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GENERAL PLANNING CONSULTANT

TECHNICAL MEMORANDUM 89.3.6

STATION-TO-STATION TABLES  
/LINKFLOW DIAGRAM  
PROCEDURE DOCUMENTATION

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Prepared for:

Southern California Rapid Transit District

Prepared by:

Schimpeler Corradino Associates

SCRTD General Planning Consultant

June, 1989

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URBAN TRANSPORTATION PLANNING SYSTEM  
STOS / LINKFLOW ----- PROCEDURE SETUP

SUMMARY

The STOS/LINKFLOW procedure is a newly-developed JCL run stream useful for Metro Rail planning. The purpose of this procedure is to produce station-to-station trip tables and the link flow (or "diamond") diagrams for the daily, the a.m. peak hour, and the p.m. peak hour periods. This procedure follows the mode-of-arrival step in the SCRTD travel demand simulation stream. This procedure contains the following steps:

1. UMATRIX to aggregate the 23 station-to-station trip tables produced from the mode-of-arrival step (the results are in P-A format),
2. UMATRIX to convert the above aggregated trip tables from P-A into O-D format,
3. UFMTR to print in detail the station-to-station trip tables,
4. HNET to build N1 and Z1 files for the highway network representation of the rail network,
5. UROAD to load the aggregated daily station-to-station trip table onto the HNET rail network,
6. UROAD to load the aggregated a.m. peak hour station-to-station trip table onto the HNET rail network, and
7. UROAD to load the aggregated p.m. peak hour station-to-station trip table onto the HNET rail network.

The JCL run stream is saved in the MRP.DRIVER.CNTL(LINKFLOW) library. A CLIST procedure has been written and saved in the MRP.DRIVER.CLIST(LINKFLOW) library. This CLIST procedure can be invoked from the UDRIVE primary menu.

FILE TABLE -- UMATRIX STEP

This step reads the 23 parking capacity-restrained station-to-station trip tables produced from the mode-of-arrival step, and produces the daily, a.m. peak hour, and p.m. peak hour aggregated trip tables in P-A format:

	FILE NAME	DDNAME	CONTENTS OR FUNCTION
	SYSIN	FT05F001	PROGRAM CONTROL CARDS
I			
N	J1	FT11F001	PARKING CAPACITY RESTRAINED STATION-
P			TO-STATION TRIP TABLE,
U			(E.G. MRP.MYEARALT.MOA.STOS23.
T			HALFPA.AJD )
O	-	FT06F001	PROGRAM REPORTS AND MESSAGES.
U			
T	J9	FT19F001	OUTPUT DATASET &&STOSPA, CONTAINING
P			3 TABLES IN P-A FORMAT:
U			
T			J901 -- DAILY RAIL TRIPS,
			J902 -- A.M. PEAK HOUR RAIL TRIPS,
			J903 -- P.M. PEAK HOUR RAIL TRIPS.



FILE TABLE -- UMATRIX STEP

This step reads the 3 station-to-station trip tables (i.e. those in the daily, a.m. peak hour, and p.m. peak hour periods) and then converts those into O-D format.

	FILE NAME	DDNAME	CONTENTS OR FUNCTION
I	SYSIN	FT05F001	PROGRAM CONTROL CARDS
N			
P	J1	FT11F001	OUTPUT J9 FILE FROM PREVIOUS UMATRIX
U			STEP (I.E. &&STOSPA)
T			
O	-	FT06F001	PROGRAM REPORTS AND MESSAGES.
U			
T	J9	FT19F001	OUTPUT DATASET &&STOSOD, CONTAINING
P			3 TABLES IN O-D FORMAT:
U			
T			J901 -- DAILY RAIL TRIPS,
			J902 -- A.M. PEAK HOUR RAIL TRIPS,
			J903 -- P.M. PEAK HOUR RAIL TRIPS.

