5-1-1989

Fire Station Location Study Model

Stuart Bayne
University of Tennessee, Knoxville

MUNICIPAL TECHNICAL ADVISORY SERVICE
The University of Tennessee
in cooperation with The Tennessee Municipal League

FIRE STATION LOCATION
STUDY MODEL

by
Stuart Bayne

May 1989

FIRE STATION LOCATION STUDY MODEL

DIRECTED TO:

UT-MTAS GENERAL MANAGEMENT CONSULTANTS

TYPE OF DOCUMENT:

An instruction manual/model.

SCOPE OF DOCUMENT:

To serve as a guide and model for the proper, clinical study of a local government's fire/rescue station coverage. This document will probably best be applied to local government jurisdictions from suburban to rural, from medium sized regions to small towns. It is believed these procedures will not work well in areas having a very complicated street network such as urban areas; it has not, however, been tested.

ROLE OF THE DOCUMENT:

To act as an instruction manual and template for the general management consultant's application to any local government territory. This document is to be retained by the consultant and referred to anytime the consultant is working on the subject of fire/rescue station location evaluations. It contains procedures that if followed will result in objective, documentable conclusions. These procedures are not intended to be instructions cast in stone. The number of variables involved in station location studies and the fact that communities and politics are constantly evolving creates a kind of fluidity to these procedures. They are dynamic in that conclusions evolve somewhat differently every time out of the same set of instructions. This manual will be a good reference guide to which a person can refer for advice on what to do next.

DEFINITIONS:

ALARM NOTIFICATION TIME: The amount of time that elapses between the moment an emergency is detected to the moment the emergency management agency is notified.

AREA(S) REQUIRING A STATION, ARTERIES, COLLECTORS, DISPATCH TIME: That quantity of time elapsing between the second the department is notified of the alarm to the second the personnel are notified of the alarm.

ARTERIES: Primary vehicular routes of travel through a community; avenues and roads that provide the clearest access into, through, and out of a community's road network.

COLLECTORS: Feeder streets, roads, avenues that collect and release local traffic flow onto and off of arteries.

DETECTION TIME: That quantity of time elapsing between initiation of the emergency (e.g.: ignition of fire) and detection of the emergency (fire) by a person or detection system.

ENGINE: A motorized fire department vehicle specifically designed to carry water, pump, hose, and tools.

FIRST DUE VEHICLE: That fire department vehicle which is formally or informally designated to be the first vehicle to arrive at an emergency scene; also, that vehicle closest to the location of the emergency and therefore first on the scene.

LOCATION DESIGN: An arrangement of fire stations in and around a local government jurisdiction; a proposed set of station locations.

RELATIVE LIFE HAZARD: A relative value on the degree of danger to life and health as perceived by the Study Team. Said value is based upon a scale of zero-lowest hazard-to seven-highest hazard-and is assigned to various properties.

RELATIVE PROPERTY HAZARD: A relative value on the degree of danger to property as perceived by the Study Team; said value is assigned a range of zero to seven to designated properties.

RESPONSE OVERLAP: A condition in which first due response areas for fire apparatus from one station encroach or overlap into first due response areas from another station. According to ISO 1.5 miles is used as a kind of standard response maximum for a fire department pumper. Overlap occurs when stations are located too closely to each other with respect to the stations' response areas.

RESPONSE TIME: The total time it takes for an emergency response organization to respond to the notification of a request and set-up on the scene. Response time normally consists of dispatch time, turnout time, travel or run time, and set-up time. Two blocks of time which are most important to fire department success (and not part of response time) are Detection Time and alarm Notification Time.

RUN TIME: That block of time within response time elapsing from the second a fire department vehicle leaves the station to the time of arrival on the scene.

RUN TIME DEMAND AREAS: Areas in a local government jurisdiction which impose the longest, most demanding response run times for the government's emergency response organizations.

TARGET HAZARD: That property which is designated as a relatively high life and/or property hazard; that property which is used as a response run target during Location Design testing and/or validating.

