Guide for Urban Transportation Planning Package

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GUIDE FOR URBAN TRANSPORTATION
PLANNING PACKAGE

BY

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B.S.E., Florida Technological University, 1972

RESEARCH REPORT
Submitted in partial fulfillment of the requirements for the degree of Master of Science in Engineering
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The purpose of this research paper is to provide a general view of the Urban Transportation Planning Process. It will also show how the process utilizes the computer and includes sample inputs of a few basic programs. It provides the basic information needed to guide future operators in organizing and setting up the computer package of the United States Department of Transportation's "Urban Transportation Planning".

Appreciation for technical and programming advice in carrying out this project is due to Dr. Waldron McLellan, Department of Civil Engineering and Environmental Sciences. Appreciation for advisement is due to Dr. David Clapp, Department of Industrial Engineering and Management Systems, and Dr. Yousef A. Yousef, Department of Civil Engineering and Environmental Sciences. Special appreciation is due to Mr. Jaems Radford, Computer Center Consultant, for his assistance with the programs. All the above mentioned individuals are associated with Florida Technological University, Orlando, Florida.
CONTENTS

I. INTRODUCTION .......................................................... 1
   Urban Travel Forecasting
   Use of Computers

II. DATA REQUIREMENTS .................................................... 8
    Inventories - General
    Transportation System Inventories
    Trip Tables

III. TRAFFIC ASSIGNMENT .............................................. 12

IV. PROGRAMS ............................................................. 14

V. SUMMARY AND CONCLUSION ........................................... 18

VI. APPENDIX .............................................................. 19

VII. BIBLIOGRAPHY ....................................................... 25
I. INTRODUCTION

Presently most of the industrial capacity of the nation and at least seventy percent (70%) of the population, are concentrated in urban areas. The present trend towards urbanization is continuing. One of our greatest challenges is to economically create healthy and stable cities that are attractive and beneficial to society.

The movement of both people and goods efficiently is essential to the economic health of any urban area. Comprehensive urban planning gives consideration to the interaction of land development and transportation facilities. Planning also promotes the most desirable pattern and character of urban growth. Urban transportation planning is essential to develop and continuously evaluate short and long range transportation plans.

The comprehensive character of the planning process requires that the economic population and land use elements all be included and also, that estimates of future demands for all modes of transportation (public and private) be made continuously. The transfer and terminal facilities and traffic control systems should be included in the inventories and analyses. An essential requirement of the process is that the entire area within the limits of future development be included in
in the forecasting period. Some of the basic elements for which inventories and analyses are required, as stated by John Meyer (Ref. 2) are as follows:

1. Economic factors affecting development.
2. Land use.
4. Transportation facilities.
5. Travel patterns.
6. Traffic control features.
7. Zoning ordinances, subdivision regulations, etc.
8. Financial resources.

The variety of the inventories and the extent to which the various analyses need to be carried out, will always vary, depending on basic factors as to the size of the city, age, proximity to other cities and growth potential.

The overall Transportation Planning Process is represented in a diagram shown in Figure 1.

**URBAN TRAVEL FORECASTING**

The present better understanding of the urban transportation problem can be attributed to the development and improvement of travel forecasting procedures and methods of analyses. Urban traffic patterns presently existing and expected in the future are a function of:

1. The various social and economic characteristics of the population of an area.
THE URBAN TRANSPORTATION PLANNING PROCESS*

ORGANIZATION AND INVENTORIES

ORGANIZATIONAL DEVELOPMENT
   Policy and Technical Framework
   Citizens Participation

COLLECT DATA
   Population
   Economic Activity
   Land Use
   Transportation System
   Travel
   Laws and Ordinances
   Governmental Policy
   Financial Resources
   Community Values

ACCURACY CHECKS

AREAWIDE FORECASTS

POPULATION
ECONOMIC
LAND USE
TRAVEL
REVENUES

LONG RANGE PROGRAMMING

STAGING
   FINANCIAL RESOURCES
   JURISDICTIONAL RESPONSIBILITY

SHORT RANGE PROGRAMMING

PROJECT PLANNING
   CAPITAL IMPROVEMENT PROGRAMS

CONTINUING PLANNING

SURVEILLANCE
REAPPRaisal
PROCEDURE DEVELOPMENT
SERVICE

GOALS AND OBJECTIVES

ANALYSIS OF EXISTING CONDITIONS

MODEL CALIBRATION
   Traffic Assignment
   Land Use
   Trip Generation
   Trip Distribution
   Modal Split
   Parking