FILE TABLE -- UFMTR STEP

This step reads the 3 station-to-station trip tables (i.e. those in the daily, a.m. peak hour, and p.m. peak hour periods) and prints all cells in these three station-to-station trip tables.

	FILE NAME	DDNAME	CONTENTS OR FUNCTION
I	SYSIN	FT05F001	PROGRAM CONTROL CARDS
N			
P	J1	FT11F001	OUTPUT J9 FILE FROM PREVIOUS UMATRIX
U			STEP (I.E. &&STOSOD)
T			
O	-	FT06F001	PROGRAM REPORTS AND MESSAGES.
U			
T			
P			
U			
T			

FILE TABLE -- HNET STEP

This step reads the highway network representation of rail links and creates N1 and Z1 files in the HNET environment:

	FILE NAME	DDNAME	CONTENTS OR FUNCTION
I			
N	SYSIN	FT05F001	PROGRAM CONTROL CARDS
P			
U	LINKS	FT02F001	RAIL NETWORK CODED IN HNET FORMAT
T			
O	-	FT06F001	PROGRAM REPORTS AND MESSAGES.
U			
T	N1	U1	OUTPUT DATASET &&NN1, AN HNET LINK
P			N-FILE, CONTAINING DIRECTION IN-
U			DICATOR, ANODE, BNODE, LINK DIS-
T			TANCE, SPEED, TRAVEL TIME, NUMBER OF
			LANES, FACILITY TYPE, AREA TYPE,
			AND GEOGRAPHIC LOCATION OF EACH
			RAIL LINK.
	Z1	Z1	OUTPUT DATASET &&ZZ1, AN HNET LINK
			Z-FILE, CONTAINING ALL INFORMATION
			IN THE N-FILE IN DIFFERENT FORMAT.

FILE TABLE -- UROAD STEPS

This step loads trip tables &&STOSOD to the rail network HNET Z1 file three times, once for each period:

	FILE NAME	DDNAME	CONTENTS OR FUNCTION
I	SYSIN	FT05F001	PROGRAM CONTROL CARDS
N	J1	FT11F001	J904, J905, J906 OF &&STOSOD
P	Z1	Z1	&ZZ1 FROM HNET STEP
U			
T			
I			
O			
U			
P	-	FT06F001	PROGRAM REPORTS AND MESSAGES.
T			
U			
T			

## EXECUTION TIME

It requires 4.55 CPU seconds to execute STOS/LINKFLOW on an 3083 with 16 rail stations in the network.

## INPUT CARD FORMATS

LINKS cards are needed as input to the HNET step:

COLUMNS	
1	ALWAYS CODED WITH 'A'
2	DIRECTIONAL CODE, EQUAL TO '1' FOR A ONE-WAY LINK, AND '2' FOR A TWO-WAY LINK
3 - 7	A NODE NUMBER, RIGHT JUSTIFIED
8 - 12	B NODE NUMBER, RIGHT JUSTIFIED
16 - 16	LINK DISTANCE, SET TO ZERO
19 - 19	FACILITY TYPE, SET TO 5
20 - 20	AREA TYPE, SET TO 1
31 - 31	TIME/SPEED INDICATOR, SET TO 'T'
34 - 34	TRAVEL TIME, SET TO ZERO
39 - 44	LINK CAPACITY, SET TO INFINITY (32767)
49 - 49	NUMBER OF LANES, SET TO 1

