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GENERAL PLANNING CONSULTANT:
TECHNICAL MEMORANDUM 88.3.6
PROGRAM DOCUMENTATION -- READPTH

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URBAN TRANSPORTATION PLANNING SYSTEM

READPTH : READ PATH PROGRAM

SUMMARY

READPTH is a UTPS compatible utility program which reads a UTPS tree (path) file, checks for the existence of rail modes in the path, and produces eight output tables useful for Mode-of-Arrival estimation. The rail modes in READPTH program are assumed to be Modes 6 and 7, consistent with the modal convention adopted at SCRID. The eight output tables are written in standard UTPS format and saved as a single merged dataset on file J9. These eight tables are:

TABLE NO	NAME	CONTENTS
J9001	B-R XFER	Rail station node, if bus-to-rail transfer exists; 0, otherwise.
J9002	Z-R DIRECT	Rail station node, if zone-to-rail direct access is available; 0, otherwise.
J9003	Z-R DIST	Distance from zone to direct access rail station, if J9002 > 0; 0, otherwise.
J9004	Z-R DIVRSN	Proportion of zone-direct-to-rail walk access trips using bus as access to rail; 0, otherwise.
J9005	R-B XFER	Rail station node, if rail-to-bus transfer exists; 0, otherwise.
J9006	R-Z DIRECT	Rail station node, if rail-to-zone direct egress is available; 0, otherwise.
J9007	R-Z DIST	Direct egress distance from rail station to zone, if J9006 > 0; 0, otherwise.
J9008	R-Z DIVRSN	Proportion of rail-direct-to-zone walk egress trips using bus as egress from rail; 0, otherwise.

Tables J9001 to J9004 are useful for identifying bus arrivals against walk, park-and-ride (pnr), or kiss-and-ride (knr) arrivals, whereas Tables J9005 to J9008 are used to distinguish bus against walk, pnr, or knr departures from each rail egress station. Tables J9004 and J9008 are developed based on the four diversion curves provided in Appendix A and are used for walk access and walk egress trips only.

MECHANICS

The program first opens a path file and reads a path. If the path does not contain a rail mode (mode 6 or 7) it puts value 0 in all 8 tables and continues read the next path. If the path contains rail mode then it further checks whether rail mode is directly connected to the zone centroid by non-transit modes (1, 2, or 3), or indirectly connected through a bus mode (4, 5, or 8). If bus mode has been used before rail is reached, the access rail station node number is flagged in J9001, and value 0 will be put into J9002 to J9004. If bus mode was not used before boarding rail, this path must have connected the zone and the rail station directly. Thus, J9001 will be flagged 0 and J9002 will be flagged with the rail station node number. The distance in hundredth of miles between the centroid of the origin zone and the access rail station is then computed and put in J9003.

J9004 is a special diversion factor used for walk access to rail station trips only. It is irrelevant for the paths involving park-and-ride and/or kiss-and-ride access modes to rail stations. When the walk-access path shows that there is a direct walk connection from the origin zone to the access rail station, READPTH program checks which of the four station types (CBD, kiss-and-ride, potential kiss-and-ride, and park-and-ride) the access station falls into. It then determines the diversion factor in hundredth by one of the diversion graphs in Appendix A. This diversion factor enables the mode-or-arrival process to divert some walk access trips to bus access at each rail station due to the fact that some walk trips originating from the boundaries for the zone may not use walk access to the rail station although the minimum path shows all trips from the zone walk directly to the rail station.

J9005 to J9008 are produced by the same manner as that applied to J9001 to J9004 except that the paths had been reversed when producing these tables. With this reverse process J9001 to J9004 contain values of access rail station nodes, access distances, and access diversion factors, whereas J9005 to J9008 contain values of egress rail station nodes, egress distances, and egress diversion factors.

MESSAGES

0010 F (FATAL) UCHECK ERROR WHEN CHECKING FILE XXXXXXXX.
0020 F (FATAL) UJWRT ERROR WHEN OPENING J9 FILE.
1010 W (WARNING) FOLLOWING NNNN ORIGIN ZONES NOT IN PATH FILE.
1020 F (FATAL) LINE OVERFLOW; ARRAY OV EXHAUSTED,
HAVE PROGRAMMER INCREASE OV ARRAY SIZE.
2010 F (FATAL) UJOUT OUT ERROR IN WRITING BUS-RAIL XFER.
2020 F (FATAL) UJOUT OUT ERROR IN WRITING WALK-RAIL XFER.
2030 F (FATAL) UJOUT OUT ERROR IN WRITING WALK-RAIL DISTANCE.
2040 F (FATAL) UJOUT OUT ERROR IN WRITING WALK-RAIL DIVERSION.
2050 F (FATAL) UJOUT OUT ERROR IN WRITING RAIL-BUS XFER.
2060 F (FATAL) UJOUT OUT ERROR IN WRITING RAIL-WALK XFER.
2070 F (FATAL) UJOUT OUT ERROR IN WRITING RAIL-WALK DISTANCE.
2080 F (FATAL) UJOUT OUT ERROR IN WRITING RAIL-WALK DIVERSION.

