SLAM II MODEL OF THE ROSE BOWL STAFFING PLANS

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Abstract

The Rose Bowl Staffing Plan Model is an example of the use of computer modeling in the area of security planning. This model allowed the Los Angeles Sheriff's Department and the Pasadena Police Department to consider various staffing plans for major events to be held at the Rose Bowl. The model supports staffing decisions for officers, paramedics, ambulance, fire unit, and bomb squad. Performance measures include response times by type of unit, and utilization of personnel. The model includes an interactive graphics capability which shows the occurrence of incidents, the response to the incidents and the resolution of the incidents. It also allows the user to interrupt the simulation and insert a user generated incident.

This model, being user friendly, can readily analyze various staffing plans which provides a useful tool for law enforcement in the critical area of security planning.

INTRODUCTION

During the first half of 1980, the Los Angeles Sheriff's Department (LASD) began to investigate alternate approaches to major event and disaster planning. LASD felt a new planning approach was necessary due to the following:

- An increased awareness of the need for earthquake disaster planning.
- Planning requirements of the 1984 Olympics
- The involvement of many different law enforcement agencies and government entities.
- The increasing cost of manual planning and gaming exercises.
- An increasing inadequacy of manual planning and gaming exercises.

Following several months of investigation, LASD identified computer simulation as a prime candidate for the alternate approach to major event and disaster planning.

Pritsker & Associates, Inc., was identified as a leader in the field of computer modeling and simulation with a proven record of quality work and related experience. During the last quarter of 1980 and first quarter of 1981, a suitable application and reasonable scope of work were identified to demonstrate the effectiveness of computer simulation to support major event planning.

On April 7, 1981, the Los Angeles County Board of Supervisors contracted with Pritsker & Associates to develop a model of the Rose Bowl to support base level planning for the event.

OBJECTIVES AND SCOPE

The objectives of the Rose Bowl model were to support staffing decisions and to measure performance of selected staffing plans. The model was to be designed such that decisions could be made as to the number of officers, paramedics, ambulances, fire units and bomb squads needed during a major event. The model was also to have the ability to look at various staffing plans. For each plan the response times by type of incident and type of unit were to be measured as well as the utilization of personnel.

The scope of the model included four types of incidents: civil, medical, fire and bomb. The civil incidents were broken down further into civil assists, civil crime and civil riot which differed in the number of officers needed to quell the incident. The medical was also broken down into medical assist, medical paramedic and medical ambulance. Furthermore, only those incidents occurring within the perimeter fence of the Rose Bowl were to be considered as shown in Figure 1.

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Finally, the model operation was to be depicted using a graphic display. This aspect will be detailed later.

