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GENERAL PLANNING CONSULTANT

TECHNICAL MEMORANDUM 3 4 1

DOCUMENTATION FOR RAIL STATION MINI-WALK NETWORK PROGRAM

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Prepared for

Southern California Rapid Transit District

Prepared by.

Barton-Aschman Associates, Inc

in association with
Schimpeler Corradino Associates
Cordoba Corporation
Myra L Frank & Associates
Robert J Harmon & Associates
Manuel Padron
The Planning Group, Inc

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I                                          Page 1 of 6           I
I PDS Member - MRP TESTNET LMOD(WLKFOR)    Sept. 14, 1984        I
I Documentation                                                  I
I Written by. Gordon Schultz (BAA)                               I
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FUNCTION/DESCRIPTION

Member WLKFOR is a FORTRAN program which will build walk links in
vicnity of user specified stations, i e nodes The program reads
the transit networks link and coordinate card image files and a
user specified set of "windows" to determine the area in which a
new set of walk links are to be built The output of the program
is a complete new set of transit link cards with the new walk links
merged with the original link cards. In addition, the program
produces a report of links which the user may wish to include in
the link file

The source code is stored in:

          MRP TESTNET.FOR(WLKFOR)

and the JCL to run the program is stored in

          MRP.WLKNET.SETUP

To run the program, it is necessary to specify the number of stops,
i.e. nodes, to be investigated, the units of the input coordinates,
the maximum walk distance, and the search distance, and the number
of zones in the network. It is also necessary to describe for each
node to be investigated the "window" around the node which may
contain the new walk links.

The input files are as follows·

File Table

	File Name	DD Name	Function or Contents
	WINDOW NODE	FT02F001	The list of nodes and window specifications
N	NETWORK yralt DATA(LINKS)	FT03F001	The transit network link cards
P U			
T	NETWORK.yralt. DATA(COORD)	FT04F001	The transit network coordinate cards

	File Name	DD Name	Function or Contents
I N P U T	SYSIN	FT05001	Namelist of parameters and options as described in Keyword table.

There are two output files, as shown in the following table.

	File Name	DD Name	Function or Contents
O U T	SYSOUT	FT06F001	Line printer output, as described in the Notes
P U T	NETWORK.yralt DATA(LINKSU)	FT08F001	The updated transit network cards
O T H E R	Input storage	FT20F001	The standard UTPS FT20F001 file to store title and parameter cards

The program accepts a title card, a &PARAM card and an &OPTION card. The keywords for the &PARAM and &OPTION card are as follows

Keyword Table

	Keyword	Format	Default	Explanation
& P A R A M	STOPS	I	None	The number of nodes for which Micro walk links are to be calculated
	DDIST	R	None	Factor to convert coordinates to 0 01 miles; input value of coordinates are divided by this factor.

I Keyword Table (continued)

		Keyword	Format	Default	Explanation
		SEARCH	I	50	The maximum distance a node can be from a station to be considered for the micro-walk area. Distance is coded in hundreths of a mile, i.e 50 is one-half a mile
	&				
	P				
	A	WMAX	I	50	The maximum walking distance allowed for a link Links longer than this will not be included in micro-walk network
	R				
	A				
		WSPEED	I	3	Speed of walk links in micro-walk network
	M				
		ZONES	I	None	Number of zones in the network
		&END			Mandatory terminator for &PARAM

		Keywork	Format	Default	Explanation
	&	RADWR	L	F	Use a radial distance to search for walk connectors (=T)
	O				
	P				
	T	RADWD	L	F	Use a radial distance on the link cards for walk connectors (=T)
	I				
	O				
	N	&END			Mandatory terminator for &OPTION

The program will start by reading, storing and printing the title card and the &PARAM and the &OPTION card. It will then read and and store the coordinates of the nodes Because of storage considerations, the maximum difference between the lowest coordinate value and the highest coordinate value should not exceed 300 miles The program will then read the station window cards and store the information. No more than 1000 windows (stations) should be input to the program. The format of the window cards (the FT02F001 file) is 5I4, with the fields defined as shown on page 4:

I Format of window input cards

Columns	Contents
1-4	Node for which window is for
5-8	Distance from node to left(west) side of window, in hundreth of a mile, i e. one-halk mile=50
9-12	Distance from node to right(east) side of window.
13-16	Distance from node to bottom(south) side of window.
16-20	Distance from node to top(north) side of window

Thus if node(12) had an X coordinate of 1000 and a Y coordinate of 500 and the window card was coded" 12 50 25 100 25", the window would have the following dimensions:

    Highest X coordinate· 1025
    Lowest X coordinate.   950
    Highest Y coordinate: 525
    Lowest Y coordinate: 400

Windows may overlap between nodes without causing program error. A link must be totally within one window to be considered as being in the window, i.e. both the A and B node must be within the window. A link with the A node in one window and the B node in another window, will not be considered to be in any window.