TRUCK: A fire department vehicle designed to carry a large complement of ladders and assorted tools for rescue, entry, salvage, overhaul, etc.; a fire department ladder truck is a vehicle whose functions are to complement those of an engine.

TURNOUT TIME: That quantity of time elapsing between the second the department personnel are notified of the alarm to the second the first due vehicle is moving out of the station.

EQUIPMENT/TOOLS NEEDED TO PERFORM STUDY:

Calculators, measuring tools (map mileage wheel, ruler, string, etc.), paper, colored markers, maps, maps with as small a scale as is available, map pins, stop watch, fire department vehicle with lights and siren.

INTRODUCTION

Nearly anyone can do the following station location study. One need only have common sense, patience, an analytical eye, and a small dose of persistence. Leaders in the local government for whom the study is being done are prone to say, "I know where the station(s) need to go in the community: right here, here and there." They may very well be right on target, but then again maybe not. Having no documentation to back up conclusions is dangerous and unscientific. The purpose of a study is to produce valid data to sustain recommendations. Read this document through one time prior to its application, particularly the first step.

MAJOR MILESTONES:

1. Municipality Committed To Conduct Fire Station Location Study
2. Study Team Established
3. First-Orientation-Meeting
4. Raw Data Gathering Process Completed
5. Data Analyzed; Locations Are Projected
6. Alternative Location Designs Are Identified
7. Location Designs Are Map Tested
8. Map Test Results Are Analyzed
9. Location Designs Are Eliminated
10. Final Location Designs Are Field Tested
11. Field Test Results Are Analyzed
12. Final Recommendations Are Developed
13. Final Report Is Prepared And Delivered

THE REQUEST:

1. The first contact is an expression of intent by a local government's representative to engage the consultant in a fire station location study. The consultant responds by committing to the representative an intent to proceed with the study. This commitment by the consultant must not be taken lightly. The amount of time involved in personally conducting a proper study is extensive regardless of the size and growth of the local government. There are two kinds of station location studies: one with guesses and little or no collection of confirming data, and the other with guesses and volumes of collected data to affirm or reject the guesses. Suffice to say, valid station location studies-with data collection procedures to back up conclusions-take more time than one expects or wants.

The best way to reduce the consultant's time spent on the study is to have those who request the study do the bulk of the work. This can certainly be done, and should be since the community stands to benefit more than the consultant.

STUDY TEAM ESTABLISHED:

2. When the local government's representatives say they are ready to get started, the Consultant advises them to establish a Study Team. Though no hard and fast rules of membership size or representation are recommended, the study team should consist of four to seven members representing the following groups: City Administration (1), Citizen's group(s) (1 each), and the fire department (3-5).

The best use of a consultant's time is by having him/her to organize the first meeting of the community's station location study team. In this first meeting, the consultant reviews what the team will be doing, helps the team to set goals, organizes the tasks to be accomplished, and provides careful, direct advice on the study's procedures. Once the procedures are understood (very possibly the greatest challenge), the consultant need only answer questions and provide cheerleading and directional guidance. General management consultants do not need to be right on top of the maps doing the calculations.

Once the calculations are completed (presumably with care), it is a good time for the consultant to join the project team in a meeting. The consultant can evaluate the calculations and the assumptions and even test several himself for accuracy and logic. If there is logic in the study's assumptions and accuracy in the distance and time calculations, then the consultant can "bless the work" and agree with the team on some conclusions. Then, the conclusions can be road tested with or without the consultant's attention. This system of cooperation produces a completed study "authored" and signed by the consultant who will have spent roughly thirty to forty total hours on the project. At the same time study team members will have spent several hundred hours on the project.

