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STATION EMERGENCY EGRESS STUDY

WBS 13DAK

Prepared for:

Southern California Rapid Transit District
Fire/Life Safety Committee

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VOLUME II

DETAILED EMERGENCY EXITING ANALYSIS

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FOREWORD

Transit systems are placing an increased emphasis on the expedient evacuation of patrons from stations in an emergency. This has created a problem in determining the proper number of egress units required for emergency evacuation. Additionally, a reasonable period of time to egress from station platforms to a point of safety had to be established.

An in-depth study of this problem clearly indicated that there is no single standard and/or code presently available which totally satisfies the needs of a subway-type transit system.

The Southern California Rapid Transit District (SCRTD) Fire/Life Safety Committee, consisting of representatives from the Southern California Rapid Transit District, the City and County of Los Angeles Fire Departments and the General Consultants, analyzed existing and proposed codes and standards and found that a combination of attributes from the several codes and standards, in conjunction with variation in exiting criteria, provided the most appropriate and cost effective approach toward determining exiting needs for postulated emergencies.

The Fire/Life Safety Committee believes that the station emergency exiting criteria developed for the Metro Rail Project are an appropriate solution to the emergency exiting problem.

This report describes the steps that were followed in the comprehensive analysis, the results that were obtained, and the rationale for the criteria that were adopted.

The information is presented in two documents. Volume I is an Executive Summary of the study and Volume II describes the detailed analysis.

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1.0 INTRODUCTION

1.1 Background

Fire and Life Safety are of great importance during the design phase of the Metro Rail system. Providing for egress from stations in the event of an emergency is one of the most significant safety design considerations that needs to be addressed. The proper number of station stairs, escalators, and normal and emergency exits must be specified; and emergency ventilation and fire suppression systems must be provided. Well-defined and unobstructed exit paths and procedures for evacuation must also be established.

A careful distinction must be drawn between normal and emergency exiting provisions. Although both are concerned with the efficient movement of patrons in the station, the underlying motivations differ, and, as will be shown in the analysis, the requirements are not the same. In normal exiting, emphasis is placed on getting passengers to and from the station platform. Emergency exiting is concerned with the timely evacuation of all patrons who might be in a station during a postulated emergency. Both of these concepts are addressed in this text.

1.2 Basis for Emergency Exiting Study

At the initiation of the Metro Rail Project, there was no approved code which specifically addressed emergency exiting requirements for transit stations. Therefore, the SCRTD Fire/Life Safety (F/LS) Committee performed an in-depth study of present and proposed codes, standards and guidelines to determine the most appropriate application of them in the development of egress criteria. Specifically, the codes, standards and guidelines used for the study were:

- NFPA 101, Life Safety Code, 1981 Edition
- NFPA 130 (Proposed), Standard for Fixed Guideway Transit Systems
- Uniform Building Code, 1979 and 1982 Editions
- APTA Guidelines for Design of Rapid Transit Facilities, June 1981

The review of the above codes indicated that there was no single code or standard which could be applied in its entirety to satisfy the unique SCRTD's exiting needs in an efficient and cost effective manner. This promulgated the need for a detailed study of potential alternatives for exiting from stations should an emergency arise.

1.3 Participants in the Analysis

The emergency exiting analysis was a multidisciplinary effort comprising of members of the SCRTD Fire/Life Safety Committee and the stations General Consultant. The process was initiated in September 1982, and the final criteria was adopted in April 1983. The varied disciplines and experiences of the participants lend credibility to the results since a variety of philosophies and proven approaches were tested for applicability to the Metro Rail System. In addition, although the specific requirements of the Los Angeles Program were the dominant factors

in developing appropriate criteria, knowledge acquired from site visits to other transit properties was of considerable value.

1.4 METRO RAIL SYSTEM CHARACTERISTICS

The FLS Committee recognized that emergency exiting criteria are an integral part of the total Fire/Life Safety Program for Metro Rail Stations. Therefore, it was essential to be cognizant of other station and systemwide characteristics that affected the safe evacuation of patrons from a station during an emergency.

All Metro Rail stations will be underground with top of rail elevations varying from 40 to 80 feet below grade. The stations are of a center platform configuration. Fare collection areas are at the mezzanine level and located at the center or end of the station. Two exits are provided off each mezzanine.

Emergency stairs are located at the ends of each platform providing unobstructed access to the surface. Escalator and stair elements for normal use in stations were sized to accommodate peak 15 minute patronage. The ratio of normal use stair-to-escalator exiting provisions is greater than one at all stations.

Automatic sprinkler protection is provided in station ancillary spaces, truss spaces of escalators and elevator machine rooms. A three-zoned under vehicle water spray extinguishing system is located on each area trackway at the stations. Actuation of the system is provided for each trackway at the platform level.

A wet standpipe system will be installed to enable the fire service to reach all areas in the station. The train control room will be protected by a Halon extinguishing system. An emergency ventilation system is provided throughout the Metro Rail system. It is based on a push-pull concept of fan operation, some of which are drawing air while others are exhausting air. Normal ventilation augments the emergency ventilation system, providing additional capability for:

- Increasing fresh air supply;
- Maintaining acceptable air temperatures; and
- Removing smoke or toxic fumes in the event of fire.

1.5 Metro Rail Patronage Data

The patronage characteristics of a transit system dominate the size and quantities of the various station elements.

The data used in this analysis is based on the year 2000 patronage estimates for the AM and PM peak hours that were prepared by the SCRTD Planning Department. The data was contained in a March 14, 1983 memo from this department and is appended to this document.

Year 2000 AM and PM peak 15 minute patronage was developed by multiplying peak hour volumes by a factor of 0.375. This factor assumes that volume

in the peak 15 minutes is 1.5 times average levels during the peak hour. Hence 0.375 factor is the product of 1.5 times 0.25. The 1.5 factor was also received from the SCRTD Planning Department in a memo dated January 12, 1983.

Ultimate design period patronage data was defined as 1.6 times the year 2000 baseline. The basis for this factor is contained in an SCRTD Planning Department memo dated February 14, 1983. Peak 15 minute patronage was derived in the same manner as for the Year 2000 data.

1.6 Assumptions

The results of the analysis in this text are based on a number of assumptions, which further clarify the characteristics of the Metro Rail System. Changes to any of these qualifiers may impact the study results. The assumptions include:

- Metro Rail patronage data of March 14, 1983 is representative of expected line volumes.
- Size and quantities of vertical elements are based on worst case peak 15 minute period operations (i.e., both AM and PM periods must be analyzed).
- Both Year 2000 and ultimate design period conditions must be tested.
- The 1.6 patronage contingency factor is an appropriate extrapolation from base year to ultimate design period.
- The maximum practical capacity of a six-car train is 1,200 occupants.
- Year 2000 headways will be 3-1/2 minutes.
- Ultimate design period headways will be 2 minutes.
- The fare collection area is designed so that no queuing will result during emergency evacuation of patrons.

2.0 NORMAL EXITING REQUIREMENTS

To adequately address the necessity of moving patrons through stations under normal day-to-day operations, vertical circulation elements must be evaluated.

This chapter presents an analysis of the capabilities of vertical circulation elements planned for the SCRTD Metro Rail stations to accommodate projected peak period demand under 'normal' conditions. This investigation is concerned with whether capacity of planned stairs and escalators on the station platforms meets the required demand to serve peak period entering and detraining passengers. The "normal" station exiting requirements are discussed as follows.

- Theory and Assumptions
- Application of the assumptions to Metro Rail stations.

2.1 Theory and Assumptions

This analysis tests capacity of planned vertical circulation elements for two conditions; the first is the year 2000 (base year) peak 15 minute demand for both AM and PM peaks; the second is a '1.6 design contingency' (based on the year 2000 peak 15 minute demand levels multiplied by a factor of 1.6). For the year 2000, scheduled headways are assumed to be 3-1/2 minutes. For the 1.6 contingency, scheduled headways are assumed to be 2 minutes.

Capacity assumptions for vertical circulation elements in this analysis are as follows:

- Escalator capacity is assumed to be 100 persons per minute per escalator.
- Stair capacity is assumed to be 66 persons per minute per device. All planned stairs have widths of 3 exit lanes per device.
- All escalators have widths of 2 exit lanes per device.
- Exit lanes have a standard 22 inch width.

For this analysis the normal exiting requirements for the simultaneous unloading of inbound and outbound trains is assumed. Of primary concern is the capacity of escalators needed to serve this detraining load during the peak 15 minute period.

Escalators should be capable of accommodating all detraining passengers so that the platform is cleared before the next simultaneous arrival of inbound and outbound trains. In the year 2000, with a 3-1/2 minute headway schedule, escalators should be capable of removing all detraining passengers within 2-1/2 minutes. For the 1.6 contingency and a 2 minute headway schedule, escalators should remove detraining passengers in 1-1/2 minutes.

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Stair capacity should be sufficient to serve a continuous flow of boarding passengers during the peak 15 minutes. For the year 2000, stair capacity during a 3-1/2 minute period was tested against the demand. The 1.6 contingency stair capacity during a 2 minute period was also compared with the demand.

The demand was determined by first identifying the 'worst case' (peak 15 minute period - AM or PM) for each station. Passenger detraining loads were compared for each station during the AM and PM peaks, and the higher volume peak was used as 'worst case'. The boarding volume forecast for the 15 minute peak that was designated as 'worst case', in terms of detraining volumes, was then identified for each station.

For the year 2000, station peak design load for detraining was determined by multiplying year 2000 peak 15 minute 'worst case' detraining volumes by a factor of 0.25, which represents the compliment of detraining passengers expected within scheduled headways of 3-1/2 minutes (3-1/2 minutes / 15 minutes = 0.25). For the year 2000, station peak design load for boarding was determined by multiplying peak 15 minute boarding by the same factor of 0.25.

The 1.6 contingency peak detraining and boarding design loads were determined by multiplying peak 15 minute 'worst case' volumes by a factor of 1/7. This factor is a conservative approximation of 2 minutes divided by 15 minutes.

2.2 Application to Metro Rail Stations

Table 2-1 presents the number of vertical circulation elements provided for each station, and compares year 2000 peak design load with device capacity. At all stations, device capacity is sufficient to accommodate patron demand.

Table 2-2 presents the same information for the 1.6 contingency. With the 1.6 contingency, all stations are shown to have device capacity in excess of demand except for Wilshire/Vermont. Escalators at Wilshire/Vermont would remove 1.6 contingency peak design load detraining passengers from the platform before the next scheduled train, but not within the desired 90 seconds.

At Wilshire/Vermont, stair usage under the 1.6 contingency condition would be 12 to 13 passengers per minute per foot exit width. This level of pedestrian flow corresponds to Level of Service D, which is "consistent with the more crowded public buildings and transportation terminals, subjected to relatively severe peak demands." (Fruin, Pedestrian Planning and Design, p. 82.).

TABLE 2-1

NORMAL EXITING
PATRONAGE AND VERTICAL DEVICE CAPACITY
Year 2000 3-1/2 Min. Headway

STATION	VERTICAL CIRCULATION ELEMENTS		PEAK DESIGN LOAD 3-1/2 MIN HEADWAY - 2000			STAIR CAPACITY 3-1/2 MIN	ESCALATOR CAPACITY 2-1/2 MIN
	STAIRS	ESC	BOARD	DETRAIN	TOTAL		
Union Station	4	4	272	523	795	924	1,000
Civic Center	4	4	220	401	621	924	1,000
5th/Hill	7	5	190	736	926	1,617	1,250
7th/Flower	3	3	122	458	580	693	750
Wil/Alvarado	2	2	209	301	510	462	500
Wil/Vermont	2	2	305	362	667	462	500
Wil/Normandie	3	1	134	155	289	693	250
Wil/Western	2	2	186	273	459	462	500
Wil/Crenshaw	2	2	102	225	327	462	500
Wil/LaBrea	3	1	55	97	152	693	250
Wil/Fairfax	3	3	329	414	743	693	750
Fair/Beverly	3	1	121	140	261	693	250
Fair/Santa Monica	2	2	149	183	332	462	500
Sunset/LaBrea	3	1	93	100	193	693	250
Holl/Cahuenga	2	2	154	161	315	462	500
Universal City	2	2	150	324	474	462	500
N. Hollywood	2	2	148	224	372	462	500

TABLE 2-2

NORMAL EXITING
PATRONAGE AND VERTICAL DEVICE CAPACITY
1.6 Contingency 2 Min. Headway

STATION	VERTICAL CIRCULATION ELEMENTS		PEAK DESIGN LOAD 2 MIN. HEADWAY 1.6 CONTINGENCY			STAIR CAPACITY 2 MIN	ESCALATOR CAPACITY 90 SEC
	STAIRS	ESC	BOARD	DETRAIN	TOTAL		
Union Station	4	4	248	477	725	528	600
Civic Center	4	4	201	366	567	528	600
5th/Hill	7	5	173	673	846	924	750
7th/Flower	3	3	112	420	532	396	450
Wil/Alvarado	2	2	191	274	465	264	300
Wil/Vermont	2	2	278	331	609	264	300
Wil/Normandie	3	1	123	142	265	396	150
Wil/Western	2	2	170	249	419	264	300
Wil/Crenshaw	2	2	93	205	298	264	300
Wil/LaBrea	3	1	50	88	138	396	150
Wil/Fairfax	3	3	301	379	680	396	450
Fair/Beverly	3	1	110	128	238	396	150
Fair/Santa Monica	2	2	136	167	303	264	300
Sunset/LaBrea	3	1	84	91	175	396	150
Holl/Cahuenga	2	2	141	148	289	264	300
Universal City	2	2	137	296	433	264	300
N. Hollywood	2	2	135	205	340	264	300

3.0 EMERGENCY EXITING CRITERIA ALTERNATIVES

This chapter presents four alternatives for determining emergency exiting requirements:

- Uniform Building Code, 1979 and 1982 editions
- National Fire Protection Association Standard 101 - Life Safety Code
- National Fire Protection Association Standard 130 - Standard for Fixed Guideway Transit Systems
- Proposed Fire/Life Safety Committee Criteria for Emergency Exiting from SCRTD Metro Rail Stations, hereinafter referred to as "F/LS Criteria"

Each of these alternatives are discussed in detail in the following paragraphs.

3.1 Uniform Building Code (UBC)

Interpreting the Uniform Building Code (UBC), occupant load of a building is determined according to its intended use. A Metro Rail station would fall under the category of 'Group A - Occupancy', which includes 'Assembly Buildings'. The occupant load for an assembly building is determined by dividing the floor area of assembly by an 'occupant load factor' of 7 square feet per person. The capacity of exits required is measured in feet of exit width. This capacity is calculated by dividing the occupant load by 50 persons per foot of exit width.

Applying the UBC, the Metro Rail station exit requirements would be calculated in the following manner:

Step 1: Identify the net platform area equal to gross platform area minus areas not used for normal circulation such as platform edge strips and areas occupied by vertical circulation devices.

Step 2: Calculate occupant load equal to net platform area divided by 7 square feet per person.

Step 3: Calculate required exit capacity equal to occupant load divided by 50 persons per required foot of exit width.

The content of provisions in the UBC, as they apply to Metro Rail station emergency exiting requirements, are the same for both the 1979 and the 1982 Editions of the Code. Relevant provisions are:

- Definition of an Assembly Building
  Section 402 in both Editions
- Definition of Group A Occupancy
  Section 601 in both Editions
- Determination of Occupant Load
  Section 3301(d) in 1979 Edition
  Section 3302(a) in 1982 Edition

- Number of Exits
  - Section 3302(a) in 1979 Edition
  - Section 3303(a) in 1982 Edition
- Width of Exits
  - Section 3302(b) in 1979 Edition
  - Section 3303(b) in 1982 Edition

3.2 National Fire Protection Association Standard 101 - Life Safety Code (NFPA 101)

As strictly interpreted in NFPA 101, the occupant load of a building is determined by its intended use. The classification of occupancy for a Metro Rail station would be categorized as a 'new place of assembly'. Occupant load for a 'new place of assembly' is determined by dividing the net floor area assigned to the place of assembly by an appropriate occupant load factor. For an assembly area of concentrated use without fixed seats, the occupant load factor is 7 square feet per person. The capacity of exits is measured in 'units of exit width' equal to 22 inches per unit. Fractions of a unit comprising 12 inches or more are counted as 1/2 unit of exit width. The required exit width is calculated by dividing the occupant load by a factor of 75 persons per unit of exit width.

Applying NFPA 101, Metro Rail station exit requirements would be calculated as follows:

Step 1: Identify net platform area.

Step 2: Calculate occupant load equal to the net platform area divided by 7 square feet per person.

Step 3: Calculate the required exit capacity equal to occupant load divided by 75 persons per unit of exit width.

The provisions of the 1981 Edition of NFPA 101, as they are interpreted to apply to Metro Rail station emergency exiting requirements, are contained in Chapter 5, Means of Egress, and in Chapter 8, New Places of Assembly. Chapter 5 sets forth general means of egress requirements for existing and new buildings under all classifications of occupancy. Chapter 8 sets forth specific provisions for new places of assembly. In the event of conflict between the general provisions in Chapter 5 and the provisions for specific building uses in later chapters, 8 through 30, NFPA 101 Section 5-1.1.1 clearly states that the provisions of the later chapters are to be followed.

Relevant provisions of the 1981 Edition of NFPA 101, as they apply to Metro Rail stations, are:

- Definition of 'assembly' classification of occupancy - Section 4-1.2
- Occupant load - Sections 5-3.1 and 8-1.7
- Units of exit width - Section 5-3.2
- Capacity of means of egress - Section 8-2.3.1

3.3 National Fire Protection Association Standard 130 - Standard for Fixed Guideway Transit Systems (NFPA 130)

In NFPA 130, the occupant load is based upon patrons on trains during the peak period, called "link loads" and patrons awaiting trains at a station, called "entraining loads." The occupant load thus varies from station to station according to changes in the number of entraining passengers at a station and in inbound and outbound link loads.

A station's 'inbound link' load refers to the number of passengers on trains entering a station on the inbound track. A station's outbound link load is the number of passengers on trains entering a station on the outbound track. 'Inbound' and 'outbound' in this discussion refer to the train's direction of travel relative to Union Station. All link loads are patron volumes on trains entering the station.

The occupant load is derived by adding the 'Calculated Train Load' and the station entraining load. The calculated train load represents the passenger volume on trains entering a station that would have to be off-loaded in an emergency; it is determined for one train on each inbound and outbound track in the station during the peak 15 minute period. A further assumption is that the number of persons on each train will be twice normal peak 15 minute levels to allow for one missed headway. Thus, the number of persons on a train is calculated by multiplying twice the peak 15 minute link load by the scheduled headway divided by 15.

The maximum number of persons on any train can not exceed the maximum practical capacity for the train (for Metro Rail service, a maximum capacity of 1,200 persons was assumed). Additionally, it is assumed that trains on each track will arrive and off-load simultaneously. The calculated train load is the sum of persons on an inbound and an outbound train.

As an illustration, if the peak 15 minute line volume for trains entering a given station is 4,000 persons on inbound trains and 1,000 persons on outbound trains, the calculated train load for scheduled 3-1/2 minute headways under NFPA 130 would be:

Calculated train load = inbound component + outbound component.
Inbound component = 4,000 persons x 3-1/2 min/15 min x 2
= 2,000 persons

Note: 3-1/2 min/15 min has been approximated at 0.25.

Since this value exceeds maximum practical capacity, the value for the inbound component becomes 1,200 persons which represents crush load.

Outbound component = 1,000 persons x 3-1/2 min/15 min x 2
= 500 persons
Calculated train load = 1,200 persons + 500 persons = 1,700 persons.

The station entraining load represents the peak 15 minute passenger accumulation on the station platform awaiting a train.

Occupant loads are calculated for both the AM and PM peaks. The higher

occupant load, AM or PM, is designated as 'worst case' and is the basis for determining evacuation times and emergency exiting requirements.

Emergency exit capacity is measured in units of exit width of 22 inches per unit. Occupant capacity per unit of exit width varies by circulation element. Exit capacity required is determined to allow (1) evacuation of the occupant load from the station platform in 4 minutes and (2) evacuation of passengers from the most remote part of the platform to a point of safety in 6 minutes.

Relevant provisions of the proposed NFPA 130 are:

- Definition of Occupant Load - Section 2-5.2
- Number and Capacity of Exits - Section 2-5.3
- Calculation of Occupant Load and Exit Capacity (includes sample problem) - Appendix A - Section 3.2

3.4 Metro Rail Fire/Life Safety Committee Criteria for Station Emergency Exiting (F/LS Criteria)

The basis for exiting provisions in the F/LS Criteria is similar in many respects to the approach used for NFPA 130. Both criteria rely on the dynamic modelling approach. Under both criteria, the exit capacity required is determined to allow evacuation of the occupant load from the platform in 4 minutes and evacuation of passengers to a point of safety from the most remote point on the platform in 6 minutes.

The F/LS Criteria differs from NFPA 130 in the manner of determining occupant load. Under the F/LS Criteria, the occupant load is the sum of the 'Calculated Train Load' and the entraining load. The calculated train load in the F/LS Criteria represents the passenger volume on trains entering a station that would have to be off-loaded in an emergency. The calculated train load is determined for one train on each track in the station during the peak 15 minute period. The number of persons on each train is assumed to be what would normally be expected during the 15 minute peak period. Hence, the number of persons on a train is calculated by multiplying the peak 15 minute link load by the scheduled headway and dividing by 15.

In using the F/LS Criteria, the maximum number of persons on any train cannot exceed the maximum capacity for the train. A further assumption is that trains on each track arrive and off-load simultaneously. The calculated train load is thus the sum of loads on an inbound and an outbound train. The calculated train load can be no less than the maximum capacity of a single train.

As an illustration, if the peak 15 minute line volume for trains entering a given station is 4,000 persons on inbound trains and 1,000 persons on outbound trains, the calculated train load for scheduled 3-1/2 minute headways under F/LS would be:

Calculated train load = inbound component + outbound component.
Inbound component = 4,000 persons x 3-1/2 min./15 min.
= 1,000 persons
Outbound component = 1,000 persons x 3-1/2 min./15 min.
= 250 persons
Calculated train load = 1,000 persons + 250 persons
= 1,250 persons

As an additional illustration, suppose that a particular station has a normal load on an inbound train (the inbound component) during the peak 15 minutes of 250 persons and a normal load on an outbound train (the outbound component) of 150 persons. Under the F/LS Criteria, the calculated train load is constrained to 1,200 persons, which represents the maximum capacity of a single train.

The entraining load is equal to the number of passengers that would accumulate on the platform in the time period equivalent to four headways during the peak 15 minute operating period. As a limitation, the entraining load can not exceed the net platform area divided by 4 square feet per person. This constraint reflects a commitment by the SCRTD, which limits access to the station platform by initiating operational measures whenever accumulations of entraining passengers exceed an equivalent of 4 square feet per person.

As an illustration, if the peak 15 minute station boarding is 2,700 and if net platform area is 10,430 square feet, under scheduled 2 minute headways, entraining load is calculated as:

Entraining Load = Peak 15 minute boarding x 4 x headway/15 min
= 2,700 persons x 4 x 2 min/15 min
= 1,440 persons

Under a 3-1/2 minute schedule, entraining load is:

Entraining load = Peak 15 min boardings x 4 x headway/15 min
= 2,700 persons x 4 x 3-1/2 min/15 min
= 2,700 persons

However, the entraining load would be constrained to 2,607 persons which is equivalent to 4 square feet per person on the platform.

Once the occupant load is determined under the F/LS Criteria, the remainder of the methodology for determining exiting requirements is identical to the procedure in NFPA 130.

Emergency exit capacity for the F/LS Criteria is expressed in units of exit width of 22 inches per unit. Occupant capacity per unit of exit width varies by circulation element. Exit capacity required is determined to allow (1) evacuation of the occupant load from the station platform in 4 minutes and (2) evacuation of passengers from the most remote part of the platform to a point of safety in 6 minutes.

Emergency exiting requirements are discussed in Section 2.5 of the F/LS criteria. Section 2.5.1 provides that transit stations comply with applicable building codes and with NFPA 101 chapters 5 and 8 except as set forth in the remainder of section 2.5. Section 2.5.2, Occupancy and Occupant Load, was adopted by the Fire/Life Safety Committee.

4.0 APPLICATION OF THE ALTERNATIVE EMERGENCY EXITING CRITERIA TO SELECTED STATIONS

This chapter presents the results of application of the four alternative emergency exiting criteria that were discussed in Chapter 3. The alternatives were applied to the following three Metro Rail stations:

- 5th/Hill
- Wilshire/Western
- Hollywood/Cahuenga

The 5th/Hill Station was chosen for this analysis because the highest patronage levels projected for any station occur at 5th & Hill. The forecast link loads at 5th/Hill are among the highest on the system. Emergency exiting requirements were expected to be greatest for 5th/Hill.

Wilshire/Western is representative of a medium-to-high volume mid-line station and was chosen for this reason.

Hollywood/Cahuenga was selected for this analysis as representing an outlying station of moderate volume.

It is apparent from the analysis that emergency exiting requirements and exiting times are sensitive to assumed station configurations. This is particularly true for exiting requirements and evacuation time projections for NFPA 130 and the F/LS criteria. Station configuration assumptions were based upon the latest plans available at the time of analysis.

Exiting requirements and times were independently projected for two conditions relating to patronage levels. The first condition was year 2000 peak 15 minute patronage. The second condition was a '1.6 contingency,' which represents a patronage level 60 per cent higher than year 2000 levels. It is assumed that scheduled peak hour headways in the year 2000 will be 3-1/2 minutes. When patronage projections reach 1.6 contingency levels, peak hour headways are assumed to be 2 minutes. One of the purposes of this exiting analysis was to ascertain whether the 3-1/2 minute headways were appropriate for the year 2000 (base year).

4.1 Comparison of NFPA 130 and F/LS Criteria Evacuation Times for Selected Stations

Table 4.1 presents a comparison of occupant load, platform clearance and station evacuation times for NFPA 130 and F/LS Criteria. Assuming year 2000 volumes and occupant loads as defined in NFPA 130, only Hollywood/Cahuenga meets both the 4 minute and 6 minute tests. Under the 1.6 contingency volumes, and NFPA 130 defined occupant loads, none of the three stations meets the 4 or 6 minute tests. With occupant loads as defined by the F/LS Criteria, all stations meet both time tests for both year 2000 and 1.6 contingency conditions.

Under NFPA 130, occupant loads for the 1.6 contingency exceed loads for year 2000. However, F/LS Criteria occupant loads for Wilshire/Western and for Hollywood/Cahuenga are higher in the year 2000 than they are under the 1.6 contingency. This is because the F/LS Criteria occupant load is sensitive to the closing up of headways, where the NFPA 130 occupant load is insensitive to changes in headway.

The F/LS Criteria occupant load for 5th & Hill remains the same for both year 2000 and 1.6 contingency conditions. This is because entraining platform accumulation is constrained in both conditions to 2877 persons which allows 4 square feet of net platform area per entraining passenger. Also, the calculated train load for 5th/Hill under F/LS is 1200 persons in both the year 2000 and the 1.6 contingency.

Platform and station evacuation times for 5th & Hill, Wilshire/Western and Hollywood/Cahuenga presented in Table 4-1 differ somewhat from times shown in Table 6-1 (discussed later in text). This is because assumed station configurations had changed at the time analysis shown in Table 6-1 was conducted. The F/LS Criteria is a 'dynamic' criteria, and, as such, evacuation times are sensitive to station configuration. Changes in location of circulation elements on the platform will affect evacuation times under the F/LS Criteria (and under Proposed NFPA 130)

4.2 Alternative Criteria Exiting Capacity Requirements for Selected Stations

Table 4-2 presents a comparison of occupant load under UBC, NFPA 101, NFPA 130 and F/LS Criteria, the exit width (in exit units of 22 inches) required to meet each alternative criteria and the exit width provided. The exit width provided at each station meets UBC and F/LS Criteria. Exit width provided at 5th/Hill falls far short of requirements under NFPA 130. At Wilshire/Western, exit width provided does not meet NFPA 101 or NFPA 130 requirements. At Hollywood/Cahuenga, planned exit width does not meet NFPA 101 requirements.

Exiting requirements for 5th/Hill and for Hollywood/Cahuenga in Table 4-2 differ somewhat from those shown in Table 6-2 for the reasons stated previously (due to changes in station configuration assumed at the time the analysis shown in Table 6-2 was conducted).

The data in Table 4-2 have also been presented in graphical format in Figures 4-1, 4-2 and 4-3 on a station-by-station basis to more clearly show the wide variation in exit width requirements. For the NFPA 130 and F/LS approaches, additional data points were calculated to show exit width requirements for each of the operating headways throughout the planning period.

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TABLE 4-1

EXITING TIMES FOR SELECTED STATIONS UNDER PROPOSED NFPA 130 AND UNDER FIRE/LIFE SAFETY PROPOSED CRITERIA

STATION (1)	Occupant Load		Evacuation Time (Minutes) to Clear Platform		Evacuation Time (Minutes to Point of Safety	
	NFPA 130 (2)	Metro Rail F/LS (3)	NFPA 130 (4)	Metro Rail F/LS (5)	NFPA 130 (6)	Metro Rail F/LS (7)
Year 2000 (3-1/2 Min. Headway)						
5th/Hill	5704	4077	4.66	3.33	7.31	5.98
Western	2995	2334	4.76	3.71	6.77	5.72
Holl/Cahuenga	2073	1815	3.30	2.89	5.66	5.25
1.6 Contingency (2 Min. Headway)						
5th/Hill	7681	4077	6.28	3.33	8.93	5.98
Western	3524	2089	6.00	3.32	8.01	5.33
Holl/Cahuenga	2318	1726	3.68	2.74	6.04	5.10

Note: Evacuation times shown in this table for 5th & Hill, Wilshire/Western and Hollywood/Cahuenga differ somewhat from values shown in Table 6-1. This difference is due to changes in assumed station configuration after completion of analysis in Table 4-1 but prior to time analysis in Table 6-1 was conducted. Refer to discussion in Section 4.1.

NOTES REFERRED TO IN PARENTHESIS ( ) ARE ON PAGE FOLLOWING THIS TABLE.

NOTES TO TABLE 4-1

(1) Station configurations assumed:

5th/Hill - General Plan 4/7/83
Western - Prototypical Station Plan 4/7/83
Hollywood/Cahuenga - General Plan in Milestone 10 Report

(2) Occupant load is defined in NFPA 130 - Appendix A-3. It is the sum of entraining load in peak 15 minutes and calculated train load of trains simultaneously entering the station on both tracks during the peak 15 minutes. Calculated train load assumes loads resulting from one missed headway but not greater than maximum capacity of 1200 passengers.

(3) Fire/Life Safety Proposed Criteria defines occupant load in Sections 2.5.2.1 and 2.5.2.2. It is the sum of entraining load in four headways and calculated train load of trains simultaneously entering station on both tracks during peak 15 minutes. Calculated train load is the greater of single train maximum capacity (1200 passengers) or combined peak and off-peak direction link loads with no missed headways assumed. Entraining load limited to allow a minimum of four s.f. net platform area per person.

(4) NFPA 130 - Section 2-5.3.2 sets forth requirement that there shall be sufficient exit lanes to evacuate occupant load from station platforms in 4 minutes or less. Capacities and travel speed assumptions are set forth in NFPA 130 Section 2-5.3.4. Procedure to calculate exit capacities and evacuation times is outlined in NFPA 130 - Appendix A-3.

(5) Fire/Life Safety Criteria sets forth in Section 2.5.3.2 that there shall be sufficient exit lanes to evacuate station platforms in 4 minutes or less. Procedure to calculate evacuation times is the same as methodology outlined in NFPA 130.

(6) NFPA 130 - Section 2-5.3.3 sets forth requirement that station shall be designed to permit evacuation from the most remote point on platform to a point of safety in 6 minutes or less. Capacities and travel speed assumptions are set forth in NFPA 130 Section 2-5.3.4. Procedure to calculate exit capacities and evacuation times is outlined in NFPA 130 - Appendix A-3.

(7) Fire/Life Safety Criteria provides in Section 2.5.3.3 that station shall be designed to permit evacuation from most remote point on platform to a point of safety in 6 minutes or less. Procedure to calculate evacuation times is same as methodology outlined in NFPA 130.

TABLE 4-2

EXITING CAPACITY REQUIREMENTS FOR SELECTED STATIONS UNDER ALTERNATIVE CRITERIA

STATION	Occupant Load				Exit Width Required (in exit units of 22 in. each)				Exit Width Provided (Exit Units) (10)
	U.B.C. (2)	NFPA 101 (3)	NFPA 103 (4)	Metro Rail F/LS (5)	U.B.C. (6)	NFPA 101 (7)	NFPA 130 (8)	Metro Rail F/LS (9)	
Year 2000 (3-1/2 Min. Headway)									
5th/Hill	1644	1644	5704	4077	18.0	22.0	49.0	35.0	35
Western	1490	1490	2995	2334	16.5	20.0	21.5	17.0	18
Holl/Cahuenga	1490	1490	2073	1815	16.5	20.0	16.5	14.0	18
1.6 Contingency (2 Min. Headway)									
5th/Hill	1644	1644	7681	4077	18.0	22.0	65.5	35.0	35
Western	1490	1490	3524	2089	16.5	20.0	25.5	15.0	18
Holl/Cahuenga	1490	1490	2318	1726	16.5	20.0	18.0	13.5	18

Note: Exiting requirements shown in this table for 5th & Hill and Hollywood/Cahuenga differ somewhat from values shown in Table 6-2. This difference is due to changes in assumed station configuration after completion of analysis in Table 4-2 but prior to time analysis in Table 6-2 was conducted.

NOTES REFERRED TO IN PARANTHESIS ( ) ARE ON PAGE FOLLOWING THIS TABLE.

NOTES TO TABLE 4-2

(1) Station configurations assumed:

5th/Hill - General Plan, 4/7/83
Western - Prototypical Station Plan, 4/7/83
Hollywood/Cahuenga - General Plan in Milestone 10 Report

(2) Occupant load determined by dividing available platform area by 7 s.f. per passenger as set forth in U.B.C., Table No. 33-A.

(3) Occupant load determined by dividing available platform area by 7 s.f. per passenger as set forth in NFPA 101 - Section 8-1.7.1 (a).

(4) Occupant load is defined in Proposed NFPA 130 - Appendix A-3. It is the sum of entraining load in peak 15 minutes and calculated train load of trains simultaneously entering the station on both tracks during the peak 15 minutes. Calculated train load assumes loads resulting from one missed headway but not greater than maximum capacity of 1200 passengers.

(5) Fire/Life Safety Proposed Criteria defines occupant load in Sections 2.5.2.1 and 2.5.2.2. It is the sum of entraining load in four headways and calculated train load of trains simultaneously entering station on both tracks during peak 15 minutes. Calculated train load is the greater of single train maximum capacity (1200 passengers) or combined peak and off-peak direction link loads with no missed headways assumed. Entraining load limited to allow a minimum of 4 s.f. net platform area per person.

(6) Exit width requirement based upon 50 persons per foot of exit width as set forth in U.B.C., 1982 Edition - Section 3303 (b).

(7) Exit width requirement based upon 75 persons per exit width unit as set forth in NFPA 101 - Section 8-2.3.1 (c). Units of exit width are multiples of 22 inches as set forth in NFPA 101 - Section 5-3.2.

(8) Exit width requirement based upon provision that evacuation of platform occur in 4 minutes or less and evacuation of station from most remote point on platform to point of safety in 6 minutes or less. Capacities and travel speed assumptions are set forth in Proposed NFPA 130, Section 2-5.3. Procedure to calculate exit capacities and evacuation times is set forth in NFPA 130 - Appendix A-3.

(9) Exit width requirement is established in Fire/Life Safety Criteria. Section 2.5.3 outlines criteria for exit width requirements, which is the same as NFPA 130 requirements discussed in Note 8.

FIGURE 4-1

EMERGENCY EXITING ANALYSIS
COMPARATIVE CODE
EXIT WIDTH REQUIREMENTS
5TH / HILL STATION

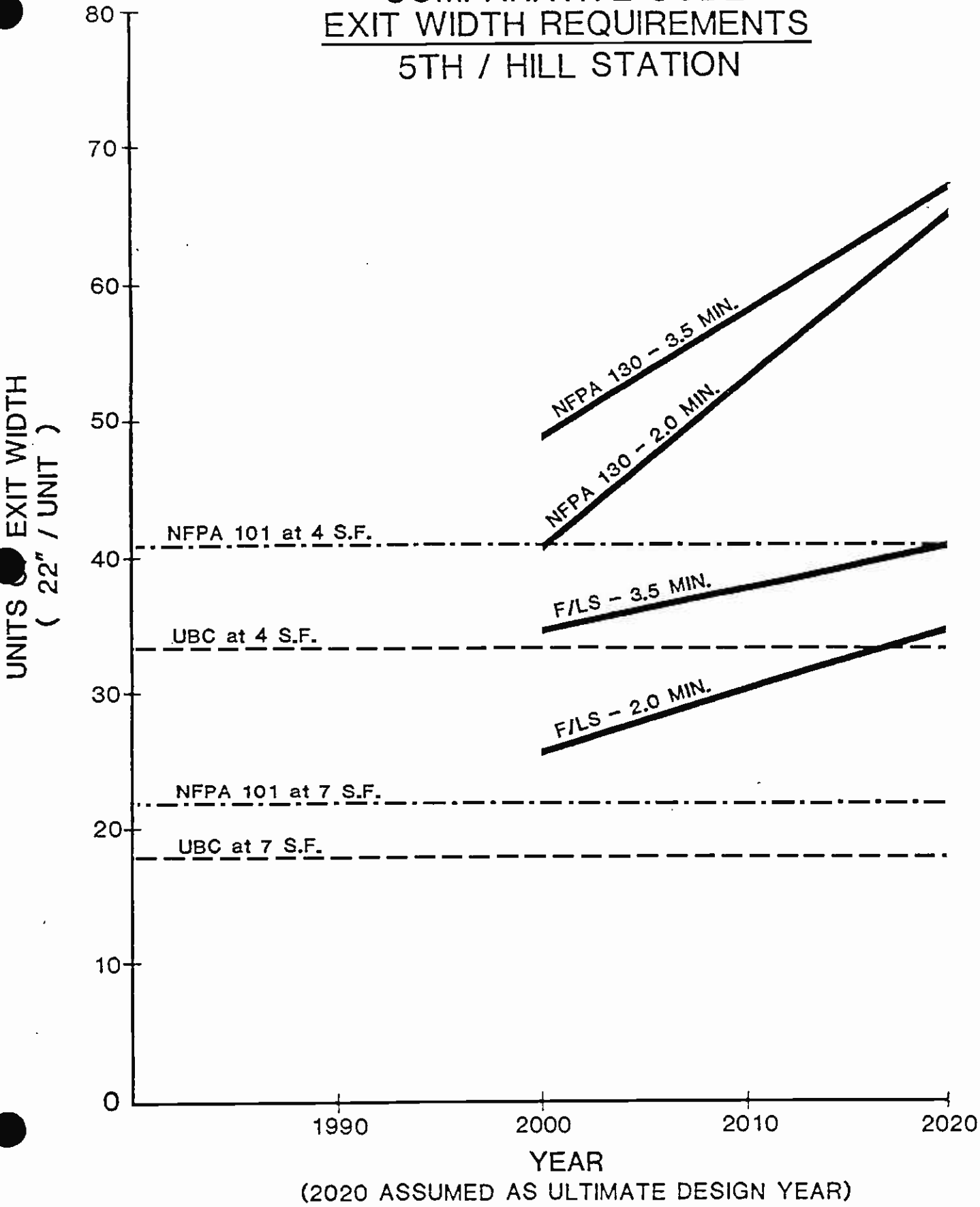


FIGURE 4-2

EMERGENCY EXITING ANALYSIS
COMPARATIVE CODE
EXIT WIDTH REQUIREMENTS
WILSHIRE / WESTERN STATION

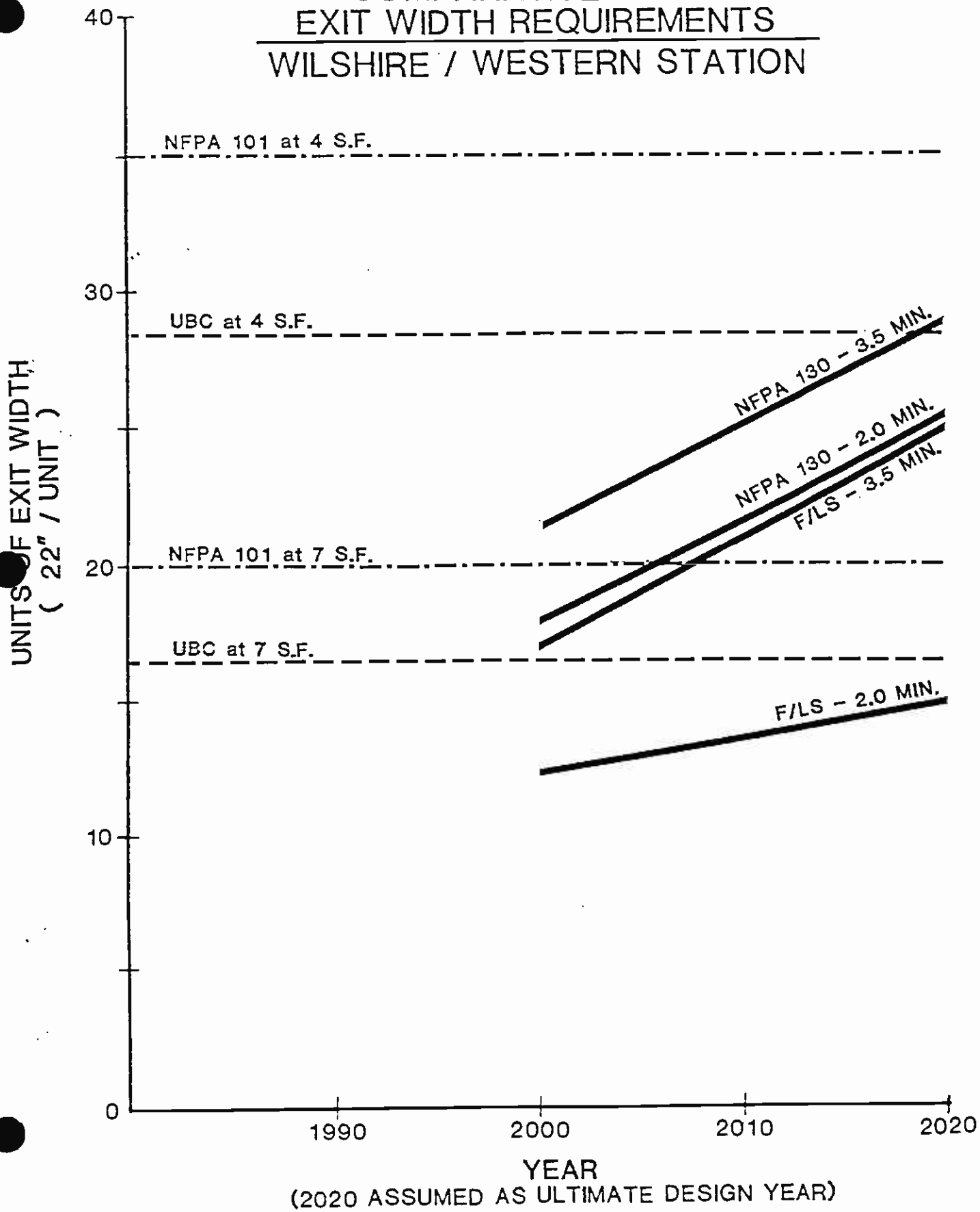
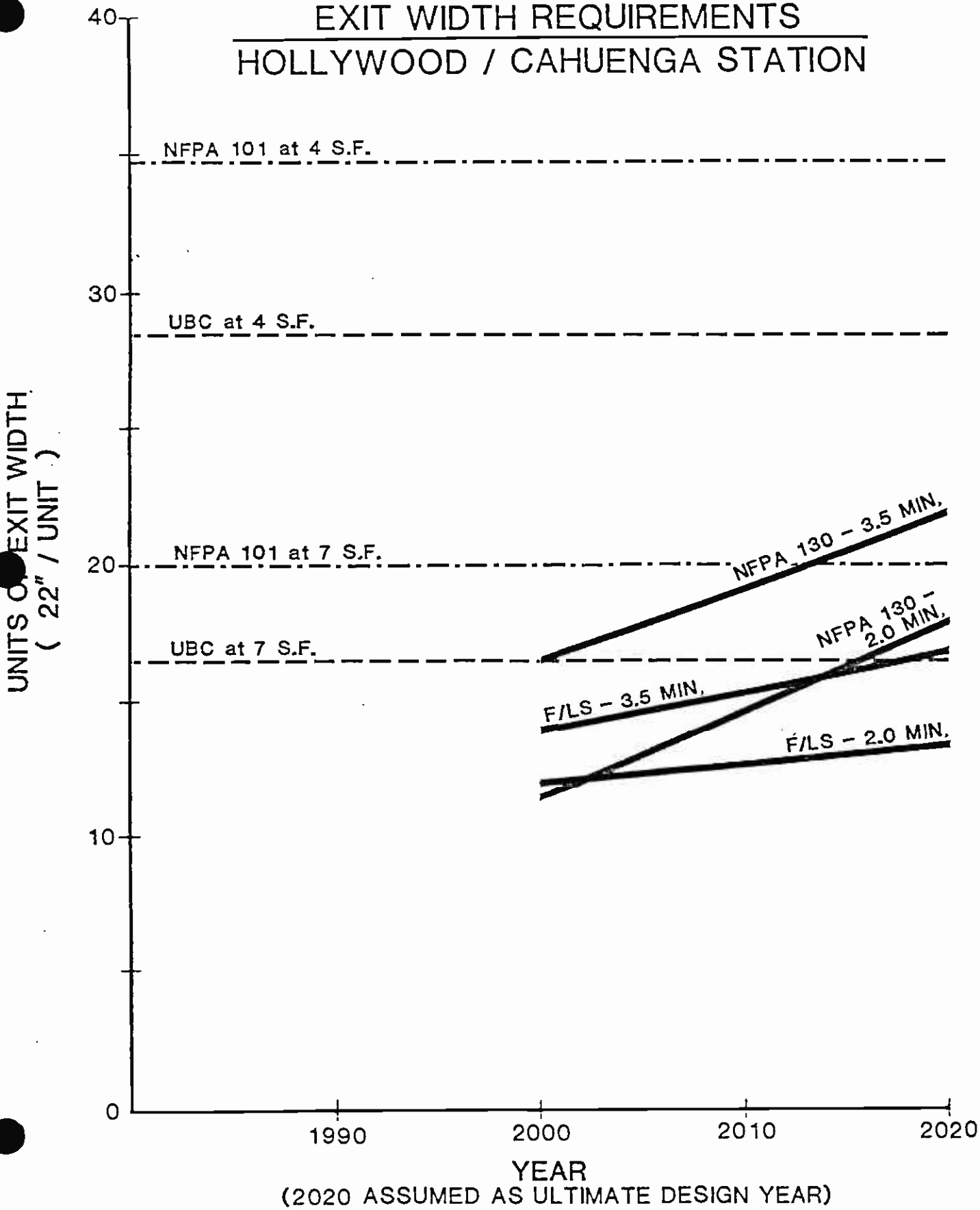


FIGURE 4-3

EMERGENCY EXITING ANALYSIS
COMPARATIVE CODE
EXIT WIDTH REQUIREMENTS

HOLLYWOOD / CAHUENGA STATION



5.0 RATIONALE FOR SELECTING THE MOST APPROPRIATE ALTERNATIVE FOR EMERGENCY EXITING CRITERIA

This chapter presents an analysis and interpretation of comparing evacuation times and emergency exiting requirements of the alternative criteria presented in Chapter 4. Additionally, the emergency exiting criteria recommended for adoption by the SCRTD Fire/Life Safety Committee is also presented.

5.1 Results and Interpretation of the Alternative Emergency Exiting Criteria

As previously indicated in Table 4-1, all three stations subjected to the analysis were capable of meeting the 4 and 6 minute evacuation requirements of the F/LS Criteria. It was also observed that:

- For NFPA 130, both 5th & Hill and Wilshire/Western Stations failed to meet either the 4 or the 6 minute tests.

- Hollywood/Cahuenga met the 4 minute test, but only marginally met the 6 minute test for NFPA 130.

The primary reason for this difference in evacuation times is attributed to the different manner of determining "occupant load".

Of importance then is comparing the respective criteria as they relate to "occupant load" determination. For the 1.6 contingency, the occupant load for NFPA 130 is 7,681 persons at 5th & Hill Station, which has a net platform area of 11,510 square feet. This implies a 1.5 square feet per person occupancy at the time of station evacuation; a highly unlikely circumstance without panic.

Even if the calculated train load for 5th & Hill were disregarded for NFPA 130 (2,166 persons) the result would be a 15 minute platform entraining load of 5,515 persons on the platform immediately prior to the simultaneous arrival of the two off-loading trains. This entraining load results in 2.1 square feet per person, again a highly unlikely circumstance without panic.