SAMPLE PRODUCTION RUN SETUP

```
//YOURIDDM JOB (09404,4200), 'NEW MOA DIAMOND',MSGLEVEL=(1,1),
//      NOTIFY=YOURID,MSGCLASS=X,CLASS=B,
//      USER=YOURID,PASSWORD=????????
//*JOBPARM  PROCLIB=PROC01,LINECT=61,SYSAFF=*
//* * * * *
//*
//*   SUBMITTED FROM   MRP.DRIVER.CNTL(LINKFLOW)
//*
//* * * * *
//UROAD84  PROC CLASS=A,CORE=320K,
//      LIB='MRP.URD84.PROGLIB',UNITLIB=SYSDA,
//      PLOTLIB='MRP.URD84.PROGLIB',
//      J1=DUMMY,UNITJ1=TAPE,
//      J2=DUMMY,UNITJ2=TAPE,
//      J3=DUMMY,UNITJ3=TAPE,
//      J4=DUMMY,UNITJ4=TAPE,
//      J8=DUMMY,UNITJ8=TAPE,
//      J9=DUMMY,UNITJ9=TAPE,
//      Z1=DUMMY,UNITZ1=SYSDA,
//      Z2=DUMMY,UNITZ2=SYSDA,
//      PATH=DUMMY,UNITPAT=TAPE,
//      TURNS=DUMMY,UNITTUR=TAPE,
//      PLOTTER=DUMMY,UNITPLO=TAPE,
//      UNITSCR=SYSDA
//*****
//*   UTPS PROCEDURE FOR UROAD - 30SEP82
//*   TO ASSIGN VEHICLE TRIPS TO A HIGHWAY NETWORK
//*   CONTACT:  UTPS SUPPORT GROUP (800) 638-8747
//*****
//*   SYMBOLIC DICTIONARY
//* * * * *
//*   CLASS   = PRINT CLASS
//*   CORE    = REGION SIZE
//*   LIB     = PROGRAM LIBRARY
//*   PLOTLIB = PROGRAM LIBRARY FOR PLOT STEP
//*   J1-J4   = J-FILES CONTAINING TRIP TABLES TO BE ASSIGNED
//*   J8      = OUTPUT J-FILE FOR TRIP TABLE(S) GENERATED
//*           BY A SELECTED-LINK ASSIGNMENT
//*   J9      = OUTPUT J-FILE CONTAINING SELECTED SKIM TABLES
//*   Z1      = Z-FILE CONTAINING HWY LINK ATTRIBUTES;
//*           UROAD LINK LAVS ARE OUTPUT TO Z1
//*   Z2      = Z-FILE CONTAINING NODE ATTRIBUTES
//*           USED FOR PLOTTING BY H PLOT
//*   PATH    = PATH FILE GENERATED FOR PLOTTING OR FOR NAG
//*   TURNS   = CARD IMAGE FILE CONTAINING TURN VOLUMES FOR
//*           SELECTED INTERSECTIONS
//*   PLOTTER = CALCOMP PLOT FILE FOR INPUT TO MECHANICAL PLOTTER *
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//*****
//*           DATA CARD FILES                                     *
//* * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
//*       SYSIN       = UROAD CONTROL CARDS,                       *
//*                   OPTIONAL TURN PENALTY CARDS, AND            *
//*                   IMPACT RATE UPDATE CARDS                    *
//*       MICRO       = MICRO INTERSECTION CARDS                  *
//*****
//*
//*
//UROAD EXEC PGM=UROAD,REGION=&CORE
//*****
//*
//*       THIS STEP EXECUTES PROGRAM UROAD TO BUILD PATHS,        *
//*       ASSIGN TRIPS, AND/OR SKIM PATHS                          *
//*
//*****
//STEPLIB DD DSN=&LIB,UNIT=&UNITLIB,DISP=SHR
//FT03F001 DD &TURNS,UNIT=&UNITTUR,DISP=(,KEEP),
//           DCB=(RECFM=FB,LRECL=80,BLKSIZE=800)
//FT04F001 DD DDNAME=MICRO
//FT05F001 DD DDNAME=SYSIN
//FT06F001 DD SYSOUT=&CLASS
//FT08F001 DD UNIT=&UNITSCR,SPACE=(TRK,(10,19)),
//           DCB=(RECFM=VBS,LRECL=2004,BLKSIZE=2008)
//FT09F001 DD UNIT=&UNITSCR,SPACE=(TRK,(10,19)),
//           DCB=(RECFM=VBS,LRECL=1004,BLKSIZE=1008)
//FT10F001 DD UNIT=&UNITSCR,SPACE=(TRK,(10,19)),
//           DCB=(RECFM=VBS,LRECL=2004,BLKSIZE=2008)
//FT11F001 DD &J1,UNIT=&UNITJ1,DISP=SHR
//FT12F001 DD &J2,UNIT=&UNITJ2,DISP=SHR
//FT13F001 DD &J3,UNIT=&UNITJ3,DISP=SHR
//FT14F001 DD &J4,UNIT=&UNITJ4,DISP=SHR
//FT17F001 DD &PATH,UNIT=&UNITPAT,DISP=(,KEEP),
//           DCB=(RECFM=VBS,LRECL=1604,BLKSIZE=1608)
//FT18F001 DD &J8,UNIT=&UNITJ8,DISP=(,KEEP),
//           DCB=(RECFM=VBS,LRECL=1604,BLKSIZE=1608)
//FT19F001 DD &J9,UNIT=&UNITJ9,DISP=(,KEEP),
//           DCB=(RECFM=VBS,LRECL=1604,BLKSIZE=1608)
//FT20F001 DD UNIT=&UNITSCR,
//           DISP=(,PASS),SPACE=(TRK,(1,1)),
//           DCB=(RECFM=FB,LRECL=72,BLKSIZE=720)
//FT21F001 DD DSN=MRP.URD84.LOG,DISP=(SHR,PASS)
//FT24F001 DD UNIT=&UNITSCR,SPACE=(TRK,(1,5)),
//           DCB=(RECFM=VBS,LRECL=2004,BLKSIZE=2008)
//FT49F001 DD UNIT=&UNITSCR,DISP=(,PASS),
//           SPACE=(TRK,(1,1)),
//           DCB=(RECFM=FB,LRECL=72,BLKSIZE=144)
//Z1 DD &Z1,UNIT=&UNITZ1,DISP=OLD,
//           DCB=BUFNO=1