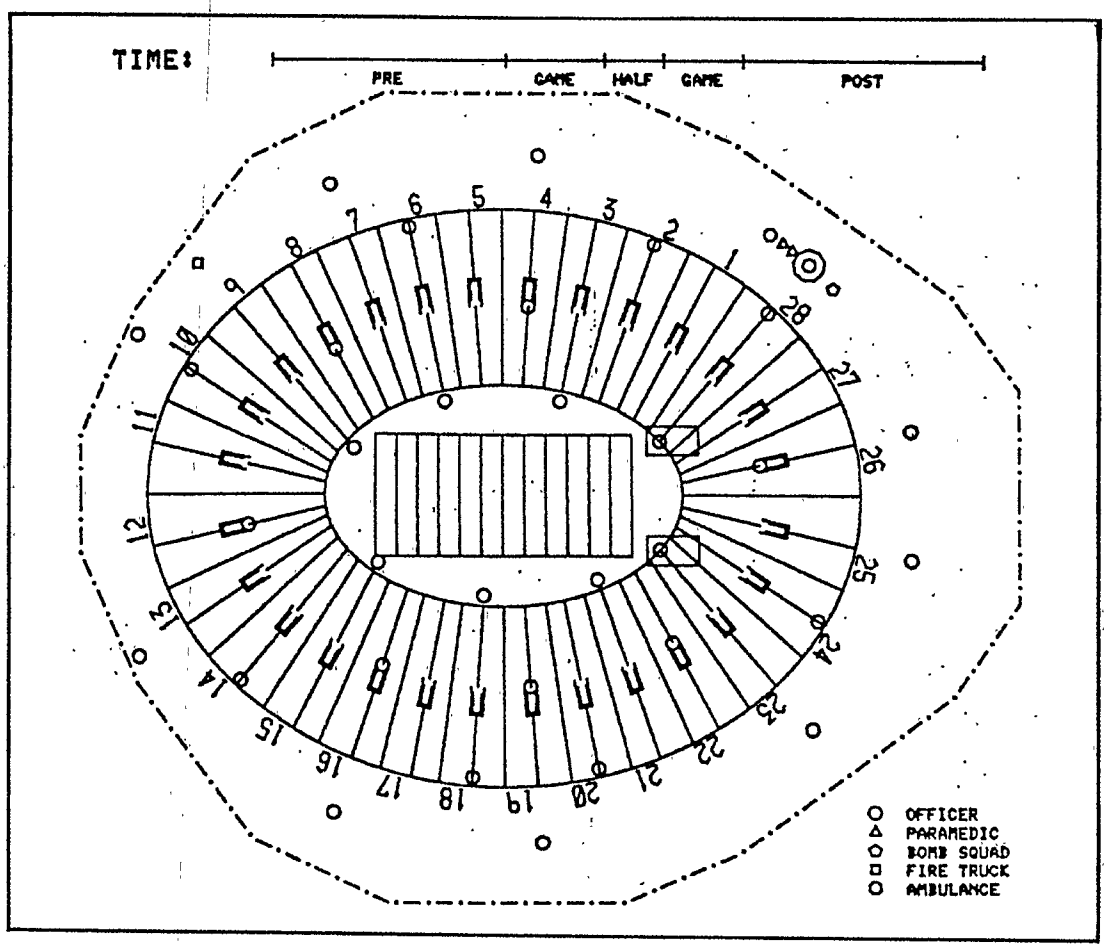

Figure 1

MODEL LOGIC

The logic of the model was coded in SLAM II (1,2) and consisted of four basic event types:

- Generation of incidents
- Response to incidents
- Resolution of incidents
- Change of post assignments

Incident characteristics were obtained from records for the 1977 and 1980 Super Bowl games which were played at the Rose Bowl and from records for the 1981 Rose Bowl. The Los Angeles Sheriff's Department clocked movement speeds in the Rose Bowl to determine the time to move from one point to another.

This data was then used to derive the frequency of occurrence for the three classes of incidents: civil/medical, fire and bomb. The frequency varied depending upon the game conditions which were pregame, during the game, half time and post game.

Once an incident occurred the area of occurrence was determined to be either the perimeter, the stands, or the field. Once that was determined, the exact location was then randomized. Then the exact type of incident was determined. That is, was the incident a civil/medical, a fire, or a bomb? And within the civil/medical category it was then determined if it was civil or medical and the type of civil or medical.

When the response to an incident was required, the handling officer assigned was based on the area of responsibility. The arrival of that officer was then scheduled and upon arrival additional officers were requested if needed. If the responsible

officer was not available to be assigned or if additional officers were required a sequence of five back-up rules was used. Each post was allowed to have a unique sequence of back-up rules.

The time to resolve an incident was based upon observed data. If no arrests were made, the units assigned to the incident returned to their posts. While returning, the units could be called upon to respond to another incident.

If arrests were made, the number of arrests were determined once the incident had been controlled. For each arrest two officers were required to transport the arrestee to the bowl jail. Again additional officers would be allocated if necessary. The incident would be considered resolved when the last arrestee arrived at the bowl jail.

The fourth event considered by the logic involved changing post assignments. During the pre-game period, selected tunnel posts were positioned at the rim of the stands. Fifteen minutes prior to the game these posts moved to the tunnel openings. Fifteen minutes before the end of the game selected posts from the stands and the perimeter moved to the field.

By considering the above four discrete events and their associated logic, the model was able to simulate the Rose Bowl game or any other major happening occurring at the Rose Bowl.

MODEL INPUTS

Data was input to the model via a preprocessor that allowed the user to easily change the three types of data:

- Incident characteristics
- Back-up rules
- Post assignments

This preprocessor was developed to be user friendly through the use of a menu format. The preprocessor menu is shown in Figure 2. Once a choice is made from the menu, the preprocessor leads the user through a series of steps to perform the action chosen.

