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K.L.K.
MAR 15 1985

Mr. Gary S. Spivack, Director
Department of Planning
Southern California Rapid Transit District
425 South Main Street
Los Angeles, CA 90013

Re: General Planning Consultant
Project 1000 - Technical Memorandum 3.5.1
Bus Statistics/Route Analysis Program Documentation -- URAP3, March, 1985

March 13, 1985

Dear Gary:

Please find attached Technical Memorandum 3.5.1 -- Bus Statistics/Route Analysis Program Documentation -- URAP3. This document provides user documentation in the format that we standardized under the Transportation Planning and Modeling Services Contract. Work on this was undertaken primarily by Bill Davidson in the programming, testing, and documentation of the program.

Sincerely,

Peter R. Stopher, Ph.D.
Vice President

cc: Project File 1000(2)
Keith Killough
Charlie Schimpeler
Subconsultants (7)

GENERAL PLANNING CONSULTANT
TECHNICAL MEMORANDUM 3.5.1

BUS STATISTICS/ROUTE ANALYSIS PROGRAM DOCUMENTATION-->URAP3

Prepared for:

Southern California Rapid Transit District

Prepared by:

Barton-Aschman Associates, Inc.

In association with:

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March, 1985

URAP3: BUS STATISTICS/ROUTE ANALYSIS PROGRAM (20OCT84)

SUMMARY

URAP3 is primarily a bus operations analysis program that combines capabilities of the existing UTPS software with a comprehensive set of additional features designed to translate the outputs of a travel demand model forecast into a detailed set of operating statistics. These route specific operating statistics can then be used as input to subsequent operating cost procedures and analyses.

The route analysis program utilizes input from the UTPS programs UNET and ULOAO and a set of generic and line specific parameter values to calculate a series of operating statistics and requirements by individual UTPS route for each of four conditions:

(1) The initial specification of service level as reflected in coded network input to the travel demand models.
(2) The service level required to satisfy the passenger demand as forecasted by the demand models.
(3) The nominal service level resulting from incorporation of minimum and/or maximum system policy levels.
(4) The service level as modified by route specific user specified(override) parameters.

URAP3 provides an analytical capability far more extensive than is available in the TRANSIT USACE SUMMARY produced as REPORT 5 in ULOAD. URAP3 considers parameters such as bus capacities,deadheading characteristics,layover times,hours of operation, and conversion from average weekday to annual operations in calculating service level statistics. The program also provides the mechanism to modify initial line codings or vary control parameters on a line-specific basis or in the creation of new lines(i.e.,turnbacks,etc.)

URAP3 differs primarily from earlier URAP versions in that it explicitly considers base period demand in calculating base period system requirements.

REPORTS

URAP3 reports 1,2, and 3 summarize the input (or default) global parameter, annual parameter, and policy headway values as described in the keyword table section(see below). These three reports are produced for each program execution and as such are not controlled by the user.

(4) LINE RECORD INFORMATION

This optional report summarizes the operating characteristics of each line as coded for input to the UTPS network program UNET. The route distances and times and the headway data are all expressed in tenths.

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LINE	MODE	DIR CODE	AM HDWY	DFPK HDWY	NGHT HDWY	HALF WORDS	NODE COUNT	CIRCLE INDICATOR
1	4	0	150	180	0	223	44	0

TOTAL ROUTE DISTANCE	AM ROUTE TIME	PM ROUTE TIME	OFF-PEAK ROUTE TIME
304	1554	1554	1362

NODE SEQUENCE

4522	4820	4832	4856	4873	4883	4890	49D7	4927	4938
4936	4932	5168	5166	5162	5158	5155	5152	5148	5279
5277	5273	5269	5262	5258	5248	5243	5239	5235	5228
5226	5223	5224	5222	5218	5068	5066	5064	5058	5056
5054	5D53	5050	4680						

(5) MAXIMUM LOAD POINT SUMMARY

This optional report summarizes the four highest ridership links for each network line. Seperate reports are provided for both peak and off-peak volumes. The ridership volume is expressed in units as defined by the peak and off-peak hour factor parameters (PHF and OPHF)