```

```

//*
//*
//H PLOT EXEC PGM=H PLOT,COND=(20,NE,UROAD),REGION=&CORE
//*****
//*
//* THIS STEP EXECUTES PROGRAM H PLOT TO PLOT THE *
//* HIGHWAY NETWORK OR ITS MINIMUM PATH TREES *
//*
//*****
//STEPLIB DD DSN=&PLOTLIB,UNIT=&UNITLIB,DISP=SHR
//FT05F001 DD DSN=*.UROAD.FT20F001,DISP=(OLD,DELETE)
//FT06F001 DD SYSOUT=&CLASS
//FT17F001 DD &PATH,UNIT=&UNITPAT,DISP=SHR
//FT20F001 DD UNIT=&UNITSCR,SPACE=(TRK,(1,1)),DISP=(,PASS),
// DCB=(RECFM=FB,LRECL=72,BLKSIZE=720)
//FT21F001 DD DSN=*.UROAD.FT21F001,DISP=SHR
//FT22F001 DD &PLOTTER,UNIT=&UNITPLO,DISP=(,KEEP),
// LABEL=(1,BLP),DCB=DEN=2
//FT49F001 DD DSN=*.UROAD.FT49F001,DISP=(OLD,DELETE)
//Z1 DD &Z1,UNIT=&UNITZ1,DISP=SHR,
// DCB=BUFNO=1
//Z2 DD &Z2,UNIT=&UNITZ2,DISP=SHR,
// DCB=BUFNO=1
// PEND
//*
//STEP1 EXEC UMATRIX,CLASS=X,CORE=1536K,LIB='MRP.URD84.PROGLIB',
// J1='DSN=INSTOS',UNITJ1=SYSDA,
// J9='DSN=&&STOSPA',UNITJ9=SYSDA
//UMATRIX.FT11F001 DD DISP=SHR
//UMATRIX.FT19F001 DD DISP=(,PASS),SPACE=(TRK,(2,1),RLSE),
// UNIT=SYSDA
//UMATRIX.SYSIN DD *
UMATRIX RUN TO MERGE 23 STOS TABLES
&PARAM SIZE=NSTNS,
J901.HBW TRIPS='J101+J102+J103+J104+J105+J106+J107',
J902.HOOOOW TT='J108+J109+J110+J111+J112+J113',
J903.PA TRIPS='J101+J102+J103+J104+J105+J106+J107+J108+J109+
J110+J111+J112+J113' &END
&SELECT I=1,-NSTNS &END
//*
//STEP2 EXEC UMATRIX,CLASS=X,CORE=1536K,LIB='MRP.URD84.PROGLIB',
// J1='DSN=&&STOSPA',UNITJ1=SYSDA,
// J9='DSN=&&STOSOD',UNITJ9=SYSDA
//UMATRIX.FT11F001 DD DISP=(OLD,PASS)
//UMATRIX.FT19F001 DD DISP=(,PASS),SPACE=(TRK,(2,1),RLSE),
// UNIT=SYSDA
//UMATRIX.SYSIN DD *
UMATRIX RUN TO CREATE DAILY,AMHR AND PMHR TRIPS
&PARAM SIZE=NSTNS,
J901.DAILY TRIPS='J103+TR(J103)',