DEVELOP IMMEDIATE ACTION
   Plan

ANALYSIS OF FUTURE ALTERNATIVES

DEVELOP ALTERNATIVES
   APPLY MODELS
   Land Use
   Trip Generation
   Trip Distribution
   Modal Split
   Parking
   Traffic Assignment

PLAN TESTING, EVALUATION AND SELECTION

IMPLEMENTATION

*The information was taken from Techniques of Transport Planning, by John Meyer.
2. Analysis of existing conditions and calibration of the forecasting techniques.

3. The forecasting of future conditions.

4. An analysis of future transportation systems which provide essential feedbacks.

Figure 2 shows the various elements which make up the four main phases of the forecasting process.

In the first phase, inventories provide a base which the Transportation Planning Process rests. These inventories include surveys of economic activity and population, measures of land use, basic travel characteristics, and the existing transportation facilities. The data resources of the inventory phase are analyzed and forecasting techniques are developed in the analysis and calibration phase. The primary forecasts are estimates of the future population and the level of economic activity in the study area. These are usually expressed in terms of income and employment. Population and employment are then translated into land requirements. Trip generation builds a bridge between land use and travel by providing the means which the number of trips that start or end in a given unit can be related to the land use or the economic characteristic of the unit. These generated trips of origins and destinations are used in trip distribution. From these we can estimate travel patterns. These patterns are then assigned to a transit network in the traffic assignment element.
*The information was taken from article "Forecasting Transit Use", by Arthur Schwartz.
In the transportation system analysis phase, many alternatives of both land use plans and transportation systems can be evaluated. The primary objective of the Transportation Planning Process is to provide the necessary information for making decisions on where and when improvements should be made in transportation systems. By doing this, the process satisfies travel demands and promotes land development patterns that are within the community goals and objectives.

To provide a clearer view of the elements in the process, the following questions portray the basic ideas:

1. Population and Economic Studies - what will be the magnitude of activities?
2. Land Use - where will the activities be located?
3. Generation - how many trips will these activities generate?
4. Distribution - where will these trips go?
5. Modal Split - by which mode?
6. Assignment - which route will these trips take?
7. Systems Analysis - what is the best transportation system?

This is a very simplified view of the Transportation Planning Process, although it gives the basic ideas. It does show the functional relationships of the primary elements of the process. It is stressed that it is understood that the components of the Planning Process must be integrated, although elements like trip generation, distribution and assignment are viewed individually. The decisions come from an integrated product.
USE OF COMPUTERS

The electronic computer has made possible the degree of depth and refinement used at present in Urban Transportation Planning. The present Urban Planning 360 Battery, described in the "Urban Planning System 360 - Program Documentation" manual, has many programs which are pertinent to most all phases of technical planning process.

It became apparent from the quantities of data to be processed that assistance from the computer should be utilized. At present, the computer may be set up for trip distributions, assigning traffic, capacity calculations and cross tabulations. The computer is directly responsible for the development of the transportation planning process. Some of the programs in the 360 Battery will be more detailed later and example set ups shown in the Appendix of this paper.
II. DATA REQUIREMENTS

A. Inventories - General

The Transportation Planning Process relies on measurable and observed data within an urban area. The basis for forecasting future system requirements is the base year conditions which is set up from the original inventories. The inventories which are collected come from the following elements:

1. Land use.
2. Population.
3. Economic factors.
4. Transportation facilities.
5. Travel patterns (Origin-Destination Surveys).
7. Financial resources.

All these data collected are processed and summarized for analysis purposes to develop trends and relationships between existing conditions. These processed data form the basis for developing models for trip generation, trip distribution, modal choice and traffic assignment. The inventories are used mostly for formulating transportation facilities and travel patterns.
B. Transportation Systems Inventories

Inventories from transportation facilities include those for highway, transit, and terminals. Highway and transit inventories provide the basis for traffic assignment networks.

In the highway system, the first step is to classify streets and highways into major arterial streets, minor arterial streets, or collector streets. The criteria for selection include trip length, volume of traffic, service provided, and access. Traffic volume data are needed to verify and develop transportation models. Traffic counts are the basic tool for providing this data. It is of very great importance to obtain representative traffic counts of each area.