Neither the 1.5 or 2.1 square feet per person platform accumulation is a reasonably assumed and acceptable platform density to plan for because of the following:

- A 2 square foot per person occupancy is unacceptable even in elevators where it causes physical and psychological discomfort.

- Movement is not possible at this level of crowding.

- There is also a potential for panic in large crowds. (See Fruin, Pedestrian Planning and Design, page 87.)

It is a logical assumption that passengers would not willingly subject themselves to the level of crowding implicit in the entraining load required for NFPA 130.

Additionally, the system can operationally intervene by closing a station

prior to platform accumulations reaching this level. It can, therefore, be assumed that NFPA 130 does not limit its entraining load to a level that reflects maximum practical platform densities. By recognizing operational capability to constrain platform accumulations of entraining passengers to a limit of 4 square feet per person, the F/LS criteria is more representative of what could be expected when intervening measures can be implemented.

Another comparison between NFPA 130 and the F/LS Criteria is the assumed entraining load. The F/LS criteria states that the entraining load is equal to a platform accumulation 4 times the headway; NFPA 130 states that the entraining load is a 15 minute accumulation of patrons on the platform without recognition of the headway. The length of time for management action and intervention during an emergency is a function of headway spacing. Therefore, the assumption of entraining load varying with the scheduled headway as in the F/LS Criteria is preferable to the assumption that entraining load is a function of time and is insensitive to headway times.

NFPA 130 and F/LS Criteria also differ in their definition of the calculated train load. NFPA 130 assumes that trains in both the inbound and outbound direction will have twice normal peak loads constrained by the crush load to reflect one missed headway for each train. The F/LS Criteria assumes no missed headway, but sets a minimum calculated train load as assurance that exiting capacity can compensate for an underforecasting of link load. By assuming simultaneous arrival of two off-loading trains, both criteria are conservative at the outset.

In the meetings of the Metro Rail Fire/Life Safety Committee there was considerable discussion about whether the added assumption in NFPA 130 of one missed headway on each train resulted in calculated train loads that were overly conservative. Additionally, there is some question about whether doubling the normal peak period train load is an accurate estimate of the number of detraining passengers resulting from a missed headway. If a train fell behind schedule a few stations before the station under study, its detraining passengers could be expected to exceed a normal peak train load but would not be twice the normal peak train load.

It can be seen from Table 4-2 that occupant loads and, consequently exiting requirements, under UBC and NFPA 101 are not responsive to station usage or link loading. Their requirements are a function of platform area. A number of factors in addition to demand determine platform sizing for stations. These include train length, vertical circulation device requirements, and other physical limitations, such as location of existing building foundations. The lack of sensitivity of UBC and NFPA exit width requirements to projected patronage is neither realistic nor desirable.

5.2 Selected Emergency Exiting Criteria

The F/LS Criteria was selected as the basis for determining exiting requirements for the following reasons:

- F/LS is sensitive to changes in demand, and
- F/LS has assumptions that are more representative of the actual environment as compared to the other criteria that were investigated.

6.0 APPLICATION OF F/LS CRITERIA TO ALL METRO RAIL STATIONS

This chapter presents the results of application of the F/LS Criteria for Emergency exiting to all Metro Rail stations. Evacuation times and emergency exiting requirements are identified for all stations. The Station configurations assumed are reflected in the general station plans as of April 20, 1983. The patronage data base is as of March 14, 1983. Occupant loads, evacuation times and exiting requirements are presented for the year 2000 demand and for the 1.6 contingency conditions.

6.1 Platform and Station Emergency Evacuation Times for Stations

Table 6-1 presents the projected times for platform evacuation and for evacuation to a point of safety for all Metro Rail Stations. For all stations except 5th & Hill, evacuation times are greater for the year 2000 than for the 1.6 contingency condition. This is due to shorter headways assumed under the 1.6 contingency.

In the year 2000:

- Four stations have platform evacuation times in excess of 4 minutes - 7th/Flower, Wilshire/Alvarado, Wilshire/Vermont and North Hollywood.

- Four stations have station evacuation times in excess of 6 minutes - 5th/Hill, 7th/Flower, Wilshire/Alvarado and Wilshire/Vermont.

Platform and station evacuation times for 5th/Hill, Wilshire/Western and Hollywood/Cahuenga presented in Table 6-1 differ somewhat from times shown in Table 4-1. This is because assumed station configurations had changed from the time of the original analysis. The F/LS Criteria is a 'dynamic' criteria, and, as such, evacuation times are sensitive to station configuration. Changes in the location of circulation elements on the platform will affect evacuation times under the F/LS Criteria (and under NFPA 130).

6.2 Emergency Exiting Capacity Requirements for Stations

Table 6-2 presents the F/LS emergency exiting capacity requirements for all Metro Rail stations. The capacity requirements, as indicated in Table 6-2 would permit each station to meet the 4 and 6 minute tests. Except for 5th/Hill, emergency exiting requirements for all stations are greater for the year 2000 than for the 1.6 contingency. As previously mentioned, exiting requirements are greater for year 2000 because of the extended time between trains. At 5th/Hill Station, exiting requirements are identical for both the year 2000 and 1.6 contingency, because the occupant load is identical.

Exiting requirements for 5th & Hill and for Hollywood/Cahuenga in Table 6-2 differ somewhat from those shown in Table 4-2 (for Wilshire/Western, exiting requirements are the same for both Tables). The difference in exiting requirements was due to changes in station configuration assumed at the time the analysis shown in Table 6-2 was conducted. As a dynamic criteria, the F/LS Criteria produces results that are sensitive to station configuration. Changes in on-platform location of elements will affect the exit width requirement.

Year 2000 exit capacity requirements exceed provided exit units at five stations: 5th/Hill, 7th/Flower, Wilshire/Alvarado, Wilshire/Vermont and Hollywood/Cahuenga. For 1.6 contingency conditions, exit capacity requirements exceed units provided at all of these stations except Hollywood/Cahuenga. However, it should be noted that under the 1.6 contingency condition, none of the Metro Rail stations requires exiting capacity more than 12 percent in excess of that provided.

If this difference between required and supplied exiting is found to be worth mitigating, the Metro Rail management has a number of options. These include:

- providing more exiting where it is cost-effective to do so,
- operating on shorter headways than assumed in this analysis (particularly in year 2000) and
- developing operations plans to intervene and/or mitigate some emergencies (as discussed in Chapter 7 of this report).

In addition, some or all of the difference between required and supplied exiting may be judged by Metro Rail management as tolerable due to the presence of other fire protection features included in station and tunnel design.

The F/LS Criteria (Section 2.5.2.2.2) states that, notwithstanding other provisions in Section 2.5.2, as a minimum, exit width provided shall accommodate the equivalent of 7 square feet per person according to the following formula:

$$\text{Minimum Total Exit Width (Feet)} = \frac{\text{Net Platform Area}}{7 \text{ sq. ft./Person}} \times \frac{1}{50 \text{ Persons per Foot of Exit Width}}$$

Table 6-3 compares minimum exit units required by this formula with exit units provided. At all stations as presently configured, exiting units provided meet or exceed this minimum requirement.

TABLE 6-1

EMERGENCY EXITING ANALYSIS - EVACUATION TIMES UNDER PROPOSED FIRE/LIFE SAFETY CRITERIA

	Year 2000 3-1/2 Min. Headway			1.6 Contingency 2 Min. Headway			Exit
STATION	Occ. Load	Platform Evacuation	Station Evacuation	Occ. Load	Platform Evacuation	Station Evacuation	Units Provided
Union	3005	3.58 min.	5.64 min.	2740	3.27 min.	5.33 min.	24
Civic Center	2913	2.98	5.54	2662	2.72	5.28	28
5th/Hill	4077	3.33	6.32	4077	3.33	6.32	35
7th/Flower	4047	4.63	6.85	3564	4.08	6.30	25
Wil/Alvarado	2812	4.47	6.01	2531	4.02	5.56	18
Wil/Vermont	2961	4.70	6.39	2735	4.35	6.04	18
Wil/Normandie	2297	3.46	5.42	2062	3.11	5.07	19
Wil/Western	2334	3.71	5.30	2089	3.32	4.91	18
Wil/Crenshaw	2059	3.27	5.18	1931	3.07	4.98	18
Wil/La Brea	1597	2.41	3.96	1540	2.32	3.87	19
Wil/Fairfax	2578	3.21	5.49	2377	2.96	5.24	23
Fair/Beverly	1787	2.69	4.17	1701	2.56	4.04	19
Fair/Sta.Monica	1795	2.85	4.86	1708	2.72	4.73	18
Sunset/La Brea	1570	2.37	3.88	1516	2.28	3.79	19
Holl/Cahuenga	1815	2.89	4.65	1726	2.74	4.50	18
Universal City	2368	3.76	5.80	2197	3.49	5.53	18
N. Hollywood	2529	4.02	5.71	2335	3.71	5.40	18

Note: Evacuation times shown in this table for 5th/Hill, Wilshire/Western and Hollywood/Cahuenga differ somewhat from values shown in Table 4-1. This difference is due to changes in assumed station configuration after completion of analysis in Table 4-1 but prior to time analysis in Table 6-1 was conducted. Refer to discussion in text in Section 6.1.

TABLE 6-2

EMERGENCY EXITING ANALYSIS - EMERGENCY EXIT CAPACITY UNDER PROPOSED FIRE/LIFE SAFETY CRITERIA

STATION	Year 2000 - 3-1/2 Min. Hdwy Occ. Load	Exit Req't (Units)	1.6 Contingency Occ. Load	2 Min. Hdwy. Exit Req't	Exit Units Provided
Union	3005	22.0	2740	20.0	24
Civic Center	2913	24.5	2662	22.5	28
5th/Hill	4077	39.0	4077	39.0	35
7th/Flower	4047	31.0	3564	27.0	25
Wil/Alvarado	2812	21.0	2531	18.5	18
Wil/Vermont	2961	21.5	2735	20.0	18
Wil/Normandie	2297	16.5	2062	15.0	19
Wil/Western	2334	17.0	2089	15.0	18
Wil/Crenshaw	2059	15.0	1931	14.0	18
Wil/La Brea	1597	11.5	1540	11.0	19
Wil/Fairfax	2578	20.0	2377	17.0	23
Fair/Beverly	1787	13.0	1701	12.5	19
Fair/StaMonica	1795	13.0	1708	12.5	18
Sunset/La Brea	1570	11.5	1516	11.0	19
Holl/Cahuenga	1815	13.0	1726	12.5	18
Universal City	2368	17.5	2197	16.0	18
N. Hollywood	2529	18.5	2335	17.0	18

Note: Exiting requirements shown in this table for 5th & Hill and Hollywood/Cahuenga differ somewhat from values shown in Table 4-2. This difference is due to changes in assumed station configuration after completion of analysis in Table 4-2 but prior to time analysis in Table 6.2 was conducted. Refer to discussion in text in Section 6-2.

TABLE 6-3

MINIMUM EXITING REQUIREMENT EQUIVALENT TO 7 SQUARE FEET PER PERSON

STATION	NET PLATFORM AREA (S.F.)	EXIT FEET REQUIRED (Net Area/350)	EXIT FEET PROVIDED (Exit Units x 22/12)
Union	12230	35	44.0
Civic Center	11510	33	51.3
5th/Hill	11510	33	64.2
7th/Flower	11870	34	45.8
Wil/Alvarado	10430	30	33.0
Wil/Vermont	10430	30	33.0
Wil/Normandie	10430	30	34.8
Wil/Western	10430	30	33.0
Wil/Crenshaw	10430	30	33.0
Wil/La Brea	10430	30	34.8
Wil/Fairfax	11870	34	42.2
Fair/Beverly	10430	30	34.8
Fair/Sta.Monica	10430	30	33.0
Sunset/La Brea	10430	30	34.8
Holl/Cahuenga	10430	30	33.0
Universal City	10430	30	33.0
N. Hollywood	10430	30	33.0

Note: This table identifies minimum exiting requirements according to F/LS Criteria, Section 2.5.2.2.2.

7.0 STATION EMERGENCY OPERATIONAL INTERVENTION AND/OR MITIGATION CAPABILITY

As previously indicated, the recognition of operational capability to intervene and/or mitigate station emergencies is necessary. There are many measures which can be procedurally instituted to evacuate patrons safely. Table 7-1 is an illustration of some typical measures that can be accomplished operationally to prevent station platform overcrowding and safe egress should an emergency arise.

The items identified in the table are not intended to be an exhaustive list of all postulated emergencies, but rather, the table is presented as a representative example of what can be instituted in the event of an emergency.

TABLE 7-1

STATION EMERGENCY OPERATIONAL INTERVENTION AND/OR MITIGATION CAPABILITY

TYPE OF SCENARIO POSTULATED	OPERATIONAL CAPABILITY	TYPE OF MEASURE
I. FIRE: ON TRAIN		
- Detected on arrival at station; another train on adjacent track	Make station announcement; evacuate incident train; inform patrons on train on adjacent track to remain on board and move train to next station; activate fare gate array to "Exit Only"; assist patrons out of station.	Intervention
- Detected on arrival at station; no other train on adjacent track	Same as above except train on adjacent track procedure not required.	Intervention
- Detected in advance of arrival at station; trains at station	Activate fare gate array to "Exit Only"; make station announcements and escort patrons out of station; inform patrons on train(s) at station to remain on board and move train(s) to next station; incident train proceeds to station to off load patrons.	Mitigation
IN STATION:		
- Detected while train(s) are at platform unloading	Activate fare gate array to "Exit Only"; make station announcements and assist patrons in evacuation; train(s) at platform make announcement for patrons to remain on board; train(s) proceed to next station	Intervention

TABLE 7-1

STATION EMERGENCY OPERATIONAL INTERVENTION AND/OR MITIGATION CAPABILITY

TYPE OF SCENARIO POSTULATED	OPERATIONAL CAPABILITY	TYPE OF MEASURE
IN STATION (Continued):		
- Detected before train(s) arrive	Activate fare gate array to "Exit Only"; make station announcements and assist patrons in the evacuation process; preclude train(s) from arriving at affected station until incident is under control.	Mitigation
II. NORMAL DAILY OPERATIONS:		
IN STATION		
- Platform accumulation approaches 4 sq.ft./person	Activate fare gate array to "Exit Only"; make announcement that station is temporarily closed because of over crowding; do not permit further patron access into station until overcrowding subsides	Mitigation
- Fare collection array failures causing excessive queing at fare gates and patron build-up approaching 4 sq.ft./person	Same as above for 4 sq.ft./person	Intervention

TABLE 7-1

STATION EMERGENCY OPERATIONAL INTERVENTION AND/OR MITIGATION CAPABILITY

TYPE OF SCENARIO POSTULATED	OPERATIONAL CAPABILITY	TYPE OF MEASURE
III. BOMB THREAT: ON TRAIN		
- Train informed while at station; another train at adjacent track	Make station announcement to evacuate station and activate fare gate array to "Exit Only" and assist patrons in evacuation process; move non-incident train out of station with patrons on board; off-load patrons on incident train and move train into tunnel; prevent all trains from entering the affected zone.	Intervention
- Train informed while at station; no train at adjacent track	Same as above except for "Non-Affected" train	Intervention
- Train informed prior to approaching station	Make station announcement to evacuate station and activate fare gate array to "Exit Only"; assist patrons in the evacuation process; stop incident train short of, but near station; off load patrons from incident train and evacuate toward station; leave train in tunnel until incident is resolved	Intervention
IN STATION:		
- Informed while train(s) at station platform	Make station announcements, activate fare gate array to "Exit Only" and assist patrons in evacuation process; inform patrons on train(s) to remain on board and move train(s) to next station; preclude further train arrivals at station until incident is resolved	Intervention

TABLE 7-1

STATION EMERGENCY OPERATIONAL INTERVENTION AND/OR MITIGATION CAPABILITY

TYPE OF SCENARIO POSTULATED	OPERATIONAL CAPABILITY	TYPE OF MEASURE
III. BOMB THREAT IN STATION (Continued): - Informed prior to train arrival at station platform	Same as above except for "Trains at station"	Intervention

This list is not exhaustive; it is only a representative example of some postulated events and measures that can be instituted to intervene and/or mitigate station emergency exiting.

8.0 CONCLUSIONS

The foregoing text reveals that a comprehensive analysis of the various codes was conducted by the SCRTD Fire/Life Safety Committee. Although it would have been advantageous to universally apply a single code to the Metro Rail Project, the analysis revealed weaknesses in existing code provisions as they applied to transit station requirements. A number of these include:

- UBC and NFPA 101 provisions do not consider actual patron loads which may be in the station.
- At high volume stations, UBC and NFPA 101 provisions appear to provide insufficient exiting width and, at low volume stations, more than may be needed.
- NFPA 130 does not recognize physical limitations of the platform in deriving entraining load.
- UBC, NFPA 101 and NFPA 130 do not adequately recognize transit system operational procedures which may be instituted to intervene and limit occupant loading during potential emergency conditions.
- NFPA 130 uses a static period for determining entraining loads and does not recognize the effect that variations in headway interval may have on platform accumulation.

It is noteworthy to mention the conclusions of an independent analysis of NFPA 130 egress requirements by the Department of Transportation (Transportation System Center). These conclusions are documented in a report dated May 16, 1983 to the Urban Mass Transportation Administration and amplify those of the currrent study. The conclusions are reproduced below:

- "...There does not appear to be any rationale for the selection of a fixed evacuation time of four minutes from the platform and six minutes from the station.
- The standard does not differentiate between underground, elevated or at grade stations but applies the same egress requirements to all stations. Moreover the times to evacuate an underground station will vary with the depth of the station and cannot be specified as a fixed period of time. For example, using the patron walking speeds specified in NFPA-130, stations over 200 feet deep could not be evacuated in 6 minutes even if there were no waiting times. WMATA has several existing or planned deep stations, including Forest Glen which is nearly 200 feet deep. Five stations have escalators that exceed 200 feet in length with Wheaton being 229 feet. Forest Glen is deep enough that the normal travel mode will be by elevator. Since undelayed walking time can exceed 6 minutes, the only other recourse that NFPA-130 (has is to construct) a "place of safety" underground for hundreds, if not thousands of people. Such a solution will be very difficult and expensive to implement and as past transit experience has shown, unnecessary. Furthermore, the concern over smoke will vary with whether the station is underground, elevated, or at grade.

- The NFPA-130 capacity and travel speeds are questionable. For example, the walking speed up stairs and up stopped escalators are the same in the standard. Escalators, however, are not designed for walking efficiency and the walking speed on escalators is slower than that for stairs. Furthermore, it is questionable that the average person can maintain a speed of 50 FPM (vertical component) up a stopped escalator over 200 feet in length.

- Many stations cannot meet the evacuation time requirements not because of egress design, but rather because of the large platform loading produced by the method of calculation required by NFPA-130. The methods of calculating occupancy loads as defined in NFPA-130 contain several inconsistencies and tend to inflate platform loads beyond worst case conditions. Train loads are based on headways, although it is presumed that one headway is missed, and since calculations are based on the peak hours, it is tantamount to assuming that trains will have crush loads. Platform loads, however, are not based on headways. The method of calculating platform load or entraining load requires that all headways during the peak fifteen minute period are missed. Thus, at the start of an emergency evacuation, it is assumed that all the patrons entering the station during the previous peak fifteen minutes are standing on the platform. Use of the "disruption curve correction factor" also can inflate that number of patrons by another fifty percent.

- The proposed Standard does not reflect the present state-of-the-art in station design, but merely introduces a new untested design criteria. Past experience from may existing station designs, which have served well for many years has not been utilized..."

From the analysis and findings there was a clear indication that occupancy load, and, thereby, exit width requirements were a function of three distinct but integral factors:

- Patronage levels
- Operational characteristics of the system
- Station configuration

It was, therefore, recommended and subsequently mandated that the SCRTD Emergency Exiting Criteria incorporate these system variables.

The Criteria developed by the Fire/Life Safety Committee and described in Section 3.0 achieve this objective. It combines the merits of a patronage-based dynamic approach and the constraint that platform accumulation is limited by physical dimensions. This joint consideration dictates that operational measures are an integral part of the station emergency egress characteristics. In addition, by tying entraining loads to an accumulation of headways, the criteria assert that:

- The time-lapse for identification of an emergency condition is not static and is a function of system operation which varies during the day and throughout the life of the system and that

- The entraining portion of the station occupant load will vary as the headway is shortened or lengthened.

These two characteristics imply that actual operations directly affect the volume of patrons that may have to be evacuated during an emergency condition. They also imply that, as operational effectiveness improves, the element of risk is reduced and Fire/Life Safety response capabilities are enchanced. Likewise, if operations are not achieving the intended objectives, the increased risk will also be apparent.

For criteria to be appropriate, this flexibility to respond to and accurately assess the actual conditions is mandatory. The Metro Rail F/LS Criteria possess this flexibility.

The adopted emergency exiting criteria for the Metro Rail System provide a realistic answer to the dilemma of specifying the appropriate exit width requirements for the Metro Rail Stations. By integrating the factors of patronage, operational characteristics, and station configuration, the criteria enable the SCRTD to monitor and report actual conditions and to assess the emergency characteristics of the respective stations.

APPENDIX A

ITA LIBRARY

2.2.5 MEANS OF EGRESS

2.2.5.1 Public Occupancy Areas

The transit station shall comply with the provisions of applicable building codes and NFPA 101 Chapters 5 and 8, except as set forth below.

2.2.5.2 Occupancy and Occupant Load

2.2.5.2.1 The occupant load for a station shall be determined based on an emergency condition requiring evacuation of that station load to a point of safety. The station occupant load is defined as follows:

- Calculated train load
- Entraining load (on platform awaiting train)

(A) The Calculated train load is the number of passengers on trains simultaneously entering the station during the peak 15-minute period. The following limitations to the calculated train load are followed:

- No more than one train will unload at any one track to a platform.
- The load on any single train is limited to the maximum train capacity.
- The calculated train load can be no less than the maximum passenger capacity of a single train.

(B) The entraining load is equal to the number of passengers that would accumulate on the platform in the time period equivalent to four headways during the peak 15-minute operating period. This entraining load is constrained as defined in paragraph 2.2.5.2.2 (A).

2.2.5.2.2 Special Conditions and Design Considerations

(A) Access to the platform and/or the station must be operationally constrained to a platform net area occupancy equivalent to 4 square feet per person. For anticipated platform entraining loads that would result in area occupancies of less than 4 square feet per person, the calculated platform load will be limited to the net platform area divided by 4 square feet per person. The minimum total exit width in feet shall be equal to this platform load divided by 50 patrons per foot of exit width.

(B) Notwithstanding other provisions in section 2.2.5.2, exiting shall be provided, as a minimum, to accommodate the

equivalent of 7 square feet per person; i.e.,

$$\text{Minimum Total Exit Width (Feet)} = \frac{\text{Net Platform Area}}{\text{7 Sq. Ft./Per Person}} \times \frac{1}{\text{50 Persons Per Foot of Exit Width}}$$

(C) Special design consideration shall be given to stations directly servicing areas where events occur that result in abnormal patron loads. These would include such areas as arenas, sports complexes, and convention centers. Consideration of control access to platforms may be necessary to provide appropriate safety levels.

2.2.5.2.3 If there are side platform stations, each platform shall be considered separately. At center platform stations, arrival of trains from both directions, plus their entraining loads, shall be considered.

2.2.5.2.4 At concourses, mezzanines, or multi-level stations, simultaneous platform loads shall be considered for all exit paths passing through that area.

2.2.5.3 Number and Capacity of Exits

2.2.5.3.1 Exit capacities shall be calculated on the basis of 22-inch wide exit lanes. Width shall be measured in the clear at the narrowest point except that individual handrails may project 3-1/2 inches into the required width. Fractional lanes shall not be counted in measuring exit capacities except that 12 inches added to one or more lanes shall be counted as 1/2 a lane.

2.2.5.3.2 There shall be sufficient exit lanes to evacuate the station occupant load as defined in paragraph 2.2.5.2.1 from the station platforms in 4 minutes or less (see Figure 2-1 "Emergency Exit Capacity Calculation").

2.2.5.3.3 The station shall also be designed to permit evacuation from the most remote point on the platform to a point of safety in 6 minutes or less.

2.2.5.3.4 To calculate this evacuation time, the walking travel time should be tabulated using the longest exit route and travel speeds indicated in paragraph 2.2.5.3.5. To this time should be added the following factors:

(A) (W_1-T_1) The waiting time at the vertical elements at platform level minus the longest walking travel time at platform level.

(B) (W_2-W_1) The waiting time at the fare collection barriers minus the waiting time at the platform vertical circulation elements.

(C) (W_3-W_x) The waiting time at the vertical or horizontal circulation elements from concourse to grade minus the waiting time at the platform vertical circulation elements or fare collection barrier, whichever is greater.

(D) (W_4-W_x) The waiting time, if any, at any additional constriction minus the greatest previous waiting time. (Repeat for all additional constrictions.)

Note: The total of any of the factors in (A) through (D) above cannot be less than zero.

2.2.5.3.5 The capacity in persons per minute (ppm), travel speeds in feet per minute (fpm), and requirements for exit lanes shall be as follows:

(A) Platforms, corridors, and ramps of 4 percent slope or less: Exit corridors and ramps shall be a minimum clear width of 5 feet 8 inches. In computing the number of exit lanes available, 1 foot 6 inches shall be deducted at each platform edge and 1 foot at each sidewall.

Per exit lane: Capacity - 50 ppm
Travel Speed - 200 fpm

(B) Stairs, stopped escalators, and ramps of over 4 percent slope: Exit stairs shall be a minimum clear width of 3 feet 8 inches. Exit ramps shall be a minimum clear width of 6 feet. Stopped escalators may be considered as emergency exits of 2-lane capacity provided they are of nominal 4 feet width; of 1-1/2 lane capacity provided they are of nominal 2 feet 8 inches width; and one-lane capacity if less than 2 feet 8 inches width.

Per exit lane "up" direction: Capacity - 35 ppm
Travel Speed - 50 fpm*

Per exit lane "down" direction: Capacity - 40 ppm
Travel Speed - 60fpm*

(C) Doors and gates: Exit doors and gates shall be a minimum of 3 feet wide.
Per exit lane: Capacity - 50 ppm

(D) Fare collection gates qualifying for use in exit paths shall be electrically deactivated to assume an acceptable exit mode in the event of a power failure or through actuation of a manual or remote control, or shall be of the swinging type fitted with approved panic hardware and

---

*Indicates vertical component of travel speed)

opening in the direction of exit travel, and shall be rated in exit capacity as follows:

(1) Gates that when deactivated provide a clear unobstructed aisle, a minimum of 1 foot 8 inches in width, mounted between consoles not exceeding 3 feet 4 inches in height.

Per gate: Capacity - 50 ppm

(2) Gates, a minimum of 18 inches wide, having a turnstile bar positioned to have maximum height of 3 feet which, when deactivated, will free wheel in the exit direction.

Per gate: 25 ppm with exit capacity of gates with turn-stile bars not exceeding 50 percent of total capacity in any gate array.

(3) Swinging gates fitted with approved panic hardware and opening in the direction of exit travel, with mimimum nominal width of 3 feet.
Per gate: Capacity - 50 ppm per exit lane

Fare gate not qualifying for use in exit paths shall be prominently marked "Not an Exit."

2.2.5.3.6 From each platform there shall be a minimum of 2 exits not less than 100 feet apart. Platform exits shall be stairs or stopped escalators to concourse level, emergency stairs, doorways, corridors, or walkways to a point of safety. Routes from platform ends into the underground trainway may not be considered as exits for calculating exiting requirements.

2.2.5.3.7 There shall be a minimum of 2 exits from each concourse. Exits shall be separated by a minimum distance of 40 feet.

2.2.5.3.8 No point of the station platform(s) or concourse(s) shall be more than 300 feet from an exit.

2.2.5.3.9 All exit measurements shall be to a point of access to the exit.

2.2.5.3.10 Exits other than turnstiles shall provide for at least 50 percent of the exit capacity in any fare barrier.

2.2.5.3.11 A point of safety shall be defined as any at-grade area beyond any structure; any exit having a fire-rated enclosure which discharges to an at-grade area beyond any structure; or a passageway that affords equivalent protection.

2.2.5.3.12 In addition to the exits specified to obtain compliance with the foregoing requirements, means of ingress shall be provided from each trainway to the platform.

(A) Two 2 feet 10 inches wide stairways, or other arrangement having equivalent capacity, shall be provided at each end of the platform, arranged to provide full capacity exiting from either trackway.

(B) Gates at top of each stairway shall swing in the direction of access to the platform, and shall provide clear opening width not less than 3 feet.

(C) Gates, stairs, and landings shall conform to requirements of NFPA 101 and applicable building codes.

(D) For ends of platform where calculated capacity exits emanate within 25 feet from an end of platform, the access points and the exit may be integrated.

2.2.5.3.13 Escalators shall not account for more than half of the units of exit at any one level in the public area.

Figure 2-1

EMERGENCY EXIT CAPACITY CALCULATIONS

Station _____

Occupancy Load _____

Exit Lanes and Capacity Provided

Platform to Concourse

Stairs	_____	x	_____	Lanes x	_____	PPM =	_____	PPM
Escalators	_____	x	_____	Lanes x	_____	PPM =	_____	PPM
Emergency Stairs	_____	x	_____	Lanes x	_____	PPM =	_____	PPM
				TOTAL			_____	PPM

Through Fare Barrier

Fare Gates	_____	x	_____	Lanes x	_____	PPM =	_____	PPM
Service Gates	_____	x	_____	Lanes x	_____	PPM =	_____	PPM
Emergency Gates	_____	x	_____	Lanes x	_____	PPM =	_____	PPM
				TOTAL			_____	PPM

Fare Barrier to Safe Area

Stairs	_____	x	_____	Lanes x	_____	PPM =	_____	PPM
Escalators	_____	x	_____	Lanes x	_____	PPM =	_____	PPM
Emergency Stairs	_____	x	_____	Lanes x	_____	PPM =	_____	PPM
				TOTAL			_____	PPM

Figure 2-1 (cont.)

EMERGENCY EXIT CAPACITY TESTS

Test 1

Evacuate station occupant load from station platform(s) in 4 minutes or less.

$$W_1 \text{ (waiting time at platform exits)} = \frac{W \text{ (occupancy load)}}{\text{Exit Capacity}}$$

$$W_1 = \frac{\_\_\_\_ \text{ Persons}}{\_\_\_\_ \text{ PPM}} = \_\_\_\_ \text{ Minutes}$$

Test 2

Evacuate station occupant load from the most remote point on the platform to a point of safety in 6 minutes or less.

Walking Time for Longest Exit Route

$$T = T_1 + T_2 + T_3 + T_4 + T_5$$

T_1 (platform) =	____ Feet	____ FPM =	____ Minutes
T_2 (platform to concourse) =	____ Feet	____ FPM =	____ Minutes
T_3 (concourse to fare barrier) =	____ Feet	____ FPM =	____ Minutes
T_4 (fare barrier to safe area) =	____ Feet	____ FPM =	____ Minutes
T_5 (grade) =	____ Feet	____ FPM =	____ Minutes

T = ____ MINUTES

Additional Waiting Time at Platform Exits

W_1 _____ - T_1 _____ = _____ Minutes

Additional Waiting Time at Fare Barrier

Occupant Load at Concourse = Occupant Load - Emergency Stair 4 Minute Capacity

- _____ - _____ = _____ Patrons

W_2 (Concourse Occupant Load Gate Capacity)

_____ Persons _____ PPM = _____ Minutes

W_2 _____ - W_1 _____ = _____ Minutes

Additional Waiting Time at Concourse Exits

$$W_3 = \frac{\text{Concourse Occupant Load}}{\text{Exit Capacity}}$$

$$W_3 = \frac{\text{___ Persons}}{\text{___ PPM}} = \text{____ Minutes}$$

W_3 _____ - W_1 _____ = ____ Minutes

Total Exit Time

T _____ + (W_1 - T_1) _____ + (W_2 - W_1) _____ +

(W_3 - W_1) _____ = _____ TOTAL MINUTES

APPENDIX B

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SYS. DESIGN & ANAL.
METRO RAIL PROJECT

SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT

DO NOT INCLUDE MORE THAN ONE SUBJECT IN THIS COMMUNICATION

DATE: March 14, 1983

TO: Distribution

FROM: Gary Spivack by: Keith Killough

SUBJECT: Metro Rail Patronage Estimates

Attached are the most recent year 2000 patronage estimates for the Metro Rail Project. The estimates are for total daily, A.M. peak hour, and P.M. peak hour. Line loading diagrams showing boardings and alightings by station are also provided for each of the above time periods. The final item included with this package is a series of station mode of arrival charts covering entering and exiting volumes for each time period.

Please note that these estimates are to be used until further notice. By April 8, 1983, we will be revising the patronage estimates to incorporate the SCAG '82 trip table, demographic, and trip end data which we have just received. In the interim, we will be reviewing the SCAG data for consistency with the models, logic, and to insure that all existing and committed developments in the Metro Rail corridor are included.

Finally, the items included in this package are those which have been requested most frequently and appear to be the most useful. If there are any additional items or formats that will be needed for future planning and design activities, written specifications of these other needs are requested. This will enable us to respond more expediently and more efficiently since some items require manipulation and additional simulations.

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Attachment

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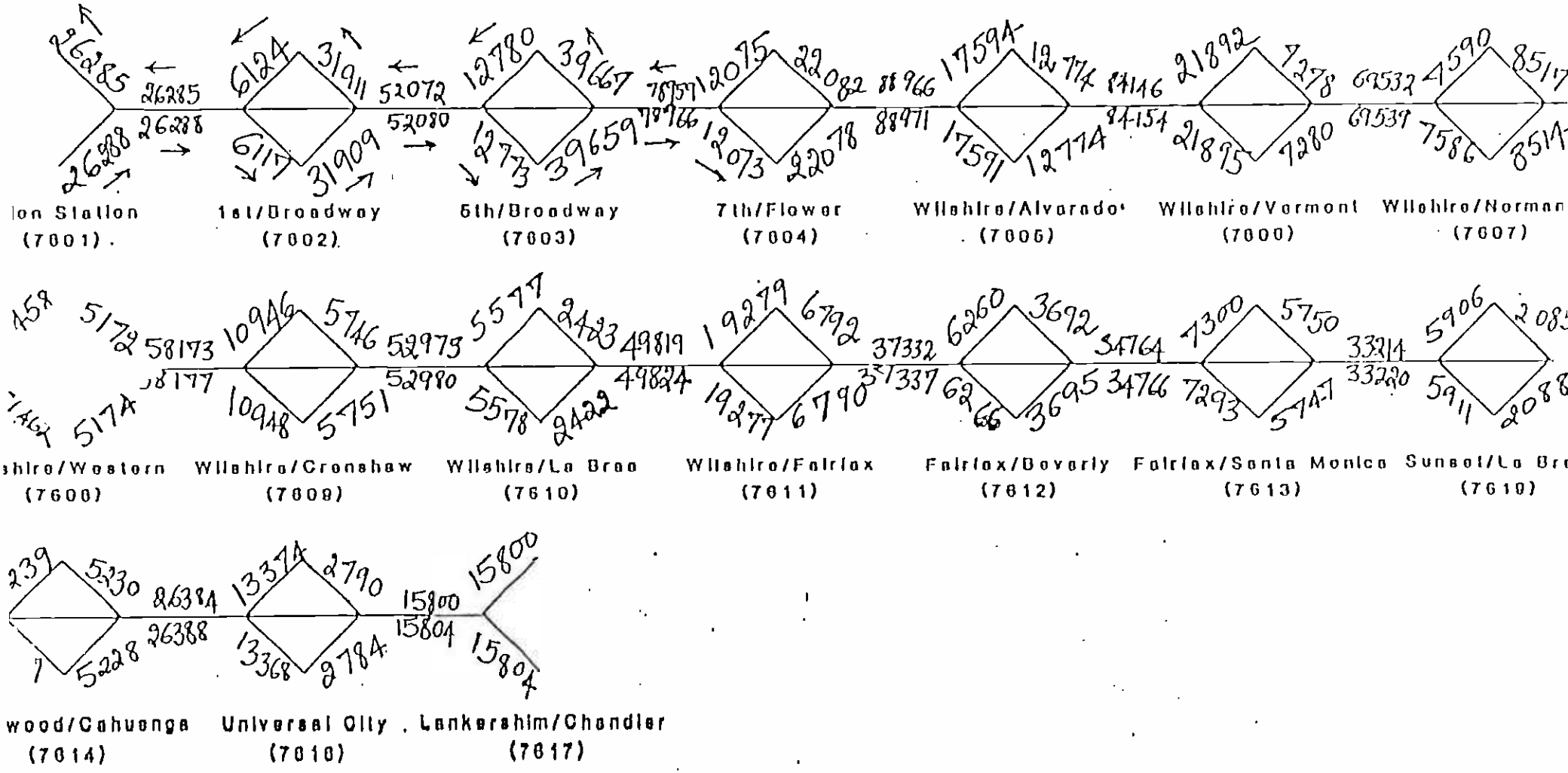
YEAR 2000 DAILY PATRONAGE PROJECTIONS

	MODE OF ARRIVAL				
	WALK	BUS	KISS & RIDE	PARK & RIDE	TOTAL
UNION STATION	2,378	17,003	2,161	4,746	26,288
CIVIC CENTER	15,299	22,734	0	0	38,033
5TH & HILL	10,582	41,857	0	0	52,439
7TH & HILL	24,047	10,106	0	0	34,153
ALVARADO	16,522	9,808	4,038	0	30,368
VERMONT	10,267	15,776	3,129	0	29,172
NORMANDIE	1,348	12,691	2,065	0	16,104
WESTERN	1,706	19,237	1,689	0	22,632
CRENSHAW	4,258	10,489	1,950	0	16,697
LA BREA	1,320	5,770	909	0	7,999
FAIRFAX	1,380	21,165	1,459	2,065	26,069
BEVERLY	1,727	6,394	437	1,397	9,955
SANTA MONICA	714	12,042	291	0	13,047
SUNSET	333	7,238	423	0	7,994
CAHUENGA	642	10,739	2,446	0	13,467
UNIVERSAL	3,919	7,342	1,329	3,568	16,158
NORTH HOLLYWOOD	1,934	10,391	496	2,979	15,800
SYSTEM TOTAL	98,376	240,422	22,822	14,755	376,375



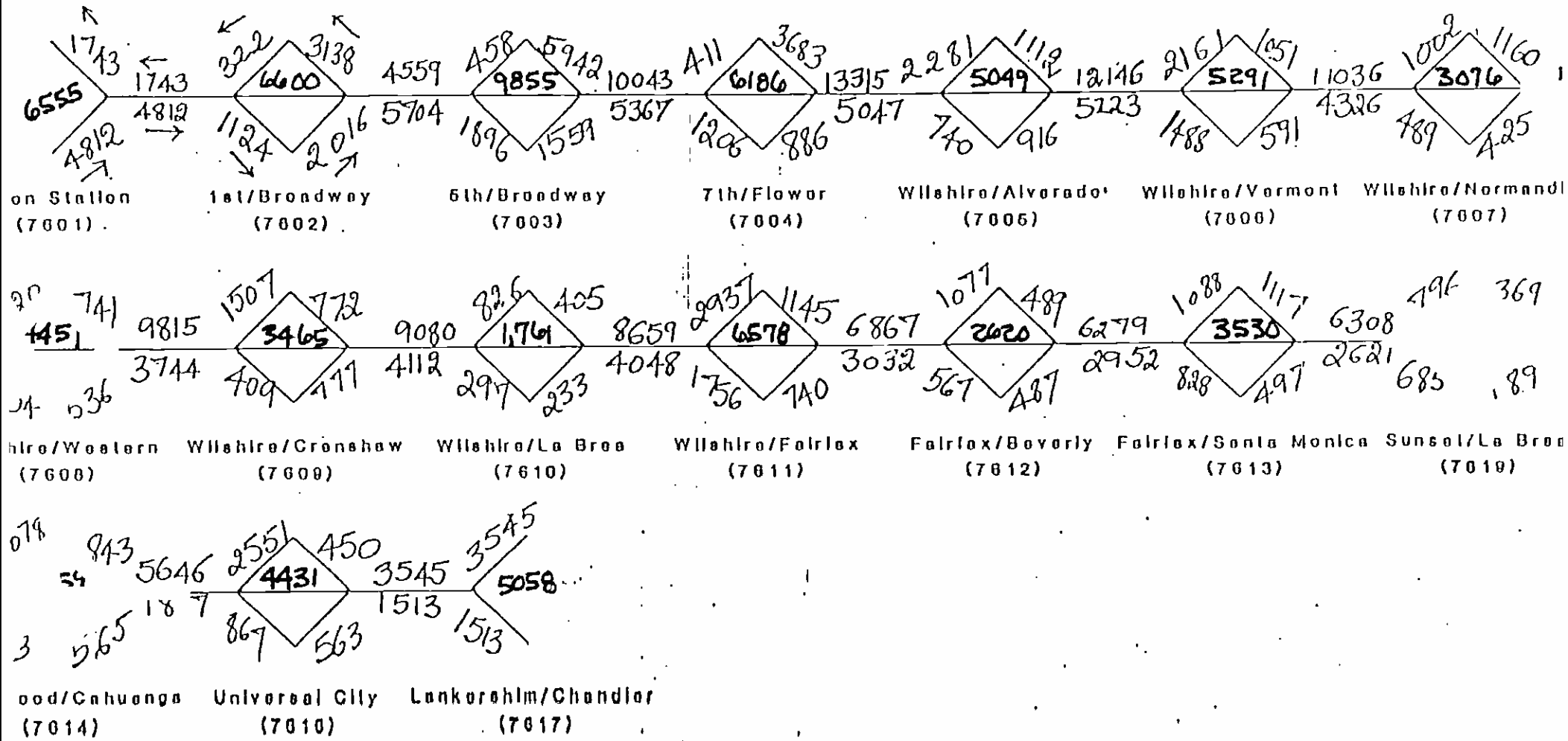
STARTER LINE CORRIDOR

BOARDING, ALIGHTING & LINK VOLUMES BY DIRECTION

~~(1995)~~ AVERAGE DAILY VOLUMES

2000

Revised 3/7/83



STARTER LINE CORRIDOR

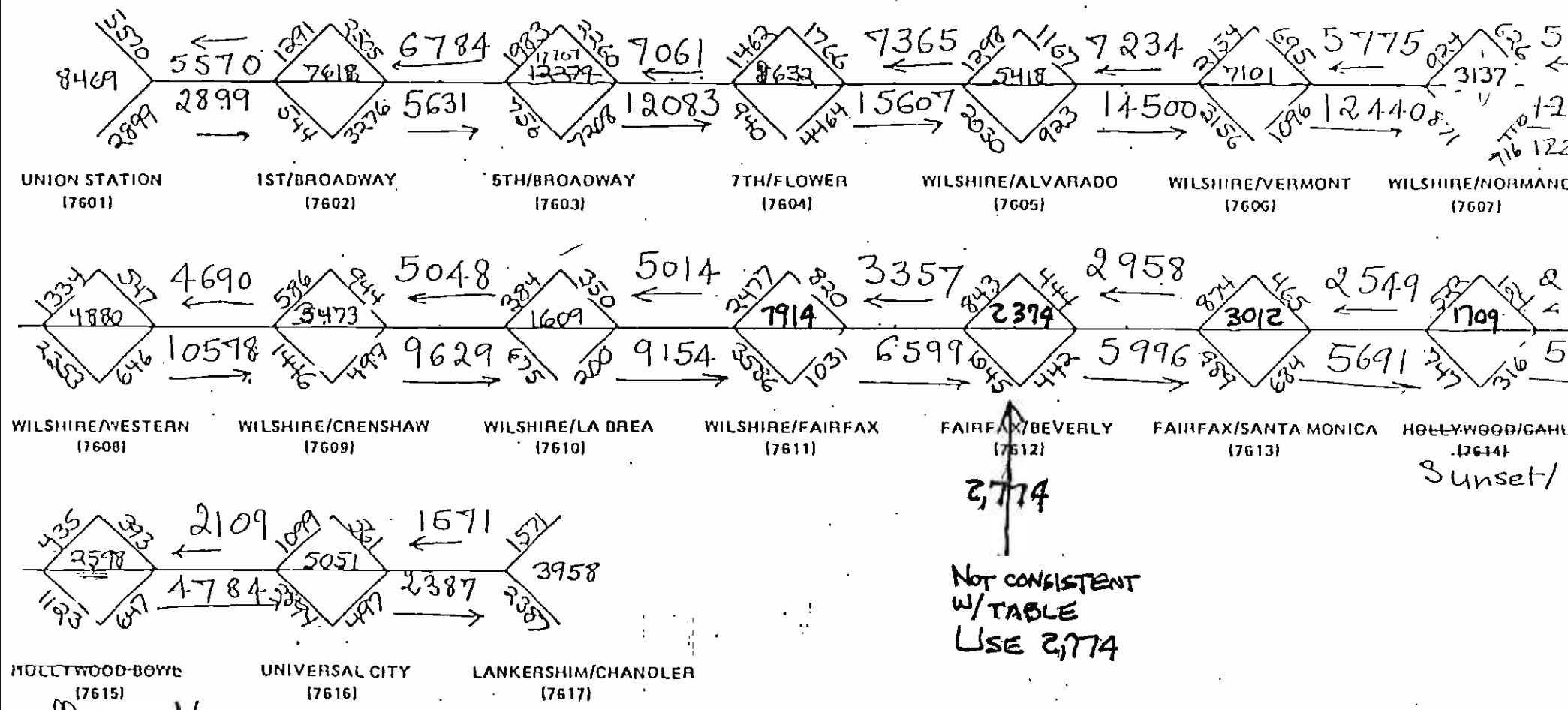
BOARDING, ALIGHTING & LINK VOLUMES BY DIRECTION

~~(1995) AVERAGE DAILY~~ VOLUMES

2000 AM PEAK HR

AM PEAK HR

3/8/83



2,774

NOT CONSISTENT W/TABLE USE 2,774

Sunset/

Hollywood/Cahuenga

OPTION 1
STARTER LINE CORRIDOR

BOARDING, ALIGHTING & LINK VOLUMES BY DIRECTION
(1995) AVERAGE DAILY VOLUMES
Figure 11c

PM PEAK HR
LINK VOLUMES
LPA (YR 2000)

		AM PEAK HOUR ENTERING	AM PEAK HOUR EXITING	PM PEAK HOUR ENTERING	PM PEAK HOUR EXITING	24 HOUR
ALTERNATIVE LPA	Park and ride	1425	39	356	2550	4746
	Kiss and ride	722	21	74	531	2161
	Bus	2481	1376	2068	2280	17003
	Walk	185	307	401	209	2378
	TOTAL	4812	1743	2899	5570	26288

STATION Union Station

		AM PEAK HOUR ENTERING	AM PEAK HOUR EXITING	PM PEAK HOUR ENTERING	PM PEAK HOUR EXITING	24 HOUR
ALTERNATIVE LPA	Park and ride	0	0	0	0	0
	Kiss and ride	0	0	0	0	0
	Bus	1975	2464	2576	2192	22734
	Walk	363	1798	1991	857	15299
	TOTAL	2338	4262	4567	3049	38033

STATION Civic Center

		AM PEAK HOUR ENTERING	AM PEAK HOUR EXITING	PM PEAK HOUR ENTERING	PM PEAK HOUR EXITING	24 HOUR
ALTERNATIVE LPA	Park and ride	0	0	0	0	0
	Kiss and ride	0	0	0	0	0
	Bus	1844	5698	6917	2620	41857
	Walk	173	2140	2274	396	10582
	TOTAL	2017	7838	9191	3016	52439

STATION 5th & Hill

ALTERNATIVE		AM PEAK HOUR ENTERING	AM PEAK HOUR EXITING	PM PEAK HOUR ENTERING	PM PEAK HOUR EXITING	24 HOUR
LPA	Park and ride	0	0	0	0	0
	Kiss and ride	0	0	0	0	0
	Bus	939	1618	1770	1212	10106
	Walk	358	3271	4156	1494	24047
	TOTAL	1297	4889	5926	2706	34153

STATION 7th & Flower

ALTERNATIVE		AM PEAK HOUR ENTERING	AM PEAK HOUR EXITING	PM PEAK HOUR ENTERING	PM PEAK HOUR EXITING	24 HOUR
LPA	Park and ride	0	0	0	0	0
	Kiss and ride	912	97	357	957	4038
	Bus	649	509	504	608	9808
	Walk	1635	1246	1361	1633	16522
	TOTAL	3197	1852	2221	3197	30368

STATION Alvarado

ALTERNATIVE		AM PEAK HOUR ENTERING	AM PEAK HOUR EXITING	PM PEAK HOUR ENTERING	PM PEAK HOUR EXITING	24 HOUR
LPA	Park and ride	0	0	0	0	0
	Kiss and ride	373	37	170	527	3129
	Bus	1732	1290	1667	2284	15776
	Walk	647	1212	1413	1040	10267
	TOTAL	2752	2539	3250	3851	29172

STATION Vermont

		AM PEAK HOUR ENTERING	AM PEAK HOUR EXITING	PM PEAK HOUR ENTERING	PM PEAK HOUR EXITING	24 HOUR
ALTERNATIVE	Park and ride	0	0	0	0	0
	Kiss and ride	276	24	73	277	2065
LPA	Bus	1021	1427	1137	1101	12691
	Walk	130	198	130	119	1348
	TOTAL	1427	1649	~~1340~~ 1640	1497	16104

STATION Normandie

		AM PEAK HOUR ENTERING	AM PEAK HOUR EXITING	PM PEAK HOUR ENTERING	PM PEAK HOUR EXITING	24 HOUR
ALTERNATIVE	Park and ride	0	0	0	0	0
	Kiss and ride	217	20	77	252	1689
LPA	Bus	2370	1491	1658	2547	19237
	Walk	69	284	245	100	1706
	TOTAL	2656	1795	1980	2900	22632

STATION Western

		AM PEAK HOUR ENTERING	AM PEAK HOUR EXITING	PM PEAK HOUR ENTERING	PM PEAK HOUR EXITING	24 HOUR
ALTERNATIVE	Park and ride	0	0	0	0	0
	Kiss and ride	494	21	51	436	1950
LPA	Bus	1399	605	619	1515	10489
	Walk	391	555	413	438	4258
	TOTAL	2284	1181	1083	2390	16697

STATION Crenshaw

MTA LIBRARY

ALTERNATIVE		AM PEAK HOUR ENTERING	AM PEAK HOUR EXITING	PM PEAK HOUR ENTERING	PM PEAK HOUR EXITING	24 HOUR
LPA	Park and ride	0	0	0	0	0
	Kiss and ride	212	10	25	179	909
	Bus	760	518	428	741	5770
	Walk	87	174	131	105	1320
	TOTAL	1059	702	584	1025	7999

STATION La Brea

ALTERNATIVE		AM PEAK HOUR ENTERING	AM PEAK HOUR EXITING	PM PEAK HOUR ENTERING	PM PEAK HOUR EXITING	24 HOUR
LPA	Park and ride	591	12	184	1396	2065
	Kiss and ride	456	15	48	368	1459
	Bus	2525	2717	3101	2529	21165
	Walk	105	157	176	112	1380
	TOTAL	3677	2901	3508	4406	26069

STATION Fairfax

ALTERNATIVE		AM PEAK HOUR ENTERING	AM PEAK HOUR EXITING	PM PEAK HOUR ENTERING	PM PEAK HOUR EXITING	24 HOUR
LPA	Park and ride	575	14	48	566	1397
	Kiss and ride	160	4	12	118	437
	Bus	780	830	984	733	6394
	Walk	49	208	241	72	1727
	TOTAL	1564	1056	1285	1489	9955

STATION Beverly

ALTERNATIVE		AM PEAK HOUR ENTERING	AM PEAK HOUR EXITING	PM PEAK HOUR ENTERING	PM PEAK HOUR EXITING	24 HOUR
LPA	Park and ride	0	0	0	0	0
	Kiss and ride	80	3	8	64	291
	Bus	1495	1825	1469	1378	12042
	Walk	10	117	80	22	714
	TOTAL	1585	1945	1558	1454	13047

STATION Santa Monica*

ALTERNATIVE		AM PEAK HOUR ENTERING	AM PEAK HOUR EXITING	PM PEAK HOUR ENTERING	PM PEAK HOUR EXITING	24 HOUR
LPA	Park and ride	0	0	0	0	0
	Kiss and ride	89	5	14	74	423
	Bus	895	999	791	795	7238
	Walk	1	50	32	2	333
	TOTAL	985	1054	838	871	7994

STATION Sunset*

ALTERNATIVE		AM PEAK HOUR ENTERING	AM PEAK HOUR EXITING	PM PEAK HOUR ENTERING	PM PEAK HOUR EXITING	24 HOUR
LPA	Park and ride	0	0	0	0	0
	Kiss and ride	539	24	62	464	2446
	Bus	1103	1447	995	1049	10739
	Walk	1	45	25	2	642
	TOTAL	1643	~~1546~~ 1716	1082	1516	13467

STATION Cahuenga*

: Due to a simulation error, the bus arrivals and departures at these stations include potential walk trips; thus the walk volumes shown in these tables are underestimated.

