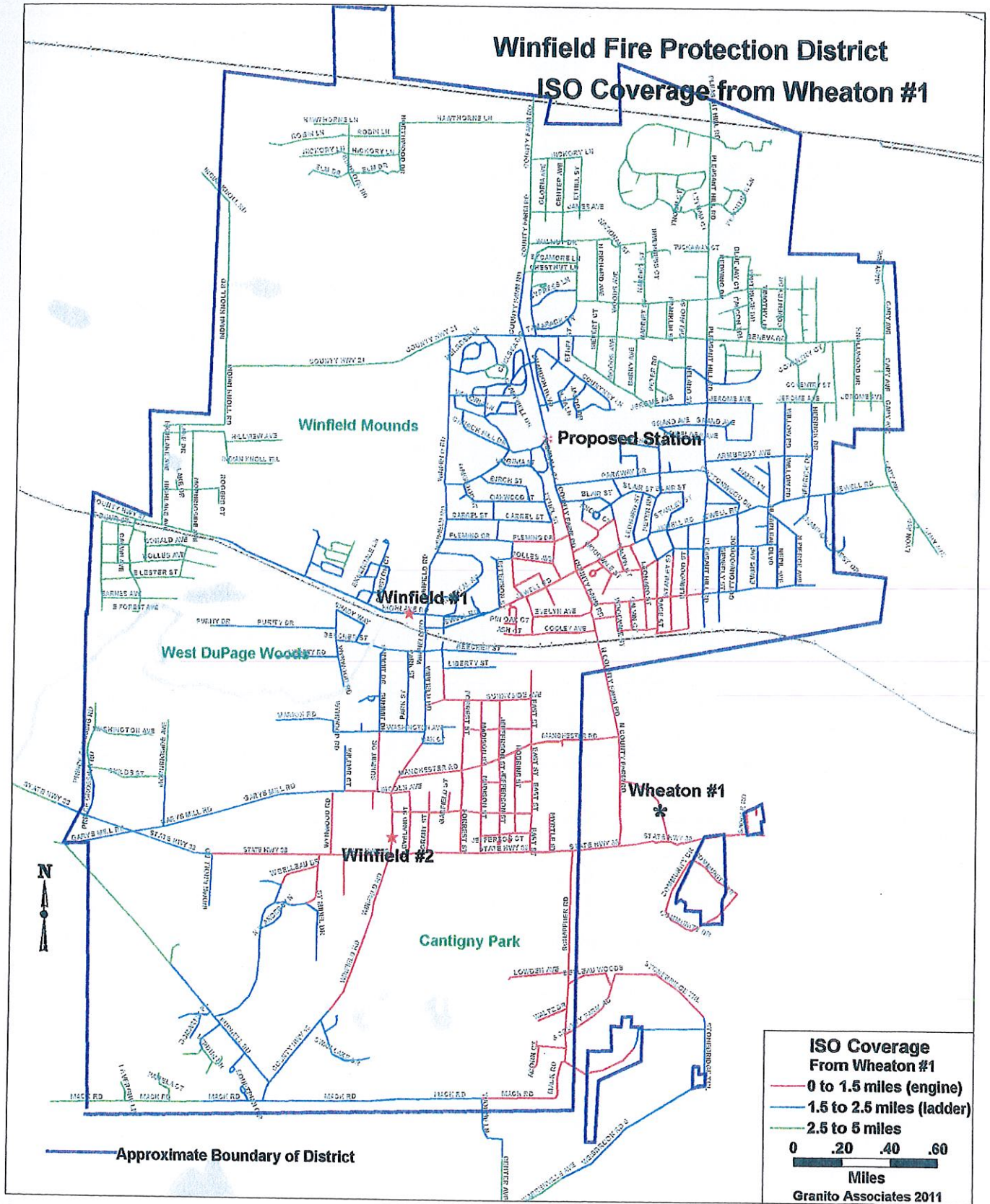


EXHIBIT 5

Winfield Fire Protection District Response Coverage from Station #1 at avg 35 mph