Another primary factor in highway system inventories is travel time. Vehicle operators usually select the route in which they will reach their destination in minimum time. Travel time studies provide a measure of congestion. They are also used to estimate benefits from new facilities.

Transit system data can usually be obtained from the company or agency operating in that area of study. In most urban areas, the data needed is a matter of public record.

C. Travel Surveys

Travel inventories obtain a complete picture of present travel within an urban area. These data are used to estimate future travel and to design and locate new transportation facilities.

There are three basic types of surveys used in preparing these inventories:
1. Home interview survey (internal).

2. External survey.

3. Truck and taxi survey.

The internal (home interview) survey provides a measure of trips within an urban area by the residents. The trips accounted for usually are around 80-90 percent of actual trips.

The external survey tries to intercept 90-95 percent of travel recorded crossing the boundaries of the area. This survey is for people not living in the area of study and for trucks registered outside the study area.

The truck survey obtains a current picture of truck travel in the area of study. These surveys are made by selecting and interviewing similar to the internal survey. This gives a general picture of business activity.

D. Trip Tables

A matrix of trips from one area to another area is a trip table. To use the computer these trip data must be summarized to units which are traffic analysis zones. The trips are assumed to begin and end in the center of these zones. The trip table is actually a binary representation of this matrix of trips.¹

Trip tables do not contain specific routings, only flows from zone to zone (center to center). The trip tables used in trans-

portation planning are of the origin-destination (O-D) nature. Trip tables are in sort by origin zone for an O-D table.

In the transportation planning computer package, the programs TRPTAP and TRPCODE are used to build trip tables. These programs will be detailed more later, in the section "Programs".
III. TRAFFIC ASSIGNMENT

Traffic assignment may be defined as the process of allocating a given set of trip interchanges to a specific transportation system.\(^2\) The process is mostly used to estimate the traffic load on various sections of the system for some future year, but is also used in simulating the present conditions.

The purposes of traffic assignment are as follows:
1. To determine the deficiencies in the existing system.
2. To guide in the planning and development of a future system through evaluation of the effects of improvements or additions to the existing system.
3. To provide systematic and reproducible tests for alternate system proposals.
4. To provide the design engineer with the design traffic columns.

The input to the traffic assignment process are:
1. A complete description of the existing transportation system.
2. A trip volume matrix of the zone to zone traffic movement (trip tables).

The traffic assignment procedure is based essentially on the selection of the least impedance path between zones. This is accomplished by the computer. First, a description of the network is coded, key punched, and stored in the computer memory. Following the selection of the minimum impedance path between zones, the computer assigns the trips to these paths. Traffic volumes are then accumulated for each path section.

In the transportation planning package, the program BUILDVN reads the historical data and computes the minimum paths. These paths may be viewed for logical accuracy by program PRINTVN. Next program LOADVN reads the files and routes the zone to zone trips along their minimum path. In effect, traffic assignment uses these programs to produce a simulation of link volumes in a transportation network.

The traffic assignment process, with its use of the computer, provides the engineer and planner with the tools for testing networks for adequacy under estimated transportation loads. The efficiency of a network depends on location and its ability to carry the load. Many various possibilities must be evaluated.

The traffic assignment process does not take the place of transportation planning. It just provides the planner with areas of greatest needs and test the adequacy of the various plans.
IV. PROGRAMS

The Urban Transportation Planning Package has a 100 or more different programs. With a vast majority of the programs aiming at the same goal and providing the same information, only the basic starting programs were set up and detailed.

The flow chart in Figure 3 provides a general picture of the process outlined in this paper. This process is the set of programs that complete the "traffic assignment" part of the package. Other programs are available to provide effective trip generation and trip distribution analyses, but are not covered in this paper.

The following is a summary of the "traffic assignment" computer programs with general purposes stated:

BUILDHR - Build Traditional Historical Record.

The program reads link data cards, edits them and unless errors are too numerous, prepares a historical record containing (1) descriptive print records, (2) a parameter record, and (3) one historical record for each mode in the network described. 3

PRINTHR - Rigid Format of Historical Record.

This program prepares a printout of selected data from the traditional network historical record file. Although the program

FLOW CHART FOR COMPUTER PROCESS

BUILDHR

HISTORICAL RECORD

PRINTHR

BUILDVN

PATHS

PRINTVN

FORMAT VINE

LOADVN

PRINT LOADS

EDITED #2, 3, 4 & 5 TRIP CARDS

TRP CODE

BINARY TRIP CARDS

TRPTAB

ALL PURPOSE TRIP TABLE

FIGURE 3
can format a variety of data, the program FORMAT is preferred for flexible formatting.  