MODEL OUTPUTS

Output statistics from the model were divided into three categories:

- Incident statistics
- Unit statistics
- Post statistics

An example of each category is shown in the accompanying Figures 3 through 5. Also in each figure there is an explanation of each statistic for that category.

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PREPROCESSOR MENU

 1: CHANGE EVENT FREQUENCY
 2: CHANGE EVENT SERVICE TIME
 3: ADD BACKUP RULES
 4: CHANGE BACKUP RULES
 5: DELETE BACKUP RULES
 6: ADD POST DEFINITIONS
 7: CHANGE POST DEFINTION
 8: DELETE POST DEFINITON
 9: STOP AND SAVE CHANGES
10: STOP WITHOUT SAVING CHANGES

OPTION:
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Figure 2

*** INCIDENT STATISTICS ***

(COMPUTED VALUES BASED ON 10 GAMES)

INCIDENT TYPE	AVG NUM PER GAME	AVG 1ST RESP	AVG ALL RESP	AVG DURATION	MAXIMUM ALL RESP	MAXIMUM DURATION
CIV ASST	32.2	0.98	0.98	5.97	4.69	12.89
(A)	(B)	(C)	(D)	(E)	(F)	(G)

A - Type of incident

B - Average number of occurrences of this incident type per game

C - Average response time observed for first responding unit. (In all cases but bomb-related, this is the response time of the handling officer)

D - Average time observed from the time the incident occurred until all required units had responded

E - Average length of time observed from occurrence until resolution of the incident

F - Maximum time observed for all occurrences of this incident type for all required units to respond

G - Maximum duration observed

Figure 3

*** UNIT STATISTICS ***

(COMPUTED VALUES BASED ON 10 GAMES)

UNIT TYPE	AVG RESP PER GAME	BUSY FRACTION	AVG RESP TIM	MAX RESPONSE	AVG WAIT TIM	NUM OCC PER GAME
OFFICER	106.3	0.05	1.22	6.68	0.00	0.0
(A)	(B)	(C)	(D)	(E)	(F)	(G)

A - Type of unit

B - Average number of times this type of unit had to respond per game

C - Fraction of time this unit type was busy responding to incidents. (Is an average for all units of this type)

D - Average time observed for units of this type to respond after request for response

E - Maximum time observed for any unit of this type to respond

F - When a need for a unit of this type had to wait before a unit could be dispatched (all units were busy), the average length of time till a unit became available

G - The average number of times per game that the waiting defined in F above occurred

Figure 4

*** POST STATISTICS ***

(COMPUTED VALUES BASED ON 10 GAMES)

UNIT ID	UNIT TYPE	AVG RESP PER GAME	BUSY FRACTION	FRACTION OF BUSY		INCIDENTS IN AREA	
				PRIMARY	SECONDARY	NUM OCC	FRC PRI
801E	OFFICER	3.0	0.04	0.93	0.07	2.6	0.96
(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)

A - Call letters of the post

B - Unit type for this post

C - Average number of times per game this post had to respond to an incident

D - Fraction of time this post was busy responding to an incident

E - For the busy time defined in D above, the fraction of the time that the post responded as the handling officer

F - The fraction of the time defined in D above that the post responded to assist

G - The average number of incidents per game that occurred in the area defined as the responsibility of this post

H - For the incidents occurring in this post's area of responsibility, the fraction for which this post was the handling officer

Figure 5

GRAPHICS CAPABILITY

The Rose Bowl model provides an interactive graphics capability. This graphic capability is a real-time display of model operation. Figure 6 shows a typical display. The bowl and the area within the perimeter fence are depicted. Above the display is a time line which indicates the game condition. A legend appears near the lower right hand corner indicating the symbols for officers, paramedics, bomb squad, fire truck, and ambulance. As incidents occur, a symbol appears on the screen to represent that incident. In Figure 6, a cross with a "1" inside indicates that a medical incident has occurred. The "1" corresponds to event 1 in the left hand information column. The symbol with the "2" inside represents a suspicious package or bomb. Again, the "2" corresponds to the event 2 in the left hand information column. The star symbol with the "3" inside represents a civil incident. Additional information is found under event 3 on the left side of the screen. The left side provides additional information on each event as it occurs. Up to six events can be portrayed at any time. The screen is redrawn periodically to reduce clutter. At the bottom of the screen is a menu which provides the user interrupt feature. The user can alter the graphics mode, make hard copies, and enter an incident or event.