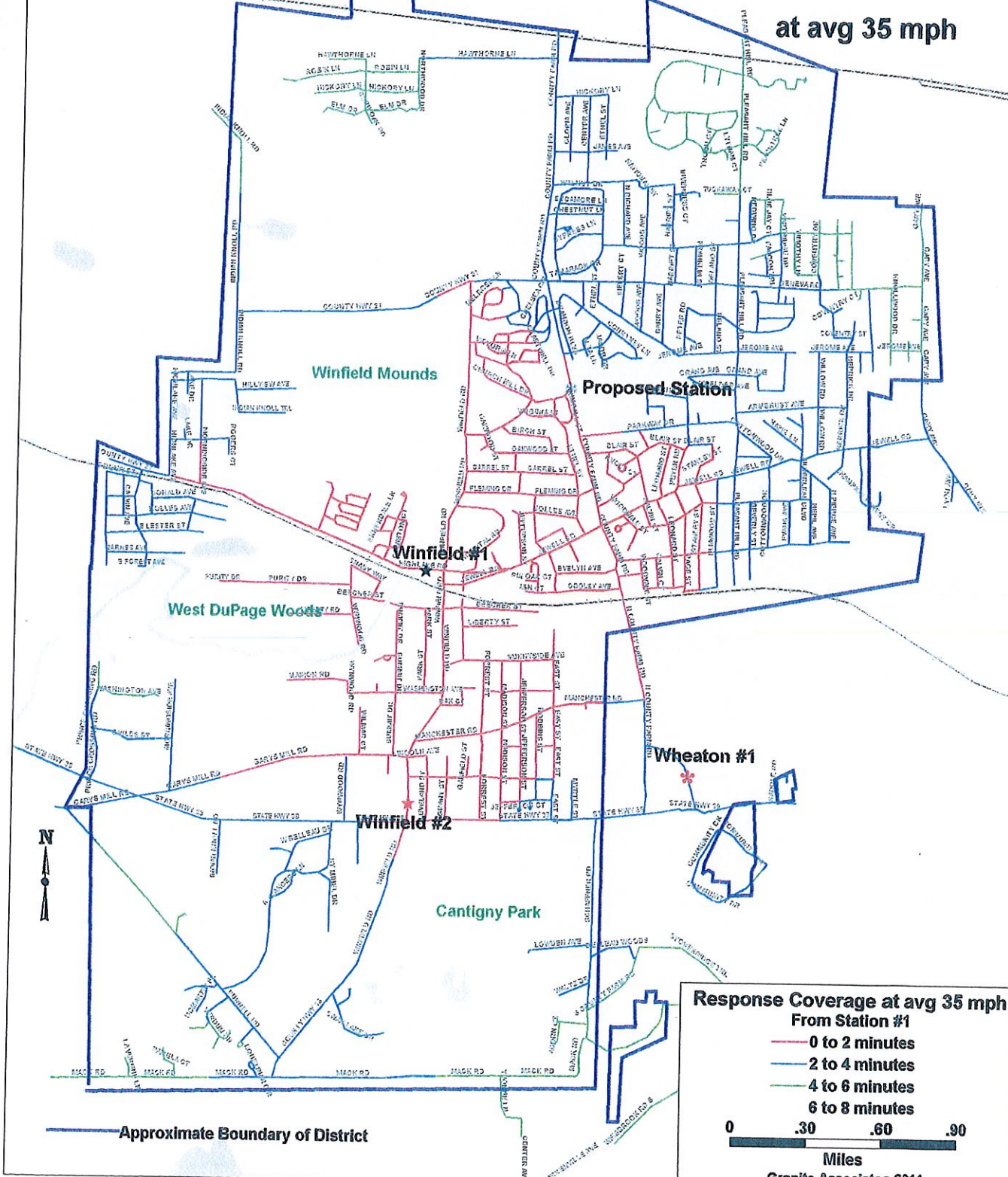


EXHIBIT 6

Granito Associates 2011

Winfield Fire Protection District Response Coverage from Station #2 at avg 35 mph