3. Following a commitment by the consultant (who checks his/her calendar carefully), the local government is asked to provide the following items of information:

- Any planning documents, including:
  - Land use plans
  - Major thoroughfare plans
  - Annexation plans

    - Property development plans
- Current inventory of apparatus
- Current location of apparatus
- Expected apparatus purchases
- Current station location(s) and condition(s)
- Locations of local government owned property
- Any information on local traffic patterns/flow etc.
- Status of annexation plans
- Maps of local government on as small a scale as can be obtained
- Zoning maps
- Emergency assistance agreements between organizations
- Current status, type and size of developing properties
- Informal/unwritten annexation plans agreed upon by neighboring local governments
- An analysis of developed properties to which the emergency organization responds. This includes:
    - sprinklered versus unsprinklered
    - breakdown by occupancy:
        - Residential

          hotels

          apts

          rooming

          dormitories

          trailer parks
        - Industrial

        - Assembly
        - Etc.
    - Addresses and sizes of occupancies
    - Occupant load
    - Accessibility (should be available from maps)
- Population trends
- Political climate/perceptions
- Expectations/perceptions of local government leadership toward station location(s), and
- The willingness of the local government to contribute to the progress of the study. In other words, ask whether the local government will help, and how.

The list of information requested is extensive; perhaps the above is even incomplete. Most of this information is requested during the initial meetings between the government's leadership and the consultant. It could be requested over the telephone and/or by mail prior to meeting even the first time on the subject of station location. Better that the list of information requested be in writing than not, obviously.

Bear in mind that the study does not need to wait for all the above information to be forwarded; some will be collected as the study team moves through the process. All the information will be needed to enforce and reinforce final decisions, but some areas of information are needed prior to the study getting far. Those areas are: maps, current station locations, the extensive property analysis, and the local government's degree of commitment.

TIME FRAMES:

4. The local government provides the requested information and advises the consultant when the rest will be available, when the maps, plans, etc. need to be returned, and a sense of when the study is asked to be completed. The local government WILL HAVE a time frame, that is a date when they want the study team to complete its work and make recommendations to the powers that be.

ESTABLISHMENT OF RELATIVE OCCUPANCY RATINGS:

5. The study team is asked to identify and rate the target hazards in the local government's jurisdiction. This step in the process has two levels of work to be done, one as an individual and the other as a group. First, each individual selects twenty to thirty separate occupancies and rates those occupancies for their relative life and property hazard levels (over a zero-no hazard-to seven-extreme hazard-scale). Then, the group draws together and arrives at consensus on what occupancies shall act as target hazards and what relative ratings are assigned each occupancy. This information is carefully copied and stored.

TOUR:

6. An extensive tour of the area within the local government's boundaries is conducted. Information is collected during this tour on some major road distances, street conditions, station conditions, apparatus condition, the apparatus' current accessibility to the road network, etc. Emphasis is on getting the broad brush kind of information on arteries and the larger collectors, not the details on each and every street.

FIRE STATION APPARATUS CHECK:

7. The local government's apparatus should be checked out for its relative ability to produce average response speeds of thirty-five miles per hour. Also, check the local government's apparatus replacement schedule for when the vehicles currently in use are to be replaced. If the equipment currently in use cannot maintain that average speed and an apparatus replacement schedule will not solve the problem, then some alternative arrangements need to be made in order to achieve reliable location recommendations. Examples of alternative arrangements follow:

a. Change the average speed used in all the calculations.

b. Investigate the possibility of improving the capability of the apparatus currently in use. If impossible, then look into a replacement schedule or scale back on the average speed for the study.

c. In certain cases road improvements will help out the responding personnel and apparatus.

Experience has shown that many times apparatus is capable of maintaining average speeds above thirty-five mph where four lane travel is available. This average speed can be used extensively in calculations if the study team agrees to use it.

8. The study team takes the information and locates the space necessary to conduct the next several procedures of this study. The space needed can be estimated as follows. One map with a scale drawn to about 1 inch = 800 feet will require a minimum of one large table top, at least three by five feet. If more than one map need be open for review at the same time, then the amount

of space needed can be multiplied. Additionally, space for tools such as a personal computer or processor, measuring instruments, notepads, calculator, colored markers, pens and pencils, and the information obtained from the local government will be needed. The next several steps will happen at this work place.

MASTER MAP:

9. Of the maps provided by the local government, one with the smallest scale and the clearest, most easily read street network is selected as the master map upon which all proposed station locations will be placed and tested.