		AM PEAK HOUR ENTERING	AM PEAK HOUR EXITING	PM PEAK HOUR ENTERING	PM PEAK HOUR EXITING	24 HOUR
ALTERNATIVE LPA	Park and ride	1419	32	167	2084	3568
	Kiss and ride	532	12	30	393	1329
	Bus	1145	1236	1361	964	7342
	Walk	17	37	38	14	3919
	TOTAL	3114	1317	1596	3455	16158

STATION Universal City*

		AM PEAK HOUR ENTERING	AM PEAK HOUR EXITING	PM PEAK HOUR ENTERING	PM PEAK HOUR EXITING	24 HOUR
ALTERNATIVE LPA	Park and ride	1143	28	75	741	2979
	Kiss and ride	192	5	11	123	496
	Bus	2209	1418	1429	1521	10391
	Walk	1	62	55	2	1934
	TOTAL	3545	1513	1571	2387	15800

STATION North Hollywood*

		AM PEAK HOUR ENTERING	AM PEAK HOUR EXITING	PM PEAK HOUR ENTERING	PM PEAK HOUR EXITING	24 HOUR
ALTERNATIVE	Park and ride					
	Kiss and ride					
	Bus					
	Walk					
	TOTAL					

STATION _____

*: Due to a simulation error, the bus arrivals and departures at these stations include potential walk trips; thus the walk volumes shown in these tables are underestimated.

RTD 37-11
REV 5/82

DEPARTMENTAL

SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT

DO NOT INCLUDE MORE THAN ONE SUBJECT IN THIS COMMUNICATION

DATE: January 12, 1983
12BB

TO: Douglas Low

FROM: Nadeem Tahir

SUBJECT: Response to Your Peak 15 Minute Patronage Memo

Converting the NFPA formula to a percentage gives:

1. For PK 15 minutes

   Peak hour ÷ 4 x 1.5 = 37.5%
   Peak hour ÷ 4 x 1.2 = 30.0%

2. For PK 20 minutes

   Peak hour ÷ 3 x 1.5 = 50%
   Peak hour ÷ 3 x 1.2 = 40%

3. SCRTD Staff Analysis

   This included derivation of the Peak 20 minutes to Peak Hour relationship based on actual ridership statistics on Wilshire and Hollywood Bus lines, and is contained in the report transmitted to all Metro staff and consultants on October 11, 1982.

   The analysis showed that for all Wilshire lines, the Peak 20 minutes volume is 39% of Peak Hour. For line 83 alone this relationship is 41%.

   For the Hollywood to Downtown Bus lines, the Peak 20 minutes is 50% of Peak Hour, while, for the Hollywood line 35 alone, it is 54%.

   From the conversion relationship above it can be seen that a 40% share for the Peak 20 minutes is the same as a 30% share for the Peak 15 minutes. Similarly a 50% share for the Peak 20 minutes = 40% for the Peak 15 minutes.

   Thus based on these comparisons and actual Bus Ridership statistics, it appears that the 1.2 value is only appropriate for Wilshire where the Peak 20 minute ranges from 39% to 41%. For Hollywood, the more appropriate number is 1.5, since the Peak 20 minute volume there ranges from 50% to 54%.

As a composite value for the regional core as a whole, I would suggest that 1.5 be used. The 1.2 may be on the low side, particularly when you consider the fact that our statistics are for bus ridership which usually has a flatter peak because of capacity limitations and that on rapid transit systems, peaks tend to be sharper.

cc: J. Callaway/J. Sowell

REV 5/82

RECEIVED
SCRTD
FEB 16 1983
SYS. DESIGN & ANAL.
METRO RAIL PROJECT

SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT

DO NOT INCLUDE MORE THAN ONE SUBJECT IN THIS COMMUNICATION

DATE: February 14, 1983

RECEIVED
SCRTD
FEB 16 1983
OFFICE OF
MGR/CHIEF ENGINEER
METRO RAIL PROJECT

TO: Richard Gallagher

FROM: Gary S. Spivack

SUBJECT: METRO RAIL DESIGN PATRONAGE

VOID → RGC 3/14/83

The attached tables present the most recent patronage simulation estimates for the Metro Rail Project. These estimates incorporate the mode-of-access modeling improvements of the new SCAG/CSI mode choice model and the integrated bus network developed for the Milestone 9 Supporting Services Plan. As before, various characteristics of the patronage simulation results and the integrated bus network will continue to be evaluated and refined as the Metro Rail Project moves toward implementation. This information is transmitted now for use in the design of system components and will also be included in the Milestone 9 Report which is to be distributed in a series of public meetings during the week of February 14 - 18, 1983.

To account for future growth in the region and to provide for fire/safety assurance, a design factor of 1.6 is recommended for application in combination with the attached patronage estimates. This factor is based upon a review of the factors used in other cities which have included similar considerations in the design of their rail systems.

The estimate of daily transit use at the Universal City Station, as well as the rest of the Metro Rail system, considers only patronage generated by residents of the Los Angeles region. An analysis of tourist transit at other similar attractions in Los Angeles suggests that an additional 700 daily arrivals can be expected to use the Universal City Station, increasing total daily arrivals to 11,300.

GSS/KLK:gh

Attachments

cc: Jim Crawley
John A. Dyer
Doug Low
Al Perdon
Bill Rhine ✓

DISTRIBUTION	ALL
Mgr., Civil Engineer	
Administration	
Project Control	
Systems Analysis	
Comm. Relations	
Ways & Structures	
Systems	
Systems Planning	
Construction	

APPENDIX C

TELEPHONE SURVEY OF NORTH AMERICAN TRANSIT SYSTEMS

A telephone survey was conducted to determine the technique(s) used to calculate exiting requirements and the results are summarized. The other important elements of the evacuation scenario, such as alarming, response, and patron control, have not been addressed herein.

1. LOCATION: Baltimore, Maryland

   AUTHORITY: Mass Transit Administration

   GENERAL:

   A Fire Marshals/Mass Transit Administration Liaison Committee was established early in design to develop a systemwide fire protection criteria. The Committee was given the responsibility as Authority Having Jurisdiction by the Fire Chiefs Council and the State Fire Marshal. The Committee reviews and approves all aspects of system design relating to fire safety. Six of the nine stations in the first leg are underground and in the Central Business District.

   BASIS FOR EXITING:

   Exiting requirements are based upon guidelines established in NFPA 101, Life Safety Code, and occupancy load is based on 7 sq. ft. per person for the net platform area. Net area is calculated by excluding safety zones, escalator and stair projections and other fixed equipment in the public area at the platform level.

   Unit of Exit Width capacities are based upon NFPA 101.

2. LOCATION: Boston, Massachusetts

   AUTHORITY: MBTA

   GENERAL:

   The older lines of the MBTA were developed with limited interface with the local jurisdictions and the fire department. However, over the past years, a public safety committee on which fire protection personnel are represented, now review and approve transit station and line designs for adequate fire protection and life safety. This committee's reviews have included the fire protection features for the ongoing extensions to the MBTA.

   BASIS FOR EMERGENCY EXITING:

   The MBTA has adopted, with the approval of the committee, the exiting philosophy of Baltimore, which is based upon the occupancy load as

calculated from the net platform area. Occupancy loading is based upon 7 sq. ft. per patron and the UEW capacities are those of NFPA 101 Life Safety Code.

3. LOCATION: San Francisco Bay Area

   AUTHORITY: BART

   GENERAL:

   A multi-jurisdictional committee involving 5 fire departments together with the State Fire Marshal and a fire prevention engineer established the safety requirements for the overall system. Minor modifications to the general criteria was made by various jurisdictions to meet their particular firefighting techniques and needs.

   BASIS FOR EMERGENCY EXITING:

   Exiting requirements were based upon patronage projections for the year 1985.

4. LOCATION: Atlanta, Georgia

   AUTHORITY: MARTA

   GENERAL:

   The State of Georgia has adopted NFPA 101, Life Safety Code. The State Fire Marshal considers buildings such as transit stations as places of assembly. MARTA, on the other hand, considers the station a place of "disassembly". As a result, no master agreement exists between MARTA and the jurisdictions through which it travels. Approval is made on a station-by-station basis with the concerned jurisdiction.

   BASIS FOR EMERGENCY EXITING:

   The exiting philosophy follows NFPA 130, which is based upon patronage requirements.

5. LOCATION: Montreal, Canada

   AUTHORITY: MUCTC

   GENERAL:

   Montreal is a rubber-tired system which operates underground. The fire protection criteria was established by the Authority in conjunction with local firefighting personnel.

BASIS FOR EMERGENCY EXITING:

Exiting is based upon patronage requirements using the 15-minute peak period. Currently, the Authority is in the process of bringing all stations in line with NFPA 130 in exiting requirements. MUCTC believes most existing stations already meet NFPA 130.

6. LOCATION: Buffalo, New York

AUTHORITY: Niagara Frontier Transportation Authority

GENERAL:

A fire safety report which is independent of both the Buffalo City Code and the state code was developed for the transit system. There has been limited involvement with local fire jurisdictions and the State Fire Marshal's Office and no committee involving "outside" personnel has been established.

BASIS FOR EXITING:

Exiting requirements are based upon patronage and generally follow NFPA 130. However, under some conditions the fire safety report permits extended times to clear the platform, or to reach the outside or place of refuge.

7. LOCATION: Miami, Florida

AUTHORITY: Dade County

GENERAL:

A multi-jurisdictional committee was established early in design to develop systemwide fire protection criteria. It should be noted that Miami only has at-grade and aerial stations and the problems confronting those parties with underground stations do not exist.

BASIS FOR EMERGENCY EXITING:

NFPA 130 is used as a guideline for determining platform loading and exiting requirements. The trackway is not included in the exiting calculations and at some high patronage stations, end-of-platform stairs to grade have been constructed.

8. LOCATION: Toronto, Ontario, Canada

AUTHORITY: Toronto Transit Commission

*GENERAL:

Toronto Transit Commission (TTC) utilizes running tunnels as optional egress paths from each platform. They do not use any specific standard but generally conform to NFPA 130 for exit capacity, exit turnstiles, exit gates, escalators and passengers per-minute (PPM). There are variations, however. Much of TTC was constructed under NFPA 101.

BASIS FOR EMERGENCY EXITING:

Exiting requirements were based on NFPA 101, but generally conform to NFPA 130 with exceptions and liberal interpretations of such things as "egress paths".

9. LOCATION: Washington, D.C.

AUTHORITY: Washington Metropolitan Area Transit Authority (WMATA)

GENERAL:

No specific STD use, but NFPA 101 allowed for some aspects of design (type of construction).

BASIS FOR EMERGENCY EXITING:

Arbitrarily set based on 2 fully loaded trains arriving simultaneously; liberal use of escalators operating in exiting direction used as part of their exiting calculations. Emergency exits from tunnel to surface were also arbitrarily set, based on distance between stations.

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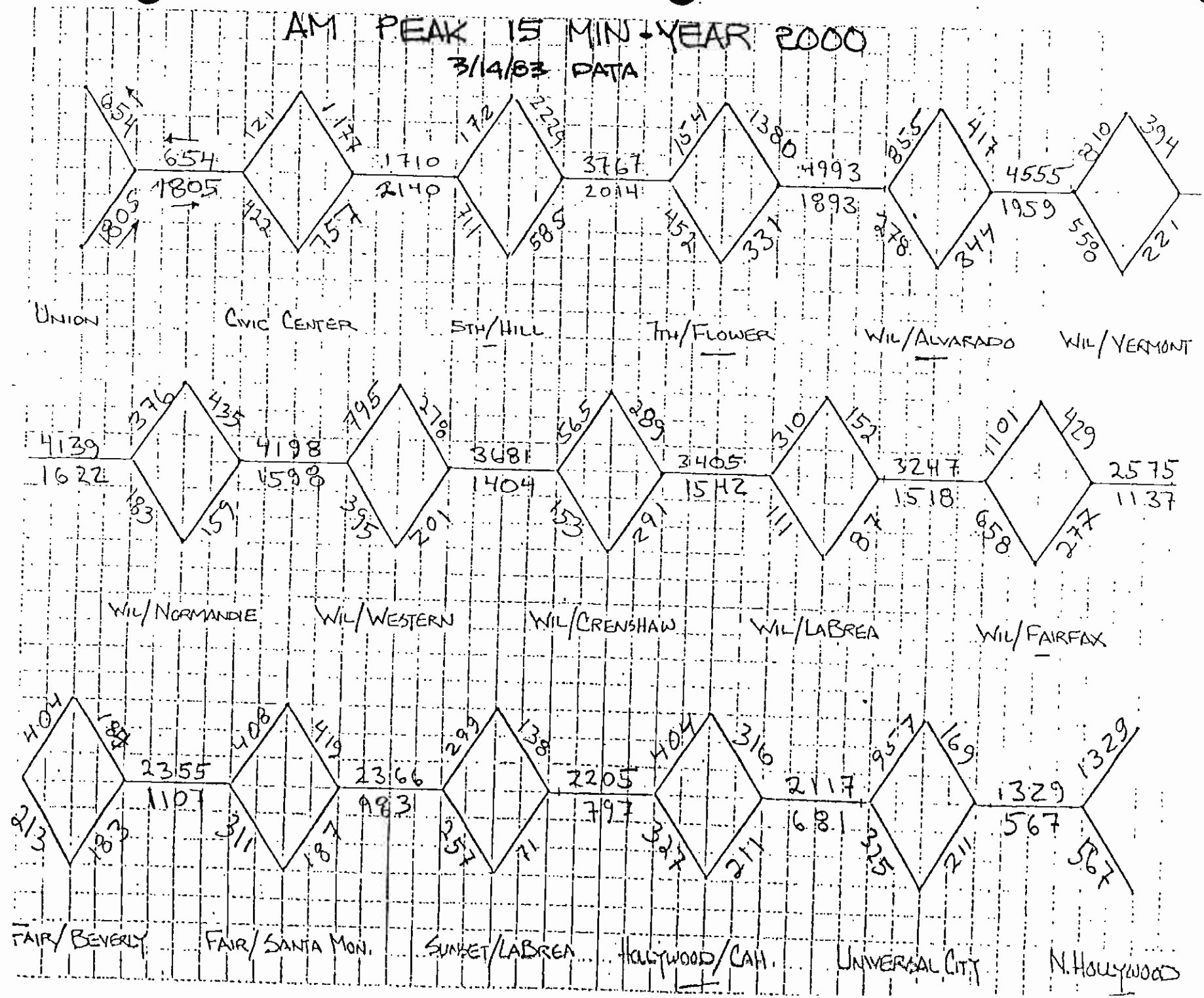
*Extracted from "TTC Review of Fire Safety Standards", March 1982.

APPENDIX D

MTA LIBRARY

AM PEAK 15 MIN - YEAR 2000

3/14/03 DATA



Job No. _____

Project _____

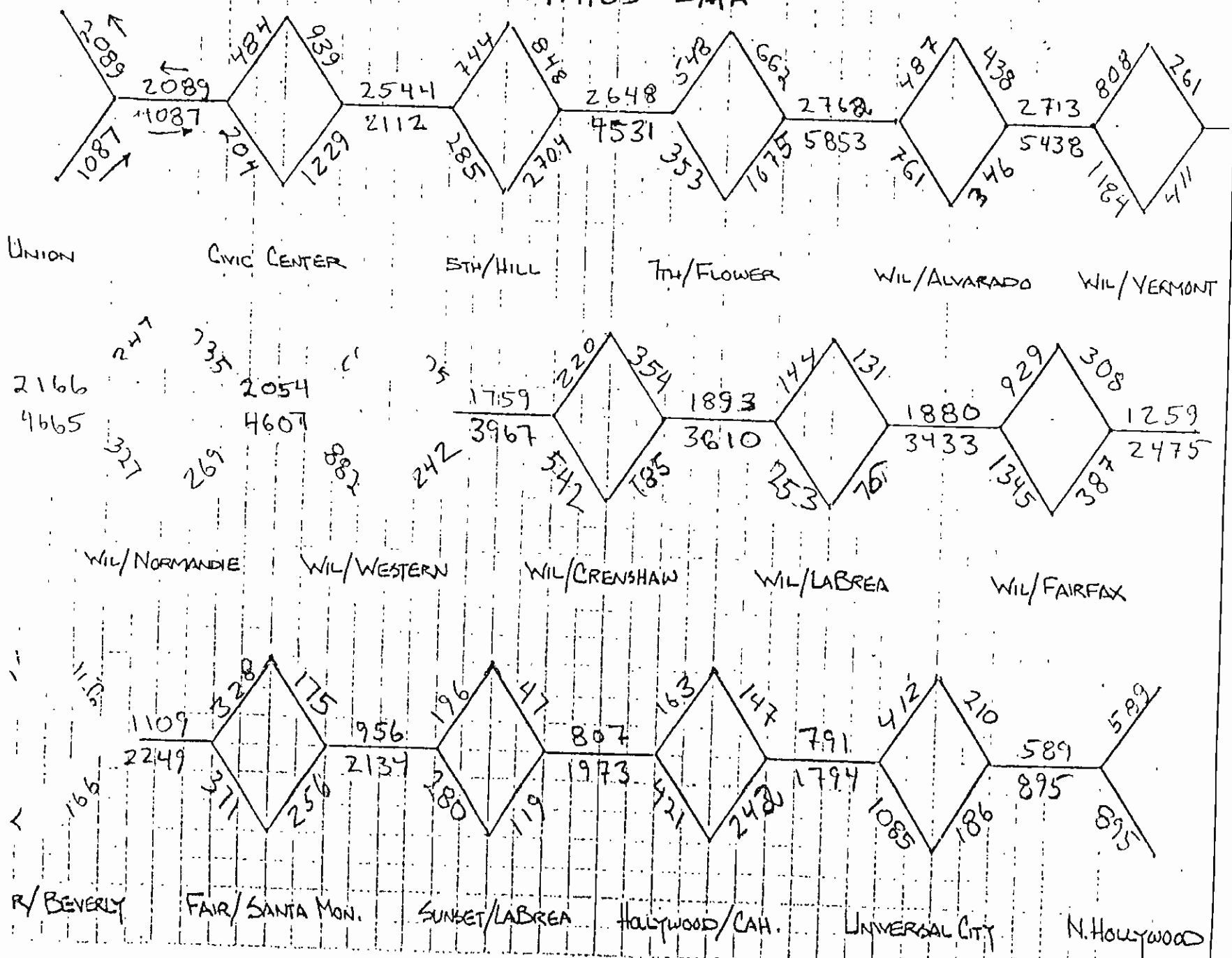
Subject _____

By _____ Date _____

Ch'k. by _____ Sheet _____ of _____

PM PEAK 15 MIN - YEAR 2000

3/14/83 DATA



LAMS

Job No. _____

Project _____

Subject _____

Sheet _____ of _____

Date _____

By _____

Ch'k. by _____

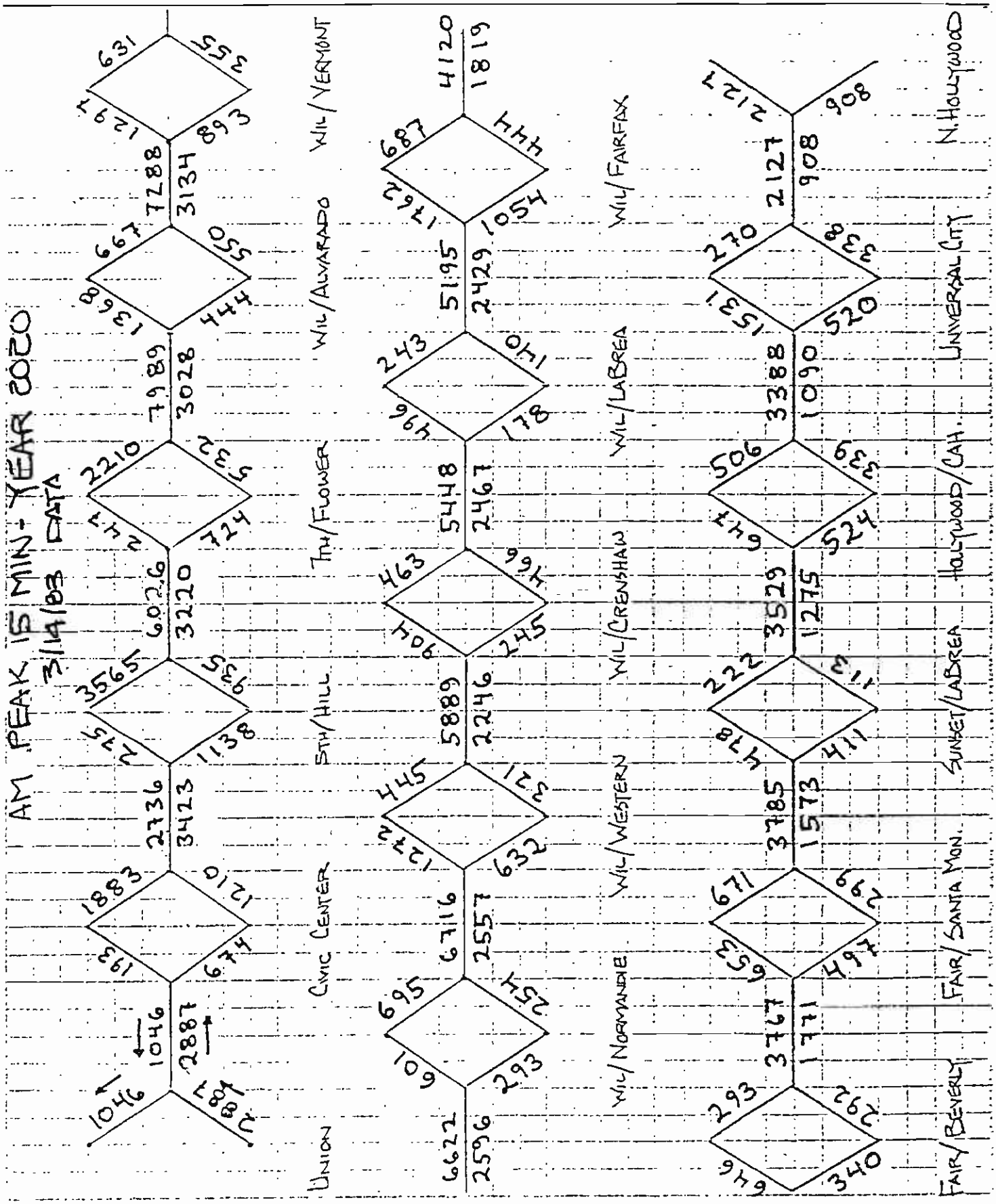
TAMS

Job No. _____ Sheet _____ of _____

Project _____ Date 3/16/83

Subject EMERGENCY EXITING ANALYSIS By SIMON

_____ Ch'k. by _____



TAMS

Job No. ______________

Project ______________

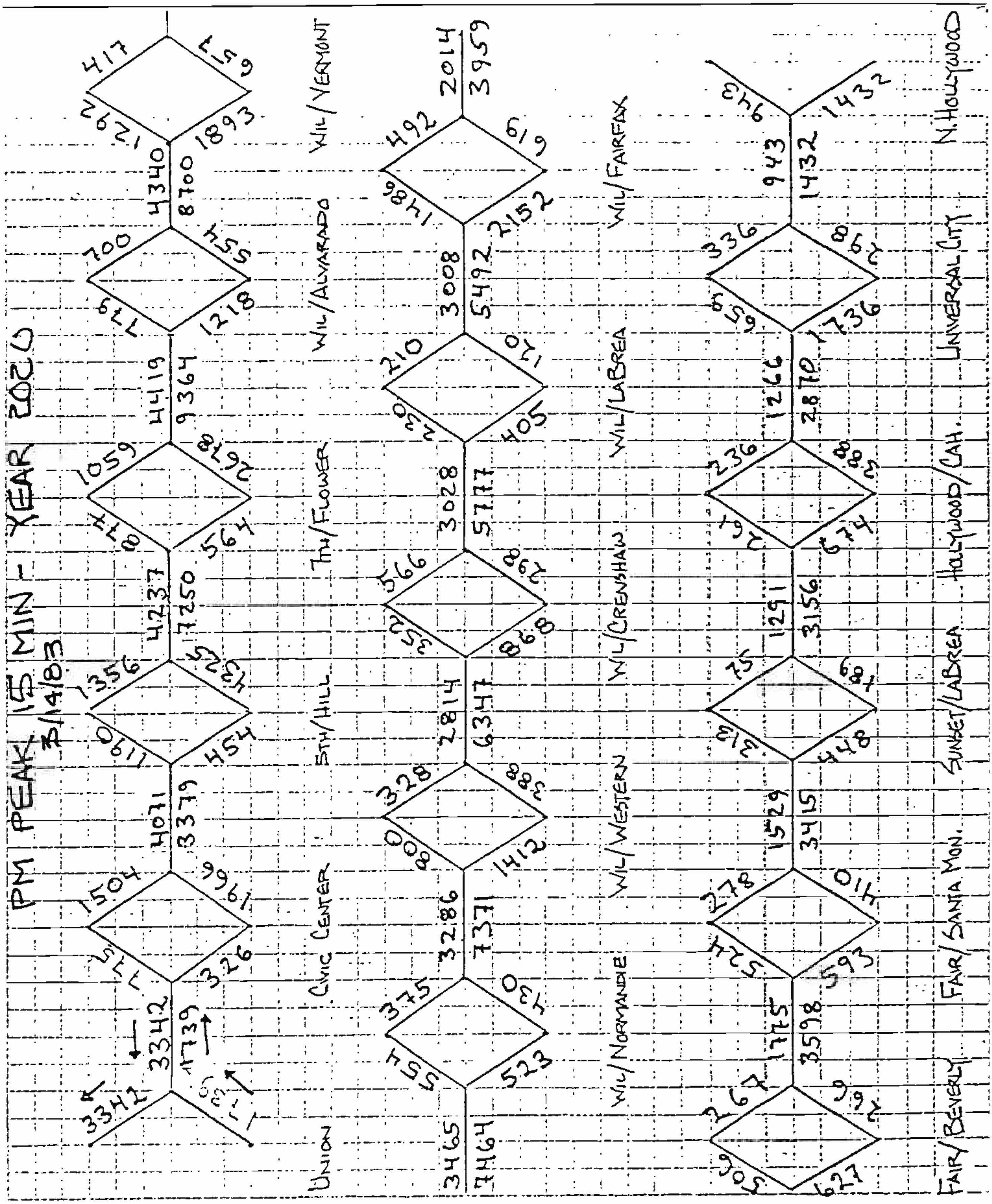
Subject EMERGENCY EXIT ANALYSIS

Sheet ____ of ____

Date 3/16/83

By SIMON

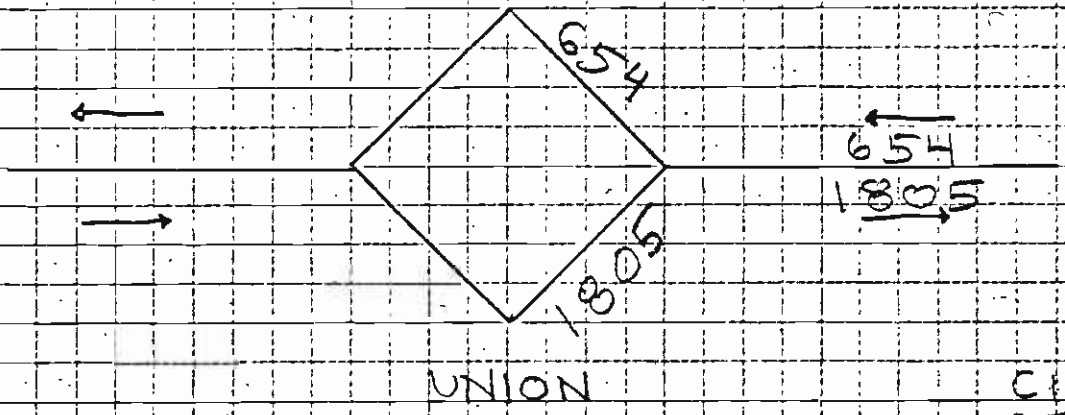
Ch'k. by ______________



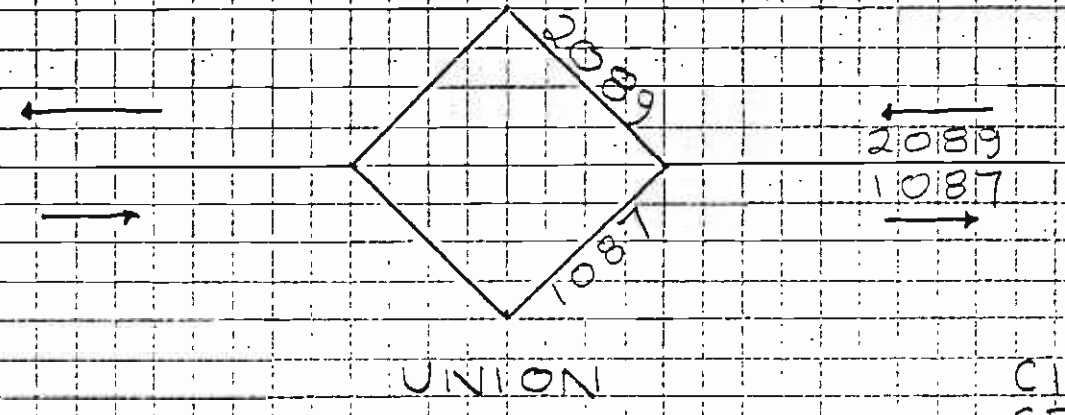
STATION: UNION

PATRONAGE DATA: YEAR 2000

AM PEAK 15 MIN



PM PEAK 15 MIN



STATION: UNION

OCCUPANT LOAD - F/LS CRITERIA

HEADWAY ASSUMED 3½ MIN

YEAR 2000

AM PEAK

A. PEAK ENTRAINING - 4 MISSED HEADWAY ACCUM.
1805

B. LINK LOAD CONTRIBUTIONS:
1. LINK OUTBOUND

2. LINK INBOUND
654 × ¼ = 164 USE 1200

C. TOTAL STATION LOAD
1805 + 1200 = 3005

PM PEAK

A. PEAK ENTRAINING - 4 MISSED HEADWAY ACCUM.
1087

B. LINK LOAD CONTRIBUTIONS:
1. LINK OUTBOUND

2. LINK INBOUND
2089 × ¼ = 523 USE 1200

C. TOTAL STATION LOAD
1087 + 1200 = 2287

Project _____ Date _____

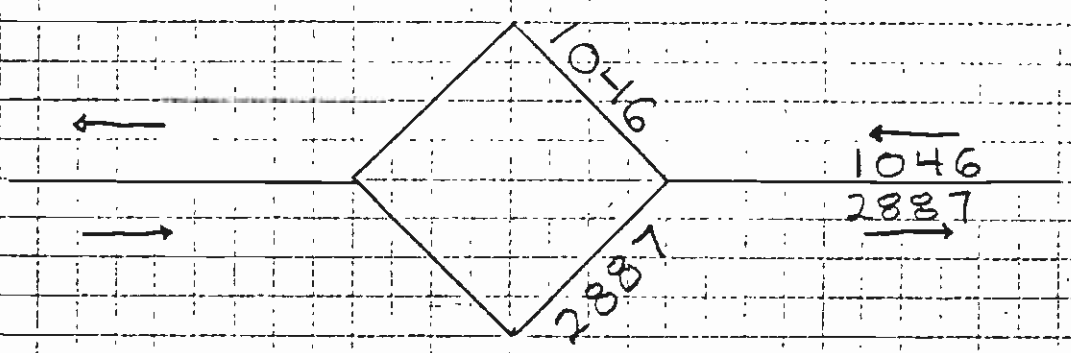
Subject _____ By _____

_____ Ch'k. by _____

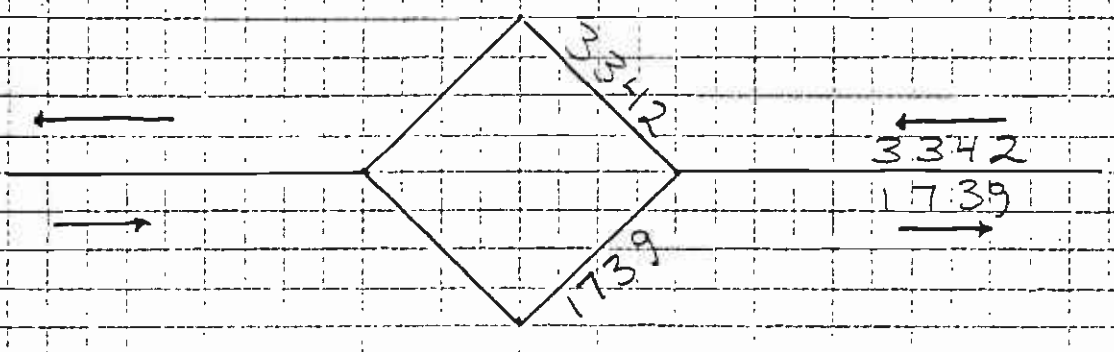
STATION: UNION

PATRONAGE DATA: YEAR 2020

AM PEAK 15 MIN



PM PEAK 15 MIN



STATION: UNION

OCCUPANT LOAD - F/LS CRITERIA

HEADWAY ASSUMED 2 MIN

YEAR 2020

AM PEAK

A. PEAK ENTRAINING - 4 MISSED HEADWAY ACCUM.
2887 × 8/15 = 1540

B. LINK LOAD CONTRIBUTIONS:
1. LINK OUTBOUND

2. LINK INBOUND
1046 × 1/7 = 150 - USE 1200

C. TOTAL STATION LOAD
1540 + 1200 = 2740

PM PEAK

A. PEAK ENTRAINING - 4 MISSED HEADWAY ACCUM.
1739 × 8/15 = 928

B. LINK LOAD CONTRIBUTIONS:
1. LINK OUTBOUND

2. LINK INBOUND
3342 × 1/7 = 478 - USE 1200

C. TOTAL STATION LOAD
928 + 1200 = 2128

FIGURE 2-1

EMERGENCY EXIT CAPACITY

CALCULATION

STATION UNION

OCCUPANCY LOAD YR 2000 3025 PERSONS

EXIT LANES AND CAPACITY PROVIDED

PLATFORM TO CONCOURSE

STAIRS	4	X	3 LANES	X	35	PPM =	420	PPM
ESCALATORS	4	X	2 LANES	X	35	PPM =	280	PPM
EMG. STAIRS	1	X	4 LANES	X	35	PPM =	140	PPM
TOTAL							840	PPM

THRU FARE BARRIER

FARE GATES	22	X	1 LANES	X	50	PPM =	1100	PPM
SERVICE GATES	4	X	2 LANES	X	50	PPM =	400	PPM
EMG. GATES		X	LANES	X		PPM =		PPM
TOTAL							1500	PPM

FARE BARRIER TO SAFE AREA

STAIRS	4	X	3 LANES	X	35	PPM =	420	PPM
ESCALATORS	4	X	3 LANES	X	35	PPM =	420	PPM
EMG. STAIRS	1	X	2 LANES	X	35	PPM =	70	PPM
TOTAL							910	PPM

TEST 1.

EVACUATE STATION OCCUPANT LOAD FROM STATION PLATFORM(S) IN FOUR MINUTES OR LESS.

YR 2000
3½ MIN HWY
4 ESC &
4 STAIRS

WAITING TIME AT PLATFORM EXITS

W = OCCUPANCY LOAD/EXIT CAPACITY
= 3005 PERSONS ÷ 840 PPM = 3.58 MINUTES

TEST # 2

EVACUATE STATION OCCUPANT LOAD FROM THE MOST REMOTE POINT ON THE PLATFORM TO A POINT OF SAFETY IN SIX MINUTES OR LESS.

WALKING TIME FOR LONGEST EXIT ROUTE

PLATFORM $= T_1 =$ 115 FEET ÷ 200 FPM = .58 Minutes
PLAT. TO CONCOURSE $= T_2 =$ 28 FEET ÷ 50 FPM = .56 Minutes
CONCOURSE TO FARE BARRIER $T_3 =$ 98 FEET ÷ 200 FPM = .49 Minutes

FARE BARRIER TO SAFE AREA $T_4 =$ 111 FEET ÷ 200 FPM = .56 Minutes
TO GRADE 54 50 .18
200 .27

TOTAL $= T =$ 2.64 MINUTES

ADDITIONAL WAITING TIME AT PLATFORM EXITS

W_1 = 3.58 MINUTES T_1 = .58 MINUTES
$(W_1 - T_1)$ = 3.58 - .58 = 3.00 MINUTES

ADDITIONAL WAITING TIME AT FARE BARRIER

3.58
OCCUPANT LOAD AT CONCOURSE
= OCCUPANT LOAD - EMERGENCY STAIR 4 MIN. CAPACITY
= 3005 PERSONS - (140 PPM X 4 MINUTES) = 2504 PERSONS
W_2 = CONCOURSE OCCUPANT LOAD/GATE CAPACITY
= 2504 PERSONS ÷ 1500 PPM = 1.67 MINUTES
$(W_2 - W_1)$ = 1.67 - 3.58 = 0 MINUTES

ADDITIONAL WAITING TIME AT CONCOURSE EXITS

W_3 = CONCOURSE OCCUPANT LOAD/EXIT CAPACITY
= 2504 PERSONS ÷ 910 PPM = 2.76 MINUTES

$(W_3 - W_x)$ = 2.76 - 3.58 = 0 MINUTES

TOTAL EXIT TIME

$= T + (W_1 - T_1) + (W_2 - W_1) + (W_3 - W_x)$
= 2.64 + 3.00 + 0 + 0 = 5.64 Minutes

TEST 1.

2 MIN HWY
4 ESC
4 STAIRS
1.6 CONTINGEN.

EVACUATE STATION OCCUPANT LOAD FROM STATION PLATFORM(S) IN FOUR MINUTES OR LESS.

WAITING TIME AT PLATFORM EXITS

W = OCCUPANCY LOAD/EXIT CAPACITY
= 2740 PERSONS ÷ 840 PPM = 3.27 MINUTES

TEST # 2

EVACUATE STATION OCCUPANT LOAD FROM THE MOST REMOTE POINT ON THE PLATFORM TO A POINT OF SAFETY IN SIX MINUTES OR LESS.

WALKING TIME FOR LONGEST EXIT ROUTE

PLATFORM = T_1 = 115 FEET ÷ 200 FPM = .58 Minutes
PLAT. TO CONCOURSE = T_2 = 28 FEET ÷ 50 FPM = .56 Minutes
CONCOURSE TO FARE BARRIER T_3 = 98 FEET ÷ 200 FPM = .49 Minutes

FARE BARRIER TO SAFE AREA T_4 = 111 FEET ÷ 200 FPM = .56 Minutes
TO GRADE 9 54 50 200 .18 .27

TOTAL = T = 2.64 MINUTES

ADDITIONAL WAITING TIME AT PLATFORM EXITS

W_1 = 3.27 MINUTES T_1 = .58 MINUTES
$(W_1 - T_1)$ = 3.27 - .58 = 2.69 MINUTES

ADDITIONAL WAITING TIME AT FARE BARRIER

OCCUPANT LOAD AT CONCOURSE
= OCCUPANT LOAD - EMERGENCY STAIR 4 MIN. CAPACITY
= 2740 PERSONS - (140 PPM X 4 MINUTES) = 2282 PERSONS
W_2 = CONCOURSE OCCUPANT LOAD/GATE CAPACITY
= 2282 PERSONS ÷ 1500 PPM = 1.53 MINUTES
$(W_2 - W_1)$ = 1.53 - 3.27 = 0 MINUTES

3.27 / 5

ADDITIONAL WAITING TIME AT CONCOURSE EXITS

W_3 = CONCOURSE OCCUPANT LOAD/EXIT CAPACITY
= 2282 PERSONS ÷ 910 PPM = 2.51 MINUTES

$(W_3 - W_x)$ = 2.51 - 3.27 = 0 MINUTES

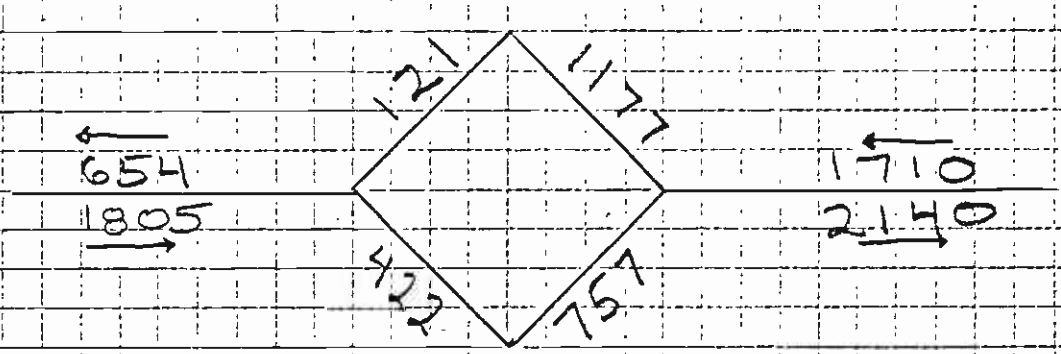
TOTAL EXIT TIME

= T + $(W_1 - T_1)$ + $(W_2 - W_1)$ + $(W_3 - W_x)$
= 2.64 + 2.69 + 0 + 0 = 5.33 Minutes

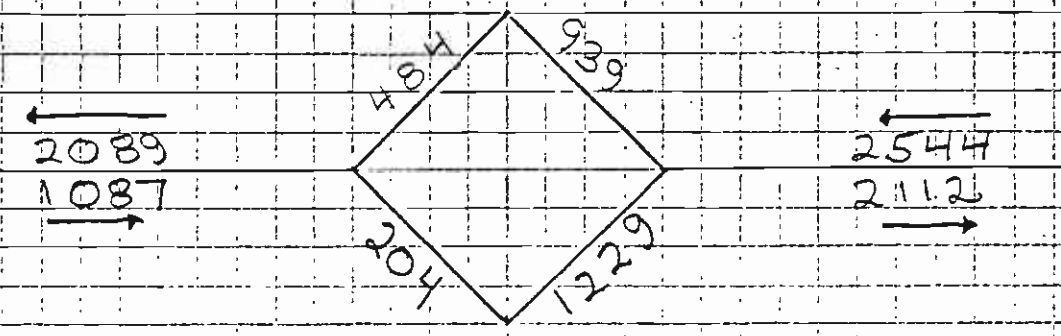
STATION: CIVIC CENTER

PATRONAGE DATA: YEAR 2000

AM PEAK 15 MIN



PM PEAK 15 MIN



STATION: CIVIC CENTER

OCCUPANT LOAD - F/LS CRITERIA

HEADWAY ASSUMED 3½ MIN

YEAR 2000

AM PEAK

A. PEAK ENTRAINING - 4 MISSED HEADWAY ACCUM.
757 + 121 = 878

B. LINK LOAD CONTRIBUTIONS:
1. LINK OUTBOUND
1805 × ¼ = 452 \
USE 1200
2. LINK INBOUND
1710 × ¼ = 428 /

C. TOTAL STATION LOAD
878 + 1200 = 2078

PM PEAK

A. PEAK ENTRAINING - 4 MISSED HEADWAY ACCUM.
1229 + 484 = 1713

B. LINK LOAD CONTRIBUTIONS:
1. LINK OUTBOUND
1087 × ¼ = 272 \
USE 1200
2. LINK INBOUND
2544 × ¼ = 636 /

C. TOTAL STATION LOAD
1713 + 1200 = 2913

Project _____ Date _____

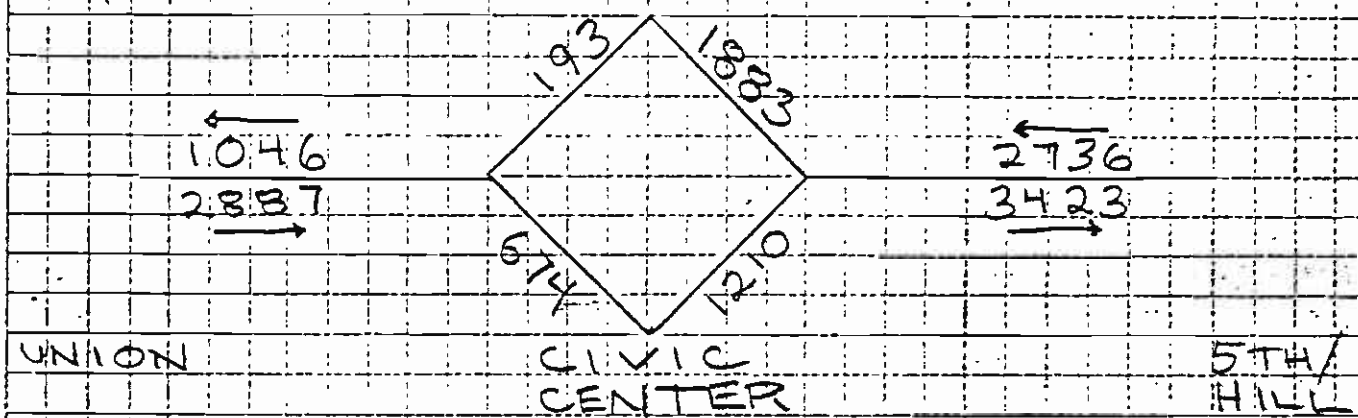
Subject _____ By _____

_____ Ch'k. by _____

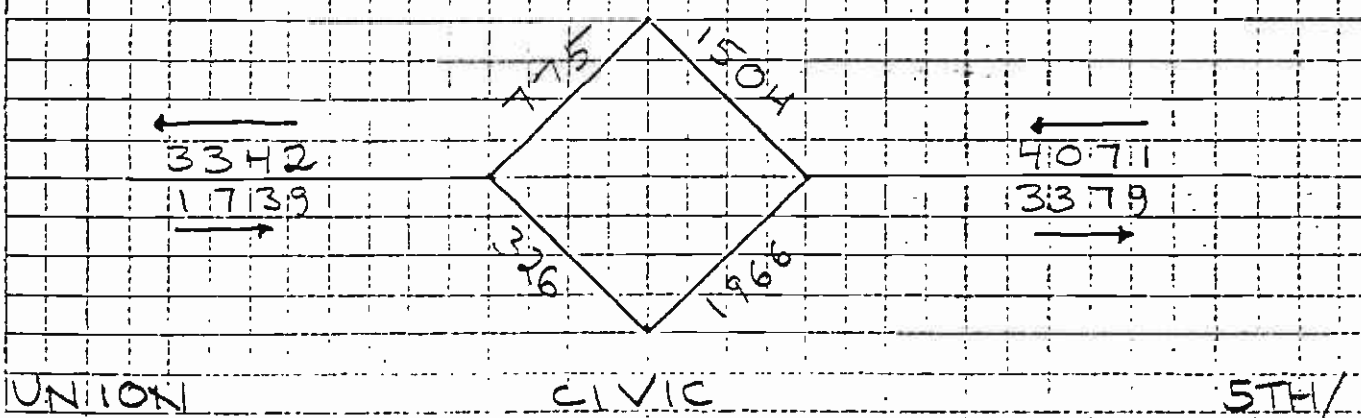
STATION: CIVIC CENTER

PATRONAGE DATA: YEAR 2020

AM PEAK 15 MIN



PM PEAK 15 MIN



STATION: CIVIC CENTER

OCCUPANT LOAD - F/LS CRITERIA

HEADWAY ASSUMED 2 MIN

YEAR 2020

AM PEAK

A. PEAK ENTRAINING - 4 MISSED HEADWAY ACCUM.
(1210 + 193) × 8/15 = 749

B. LINK LOAD CONTRIBUTIONS:
1. LINK OUTBOUND
2887 × 1/7 = 413 ⎫ USE 1200.
2. LINK INBOUND
2736 × 1/7 = 391 ⎭

C. TOTAL STATION LOAD
749 + 1200 = 1949

PM PEAK

A. PEAK ENTRAINING - 4 MISSED HEADWAY ACCUM.
(1966 + 775) × 8/15 = 1462

B. LINK LOAD CONTRIBUTIONS:
1. LINK OUTBOUND
1739 × 1/7 = 249 ⎫ USE 1200
2. LINK INBOUND
4071 × 1/7 = 582 ⎭

C. TOTAL STATION LOAD
1462 + 1200 = 2662

FIGURE 2-1

EMERGENCY EXIT CAPACITY

CALCULATION

STATION CIVIC CENTER

OCCUPANCY LOAD YR 2000 2913 PERSONS

EXIT LANES AND CAPACITY PROVIDED

PLATFORM TO CONCOURSE

STAIRS	4	X	3	LANES	X	35	PPM =	420 PPM
ESCALATORS	4	X	2	LANES	X	35	PPM =	280 PPM
EMG. STAIRS	2	X	4	LANES	X	35	PPM =	280 PPM
TOTAL								980 PPM

THRU FARE BARRIER

FARE GATES	20	X	1	LANES	X	50	PPM =	1000 PPM
SERVICE GATES	4	X	2	LANES	X	50	PPM =	400 PPM
EMG. GATES		X		LANES	X		PPM =	PPM
TOTAL								1400 PPM

FARE BARRIER TO SAFE AREA

STAIRS	4	X	3	LANES	X	35	PPM =	420 PPM
ESCALATORS	4	X	2	LANES	X	35	PPM =	280 PPM
EMG. STAIRS	2	X	2	LANES	X	35	PPM =	140 PPM
TOTAL								840 PPM

FIGURE 2-2

TEST 1.