FILE TABLE

FILE NAME	DDNAME	CONTENTS OR FUNCTION
SYSIN	FT05F001	PROGRAM CONTROL CARDS
PATH	FT12F001	TRANSIT PATH FILE (E.G. MRP.MYEARALT.WPTH)
TNETAM3	FT13F001	TRANSIT LINK DESCRIPTION (E.G. MRP.TNET.MYEARALT.AM3)
TNETAM4	FT14F001	TRANSIT A-NODE TABLE (E.G. MRP.TNET.MYEARALT.AM4)
TNETAM5	FT15F001	TRANSIT COORDINATE TABLE (E.G. MRP.TNET.MYEARALT.AM5)
LOG	FT21F001	UTPS LOG FILE (E.G. MRP.URD79.LOG)
COORD	FT24F001	TRANSIT COORDINATE FILE (E.G. MRP.COORD.FOP.DATA)
PKCOST	FT25F001	PARKING COST AT EACH STATION (E.G. MRP.MOA.STATION.DATA(MYEARALT))
EQVTBL	FT26F001	EQUIVALENCE TABLE CONVERTING STATION NUMBER TO UNET NODE NUMBER (E.G. MRP.STATION.NODE.DATA(MYEARALT))
-	FT06F001	PROGRAM REPORTS AND MESSAGES.
J9	FT19F001	OUTPUT DATASET CONTAINING 8 TABLES. (E.G. MRP.MYEARALT.WXFER)

KEYWORD TABLE

KEYWORD	TYPE	DEFAULT	MAX	VALUE OR PURPOSE
ZONES	I	1628	1628	MAX NUMBER OF ORIGIN ZONES IN PATH TO BE READ
NODES	I	8191	8191	MAX NODE NUMBER IN COORD FILE
PRTZN	I	0	1628	TO PRINT ALL PATHS FROM PRTZN TO ALL DEST ZONES FOR CHECKING PURPOSE
PROB1	F(11)	NONE	NONE	PROPORTION USING BUS-RAIL IN WLK-RAIL TRIPS (STA TYP 1)
PROB2	F(11)	NONE	NONE	PROPORTION USING BUS-RAIL IN WLK-RAIL TRIPS (STA TYP 2)
PROB3	F(11)	NONE	NONE	PROPORTION USING BUS-RAIL IN WLK-RAIL TRIPS (STA TYP 3)
PROB4	F(11)	NONE	NONE	PROPORTION USING BUS-RAIL IN WLK-RAIL TRIPS (STA TYP 4)

SUBROUTINES CALLED

NAME	CALLED BY	CALLS	PURPOSE OR FUNCTION	PARAMS
MAIN	NONE	SIGNON UCHECK UFILES TOPEN TREAD TGET TLINES RBXFER BRXFER DIVERS UJWRT UJOUT UMSG SINOFF	MAIN PROGRAM (READPTH) 1.READ ALL CONTROL CARDS 2.VALIDITY CHECKS 3.INITIALIZE ALL VALUES 4.CALLING ALL SUBROUTINES	NONE
SIGNON	MAIN		UTPS PROGRAM - INITIALIZE JOB	
UCHECK	MAIN		UTPS PROGRAM - CHECK INPUTS	
UFILES	MAIN		UTPS PROGRAM - CHECK FILE DD	
TOPEN	MAIN		UTPS PROGRAM - OPEN PATH FILE	
TREAD	MAIN		UTPS PROGRAM - READ PATH FILE	
TGET	MAIN		UTPS PROGRAM - CHECK PATH	
TLINES	MAIN		UTPS PROGRAM - SUMMARIZE PATH	
RBXFER	MAIN	NONE	CHECK RAIL-BUS XFER IN PATH	
BRXFER	MAIN	NONE	CHECK BUS-RAIL XFER IN PATH	
DIVERS	MAIN	NONE	DIVERT SOME WALK-RAIL TRIPS TO WALK-BUS-RAIL TRIPS	
UJWRT	MAIN		UTPS PROGRAM - OPEN OUTPUT FILE	
UJOUT	MAIN		UTPS PROGRAM - WRITE TO OUTPUT FILE	
UMSG	MAIN		UTPS PROGRAM - PRINT MESSAGE	

SIGNOFF	MAIN			UTPS PROGRAM - PRINT CPU TIME		
				AND RETURN CODE		
+-----+-----+-----+-----+-----+						

EXECUTION TIME

- (1) 4.41 CPU minutes to execute READPTH on an 3083 with:
ZONES=1628, NODES=8091, and PRTZN=0.