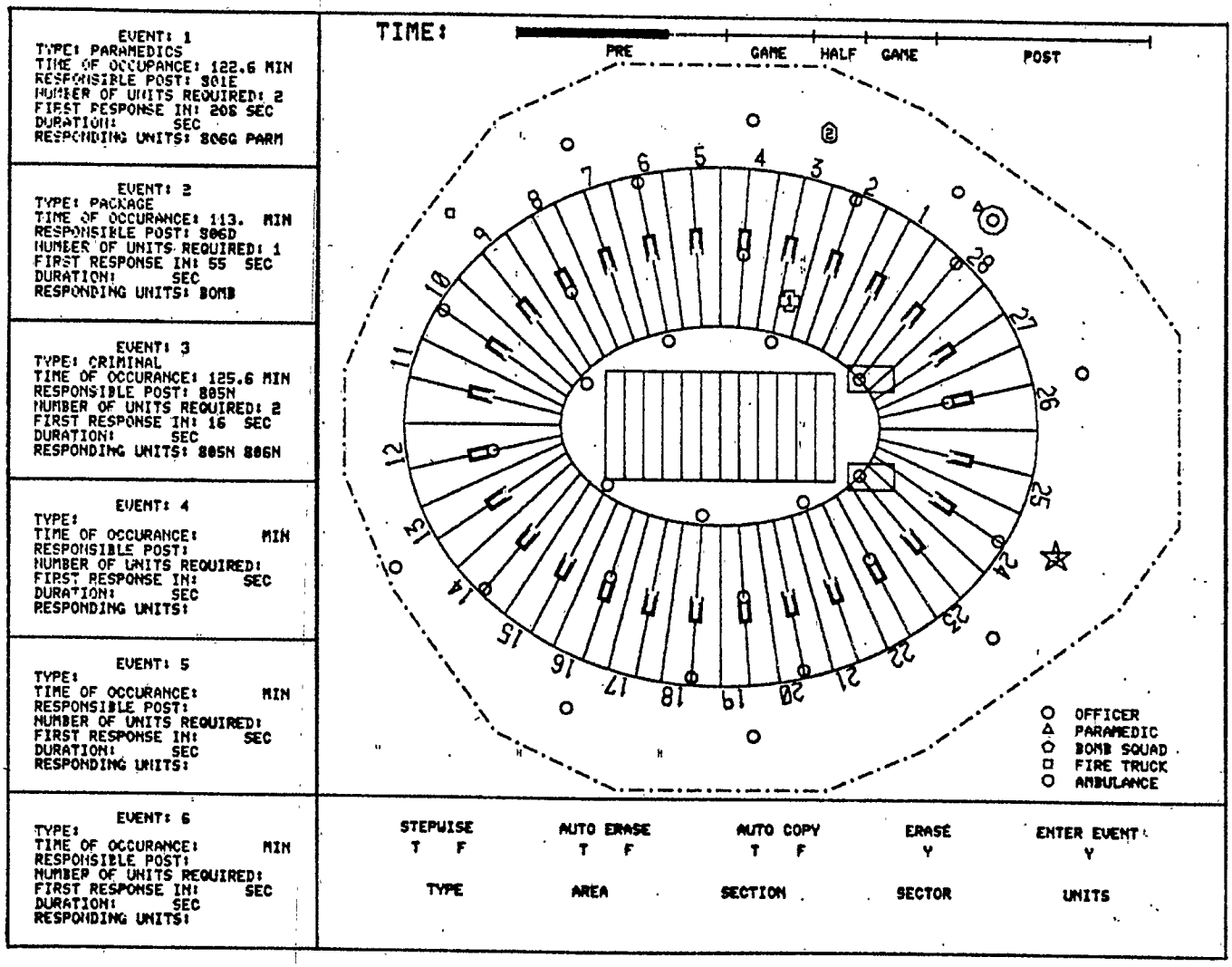

Figure 6

were also plotted for each plan as shown in Figure 10. As can be seen, even though the number of officers was significantly reduced in Plan 6, the average officer response time appeared to be the same. The law enforcement agencies were, to say the least, overwhelmed by such results.