EVACUATE STATION OCCUPANT LOAD FROM STATION PLATFORM(S) IN FOUR MINUTES OR LESS.

YR 2000
3½ MIN HWY
4 ESCALATORS
4 STAIRS

WAITING TIME AT PLATFORM EXITS

W = OCCUPANCY LOAD/EXIT CAPACITY
= 2913 PERSONS ÷ 980 PPM = 2.98 MINUTES

TEST # 2

EVACUATE STATION OCCUPANT LOAD FROM THE MOST REMOTE POINT ON THE PLATFORM TO A POINT OF SAFETY IN SIX MINUTES OR LESS.

WALKING TIME FOR LONGEST EXIT ROUTE

PLATFORM = T_1 = 37 FEET ÷ 200 FPM = .19 Minutes

PLAT. TO CONCOURSE = T_2 = 15 FEET ÷ 50 FPM = .30 Minutes

CONCOURSE TO FARE BARRIER T_3 = 140 FEET ÷ 200 FPM = .70 Minutes

FARE BARRIER TO SAFE AREA T_4 = 100 FEET ÷ 200 FPM = .50 Minutes
TO GRADE 53 50 1.06

TOTAL = T = 2.75 MINUTES

ADDITIONAL WAITING TIME AT PLATFORM EXITS

W_1 = 2.98 MINUTES T_1 = .19 MINUTES

$(W_1 - T_1)$ = 2.98 - 0.19 = 2.79 MINUTES

ADDITIONAL WAITING TIME AT FARE BARRIER

OCCUPANT LOAD AT CONCOURSE
= OCCUPANT LOAD - EMERGENCY STAIR 4 MIN. CAPACITY 2.98
= 2913 PERSONS - (280 PPM X 4 MINUTES) = 2079 PERSONS

W_2 = CONCOURSE OCCUPANT LOAD/GATE CAPACITY
= 2079 PERSONS ÷ 1400 PPM = 1.49 MINUTES

$(W_2 - W_1)$ = 1.49 - 2.98 = 0 MINUTES

ADDITIONAL WAITING TIME AT CONCOURSE EXITS

W_3 = CONCOURSE OCCUPANT LOAD/EXIT CAPACITY

= 2079 PERSONS ÷ 840 PPM = 2.48 MINUTES

$(W_3 - W_x)$ = 2.48 - 2.98 = 0 MINUTES

TOTAL EXIT TIME

= T + $(W_1 - T_1)$ + $(W_2 - W_1)$ + $(W_3 - W_x)$
= 2.75 + 2.79 + 0 + 0 = 5.54 Minutes

FIGURE 2-2

TEST 1.

2 MIN HWY
1.6 CONTINGENCY
4 ESC
4 STAIRS

EVACUATE STATION OCCUPANT LOAD FROM STATION PLATFORM(S) IN FOUR MINUTES OR LESS.

WAITING TIME AT PLATFORM EXITS

W = OCCUPANCY LOAD/EXIT CAPACITY
= 2662 PERSONS ÷ 980 PPM = 2.72 MINUTES

TEST # 2

EVACUATE STATION OCCUPANT LOAD FROM THE MOST REMOTE POINT ON THE PLATFORM TO A POINT OF SAFETY IN SIX MINUTES OR LESS.

WALKING TIME FOR LONGEST EXIT ROUTE

PLATFORM = T_1 = 37 FEET ÷ 200 FPM = .19 Minutes

PLAT. TO CONCOURSE = T_2 = 15 FEET ÷ 50 FPM = .30 Minutes

CONCOURSE TO FARE BARRIER T_3 = 140 FEET ÷ 200 FPM = .70 Minutes

FARE BARRIER TO SAFE AREA T_4 = 100 FEET ÷ 200 FPM = .50 Minutes
TO GRADE 53 50 1.06

TOTAL = T = 2.75 MINUTES

ADDITIONAL WAITING TIME AT PLATFORM EXITS

W_1 = 2.72 MINUTES T_1 = .19 MINUTES

$(W_1 - T_1)$ = 2.72 - .19 = 2.53 MINUTES

ADDITIONAL WAITING TIME AT FARE BARRIER

OCCUPANT LOAD AT CONCOURSE
= OCCUPANT LOAD - EMERGENCY STAIR 4 MIN. CAPACITY (2.72)
= 2662 PERSONS - (280 PPM X 4 MINUTES) = 1901 PERSONS

W_2 = CONCOURSE OCCUPANT LOAD/GATE CAPACITY
= 1901 PERSONS ÷ 1400 PPM = 1.36 MINUTES

$(W_2 - W_1)$ = 1.36 - 2.72 = 0 MINUTES

ADDITIONAL WAITING TIME AT CONCOURSE EXITS

W_3 = CONCOURSE OCCUPANT LOAD/EXIT CAPACITY

= 1901 PERSONS ÷ 840 PPM = 2.27 MINUTES

$(W_3 - W_x)$ = 2.27 - 2.72 = 0 MINUTES

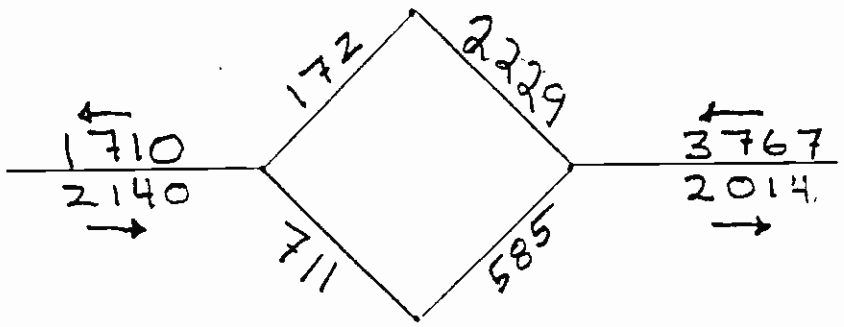
TOTAL EXIT TIME

= T + $(W_1 - T_1)$ + $(W_2 - W_1)$ + $(W_3 - W_x)$
= 2.75 + 2.53 + 0 + 0 = 5.28 Minutes

STATION: 5TH & HILL

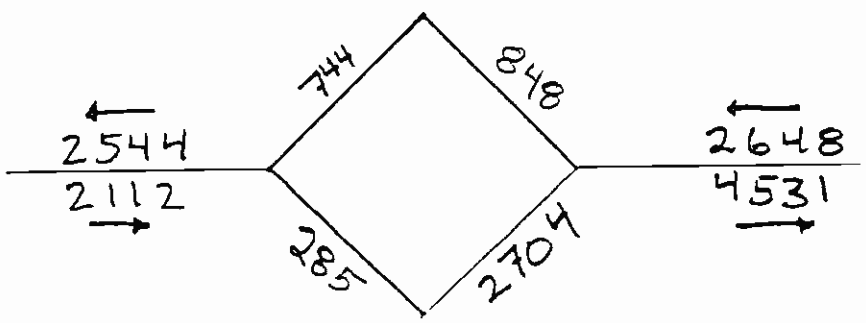
PATRONAGE DATA: YEAR 2000

AM PEAK 15 MIN. = PK. HR × 1.5 × 1/4



1ST & HILL | 5TH & HILL | 7TH & FLOWER

PM PEAK 15 MIN. = PK HR × 1.5 × 1/4



1ST & HILL | 5TH & HILL | 7TH & FLOWER

REVISED 4/26

Job No. _____ Sheet _____ of _____

Project _____ Date _____

Subject EMERGENCY EXITING ANALYSIS By _____ Ch'k. by _____

STATION: 5TH & HILL

OCCUPANT LOAD - F/LS CRITERIA

HEADWAY ASSUMED 3½ MIN

YEAR 2000

AM PEAK

A. PEAK ENTRAINING - 4 MISSED HEADWAY ACCUM
757

B. LINK LOAD CONTRIBUTIONS:

1. LINK OUTBOUND
2140 × 1/4 = 535

2. LINK INBOUND
3767 × 1/4 = 942

C. TOTAL STATION LOAD
757 + 535 + 942 = 2234

PM PEAK

A. PEAK ENTRAINING - 4 MISSED HEADWAY ACCUM
3448 USE 287

B. LINK LOAD CONTRIBUTIONS:

1. LINK OUTBOUND
2112 × 1/4 = 528

USE 1200

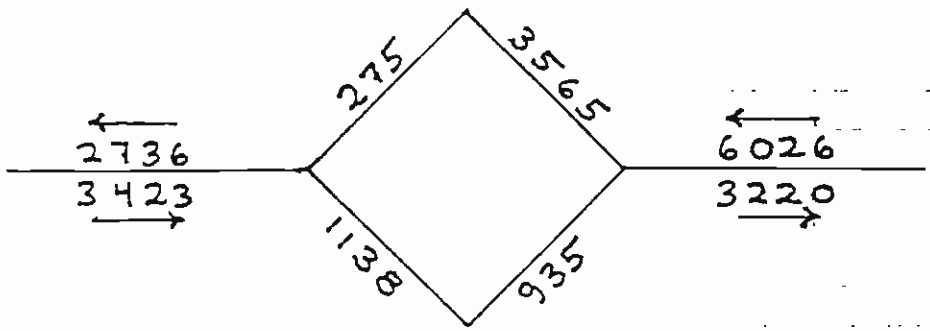
2. LINK INBOUND
2649 × 1/4 = 663

C. TOTAL STATION LOAD
2877 + 1200 = ~~4077~~ 4077

STATION: 5TH & HILL

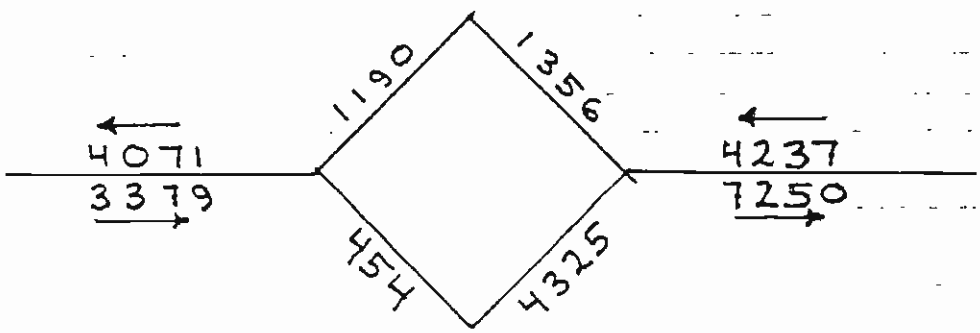
PATRONAGE DATA - YEAR 2020

AM PEAK 15 MINUTES =
YEAR 2020 AM PEAK HOUR × ¼ × 1.5



1ST & HILL | 5TH & HILL | 7TH & FLOWER

PM PEAK 15 MINUTES =
YEAR 2020 PM PEAK HOUR × ¼ × 1.5



1ST & HILL | 5TH & HILL | 7TH & FLOWER

Job No. _____ REVISED 4/26 Sheet _____ of _____

Project _____ Date 3/16/83

Subject EMERGENCY EXITING ANALYSIS By SIMON

Ch'k. by _____

STATION: 5TH & HILL YR 2020
2 MIN HEADWAY

OCCUPANT LOAD UNDER F/LS CRITERIA -
8 MINUTE ACCUMULATION OF ENTRAINING
PASSENGERS ASSUMED

AM PEAK

A. 8 MIN. OF 15 MIN. PEAK ENTRAINING
1210 × 8/15 = 646

B. LINK LOAD CONTRIBUTION

1. INBOUND AND OUTBOUND COMBIN
(3423 + 6026) × 1/7 = 1350

C. TOTAL STATION LOAD
646 + 1350 = 1996

PM PEAK

A. 8 MIN. OF 15 MIN. PEAK ENTRAINING
5515 × 8/15 = 2942 USE 2877

B. LINK LOAD CONTRIBUTIONS

1. INBOUND AND OUTBOUND COMBINE
(3379 + 4237) × 1/7 = 1088 USE 12

C. TOTAL STATION LOAD
2877 + 1200 = ~~4442~~ 4077

USE PM PEAK AS WORST CASE
OCCUPANT LOAD = ~~4442~~ 4077

FIGURE 2-1

EMERGENCY EXIT CAPACITY CALCULATION

REVISED 4/26

STATION 5TH/HILL

OCCUPANCY LOAD YR 2000 4077 PERSONS

EXIT LANES AND CAPACITY PROVIDED

PLATFORM TO CONCOURSE

STAIRS	7	X	3 LANES	X	35	PPM =	735	PPM
ESCALATORS	5	X	2 LANES	X	35	PPM =	350	PPM
EMG. STAIRS	1	X	4 LANES	X	35	PPM =	140	PPM
TOTAL							1225	PPM

THRU FARE BARRIER

FARE GATES	20	X	1 LANES	X	50	PPM =	1000	PPM
SERVICE GATES	4	X	2 LANES	X	50	PPM =	400	PPM
EMG. GATES		X	LANES	X		PPM =		PPM
TOTAL							1400	PPM

FARE BARRIER TO SAFE AREA

STAIRS	6	X	3 LANES	X	35	PPM =	630	PPM
ESCALATORS	6	X	2 LANES	X	35	PPM =	420	PPM
EMG. STAIRS	2	X	2 LANES	X	35	PPM =	140	PPM
TOTAL							1190	PPM

REVISED 4/26

3½ MIN HEADWAY
7 STAIRS
5 ESC

STATION 5TH & HILL
YEAR 2000

TEST 1.

EVACUATE STATION OCCUPANT LOAD FROM STATION PLATFORM(S) IN FOUR MINUTES OR LESS.

WAITING TIME AT PLATFORM EXITS

W 1 = OCCUPANCY LOAD/EXIT CAPACITY
= 4077 PERSONS - 1225 PPM = 3.33 MINUTES

TEST #2

EVACUATE STATION OCCUPANT LOAD FROM THE MOST REMOTE POINT ON THE PLATFORM TO A POINT OF SAFETY IN SIX MINUTES OR LESS.

WALKING TIME FOR LONGEST EXIT ROUTE

PLATFORM =T 1 = 81 FEET / 200 FPM = .41 MINUTES
PLATFORM TO CONCOURSE =T 2 = 15 FEET / 50 FPM = .30 MINUTES
CONCOURSE TO FARE BARRIER =T 3 = 218 FEET / 200 FPM = 1.09 MINUTES
FARE BARRIER TO SAFE AREA =T 4 = 160 FEET / 200 FPM = .80 MINUTES
TO GRADE = 40 FEET / 50 FPM = .80 MINUTES

TOTAL = T = = 3.40 MINUTES

ADDITIONAL WAITING TIME AT PLATFORM EXITS

W 1 = 3.33 MINUTES T 1 = .41 MINUTES

W 1 - T 1 = 3.33 - .41 = 2.92 MINUTES

ADDITIONAL WAITING TIME AT FARE BARRIER

OCCUPANT LOAD AT CONCOURSE
= OCCUPANT LOAD - EMERGENCY STAIR 3.33 MIN. CAPACITY
= 4077 PERSONS - (140 PPM X 3.33 MINUTES) = 3610 PERSONS
W 2 = CONCOURSE OCCUPANT LOAD/GATE CAPACITY
= 3610 PERSONS / 1400 PPM = 2.58 MINUTES

W 2 - W 1 = 2.58 - 3.33 = 0 MINUTES

ADDITIONAL WAITING TIME AT CONCOURSE EXITS

W 3 = CONCOURSE OCCUPANT LOAD/EXIT CAPACITY

= 3610 PERSONS ÷ 1190 PPM = 3.04 MINUTES

(W 3 - W x) = 3.04 - 3.33 = 0 MINUTES

TOTAL EXIT TIME

= T + (W 1 - T 1) + (W 2 - W 1) + (W 3 - W x)
= 3.40 + 2.92 + 0 + 0 = 6.32 Minutes

REVISED 4/26

2 MIN HEADWAY
2 STAIRS
5 ESC

STATION 5TH & HILL
YEAR 1.6 CONTINGENCY

TEST 1.

EVACUATE STATION OCCUPANT LOAD FROM STATION PLATFORM(S) IN FOUR MINUTES OR LESS.

WAITING TIME AT PLATFORM EXITS

W 1 = OCCUPANCY LOAD/EXIT CAPACITY
= 4077 PERSONS - 1225 PPM = 3.33 MINUTES

TEST #2

EVACUATE STATION OCCUPANT LOAD FROM THE MOST REMOTE POINT ON THE PLATFORM TO A POINT OF SAFETY IN SIX MINUTES OR LESS.

WALKING TIME FOR LONGEST EXIT ROUTE

PLATFORM =T 1 = 81 FEET / 200 FPM = .41 MINUTES
PLATFORM TO CONCOURSE =T 2 = 15 FEET / 50 FPM = .30 MINUTES
CONCOURSE TO FARE BARRIER =T 3 = 218 FEET / 200 FPM = 1.09 MINUTES
FARE BARRIER TO SAFE AREA =T 4 = 160 FEET / 200 FPM = .80 MINUTES
TO GRADE = 40 FEET / 50 FPM = .80 MINUTES

TOTAL = T = = 3.40 MINUTES

ADDITIONAL WAITING TIME AT PLATFORM EXITS

W 1 = 3.33 MINUTES T 1 = .41 MINUTES

W 1 - T 1 = 3.33 - .41 = 2.92 MINUTES

ADDITIONAL WAITING TIME AT FARE BARRIER

OCCUPANT LOAD AT CONCOURSE
= OCCUPANT LOAD - EMERGENCY STAIR 3.33 MIN. CAPACITY
= 4077 PERSONS - (140 PPM X 3.33 MINUTES) = 3610 PERSONS
W 2 = CONCOURSE OCCUPANT LOAD/GATE CAPACITY
= 3610 PERSONS / 1400 PPM = 2.58 MINUTES

W 2 - W 1 = 2.58 - 3.33 = 0 MINUTES

ADDITIONAL WAITING TIME AT CONCOURSE EXITS

W 3 = CONCOURSE OCCUPANT LOAD/EXIT CAPACITY

= 3610 PERSONS ÷ 1190 PPM = 3.04 MINUTES

(W 3 - W x) = 3.04 - 3.33 = 0 MINUTES

TOTAL EXIT TIME

= T + (W 1 - T 1) + (W 2 - W 1) + (W 3 - W x)
= 3.40 + 2.92 + 0 + 0 = 6.32 Minutes

TAMS

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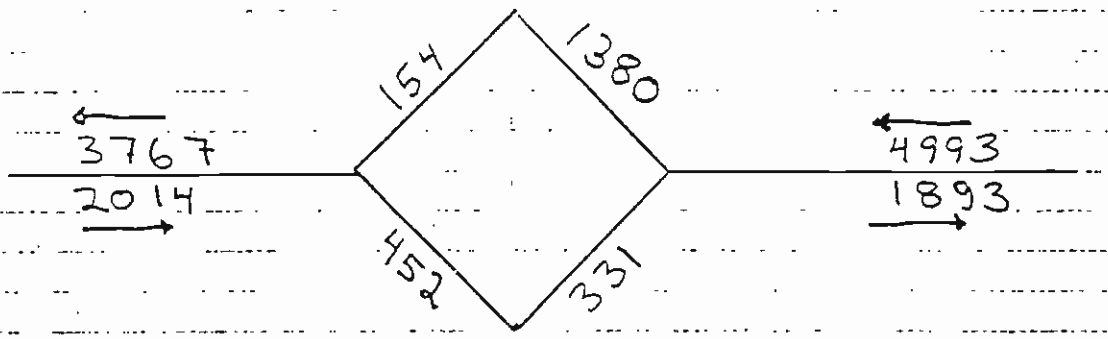
_____ Ch'k. by _____

STATION: 7TH & FLOWER

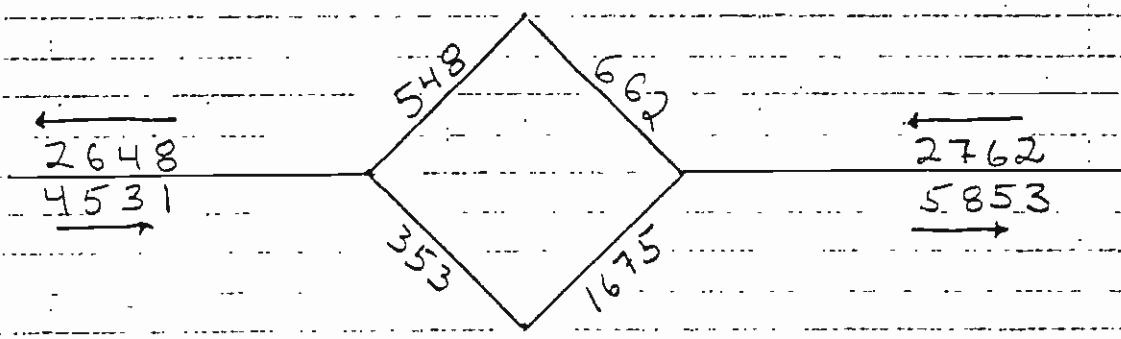
PATRONAGE DATA: YEAR 2000

AM. PEAK 15 MIN



5TH/ HILL | 7TH/ FLOWER | WIL/ ALVARADO

PM PEAK 15 MIN.



5TH/ HILL | 7TH/ FLOWER | WIL/ ALVARADO

TAMS

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Project _____ Date _____

Subject _____ By _____

EMERGENCY EXITING ANALYSIS Ch'k. by _____

STATION: 7TH & FLOWER

OCCUPANT LOAD - F/LS CRITERIA

HEADWAY ASSUMED 3½ MIN

YEAR 2000

AM PEAK

A. PEAK ENTRAINING - 4 MISSED HEADWAY ACCUM.
485

B. LINK LOAD CONTRIBUTIONS:
1. LINK OUTBOUND
2014 × 1/4 = 504

2. LINK INBOUND
4993 × 1/4 = 1249 USE 1200

C. TOTAL STATION LOAD
485 + 504 + 1200 = 2189

PM PEAK

A. PEAK ENTRAINING - 4 MISSED HEADWAY ACCUM.
2223

B. LINK LOAD CONTRIBUTIONS:
1. LINK OUTBOUND
4531 × 1/4 = 1133

2. LINK INBOUND
2762 × 1/4 = 691

C. TOTAL STATION LOAD
2223 + 1133 + 691 = 4047

TAMS

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Project _____ Date _____

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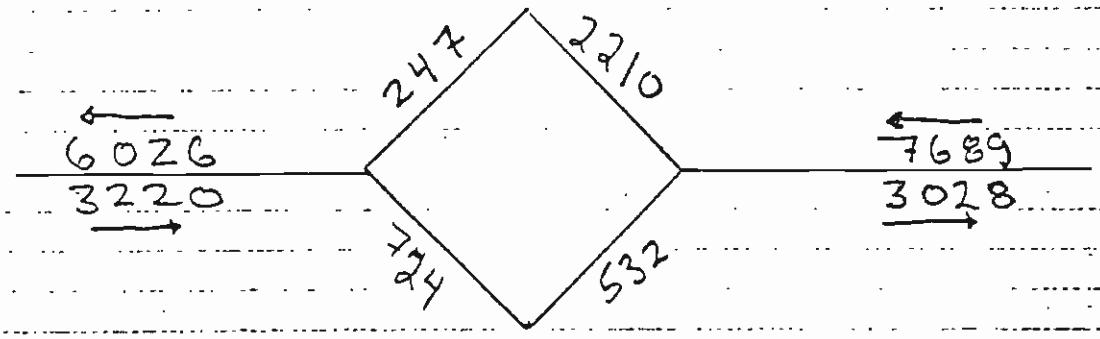
_____ Ch'k. by _____

STATION: 7TH & FLOWER

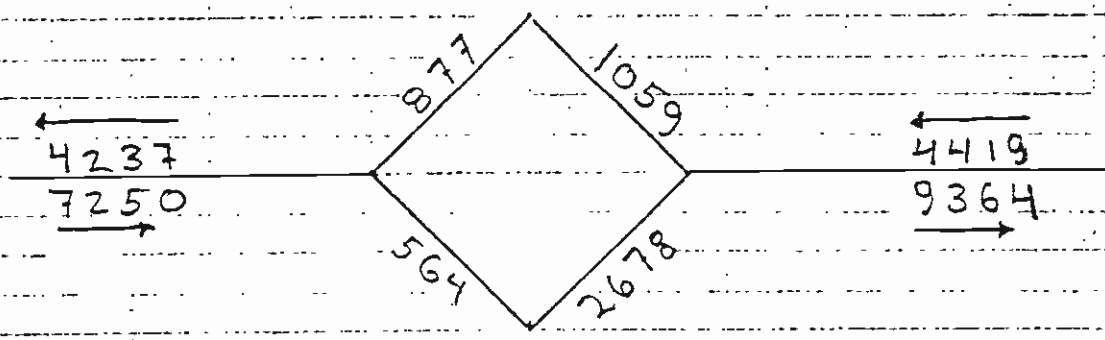
PATRONAGE DATA: YEAR 2020

AM PEAK 15 MIN



5TH/HILL 7TH/FLOWER WIL/ALVARAD

PM PEAK 15 MIN



5TH/HILL 7TH/FLOWER WIL/ALVARA

TAMS

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Project _____ Date

Subject _____ By _____

EMERGENCY EXITING ANALYSIS Ch'k. by

STATION: WILSHIRE/ALVARADO

OCCUPANT LOAD - F/LS CRITERIA

HEADWAY ASSUMED 2 MIN

YEAR 2020

AM PEAK

A. PEAK ENTRAINING - 4 MISSED HEADWAY ACCUM.
1918 × 8/15 = 1023

B. LINK LOAD CONTRIBUTIONS:
1. LINK OUTBOUND
3028 × 1/7 = 433

2. LINK INBOUND
7288 × 1/7 = 1042

C. TOTAL STATION LOAD
1023 + 433 + 1042 = 2498

PM PEAK

A. PEAK ENTRAINING - 4 MISSED HEADWAY ACCUM.
1333 × 8/15 = 711

B. LINK LOAD CONTRIBUTIONS:
1. LINK OUTBOUND
9364 × 1/7 = 1338 USE 1200

2. LINK INBOUND
4340 × 1/7 = 620

C. TOTAL STATION LOAD
711 + 1200 + 620 = 2531

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EMERGENCY EXITING ANALYSIS Ch'k. by _____

STATION: 7TH & FLOWER

OCCUPANT LOAD - F/LS CRITERIA

HEADWAY ASSUMED 2 MIN

YEAR 2020

AM PEAK

A. PEAK ENTRAINING - 4 MISSED HEADWAY ACCUM.
779 × 8/15 = 416

B. LINK LOAD CONTRIBUTIONS:
1. LINK OUTBOUND
3220 × 1/7 = 460

2. LINK INBOUND
7689 × 1/7 = 1099

C. TOTAL STATION LOAD
416 + 460 + 1099

PM PEAK

A. PEAK ENTRAINING - 4 MISSED HEADWAY ACCUM.
3555 × 8/15 = 1896

B. LINK LOAD CONTRIBUTIONS:
1. LINK OUTBOUND
7250 × 1/7 = 1036

2. LINK INBOUND
4419 × 1/7 = 632

C. TOTAL STATION LOAD
1896 + 1036 + 632 = 3564

FIGURE 2-1

EMERGENCY EXIT CAPACITY

CALCULATION

STATION 7TH/FLOWER

OCCUPANCY LOAD YR 2000 - 4047 PERSONS

EXIT LANES AND CAPACITY PROVIDED

PLATFORM TO CONCOURSE

STAIRS	3	X	3 LANES	X	35	PPM =	315	PPM
ESCALATORS	3	X	2 LANES	X	35	PPM =	210	PPM
EMG. STAIRS	2	X	5 LANES	X	35	PPM =	350	PPM
TOTAL							875	PPM

THRU FARE BARRIER

FARE GATES	20	X	1 LANES	X	50	PPM =	1000	PPM
SERVICE GATES	4	X	2 LANES	X	50	PPM =	400	PPM
EMG. GATES		X	LANES	X		PPM =		PPM
TOTAL							1400	PPM

FARE BARRIER TO SAFE AREA

STAIRS	3	X	3 LANES	X	35	PPM =	315	PPM
ESCALATORS	3	X	2 LANES	X	35	PPM =	210	PPM
EMG. STAIRS	2	X	2 LANES	X	35	PPM =	140	PPM
TOTAL							665	PPM

FIGURE 2-2

TEST 1.

YR 2000
3½ MIN HWY
3 SEC.
3 STAIRS.

EVACUATE STATION OCCUPANT LOAD FROM STATION PLATFORM(S) IN FOUR MINUTES OR LESS.

WAITING TIME AT PLATFORM EXITS

W = OCCUPANCY LOAD/EXIT CAPACITY
= 4047 PERSONS ÷ 875 PPM = 4.63 MINUTES

TEST # 2

EVACUATE STATION OCCUPANT LOAD FROM THE MOST REMOTE POINT ON THE PLATFORM TO A POINT OF SAFETY IN SIX MINUTES OR LESS.

WALKING TIME FOR LONGEST EXIT ROUTE

PLATFORM = T_1 = 94 FEET ÷ 200 FPM = .47 Minutes

PLAT. TO CONCOURSE = T_2 = 15 FEET ÷ 50 FPM = .30 Minutes

CONCOURSE TO FARE BARRIER T_3 = 74 FEET ÷ 200 FPM = .37 Minutes

FARE BARRIER TO SAFE AREA T_4 = 209 FEET ÷ 200 FPM = 1.05 Minutes
TO GRADE 25 50 .50

TOTAL = T = 2.69 MINUTES

ADDITIONAL WAITING TIME AT PLATFORM EXITS

W_1 = 4.63 MINUTES T_1 = .47 MINUTES

$(W_1 - T_1)$ = 4.63 - 0.47 = 4.16 MINUTES

ADDITIONAL WAITING TIME AT FARE BARRIER

4.63

OCCUPANT LOAD AT CONCOURSE
= OCCUPANT LOAD - EMERGENCY STAIR 4 MIN. CAPACITY
= 4047 PERSONS - (350 PPM X 4 MINUTES) = 2427 PERSONS

W_2 = CONCOURSE OCCUPANT LOAD/GATE CAPACITY
= 2427 PERSONS ÷ 1400 PPM = 1.74 MINUTES

$(W_2 - W_1)$ = 1.74 - 4.63 = 0 MINUTES

ADDITIONAL WAITING TIME AT CONCOURSE EXITS

W_3 = CONCOURSE OCCUPANT LOAD/EXIT CAPACITY

= 2427 PERSONS ÷ 665 PPM = 3.65 MINUTES

$(W_3 - W_x)$ = 3.65 - 4.63 = 0 MINUTES

TOTAL EXIT TIME

= T + $(W_1 - T_1)$ + $(W_2 - W_1)$ + $(W_3 - W_x)$
= 2.69 + 4.16 + 0 + 0 = 6.85 Minutes

FIGURE 2-2

TEST 1.

EVACUATE STATION OCCUPANT LOAD FROM STATION PLATFORM(S) IN FOUR MINUTES OR LESS.

1 + FLOWER
1.6 CONTINUOUS
2 MIN HWY
3 ESC
3 STAIRS

WAITING TIME AT PLATFORM EXITS

W = OCCUPANCY LOAD/EXIT CAPACITY
= 3564 PERSONS ÷ 875 PPM = 4.08 MINUTES

TEST # 2

EVACUATE STATION OCCUPANT LOAD FROM THE MOST REMOTE POINT ON THE PLATFORM TO A POINT OF SAFETY IN SIX MINUTES OR LESS.

WALKING TIME FOR LONGEST EXIT ROUTE

PLATFORM = T_1 = 94 FEET ÷ 200 FPM = .47 Minutes

PLAT. TO CONCOURSE = T_2 = 15 FEET ÷ 50 FPM = .30 Minutes

CONCOURSE TO FARE BARRIER T_3 = 74 FEET ÷ 200 FPM = .37 Minutes

FARE BARRIER TO SAFE AREA T_4 = $\frac{209}{25}$ FEET ÷ $\frac{200}{50}$ FPM = $\frac{1.05}{.50}$ Minutes

TO GRADE

TOTAL = T = 2.69 MINUTES

ADDITIONAL WAITING TIME AT PLATFORM EXITS

W_1 = 4.08 MINUTES T_1 = 0.47 MINUTES

$(W_1 - T_1)$ = 4.08 - 0.47 = 3.61 MINUTES

ADDITIONAL WAITING TIME AT FARE BARRIER

4.08

OCCUPANT LOAD AT CONCOURSE
= OCCUPANT LOAD - EMERGENCY STAIR 4 MIN. CAPACITY
= 3564 PERSONS - (350 PPM X 4 MINUTES) = 2136 PERSONS

W_2 = CONCOURSE OCCUPANT LOAD/GATE CAPACITY
= 2136 PERSONS ÷ 1400 PPM = 1.53 MINUTES

$(W_2 - W_1)$ = 1.53 - 4.08 = 0 MINUTES

ADDITIONAL WAITING TIME AT CONCOURSE EXITS

W_3 = CONCOURSE OCCUPANT LOAD/EXIT CAPACITY

= 2136 PERSONS ÷ 665 PPM = 3.22 MINUTES

$(W_3 - W_x)$ = 3.22 - 4.08 = 0 MINUTES

TOTAL EXIT TIME

= T + $(W_1 - T_1)$ + $(W_2 - W_1)$ + $(W_3 - W_x)$

= 2.69 + 3.61 + 0 + 0 = 6.30 Minutes

TAMS

6/15

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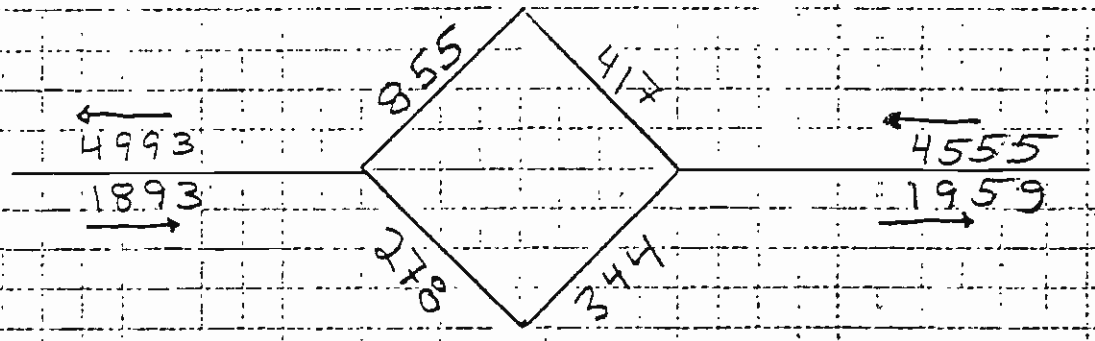
STATION: WILSHIRE/ALVARADO

PATRONAGE DATA: YEAR 2000

AM PEAK 15 MIN

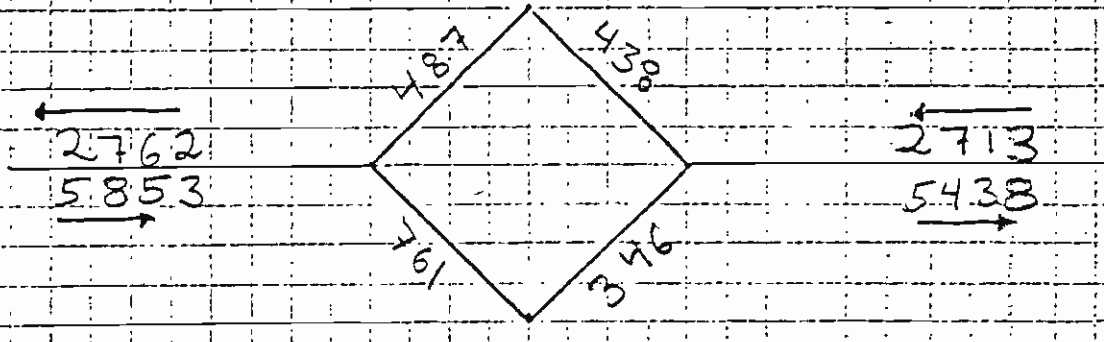


7TH/ FLOWER

WIL/ ALVARADO

WIL/ VERMC

PM PEAK 15 MIN



7TH/ FLOWER

WIL/ ALVARADO

WIL/ VERMON

TAMS

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EMERGENCY EXITING ANALYSIS Ch'k. by _____

STATION: WILSHIRE/ALVARADO

OCCUPANT LOAD - F/LS CRITERIA

HEADWAY ASSUMED 3½ MIN

YEAR 2000

AM PEAK

A. PEAK ENTRAINING - 4 MISSED HEADWAY ACCUM.
1199

B. LINK LOAD CONTRIBUTIONS:
1. LINK OUTBOUND
1893 × 1/4 = 474

2. LINK INBOUND
4535 × 1/4 = 1139

C. TOTAL STATION LOAD
1199 + 474 + 1139 = 2812

PM PEAK

A. PEAK ENTRAINING - 4 MISSED HEADWAY ACCUM.
833

B. LINK LOAD CONTRIBUTIONS:
1. LINK OUTBOUND
5853 × 1/4 = 1464 - USE 1200

2. LINK INBOUND
2713 × 1/4 = 679

C. TOTAL STATION LOAD
833 + 1200 + 679 = 2712

TAMS

7/15

Job No. _____ Sheet _____ of _____

Project _____ Date _____

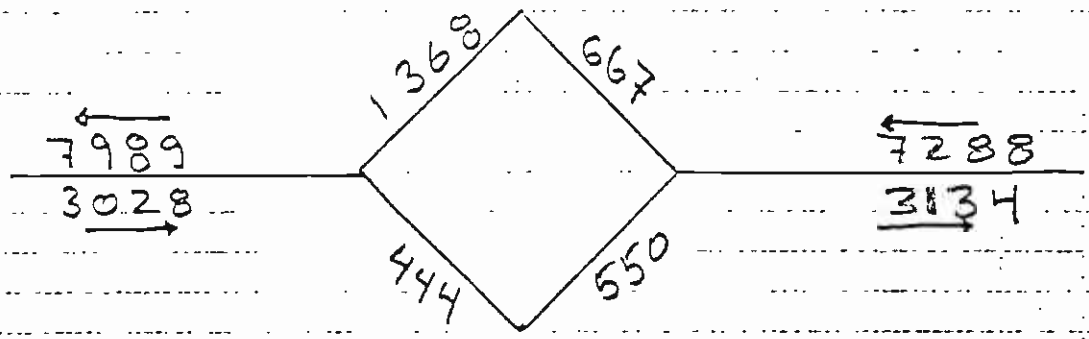
Subject _____ By _____

_____ Ch'k. by _____

STATION: WILSHIRE / ALVARADO

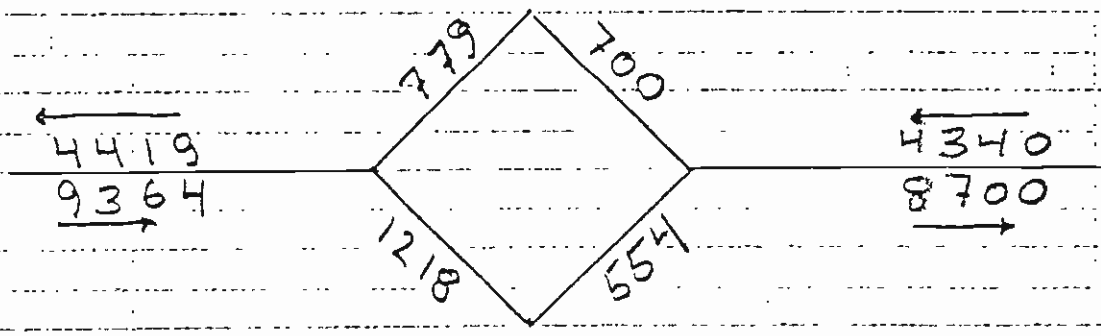
PATRONAGE DATA: YEAR 2020

AM PEAK 15 MIN



7TH/ FLOWER | WIL/ ALVARADO | WIL/ VERMONT

PM PEAK 15 MIN



7TH/ FLOWER | WIL/ ALVARADO | WIL/ VERMO

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TAMS

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Project _____ Date _____

Subject _____ By _____

EMERGENCY EXITING ANALYSIS Ch'k. by _____

STATION: WILSHIRE/ALVARADO

OCCUPANT LOAD - F/LS CRITERIA

HEADWAY ASSUMED 2 MIN

YEAR 2020

AM PEAK

A. PEAK ENTRAINING - 4 MISSED HEADWAY ACCUM
1918 × 8/15 = 1023

B. LINK LOAD CONTRIBUTIONS:
1. LINK OUTBOUND
3028 × 1/7 = 433

2. LINK INBOUND
7288 × 1/7 = 1042

C. TOTAL STATION LOAD
1023 + 433 + 1042 = 2498

PM PEAK

A. PEAK ENTRAINING - 4 MISSED HEADWAY ACCUM.
1333 × 8/15 = 711

B. LINK LOAD CONTRIBUTIONS:
1. LINK OUTBOUND
9364 × 1/7 = 1338 USE 1200

2. LINK INBOUND
4340 × 1/7 = 620

C. TOTAL STATION LOAD
711 + 1200 + 620 = 2531

FIGURE 2-1

EMERGENCY EXIT CAPACITY

CALCULATION

STATION NW/ALVARADO

OCCUPANCY LOAD YR 2000 2812 PERSONS

EXIT LANES AND CAPACITY PROVIDED

PLATFORM TO CONCOURSE

STAIRS	2	X	3	LANES	X	35	PPM =	210 PPM
ESCALATORS	2	X	2	LANES	X	35	PPM =	140 PPM
EMG. STAIRS	2	X	4	LANES	X	35	PPM =	280 PPM
TOTAL								630 PPM

THRU FARE BARRIER

FARE GATES	14	X	1	LANES	X	50	PPM =	700 PPM
SERVICE GATES	2	X	2	LANES	X	50	PPM =	200 PPM
EMG. GATES		X		LANES	X		PPM =	PPM
TOTAL								900 PPM

FARE BARRIER TO SAFE AREA

STAIRS	2	X	3	LANES	X	35	PPM =	210 PPM
ESCALATORS	2	X	2	LANES	X	35	PPM =	140 PPM
EMG. STAIRS		X		LANES	X		PPM =	PPM
TOTAL								350 PPM

FIGURE 2 -
TEST 1.

WIL/ALVARADO
YR 2000
3½ MIN HWY
2 STAIRS
2 ESC

EVACUATE STATION OCCUPANT LOAD FROM STATION PLATFORM(S) IN FOUR MINUTES OR LESS.

WAITING TIME AT PLATFORM EXITS

W = OCCUPANCY LOAD/EXIT CAPACITY
= 2812 PERSONS ÷ 630 PPM = 4.47 MINUTES

TEST # 2

EVACUATE STATION OCCUPANT LOAD FROM THE MOST REMOTE POINT ON THE PLATFORM TO A POINT OF SAFETY IN SIX MINUTES OR LESS.

WALKING TIME FOR LONGEST EXIT ROUTE

PLATFORM = T_1 = 132 FEET ÷ 200 FPM = .66 Minutes
PLAT. TO CONCOURSE = T_2 = 29 FEET ÷ 50 FPM = .58 Minutes
CONCOURSE TO FARE BARRIER T_3 = 137 FEET ÷ 200 FPM = .69 Minutes

FARE BARRIER TO SAFE AREA T_4 = 54 FEET ÷ 200 FPM = .27 Minutes

TOTAL = T = 2.20 MINUTES

ADDITIONAL WAITING TIME AT PLATFORM EXITS

W_1 = 4.47 MINUTES T_1 = .66 MINUTES
$(W_1 - T_1)$ = 4.47 - .66 = 3.81 MINUTES

ADDITIONAL WAITING TIME AT FARE BARRIER

4.47

OCCUPANT LOAD AT CONCOURSE
= OCCUPANT LOAD - EMERGENCY STAIR ~~4~~ MIN. CAPACITY
= 2812 PERSONS - (280 PPM X ~~4~~ MINUTES) = 1561 PERSONS
W_2 = CONCOURSE OCCUPANT LOAD/GATE CAPACITY
= 1561 PERSONS ÷ 900 PPM = 1.74 MINUTES
$(W_2 - W_1)$ = 1.74 - 4.47 = 0 MINUTES

ADDITIONAL WAITING TIME AT CONCOURSE EXITS

W_3 = CONCOURSE OCCUPANT LOAD/EXIT CAPACITY
= 1561 PERSONS ÷ 350 PPM = 4.46 MINUTES
$(W_3 - W_x)$ = 4.46 - 4.47 = 0 MINUTES

TOTAL EXIT TIME
= T + $(W_1 - T_1)$ + $(W_2 - W_1)$ + $(W_3 - W_x)$
= 2.20 + 3.81 + 0 + 0 = 6.01 Minutes

FIGURE 2-2

TEST 1.