TARGET HAZARDS:

10. The various occupancies whose addresses and sizes were provided are color coded and located carefully on the master map. Additional information about each target hazard is indicated on the map in symbolic form (if space is limited) including sprinklered/unsprinklered, occupant load, distance from road network, and maybe more. The relative life and property hazard ratings can be color coded by occupancy or by rating number or by life and property. The best is probably color coding by type of occupancy with the rating number color coded and written in.

TRAFFIC ARTERIES:

11. Major and minor traffic arteries, and principle and secondary collectors are outlined with different colors in the road network onto the map. The purpose is to be able to easily see how fire apparatus will

routinely move through the community. The study team familiarizes itself with these common or habitual routes of movement in order to be "fluent" in the local fire department's response runs.

NATURAL BREAKS, OBSTACLES:

12. The "natural" breaks or obstacles within the local government's boundaries which cause traffic to flow along certain roads to get places are identified and indicated on the master map or on note pad. Examples of road-network obstacles are railroad tracks, limited access highways, floodways, bodies of water, one entrance subdivisions, large parks, etc. Understanding where the smoothest, most fastest routes of travel are will help the study team to know the routes fire trucks take and ultimately, to know where to best place stations.

ROAD MEASUREMENTS:

13. Measure various sections of roads on the map in inches from intersection to intersection. Do this carefully as mistakes in measurements can throw mileage and time calculations way off.

Based on the scale of the map, convert those length measurements into mileage distances (eg: if 1 inch = 800 feet, then 6.6 inches = 1 mile, etc.). Measuring lengths of avenues and roads on maps can be very difficult, especially with only straight line measuring tools. Two types of distance measuring systems are available to the study team: a mileage wheel and the string method. A mileage wheel takes little discussion and is advantageous to use. The string method takes some practice and will work well when mileage wheels are not available. The following directions for using string can apply equally well for the mileage wheel. Use a very pliant, medium thickness string and tie a small, tight knot on one end (with perhaps small knots at intervals of one mile-quite optional). Place the string along the route or section of street to be measured with the knot at point zero; when curves or turns occur, simply track the string along the road. Reaching the end of the desired section to be measured, simply pick up the string and measure the resulting length along a straight edge. Use the same twenty five or thirty inch string for all measurements and, when measuring road stretches from the same beginning points, try to start the measurement at the same spot on the intersection or road. When measuring run distances to target occupancies from hypothetical station locations, remember to measure in the same way from the same point where a station may be placed on the map.

Now that distance measurements in inches are established, divide the measurements in inches by 6.6 inches per mile in order to convert the map distances in inches to miles. Apply the division process out to hundredths of miles. The result will be mileage measurements (to hundredths of miles) that can be placed on the map near the road measured or on a chart.

Place the mileage measurements onto the map in a format similar to that on architectural drawings along the section of road measured; double up on measurements several times and do longer or shorter stretches to test the accuracy of the measurements. Check the accuracy of measurements with the route distances that were collected when the community's areas were toured (step #4). Measure all the primary and secondary arteries, all the collectors, and those roads that though not considered the above nevertheless will be used to (for example) travel from one collector, artery, etc., to another.

GOALS:

14. It is now time to decide upon some goals and develop some hypotheses. This point in the process will require input (if it has not already been received) from the leadership of the local government requesting the study. What the leadership wants matters directly into recommendations. For example, a city may be able to afford only one more fire station even though two more would produce better coverage. Or, if a local governing authority were willing to provide the best fire station coverage regardless how many stations or the price, then goals can reflect that. Perhaps a city wants to lower its response run times twenty percent. If that city knows its response run times over the last three to five years, then goals for the study can be set accordingly.

1. One good, common sense goal is to have maximum response run times under five minutes and city-wide averages under three minutes.
2. A second way to develop goals is to decide upon maximum run times to particular occupancies; then set goals to stay under the maximums. For example, a maximum acceptable run time to a sprinklered, assembly occupancy might be 4 minutes; to an unsprinklered apartment building 1.5 minutes; to a single family dwelling at the city limits 6 minutes.
3. A third goal setting plan is to reduce city-wide run times by a certain percentage. Input can be sought from ISO, ICMA, etc., on what would be desirable time limits.