BUILDVN - Building Minimum Impedance Paths.
This program reads the historical record data set created by BUILDHR and prepares designated outputs (PATHSO = trees or vines).  

FMTSKIM - Format Skims.
This program creates formatted tables of 1 or 2 byte skim tree/vine data sets.  

PRINTVN - Format Zone to Zone Paths.
This program formats for printing, traces to selected destination zones for selected origin zones.  

LOADVN - Load Trips on Network Links.
This program reads the PATHSI data set created by BUILDVN and loads specified trips from a TRIPSI (trip table) data set. An HRI data set is read and updated.  

TRPCODE - This program edits a file of trip cards and writes a survey record tape file in a standard format. The binary format output is acceptable by the trip table builder program TRPTAB.

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4 Ibid.  
5 Ibid.  
6 Ibid.  
7 Ibid.  
8 Ibid.  
9 Ibid.
TRPTAB - This program takes the output of program TRPCODE as input and produces standard origin-destination trip tables.

The JCL (job control language) input to successfully run the basic programs on the 360 Computer at Florida Technological University are in the Appendix.

The programs and the data for the programs are stored on tape. These inputs actually designate the tapes to be used and will initially start the process. In the TRPCODE programs the input also defines certain data to be read.

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Ibid.
V. SUMMARY AND CONCLUSION

With a general view of the Urban Transportation Planning Process and recognizing the volume of data, one can understand the utilization of the computer in this continuing process.

This paper is actually the initial step in an attempt to use the complete Urban Transportation Planning Package. From this point, one could successfully set up more of these programs with use of the "Urban Transportation Planning Program Documentation", and the assistance of Mr. James Radford, Computer Center Consultant at Florida Technological University.

Once in operation, the Urban Transportation Planning Package can be used to accurately test the efficiency of present and future transportation systems.
APPENDIX
JCL INPUT FOR BUILDHR AND PRINTHR PROGRAMS

COPY SOME UTILITY PROGRAM 16/01/05/53 74.191

TOTAL RECORDS READ 30  TOTAL RECORDS WRITTEN 30

C THIS PROGRAM BUILDS HISTORICAL RECORD
//BUILDHR JOB (11/13/1, $555, FTU, 0120, 0120, 10), WHIDDEN, CLASS=6
//HPBUILD EXEC PGM=BUILDHR
//STEPLIB DD DSNAME=FTU,IR,URB,LINKLIB,DISP=SHR
//SYSOUT DD SYSDSN=
//SORTLIB DD DSNAME=SYS1.SORTLIB,DISP=SHR
//TEMP1 DD UNIT=SYSDA,SPACE=(TRK*(21+1)),ELSE)
//TEMP2 DD UNIT=SYSDA,SPACE=(TRK*(50+1)),ELSE)
//SORTWK01 DD UNIT=SYSDA,SPACE=(TRK*24),CONTIG
//SORTWK02 DD UNIT=SYSDA,SPACE=(TRK*24),CONTIG
//SORTWK03 DD UNIT=SYSDA,SPACE=(TRK*24),CONTIG
//SORTWK04 DD UNIT=SYSDA,SPACE=(TRK*24),CONTIG
//LHOD DD UNIT=(TAPE,DEFER),DSN=FTU,IR,URB,SYNTHRD,DISP=OLD
//VOL=(PRIVATE,RETAI),DISP=OLD
//SYSTIN DD **
PAR.9999,417,7000,9999,************************
PAR.**************************
ID,QUATS,INITIAL,H.R. COMP,PROBLEM 7/10/74

C THIS PROGRAM PRINTS HISTORICAL RECORD
//PRINTHR EXEC PGM=PRINTHR, CONDE=4,LT
//STEPLIB DD DSNAME=FTU,IR,URB,LINKLIB,DISP=SHR
//DP=TAPE DD SYSDSN=
//HPR DD UNIT=(TAPE,DEFER),DSN=FTU,IR,URB,SYNTHRD,DISP=OLD
//SYSTIN DD **
ID,FORMAT,INITIAL,QUATS,H.R. COMP,PROBLEM 7/10/74
GO
JCL INPUT FOR BUILDVN AND PRINTVN PROGRAMS