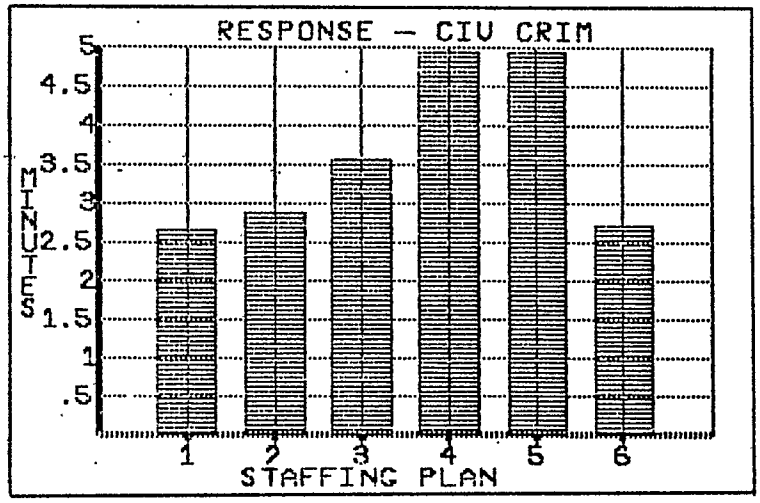

Figure 8

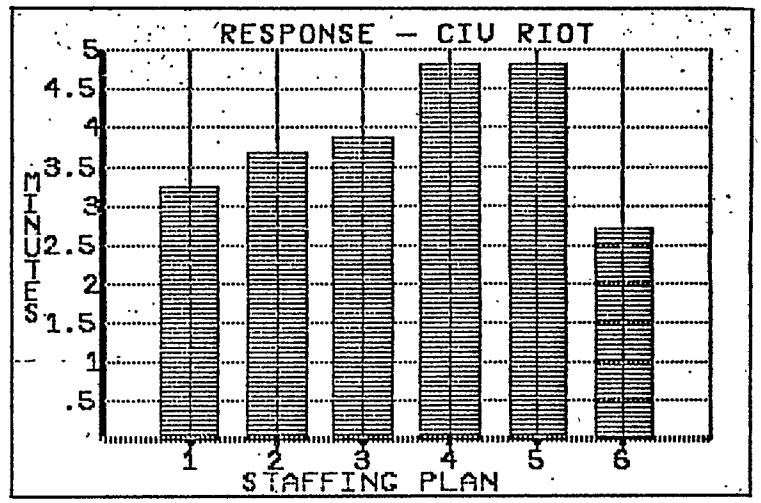

Figure 9

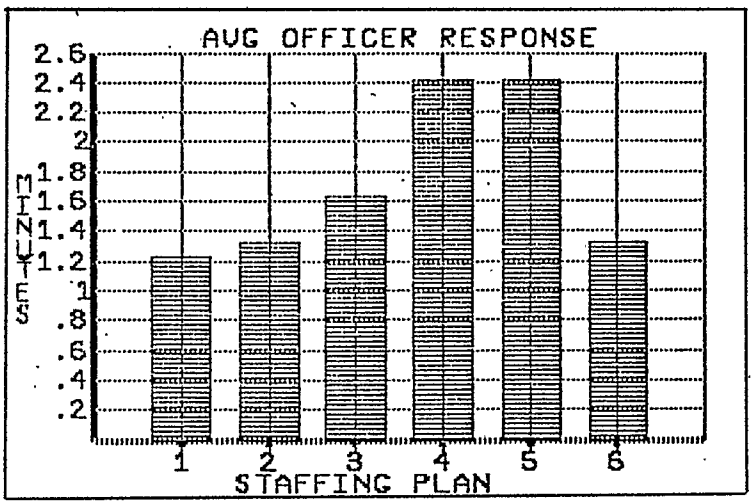

Figure 10

ANALYSIS

Six alternative staffing plans for the Rose Bowl game were considered. The details of each of these plans are as follows. Refer to Figure 1 for location numbers.

Plan 1 is the officer deployment used in the 1981 Rose Bowl. Posts are located in the perimeter, the stands, and the field. In addition, two contingency forces are deployed, one at tunnel 23A and the other at tunnel 28A. The tunnel posts in the stands include pre-game, game, and post-game positions.