```



```

J902.AM HR TRIPS='0.333*(0.782*J101+0.018*(TR(J101))+
                0.250*J102+0.050*(TR(J102)))',
J903.PM HR TRIPS='0.333*(0.032*J101+0.608*(TR(J101))+
                0.174*J102+0.326*(TR(J102)))'   &END
&SELECT I=1,-NSTNS                               &END
/**
//UFMTR EXEC UFMTR,J1='DSN=&&STOSOD',LIB='MRP.URD84.PROGLIB'
//UFMTR.SYSIN DD *
PRINT STATION-TO-STATION TRIP TABLE --- DAILY, A.M. HOUR, P.M. HOUR
&PARAM TABLES=101,102,103
        TITLE1='DAILY',TITLE2='A.M. HOUR',
        TITLE3='P.M. HOUR'                               &END
&SELECT I1=1,-NSTNS, J1=1,-NSTNS, REPORT=4          &END
/**
//BUILDH EXEC HNET,CLASS=X,CORE=1536K,SPACES2='(TRK,(500),RLSE)',
//      N1='DSN=&&NN1',
//      UNITN1='SYSDA',
//      DISPN1='(NEW,PASS)',
//      SPACEN1='(TRK,(50,10),RLSE)',
//      Z1='DSN=&&Z1',
//      UNITZ1='SYSDA',
//      DISPZ1='(NEW,PASS)',
//      SPACEZ1='(TRK,(50,10),RLSE)'
//HNET.LINKS DD DSN=RHNET,DISP=SHR
//HNET.SYSIN DD *
HNET RUN FOR DIAMOND
&PARAM ZONES=NSTNS,NODES=MNODE                       &END
&SELECT REPORT=1,NSTNS,Z1LAVS='A','B','D','DC','FFT','FT','AT',
        'NL','C'                                       &END
/*
/**
//DAILY EXEC UROAD84,CORE=400K,
//      Z1='DSN=&&Z1',UNITZ1=SYSDA,
//      J1='DSN=&&STOSOD',UNITJ1=SYSDA
//UROAD.FT06F001 DD SYSOUT=X
//UROAD.FT11F001 DD UNIT=SYSDA,DISP=(OLD,PASS)
//UROAD.Z1 DD UNIT=SYSDA,DISP=(OLD,PASS)
//UROAD.SYSIN DD *
UROAD RUN FOR STOSOD LINK TRIPS - DAILY TRIP TABLE
&PARAM TABLES=101,THRU=1,LAVN=1                     &END
&SELECT T=101,-MNODE,REPORT=4                         &END
/*
//AMHR EXEC UROAD84,CORE=400K,
//      Z1='DSN=&&Z1',UNITZ1=SYSDA,
//      J1='DSN=&&STOSOD',UNITJ1=SYSDA
//UROAD.FT06F001 DD SYSOUT=X
//UROAD.FT11F001 DD UNIT=SYSDA,DISP=(OLD,PASS)
//UROAD.Z1 DD UNIT=SYSDA,DISP=(OLD,PASS)
//UROAD.SYSIN DD *
UROAD RUN FOR STOSOD LINK TRIPS - AM HR TRIP TABLE