COPY SOME UTILITY PROGRAM 16/03/10/98 74.191

TOTAL RECORDS READ 38 TOTAL RECORDS WRITTEN 38

//STEPLIB DD DSN=FTU.IR.URB.LINKLIB,DISP=SHR
//PATHSO DD UNIT=(TAPE,DEFER),DSN=FTU.IR.URB.TREES,
//VOL=(PRIVATE,RETAI),DISP=OLD
//SYSDUMP DD SYSOUT=A
//SYSTAPE DD SYSOUT=A
//TMTAPE DD UNIT=(TAPE,DEFER),DSN=FTU.IR.URB.SKIMS,
//VOL=(PRIVATE,RETAI),DISP=OLD
//SYSIN DD *

PAR.417,417,417
OPTION.11.1.1
ID. OUT5 HR10 TREES.SKIMS COMP. PROBLEM 7/10/74
GO

C. THIS PROGRAM BUILDS VINES
//ELOVINES EXEC PGM=BUILDVN
//STEPLIB DD DSN=FTU.IR.URB.LINKLIB,DISP=SHR
//PATHSO DD UNIT=(TAPE,DEFER),DSN=FTU.IR.URB.TREES,
//VOL=(PRIVATE,RETAI),DISP=OLD
//SYSDUMP DD SYSOUT=A
//SYSTAPE DD SYSOUT=A
//TMTAPE DD UNIT=(TAPE,DEFER),DSN=FTU.IR.URB.SKIMS,
//VOL=(PRIVATE,RETAI),DISP=OLD
//SYSIN DD *

PAR.417,417,417
OPTION.11.1.2
ID. OUT5 HR10 TREES.SKIMS COMP. PROBLEM 7/10/74
GO

C. THIS PROGRAM PRINTS VINES
//PRTVINES EXEC PGM=PRINTVN
//STEPLIB DD DSN=FTU.IR.URB.LINKLIB,DISP=SHR
//PATHSO DD UNIT=(TAPE,DEFER),DSN=FTU.IR.URB.TREES,
//VOL=(PRIVATE,RETAI),DISP=OLD
//SYSDUMP DD SYSOUT=A
//SYSTAPE DD SYSOUT=A
//TMTAPE DD UNIT=(TAPE,DEFER),DSN=FTU.IR.URB.SKIMS,
//VOL=(PRIVATE,RETAI),DISP=OLD
//SYSIN DD *

PAR.417,417,417
OPTION.11.4.17
RANGE0.1.417
RANGE1.417
ID. FORMAT SELECTED TREE TRACES FM. HR10 OUT5 COMP. PROBLEM 7/10/74
GO

C. THIS PROGRAM FORMATS THE SKIMS
//FMTSKIM EXEC PGM=FMTSKIM
//SYSDUMP DD SYSOUT=A
//SYSTAPE DD SYSOUT=A
//TMTAPE DD UNIT=(TAPE,DEFER),DSN=FTU.IR.URB.SKIMS,DISP=OLD
//SYSIN DD *
ID. FORMAT SELECTED SKIM TREE TRACES OUT5 COMP. PROBLEM 7/10/74
PAR.417
RANGE0.1.417
GO
JCL INPUT TRPCODE #2 CARDS

COPY'SOME UTILITY PROGRAM 16/05/28/58 74,191

TOTAL RECORDS READ 36  TOTAL RECORDS WRITTEN 36

//TRPCODE JOB (1095,0037,DJNS,ETU,0450,0150,20,0,0).,
  //RAFORD,)
  //MSGLEVEL=(2,1),CLASS=K
  //CONDETHM EXEC PGM=TRPCODE,PARM=MSG=AP,
  //STPLIB DD DSN=ETU.IR.URB,INKLIB,DISP=SHR
  //SORTLIB DD DSN=SYS1.SORTLIB,DISP=SHR
  //SYSOUT DD SYSOUT=A
  //TRPCODE DD UNIT=(TAPE,DEFER),DSN=ETU.IR.URB,TYPE2,DISP=OLD
  //SORTWK01 DD UNIT=SYSDA,SPACE=(CYL,10,CONTIG)
  //SORTWK02 DD UNIT=SYSDA,SPACE=(CYL,10,CONTIG)
  //SORTWK03 DD UNIT=SYSDA,SPACE=(CYL,10,CONTIG)
  //SORTWK04 DD UNIT=SYSDA,SPACE=(CYL,10,CONTIG)
  //SORTWK05 DD UNIT=SYSDA,SPACE=(CYL,10,CONTIG)
  //SORTWK06 DD UNIT=SYSDA,SPACE=(CYL,10,CONTIG)
  //TRPCODE DD UNIT=(TAPE,DEFER),DSN=ETU.IR.URB,TRIPTRB2,
  //OCR=RECFM=FR,RECF=84,RLKSIZE=1680),
  //DISP=(NEW,CATLG,UNCATLG)