WIL/ALVARADO 1.6 CONTINGENCY

EVACUATE STATION OCCUPANT LOAD FROM STATION PLATFORM(S) IN FOUR 2 MIN HWY MINUTES OR LESS. 2 STAIRS 2 ESC

WAITING TIME AT PLATFORM EXITS

W = OCCUPANCY LOAD/EXIT CAPACITY
= 2531 PERSONS ÷ 630 PPM = 4.02 MINUTES

TEST # 2

EVACUATE STATION OCCUPANT LOAD FROM THE MOST REMOTE POINT ON THE PLATFORM TO A POINT OF SAFETY IN SIX MINUTES OR LESS.

WALKING TIME FOR LONGEST EXIT ROUTE

PLATFORM = T_1 = 132 FEET ÷ 200 FPM = .66 Minutes (132) .66

PLAT. TO CONCOURSE = T_2 = 29 FEET ÷ 50 FPM = .58 Minutes (15) .30

CONCOURSE TO FARE BARRIER T_3 = 137 FEET ÷ 200 FPM = .69 Minutes (54) 5.27

FARE BARRIER TO SAFE AREA T_4 = 54 FEET ÷ 200 FPM = .27 Minutes (100) .50

.58

TOTAL = T = 2.20 MINUTES ASSUME 2.31

6/17/93

ADDITIONAL WAITING TIME AT PLATFORM EXITS

W_1 = 4.02 MINUTES T_1 = .66 MINUTES

$(W_1 - T_1)$ = 4.02 - 0.66 = 3.36 MINUTES

ADDITIONAL WAITING TIME AT FARE BARRIER

4.02

OCCUPANT LOAD AT CONCOURSE
= OCCUPANT LOAD - EMERGENCY STAIR 4 MIN. CAPACITY
= 2531 PERSONS - (280 PPM X 4 MINUTES) = 1406 PERSONS

W_2 = CONCOURSE OCCUPANT LOAD/GATE CAPACITY
= 1406 PERSONS ÷ 900 PPM = 1.57 MINUTES

$(W_2 - W_1)$ = 1.57 - 4.02 = 0 MINUTES

ADDITIONAL WAITING TIME AT CONCOURSE EXITS

W_3 = CONCOURSE OCCUPANT LOAD/EXIT CAPACITY

= 1406 PERSONS ÷ 350 PPM = 4.02 MINUTES

$(W_3 - W_x)$ = 4.02 - 4.02 = 0 MINUTES

TOTAL EXIT TIME

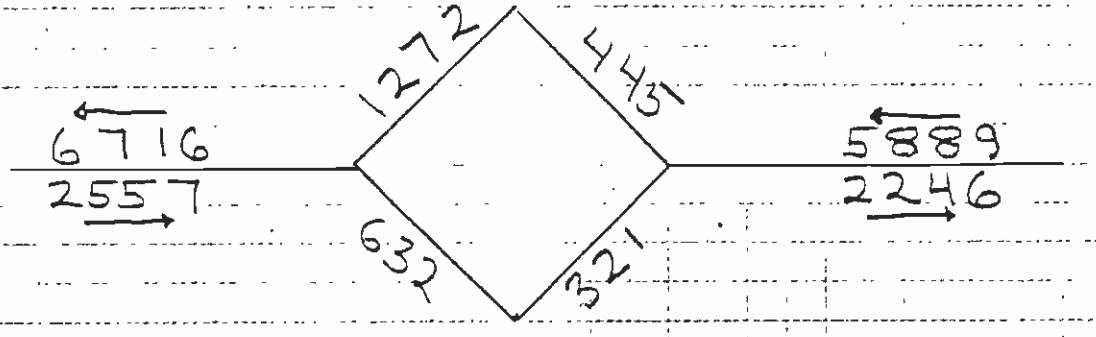
= T + $(W_1 - T_1)$ + $(W_2 - W_1)$ + $(W_3 - W_x)$

= 2.20 + 3.36 + 0 + 0 = 5.56 Minutes

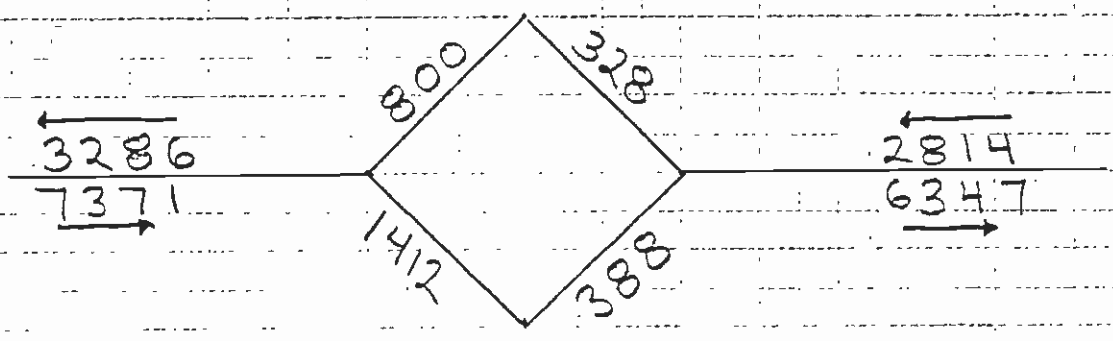
STATION: WILSHIRE / WESTERN

PATRONAGE DATA: YEAR 2020

AM PEAK 15 MIN



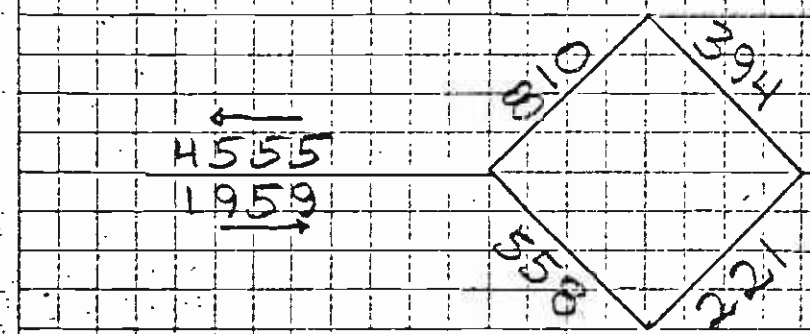
PM PEAK 15 MIN



STATION: WIL/VERMONT

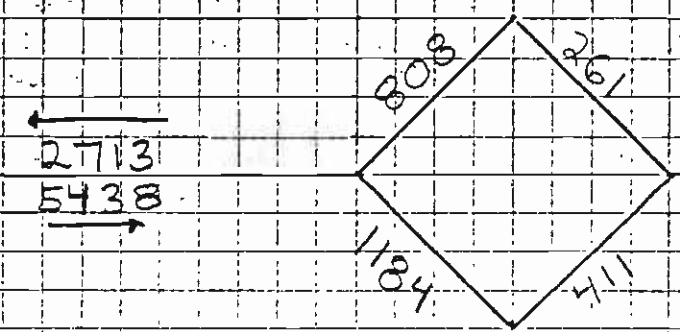
PATRONAGE DATA: YEAR 2000

AM PEAK 15 MIN



WIL/ ALVARADO | WIL/ VERMONT | WIL/ NORMANDIE

PM PEAK 15 MIN



WIL/ ALVARADO | WIL/ VERMONT | WIL/ NORMANDIE

STATION: WILSHIRE/VERMONT

OCCUPANT LOAD - F/LS CRITERIA

HEADWAY ASSUMED 3½ MIN

YEAR 2000

AM PEAK

A. PEAK ENTRAINING - 4 MISSED HEADWAY ACCUM.
221 + 810 = 1031

B. LINK LOAD CONTRIBUTIONS:
1. LINK OUTBOUND
1959 × ¼ = 490

2. LINK INBOUND
4139 × ¼ = 1035

C. TOTAL STATION LOAD
1031 + 490 + 1035 = 2556

PM PEAK

A. PEAK ENTRAINING - 4 MISSED HEADWAY ACCUM.
411 + 808 = 1219

B. LINK LOAD CONTRIBUTIONS:
1. LINK OUTBOUND
5438 × ¼ = 1360 - USE 1200

2. LINK INBOUND
2166 × ¼ = 542

C. TOTAL STATION LOAD
1219 + 1200 + 542 = 2961

Project _____ Date _____

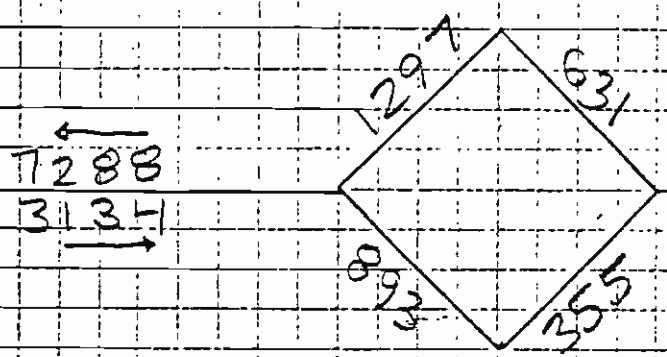
Subject _____ By _____

_____ Ch'k. by _____

STATION: WILSHIRE/VERMONT

PATRONAGE DATA: YEAR 2020

AM PEAK 15 MIN



T288
3134

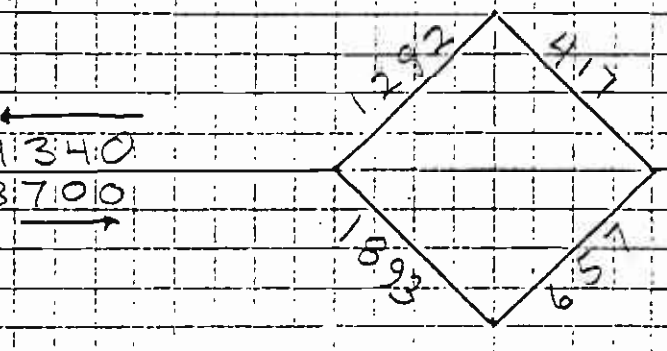
6622
2596

WIL/ ALVARADO

WIL/ VERMONT

WIL/ NORMANDIE

PM PEAK 15 MIN



4340
8700

3465
7464

WIL/ ALVARADO

WIL/ VERMONT

WIL/ NORMANDIE

STATION: WILSHIRE/VERMONT

OCCUPANT LOAD - F/LS CRITERIA

HEADWAY ASSUMED 2 MIN

YEAR 2020

AM PEAK

A. PEAK ENTRAINING - 4 MISSED HEADWAY ACCUM.
(355 + 1297) × 8/15 = 882

B. LINK LOAD CONTRIBUTIONS:
1. LINK OUTBOUND
3134 × 1/7 = 448

2. LINK INBOUND
6622 × 1/7 = 946

C. TOTAL STATION LOAD
882 + 448 + 946 = 2276

PM PEAK

A. PEAK ENTRAINING - 4 MISSED HEADWAY ACCUM.
(657 + 1292) × 8/15 = 1040

B. LINK LOAD CONTRIBUTIONS:
1. LINK OUTBOUND
8700 × 1/7 = 1243 - USE 1200

2. LINK INBOUND
3465 × 1/7 = 495

C. TOTAL STATION LOAD
1040 + 1200 + 495 = 2735

4/19/83

FIGURE 2-1

EMERGENCY EXIT CAPACITY

CALCULATION

STATION WILSHIRE/VERMONT

OCCUPANCY LOAD YR 2000: 2961 PERSONS

EXIT LANES AND CAPACITY PROVIDED

PLATFORM TO CONCOURSE

STAIRS	2	X	3 LANES	X	35	PPM =	210	PPM
ESCALATORS	2	X	2 LANES	X	35	PPM =	140	PPM
EMG. STAIRS	2	X	4 LANES	X	35	PPM =	280	PPM
TOTAL							630	PPM

THRU FARE BARRIER

FARE GATES	10	X	1 LANES	X	50	PPM =	500	PPM
SERVICE GATES	2	X	2 LANES	X	50	PPM =	200	PPM
EMG. GATES		X	LANES	X		PPM =		PPM
TOTAL							700	PPM

FARE BARRIER TO SAFE AREA

STAIRS	2	X	3 LANES	X	35	PPM =	210	PPM
ESCALATORS	2	X	2 LANES	X	35	PPM =	140	PPM
EMG. STAIRS	1	X	2 LANES	X	35	PPM =	70	PPM
TOTAL							420	PPM

GOAL 2 -
TEST 1.

WIL/VERMONT
YR 2000
3½ MIN HDWY
2 ESC +
2 STAIRS

EVACUATE STATION OCCUPANT LOAD FROM STATION PLATFORM(S) IN FOUR MINUTES OR LESS.

WAITING TIME AT PLATFORM EXITS

W = OCCUPANCY LOAD/EXIT CAPACITY
= 2961 PERSONS ÷ 630 PPM = 4.70 MINUTES

TEST # 2

EVACUATE STATION OCCUPANT LOAD FROM THE MOST REMOTE POINT ON THE PLATFORM TO A POINT OF SAFETY IN SIX MINUTES OR LESS.

WALKING TIME FOR LONGEST EXIT ROUTE

PLATFORM = T_1 = 125 FEET ÷ 200 FPM = 0.63 Minutes
PLAT. TO CONCOURSE = T_2 = 15 FEET ÷ 50 FPM = 0.30 Minutes
CONCOURSE TO FARE BARRIER T_3 = 54 FEET ÷ 200 FPM = 0.27 Minutes
FARE BARRIER TO SAFE AREA T_4 = 88 FEET ÷ 200 FPM = 0.44 Minutes
TO GRADE 34 50 0.68
TOTAL = T = 2.32 MINUTES

ADDITIONAL WAITING TIME AT PLATFORM EXITS

W_1 = 4.70 MINUTES T_1 = 0.63 MINUTES
$(W_1 - T_1)$ = 4.70 - 0.63 = 4.07 MINUTES

ADDITIONAL WAITING TIME AT FARE BARRIER

OCCUPANT LOAD AT CONCOURSE
= OCCUPANT LOAD - EMERGENCY STAIR 4.70 4 MIN. CAPACITY
= 2961 PERSONS - (280 PPM X 4 MINUTES) = 1645 PERSONS
W_2 = CONCOURSE OCCUPANT LOAD/GATE CAPACITY
= 1645 PERSONS ÷ 700 PPM = 2.35 MINUTES
$(W_2 - W_1)$ = 2.35 - 4.70 = 0 MINUTES

ADDITIONAL WAITING TIME AT CONCOURSE EXITS

W_3 = CONCOURSE OCCUPANT LOAD/EXIT CAPACITY
= 1645 PERSONS ÷ 420 PPM = 3.92 MINUTES

$(W_3 - W_x)$ = 3.92 - 4.70 = 0 MINUTES

TOTAL EXIT TIME

= T + $(W_1 - T_1)$ + $(W_2 - W_1)$ + $(W_3 - W_x)$
= 2.32 + 4.07 + 0 + 0 = 6.39 Minutes

FIGURE 2-2

TEST 1.

W/ VERMONT 1.6 CONTINGENCY
2 MIN FWY
2 ESC
2 STAIRS

EVACUATE STATION OCCUPANT LOAD FROM STATION PLATFORM(S) IN FOUR MINUTES OR LESS.

WAITING TIME AT PLATFORM EXITS

W = OCCUPANCY LOAD/EXIT CAPACITY
= 2735 PERSONS ÷ 630 PPM = 4.35 MINUTES

TEST # 2

EVACUATE STATION OCCUPANT LOAD FROM THE MOST REMOTE POINT ON THE PLATFORM TO A POINT OF SAFETY IN SIX MINUTES OR LESS.

WALKING TIME FOR LONGEST EXIT ROUTE

PLATFORM = T_1 = 125 FEET ÷ 200 FPM = .63 Minutes

PLAT. TO CONCOURSE = T_2 = 15 FEET ÷ 50 FPM = .30 Minutes

CONCOURSE TO FARE BARRIER T_3 = 54 FEET ÷ 200 FPM = .27 Minutes

FARE BARRIER TO SAFE AREA T_4 = 88 FEET ÷ 200 FPM = .44 Minutes
TO GRADE 34 50 .68

TOTAL = T = 2.32 MINUTES

ADDITIONAL WAITING TIME AT PLATFORM EXITS

W_1 = 4.35 MINUTES T_1 = 0.63 MINUTES

$(W_1 - T_1)$ = 4.35 - 0.63 = 3.72 MINUTES

ADDITIONAL WAITING TIME AT FARE BARRIER

4.35

OCCUPANT LOAD AT CONCOURSE
= OCCUPANT LOAD - EMERGENCY STAIR 4 MIN. CAPACITY
= 2735 PERSONS - (280 PPM X 4 MINUTES) = 1517 PERSONS

W_2 = CONCOURSE OCCUPANT LOAD/GATE CAPACITY
= 1517 PERSONS ÷ 700 PPM = 2.17 MINUTES

$(W_2 - W_1)$ = 2.17 - 4.35 = 0 MINUTES

ADDITIONAL WAITING TIME AT CONCOURSE EXITS

W_3 = CONCOURSE OCCUPANT LOAD/EXIT CAPACITY

= 1517 PERSONS ÷ 420 PPM = 3.62 MINUTES

$(W_3 - W_x)$ = 3.62 - 4.35 = 0 MINUTES

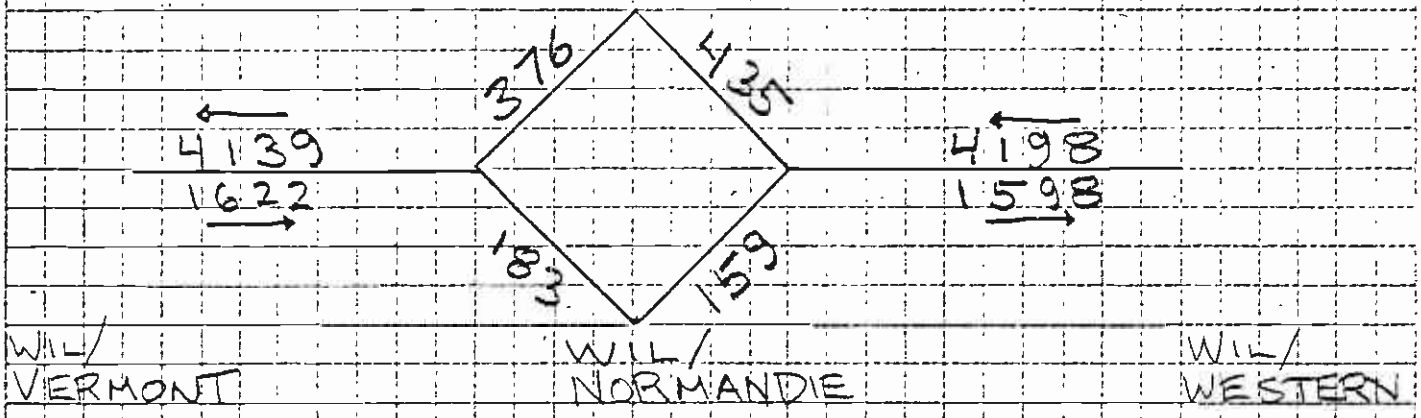
TOTAL EXIT TIME

= T + $(W_1 - T_1)$ + $(W_2 - W_1)$ + $(W_3 - W_x)$
= 2.32 + 3.72 + 0 + 0 = 6.04 Minutes

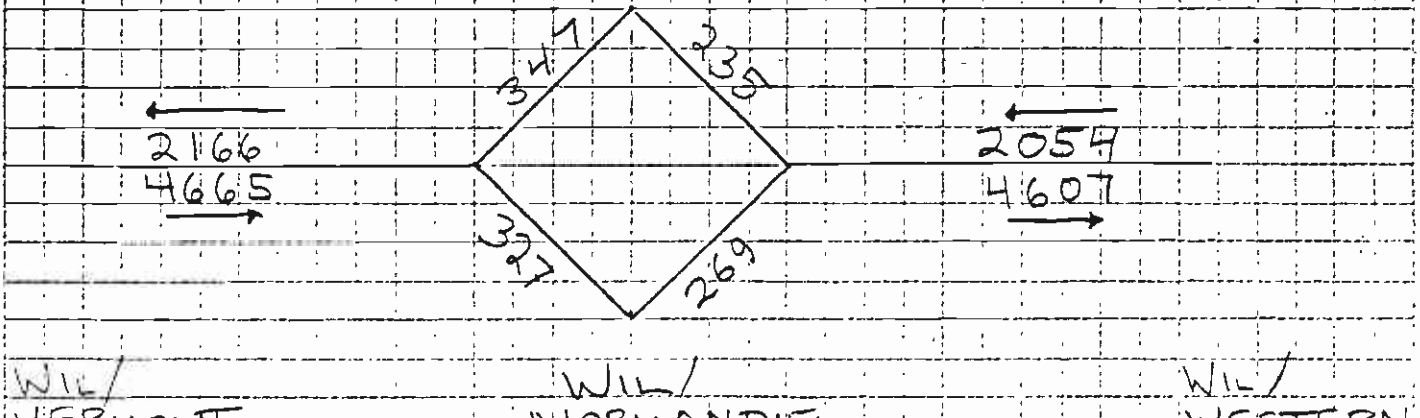
STATION: WILSHIRE/NORMANDIE

PATRONAGE DATA: YEAR 2000

AM PEAK 15 MIN



P.M PEAK 15 MIN



STATION: WILSHIRE/NORMANDIE

OCCUPANT LOAD - F/LS CRITERIA

HEADWAY ASSUMED 3½ MIN

YEAR 2000

AM PEAK

A. PEAK ENTRAINING - 4 MISSED HEADWAY ACCUM.
159 + 376 = 535

B. LINK LOAD CONTRIBUTIONS:
1. LINK OUTBOUND
1622 × ¼ = 406

2. LINK INBOUND
4198 × ¼ = 1050

C. TOTAL STATION LOAD
535 + 406 + 1050 = 1991

PM PEAK

A. PEAK ENTRAINING - 4 MISSED HEADWAY ACCUM.
269 + 347 = 616

B. LINK LOAD CONTRIBUTIONS:
1. LINK OUTBOUND
4665 × ¼ = 1167

2. LINK INBOUND
2054 × ¼ = 514

C. TOTAL STATION LOAD
616 + 1167 + 514 = 2297

Project _____ Date _____

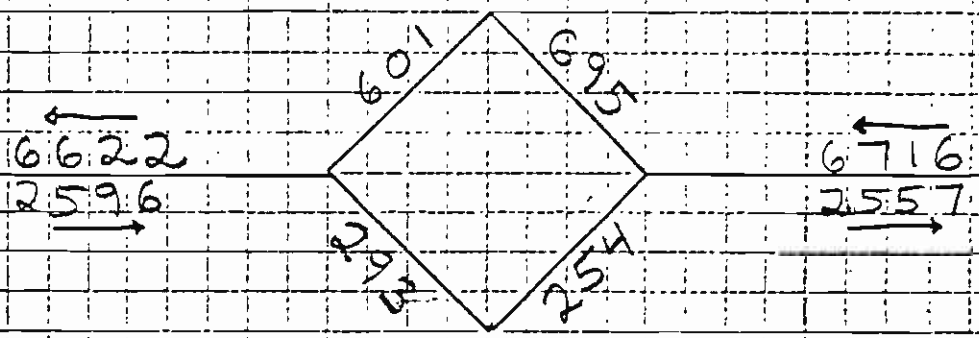
Subject _____ By _____

_____ Ch'k. by _____

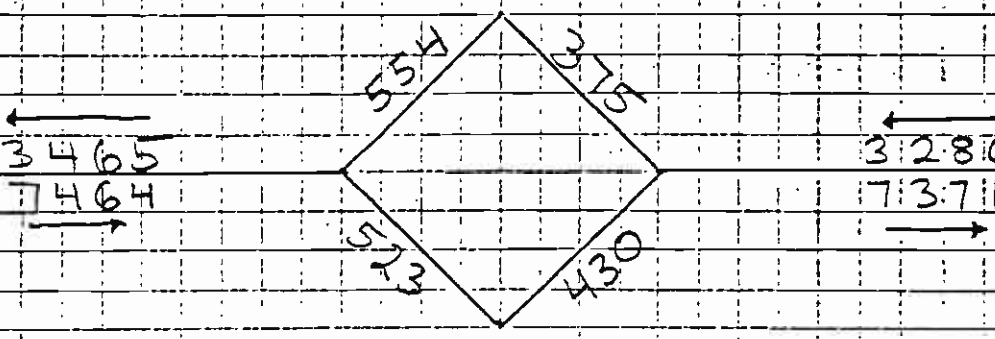
STATION: WILSHIRE/NORMANDIE

PATRONAGE DATA: YEAR 2020

AM PEAK 15 MIN



PM PEAK 15 MIN



STATION: WILSHIRE/NORMANDIE

OCCUPANT LOAD - F/LS CRITERIA

HEADWAY ASSUMED 2 MIN

YEAR 2020

AM PEAK

A. PEAK ENTRAINING - 4 MISSED HEADWAY ACCUM.
(254 + 601) × 8/15 = 456

B. LINK LOAD CONTRIBUTIONS:
1. LINK OUTBOUND
2596 × 1/7 = 371

2. LINK INBOUND
6716 × 1/7 = 960

C. TOTAL STATION LOAD
456 + 371 + 960 = 1787

PM PEAK

A. PEAK ENTRAINING - 4 MISSED HEADWAY ACCUM.
(430 + 554) × 8/15 = 525

B. LINK LOAD CONTRIBUTIONS:
1. LINK OUTBOUND
7464 × 1/7 = 1067

2. LINK INBOUND
3286 × 1/7 = 470

C. TOTAL STATION LOAD
525 + 1067 + 470 = 2062

EMERGENCY EXIT CAPACITY

CALCULATION

STATION WILSHIRE/NORMANDIE

OCCUPANCY LOAD YR 2000: 2297 PERSONS

EXIT LANES AND CAPACITY PROVIDED

PLATFORM TO CONCOURSE

STAIRS	3	X	3	LANES	X	35	PPM =	315 PPM
ESCALATORS	1	X	2	LANES	X	35	PPM =	70 PPM
EMG. STAIRS	2	X	4	LANES	X	35	PPM =	280 PPM

TOTAL 665 PPM

THRU FARE BARRIER

FARE GATES	10	X	1	LANES	X	50	PPM =	506 PPM
SERVICE GATES	2	X	2	LANES	X	50	PPM =	200 PPM
EMG. GATES		X		LANES	X		PPM =	PPM

TOTAL 700 PPM

FARE BARRIER TO SAFE AREA

STAIRS	2	X	3	LANES	X	35	PPM =	210 PPM
ESCALATORS	2	X	2	LANES	X	35	PPM =	140 PPM
EMG. STAIRS	1	X	2	LANES	X	35	PPM =	70 PPM

TOTAL 420 PPM

STATION WIL/NORMANDIE
YEAR 2000

3½ MIN HEADWAY
3 STAIRS
1 ESCALATOR

TEST 1.

EVACUATE STATION OCCUPANT LOAD FROM STATION PLATFORM(S) IN FOUR MINUTES OR LESS.

WAITING TIME AT PLATFORM EXITS

W = OCCUPANCY LOAD/EXIT CAPACITY
= 2297 PERSONS - 665 PPM = 3.46 MINUTES

TEST #2

EVACUATE STATION OCCUPANT LOAD FROM THE MOST REMOTE POINT ON THE PLATFORM TO A POINT OF SAFETY IN SIX MINUTES OR LESS.

WALKING TIME FOR LONGEST EXIT ROUTE

PLATFORM =T 1 = 107 FEET ÷ 200 FPM = 0.54 MINUTES
PLATFORM TO CONCOURSE =T 2 = 15 FEET ÷ 50 FPM = .30 MINUTES
CONCOURSE TO FARE BARRIER =T 3 = 137 FEET ÷ 200 FPM = .69 MINUTES
FARE BARRIER TO SAFE AREA =T 4 = 49 FEET ÷ 200 FPM = .25 MINUTES
TO GRADE = 36 FEET ÷ 50 FPM = .72 MINUTES

TOTAL = T = = 2.50 MIN.

ADDITIONAL WAITING TIME AT PLATFORM EXITS

W 1 = 3.46 MINUTES T 1 = 0.54 MINUTES

W 1 - T 1 = 3.46 - 0.54 = 2.92 MIN.

ADDITIONAL WAITING TIME AT FARE BARRIER

OCCUPANT LOAD AT CONCOURSE
= OCCUPANT LOAD - EMERGENCY STAIR 3.46 MIN. CAPACITY
= 2297 PERSONS - (280 PPM X 3.46 MINUTES) = 1329 PERSONS
W 2 = CONCOURSE OCCUPANT LOAD/GATE CAPACITY
= 1329 PERSONS ÷ 700 PPM = 1.90 MINUTES

W 2 - W 1 = 1.90 - 3.46 = 0 MINUTES

ADDITIONAL WAITING TIME AT CONCOURSE EXITS

W 3 = CONCOURSE OCCUPANT LOAD/EXIT CAPACITY

= 1329 PERSONS ÷ 420 PPM = 3.16 MINUTES

(W 3 - W x) = 3.16 - 3.46 = 0 MINUTES

TOTAL EXIT TIME

= T + (W 1 - T 1) + (W 2 - W 1) + (W 3 - W x)
= 2.50 + 2.92 + 0 + 0 = 5.42 Minutes

2 MIN HEADWAY
3 STAIRS
1 ESCALATOR

STATION WIL/NORMANDIE
YEAR 1.6 CONTINGENCY

TEST 1.

EVACUATE STATION OCCUPANT LOAD FROM STATION PLATFORM(S) IN FOUR MINUTES OR LESS.

WAITING TIME AT PLATFORM EXITS

W = OCCUPANCY LOAD/EXIT CAPACITY
= 2062 PERSONS - 665 PPM = 3.11 MINUTES

TEST #2

EVACUATE STATION OCCUPANT LOAD FROM THE MOST REMOTE POINT ON THE PLATFORM TO A POINT OF SAFETY IN SIX MINUTES OR LESS.

WALKING TIME FOR LONGEST EXIT ROUTE

PLATFORM	=T 1 =	107	FEET ÷	200	FPM =	0.54 MINUTES
PLATFORM TO CONCOURSE	=T 2 =	15	FEET ÷	50	FPM =	.30 MINUTES
CONCOURSE TO FARE BARRIER	=T 3 =	137	FEET ÷	200	FPM =	.69 MINUTES
FARE BARRIER TO SAFE AREA	=T 4 =	49	FEET ÷	200	FPM =	.25 MINUTES
TO GRADE	=	36	FEET ÷	50	FPM =	.72 MINUTES

TOTAL = T = = 2.50 MIN.

ADDITIONAL WAITING TIME AT PLATFORM EXITS

W 1 = 3.11 MINUTES T 1 = 0.54 MINUTES

W 1 - T 1 = 3.11 - 0.54 = 2.57 MIN.

ADDITIONAL WAITING TIME AT FARE BARRIER

OCCUPANT LOAD AT CONCOURSE
= OCCUPANT LOAD - EMERGENCY STAIR 3.11 MIN. CAPACITY
= 2062 PERSONS - (280 PPM X 3.11 MINUTES) = 1192 PERSONS
W 2 = CONCOURSE OCCUPANT LOAD/GATE CAPACITY
= 1192 PERSONS ÷ 700 PPM = 1.71 MINUTES

W 2 - W 1 = 1.71 - 3.11 = 0 MINUTES

ADDITIONAL WAITING TIME AT CONCOURSE EXITS

W 3 = CONCOURSE OCCUPANT LOAD/EXIT CAPACITY

= 1192 PERSONS ÷ 420 PPM = 2.83 MINUTES

(W 3 - W x) = 2.83 - 3.11 = 0 MINUTES

TOTAL EXIT TIME

= T + (W 1 - T 1) + (W 2 - W 1) + (W 3 - W x)
= 2.50 + 2.57 + 0 + 0 = 5.07 Minutes

TAMS

Job No. _____ Sheet 6 of 15

Project _____ Date 4/5/93

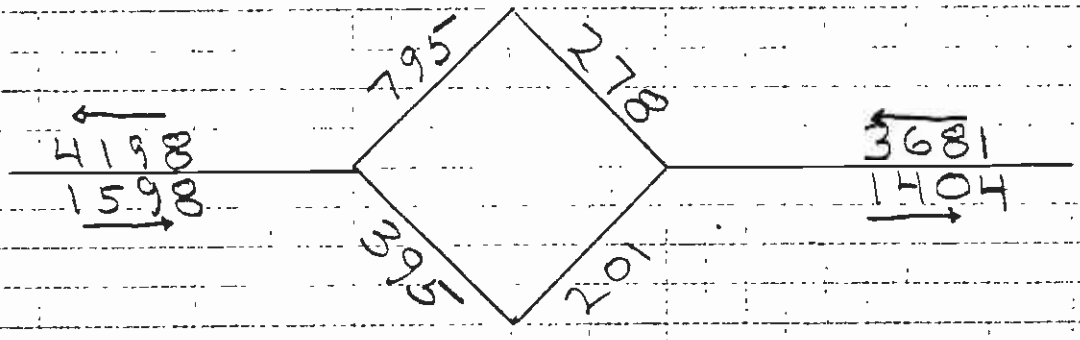
Subject _____ By SIMON

_____ Ch'k. by _____

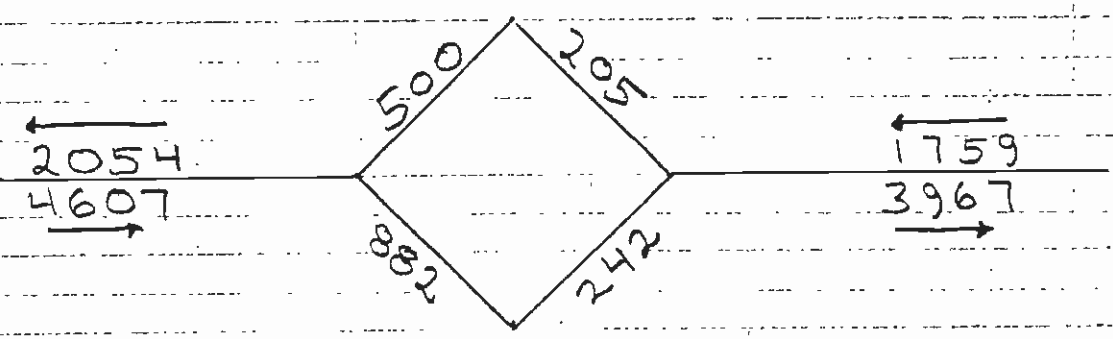
STATION: WILSHIRE/WESTERN

PATRONAGE DATA: YEAR 2000

AM PEAK 15 MIN



PM PEAK 15 MIN



TAMS

Job No. _____ Sheet 14 of 15

Project _____ Date 4/5/83

Subject EMERGENCY EXITING ANALYSIS By SIMON

Ch'k. by _____

STATION: WILSHIRE / WESTERN

OCCUPANT LOAD - F/LS CRITERIA

HEADWAY ASSUMED 3½ MIN

YEAR 2000

AM PEAK

A. PEAK ENTRAINING - 4 MISSED HEADWAY ACCUM.
996

B. LINK LOAD CONTRIBUTIONS:
1. LINK OUTBOUND
1598 × 1/4 = 400

2. LINK INBOUND
3681 × 1/4 = 921

C. TOTAL STATION LOAD
996 + 400 + 921 = 2317

PM PEAK

A. PEAK ENTRAINING - 4 MISSED HEADWAY ACCUM.
742

B. LINK LOAD CONTRIBUTIONS:
1. LINK OUTBOUND
4607 × 1/4 = 1152

2. LINK INBOUND
1759 × 1/4 = 440

C. TOTAL STATION LOAD
742 + 1152 + 440 = 2334

TAMS

Job No. _____ Sheet 13 of 15

Project _____ Date 4/5/93

Subject EMERGENCY EXITING ANALYSIS By SIMON

Ch'k. by _____

STATION: WILSHIRE/WESTERN

OCCUPANT LOAD - F/LS CRITERIA

HEADWAY ASSUMED 2 MIN

YEAR 2020

AM PEAK

A. PEAK ENTRAINING - 4 MISSED HEADWAY ACCUM.
1593 × 8/15 = 850

B. LINK LOAD CONTRIBUTIONS:
1. LINK OUTBOUND
2557 × 1/7 = 366

2. LINK INBOUND
5889 × 1/7 = 842

C. TOTAL STATION LOAD
850 + 366 + 842 = 2058

PM PEAK

A. PEAK ENTRAINING - 4 MISSED HEADWAY ACCUM.
1188 × 8/15 = 634

B. LINK LOAD CONTRIBUTIONS:
1. LINK OUTBOUND
7371 × 1/7 = 1053

2. LINK INBOUND
2814 × 1/7 = 402

C. TOTAL STATION LOAD
634 + 1053 + 402 = 2089

FIGURE 2-1

EMERGENCY EXIT CAPACITY

CALCULATION

STATION WILSHIRE/WESTERN

OCCUPANCY LOAD YR2000: 2334 PERSONS

EXIT LANES AND CAPACITY PROVIDED

PLATFORM TO CONCOURSE

STAIRS	2	X	3	LANES	X	35	PPM =	210 PPM
ESCALATORS	2	X	2	LANES	X	35	PPM =	140 PPM
EMG. STAIRS	2	X	4	LANES	X	35	PPM =	280 PPM
TOTAL								630 PPM

THRU FARE BARRIER

FARE GATES	10	X	1	LANES	X	50	PPM =	500 PPM
SERVICE GATES	2	X	2	LANES	X	50	PPM =	200 PPM
EMG. GATES		X		LANES	X		PPM =	PPM
TOTAL								700 PPM

FARE BARRIER TO SAFE AREA

STAIRS	2	X	3	LANES	X	35	PPM =	210 PPM
ESCALATORS	2	X	2	LANES	X	35	PPM =	140 PPM
EMG. STAIRS	1	X	2	LANES	X	35	PPM =	70 PPM
TOTAL								420 PPM

FIGURE 2-2

WIL/WESTERN YR 2000 3½ MIN - GRADUA 2 ESC 2 STAIRS

TEST 1.

EVACUATE STATION OCCUPANT LOAD FROM STATION PLATFORM(S) IN FOUR MINUTES OR LESS.

WAITING TIME AT PLATFORM EXITS

W = OCCUPANCY LOAD/EXIT CAPACITY
= 2334 PERSONS ÷ 630 PPM = 3.71 MINUTES

TEST # 2

EVACUATE STATION OCCUPANT LOAD FROM THE MOST REMOTE POINT ON THE PLATFORM TO A POINT OF SAFETY IN SIX MINUTES OR LESS.

WALKING TIME FOR LONGEST EXIT ROUTE

PLATFORM = T_1 = 125 FEET ÷ 200 FPM = 0.63 Minutes

PLAT. TO CONCOURSE = T_2 = 15 FEET ÷ 50 FPM = .30 Minutes

CONCOURSE TO FARE BARRIER T_3 = 54 FEET ÷ 200 FPM = .27 Minutes

FARE BARRIER TO SAFE AREA T_4 = 88 FEET ÷ 200 FPM = .44 Minutes
TO GRADE 29 50 = .58

TOTAL = T = 2.22 MINUTES

ADDITIONAL WAITING TIME AT PLATFORM EXITS

W_1 = 3.71 MINUTES T_1 = .63 MINUTES

$(W_1 - T_1)$ = 3.71 - .63 = 3.08 MINUTES

ADDITIONAL WAITING TIME AT FARE BARRIER

3.71

OCCUPANT LOAD AT CONCOURSE
= OCCUPANT LOAD - EMERGENCY STAIR ~~4~~ MIN. CAPACITY
= 2334 PERSONS - (280 PPM X ~~4~~ MINUTES) = 1296 PERSONS

W_2 = CONCOURSE OCCUPANT LOAD/GATE CAPACITY
= 1296 PERSONS ÷ 700 PPM = 1.86 MINUTES

$(W_2 - W_1)$ = 1.86 - 3.71 = 0 MINUTES

ADDITIONAL WAITING TIME AT CONCOURSE EXITS

W_3 = CONCOURSE OCCUPANT LOAD/EXIT CAPACITY

= 1296 PERSONS ÷ 420 PPM = 3.09 MINUTES

$(W_3 - W_x)$ = 3.09 - 3.71 = 0 MINUTES

TOTAL EXIT TIME

= T + $(W_1 - T_1)$ + $(W_2 - W_1)$ + $(W_3 - W_x)$

= 2.22 + 3.08 + 0 + 0 = 5.30 Minutes

FIGURE 2-2

WIL/WESTERN

1.6 CONTINGENCY

2 MIN HEADWAY

2 ESC

2 STAIRS

TEST 1.

EVACUATE STATION OCCUPANT LOAD FROM STATION PLATFORM(S) IN FOUR MINUTES OR LESS.

WAITING TIME AT PLATFORM EXITS

W = OCCUPANCY LOAD/EXIT CAPACITY
= 2089 PERSONS ÷ 630 PPM = 3.32 MINUTES

TEST # 2

EVACUATE STATION OCCUPANT LOAD FROM THE MOST REMOTE POINT ON THE PLATFORM TO A POINT OF SAFETY IN SIX MINUTES OR LESS.

WALKING TIME FOR LONGEST EXIT ROUTE

PLATFORM = T_1 = 125 FEET ÷ 200 FPM = 0.63 Minutes

PLAT. TO CONCOURSE = T_2 = 15 FEET ÷ 50 FPM = .30 Minutes

CONCOURSE TO FARE BARRIER T_3 = 54 FEET ÷ 200 FPM = .27 Minutes

FARE BARRIER TO SAFE AREA T_4 = 88 FEET ÷ 200 FPM = .44 Minutes
TO GRADE 29 50 = .58

TOTAL = T = 2.22 MINUTES

ADDITIONAL WAITING TIME AT PLATFORM EXITS

W_1 = 3.32 MINUTES T_1 = 0.63 MINUTES

$(W_1 - T_1)$ = 3.32 - 0.63 = 2.69 MINUTES

ADDITIONAL WAITING TIME AT FARE BARRIER

OCCUPANT LOAD AT CONCOURSE 3.32
= OCCUPANT LOAD - EMERGENCY STAIR 4 MIN. CAPACITY
= 2089 PERSONS - (280 PPM X 4 MINUTES) = 1160 PERSONS

W_2 = CONCOURSE OCCUPANT LOAD/GATE CAPACITY
= 1160 PERSONS ÷ 700 PPM = 1.66 MINUTES

$(W_2 - W_1)$ = 1.66 - 3.32 = 0 MINUTES

ADDITIONAL WAITING TIME AT CONCOURSE EXITS

W_3 = CONCOURSE OCCUPANT LOAD/EXIT CAPACITY

= 1160 PERSONS ÷ 420 PPM = 2.77 MINUTES

$(W_3 - W_x)$ = 2.77 - 3.32 = 0 MINUTES

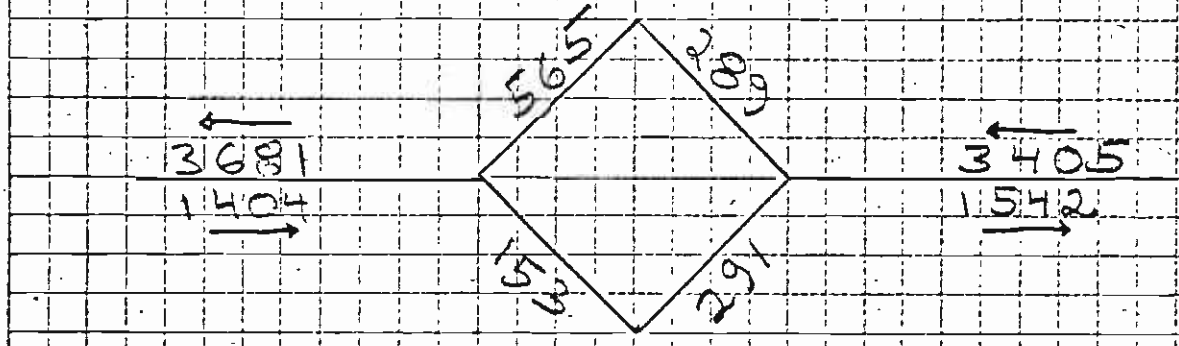
TOTAL EXIT TIME

= T + $(W_1 - T_1)$ + $(W_2 - W_1)$ + $(W_3 - W_x)$
= 2.22 + 2.69 + 0 + 0 = 4.91 Minutes

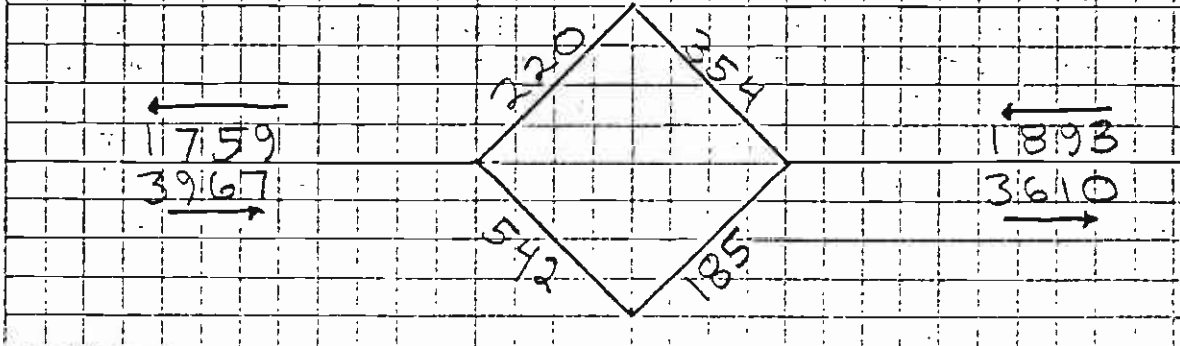
STATION: WILSHIRE/CRENSHAW

PATRONAGE DATA: YEAR 2000

AM PEAK 15 MIN



PM PEAK 15 MIN



STATION: WILSHIRE/CRENSHAW

OCCUPANT LOAD - F/LS CRITERIA

HEADWAY ASSUMED 3½ MIN

YEAR 2000

AM PEAK

A. PEAK ENTRAINING - 4 MISSED HEADWAY ACCUM.
291 + 565 = 856

B. LINK LOAD CONTRIBUTIONS:
1. LINK OUTBOUND
1404 × ¼ = 351

2. LINK INBOUND
3405 × ¼ = 852

C. TOTAL STATION LOAD
856 + 351 + 852 = 2059

PM PEAK

A. PEAK ENTRAINING - 4 MISSED HEADWAY ACCUM.
185 + 220 = 405

B. LINK LOAD CONTRIBUTIONS:
1. LINK OUTBOUND
3967 × ¼ = 992

2. LINK INBOUND
1893 × ¼ = 474

C. TOTAL STATION LOAD
405 + 992 + 474 = 1871

Project _____ Date _____

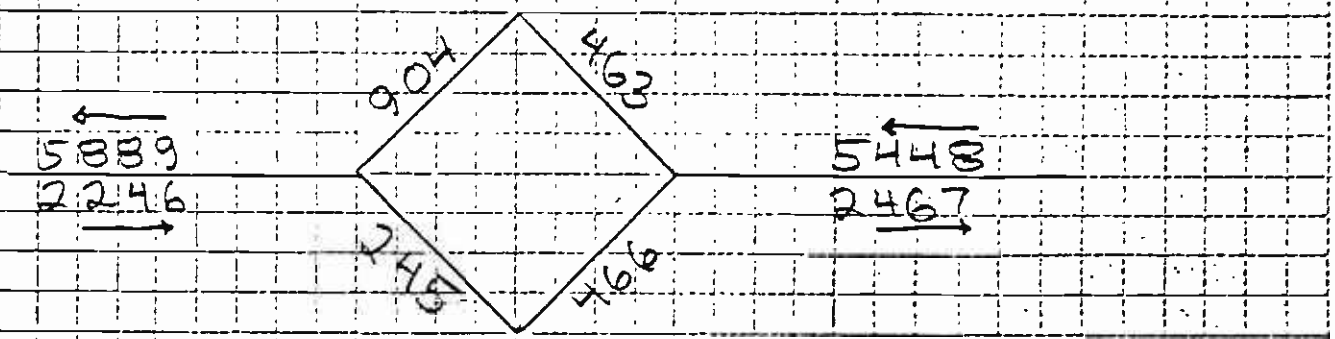
Subject _____ By _____

_____ Ch'k. by _____

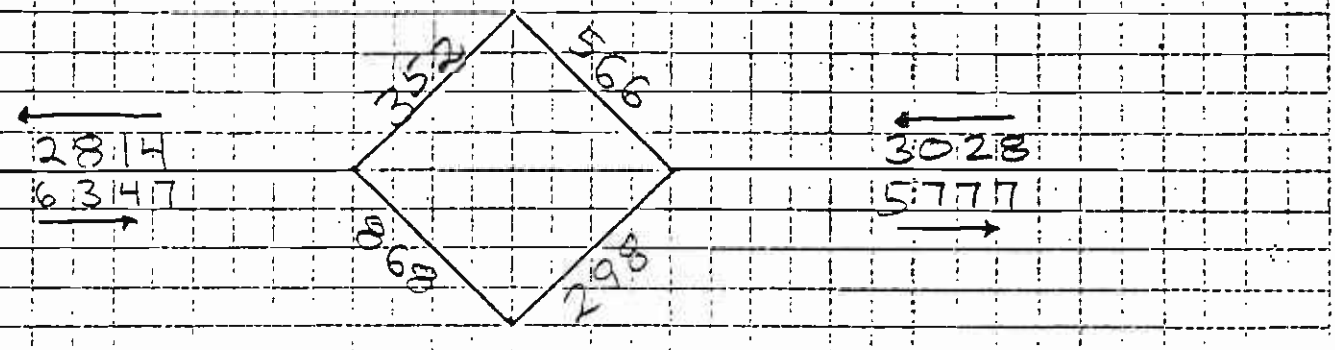
STATION: WILSHIRE/CRENSHAW

PATRONAGE DATA: YEAR 2020

AM PEAK 15 MIN



PM PEAK 15 MIN



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STATION: WILSHIRE/CRENSHAW

OCCUPANT LOAD - F/LS CRITERIA

HEADWAY ASSUMED 2 MIN

YEAR 2020

AM PEAK

A. PEAK ENTRAINING - 4 MISSED HEADWAY ACCUM.
(466 + 904) × 8/15 = 731

B. LINK LOAD CONTRIBUTIONS:
1. LINK OUTBOUND
2246 × 1/7 = 321
2. LINK INBOUND
5448 × 1/7 = 779
USE 1200

C. TOTAL STATION LOAD
731 + 1200 = 1931

PM PEAK

A. PEAK ENTRAINING - 4 MISSED HEADWAY ACCUM.
(298 + 352) × 8/15 = 347

B. LINK LOAD CONTRIBUTIONS:
1. LINK OUTBOUND
6347 × 1/7 = 907
2. LINK INBOUND
3028 × 1/7 = 433

C. TOTAL STATION LOAD
347 + 907 + 433 = 1687

EMERGENCY EXIT CAPACITY

CALCULATION

STATION WILSHIRE/CRENSHAW

OCCUPANCY LOAD YR 2000 2059 PERSONS

EXIT LANES AND CAPACITY PROVIDED

PLATFORM TO CONCOURSE

STAIRS	2	X	3	LANES	X	35	PPM =	210 PPM
ESCALATORS	2	X	2	LANES	X	35	PPM =	140 PPM
EMG. STAIRS	2	X	4	LANES	X	35	PPM =	280 PPM

TOTAL 630 PPM

THRU FARE BARRIER

FARE GATES	10	X	1	LANES	X	50	PPM =	500 PPM
SERVICE GATES	2	X	2	LANES	X	50	PPM =	200 PPM
EMG. GATES		X		LANES	X		PPM =	PPM

TOTAL 700 PPM

FARE BARRIER TO SAFE AREA

STAIRS	2	X	3	LANES	X	35	PPM =	210 PPM
ESCALATORS	2	X	2	LANES	X	35	PPM =	140 PPM
EMG. STAIRS	1	X	2	LANES	X	35	PPM =	70 PPM

TOTAL 420 PPM

STATION WIL/CRENSHAW
YEAR 2000

3½ MIN HEADWAY
2 STAIRS
2 ESCALATORS

TEST 1.