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P E A K V O L U M E S

LINE	DIST	PEAK TIME	OFF TIME	A VOL	A NODE	B NODE	A VOL	A NODE	B NODE	A VOL	A NODE	B NODE
1	304	1740	1525	463	5050	4680	383	5066	5064	383	5064	5056

(6) OPERATING STATISTICS REPORT

This optional report provides the detailed summary of operating statistics for each network line. Vehicle type (VT) normally corresponds to the UTPS mode number (i.e.,mode 4 is vehicle type 1) However,vehicle types 5 through 10 are available for special cases (i.e.,routes served by articulated vehicles). As in report 4, times distances, and headways are all expressed in tenths.
In cases where the service level required as a function of peak-period ridership demand exceeds the level supplied, an asterisk (*) appears next to the maximum load volume. If the base period ridership exceeds the peak period value, a minus symbol (-) indicates this occurence, but notes that it is still within the base period service provision, if not, a plus symbol (+) is reported.

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LINE	VT	DIST	PEAK TIME	OFF TIME	CODED HEADWAY PK	CODED HEADWAY OP	CODED VEH PK	CODED VEH OP	CODED VHT	CODED VMT	MAX LOAD
1	1	304	1740	1525	150	180	12	8	168	1761	463*

LOAD HEADWAY PK	LOAD HEADWAY OP	LOAD VEH PK	LOAD VEH OP	LOAD VHT	LOAD VMT	NOM HEADWAY PK	NOM HEADWAY OP	NOM VEH PK	NOM VEH OP	NOMINAL VHT	NOMINAL VMT
80	120	22	13	288	3019	80	120	22	13	288	3019

(7) COMPRESSED STATISTICS

This optional report is simply a condensed version of report 6, which is provided specifically for use with a 72-column computer terminal or printer.

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LINE	VT	DIST	PEAK TIME	CODED HDY PK	CODED VH PK	MAX LOAD	LOAD HDY PK	LOAD VH PK	NOM HDY PK	NOM VH PK	NOMINAL VHT	NOMINAL VMT
1	1	304	1740	150	12	463*	80	22	80	22	288	3019

(8) SUMMARY OF TOTAL OPERATION STATISTICS(OPTIONAL)

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LINE	VT	DIST	PEAK TIME	OFF TIME	CODED HEADWAY PK	CODED HEADWAY OP	CODED VEH PK	CODED VEH OP	CODED VHT	CODED VMT	MAX LOAD
VT	1	COMPANY=	1			1462		21036			
						1022		245432			

LOAD HEADWAY PK	LOAD HEADWAY OP	LOAD VEH PK	LOAD VEH OP	LOAD VHT	LOAD VMT	NOM HEADWAY PK	NOM HEADWAY OP	NOM VEH PK	NOM VEH OP	NOMINAL VHT	NOMINAL VMT
	1376		19716				1488		20124		
	955		227860				933		235090		

(9) ANNUAL STATISTICS

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A N N U A L S T A T I S T I C S

VT	COMPANY	VHT	VMT	PSGR
1	1	6686786	78115428	459245035

(10) UNDEFINED HEADWAY VALUES

This report summarizes headway values present within the network, for which policy values have not been provided, and LOAD headways are used directly as the nominal values.

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THE FOLLOWING HEADWAYS WERE ENCOUNTERED BY THE PROGRAM AND POLICY VALUES WERE NOT PROVIDED :-
90

(11) EXCESS PASSENGER DEMAND SUMMARY(OPTIONAL)

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EXCESS PASSENGER DEMAND SUMMARY

LINE	VT	PASSENGER BOARDINGS LOAD	NOMINAL
6	1	650	650

(12) OPERATING COST MODEL STATISTICS(OPTIONAL)

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MODE	LINE	VEHICLE TYPE	ROUTE DIST	ROUTE TIME	PEAK VEHICLES	VHT	VMT	PASSENGER BOARDINGS