DEVELOP STATION LOCATION DESIGNS:

15. The next step in this process is to develop several hypothetical station location designs. Early on in the study, perhaps even before, several possible station locations surface in conversation. Expressed by the fire chief, the city clerk, the planning officer, etc., are thoughts on where stations should be. Many times they are going to be right; they know the community longer and more intimately than the consultant, but usually they have no documentation, no proof. Those possible locations can become part of alternative location designs.

Oftentimes, studying the street network of the jurisdiction yields clues as to "areas requiring stations." An area requiring a station is an area of a local government jurisdiction within which a station is required; an area in which station(s) from any other areas still will not produce satisfactory response run times. The City of Smyrna for example has a northern, rectangular-shaped portion within its corporate borders that needed but did not have a fire station. That particular area was considered an area requiring a station because the only way low enough response run times could be achieved was to locate a station in that area.

Base the development of alternative location designs partly on road distances between stations, partly on road distances to target occupancy, and partly on all the other jigsaw pieces. In addition, when developing alternative designs attempt to place stations in locations which provide easy access to arteries and/or collectors.

Identify perhaps eight to ten alternative designs including differing numbers of stations. In most cases, the local government's leadership identifies one or more stations that are considered permanent, fixed.

Alternative designs therefore will be based around that and other "conditions" offered by the local leadership.

ELIMINATION OF LOCATION DESIGNS:

16. Now that eight to ten alternative designs have been proposed (all do not necessarily need to be in writing), eliminate the ones that are obviously too many and those that are too few stations. Eliminate the ones in which the stations are closer to each other than one to one and one half miles. Then, eliminate the one(s) that are certain to produce the highest response run times. What is left will be three to six possible location designs. Assign each location design to be studied a number. The following numbering system works well: the number of stations followed by a "-" and the option number (eg: 4-1, 4-2, 3-1. etc.) It is now time to compare probable response run times of location designs to the various target occupancies located on the map earlier.

DETERMINING DISTANCES:

17. Determine the distances in inches from the nearest stations of each of the location designs to each of the following types of occupancies. Always use the station whose apparatus will be first due:

Assembly	Educational
Nursing Homes	Hospitals
Multi-family Residential	Trailer Parks
Farthest single family homes	Prisons
Industrial (high hazard)	Mercantile
City Limits	

Most of the above target hazards have already been located on the map. It is preferable to have several buildings or addresses of each type of target hazard included in the study. Having several of each type of target hazard in the study improves its chances of producing clear choices among possible location designs. It is now simply a matter of determining the distance (in miles) from a nearest proposed station to each of the above. The string measuring system again works well here, since a fire department run response may require turning several times in the street network until "arrival." Convert the inches measurement collected with the string to miles (to the hundredths); then do either of two calculations:

- Multiply the miles times 1.71 minutes per mile or two minutes per mile, or
- divide the miles by .58 miles per minute or .50 miles per minute.

The resulting calculations will be in minutes of response times to each of the above target hazards.

EQUATION: Miles x minutes/mile = minutes,

or

$$\frac{\text{Miles}}{\text{Miles/minute}} = \text{Minutes}$$

1.71 minutes per mile and .58 miles per minute equals a fire truck moving through the street network at an average speed of 35 miles per hour.

2 minutes per mile and .50 miles per minute equals a fire truck moving at an average speed of 30 miles per hour.

These speeds are considered reasonable, average speeds of emergency vehicles moving safely through a street network. In many cases, fire trucks have stretches of road (highways, four lanes, etc.) in which they can move at greater rates than 35 mph. In that case, calculate such stretches of road at the rate of .75 miles per minute and 1.50 minutes per mile. Carry the resulting calculations out to hundredths of minutes.