```

```
&PARAM TABLES=102,THRU=1,LAVN=2          &END
&SELECT T=101,-MNODE,REPORT=4              &END
/*
//PMHR      EXEC UROAD84,CORE=400K,
//          Z1='DSN=&&Z1',UNITZ1=SYSDA,
//          J1='DSN=&&STOSOD',UNITJ1=SYSDA
//UROAD.FT06F001 DD SYSOUT=X
//UROAD.FT11F001 DD UNIT=SYSDA,DISP=(OLD,PASS)
//UROAD.Z1 DD UNIT=SYSDA,DISP=(OLD,PASS)
//UROAD.SYSIN DD *
UROAD RUN FOR STOSOD LINK TRIPS - PM HR TRIP TABLE
&PARAM TABLES=103,THRU=1,LAVN=3          &END
&SELECT T=101,-MNODE,REPORT=4              &END
/*
```

LINKS FILE FOR AN EXAMPLE RAIL NETWORK --- CONTENTS OF  
MRP.NETWORK.MYEARALT.DATA(RAILHNET)

Suppose a rail network has 16 stations in two branches. The west branch has stations No. 1, 2, 3, 4, 5, 6, 7, 8. The north branch has stations No. 1, 2, 3, 4, 5, 6, 9, 10, 11, 12, 13, 14, 15, 16. Stations No. 1 through 6 are common to both branches. The set of RAILHNET links contains two parts. The first 16 links are the zonal connectors, linking the 16 station nodes with the 16 pseudo trip production/attraction zone nodes. These zonal connectors are followed by the network representation of the rail network. Each segment linking two stations in the rail network will be coded as a record in the file.

```

1---5---10---15---20---25---30---35---40---45---50---55
A2   1   101   0   51           T   0   32767   1
A2   2   102   0   51           T   0   32767   1
A2   3   103   0   51           T   0   32767   1
A2   4   104   0   51           T   0   32767   1
A2   5   105   0   51           T   0   32767   1
A2   6   106   0   51           T   0   32767   1
A2   7   107   0   51           T   0   32767   1
A2   8   108   0   51           T   0   32767   1
A2   9   109   0   51           T   0   32767   1
A2  10  110   0   51           T   0   32767   1
A2  11  111   0   51           T   0   32767   1
A2  12  112   0   51           T   0   32767   1
A2  13  113   0   51           T   0   32767   1
A2  14  114   0   51           T   0   32767   1
A2  15  115   0   51           T   0   32767   1
A2  16  116   0   51           T   0   32767   1
A2 101  102   0   51           T   0   32767   1
A2 102  103   0   51           T   0   32767   1
A2 103  104   0   51           T   0   32767   1
A2 104  105   0   51           T   0   32767   1
A2 105  106   0   51           T   0   32767   1
A2 106  107   0   51           T   0   32767   1
A2 107  108   0   51           T   0   32767   1
A2 106  109   0   51           T   0   32767   1
A2 109  110   0   51           T   0   32767   1
A2 110  111   0   51           T   0   32767   1
A2 111  112   0   51           T   0   32767   1
A2 112  113   0   51           T   0   32767   1
A2 113  114   0   51           T   0   32767   1
A2 114  115   0   51           T   0   32767   1
A2 115  116   0   51           T   0   32767   1
1---5---10---15---20---25---30---35---40---45---50---55

```