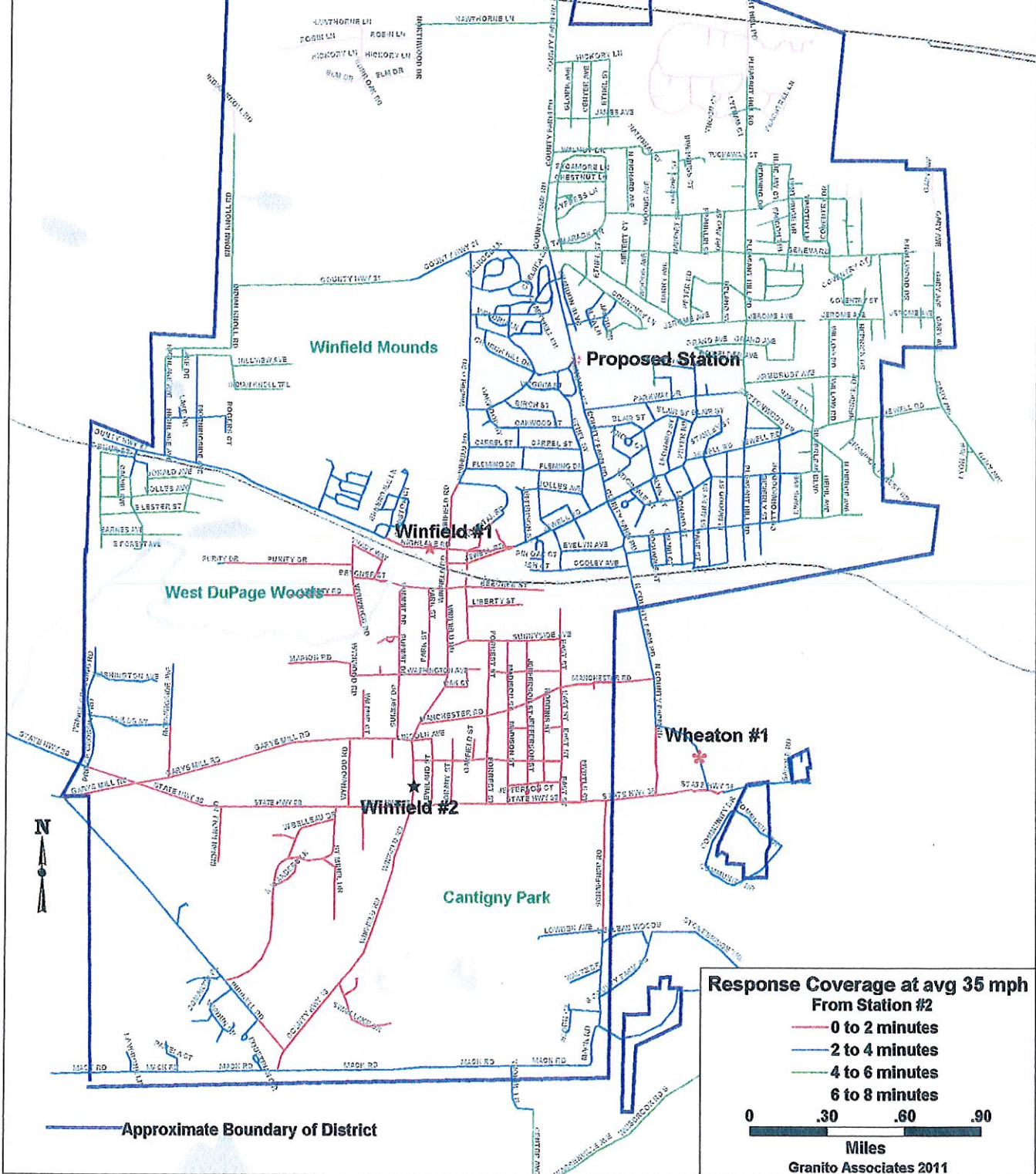


EXHIBIT 7

Winfield Fire Protection District Response Coverage from Proposed Station at avg 35 mph