To each response run time add 5 seconds per 90 degree turn taken by the piece of apparatus in its run to locations. This addition of five seconds to the run time is akin to the increased friction loss experienced in elbows, turns, etc., in a water pipe.

RUN TIMES:

18. If all the former steps have been followed, then the study team has two sets of measurements (in minutes and miles) for each of the three to six possible location designs. These two sets of measurements-miles and minutes-are from the hypothetical station locations to the aforementioned occupancies. These sets of time and mileage measurements are listed by type of occupancy and location design. Obviously, the time measurements are compared to each other; the run times by occupancy are compared between possible location designs (eg: apartment buildings: design 5-1 run times averaged 2.45 minutes; for design 5-2 the times averaged 2.20 minutes, etc.). The run times for each possible location design are tallied and averaged, with the resulting averages then compared between one design and another (eg: overall average response run time for design 5-1: 2.67 minutes; for design 5-2: 2.18 minutes, etc.). Graph all results. On the following page find an example of a chart system.

TABLE #3: SIMULATED MAP RUN TIMES

TARGET OCCUPATIONS

	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	#11	#12	#13	Total Time	Averages
3-1	1:20m	2:20m	1:09m	3:49m	4:34m	4:25m	3:36m	7:51m	1:25m	1:16m	2:20m	1:29m	1:26m	37:00m	2:51m
3-2	1:20m	2:20m	3:26m	2:00m	4:34m	4:25m	3:36m	7:51m	1:25m	1:16m	2:34m	2:09m	1:26m	38:22m	2:57m
4-1	1:20m	2:20m	1:15m	2:33m	4:34m	4:25m	1:23m	3:49m	1:25m	1:16m	2:56m	0:36m	1:24m	29:16m	2:15m
4-2	1:20m	2:20m	1:59m	2:33m	4:34m	4:25m	1:12m	5:42m	1:25m	1:16m	2:56m	0:36m	1:24m	31:42m	2:25m
4-3	1:20m	2:20m	1:59m	2:33m	2:45m	3:48m	2:23m	6:21m	1:25m	1:16m	2:56m	0:36m	1:24m	31:05m	2:23m
4-4	1:20m	2:20m	1:09m	3:49m	3:11m	3:48m	1:51m	6:21m	1:25m	1:16m	2:20m	1:29m	2:19m	32:38m	2:30m
4-5	1:20m	2:20m	1:09m	3:49m	2:45m	3:48m	2:23m	6:53m	0:11m	0:39m	2:20m	1:29m	2:19m	31:25m	2:24m
4-6	1:20m	2:20m	3:26m	2:00m	4:34m	4:25m	1:12m	5:42m	1:25m	1:16m	2:34m	2:09m	1:26m	33:45m	2:34m
4-7	2:40m	2:11m	3:26m	2:00m	4:34m	4:25m	1:12m	5:42m	1:25m	1:16m	2:34m	2:09m	1:26m	35:00m	2:42m
5-1	1:20m	2:20m	3:26m	2:00m	4:34m	4:25m	1:23m	3:49m	1:25m	1:16m	2:34m	0:34m	1:15m	30:22m	2:19m

PUTTING IT ALL TOGETHER:

19. In the course of taking measurements of the same or very similar route distances, the resulting calculations will differ slightly, due to slight differences in measuring. This is not to say that oftentimes measurements will be the same; they will. But, it must be understood that a margin of error exists and will be relatively small if care was taken in measurements. It is safe to suggest a margin of error of about three to four seconds in estimated response run times. This margin will be detected and can be estimated. If variations in the same measurements consistently exceed five seconds of run time, then consideration should be given to why the variations exist and reducing them. A small margin of error is not a problem; the three to six possible location designs will have a significant spread of individual occupancy run times and overall averages. The spread will be large enough to be able to eliminate most of the possible designs.