FILE TABLE

	File Name	DD Name	Function or Contents
	NETWORK	FT11F001	The transit network line file from UNET
I	LEGS1	FT12F001	Loaded legs file from ULOAD for
N			the peak period
P	LEGS2	FT13F001	Loaded legs file from ULOAD for
U			the base period
T	SYSIN	FT05F001	Title and namelist of parameters and options as described in the keyword table.
	SCRATCH	FT20F001	The system scratch file for title and control cards
	LOG	FT21F001	The UTPS log file
O	SYSOUT	FT06F001	Program messages and reports.
U	LINECOST	FT31F001	Binary file containing individual
T			line statistics for input to
P			BUSCOST.
U	TOTCOST	FT33F001	Binary file containing system
T			statistics for input to BUSGOST.
	WORK1	FT16F001	Detailed operating statistics (report 6) work file.
	WORK2	FT17F001	Maximum load point(report 5) work file for the peak period.
S	WORK3	FT18F001	Compressed operating statistics
C			(report 7) work file.
R	WORK4	FT19F001	Undefined headway values
A			(report 6) work file.
T	WORK5	FT22F001	Detailed operating statistics
C			(report 6) work file,new lines.
H	WORK6	FT23F001	Compressed operating statistics (report 7) work file,new lines.
	WORK7	FT30F001	Excess demand (report 11) work file.
	WORK8	FT32F001	Maximum load point(report 5) work file for the base period.

KEYWORD TABLE

	Keyword	Format	Default	Explanation
	NMH	I	11	The number of acceptable headway values(1.1).
&PARAM	MH	I(40)	(1.2)	Coded headway values for which policy values are specified.
	NHEAD	I	11	The number of input policy headway values.
	DT1F	R	0.0	Non-cycle deadhead time factor for a one-way route(1.3).
	DD1F	R	0.0	Non-cycle deadhead distance factor for a one-way route.
	ISDTF	R	0.0	Non-cycle deadhead time factor for a two-way route.
	ISDDF	R	0.0	Non-cycle deadhead distance factor for a two-way route.
	NST	I	0	Neighborhood circulation time (1.4)
	LOT	R	0.0	Layover time factor.
	MODES	I(5)	0	Select modes for analysis.
	NLEG	I	1	The number of peak period sorted loaded leg file inputs (1.5).
	NLEGO	I	1	The number of base period sorted loaded leg file inputs (1.5).
	NVT	I	1	The number of vehicle capacity types.
	VCAP	I(10)	(1.6)	Peak period passenger capacity by vehicle type
	OVCAP	I(10)	(1.6)	Base period passenger capacity by vehicle type
	PHF	R	1.0	The factor used to convert peak period passenger trips to the peak period.
	OPHF	R	1.0	The factor used to convert base period passenger trips to the base period.
	NUMPH	I	5	The number of peak hours.
	NUMOPH	I	13	The number of off-peak or base hours.
	ADFP	R	0.090	The factor used to expand peak hour to average daily passenger miles.
&OPTION	PEROC	L	T	=T; To apply the peak period route time constraint (2.1).
	EXCESS	L	F	=T; To calculate excess passenger demand and produce report 11 (2.2).
	CSTMDL	L	F	=T; To output operating cost model statistics to FT31F001 and FT33F001 and produce report 12.