EVACUATE STATION OCCUPANT LOAD FROM STATION PLATFORM(S) IN FOUR MINUTES OR LESS.

WAITING TIME AT PLATFORM EXITS

W 1 = OCCUPANCY LOAD/EXIT CAPACITY
= 2059 PERSONS - 630 PPM = 3.27 MINUTES

TEST #2

EVACUATE STATION OCCUPANT LOAD FROM THE MOST REMOTE POINT ON THE PLATFORM TO A POINT OF SAFETY IN SIX MINUTES OR LESS.

WALKING TIME FOR LONGEST EXIT ROUTE

PLATFORM =T 1 = 125 FEET ÷ 200 FPM = .63 MINUTES
PLATFORM TO CONCOURSE =T 2 = 15 FEET ÷ 50 FPM = .30 MINUTES
CONCOURSE TO FARE BARRIER =T 3 = 54 FEET ÷ 200 FPM = .27 MINUTES
FARE BARRIER TO SAFE AREA =T 4 = 108 FEET ÷ 200 FPM = .54 MINUTES
TO GRADE = 40 FEET ÷ 50 FPM = .80 MINUTES

TOTAL = T = = 2.54 MIN.

ADDITIONAL WAITING TIME AT PLATFORM EXITS

W 1 = 3.27 MINUTES T 1 = 0.63 MINUTES

W 1 - T 1 = 3.27 - 0.63 = 2.64 MIN.

ADDITIONAL WAITING TIME AT FARE BARRIER

OCCUPANT LOAD AT CONCOURSE
= OCCUPANT LOAD - EMERGENCY STAIR 3.27 MIN. CAPACITY
= 2059 PERSONS - (280 PPM X 3.27 MINUTES) = 1144 PERSONS
W 2 = CONCOURSE OCCUPANT LOAD/GATE CAPACITY
= 1144 PERSONS ÷ 760 PPM = 1.64 MINUTES

W 2 - W 1 = 1.64 - 3.27 = 0 MINUTES

ADDITIONAL WAITING TIME AT CONCOURSE EXITS

W 3 = CONCOURSE OCCUPANT LOAD/EXIT CAPACITY

= 1144 PERSONS ÷ 420 PPM = 2.73 MINUTES

(W 3 - W x) = 2.73 - 3.27 = 0 MINUTES

TOTAL EXIT TIME

= T + (W 1 - T 1) + (W 2 - W 1) + (W 3 - W x)
= 2.54 + 2.64 + 0 + 0 = 5.18 Minutes

STATION WIL/CRENSHAW
YEAR 1.6 CONTINGENCY

2 MIN HEADWAY
2 STAIRS
2 ESCALATORS

TEST 1.

EVACUATE STATION OCCUPANT LOAD FROM STATION PLATFORM(S) IN FOUR MINUTES OR LESS.

WAITING TIME AT PLATFORM EXITS

W = OCCUPANCY LOAD/EXIT CAPACITY
= 1931 PERSONS - 630 PPM= 3.07 MINUTES

TEST #2

EVACUATE STATION OCCUPANT LOAD FROM THE MOST REMOTE POINT ON THE PLATFORM TO A POINT OF SAFETY IN SIX MINUTES OR LESS.

WALKING TIME FOR LONGEST EXIT ROUTE

PLATFORM =T 1 = 125 FEET ÷ 200 FPM = .63 MINUTES
PLATFORM TO CONCOURSE =T 2 = 15 FEET ÷ 50 FPM = .30 MINUTES
CONCOURSE TO FARE BARRIER =T 3 = 54 FEET ÷ 200 FPM = .27 MINUTES
FARE BARRIER TO SAFE AREA =T 4 = 108 FEET ÷ 200 FPM = .54 MINUTES
TO GRADE = 40 FEET ÷ 50 FPM = .80 MINUTES

TOTAL = T = = 2.54 MIN.

ADDITIONAL WAITING TIME AT PLATFORM EXITS

W 1 = 3.07 MINUTES T 1 = 0.63 MINUTES

W 1 - T 1 = 3.07 - 0.63 = 2.44 MIN.

ADDITIONAL WAITING TIME AT FARE BARRIER

OCCUPANT LOAD AT CONCOURSE
= OCCUPANT LOAD - EMERGENCY STAIR 3.07 MIN. CAPACITY
= 1931 PERSONS - (280 PPM X 3.07 MINUTES) = 1072 PERSONS
W 2 = CONCOURSE OCCUPANT LOAD/GATE CAPACITY
= 1072 PERSONS ÷ 700 PPM = 1.54 MINUTES

W 2 - W 1 = 1.54 - 3.07 = 0 MINUTES

ADDITIONAL WAITING TIME AT CONCOURSE EXITS

W 3 = CONCOURSE OCCUPANT LOAD/EXIT CAPACITY

= 1072 PERSONS ÷ 420 PPM = 2.56 MINUTES

(W 3 - W x) = 2.56 - 3.07 = 0 MINUTES

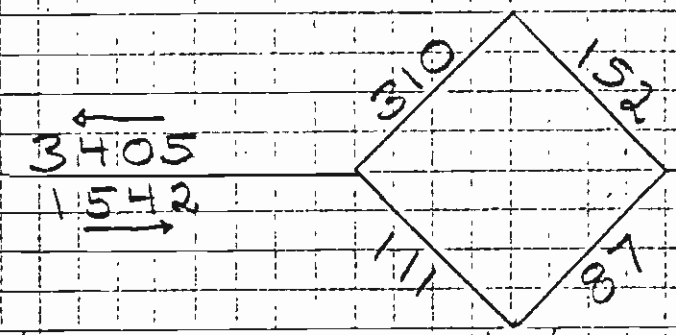
TOTAL EXIT TIME

= T + (W 1 - T 1) + (W 2 -W 1) + (W 3-W x)
= 2.54 + 2.44 + 0 + 0 = 4.98 Minutes

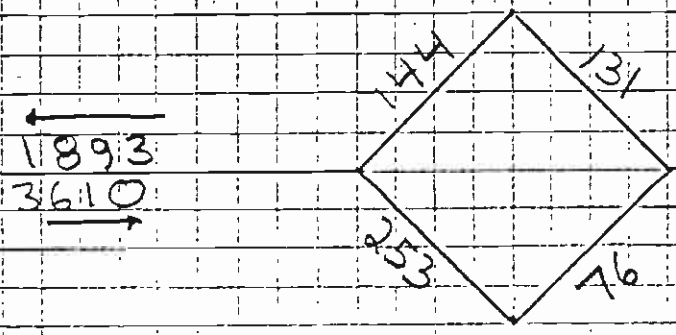
STATION: WILSHIRE / LA BREA

PATRONAGE DATA: YEAR 2000

AM PEAK 15 MIN



PM PEAK 15 MIN



STATION: WILSHIRE / LA BREA

OCCUPANT LOAD - F/LS CRITERIA

HEADWAY ASSUMED 3½ MIN

YEAR 2000

AM PEAK

A. PEAK ENTRAINING - 4 MISSED HEADWAY ACCUM.
87 + 310 = 397

B. LINK LOAD CONTRIBUTIONS:
1. LINK OUTBOUND
1542 x 1/4 = 386

2. LINK INBOUND
3247 x 1/4 = 812

USE 1200

C. TOTAL STATION LOAD
397 + 1200 = 1597

PM PEAK

A. PEAK ENTRAINING - 4 MISSED HEADWAY ACCUM.
76 + 144 = 220

B. LINK LOAD CONTRIBUTIONS:
1. LINK OUTBOUND
3610 x 1/4 = 903

2. LINK INBOUND
1880 x 1/4 = 470

C. TOTAL STATION LOAD
220 + 903 + 470 = 1593

Project _____ Date _____

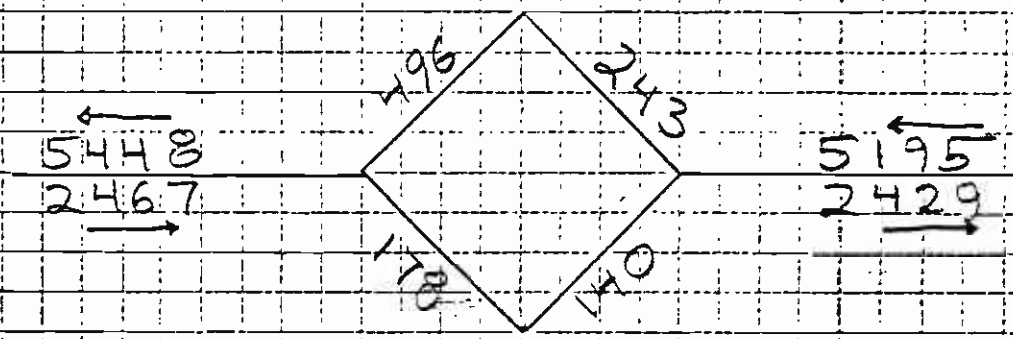
Subject _____ By _____

_____ Ch'k. by _____

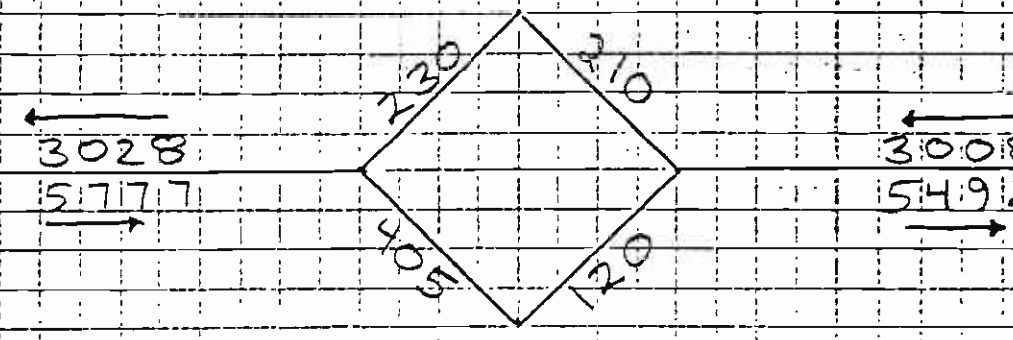
STATION: WILSHIRE / LA BREA

PATRONAGE DATA: YEAR 2020

AM PEAK 15 MIN



PM PEAK 15 MIN



STATION: WILSHIRE / LA BREA

OCCUPANT LOAD - F/LS CRITERIA

HEADWAY ASSUMED 2 MIN

YEAR 2020

AM PEAK

A. PEAK ENTRAINING - 4 MISSED HEADWAY ACCUM.
(140 + 496) × 8/15 = 340

B. LINK LOAD CONTRIBUTIONS:
1. LINK OUTBOUND
2467 × 1/7 = 353

2. LINK INBOUND
5195 × 1/7 = 742

USE 1200

C. TOTAL STATION LOAD
340 + 1200 = 1540

PM PEAK

A. PEAK ENTRAINING - 4 MISSED HEADWAY ACCUM.
(120 + 230) × 8/15 = 187

B. LINK LOAD CONTRIBUTIONS:
1. LINK OUTBOUND
5777 × 1/7 = 826

2. LINK INBOUND
3008 × 1/7 = 430

C. TOTAL STATION LOAD
187 + 826 + 430 = 1443

EMERGENCY EXIT CAPACITY

CALCULATION

STATION WILSHIRE/LA BREA

OCCUPANCY LOAD YR 2000: 1597 PERSONS

EXIT LANES AND CAPACITY PROVIDED

PLATFORM TO CONCOURSE

STAIRS	3	X	3	LANES	X	35	PPM =	315 PPM
ESCALATORS	1	X	2	LANES	X	35	PPM =	70 PPM
EMG. STAIRS	2	X	4	LANES	X	35	PPM =	280 PPM

TOTAL 665 PPM

THRU FARE BARRIER

FARE GATES	10	X	1	LANES	X	50	PPM =	500 PPM
SERVICE GATES	2	X	2	LANES	X	50	PPM =	200 PPM
EMG. GATES		X		LANES	X		PPM =	PPM

TOTAL 700 PPM

FARE BARRIER TO SAFE AREA

STAIRS	2	X	3	LANES	X	35	PPM =	210 PPM
ESCALATORS	2	X	2	LANES	X	35	PPM =	140 PPM
EMG. STAIRS	1	X	2	LANES	X	35	PPM =	70 PPM

TOTAL 420 PPM

3½ MIN HEADWAY
3 STAIRS
1 ESCALATOR

STATION WIL/LA BREA
YEAR 2000

TEST 1.

EVACUATE STATION OCCUPANT LOAD FROM STATION PLATFORM(S) IN FOUR MINUTES OR LESS.

WAITING TIME AT PLATFORM EXITS

W = OCCUPANCY LOAD/EXIT CAPACITY
= 1597 PERSONS - 665 PPM= 2.41 MINUTES

TEST #2

EVACUATE STATION OCCUPANT LOAD FROM THE MOST REMOTE POINT ON THE PLATFORM TO A POINT OF SAFETY IN SIX MINUTES OR LESS.

WALKING TIME FOR LONGEST EXIT ROUTE

PLATFORM =T 1 = 125 FEET ÷ 200 FPM = .63 MINUTES
PLATFORM TO CONCOURSE =T 2 = 15 FEET ÷ 50 FPM = .30 MINUTES
CONCOURSE TO FARE BARRIER =T 3 = 54 FEET ÷ 200 FPM = .27 MINUTES
FARE BARRIER TO SAFE AREA =T 4 = 88 FEET ÷ 200 FPM = .44 MINUTES
TO GRADE = 27 FEET ÷ 50 FPM = .54 MINUTES

TOTAL = T = = 2.18 MIN.

ADDITIONAL WAITING TIME AT PLATFORM EXITS

W 1 = 2.41 MINUTES T 1 = 0.63 MINUTES

W 1 - T 1 = 2.41 - 0.63 = 1.78 MIN.

ADDITIONAL WAITING TIME AT FAKE BARRIER

OCCUPANT LOAD AT CONCOURSE
= OCCUPANT LOAD - EMERGENCY STAIR 2.41 MIN. CAPACITY
= 1597 PERSONS - (280 PPM X 2.41 MINUTES) = 923 PERSONS
W 2 = CONCOURSE OCCUPANT LOAD/GATE CAPACITY
= 923 PERSONS ÷ 700 PPM = 1.32 MINUTES

W 2 - W 1 = 1.32 - 2.41 = 0 MINUTES

ADDITIONAL WAITING TIME AT CONCOURSE EXITS

W 3 = CONCOURSE OCCUPANT LOAD/EXIT CAPACITY

= 923 PERSONS ÷ 420 PPM = 2.20 MINUTES

(W 3 - W x) = 2.20 - 2.41 = 0 MINUTES

TOTAL EXIT TIME

= T + (W 1 - T 1) + (W 2 -W 1) + (W 3-W x)
= 2.18 + 1.78 + 0 + 0 = 3.96 Minutes

2 MIN HEADWAY
3 STAIRS
1 ESCALATOR

STATION WIL/LA BREA
YEAR 1.6 CONTINGENCY

TEST 1.

EVACUATE STATION OCCUPANT LOAD FROM STATION PLATFORM(S) IN FOUR MINUTES OR LESS.

WAITING TIME AT PLATFORM EXITS

W = OCCUPANCY LOAD/EXIT CAPACITY
= 1540 PERSONS - 665 PPM = 2.32 MINUTES

TEST #2

EVACUATE STATION OCCUPANT LOAD FROM THE MOST REMOTE POINT ON THE PLATFORM TO A POINT OF SAFETY IN SIX MINUTES OR LESS.

WALKING TIME FOR LONGEST EXIT ROUTE

PLATFORM =T 1 = 125 FEET ÷ 200 FPM = .63 MINUTES
PLATFORM TO CONCOURSE =T 2 = 15 FEET ÷ 50 FPM = .30 MINUTES
CONCOURSE TO FARE BARRIER =T 3 = 54 FEET ÷ 200 FPM = .27 MINUTES
FARE BARRIER TO SAFE AREA =T 4 = 88 FEET ÷ 200 FPM = .44 MINUTES
TO GRADE = 27 FEET ÷ 50 FPM = .54 MINUTES

TOTAL = T = = 2.18 MIN.

ADDITIONAL WAITING TIME AT PLATFORM EXITS

W 1 = 2.32 MINUTES T 1 = 0.63 MINUTES

W 1 - T 1 = 2.32 - 0.63 = 1.69 MIN.

ADDITIONAL WAITING TIME AT FAKE BARRIER

OCCUPANT LOAD AT CONCOURSE
= OCCUPANT LOAD - EMERGENCY STAIR 2.32 MIN. CAPACITY
= 1540 PERSONS - (280 PPM X 2.32 MINUTES) = 891 PERSONS
W 2 = CONCOURSE OCCUPANT LOAD/GATE CAPACITY
= 891 PERSONS ÷ 700 PPM = 1.28 MINUTES

W 2 - W 1 = 1.28 - 2.32 = 0 MINUTES

ADDITIONAL WAITING TIME AT CONCOURSE EXITS

W 3 = CONCOURSE OCCUPANT LOAD/EXIT CAPACITY

= 891 PERSONS ÷ 420 PPM = 2.13 MINUTES

(W 3 - W x) = 2.13 - 2.32 = 0 MINUTES

TOTAL EXIT TIME

= T + (W 1 - T 1) + (W 2 - W 1) + (W 3 - W x)
= 2.18 + 1.69 + 0 + 0 = 3.87 Minutes

Job No. _____ Sheet _____ of _____

Project _____ Date _____

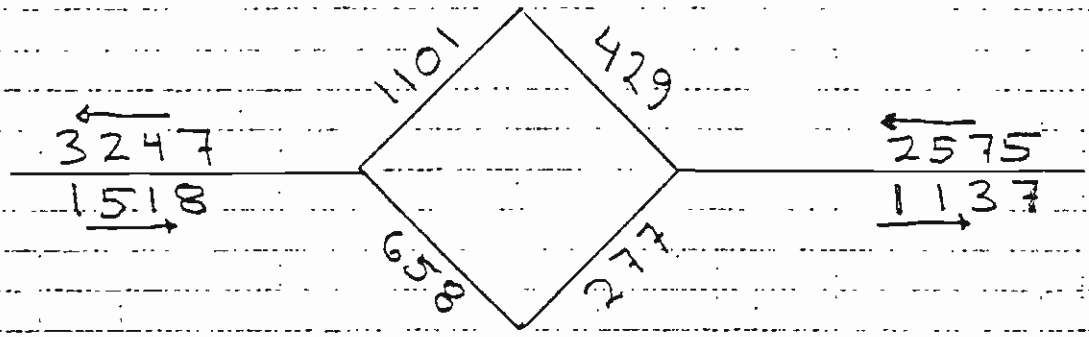
Subject _____ By _____

_____ Ch'k. by _____

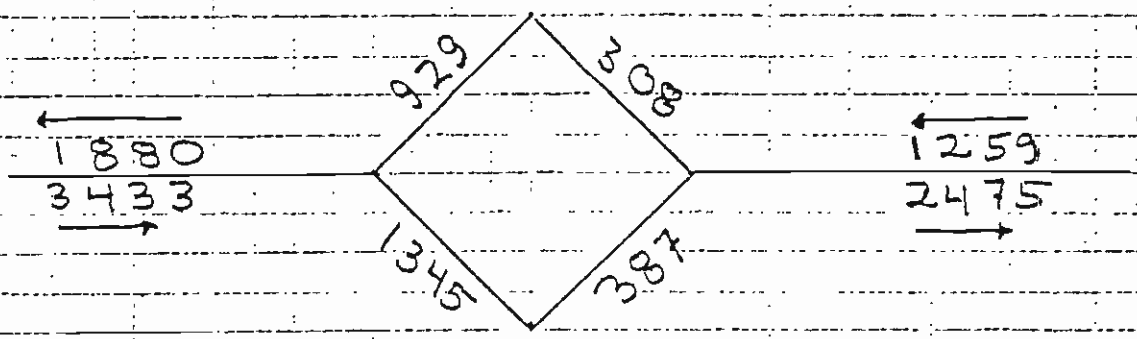
STATION: WILSHIRE/FAIRFAX

PATRONAGE DATA: YEAR 2000

AM PEAK 15 MIN



PM PEAK 15 MIN



TAMS

14/15

Job No. _____ Sheet _____ of _____

Project _____ Date _____

Subject _____ By _____

EMERGENCY EXITING ANALYSIS Ch'k. by _____

STATION: WILSHIRE/FAIRFAX

OCCUPANT LOAD - F/LS CRITERIA

HEADWAY ASSUMED 3½ MIN

YEAR 2000

AM PEAK

A. PEAK ENTRAINING - 4 MISSED HEADWAY ACCUM.
1378

B. LINK LOAD CONTRIBUTIONS:
1. LINK OUTBOUND
1518 × 1/4 = 380
2. LINK INBOUND
2575 × 1/4 = 644
USE 1200

C. TOTAL STATION LOAD
1378 + 1200 = 2578

PM PEAK

A. PEAK ENTRAINING - 4 MISSED HEADWAY ACCUM.
1316

B. LINK LOAD CONTRIBUTIONS:
1. LINK OUTBOUND
3433 × 1/4 = 859
2. LINK INBOUND
1259 × 1/4 = 315
USE 1200

C. TOTAL STATION LOAD
1316 + 1200 = 2516

Job No. _____ Sheet _____ of _____

Project _____ Date _____

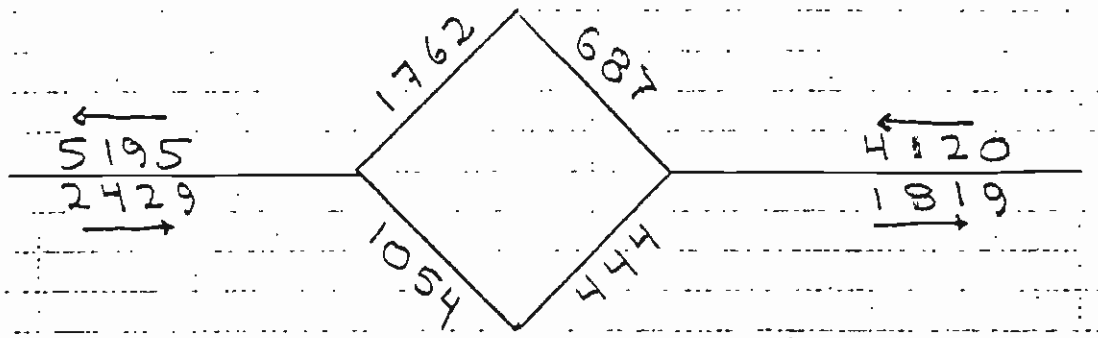
Subject _____ By _____

_____ Chk. by _____

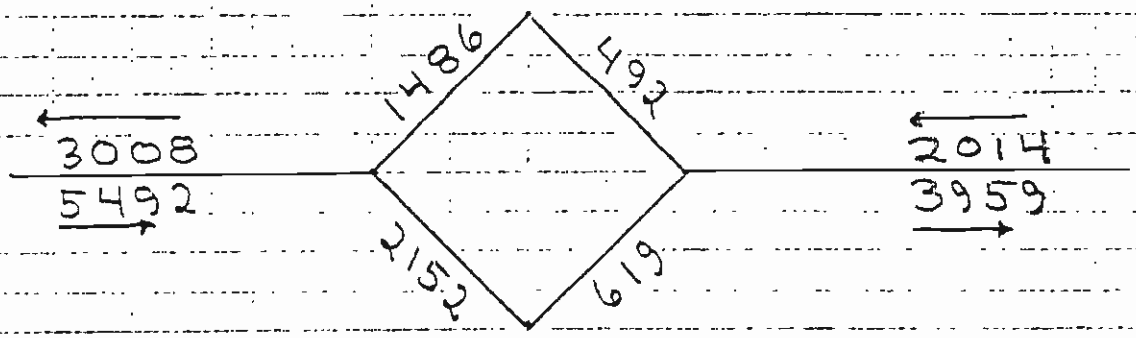
STATION: WILSHIRE/FAIRFAX

PATRONAGE DATA: YEAR 2020

AM PEAK 15 MIN



PM PEAK 15 MIN



TAMS

Job No. _____ Sheet _____ of _____

Project _____ Date _____

Subject _____ By _____

EMERGENCY EXITING ANALYSIS Ch'k. by _____

STATION: WILSHIRE / FAIRFAX

OCCUPANT LOAD - F/LS CRITERIA

HEADWAY ASSUMED 2 MIN

YEAR 2020

AM PEAK

A. PEAK ENTRAINING - 4 MISSED HEADWAY ACCUM.
2206 × 8/15 = 1177

B. LINK LOAD CONTRIBUTIONS:
1. LINK OUTBOUND
2429 × 1/7 = 347,
USE 1200
2. LINK INBOUND
4120 × 1/7 = 589 /

C. TOTAL STATION LOAD
1177 + 1200 = 2377

PM PEAK

A. PEAK ENTRAINING - 4 MISSED HEADWAY ACCUM.
2105 × 8/15 = 1123

B. LINK LOAD CONTRIBUTIONS:
1. LINK OUTBOUND
5492 × 1/7 = 785,
USE 1200
2. LINK INBOUND
2014 × 1/7 = 288 /

C. TOTAL STATION LOAD
1123 + 1200 = 2323

EMERGENCY EXIT CAPACITY

CALCULATION

STATION WILSHIRE/FAIRFAX

OCCUPANCY LOAD YR 2000: 2578 PERSONS

EXIT LANES AND CAPACITY PROVIDED

PLATFORM TO CONCOURSE

STAIRS	3	X	3	LANES	X	35	PPM =	315	PPM
ESCALATORS	3	X	2	LANES	X	35	PPM =	210	PPM
EMG. STAIRS	2	X	4	LANES	X	35	PPM =	280	PPM
TOTAL								805	PPM

THRU FARE BARRIER

FARE GATES	20	X	1	LANES	X	50	PPM =	1000	PPM
SERVICE GATES	4	X	2	LANES	X	50	PPM =	400	PPM
EMG. GATES		X		LANES	X		PPM =		PPM
TOTAL								1400	PPM

FARE BARRIER TO SAFE AREA

STAIRS	3	X	3	LANES	X	35	PPM =	315	PPM
ESCALATORS	3	X	2	LANES	X	35	PPM =	210	PPM
EMG. STAIRS	2	X	2	LANES	X	35	PPM =	140	PPM
TOTAL								665	PPM

3½ MIN HEADWAY
3 STAIRS
2 ESCALATORS

STATION WIL/FAIRFAX
YEAR 2000

TEST 1.

EVACUATE STATION OCCUPANT LOAD FROM STATION PLATFORM(S) IN FOUR MINUTES OR LESS.

WAITING TIME AT PLATFORM EXITS

W = OCCUPANCY LOAD/EXIT CAPACITY
= 2578 PERSONS - 805 PPM = 3.21 MINUTES

TEST #2

EVACUATE STATION OCCUPANT LOAD FROM THE MOST REMOTE POINT ON THE PLATFORM TO A POINT OF SAFETY IN SIX MINUTES OR LESS.

WALKING TIME FOR LONGEST EXIT ROUTE

PLATFORM =T 1 = 125 FEET ÷ 200 FPM = .63 MINUTES
PLATFORM TO CONCOURSE =T 2 = 15 FEET ÷ 50 FPM = .30 MINUTES
CONCOURSE TO FARE BARRIER =T 3 = 75 FEET ÷ 200 FPM = .38 MINUTES
FARE BARRIER TO SAFE AREA =T 4 = 171 FEET ÷ 200 FPM = .86 MINUTES
TO GRADE = 37 FEET ÷ 50 FPM = .74 MINUTES

TOTAL = T = = 2.91 MIN.

ADDITIONAL WAITING TIME AT PLATFORM EXITS

W 1 = 3.21 MINUTES T 1 = 0.63 MINUTES

W 1 - T 1 = 3.21 - 0.63 = 2.58 MIN.

ADDITIONAL WAITING TIME AT FARE BARRIER

OCCUPANT LOAD AT CONCOURSE
= OCCUPANT LOAD - EMERGENCY STAIR 3.21 MIN. CAPACITY
= 2578 PERSONS - (280 PPM X 3.21 MINUTES) = 1680 PERSONS
W 2 = CONCOURSE OCCUPANT LOAD/GATE CAPACITY
= 1680 PERSONS ÷ 1400 PPM = 1.20 MINUTES

W 2 - W 1 = 1.20 - 3.21 = 0 MINUTES

ADDITIONAL WAITING TIME AT CONCOURSE EXITS

W 3 = CONCOURSE OCCUPANT LOAD/EXIT CAPACITY

= 1680 PERSONS ÷ 665 PPM = 2.53 MINUTES

(W 3 - W x) = 2.53 - 3.21 = 0 MINUTES

TOTAL EXIT TIME

= T + (W 1 - T 1) + (W 2 - W 1) + (W 3 - W x)
= 2.91 + 2.58 + 0 + 0 = 5.49 Minutes

2 MIN HEADWAY
3 STAIRS
3 ESCALATORS

STATION WIL/FAIRFAX
YEAR 1.6 CONTINGENCY

TEST 1.

EVACUATE STATION OCCUPANT LOAD FROM STATION PLATFORM(S) IN FOUR MINUTES OR LESS.

WAITING TIME AT PLATFORM EXITS

W 1 = OCCUPANCY LOAD/EXIT CAPACITY
= 2377 PERSONS - 805 PPM = 2.96 MINUTES

TEST #2

EVACUATE STATION OCCUPANT LOAD FROM THE MOST REMOTE POINT ON THE PLATFORM TO A POINT OF SAFETY IN SIX MINUTES OR LESS.

WALKING TIME FOR LONGEST EXIT ROUTE

PLATFORM =T 1 = 125 FEET ÷ 200 FPM = .63 MINUTES
PLATFORM TO CONCOURSE =T 2 = 15 FEET ÷ 50 FPM = .30 MINUTES
CONCOURSE TO FARE BARRIER =T 3 = 75 FEET ÷ 200 FPM = .38 MINUTES
FARE BARRIER TO SAFE AREA =T 4 = 171 FEET ÷ 200 FPM = .86 MINUTES
TO GRADE = 37 FEET ÷ 50 FPM = .74 MINUTES

TOTAL = T = = 2.91 MIN.

ADDITIONAL WAITING TIME AT PLATFORM EXITS

W 1 = 2.96 MINUTES T 1 = 0.63 MINUTES

W 1 - T 1 = 2.96 - 0.63 = 2.33 MIN.

ADDITIONAL WAITING TIME AT FARE BARRIER

OCCUPANT LOAD AT CONCOURSE
= OCCUPANT LOAD - EMERGENCY STAIR 2.96 MIN. CAPACITY
= 2377 PERSONS - (280 PPM X 2.96 MINUTES) = 1549 PERSONS
W 2 = CONCOURSE OCCUPANT LOAD/GATE CAPACITY
= 1549 PERSONS ÷ 1400 PPM = 1.11 MINUTES

W 2 - W 1 = 1.11 - 2.96 = 0 MINUTES

ADDITIONAL WAITING TIME AT CONCOURSE EXITS

W 3 = CONCOURSE OCCUPANT LOAD/EXIT CAPACITY

= 1549 PERSONS ÷ 665 PPM = 2.33 MINUTES

(W 3 - W x) = 2.33 - 2.96 = 0 MINUTES

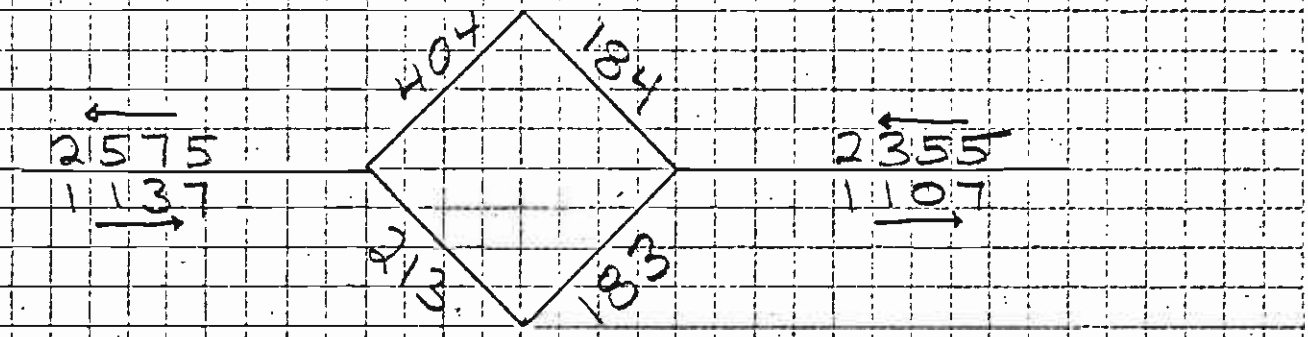
TOTAL EXIT TIME

= T + (W 1 - T 1) + (W 2 - W 1) + (W 3 - W x)
= 2.91 + 2.33 + 0 + 0 = 5.24 Minutes

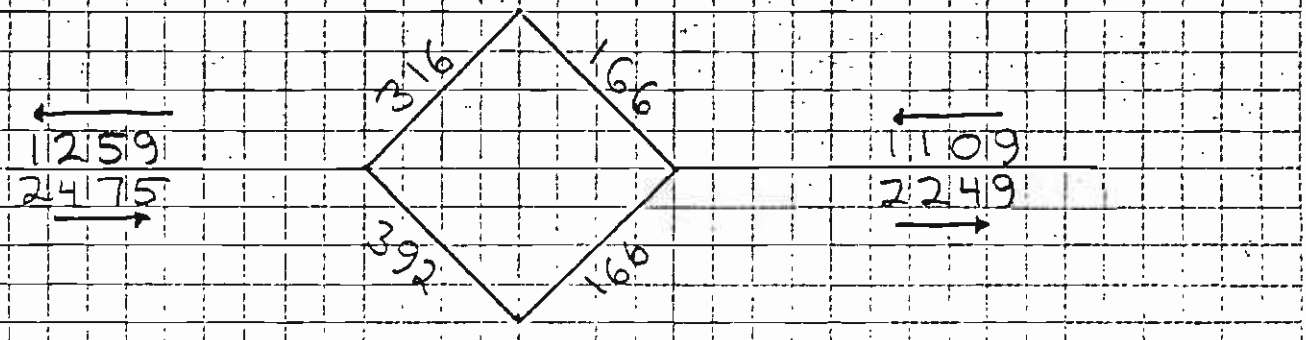
STATION: FAIRFAX / BEVERLY

PATRONAGE DATA: YEAR 2000

AM PEAK 15 MIN



P.M PEAK 15 MIN



STATION: FAIRFAX / BEVERLY

OCCUPANT LOAD - F/LS CRITERIA

HEADWAY ASSUMED 3½ MIN

YEAR 2000

AM PEAK

A. PEAK ENTRAINING - 4 MISSED HEADWAY ACCUM.
183 + 404 = 587

B. LINK LOAD CONTRIBUTIONS:
1. LINK OUTBOUND
1137 × ¼ = 285
2. LINK INBOUND
2355 × ¼ = 589
USE 1200

C. TOTAL STATION LOAD
587 + 1200 = 1787

PM PEAK

A. PEAK ENTRAINING - 4 MISSED HEADWAY ACCUM.
166 + 316 = 482

B. LINK LOAD CONTRIBUTIONS:
1. LINK OUTBOUND
2475 × ¼ = 619
2. LINK INBOUND
1109 × ¼ = 278
USE 1200

C. TOTAL STATION LOAD
482 + 1200 = 1682

Project _____ Date _____

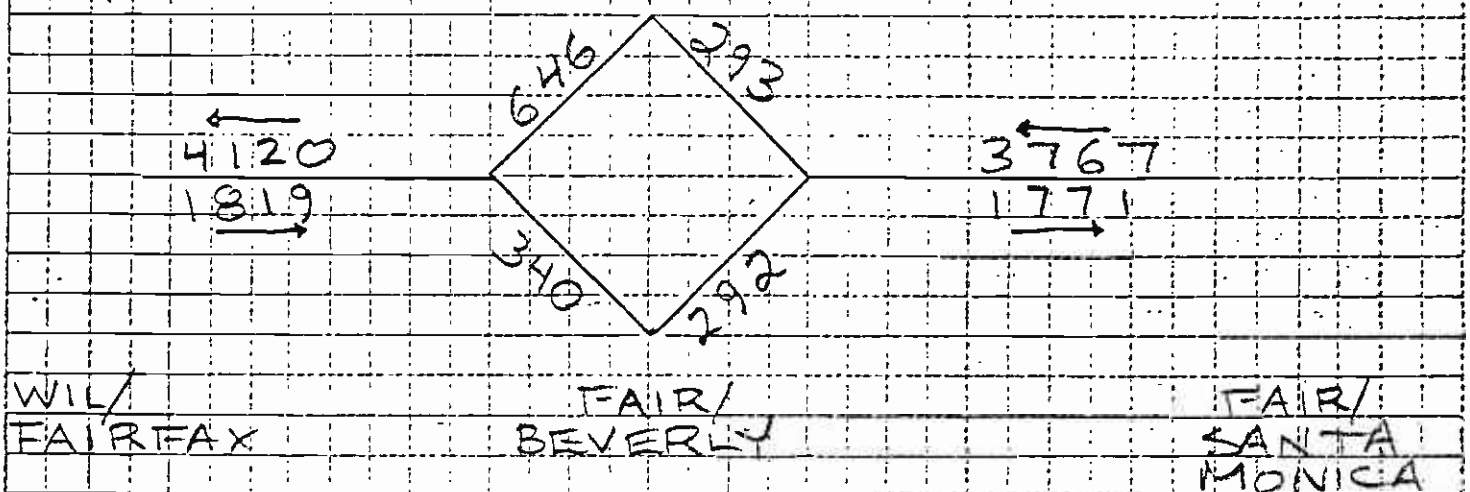
Subject _____ By _____

_____ Ch'k. by _____

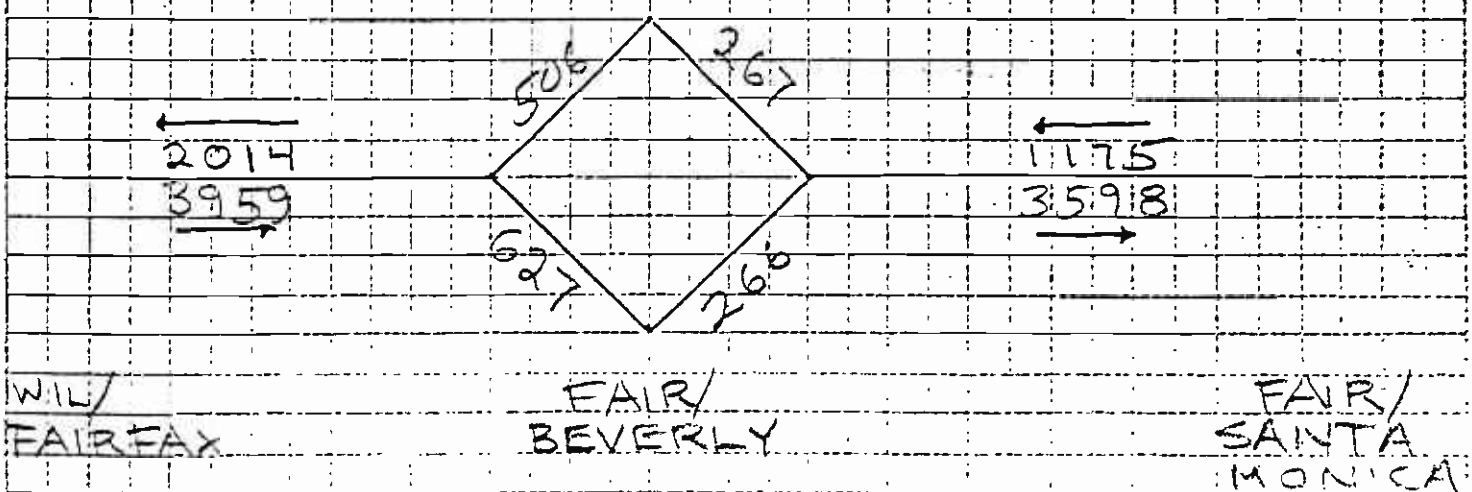
STATION: FAIRFAX / BEVERLY

PATRONAGE DATA: YEAR 2020

AM PEAK 15 MIN



PM PEAK 15 MIN



STATION: FAIRFAX / BEVERLY

OCCUPANT LOAD - F/LS CRITERIA

HEADWAY ASSUMED 2 MIN

YEAR 2020

AM PEAK

A. PEAK ENTRAINING - 4 MISSED HEADWAY ACCUM.
(292 + 646) × 8/15 = 501

B. LINK LOAD CONTRIBUTIONS:
1. LINK OUTBOUND
1819 × 1/7 = 260
2. LINK INBOUND
3767 × 1/7 = 539
USE 1200

C. TOTAL STATION LOAD
501 + 1200 = 1701

PM PEAK

A. PEAK ENTRAINING - 4 MISSED HEADWAY ACCUM.
(266 + 506) × 8/15 = 412

B. LINK LOAD CONTRIBUTIONS:
1. LINK OUTBOUND
3959 × 1/7 = 566
2. LINK INBOUND
1175 × 1/7 = 168
USE 1200

C. TOTAL STATION LOAD
412 + 1200 = 1612

EMERGENCY EXIT CAPACITY

CALCULATION

STATION FAIRFAX/BEVERLY

OCCUPANCY LOAD YR 2000: 1787 PERSONS

EXIT LANES AND CAPACITY PROVIDED

PLATFORM TO CONCOURSE

STAIRS	3	X	3	LANES	X	35	PPM =	315 PPM
ESCALATORS	1	X	2	LANES	X	35	PPM =	70 PPM
EMG. STAIRS	2	X	4	LANES	X	35	PPM =	280 PPM

TOTAL 665 PPM

THRU FARE BARRIER

FARE GATES	10	X	1	LANES	X	50	PPM =	500 PPM
SERVICE GATES	2	X	2	LANES	X	50	PPM =	200 PPM
EMG. GATES		X		LANES	X		PPM =	PPM

TOTAL 700 PPM

FARE BARRIER TO SAFE AREA

STAIRS	2	X	3	LANES	X	35	PPM =	210 PPM
ESCALATORS	2	X	2	LANES	X	35	PPM =	140 PPM
EMG. STAIRS	1	X	2	LANES	X	35	PPM =	70 PPM

TOTAL 420 PPM

MTA LIBRAR

3½ MIN HEADWAY
3 STAIRS
1 ESCALATOR

STATION FAIR/BEVERLY
YEAR 2000

TEST 1.

EVACUATE STATION OCCUPANT LOAD FROM STATION PLATFORM(S) IN FOUR MINUTES OR LESS.

WAITING TIME AT PLATFORM EXITS

W 1 = OCCUPANCY LOAD/EXIT CAPACITY
= 1787 PERSONS - 665 PPM = 2.69 MINUTES

TEST #2

EVACUATE STATION OCCUPANT LOAD FROM THE MOST REMOTE POINT ON THE PLATFORM TO A POINT OF SAFETY IN SIX MINUTES OR LESS.

WALKING TIME FOR LONGEST EXIT ROUTE

PLATFORM =T 1 = 125 FEET ÷ 200 FPM = .63 MINUTES
PLATFORM TO CONCOURSE =T 2 = 15 FEET ÷ 50 FPM = .30 MINUTES
CONCOURSE TO FARE BARRIER =T 3 = 54 FEET ÷ 200 FPM = .27 MINUTES
FARE BARRIER TO SAFE AREA =T 4 = 74 FEET ÷ 200 FPM = .37 MINUTES
TO GRADE = 27 FEET ÷ 50 FPM = .54 MINUTES

TOTAL = T = = 2.11 MIN.

ADDITIONAL WAITING TIME AT PLATFORM EXITS

W 1 = 2.69 MINUTES T 1 = 0.63 MINUTES

W 1 - T 1 = 2.69 - 0.63 = 2.06 MIN

ADDITIONAL WAITING TIME AT FARE BARRIER

OCCUPANT LOAD AT CONCOURSE
= OCCUPANT LOAD - EMERGENCY STAIR 2.69 MIN. CAPACITY
= 1787 PERSONS - (280 PPM X 2.69 MINUTES) = 1034 PERSONS
W 2 = CONCOURSE OCCUPANT LOAD/GATE CAPACITY
= 1034 PERSONS ÷ 700 PPM = 1.48 MINUTES

W 2 - W 1 = 1.48 - 2.69 = 0 MINUTES

ADDITIONAL WAITING TIME AT CONCOURSE EXITS

W 3 = CONCOURSE OCCUPANT LOAD/EXIT CAPACITY

= 1034 PERSONS ÷ 420 PPM = 2.47 MINUTES

(W 3 - W x) = 2.47 - 2.69 = 0 MINUTES

TOTAL EXIT TIME

= T + (W 1 - T 1) + (W 2 -W 1) + (W 3-W x)
= 2.11 + 2.06 + 0 + 0 = 4.17 Minutes

2 MIN HEADWAY
2 STAIRS
1 ESCALATOR

STATION FAIR/BEVERLY
YEAR 1.6 CONTINGENCY

TEST 1.

EVACUATE STATION OCCUPANT LOAD FROM STATION PLATFORM(S) IN FOUR MINUTES OR LESS.

WAITING TIME AT PLATFORM EXITS

W 1 = OCCUPANCY LOAD/EXIT CAPACITY
= 1701 PERSONS - 665 PPM = 2.56 MINUTES

TEST #2

EVACUATE STATION OCCUPANT LOAD FROM THE MOST REMOTE POINT ON THE PLATFORM TO A POINT OF SAFETY IN SIX MINUTES OR LESS.