This is the moment in the study when as many factors as can be considered are brought in to one's thinking. It is analogous to putting together the final pieces of a jigsaw puzzle. Consider the following incomplete list:

- the citizens' views toward moving/changing station locations;
- the willingness of the city to pay for station locations;
- the discovery of options that produce cost effectiveness, such as a location already having a building suitable to housing fire apparatus, or a piece of property already owned by the local government.
- the degree of difficulty of acquiring the property;
- the size of the fire/rescue organization. Too few

personnel +/or too few pieces of apparatus may need to be improved prior to recommending station location changes. It seems kind of silly to build a fire station and put nothing in it;

- the degree of property development around one proposed set of station locations versus another;
- the probability of annexation in one direction before another;
- the quality of mutual aid;
- the formal request(s) by other local governments regarding providing emergency response coverage; and
- the commitment by state or county government to effect long term changes which will result in changing traffic patterns (eg: highways, newly created bodies of water, etc).

RECOMMENDATION OF LOCATION DESIGN:

20. This next step is the decision to commit to recommending one or perhaps two sets of station locations. At this point, it is worth double checking the work to assure one's mind of objectivity. In deciding to commit to recommending one design, a small leap of faith is required that what one is saying is accurate.

REVIEW RESULTS:

21. Contact the local government leader(s) who requested the study and set up a meeting to go over the results and recommendations.

Explain the procedures in the study and review the results. Seek feedback from the leader(s); seek consensus on the recommendations. Seek any new information that could cause recommendations to be changed. The client is usually right; so, if the client says they can afford one more station than recommended, then so be it. New information might result in more work having to be done, but if the objective is to author a sound, well documented research study, then the extra work will be well worth it.

OFFICIAL FIELD TEST TIMES:

22. The study team sets up times with the fire officials to verify the calculated run times from the proposed station location(s) to several of the aforementioned target occupancies. This step does not need the consultant to be present (though it is recommended, to maintain quality) as long as the fire officials understand what they are supposed to do. "Tools" needed for the verification exercise are (preferably) one fire truck operated under nonemergency conditions, two stop watches, radio communications with dispatch, written forms for keeping records, and two people with the apparatus (one driver and one timekeeper). It is difficult to simulate emergency driving under nonemergency conditions, but little choice is available. Perhaps the best time to simulate emergency driving conditions is late at night, but it should not be considered a fully valid test of run times. Run times are carefully logged and compared to the map times.

FIELD TEST RESULTS ANALYSIS:

23. Review the field test results and the conditions under which the tests were run. Regardless of the results obtained in the field tests, return

to the master map and see why the results differed (if indeed they did) from those expected by working with the map. It may be appropriate to rework some conclusions; for example, if two location designs are very close and a tough call resulted in one over the other, perhaps the field test results will shift the thinking for the other as the best design. In any event, differences in results between map tests and field tests need to be explained.

If the field test results cause changes in recommendations, then new recommendations may need to be tested and a new document may need to be drafted.

STUDY TEAM REVIEW OF DRAFT:

24. Complete, process and submit the draft of a final report to the study team for careful review. Receive the comments, amend the document and send on to the local government's point of contact, the person with whom the consultant and study team had been working.

25. Offer to meet with city leaders at perhaps a regular Aldermen's or Council meeting. If arranged, bring the documentation including any maps which were used in the development of recommendations and be prepared to discuss the process used. If the above procedures are followed closely, if all materials generated in the course of this study are saved for public meetings, and the conclusions are sound, then there is no reason to be concerned about being challenged.

SUMMARY

This document can well be considered a good, needed municipal study guide for fire/rescue station placement. In its future it will experience at least a few revisions as new information, new thinking, and new challenges surface. It is hoped that those who use this study model will feedback information on its quality, its strengths and its weaknesses to the author. It would be much appreciated.

This guide has been drafted with the intent of being a very methodical, very simple study system. It is intended for use by any of the UT-MTAS consultants whether or not any has experience in fire protection. This study model system requires only a good dose of common sense, analytical power, creative thinking and persistence.

fn:SB#2/FISTA.MOD

Municipal Technical Advisory Service
The University of Tennessee
891 20th Street
Knoxville, Tennessee 37996-4400

Non-Profit Org.
U.S. POSTAGE
PAID
Knoxville, Tenn.
Permit No. 870