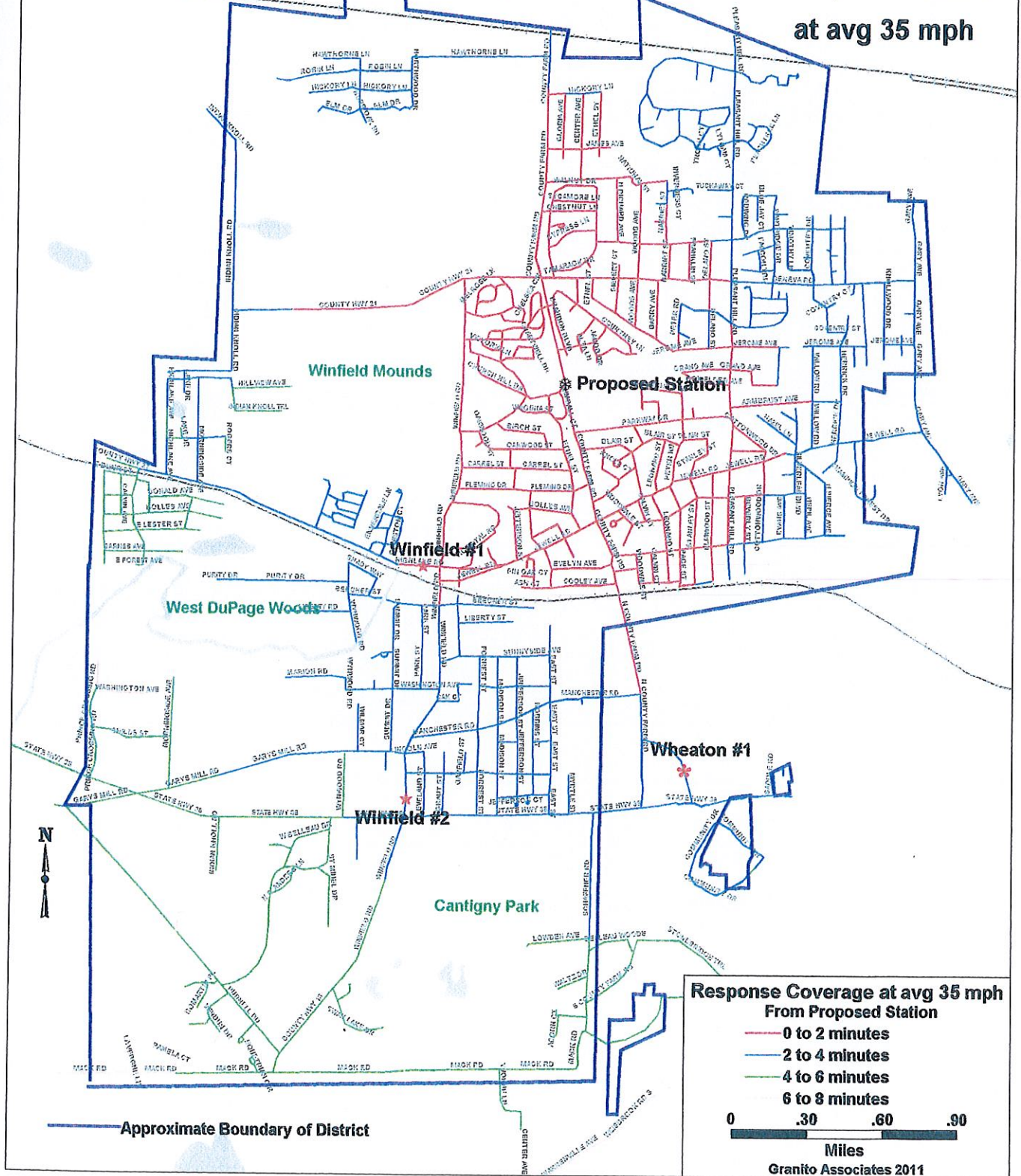