WALKING TIME FOR LONGEST EXIT ROUTE

PLATFORM	=T 1 =	125	FEET ÷	200	FPM =	.63 MINUTES
PLATFORM TO CONCOURSE	=T 2 =	15	FEET ÷	50	FPM =	.30 MINUTES
CONCOURSE TO FARE BARRIER	=T 3 =	54	FEET ÷	200	FPM =	.27 MINUTES
FARE BARRIER TO SAFE AREA	=T 4 =	74	FEET ÷	200	FPM =	.37 MINUTES
TO GRADE	=	27	FEET ÷	50	FPM =	.54 MINUTES

TOTAL = T = = 2.11 MINUTES

ADDITIONAL WAITING TIME AT PLATFORM EXITS

W 1 = 2.56 MINUTES T 1 = 0.63 MINUTES

W 1 - T 1 = 2.56 - 0.63 = 1.93 MIN.

ADDITIONAL WAITING TIME AT FARE BARRIER

OCCUPANT LOAD AT CONCOURSE
= OCCUPANT LOAD - EMERGENCY STAIR 2.56 MIN. CAPACITY
= 1701 PERSONS - (280 PPM X 2.56 MINUTES) = 985 PERSONS
W 2 = CONCOURSE OCCUPANT LOAD/GATE CAPACITY
= 985 PERSONS ÷ 700 PPM = 1.41 MINUTES

W 2 - W 1 = 1.41 - 2.56 = 0 MINUTES

ADDITIONAL WAITING TIME AT CONCOURSE EXITS

W 3 = CONCOURSE OCCUPANT LOAD/EXIT CAPACITY

= 985 PERSONS ÷ 420 PPM = 2.35 MINUTES

(W 3 - W x) = 2.35 - 2.56 = 0 MINUTES

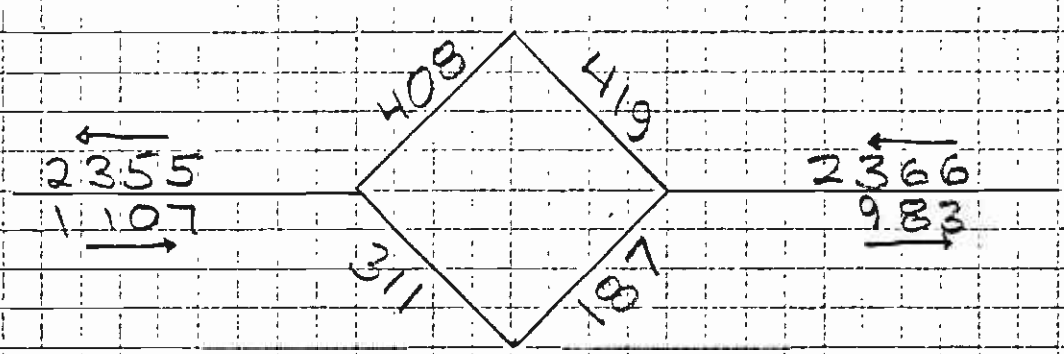
TOTAL EXIT TIME

= T + (W 1 - T 1) + (W 2 - W 1) + (W 3 - W x)
= 2.11 + 1.93 + 0 + 0 = 4.04 Minutes

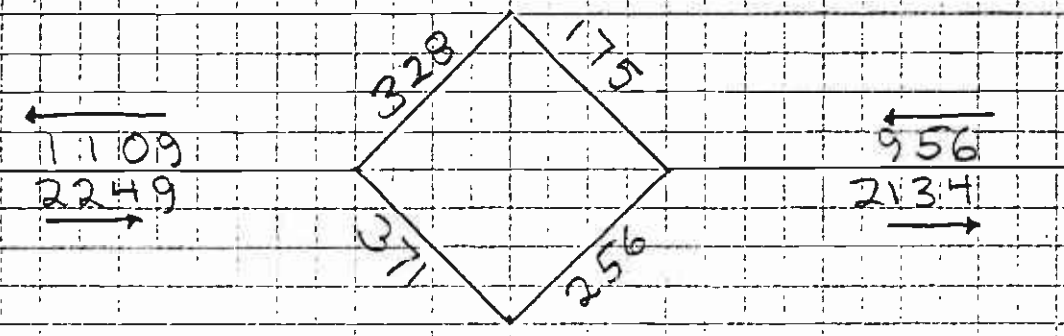
STATION: FAIRFAX / SANTA MONICA

PATRONAGE DATA: YEAR 2000

AM PEAK 15 MIN



PM PEAK 15 MIN



STATION: FAIRFAX/SANTA MONICA

OCCUPANT LOAD - F/LS CRITERIA

HEADWAY ASSUMED 3½ MIN

YEAR 2000

AM PEAK

A. PEAK ENTRAINING - 4 MISSED HEADWAY ACCUM.
187 + 408 = 595

B. LINK LOAD CONTRIBUTIONS:
1. LINK OUTBOUND
1107 × ¼ = 277
2. LINK INBOUND
2366 × ¼ = 592
USE 1200

C. TOTAL STATION LOAD
595 + 1200 = 1795

PM PEAK

A. PEAK ENTRAINING - 4 MISSED HEADWAY ACCUM.
256 + 328 = 584

B. LINK LOAD CONTRIBUTIONS:
1. LINK OUTBOUND
2249 × ¼ = 563
2. LINK INBOUND
956 × ¼ = 239
USE 1200

C. TOTAL STATION LOAD
584 + 1200 = 1784

Project _____ Date _____

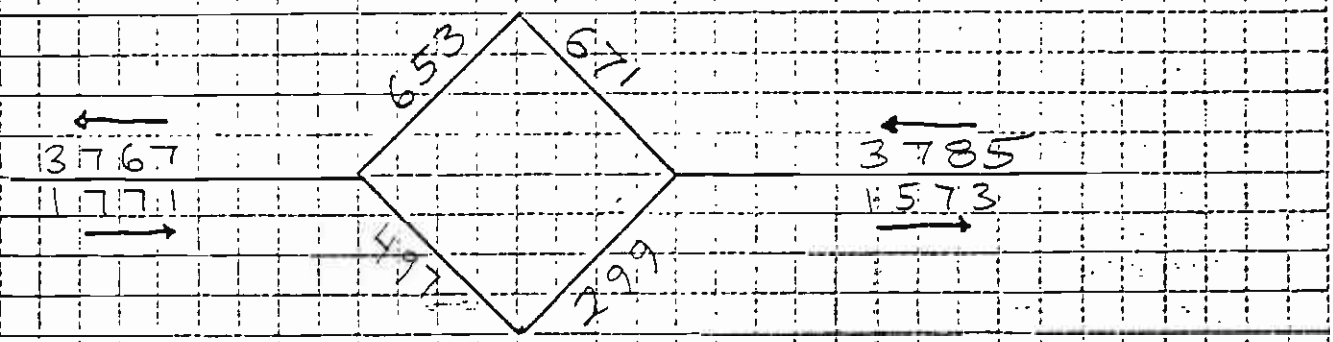
Subject _____ By _____

_____ Ch'k. by _____

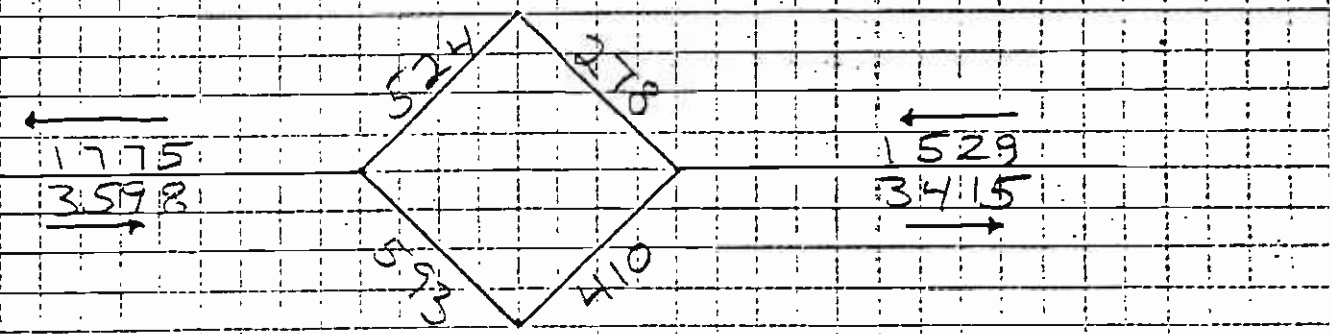
STATION: FAIRFAX/SANTA MONICA

PATRONAGE DATA: YEAR 2020

AM PEAK 15 MIN



PM PEAK 15 MIN



STATION: FAIRFAX / SANTA MONICA

OCCUPANT LOAD - F/LS CRITERIA

HEADWAY ASSUMED 2 MIN

YEAR 2020

AM PEAK

A. PEAK ENTRAINING - 4 MISSED HEADWAY ACCUM.
(299 + 653) * 8/15 = 508

B. LINK LOAD CONTRIBUTIONS:
1. LINK OUTBOUND
1771 * 1/7 = 253
2. LINK INBOUND
3785 * 1/7 = 541
USE 1200

C. TOTAL STATION LOAD
508 + 1200 = 1708

PM PEAK

A. PEAK ENTRAINING - 4 MISSED HEADWAY ACCUM.
(410 + 524) * 8/15 = 499

B. LINK LOAD CONTRIBUTIONS:
1. LINK OUTBOUND
3598 * 1/7 = 514
2. LINK INBOUND
1529 * 1/7 = 219
USE 1200

C. TOTAL STATION LOAD
499 + 1200 = 1699

FIGURE 2-1

EMERGENCY EXIT CAPACITY

CALCULATION

STATION FAIRFAX/SANTA MONICA

OCCUPANCY LOAD YR 2000: 1795 PERSONS

EXIT LANES AND CAPACITY PROVIDED

PLATFORM TO CONCOURSE

STAIRS	2	X	3 LANES	X	35	PPM =	210	PPM
ESCALATORS	2	X	2 LANES	X	35	PPM =	140	PPM
EMG. STAIRS	2	X	4 LANES	X	35	PPM =	280	PPM
TOTAL							630	PPM

THRU FARE BARRIER

FARE GATES	10	X	1 LANES	X	50	PPM =	500	PPM
SERVICE GATES	2	X	2 LANES	X	50	PPM =	200	PPM
EMG. GATES		X	LANES	X		PPM =		PPM
TOTAL							700	PPM

FARE BARRIER TO SAFE AREA

STAIRS	2	X	3 LANES	X	35	PPM =	210	PPM
ESCALATORS	2	X	2 LANES	X	35	PPM =	140	PPM
EMG. STAIRS	1	X	2 LANES	X	35	PPM =	70	PPM
TOTAL							420	PPM

3½ MIN HEADWAY
2 STAIRS
2 ESCALATORS

STATION FAIR / SANTA MONICA
YEAR 2000

TEST 1.

EVACUATE STATION OCCUPANT LOAD FROM STATION PLATFORM(S) IN FOUR MINUTES OR LESS.

WAITING TIME AT PLATFORM EXITS

W 1 = OCCUPANCY LOAD/EXIT CAPACITY
= 1795 PERSONS - 630 PPM = 2.85 MINUTES

TEST #2

EVACUATE STATION OCCUPANT LOAD FROM THE MOST REMOTE POINT ON THE PLATFORM TO A POINT OF SAFETY IN SIX MINUTES OR LESS.

WALKING TIME FOR LONGEST EXIT ROUTE

PLATFORM	=T 1 =	125 FEET	÷ 200 FPM	= .63	MINUTES
PLATFORM TO CONCOURSE	=T 2 =	15 FEET	÷ 50 FPM	= .30	MINUTES
CONCOURSE TO FARE BARRIER	=T 3 =	54 FEET	÷ 200 FPM	= .27	MINUTES
FARE BARRIER TO SAFE AREA	=T 4 =	88 FEET	÷ 200 FPM	= .44	MINUTES
TO GRADE	=	50 FEET	÷ 50 FPM	= 1.00	MINUTES
TOTAL	= T = =			2.64	MIN.

ADDITIONAL WAITING TIME AT PLATFORM EXITS

W 1 = 2.85 MINUTES T 1 = 0.63 MINUTES

W 1 - T 1 = 2.85 - 0.63 = 2.22 MIN.

ADDITIONAL WAITING TIME AT FARE BARRIER

OCCUPANT LOAD AT CONCOURSE
= OCCUPANT LOAD - EMERGENCY STAIR 2.85 MIN. CAPACITY
= 1795 PERSONS - (280 PPM X 2.85 MINUTES) = 997 PERSONS
W 2 = CONCOURSE OCCUPANT LOAD/GATE CAPACITY
= 997 PERSONS ÷ 700 PPM = 1.43 MINUTES

W 2 - W 1 = 1.43 - 2.85 = 0 MINUTES

ADDITIONAL WAITING TIME AT CONCOURSE EXITS

W 3 = CONCOURSE OCCUPANT LOAD/EXIT CAPACITY

= 997 PERSONS ÷ 420 PPM = 2.38 MINUTES

(W 3 - W x) = 2.38 - 2.85 = 0 MINUTES

TOTAL EXIT TIME

= T + (W 1 - T 1) + (W 2 - W 1) + (W 3 - W x)
= 2.64 + 2.22 + 0 + 0 = 4.86 Minutes

2 MIN HEADW...
2 STAIRS
2 ESCALATORS

STATION FAIR / SANTA MONICA
YEAR 1.6 CONTINGENCY

TEST 1.

EVACUATE STATION OCCUPANT LOAD FROM STATION PLATFORM(S) IN FOUR MINUTES OR LESS.

WAITING TIME AT PLATFORM EXITS

W 1 = OCCUPANCY LOAD/EXIT CAPACITY
= 1708 PERSONS - 630 PPM = 2.72 MINUTES

TEST #2

EVACUATE STATION OCCUPANT LOAD FROM THE MOST REMOTE POINT ON THE PLATFORM TO A POINT OF SAFETY IN SIX MINUTES OR LESS.

WALKING TIME FOR LONGEST EXIT ROUTE

PLATFORM =T 1 = 125 FEET ÷ 200 FPM = .63 MINUTES
PLATFORM TO CONCOURSE =T 2 = 15 FEET ÷ 50 FPM = .30 MINUTES
CONCOURSE TO FARE BARRIER =T 3 = 54 FEET ÷ 200 FPM = .27 MINUTES
FARE BARRIER TO SAFE AREA =T 4 = 88 FEET ÷ 200 FPM = .44 MINUTES
TO GRADE = 50 FEET ÷ 50 FPM = 1.00 MINUTES

TOTAL = T = = 2.64 MIN.

ADDITIONAL WAITING TIME AT PLATFORM EXITS

W 1 = 2.72 MINUTES T 1 = 0.63 MINUTES

W 1 - T 1 = 2.72 - 0.63 = 2.09 MIN

ADDITIONAL WAITING TIME AT FARE BARRIER

OCCUPANT LOAD AT CONCOURSE
= OCCUPANT LOAD - EMERGENCY STAIR 2.72 MIN. CAPACITY
= 1708 PERSONS - (280 PPM X 2.72 MINUTES) = 947 PERSONS
W 2 = CONCOURSE OCCUPANT LOAD/GATE CAPACITY
= 947 PERSONS ÷ 700 PPM = 1.35 MINUTES

W 2 - W 1 = 1.35 - 2.72 = 0 MINUTES

ADDITIONAL WAITING TIME AT CONCOURSE EXITS

W 3 = CONCOURSE OCCUPANT LOAD/EXIT CAPACITY

= 947 PERSONS ÷ 420 PPM = 2.26 MINUTES

(W 3 - W x) = 2.26 - 2.72 = 0 MINUTES

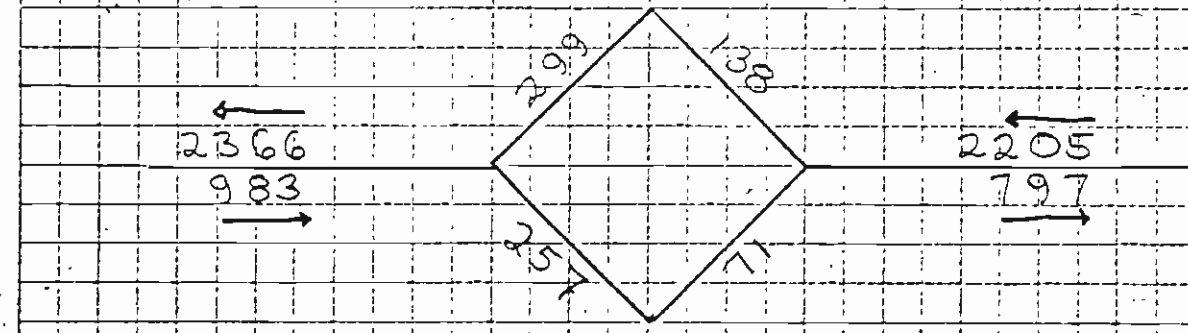
TOTAL EXIT TIME

= T + (W 1 - T 1) + (W 2 - W 1) + (W 3 - W x)
= 2.64 + 2.09 + 0 + 0 = 4.73 Minutes

STATION: SUNSET / LA BREA

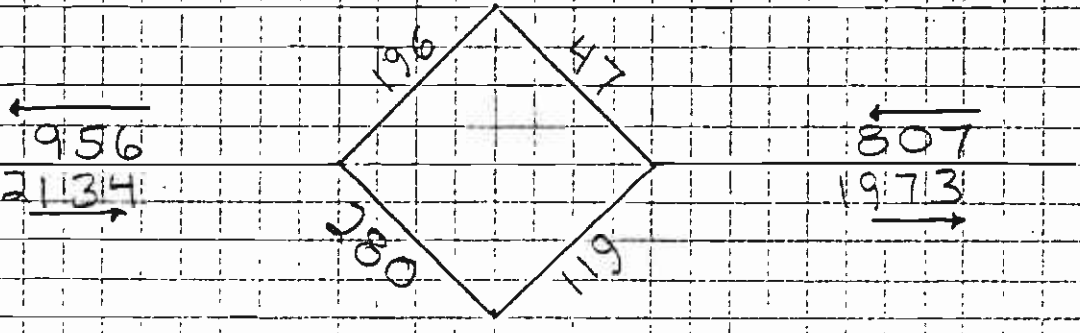
PATRONAGE DATA: YEAR 2000

AM PEAK 15 MIN



FAIR/ SANTA MONICA — SUNSET/ LA BREA — HOLLYWOOD/ CAHUENGA

PM PEAK 15 MIN



FAIR/ SANTA MONICA — SUNSET/ LA BREA — HOLLYWOOD/ CAHUENGA

STATION: SUNSET / LA BREA

OCCUPANT LOAD - F/LS CRITERIA

HEADWAY ASSUMED 3½ MIN

YEAR 2000

AM PEAK

A. PEAK ENTRAINING - 4 MISSED HEADWAY ACCUM.
71 + 299 = 370

B. LINK LOAD CONTRIBUTIONS:
1. LINK OUTBOUND
983 × ¼ = 246
2. LINK INBOUND
2205 × ¼ = 552
USE 1200

C. TOTAL STATION LOAD
370 + 1200 = 1570

PM PEAK

A. PEAK ENTRAINING - 4 MISSED HEADWAY ACCUM.
119 + 196 = 315

B. LINK LOAD CONTRIBUTIONS:
1. LINK OUTBOUND
2134 × ¼ = 534
2. LINK INBOUND
807 × ¼ = 202
USE 1200

C. TOTAL STATION LOAD
315 + 1200 = 1515

Project _____ Date _____

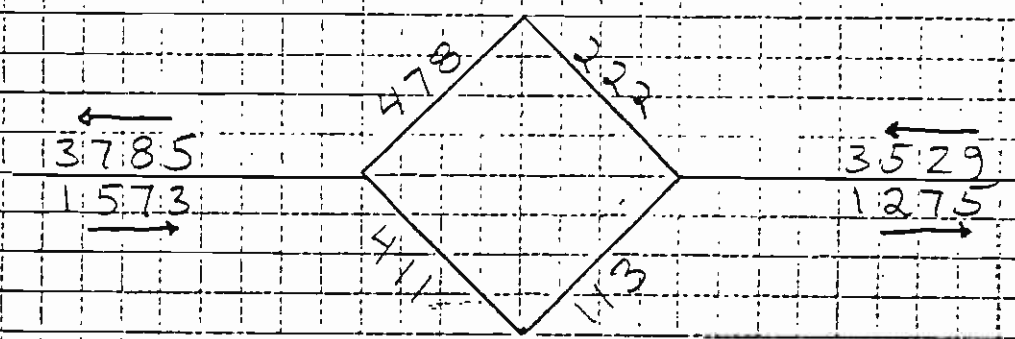
Subject _____ By _____

_____ Ch'k. by _____

STATION: SUNSET / LA BREA

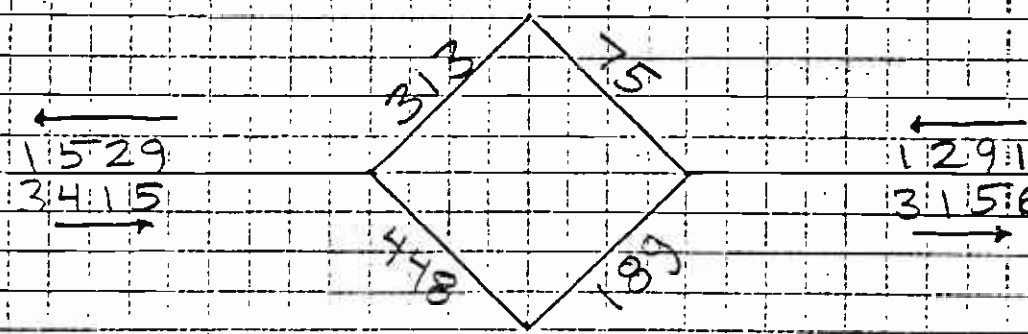
PATRONAGE DATA: YEAR 2020

AM PEAK 15 MIN



FAIR/ SANTA MONICA — SUNSET/ LA BREA — HOLLYWOOD/ CAHUENGA

PM PEAK 15 MIN



FAIR/ SANTA MONICA — SUNSET/ LA BREA — HOLLYWOOD/ CAHUENGA

STATION: SUNSET / LA BREA

OCCUPANT LOAD - F/LS CRITERIA

HEADWAY ASSUMED 2 MIN

YEAR 2020

AM PEAK

A. PEAK ENTRAINING - 4 MISSED HEADWAY ACCUM.
(113 + 478) × 8/15 = 316

B. LINK LOAD CONTRIBUTIONS:
1. LINK OUTBOUND
1573 × 1/7 = 225
2. LINK INBOUND
3529 × 1/7 = 505
USE 1200

C. TOTAL STATION LOAD
316 + 1200 = 1516

PM PEAK

A. PEAK ENTRAINING - 4 MISSED HEADWAY ACCUM.
(189 + 313) × 8/15 = 268

B. LINK LOAD CONTRIBUTIONS:
1. LINK OUTBOUND
3415 × 1/7 = 488
2. LINK INBOUND
1291 × 1/7 = 185
USE 1200

C. TOTAL STATION LOAD
268 + 1200 = 1468

EMERGENCY EXIT CAPACITY

CALCULATION

STATION SUNSET / LA BREA

OCCUPANCY LOAD YR 2000: 1570 PERSONS

EXIT LANES AND CAPACITY PROVIDED

PLATFORM TO CONCOURSE

STAIRS	3	X	3	LANES	X	35	PPM =	315 PPM
ESCALATORS	1	X	2	LANES	X	35	PPM =	70 PPM
EMG. STAIRS	2	X	4	LANES	X	35	PPM =	280 PPM

TOTAL 665 PPM

THRU FARE BARRIER

FARE GATES	10	X	1	LANES	X	50	PPM =	500 PPM
SERVICE GATES	2	X	2	LANES	X	50	PPM =	200 PPM
EMG. GATES		X		LANES	X		PPM =	PPM

TOTAL PPM

FARE BARRIER TO SAFE AREA

STAIRS	2	X	3	LANES	X	35	PPM =	210 PPM
ESCALATORS	2	X	2	LANES	X	35	PPM =	140 PPM
EMG. STAIRS	1	X	2	LANES	X	35	PPM =	70 PPM

TOTAL 420 PPM

MTA LIBRARY

3½ MIN HEADWAY
3 STAIRS
1 ESCALATOR

STATION SUNSET/LA BREA
YEAR 2000

TEST 1.

EVACUATE STATION OCCUPANT LOAD FROM STATION PLATFORM(S) IN FOUR MINUTES OR LESS.

WAITING TIME AT PLATFORM EXITS

W 1 = OCCUPANCY LOAD/EXIT CAPACITY
= 1570 PERSONS - 665 PPM = 2.37 MINUTES

TEST #2

EVACUATE STATION OCCUPANT LOAD FROM THE MOST REMOTE POINT ON THE PLATFORM TO A POINT OF SAFETY IN SIX MINUTES OR LESS.

WALKING TIME FOR LONGEST EXIT ROUTE

PLATFORM	=T 1 =	125 FEET	÷ 200 FPM	=	.63	MINUTES
PLATFORM TO CONCOURSE	=T 2 =	15 FEET	÷ 50 FPM	=	.30	MINUTES
CONCOURSE TO FARE BARRIER	=T 3 =	54 FEET	÷ 200 FPM	=	.27	MINUTES
FARE BARRIER TO SAFE AREA	=T 4 =	88 FEET	÷ 200 FPM	=	.44	MINUTES
TO GRADE	=	25 FEET	÷ 50 FPM	=	.50	MINUTES
TOTAL	= T =	=			2.14	MIN.

ADDITIONAL WAITING TIME AT PLATFORM EXITS

W 1 = 2.37 MINUTES T 1 = 0.63 MINUTES

W 1 - T 1 = 2.37 - 0.63 = 1.74 MIN

ADDITIONAL WAITING TIME AT FARE BARRIER

OCCUPANT LOAD AT CONCOURSE
= OCCUPANT LOAD - EMERGENCY STAIR 2.37 MIN. CAPACITY
= 1570 PERSONS - (280 PPM X 2.37 MINUTES) = 907 PERSONS
W 2 = CONCOURSE OCCUPANT LOAD/GATE CAPACITY
= 907 PERSONS ÷ 700 PPM = 1.30 MINUTES

W 2 - W 1 = 1.30 - 2.37 = 0 MINUTES

ADDITIONAL WAITING TIME AT CONCOURSE EXITS

W 3 = CONCOURSE OCCUPANT LOAD/EXIT CAPACITY

= 907 PERSONS ÷ 420 PPM = 2.16 MINUTES

(W 3 - W x) = 2.16 - 2.37 = 0 MINUTES

TOTAL EXIT TIME

= T + (W 1 - T 1) + (W 2 -W 1) + (W 3-W x)
= 2.14 + 1.74 + 0 + 0 = 3.88 Minutes

2 MIN HEADWAY
3 STAIRS
1 ESCALATOR

STATION SUNSET/LA BREA
YEAR 1.6 CONTINGENCY

TEST 1.

EVACUATE STATION OCCUPANT LOAD FROM STATION PLATFORM(S) IN FOUR MINUTES OR LESS.

WAITING TIME AT PLATFORM EXITS

W 1 = OCCUPANCY LOAD/EXIT CAPACITY
= 1516 PERSONS - 665 PPM= 2.28 MINUTES

TEST #2

EVACUATE STATION OCCUPANT LOAD FROM THE MOST REMOTE POINT ON THE PLATFORM TO A POINT OF SAFETY IN SIX MINUTES OR LESS.

WALKING TIME FOR LONGEST EXIT ROUTE

PLATFORM =T 1 = 125 FEET ÷ 200 FPM = .63 MINUTES
PLATFORM TO CONCOURSE =T 2 = 15 FEET ÷ 50 FPM = .30 MINUTES
CONCOURSE TO FARE BARRIER =T 3 = 54 FEET ÷ 200 FPM = .27 MINUTES
FARE BARRIER TO SAFE AREA =T 4 = 88 FEET ÷ 200 FPM = .44 MINUTES
TO GRADE = 25 FEET ÷ 50 FPM = .50 MINUTES

TOTAL = T = = 2.14 MIN.

ADDITIONAL WAITING TIME AT PLATFORM EXITS

W 1 = 2.28 MINUTES T 1 = 0.63 MINUTES

W 1 - T 1 = 2.28 - 0.63 = 1.65 MIN.

ADDITIONAL WAITING TIME AT FARE BARRIER

OCCUPANT LOAD AT CONCOURSE
= OCCUPANT LOAD - EMERGENCY STAIR 2.28 MIN. CAPACITY
= 1516 PERSONS - (280 PPM X 2.28 MINUTES) = 878 PERSONS
W 2 = CONCOURSE OCCUPANT LOAD/GATE CAPACITY
= 878 PERSONS ÷ 700 PPM = 1.26 MINUTES

W 2 - W 1 = 1.26 - 2.28 = 0 MINUTES

ADDITIONAL WAITING TIME AT CONCOURSE EXITS

W 3 = CONCOURSE OCCUPANT LOAD/EXIT CAPACITY

= 878 PERSONS ÷ 420 PPM = 2.09 MINUTES

(W 3 - W x) = 2.09 - 2.28 = 0 MINUTES

TOTAL EXIT TIME

= T + (W 1 - T 1) + (W 2 - W 1) + (W 3 - W x)
= 2.14 + 1.65 + 0 + 0 = 3.79 Minutes

TAMS

6/15

Job No. _____ Sheet _____ of _____

Project _____ Date _____

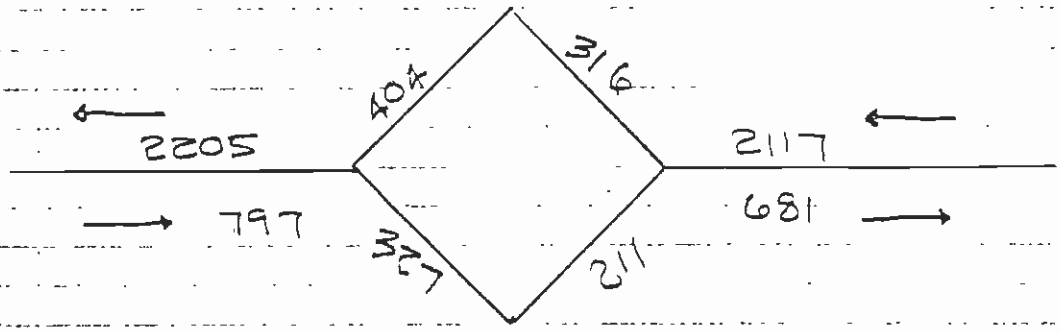
Subject _____ By _____

_____ Ch'k. by _____

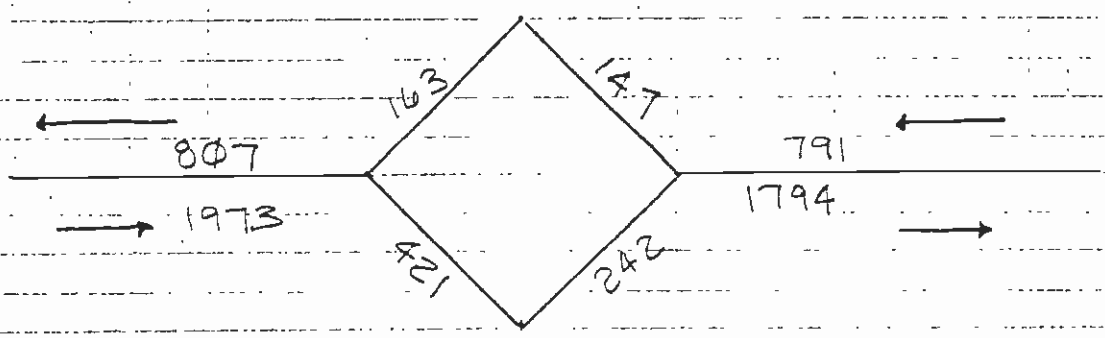
STATION: HOLLYWOOD/CAHUENGA

PATRONAGE DATA: YEAR 2000

AM PEAK 15 MIN



PM PEAK 15 MIN



TAMS

Job No. _____ Sheet _____ of _____

Project _____ Date _____

Subject _____ By _____

EMERGENCY EXITING ANALYSIS Ch'k. by _____

STATION: HOLLYWOOD / CAHUENGA

OCCUPANT LOAD - F/LS CRITERIA

HEADWAY ASSUMED 3½ MIN

YEAR 2000

AM PEAK

A. PEAK ENTRAINING - 4 MISSED HEADWAY ACCUM.
615

B. LINK LOAD CONTRIBUTIONS:
1. LINK OUTBOUND
797 x ¼ = 199
2. LINK INBOUND
2117 x ¼ = 529
} 1200

C. TOTAL STATION LOAD
615 + 1200 = 1,815

PM PEAK

A. PEAK ENTRAINING - 4 MISSED HEADWAY ACCUM.
405

B. LINK LOAD CONTRIBUTIONS:
1. LINK OUTBOUND
1,973 x ¼ = 493
2. LINK INBOUND
791 x ¼ = 198
} 1200

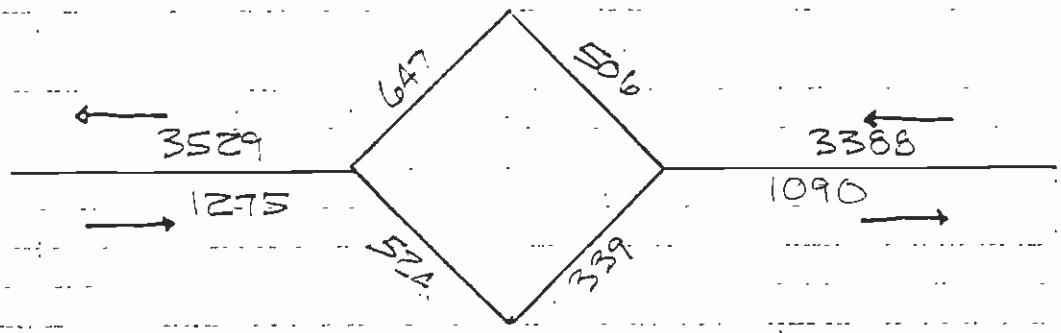
C. TOTAL STATION LOAD

405 + 1200 = 1,605

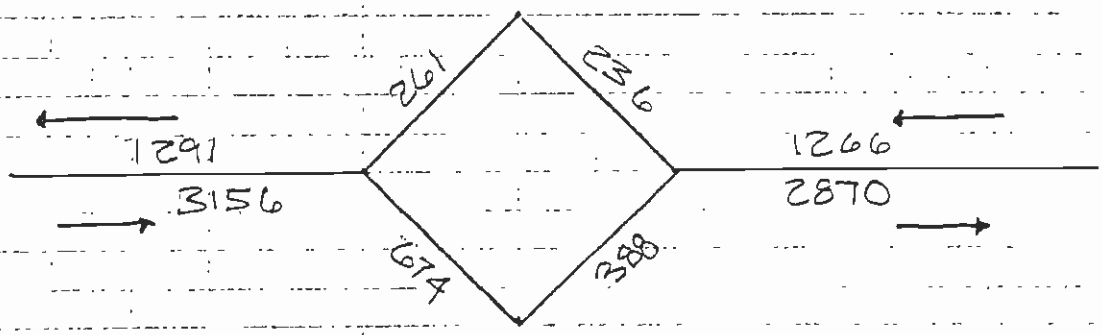
STATION: HOLLYWOOD/CAHUENGA

PATRONAGE DATA: YEAR 2020

AM PEAK 15 MIN



PM PEAK 15 MIN



TAMS

Job No. _____ Sheet _____ of _____

Project _____ Date _____

Subject EMERGENCY EXITING ANALYSIS By _____ Ch'k. by _____

STATION: HOLLYWOOD / CAHUENGA

OCCUPANT LOAD - F/LS CRITERIA

HEADWAY ASSUMED 2 MIN

YEAR 2020

AM PEAK

A. PEAK ENTRAINING - 4 MISSED HEADWAY ACCUM.
986 x 8/15 = 526

B. LINK LOAD CONTRIBUTIONS:
1. LINK OUTBOUND
1275 x 1/7 = 182
2. LINK INBOUND
3388 x 1/7 = 484
} 1,200

C. TOTAL STATION LOAD
526 + 1200 = 1,726

PM PEAK

A. PEAK ENTRAINING - 4 MISSED HEADWAY ACCUM.
649 x 8/15 = 346

B. LINK LOAD CONTRIBUTIONS:
1. LINK OUTBOUND
3156 x 1/7 = 451
2. LINK INBOUND
3388 x 1/7 = 484
} 1,200

C. TOTAL STATION LOAD
346 + 1,200 = 1546

EMERGENCY EXIT CAPACITY

CALCULATION

STATION HOLLYWOOD CAHUENGA

OCCUPANCY LOAD YR 2000: 1815 PERSONS

EXIT LANES AND CAPACITY PROVIDED

PLATFORM TO CONCOURSE

STAIRS	2	X	3	LANES	X	35	PPM =	210 PPM
ESCALATORS	2	X	2	LANES	X	35	PPM =	140 PPM
EMG. STAIRS	2	X	4	LANES	X	35	PPM =	280 PPM

TOTAL 630 PPM

THRU FARE BARRIER

FARE GATES	10	X	1	LANES	X	50	PPM =	500 PPM
SERVICE GATES	2	X	2	LANES	X	50	PPM =	200 PPM
EMG. GATES		X		LANES	X		PPM =	PPM

TOTAL 700 PPM

FARE BARRIER TO SAFE AREA

STAIRS	2	X	3	LANES	X	35	PPM =	210 PPM
ESCALATORS	2	X	2	LANES	X	35	PPM =	140 PPM
EMG. STAIRS	1	X	2	LANES	X	35	PPM =	70 PPM

TOTAL 420 PPM

3 ½ MIN HEADWAY
2 STAIRS
2 ESCALATORS

STATION HOLLYWOOD/CAHUENGA
YEAR 2000

TEST 1.

EVACUATE STATION OCCUPANT LOAD FROM STATION PLATFORM(S) IN FOUR MINUTES OR LESS.

WAITING TIME AT PLATFORM EXITS

W 1 = OCCUPANCY LOAD/EXIT CAPACITY
= 1815 PERSONS - 630 PPM = 2.89 MINUTES

TEST #2

EVACUATE STATION OCCUPANT LOAD FROM THE MOST REMOTE POINT ON THE PLATFORM TO A POINT OF SAFETY IN SIX MINUTES OR LESS.

WALKING TIME FOR LONGEST EXIT ROUTE

PLATFORM =T 1 = 125 FEET ÷ 200 FPM = 0.63 MINUTES
PLATFORM TO CONCOURSE =T 2 = 15 FEET ÷ 50 FPM = .30 MINUTES
CONCOURSE TO FARE BARRIER =T 3 = 54 FEET ÷ 200 FPM = .27 MINUTES
FARE BARRIER TO SAFE AREA =T 4 = 109 FEET ÷ 200 FPM = .55 MINUTES
TO GRADE = 32 FEET ÷ 50 FPM = .64 MINUTES

TOTAL = T = = 2.39 MIN.

ADDITIONAL WAITING TIME AT PLATFORM EXITS

W 1 = 2.89 MINUTES T 1 = 0.63 MINUTES

W 1 - T 1 = 2.89 - 0.63 = 2.26 MIN.

ADDITIONAL WAITING TIME AT FARE BARRIER

OCCUPANT LOAD AT CONCOURSE
= OCCUPANT LOAD - EMERGENCY STAIR 2.89 MIN. CAPACITY
= 1815 PERSONS - (280 PPM X 2.89 MINUTES) = 1006 PERSONS
W 2 = CONCOURSE OCCUPANT LOAD/GATE CAPACITY
= 1006 PERSONS ÷ 700 PPM = 1.44 MINUTES

W 2 - W 1 = 1.44 - 2.89 = 0 MINUTES

ADDITIONAL WAITING TIME AT CONCOURSE EXITS

W 3 = CONCOURSE OCCUPANT LOAD/EXIT CAPACITY

= 1006 PERSONS ÷ 420 PPM = 2.40 MINUTES

(W 3 - W x) = 2.40 - 2.89 = 0 MINUTES

TOTAL EXIT TIME

= T + (W 1 - T 1) + (W 2 - W 1) + (W 3 - W x)
= 2.39 + 2.26 + 0 + 0 = 4.65 Minutes

2 MIN HEADW.
2 STAIRS
2 ESCALATORS

STATION HOLLYWOOD/CAHUENGA
YEAR 1.6 CONTINGENCY

TEST 1.

EVACUATE STATION OCCUPANT LOAD FROM STATION PLATFORM(S) IN FOUR MINUTES OR LESS.

WAITING TIME AT PLATFORM EXITS

W 1 = OCCUPANCY LOAD/EXIT CAPACITY
= 1726 PERSONS - 630 PPM = 2.74 MINUTES

TEST #2

EVACUATE STATION OCCUPANT LOAD FROM THE MOST REMOTE POINT ON THE PLATFORM TO A POINT OF SAFETY IN SIX MINUTES OR LESS.

WALKING TIME FOR LONGEST EXIT ROUTE

PLATFORM	=T 1 =	125	FEET ÷	200	FPM =	.63 MINUTES
PLATFORM TO CONCOURSE	=T 2 =	15	FEET ÷	50	FPM =	.30 MINUTES
CONCOURSE TO FARE BARRIER	=T 3 =	54	FEET ÷	200	FPM =	.27 MINUTES
FARE BARRIER TO SAFE AREA	=T 4 =	109	FEET ÷	200	FPM =	.55 MINUTES
TO GRADE	=	32	FEET ÷	50	FPM =	.64 MINUTES

TOTAL = T = = 2.39 MIN

ADDITIONAL WAITING TIME AT PLATFORM EXITS

W 1 = 2.74 MINUTES T 1 = 0.63 MINUTES

W 1 - T 1 = 2.74 - 0.63 = 2.11 MIN

ADDITIONAL WAITING TIME AT FARE BARRIER

OCCUPANT LOAD AT CONCOURSE
= OCCUPANT LOAD - EMERGENCY STAIR 2.74 MIN. CAPACITY
= 1726 PERSONS - (280 PPM X 2.74 MINUTES) = 959 PERSONS
W 2 = CONCOURSE OCCUPANT LOAD/GATE CAPACITY
= 959 PERSONS ÷ 700 PPM = 1.34 MINUTES

W 2 - W 1 = 1.34 - 2.74 = 0 MINUTES

ADDITIONAL WAITING TIME AT CONCOURSE EXITS

W 3 = CONCOURSE OCCUPANT LOAD/EXIT CAPACITY

= 959 PERSONS ÷ 420 PPM = 2.29 MINUTES

(W 3 - W x) = 2.29 - 2.74 = 0 MINUTES

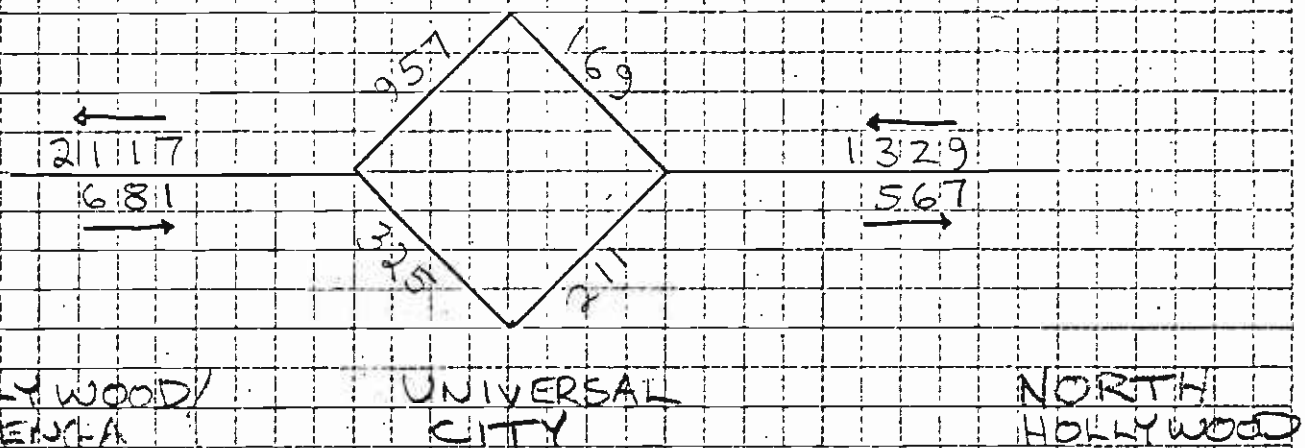
TOTAL EXIT TIME

= T + (W 1 - T 1) + (W 2 - W 1) + (W 3 - W x)
= 2.39 + 2.11 + 0 + 0 = 4.50 Minutes

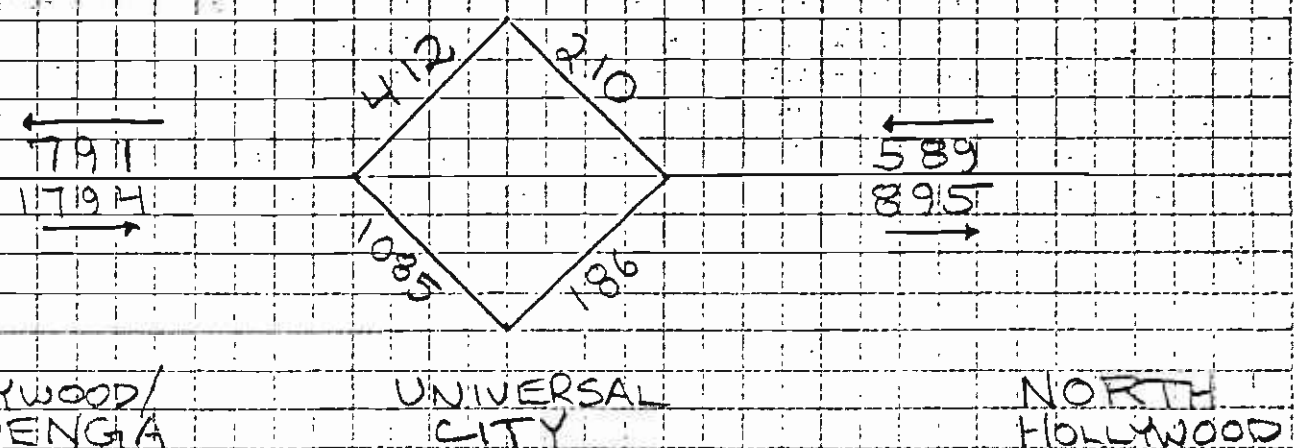
STATION: UNIVERSAL CITY

PATRONAGE DATA: YEAR 2000

AM PEAK 15 MIN



PM PEAK 15 MIN



STATION: UNIVERSAL CITY

OCCUPANT LOAD - F/LS CRITERIA

HEADWAY ASSUMED 3½ MIN

YEAR 2000

AM PEAK

A. PEAK ENTRAINING - 4 MISSED HEADWAY ACCUM.
211 + 957 = 1168

B. LINK LOAD CONTRIBUTIONS:
1. LINK OUTBOUND
681 × ¼ = 171
2. LINK INBOUND
1329 × ¼ = 333
USE 1200

C. TOTAL STATION LOAD
1168 + 1200 = 2368

PM PEAK

A. PEAK ENTRAINING - 4 MISSED HEADWAY ACCUM.
186 + 412 = 598

B. LINK LOAD CONTRIBUTIONS:
1. LINK OUTBOUND
1794 × ¼ = 449
2. LINK INBOUND
589 × ¼ = 148
USE 1200

C. TOTAL STATION LOAD
598 + 1200 = 1798

Project _____ Date _____

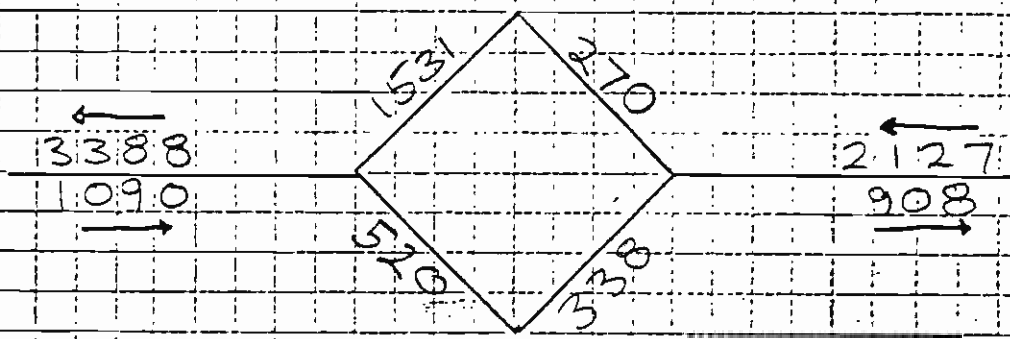
Subject _____ By _____

_____ Ch'k. by _____

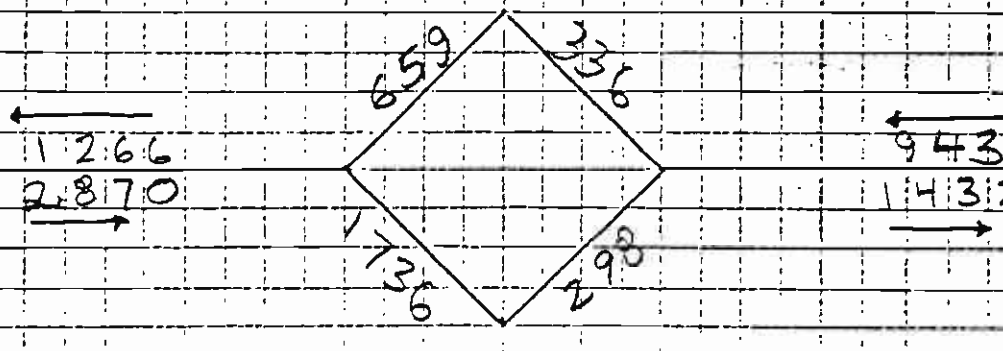
STATION: UNIVERSAL CITY

PATRONAGE DATA: YEAR 2020

AM PEAK 15 MIN



PM PEAK 15 MIN



STATION: UNIVERSAL CITY

OCCUPANT LOAD - F/LS CRITERIA

HEADWAY ASSUMED 2 MIN

YEAR 2020

AM PEAK

A. PEAK ENTRAINING - 4 MISSED HEADWAY ACCUM.
(338 + 1531) × 8/15 = 997

B. LINK LOAD CONTRIBUTIONS:
1. LINK OUTBOUND
1090 × 1/7 = 156
2. LINK INBOUND
2127 × 1/7 = 304
USE 1200

C. TOTAL STATION LOAD
997 + 1200 = 2197

PM PEAK

A. PEAK ENTRAINING - 4 MISSED HEADWAY ACCUM.
(298 + 659) × 8/15 = 511

B. LINK LOAD CONTRIBUTIONS:
1. LINK OUTBOUND
2870 × 1/7 = 410
2. LINK INBOUND
943 × 1/7 = 135
USE 1200

C. TOTAL STATION LOAD
511 + 1200 = 1711

EMERGENCY EXIT CAPACITY

CALCULATION

STATION UNIVERSAL CITY

OCCUPANCY LOAD YR 2000: 2368 PERSONS

EXIT LANES AND CAPACITY PROVIDED

PLATFORM TO CONCOURSE

STAIRS	2	X	3	LANES	X	35	PPM =	210 PPM
ESCALATORS	2	X	2	LANES	X	35	PPM =	140 PPM
EMG. STAIRS	2	X	4	LANES	X	35	PPM =	280 PPM

TOTAL 630 PPM

THRU FARE BARRIER

FARE GATES	10	X	1	LANES	X	50	PPM =	500 PPM
SERVICE GATES	2	X	2	LANES	X	50	PPM =	200 PPM
EMG. GATES		X		LANES	X		PPM =	PPM

TOTAL 700 PPM

FARE BARRIER TO SAFE AREA

STAIRS	2	X	3	LANES	X	35	PPM =	210 PPM
ESCALATORS	2	X	2	LANES	X	35	PPM =	140 PPM
EMG. STAIRS	1	X	2	LANES	X	35	PPM =	70 PPM

TOTAL 420 PPM

3½ MIN HEADWAY
2 STAIRS
2 ESCALATORS

STATION UNIVERSAL CITY
YEAR 2000

TEST 1.