Staffing Summary:		
	Perimeter Posts	- 11
	Tunnel Posts	- 15
	Field Posts	- 6
	Contingency Force (23A-7, 28A-7)	- 14
	Total	46

In Plan 2, all of the tunnel posts of Plan 1 (except tunnels 18, 19 and 20) are moved out of the stands into the perimeter.

Staffing Summary:		
	Perimeter Posts	- 23
	Tunnel Posts	- 3
	Field Posts	- 6
	Contingency Force (23A-7, 28A-7)	- 14
	Total	46

In Plan 3, all tunnel posts of Plan 1 remain assigned to the rim (top of stands) during the entire game.

Staffing Summary:		
	Perimeter Posts	- 11
	Tunnel Posts	- 15
	Field Posts	- 6
	Contingency Force (23A-7, 28A-7)	- 14
	Total	46

In Plan 4, all perimeter and tunnel posts of Plan 1 are assigned to the contingency force. Only the field posts remain visible inside the Bowl.

Staffing Summary:		
	Perimeter Posts	- 0
	Tunnel Posts	- 0
	Field Posts	- 6
	Contingency Force (23A-20, 28A-20)	- 40
	Total	46

In Plan 5, all of the perimeter, tunnel, and field posts join the contingency force. No posts remain visible within the Bowl.

Staffing Summary:		
	Perimeter Posts	- 0
	Tunnel Posts	- 0
	Field Posts	- 0
	Contingency Force (23A-23, 28A-23)	- 46
	Total	46

Like Plan 5, Plan 6 has no visible deployment of officers within the Bowl. They are all assigned to a contingency force. However, unlike Plan 5, the contingency force is broken up into six squads located at different points around the Bowl. In addition to the usual 23A and 28A locations, squads are located in the perimeter at tunnels 8, 15, 22 and 28. Also, Plan 6 requires 10 fewer officers than Plans 1 through 5.

Staffing Summary:		
	Perimeter Posts	- 0
	Tunnel Posts	- 0
	Field Posts	- 0
	Contingency Force (23A-6, 28A-6, 8-6, 15-6, 22-6, 28-6)	- 36
	Total	36

The output statistics for each plan were compared with a somewhat surprising result. Response times for civil assist, civil criminal, and civil riot incidents were compared for all six plans. The times were plotted and are shown in Figures 7-9. In addition, the average officer response times

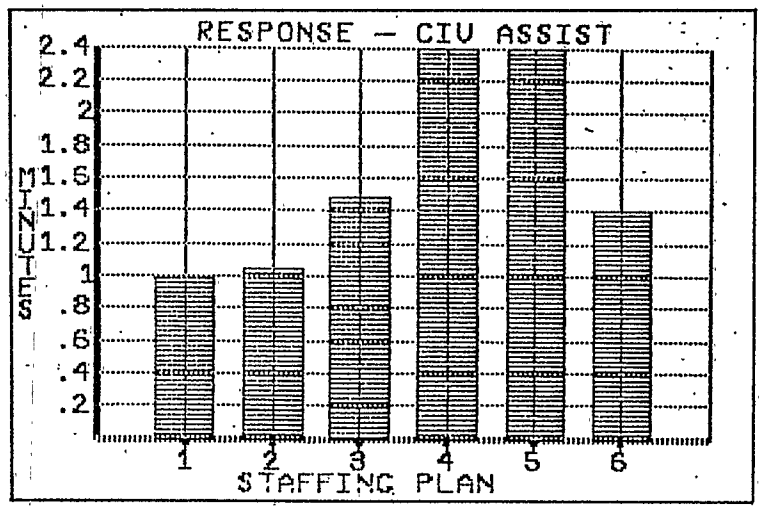

Figure 7

CONCLUSIONS AND APPLICATIONS

Fron the analysis it was concluded that manpower, the most significant cost item for event security could be reduced without reducing effectiveness. This model was used by the Pasadena Police Department in planning for two concert events that were held in the Rose Bowl and the model was used by LASD in planning for a part of the 1982 Rose Bowl staffing.

This model demonstrates the viability of using simulation in security planning for the 1984 Summer Olympics to be held at various sites in the Los Angeles area. This model in particular could be used for the security planning for the soccer games to be held in the Rose Bowl. Simular models could be developed for the other sites. On a larger scale, however, the successful implementation of this model demonstrates the great potential role that computer modeling and simulation can play in the critical area of security planning.

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