	Keyword	Format	Default	Explanation
&SELECT	REPORT	I(4)	D	Selection of optional reports desired (4,5,6, or 7)
	NWEEK	I	252	Number of weekdays.
	NSAT	I	57	Number of Saturdays.
	NSUN	I	56	Number of Sundays.
&ANNUAL	SATPH	I	D	Saturday peak hours.
	SATPF	R	D.D	Saturday peak hour factor(3.1)
	SATOH	I	18	Saturday off-peak hours.
	SATOF	R	1.D	Saturday off-peak hour factor(3.2)
	SUNPH	I	D	Sunday peak hours.
	SUNPF	R	D.D	Sunday peak hour factor.
	SUNOH	I	18	Sunday off-peak hours.
	SUNOF	R	0.70	Sunday off-peak hour factor
	SATPAS	R	1.D	Ratio of saturday to average daily passenger miles.
	SUNPAS	R	0.5	Ratio of sunday to average daily passenger miles.
&PLOTCY	ICODE	I		Coded headway value(4.1)
	IMAXP	I		Maximum allowable peak headway(4.2)
	IMAXDP	I		Maximum allowable off-peak headway(4.2)
	IMINDP	I		Minimum off-peak headway(4.2)
	LN	I		Network line number(5.1)
	LM	I		Mode number(5.1)
	VT	I		Vehicle capacity type designator(5.2)
&VEHR	ISDT	R	ISDTF	Non-cycle deadhead time factor
	ISDD	R	ISDDF	Non-cycle deadhead distance factor(5.3)
	DT1	R	DT1F	One-way non-cycle deadhead time factor
	DD1	R	DD1F	One-way non-cycle deadhead distance factor.
	MAXL	I		Maximum allowable passenger load volume
	NSTL	I	NST	Neighborhood circulation time value.
	LOTL	I	LOT	Layover time value
	NEND	I		Namelist read end seperator(=9)(5.4)

	Keyword	Format	Default	Explanation
	NLN	I		User specified new line number(6.1)
	N1T	I		One-way total route time
&	N1D	I		One-way total route distance
N	NCD	I		Total route distance
E	NCT	I		Total route time
W	NNVT	I		Vehicle capacity type designator
L	NLD	I		Maximum load point passenger volume
	NOP	I		Off-peak service indicator (1=yes)
	NOPSR	R		Off-peak service ratio factor.
	NCTD	I		Total route off-peak travel time
	NEND	I		Namelist read end seperator(=99)(6.2)

NOTES

1.0 &PARAM

1.1 Parameters NMH and NHEAD are very similiar. NMH is the toal number of policy values to be used in evaluating loaded headways, while NHEAD simply refers to the number of policy values input for the specific program run.

1.2 Default headway values contained in the program are: 30,40,50,60,75,100,120,150,200,300, and 600 (all are expressed in tenths). Unless all MH values are set to zero, policy values for each of these values are required.

1.3 Values are generally less than 1.0. If deadhead time is equal to five percent of normal round-trip in-service(revenue) time then code DT1F=0.05, and round-trip time will be internally multiplied by 1.05.

1.4 NST is generally used to represent route time spent in turn around loops or other surface streets not included in the UTPS network.

1.5 NLEG and NLEGO refer to the number of ULOAD steps executed prior to SORT and UPRAS. Modal split models which differentiate between auto and walk access are examples of a case where NLEG=2.

1.6 Vehicle types 1-5 are associated with modes 4-8 respectively. Types 6-10 can be used for special cases. The program contains as default values 60 passengers per vehicle for types 1-5 and 0 for types 6-10.

2.0 &OPTION

2.1 This constraint used in the calculation of vehicle requirements, limits the route time to one-half of the total number of peak hours.

2.2 Excess passenger demand is the numerical difference between coded supply(total capacity) and the loaded and nominal demand. Totals by vehicle type provide a measure of total demand in excess of supply.

3.0 &ANNUAL

3.1 SATPF represents the service level relationship of saturday to weekday peak service.

3.2 SATOF represents the service level relationship of saturday to weekday off-peak or base service.

4.0 &POLICY

4.1 An &POLICY card should be present for NHEAD number of MH values.

4.2 IMAXP,IMAXOP, AND IMINOP are all specific to a value of ICODE.

5.0 &OVER

5.1 LN and LM should exist in the UTPS line description file. If a new line is desired the &NEWL should be utilized.

5.2 Vehicle capacity type can be a value different from NVT.

5.3 ISDT,ISDD,DT1,DD1,OPSR,NSTL, and LOTL will be set to their respective global factors if not defined in the &OVER card.

5.4 The program will continue to seek additional &OVER cards until an NEND=9 is encountered. At a minimum, one &OVER card with NEND=9 is required.

6.0 &OVER

6.1 A maximum of fifty(50) new lines can be added per program run.

6.2 The program will continue to seek additional &NEWL cards until an NEND=99 is encountered. At a minimum, one &NEWL card with NEND=99 is required.