After reading all the window cards, the program will read the link cards and, for each link card, ascertain if the link is in any window. If the link is in a window, the program will check to see that the distance constraints are meet, i.e. the search distance and the length of the link. If the link is a transit link, modes 4-8, the program will then write a walk link node using the data from the original link(A node, B node, and distance) and the walk speed coded on the &PARAM card This link card will also have, in columns 72-80, the word "WALK" and the station node number The program allways writes out the original link record; thus the output file, the FT08F001, is exactly like the input link file with the micro-walk links embedded in the file next to the transit links.

I The program also outputs three reports. The first report is simply a I
I playback of the title, &PARAM, and &OPTION card   The second report I
I is a summary report of the window cards, showing the station node I
I number, the X and Y coordinate of the station node, the left, right, I
I bottom , and top boundaries of the window, and if the window was   I
I modified. A window is modified if the boundary of the window exceedsI
I the distance of the lowest and highest X and Y node coordinate In   I
I this case the boundary is set to the highest or lowest coordinate   I
I value. Note these coordinates may look a little strange since the   I
I program converted the coordinates to hundreths of miles and made the I
I lowest X and Y value equal to 1 prior to producing this report. Thus I
I the coordinates shown are in hundreths of miles from the most   I
I western and southern nodes in the network.   I
I   I
I The third report, produced by the program, is a listing of walk link I
I nodes which the user may wish to put in the network, but which are   I
I not written to the FT08 link file. These nodes are walk link nodes   I
I from the station node to a node in the window, not associated with a I
I link directly connected to the station node That is these are   I
I potential direct walk links to the station. It is anticipated that I
I the user will not want most of these links in the network, but some I
I of the zone to station connections may be useable. The distance   I
I shown on these nodes are from the coordinates, either air line or   I
I right angle distances depending on the option used. And the report   I
I uses the link card format, so that the user may use the report   I
I directly to input the links. If the user feels there might be a   I
I large number of these nodes, the SYSOUT might be coded as a disk   I
I file   I
I '   I
I   I
I   ERROR MESSAGES: I
I   I
I ERROR 770. PGM CANNOT HANDLE COORDINATE VALUES.   I
I   THE COORDINATES EITHER HAVE A RANGE OF GREATER THAN 300 MILES   I
I   OR ARE NEGATIVE. CHECK COORDINATES OR MODIFY PROGRAM.   I
I   LOWEST X COORDINATE = XXXXX HUNDRETHS OF MILES   I
I   HIGHEST X COORDINATE = XXXXX HUNDRETHS OF MILES   I
I   X COORDINATE RANGE = XXXXXX HUNDRETHS OF MILES   I
I   LOWEST Y COORDINATE = XXXXX HUNDRETHS OF MILES   I
I   HIGHEST Y COORDINATE = XXXXXX HUNDRETHS OF MILES   I
I   Y COORDINATE RANGE = XXXXXX HUNDRETHS OF MILES   I
I   I
I ERROR 272 NUMBER OF STATIONS READ FROM FT02 (XXX)   I
I   DOES NOT EQUAL THE STOPS PARAMETER (XXX)   I
I   I QUITE   I
_I   I
I   I

I RUNNING TIME AND CORE REQUIREMENTS   I

I An application of the program to a typical SCRTD network (LBLRT)   I
I for 13 stops required 19.6 seconds of CPU time. It is anticipated   I
I that the program running time is proportional to the number of   I
I stops, but not necessarily in a linear function, i e 26 stops for   I
I the LBLRT network would probably run longer than 40 seconds. The   I
I running time is a function of the search routine and is probably   I
I proportional to the square of the stations, e.g. 26 stops for the   I
I LBLRT network would take on the order of 80 seconds. Because of   I
I this, applications with a large number of stations maybe more   I
I efficient if broken into several runs   The program will operate   I
I in 256 K core.   I

I NOTES.   I
I   1) The assummed walk link mode for the program is mode 1   I

I   2) The option keywords (RADWR and RADWD) define the method   I
I   of measuring distance. If TRUE the distances are measured as   I
I   air-line distances. If FALSE, the distances are measured as   I
I   right angle distances; i.e the sum of the X and Y distances.   I
I   For this program, both option keywords should be coded the   I
I   same; either both true or both false.   I