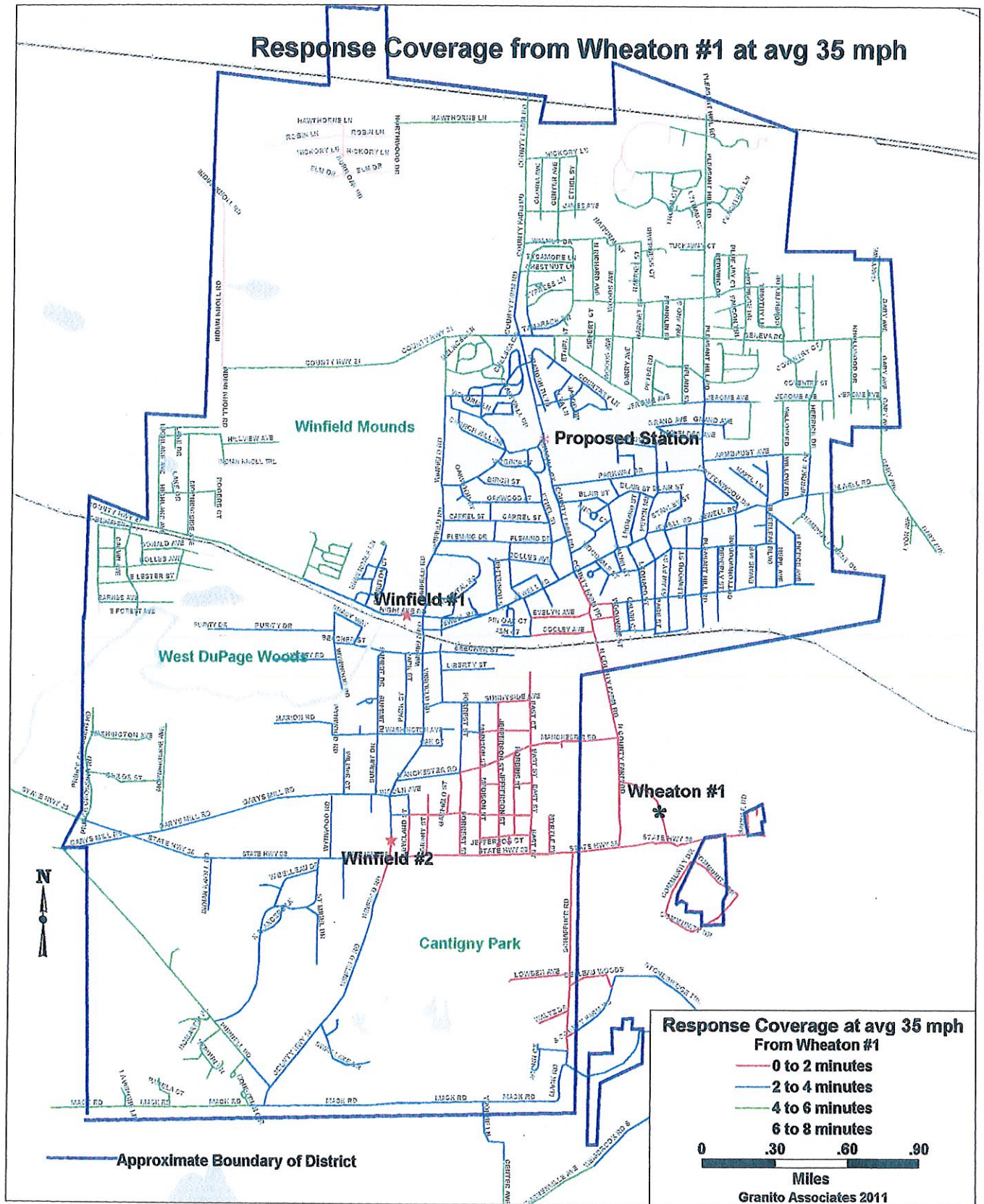