EVACUATE STATION OCCUPANT LOAD FROM STATION PLATFORM(S) IN FOUR MINUTES OR LESS.

WAITING TIME AT PLATFORM EXITS

W 1 = OCCUPANCY LOAD/EXIT CAPACITY
= 2368 PERSONS - 630 PPM = 3.76 MINUTES

TEST #2

EVACUATE STATION OCCUPANT LOAD FROM THE MOST REMOTE POINT ON THE PLATFORM TO A POINT OF SAFETY IN SIX MINUTES OR LESS.

WALKING TIME FOR LONGEST EXIT ROUTE

PLATFORM =T 1 = 125 FEET ÷ 200 FPM = .63 MINUTES
PLATFORM TO CONCOURSE =T 2 = 15 FEET ÷ 50 FPM = .30 MINUTES
CONCOURSE TO FARE BARRIER =T 3 = 54 FEET ÷ 200 FPM = .27 MINUTES
FARE BARRIER TO SAFE AREA =T 4 = 82 FEET ÷ 200 FPM = .41 MINUTES
TO GRADE = 53 FEET ÷ 50 FPM = 1.06 MINUTES

TOTAL = T = = 2.67 MIN.

ADDITIONAL WAITING TIME AT PLATFORM EXITS

W 1 = 3.76 MINUTES T 1 = 0.63 MINUTES

W 1 - T 1 = 3.76 - 0.63 = 3.13 MIN.

ADDITIONAL WAITING TIME AT FARE BARRIER

OCCUPANT LOAD AT CONCOURSE
= OCCUPANT LOAD - EMERGENCY STAIR 3.76 MIN. CAPACITY
= 2368 PERSONS - (280 PPM X 3.76 MINUTES) = 1316 PERSONS
W 2 = CONCOURSE OCCUPANT LOAD/GATE CAPACITY
= 1316 PERSONS ÷ 700 PPM = 1.88 MINUTES

W 2 - W 1 = 1.88 - 3.76 = 0 MINUTES

ADDITIONAL WAITING TIME AT CONCOURSE EXITS

W 3 = CONCOURSE OCCUPANT LOAD/EXIT CAPACITY

= 1316 PERSONS ÷ 420 PPM = 3.14 MINUTES

(W 3 - W x) = 3.14 - 3.76 = 0 MINUTES

TOTAL EXIT TIME

= T + (W 1 - T 1) + (W 2 - W 1) + (W 3 - W x)
= 2.67 + 3.13 + 0 + 0 = 5.80 Minutes

2 MIN HEADWAY
2 STAIR
2 ESCALATORS

STATION UNIVERSAL CITY
YEAR 1-6 CONTINGENCY

TEST 1.

EVACUATE STATION OCCUPANT LOAD FROM STATION PLATFORM(S) IN FOUR MINUTES OR LESS.

WAITING TIME AT PLATFORM EXITS

W 1 = OCCUPANCY LOAD/EXIT CAPACITY
= 2197 PERSONS - 630 PPM = 3.49 MINUTES

TEST #2

EVACUATE STATION OCCUPANT LOAD FROM THE MOST REMOTE POINT ON THE PLATFORM TO A POINT OF SAFETY IN SIX MINUTES OR LESS.

WALKING TIME FOR LONGEST EXIT ROUTE

PLATFORM	=T 1 =	125 FEET	÷	200 FPM	=	.63 MINUTES
PLATFORM TO CONCOURSE	=T 2 =	15 FEET	÷	50 FPM	=	.30 MINUTES
CONCOURSE TO FARE BARRIER	=T 3 =	54 FEET	÷	200 FPM	=	.27 MINUTES
FARE BARRIER TO SAFE AREA	=T 4 =	82 FEET	÷	200 FPM	=	.41 MINUTES
TO GRADE	=	53 FEET	÷	50 FPM	=	1.06 MINUTES
TOTAL	= T =	=				2.67 MIN.

ADDITIONAL WAITING TIME AT PLATFORM EXITS

W 1 = 3.49 MINUTES T 1 = 0.63 MINUTES

W 1 - T 1 = 3.49 - 0.63 = 2.86 MIN.

ADDITIONAL WAITING TIME AT FARE BARRIER

OCCUPANT LOAD AT CONCOURSE
= OCCUPANT LOAD - EMERGENCY STAIR 3.49 MIN. CAPACITY
= 2197 PERSONS - (290 PPM X 3.49 MINUTES) = 1220 PERSONS
W 2 = CONCOURSE OCCUPANT LOAD/GATE CAPACITY
= 1220 PERSONS ÷ 700 PPM = 1.75 MINUTES

W 2 - W 1 = 1.75 - 3.49 = 0 MINUTES

ADDITIONAL WAITING TIME AT CONCOURSE EXITS

W 3 = CONCOURSE OCCUPANT LOAD/EXIT CAPACITY

= 1220 PERSONS ÷ 420 PPM = 2.91 MINUTES

(W 3 - W x) = 2.91 - 3.49 = 0 MINUTES

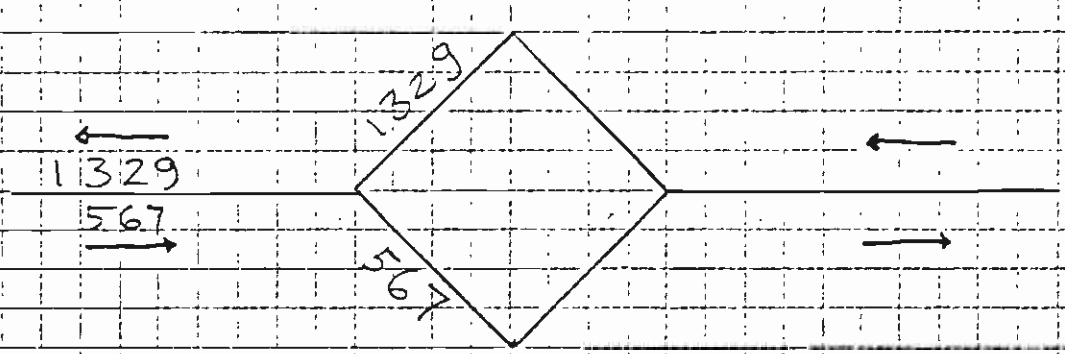
TOTAL EXIT TIME

= T + (W 1 - T 1) + (W 2 -W 1) + (W 3-W x)
= 2.67 + 2.86 + 0 + 0 = 5.53 Minutes

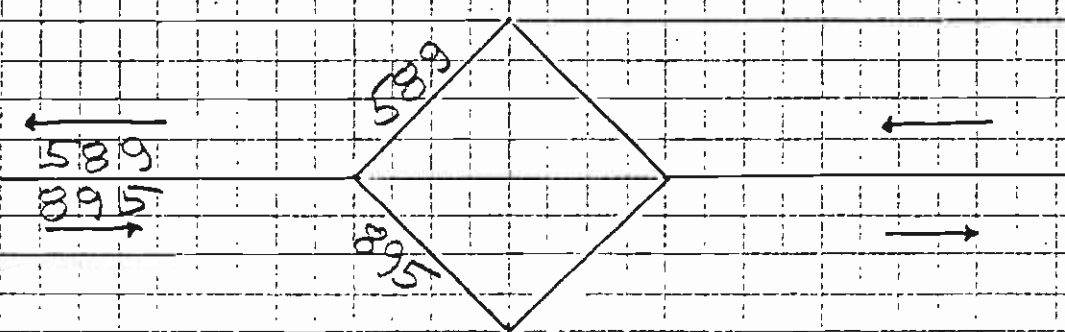
STATION: NORTH HOLLYWOOD

PATRONAGE DATA: YEAR 2000

AM PEAK 15 MIN



PM PEAK 15 MIN



STATION: NORTH HOLLYWOOD

OCCUPANT LOAD - F/LS CRITERIA

HEADWAY ASSUMED 3½ MIN

YEAR 2000

AM PEAK

A. PEAK ENTRAINING - 4 MISSED HEADWAY ACCUM.
1329

B. LINK LOAD CONTRIBUTIONS:
1. LINK OUTBOUND
567 × ¼ = 142 - USE 1200

2. LINK INBOUND

C. TOTAL STATION LOAD
1329 + 1200 = 2529

PM PEAK

A. PEAK ENTRAINING - 4 MISSED HEADWAY ACCUM.
589

B. LINK LOAD CONTRIBUTIONS:
1. LINK OUTBOUND
895 × ¼ = 224 - USE 1200

2. LINK INBOUND

C. TOTAL STATION LOAD
589 + 1200 = 1789

Project _____ Date _____

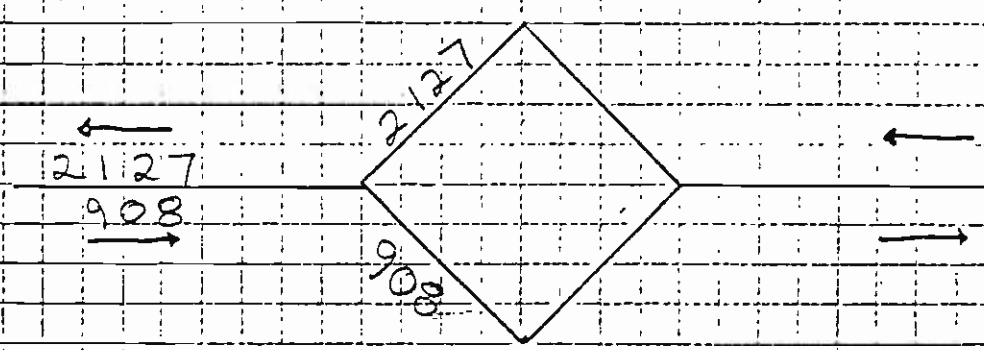
Subject _____ By _____

_____ Ch'k. by _____

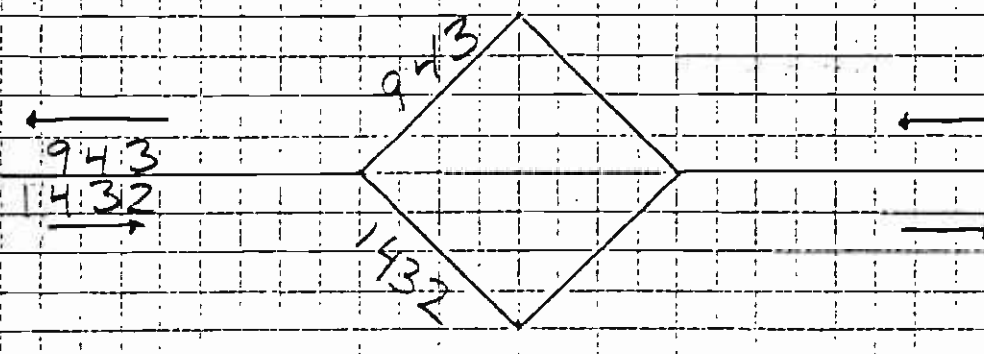
STATION: NORTH HOLLYWOOD

PATRONAGE DATA: YEAR 2020

AM PEAK 15 MIN



PM PEAK 15 MIN



STATION: NORTH HOLLYWOOD

OCCUPANT LOAD - F/LS CRITERIA

HEADWAY ASSUMED 2 MIN

YEAR 2020

AM PEAK

A. PEAK ENTRAINING - 4 MISSED HEADWAY ACCUM.
2127 × 8/15 = 1135

B. LINK LOAD CONTRIBUTIONS:
1. LINK OUTBOUND
908 × 1/7 = 130 - USE 1200

2. LINK INBOUND

C. TOTAL STATION LOAD
1135 + 1200 = 2335

PM PEAK

A. PEAK ENTRAINING - 4 MISSED HEADWAY ACCUM.
943 × 8/15 = 503

B. LINK LOAD CONTRIBUTIONS:
1. LINK OUTBOUND
1432 × 1/7 = 205 - USE 1200

2. LINK INBOUND

C. TOTAL STATION LOAD
503 + 1200 = 1703

FIGURE 2-1

EMERGENCY EXIT CAPACITY

CALCULATION

STATION NORTH HOLLYWOOD

OCCUPANCY LOAD YR 2000 2529 PERSONS

EXIT LANES AND CAPACITY PROVIDED

PLATFORM TO CONCOURSE

STAIRS	2	X	3 LANES	X	35	PPM =	210	PPM
ESCALATORS	2	X	2 LANES	X	35	PPM =	140	PPM
EMG. STAIRS	2	X	4 LANES	X	35	PPM =	280	PPM
TOTAL							630	PPM

THRU FARE BARRIER

FARE GATES	10	X	1 LANES	X	50	PPM =	500	PPM
SERVICE GATES	2	X	2 LANES	X	50	PPM =	200	PPM
EMG. GATES		X	LANES	X		PPM =		PPM
TOTAL							700	PPM

FARE BARRIER TO SAFE AREA

STAIRS	2	X	3 LANES	X	35	PPM =	210	PPM
ESCALATORS	2	X	2 LANES	X	35	PPM =	140	PPM
EMG. STAIRS	1	X	2 LANES	X	35	PPM =	70	PPM
TOTAL							420	PPM

FIGURE 2-2
TEST 1.

No. HOLLYWOOD YR 2000 3½ MIN HEADWAY 2 ESC 2 STAIRS

EVACUATE STATION OCCUPANT LOAD FROM STATION PLATFORM(S) IN FOUR MINUTES OR LESS.

WAITING TIME AT PLATFORM EXITS

W = OCCUPANCY LOAD/EXIT CAPACITY
= 2529 PERSONS ÷ 630 PPM = 4.02 MINUTES

TEST # 2

EVACUATE STATION OCCUPANT LOAD FROM THE MOST REMOTE POINT ON THE PLATFORM TO A POINT OF SAFETY IN SIX MINUTES OR LESS.

WALKING TIME FOR LONGEST EXIT ROUTE

PLATFORM = T_1 = 125 FEET ÷ 200 FPM = 0.63 Minutes
PLAT. TO CONCOURSE = T_2 = 15 FEET ÷ 50 FPM = .30 Minutes
CONCOURSE TO FARE BARRIER T_3 = 54 FEET ÷ 200 FPM = .27 Minutes
FARE BARRIER TO SAFE AREA TO GRADE T_4 = 88/34 FEET ÷ 200/50 FPM = .44/.68 Minutes
TOTAL = T = 2.32 MINUTES

ADDITIONAL WAITING TIME AT PLATFORM EXITS

W_1 = 4.02 MINUTES T_1 = 0.63 MINUTES
$(W_1 - T_1)$ = 4.02 - 0.63 = 3.39 MINUTES

ADDITIONAL WAITING TIME AT FARE BARRIER

4.02
OCCUPANT LOAD AT CONCOURSE
= OCCUPANT LOAD - EMERGENCY STAIR 4 MIN. CAPACITY
= 2529 PERSONS - (280 PPM X 4 MINUTES) = 1404 PERSONS
W_2 = CONCOURSE OCCUPANT LOAD/GATE CAPACITY
= 1404 PERSONS ÷ 700 PPM = 2.01 MINUTES
$(W_2 - W_1)$ = 2.01 - 4.02 = 0 MINUTES

ADDITIONAL WAITING TIME AT CONCOURSE EXITS

W_3 = CONCOURSE OCCUPANT LOAD/EXIT CAPACITY
= 1404 PERSONS ÷ 420 PPM = 3.35 MINUTES
$(W_3 - W_x)$ = 3.35 - 4.02 = 0 MINUTES

TOTAL EXIT TIME

= T + $(W_1 - T_1)$ + $(W_2 - W_1)$ + $(W_3 - W_x)$
= 2.32 + 3.39 + 0 + 0 = 5.71 Minutes

FIGURE 2-2

TEST 1.

P.O. HOLLYWOOD
1.6 CONTINGENCY
2 MIN HEADWAY
2 ESC.
2 STAIRS

EVACUATE STATION OCCUPANT LOAD FROM STATION PLATFORM(S) IN FOUR MINUTES OR LESS.

WAITING TIME AT PLATFORM EXITS

W = OCCUPANCY LOAD/EXIT CAPACITY
= 2335 PERSONS ÷ 630 PPM = 3.71 MINUTES

TEST # 2

EVACUATE STATION OCCUPANT LOAD FROM THE MOST REMOTE POINT ON THE PLATFORM TO A POINT OF SAFETY IN SIX MINUTES OR LESS.

WALKING TIME FOR LONGEST EXIT ROUTE

PLATFORM = T_1 = 125 FEET ÷ 200 FPM = .63 Minutes
PLAT. TO CONCOURSE = T_2 = 15 FEET ÷ 50 FPM = .30 Minutes
CONCOURSE TO FARE BARRIER T_3 = 54 FEET ÷ 200 FPM = .27 Minutes
FARE BARRIER TO SAFE AREA TO GRADE T_4 = 88/34 FEET ÷ 200/50 FPM = .44/.68 Minutes
TOTAL = T = 2.32 MINUTES

ADDITIONAL WAITING TIME AT PLATFORM EXITS

W_1 = 3.71 MINUTES T_1 = 0.63 MINUTES
$(W_1 - T_1)$ = 3.71 - 0.63 = 3.08 MINUTES

ADDITIONAL WAITING TIME AT FARE BARRIER

3.71
OCCUPANT LOAD AT CONCOURSE
= OCCUPANT LOAD - EMERGENCY STAIR 4 MIN. CAPACITY
= 2335 PERSONS - (286 PPM X 4 MINUTES) = 1297 PERSONS
W_2 = CONCOURSE OCCUPANT LOAD/GATE CAPACITY
= 1297 PERSONS ÷ 700 PPM = 1.86 MINUTES
$(W_2 - W_1)$ = 1.86 - 3.71 = 0 MINUTES

ADDITIONAL WAITING TIME AT CONCOURSE EXITS

W_3 = CONCOURSE OCCUPANT LOAD/EXIT CAPACITY
= 1297 PERSONS ÷ 420 PPM = 3.09 MINUTES
$(W_3 - W_x)$ = 3.09 - 3.71 = 0 MINUTES

TOTAL EXIT TIME

= $T + (W_1 - T_1) + (W_2 - W_1) + (W_3 - W_x)$
= 2.32 + 3.08 + 0 + 0 = 5.40 Minutes

LONGEST PATH ANALYSIS - DISTANCES ASSUMED 4/18/83

STATION	DISTANCE: LONGEST PATH				
	PLATFORM	PLATFORM TO CONCOURSE (VERT.)	CONCOURSE TO FARE BARRIER	FARE BARRIER TO DEVICE	DEVICE TO GRADE (VERT.)
UNION	115 FT	28 FT	98 FT	111 FT	{ 9' VERT + 54' HORIZ
CIVIC CTR	37	15	140	100	53 FT
5TH/HILL	81	15	218	160	40
7TH/FLOWER	94	15	74	209	25
WIL/ALVARADO	132	29	137	54	0
WIL/VERMONT	125	15	54	88	34
WIL/NORMANDIE	107	15	137	49	36
WIL/WESTERN	125	15	54	88	29
WIL/CRENSHAW	125	15	54	108	40
WIL/LA BREA	125	15	54	88	27
WIL/FAIRFAX	125	15	75	171	37
FAIR/BEVERLY	125	15	54	74	27
FAIR/SANTA MONICA	125	15	54	88	50
SUNSET/LA BREA	125	15	54	88	25
HOLL/CAHUENGA	125	15	54	109	32
UNIVERSAL CITY	125	15	54	82	53
[illegible] HOLLYWOOD	125	15	54	88	34

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By _____
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TAMS

4/18/83

LONGEST PATH ANALYSIS - ASSUMPTIONS TO BE USED WITH PROTOTYPICAL STATION PLANS (BASED ON 4/18/83 PLANS)

STATION	PASSAGEWAY LENGTH (DEVICE TOUCHDOWN TO STATION ℄ ON MEZZANINE)	VERTICLE DISTANCE MEZZANINE TO GRADE
CENTER MEZZANINE*:		
WIL/VERMONT	94 FEET	34 FT
WIL/WESTERN	94	29
WIL/CRENSHAW	114	40
WIL/LA. BREA	94	27
FAIR/BEVERLY	80	27
FAIR/SANTA MONICA	94	50
SUNSET/LA BREA	94	25
HOLL/CAHUENGA	115	32
UNIVERSAL CITY	88	53
NO HOLLYWOOD	94	34
END MEZZANINE:		
WIL/NORMANDIE	50	36

* CENTER MEZZANINE: FARE BARRIAR TO TOUCHDOWN POINT ON MEZZANINE OF DEVICE IS EQUAL TO 'PASSAGEWAY LENGTH' MINUS 6

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TRANSIT PATH ANALYSIS - CIVIC CENTER STATION
BASED ON PRELIMINARY GENERAL PLAN DATED 4/18/83

ITEM \ PATH	PATH #1 - MIDPOINT BETWEEN ESCALATOR #8 & ESC. #4 - USING ESC. #8 AND ESC. #6 - LEAVING BY SOUTH ENTRANCE	PATH #2 - MIDPOINT BETWEEN ESCALATORS #8 & #4 - USING ESCALATORS #4 AND #2 - LEAVING BY NORTH ENTRANCE	PATH #3 - MIDPOINT BETWEEN ESCALATOR #3 AND STAIR #11 USING ESCALATORS #3 AND #2 - LEAVING BY NORTH ENTRANCE
PLATFORM	37 FT ÷ 200 FPS = .19 MIN	37 FT ÷ 200 FPS = .19 MIN	88 FT ÷ 200 FPS = .44 MIN
PLATFORM TO CONCOURSE	15 FT ÷ 50 FPS = .30	15 FT ÷ 50 FPS = .30	15 FT ÷ 50 FPS = .30
CONC. TO FARE BARRIER	132 FT ÷ 200 FPS = .66	140 FT ÷ 200 FPS = .70	62 FT ÷ 200 FPS = .31
FARE BARRIER TO DEVICE	107 FT ÷ 200 FPS = .54	100 FT ÷ 200 FPS = .50	100 FT ÷ 200 FPS = .50
DEVICE TO GRADE	43 FT ÷ 50 FPS = .86	53 FT ÷ 50 FPS = 1.06	53 FT ÷ 50 FPS = 1.06
TOTAL	2.55 MIN	2.75 MIN	2.61 MIN
		LONGEST PATH	

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TAMS

APPENDIX E

April 21, 1983
(Revised)

NORMAL EXITING
PATRONAGE AND VERTICAL DEVICE CAPACITY
3-1/2 Min. Headway

STATION	PATRONAGE PEAK HOUR 'WORST CASE'		VERTICAL CIRCULATION ELEMENTS		PEAK DESIGN LOAD 3-1/2 MIN HEADWAY - 2000			STAIR CAPACITY 3-1/2 MIN	ESCALATOR CAPACITY 2-1/2 MIN
	2000	2020	STAIRS	ESC	BOARD	DETRAIN	TOTAL		
Union Station	8,469	13,551	4	4	272	523	795	924	1,000
Civic Center	7,616	12,185	4	4	220	401	621	924	1,000
5th/Hill	12,207	19,532	7	5	190	736	926	1,617	1,250
7th/Flower	8,632	13,812	3	3	122	458	580	693	750
Wil/Alvarado	5,418	8,669	2	2	209	301	510	462	500
Wil/Vermont	7,101	11,362	2	2	305	362	667	462	500
Wil/Normandie	3,137	5,020	3	1	134	155	289	693	250
Wil/Western	4,880	7,808	2	2	186	273	459	462	500
Wil/Crenshaw	3,473	5,557	2	2	102	225	327	462	500
Wil/LaBrea	1,761	2,818	3	1	55	97	152	693	250
Wil/Fairfax	7,914	12,663	3	3	329	414	743	693	750
Fair/Beverly	2,774	4,439	3	1	121	140	261	693	250
Fair/Santa Monica	3,530	5,648	2	2	149	183	332	462	500
Sunset/LaBrea	2,039	3,263	3	1	93	100	193	693	250
Holl/Cahuenga	3,359	5,375	2	2	154	161	315	462	500
Universal City	5,051	8,082	2	2	150	324	474	462	500
N. Hollywood	5,058	8,093	2	2	148	224	372	462	500

April 21, 1[illegible]

(Revised)

NORMAL EXITING
PATRONAGE AND VERTICAL DEVICE CAPACITY
2 Min. Headway

STATION	PATRONAGE PEAK HOUR 'WORST CASE'		VERTICAL CIRCULATION ELEMENTS		PEAK DESIGN LOAD 2 MIN HEADWAY - 2020			STAIR CAPACITY 2 MIN	ESCALATOR CAPACITY 90 SEC
	2000	2020	STAIRS	ESC	BOARD	DETRAIN	TOTAL		
Union Station	8,469	13,551	4	4	248	477	725	528	600
Civic Center	7,616	12,185	4	4	201	366	567	528	600
5th/Hill	12,207	19,532	7	5	173	673	846	924	750
7th/Flower	8,632	13,812	3	3	112	420	532	396	450
Wil/Alvarado	5,418	8,669	2	2	191	274	465	264	300
Wil/Vermont	7,101	11,362	2	2	278	331	609	264	300
Wil/Normandie	3,137	5,020	3	1	123	142	265	396	150
Wil/Western	4,880	7,808	2	2	170	249	419	264	300
Wil/Crenshaw	3,473	5,557	2	2	93	205	298	264	300
Wil/LaBrea	1,761	2,818	3	1	50	88	138	396	150
Wil/Fairfax	7,914	12,663	3	3	301	379	680	396	450
Fair/Beverly	2,774	4,439	3	1	110	128	238	396	150
Fair/Santa Monica	3,530	5,648	2	2	136	167	303	264	300
Sunset/LaBrea	2,039	3,263	3	1	84	91	175	396	150
Holl/Cahuenga	3,359	5,375	2	2	141	148	289	264	300
Universal City	5,051	8,082	2	2	137	296	433	264	300
N. Hollywood	5,058	8,093	2	2	135	205	340	264	300

TAMS

Job No. _____ Sheet _____ of _____

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Subject _____ By SIMON

_____ Ch'k. by _____

NORMAL EXITING - PEAK 15 MIN:

STATION: UNION

CALCULATE YEAR 2000 PASSENGERS UNLOADING AT STATION IN PEAK 15 MINUTES OF AM AND PM PEAK.* IDENTIFY AND USE HIGHER LOAD.

AM PEAK

A. OUTBOUND UNLOADING
— × 1/4 = —

B. INBOUND UNLOADING
654 × 1/4 = 164

C. TOTAL UNLOADING
+ = 164

PM PEAK

A. OUTBOUND UNLOADING
— × 1/4 = —

B. INBOUND UNLOADING
2089 × 1/4 = 523

C. TOTAL UNLOADING
+ = 523

USE PM PEAK UNLOADING AS WORST CASE.

AM ENTRAINING
(1805 + —) × 1/4 = 452 IN 3½ MIN PERIOD

PM ENTRAINING
(1087 + —) × 1/4 = 272 IN 3½ MIN PERIOD

*NOTE: YEAR 2000 HEADWAY ASSUMED TO BE 1½ MIN.

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NORMAL EXITING - PEAK 15 MIN:

STATION: CIVIC CENTER

CALCULATE YEAR 2000 PASSENGERS UNLOADING AT STATION IN PEAK 15 MINUTES OF AM AND PM PEAK.* IDENTIFY AND USE HIGHER LOAD.

AM PEAK

A. OUTBOUND UNLOADING
422 × 1/4 = 106

B. INBOUND UNLOADING
1177 × 1/4 = 295

C. TOTAL UNLOADING
106 + 295 = 401

PM PEAK

A. OUTBOUND UNLOADING
204 × 1/4 = 51

B. INBOUND UNLOADING
939 × 1/4 = 235

C. TOTAL UNLOADING
51 + 235 = 285

USE AM PEAK UNLOADING AS WORST CASE.

AM ENTRAINING
(757 + 121) × 1/4 = 220 IN 3½ MIN PERIOD

PM ENTRAINING
(1229 + 484) × 1/4 = 429 IN 3½ MIN PERIOD

*NOTE: YEAR 2000 HEADWAY ASSUMED TO BE 3 MIN.

TAMS

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Subject _____ By SIMON

_____ Ch'k. by _____

NORMAL EXITING - PEAK 15 MIN:

STATION: 5TH & HILL

CALCULATE YEAR 2000 PASSENGERS UNLOADING AT STATION IN PEAK 15 MINUTES OF AM AND PM PEAK.* IDENTIFY AND USE HIGHER LOAD.

AM PEAK

A. OUTBOUND UNLOADING
711 × 1/4 = 178

B. INBOUND UNLOADING
2229 × 1/4 = 558

C. TOTAL UNLOADING
178 + 558 = 736

PM PEAK

A. OUTBOUND UNLOADING
285 × 1/4 = 72

B. INBOUND UNLOADING
848 × 1/4 = 212

C. TOTAL UNLOADING
72 + 212 = 284

USE AM PEAK UNLOADING AS WORST CASE.

AM ENTRAINING
(585 + 172) × 1/4 = 190 IN 3½ MIN PERIOD

PM ENTRAINING
(2704 + 744) × 1/4 = 862 IN 3½ MIN PERIOD

*NOTE: YEAR 2000 HEADWAY ASSUMED TO BE

TAMS

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Subject _____ By SIMON

_____ Ch'k. by _____

NORMAL EXITING - PEAK 15 MIN:

STATION: 7TH & FLOWER

CALCULATE YEAR 2000 PASSENGERS UNLOADING AT STATION IN PEAK 15 MINUTES OF AM AND PM PEAK.* IDENTIFY AND USE HIGHER LOAD.

AM PEAK

A. OUTBOUND UNLOADING
452 × 1/4 = 113

B. INBOUND UNLOADING
1380 × 1/4 = 345

C. TOTAL UNLOADING
113 + 345 = 458

PM PEAK

A. OUTBOUND UNLOADING
353 × 1/4 = 89

B. INBOUND UNLOADING
662 × 1/4 = 166

C. TOTAL UNLOADING
89 + 166 = 255

USE AM PEAK UNLOADING AS WORST CASE.

AM ENTRAINING
(331 + 154) × 1/4 = 122 IN 3½ MIN PERIOD

PM ENTRAINING
(1675 + 548) × 1/4 = 556 IN 3½ MIN PERIOD

*NOTE: YEAR 2000 HEADWAY ASSUMED TO BE

TAMS

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Project _____ Date 4/4/83

Subject _____ By SIMON

_____ Ch'k. by _____

NORMAL EXITING - PEAK 15 MIN:

STATION: WILSHIRE/ALVARADO

CALCULATE YEAR 2000 PASSENGERS UNLOADING AT STATION IN PEAK 15 MINUTES OF AM AND PM PEAK.* IDENTIFY AND USE HIGHER LOAD.

AM PEAK

A. OUTBOUND UNLOADING
278 × 1/4 = 70

B. INBOUND UNLOADING
417 × 1/4 = 105

C. TOTAL UNLOADING
70 + 105 = 175

PM PEAK

A. OUTBOUND UNLOADING
761 × 1/4 = 191

B. INBOUND UNLOADING
438 × 1/4 = 110

C. TOTAL UNLOADING
191 + 110 = 301

USE PM PEAK UNLOADING AS WORST CASE.

AM ENTRAINING
(344 + 855) × 1/4 = 300 IN 3½ MIN PERIOD

PM ENTRAINING
(346 + 487) × 1/4 = 209 IN 3½ MIN PERIOD

*NOTE: YEAR 2000 HEADWAY ASSUMED TO BE _____ MIN.

TAMS

Job No. _____ Sheet _____ of _____

Project _____ Date 4/4/83

Subject _____ By SIMON

_____ Ch'k. by _____

NORMAL EXITING - PEAK 15 MIN:

STATION: WILSHIRE/VERMONT

CALCULATE YEAR 2000 PASSENGERS UNLOADING AT STATION IN PEAK 15 MINUTES OF AM AND PM PEAK.* IDENTIFY AND USE HIGHER LOAD.

AM PEAK

A. OUTBOUND UNLOADING
558 × 1/4 = 140

B. INBOUND UNLOADING
394 × 1/4 = 99

C. TOTAL UNLOADING
140 + 99 = 239

PM PEAK

A. OUTBOUND UNLOADING
1184 × 1/4 = 296

B. INBOUND UNLOADING
261 × 1/4 = 66

C. TOTAL UNLOADING
296 + 66 = 362

USE PM PEAK UNLOADING AS WORST CASE.

AM ENTRAINING
(221 + 810) × 1/4 = 258 IN 3½ MIN PERIOD

PM ENTRAINING
(411 + 808) × 1/4 = 305 IN 3½ MIN PERIOD

*NOTE: YEAR 2000 HEADWAY ASSUMED TO BE

TAMS

Job No. _____ Sheet _____ of _____

Project _____ Date 4/4/83

Subject _____ By SIMON

_____ Ch'k. by _____

NORMAL EXITING - PEAK 15 MIN:

STATION: WILSHIRE/NORMANDIE

CALCULATE YEAR 2000 PASSENGERS UNLOADING AT STATION IN PEAK 15 MINUTES OF AM AND PM PEAK.* IDENTIFY AND USE HIGHER LOAD.

AM PEAK

A. OUTBOUND UNLOADING
183 × 1/4 = 46

B. INBOUND UNLOADING
435 × 1/4 = 109

C. TOTAL UNLOADING
46 + 109 = 155

PM PEAK

A. OUTBOUND UNLOADING
327 × 1/4 = 82

B. INBOUND UNLOADING
235 × 1/4 = 59

C. TOTAL UNLOADING
82 + 59 = 141

USE AM PEAK UNLOADING AS WORST CASE.

AM ENTRAINING
(159 + 376) × 1/4 = 134 IN 3½ MIN PERIOD

PM ENTRAINING
(269 + 347) × 1/4 = 154 IN 3½ MIN PERIOD

*NOTE: YEAR 2000 HEADWAY ASSUMED TO BE

TAMS

Job No. _____ Sheet _____ of _____

Project _____ Date 4/4/83

Subject _____ By SIMON

_____ Ch'k. by _____

NORMAL EXITING - PEAK 15 MIN:

STATION: WILSHIRE/WESTERN

CALCULATE YEAR 2000 PASSENGERS UNLOADING AT STATION IN PEAK 15 MINUTES OF AM AND PM PEAK.* IDENTIFY AND USE HIGHER LOAD.

AM PEAK

A. OUTBOUND UNLOADING
395 × 1/4 = 99

B. INBOUND UNLOADING
278 × 1/4 = 70

C. TOTAL UNLOADING
99 + 70 = 169

PM PEAK

A. OUTBOUND UNLOADING
882 × 1/4 = 221

B. INBOUND UNLOADING
205 × 1/4 = 52

C. TOTAL UNLOADING
221 + 52 = 273

USE PM PEAK UNLOADING AS WORST CASE.

AM ENTRAINING
(201 + 795) × 1/4 = 249 IN 3½ MIN PERIOD

PM ENTRAINING
(242 + 500) × 1/4 = 186 IN 3½ MIN PERIOD

*NOTE: YEAR 2000 HEADWAY ASSUMED TO BE

TAMS

Job No. _____ Sheet _____ of _____

Project _____ Date 4/4/83

Subject _____ By SIMONI

_____ Ch'k. by _____

NORMAL EXITING - PEAK 15 MIN:

STATION: WILSHIRE/CRENSHAW

CALCULATE YEAR 2000 PASSENGERS UNLOADING AT STATION IN PEAK 15 MINUTES OF AM AND PM PEAK.* IDENTIFY AND USE HIGHER LOAD.

AM PEAK

A. OUTBOUND UNLOADING
153 × 1/4 = 39

B. INBOUND UNLOADING
289 × 1/4 = 73

C. TOTAL UNLOADING
39 + 73 = 112

PM PEAK

A. OUTBOUND UNLOADING
542 × 1/4 = 136

B. INBOUND UNLOADING
354 × 1/4 = 89

C. TOTAL UNLOADING
136 + 89 = 225

USE PM PEAK UNLOADING AS WORST CASE.

AM ENTRAINING
(291 + 565) × 1/4 = 214 IN 3½ MIN PERIOD

PM ENTRAINING
(185 + 220) × 1/4 = 102 IN 3½ MIN PERIOD

*NOTE: YEAR 2000 HEADWAY ASSUMED TO BE

TAMS

Job No. _____ Sheet _____ of _____

Project _____ Date 4/4/83

Subject _____ By SIMON

_____ Ch'k. by _____

NORMAL EXITING - PEAK 15 MIN:

STATION: WILSHIRE/LABREA

CALCULATE YEAR 2000 PASSENGERS UNLOADING AT STATION IN PEAK 15 MINUTES OF AM AND PM PEAK.* IDENTIFY AND USE HIGHER LOAD.

AM PEAK

A. OUTBOUND UNLOADING
111 × 1/4 = 28

B. INBOUND UNLOADING
152 × 1/4 = 38

C. TOTAL UNLOADING
28 + 38 = 66

PM PEAK

A. OUTBOUND UNLOADING
253 × 1/4 = 64

B. INBOUND UNLOADING
131 × 1/4 = 33

C. TOTAL UNLOADING
64 + 33 = 97

USE PM PEAK UNLOADING AS WORST CASE.

AM ENTRAINING
(87 + 310) × 1/4 = 100 IN 3½ MIN PERIOD

PM ENTRAINING
(75 + 144) × 1/4 = 55 IN 3½ MIN PERIOD

*NOTE: YEAR 2000 HEADWAY ASSUMED TO BE

TAMS

Job No. _____ Sheet _____ of _____

Project _____ Date 4/4/83

Subject _____ By SIMON

_____ Ch'k. by _____

NORMAL EXITING - PEAK 15 MIN:

STATION: WILSHIRE/FAIRFAX

CALCULATE YEAR 2000 PASSENGERS UNLOADING AT STATION IN PEAK 15 MINUTES OF AM AND PM PEAK.* IDENTIFY AND USE HIGHER LOAD.

AM PEAK

A. OUTBOUND UNLOADING
658 × 1/4 = 172

B. INBOUND UNLOADING
429 × 1/4 = 108

C. TOTAL UNLOADING
172 + 108 = 280

PM PEAK

A. OUTBOUND UNLOADING
1345 × 1/4 = 337

B. INBOUND UNLOADING
308 × 1/4 = 77

C. TOTAL UNLOADING
337 + 77 = 414

USE PM PEAK UNLOADING AS WORST CASE.

AM ENTRAINING
(277 + 1101) × 1/4 = 345 IN 3½ MIN PERIOD

PM ENTRAINING
(387 + 929) × 1/4 = 329 IN 3½ MIN PERIOD

*NOTE: YEAR 2000 HEADWAY ASSUMED TO BE

TAMS

Job No. _____ Sheet _____ of _____

Project _____ Date 4/4/83

Subject _____ By SIMON

_____ Ch'k. by _____

NORMAL EXITING - PEAK 15 MIN:

STATION: FAIRFAX/BEVERLY

CALCULATE YEAR 2000 PASSENGERS UNLOADING AT STATION IN PEAK 15 MINUTES OF AM AND PM PEAK.* IDENTIFY AND USE HIGHER LOAD.

AM PEAK

A. OUTBOUND UNLOADING
213 × 1/4 = 54

B. INBOUND UNLOADING
184 × 1/4 = 46

C. TOTAL UNLOADING
54 + 46 = 100

PM PEAK

A. OUTBOUND UNLOADING
392 × 1/4 = 98

B. INBOUND UNLOADING
166 × 1/4 = 42

C. TOTAL UNLOADING
98 + 42 = 140

USE PM PEAK UNLOADING AS WORST CASE.

AM ENTRAINING
(183 + 404) × 1/4 = 147 IN 3½ MIN PERIOD

PM ENTRAINING
(166 + 316) × 1/4 = 121 IN 3½ MIN PERIOD

*NOTE: YEAR 2000 HEADWAY ASSUMED TO BE

TAMS

Job No. _____ Sheet _____ of _____

Project _____ Date 4/4/83

Subject _____ By SIMON

_____ Ch'k. by _____

NORMAL EXITING - PEAK 15 MIN:

STATION: FAIRFAX / SANTA MONICA

CALCULATE YEAR 2000 PASSENGERS UNLOADING AT STATION IN PEAK 15 MINUTES OF AM AND PM PEAK.* IDENTIFY AND USE HIGHER LOAD.

AM PEAK

A. OUTBOUND UNLOADING
311 × 1/4 = 78

B. INBOUND UNLOADING
419 × 1/4 = 105

C. TOTAL UNLOADING
78 + 105 = 183

PM PEAK

A. OUTBOUND UNLOADING
371 × 1/4 = 93

B. INBOUND UNLOADING
175 × 1/4 = 44

C. TOTAL UNLOADING
93 + 44 = 137

USE AM PEAK UNLOADING AS WORST CASE.

AM ENTRAINING
(187 + 408) × 1/4 = 149 IN 3½ MIN PERIOD

PM ENTRAINING
(256 + 328) × 1/4 = 146 IN 3½ MIN PERIOD

*NOTE: YEAR 2000 HEADWAY ASSUMED TO BE

TAMS

Job No. _____ Sheet _____ of _____

Project _____ Date 4/4/93

Subject _____ By SIMON

Ch'k. by _____

NORMAL EXITING - PEAK 15 MIN:

STATION: SUNSET / LA BREA

CALCULATE YEAR 2000 PASSENGERS UNLOADING AT STATION IN PEAK 15 MINUTES OF AM AND PM PEAK.* IDENTIFY AND USE HIGHER LOAD.

AM PEAK

A. OUTBOUND UNLOADING
257 × 1/4 = 65

B. INBOUND UNLOADING
138 × 1/4 = 35

C. TOTAL UNLOADING
65 + 35 = 100

PM PEAK

A. OUTBOUND UNLOADING
280 × 1/4 = 70

B. INBOUND UNLOADING
47 × 1/4 = 12

C. TOTAL UNLOADING
70 + 12 = 82

USE AM PEAK UNLOADING AS WORST CASE.

AM ENTRAINING
(71 + 299) × 1/4 = 93 IN 3½ MIN PERIOD

PM ENTRAINING
(119 + 196) × 1/4 = 79 IN 3½ MIN PERIOD

*NOTE: YEAR 2000 HEADWAY ASSUMED TO BE

TAMS

Job No. _____ Sheet _____ of _____

Project _____ Date 4/4/33

Subject _____ By SIMON

_____ Ch'k. by _____

NORMAL EXITING - PEAK 15 MIN:

STATION: HOLLYWOOD/CAHUENGA

CALCULATE YEAR 2000 PASSENGERS UNLOADING AT STATION IN PEAK 15 MINUTES OF AM AND PM PEAK.* IDENTIFY AND USE HIGHER LOAD.

AM PEAK

A. OUTBOUND UNLOADING
327 × 1/4 = 82

B. INBOUND UNLOADING
316 × 1/4 = 79

C. TOTAL UNLOADING
82 + 79 = 161

PM PEAK

A. OUTBOUND UNLOADING
421 × 1/4 = 106

B. INBOUND UNLOADING
147 × 1/4 = 37

C. TOTAL UNLOADING
106 + 37 = 143

USE AM PEAK UNLOADING AS WORST CASE.

AM ENTRAINING
(211 + 404) × 1/4 = 154 IN 3½ MIN PERIOD

PM ENTRAINING
(242 + 163) × 1/4 = 102 IN 3½ MIN PERIOD

*NOTE: YEAR 2000 HEADWAY ASSUMED TO BE 3½ MIN.

TAMS

Job No. _____ Sheet _____ of _____

Project _____ Date 4/4/85

Subject _____ By SIMON

Ch'k. by _____

NORMAL EXITING - PEAK 15 MIN:

STATION: UNIVERSAL CITY

CALCULATE YEAR 2000 PASSENGERS UNLOADING AT STATION IN PEAK 15 MINUTES OF AM AND PM PEAK.* IDENTIFY AND USE HIGHER LOAD.

AM PEAK

A. OUTBOUND UNLOADING
325 × 1/4 = 82

B. INBOUND UNLOADING
169 × 1/4 = 43

C. TOTAL UNLOADING
82 + 43 = 125

PM PEAK

A. OUTBOUND UNLOADING
1085 × 1/4 = 271

B. INBOUND UNLOADING
210 × 1/4 = 53

C. TOTAL UNLOADING
271 + 53 = 324

USE PM PEAK UNLOADING AS WORST CASE.

AM ENTRAINING
(211 + 957) × 1/4 = 292 IN 3½ MIN PERIOD

PM ENTRAINING
(186 + 412) × 1/4 = 150 IN 3½ MIN PERIOD

*NOTE: YEAR 2000 HEADWAY ASSUMED TO BE

TAMS

Job No. _____ Sheet _____ of _____

Project _____ Date 4/4/83

Subject _____ By SIMONI

_____ Ch'k. by _____

NORMAL EXITING - PEAK 15 MIN:

STATION: NORTH HOLLYWOOD

CALCULATE YEAR 2000 PASSENGERS UNLOADING AT STATION IN PEAK 15 MINUTES OF AM AND PM PEAK.* IDENTIFY AND USE HIGHER LOAD.

AM PEAK

A. OUTBOUND UNLOADING
567 × 1/4 = 142

B. INBOUND UNLOADING
— × 1/4 = —

C. TOTAL UNLOADING
+ = 142

PM PEAK

A. OUTBOUND UNLOADING
895 × 1/4 = 224

B. INBOUND UNLOADING
— × 1/4 = —

C. TOTAL UNLOADING
+ = 224

USE PM PEAK UNLOADING AS WORST CASE.

AM ENTRAINING
(1329 + —) × 1/4 = 333 IN 3½ MIN PERIOD

PM ENTRAINING
(589 + —) × 1/4 = 148 IN 3½ MIN PERIOD

*NOTE: YEAR 2000 HEADWAY ASSUMED TO BE