IN ORLANDO 7/10/74 DD SORT TRIP CARD ENCODE - TYPE2 (INTERNAL)
OPTION,INPUT=TRPCODE,ERRS=(999,SYSOUT),P+A
RENAME,AVAIL=NOTINCAP
DEFIINE,CARDNO=1,LIMITS=2-2
DEFIINE,PFRSN0=17-18
DEFIINE,TRIPNO=19-20
DEFIINE,SEX=PACE=21
DEFIINE,ORGZ0=25-27
DEFIINE,DESTZN=32-34
DEFIINE,MODE=39
DEFIINE,STRTIME=39-41
DEFIINE,ARPTIME=42-44
DEFIINE,NOTINCAP=51
DEFIINE,PARKTYPE=52
DEFIINE,FACTOR=65-69
DEFIINE,SAMPNO=69-73
GO SORT,60500,0RGZ0,DESTZN
//
JCL INPUT FOR TRPCODE #3 CARDS

COPY SOME UTILITY PROGRAM 16/06/76 74.191

TOTAL RECORDS READ 34 TOTAL RECORDS WRITTEN 34

//TRPCOD3 JOB (1095,JOBD,WJS,FTU,J450,U150,20,1000)

//DFCPD

//CODETHEM EXEC PGM=TRPCODE,PARM=MSG=AP

//STEP14 DD DSN=FTU,TR,URB,LINKLIB,DISP=SHR

//SORTLIB DD DSN=SYS1.SORTLIB,DISP=SHR

//SYSCOUT DD SYSCOUT=A

//TRPCDDI DD UNIT=(TAPE,MDEFER).DSN=FTU,TR,URB,TYPE3,DISP=OLD

//SORTWK01 DD UNIT=SYSDA,SPACE=(CYL:10,**CONTIG)

//SORTWK02 DD UNIT=SYSDA,SPACE=(CYL:10,**CONTIG)

//SORTWK04 DD UNIT=SYSDA,SPACE=(CYL:10,**CONTIG)

//SORTWK15 DD UNIT=SYSDA,SPACE=(CYL:10,**CONTIG)

//SORTWK06 DD UNIT=SYSDA,SPACE=(CYL:10,**CONTIG)

//TRPCDD DD UNIT=(TAPE,MDEFER).DSN=FTU,TR,URB,TRIPTEXT,

// DCB=(RECFM=FB,RECL=34, BlocSIZE=1680),

// DISP=(NEW,CATLG,UNCATLG)

ID: ORLANDO 7/10/74 DD SORT TRIP CARD ENCODE - TYPE3 (EXTERNAL)