INPUT CARD FORMATS

- (1) PATH, TNETAM3, TNETAM4, TNETAM5, and LOG are all binary files in UTPS format.
- (2) COORD file is standard UTPS text input file.

COLUMNS	
1	"4" MUST BE IN COL. 1 OF ALL COORD CARDS
3 - 6	NODE NUMBER, RIGHT JUSTIFIED
13 - 20	X COORDINATE, RIGHT JUSTIFIED. DECIMALS MAY BE INCLUDED
23 - 30	Y COORDINATE, RIGHT JUSTIFIED. DECIMALS MAY BE INCLUDED

- (3) PKCOST file

COLUMNS	
1 - 4	STATION NUMBER
7 - 10	PARKING CAPACITY AT THE STATION
13 - 15	PARKING COST IN CENTS
50 - 50	STATION TYPE 1 = CBD STATION 2 = OFFICIAL KISS-AND-RIDE STATION 3 = POTENTIAL KISS-AND-RIDE STATION 4 = OFFICIAL PARK-AND-RIDE STATION

(4) EQVTBL file

COLUMNS	
1 - 4	UNET NODE NUMBER FOR THE STATION
5 - 8	STATION NUMBER IN PKCOST FILE

SAMPLE PRODUCTION RUN SETUP

(1) USING IN-STREAM PROC TO EXECUTE READPTH PROGRAM

```
//READPATH PROC CORE=1024K,
//      NETPRFX=CORE3CA6,
//      COORD='DSN=MRP.COORD.CORE2.DATA',
//      PATH='DSN=&&WPTH',UNITPAT=SYSDA,
//      J9='DSN=&&AMWXFER',UNITJ=3380
//READPTH EXEC PGM=READPTH,REGION=&CORE
//STEPLIB DD DSN='MRP.DRIVER.LMOD',DISP=SHR
//FT05F001 DD DDNAME=SYSIN
//FT06F001 DD SYSOUT=X
//FT08F001 DD DSN=&&FT08,DISP=(,PASS),UNIT=SYSDA,
//      DCB=(RECFM=FB,LRECL=80,BLKSIZE=1600),
//      SPACE=(TRK,(50,10),RLSE)
//FT12F001 DD &PATH,DISP=(OLD,PASS),UNIT=&UNITPAT
//FT13F001 DD DSN=MRP.TNET.&NETPRFX..AM3.DATA,DISP=SHR
//FT14F001 DD DSN=MRP.TNET.&NETPRFX..AM4.DATA,DISP=SHR
//FT15F001 DD DSN=MRP.TNET.&NETPRFX..AM5.DATA,DISP=SHR
//FT19F001 DD &J9,UNIT=&UNITJ9,
//      SPACE=(TRK,(300,50),RLSE),DISP=(NEW,CATLG),
//      DCB=(RECFM=VBS,LRECL=1604,BLKSIZE=22460)
//FT20F001 DD UNIT=SYSDA,SPACE=(TRK,(1,1)),DISP=(,PASS),
//      DCB=(RECFM=FB,LRECL=80,BLKSIZE=800)
//FT21F001 DD DSN=MRP.URD79.LOG,DISP=SHR
//FT24F001 DD &COORD,DISP=SHR
//FT25F001 DD DSN=MRP.MOA.STATION.DATA(&NETPRFX),DISP=SHR
//FT26F001 DD DSN=MRP.STATION.NODE.DATA(&NETPRFX),DISP=SHR
//      PEND
//READWPTH EXEC READPATH,
//      PATH='DSN=MRP.CORE3CA6.WPTH.DISK',
//      J9='DSN=MRP.CORE3CA6.WXFER',
//      UNITPAT=SYSDA,UNITJ9=SYSDA,VOL=SER=PLAN03'
//READPTH.SYSIN DD *
  READPATH RUN ---- PRINTING PATHS AND 8 TABLE VALUES FROM ZONE
  245 FOR CHECKING PURPOSE
&PARAM ZONES=1628, NODES=8191, PRTZN=245      &END
&PROB  PROB1= 1.0, 1.0, 1.0, 1.0, 1.0,0.73,0.30,0.01, 0.0, 0.0, 0.0,
        PROB2= 1.0, 1.0, 1.0,0.95,0.86,0.75,0.57,0.36,0.08,0.05, 0.0,
        PROB3= 1.0, 1.0, 1.0,0.95,0.86,0.75,0.57,0.36,0.08,0.05, 0.0,
        PROB4=0.95,0.95,0.85,0.69,0.56,0.42,0.31,0.22,0.13,0.07,0.01
        &END
```

NOTES

1.0 &PARAM CARD

1.1 ZONES defines the number of zones in the network and the path file input.

ZONES=1628

states that there are 1628 zones in the input network.