EXHIBIT 8

Response Coverage from Wheaton #1 at avg 35 mph



Winfield Fire Protection District

Coverage from Current #1 or #2 at 35 mph for 4 Minutes

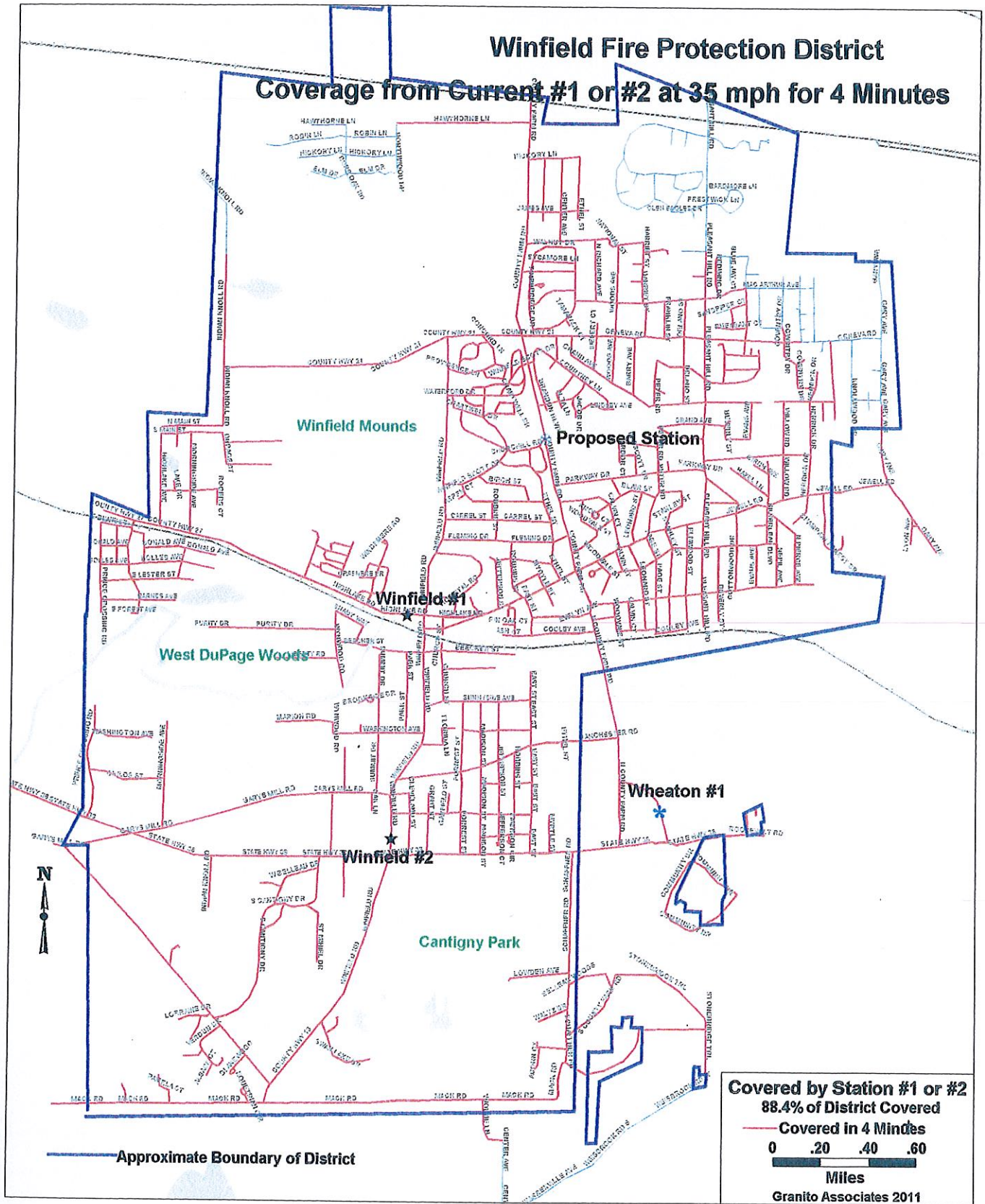


EXHIBIT 10

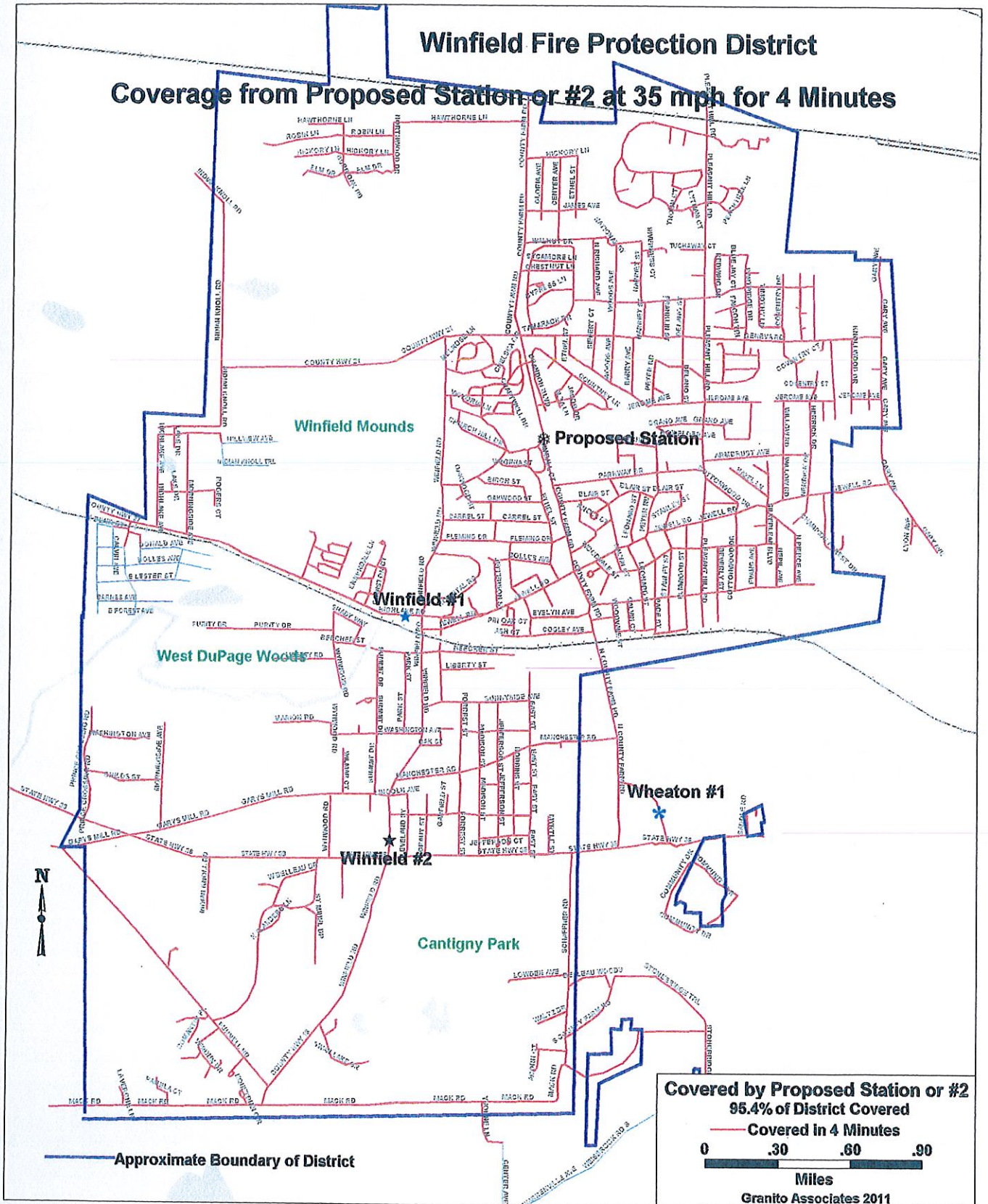


EXHIBIT 11