OPTION: INPUT=TRPCDD, EPRR=(999, SYSCOUT), P+4

RENAME: TIME=STIME

RENAME: AVAILABLE=NOTINCAT

DEFINE: CARDNO=1, LMTYS=3,3

DEFINE: AMPN=4-7

DEFINE: SSTIME=10-11

DEFINE: DEEP=9-12

DEFINE: MAINTYPE=6

DEFINE: DATE=13-24

DEFINE: ORGN=25-27

DEFINE: COSTY=28-34

DEFINE: EESYN=47-53

DEFINE: FACTOR=48-58

DEFINE: HEFACT=73-74

60 SORT: DSN=ORGN,MDEFER, TIN

//
JCL INPUT FOR TRPCODE #4 CARDS

COPY UTILITY PROGRAM 16/06/55/10 74.191

TOTAL RECORDS READ 31 TOTAL RECORDS WRITTEN 31

```
//TRPCODE JOB (1095, 0057, DINS, FTU, 0450, 0150, 20, ...., 0),
// // RANFORD,
// // MSGLEVEL=(2, 1), CLASS=K
// // CODETHEM EXEC PGM=TRPCODE, PARM=MSG=AP,
// // STEPLIB DD DSN=FTU, IR=URR, LINKLIR, DISP=SHR
// // SORTLIB DD DSN=SYS1.SORTLIB, DISP=SHR
// // SYSOUT DD SYSOUT=A
// // TRPCODE DD UNIT=(TAPE, OFF), DSN=FTU, IR=URR, TYPE4, DISP=OLD
// // SORTWK01 DD UNIT=SYSDA, SPACE=(CYL, 10, CONTIG)
// // SORTWK02 DD UNIT=SYSDA, SPACE=(CYL, 10, CONTIG)
// // SORTWK03 DD UNIT=SYSDA, SPACE=(CYL, 10, CONTIG)
// // SORTWK04 DD UNIT=SYSDA, SPACE=(CYL, 10, CONTIG)
// // SORTWK05 DD UNIT=SYSDA, SPACE=(CYL, 10, CONTIG)
// // SORTWK06 DD UNIT=SYSDA, SPACE=(CYL, 10, CONTIG)
// // TRPCODE DD UNIT=(TAPE, OFF), DSN=FTU, IR=URR, TRIPTRAP4,
// // DCR=(RECFM=F, LRECL=84, BLKSIZE=1680),
// // DISP=(NEW, CATLG, UNCATLG)
// IN OPLANDO 7/10/74 ON SORT TRIP CARD ENCODE - TYPE4 (TRUCK)
// OPTION, INPUT=TRPCODE, EPPS=(999, SYSOUT), P+A
// DEFINE, CARDNO=1, LIMITE=44
// DEFINE, DATE=2-3
// DEFINE, SAMPNO=4-7
// DEFINE, VEHTYPE=10-11
// DEFINE, TRIPNO=24-26
// DEFINE, ORGZN=32-34
// DEFINE, RESZRN=35-36
// DEFINE, DESTZRN=39-41
// DEFINE, MDTIMT=51-53
// DEFINE, FACTOR=65-68
// GO SORT, 605000, ORGZN, DESTZRN
```

GO SORT, 605000, ORGZN, DESTZRN
JCL INPUT FOR TRICODE #5 CARDS

COPY SOME UTILITY PROGRAM 16/08/02/18 74.191

TOTAL RECORDS READ 31 TOTAL RECORDS WRITTEN 31

//TRICODE JOB (1096,0037,T,0,MSJ,FILE,0456,0150,20,...,0),
// RANFORD,
// CODELEVEL = (?+1)*CLASS=K
//STEPHEM EXEC PGM=TRICODE,PARM=MSG=AP,
//SORTLIB DD DSN=FTU,IR,URR,LINKLIB,DISP=SHR
//SORTLIB DD DSN=SYS1.SORTLIB,DISP=SHR
//SYSORT DD DSN=SYT4,DISP=SHR
//TRPCOI DD UNIT=(TAPE,NOERI),DSN=FTU,IR,URR,TYPES,DISP=OLD
//SORTWK01 DD UNIT=SYSDA,SPACE=(CYL,10,*CONTIG)
//SORTWK02 DD UNIT=SYSDA,SPACE=(CYL,10,*CONTIG)
//SORTWK03 DD UNIT=SYSDA,SPACE=(CYL,10,*CONTIG)
//SORTWK04 DD UNIT=SYSDA,SPACE=(CYL,10,*CONTIG)
//SORTWK05 DD UNIT=SYSDA,SPACE=(CYL,10,*CONTIG)
//TRPCON DD UNIT=(TAPE,NOERI),DSN=FTU,IR,URR,TRIPTARS,
// DCR = (RECFM=FB,LF,FC=28,RECSIZE=1680),
// DISP = (NEW,CATLG,INCATLG)

ID ORLANDO 7/10/74 00 SORT TRIP CARD ENCODE - TYPES (TAXI)
OPTION=INPUT=TRPCON,FILE=1230,SYSORT),?*.
DEFINE=CARNO=1,LIMITS=5-5
DEFINE=DATE=2-3
DEFINE=SAMPNO=4-7
DEFINE=WHTYPE=10-11
DEFINE=TRIPNO=24-26
DEFINE=ORGZN=32-34
DEFINE=DESZN=35-36
DEFINE=DESTDN=93-41
DEFINE=AINS=51-53
DEFINE=FACTOR=64-9
GO SORT,60500,ORGZN,DESTDN
//
BIBLIOGRAPHY