1.2 NODES is coded to specify the highest node number in the network.

NODES=8191

indicates that the highest allowable node number in the network is 8191. Any input node numbers greater than this value will result in a fatal error.

1.2 PRTZN is coded to allow the user to print all paths and the contents of the J9 file for checking purpose. Coding

PRTZN=245

will produce a thick output containing all the transit paths originating from zone 245 to all destination zones in the path file. It will also print the values of all the eight tables in the J9 file containing trips origin zone 245.

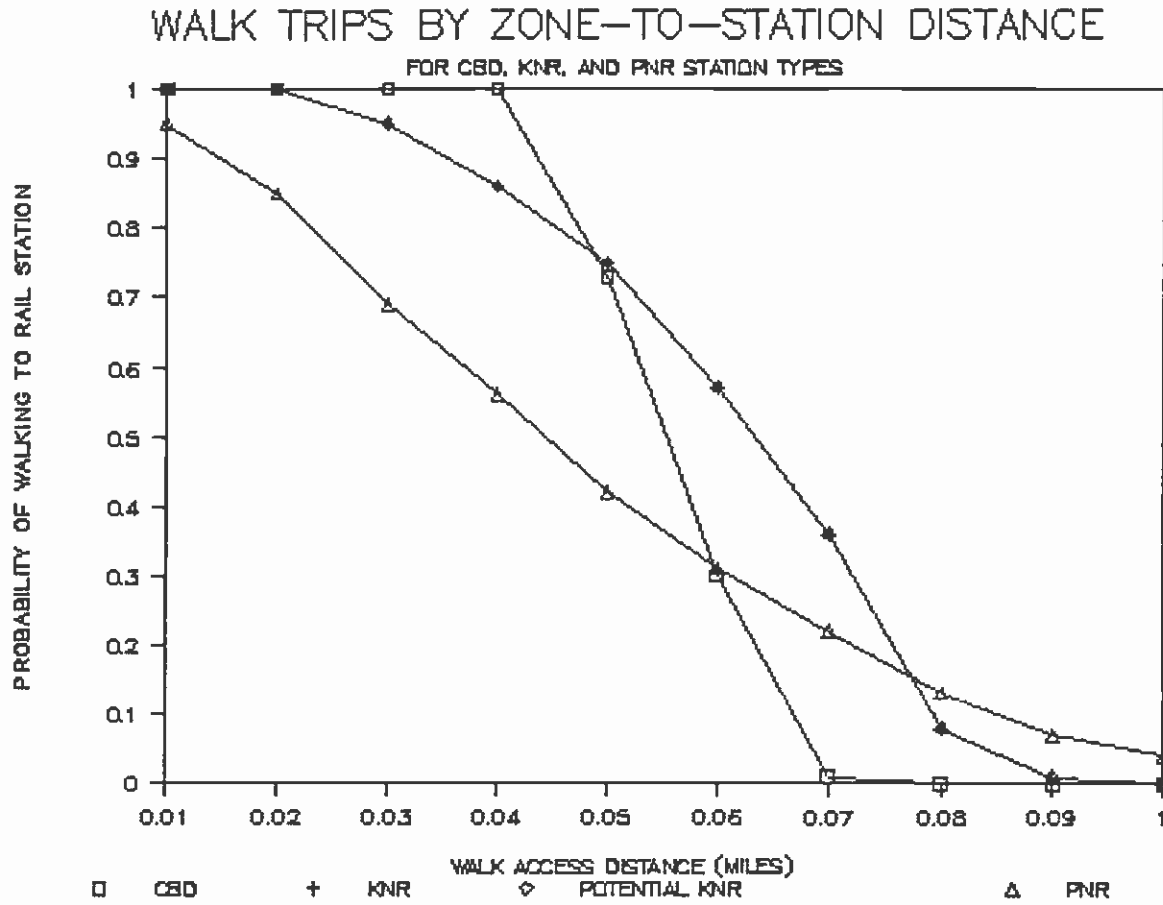
2.0 &PROB CARD

PROB1 to PROB4 are the arrays defining the probability of using bus access to the rail station given that the minimum path shows direct walk access to rail station. The arrays show the proportion of walk arrival as a function of walking distance and the station type. The functional relationship is graphed in Appendix A of this report.

APPENDIX A

DIVERSION CURVES

APPENDIX A
DIVERSION CURVES



STATION TYPE	PROPORTION OF WALK TRIPS FOR EACH ZONE-TO-STATION DISTANCE (MILES)									
	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	1
1	1	1	1	1	0.73	0.3	0.01	0	0	0
2	1	1	0.95	0.86	0.75	0.57	0.36	0.08	0.01	0
3	1	1	0.95	0.86	0.75	0.57	0.36	0.08	0.01	0
4	0.95	0.85	0.69	0.56	0.42	0.31	0.22	0.13	0.07	0.04