

## บรรณานุกรม

หนังสืออ้างอิง

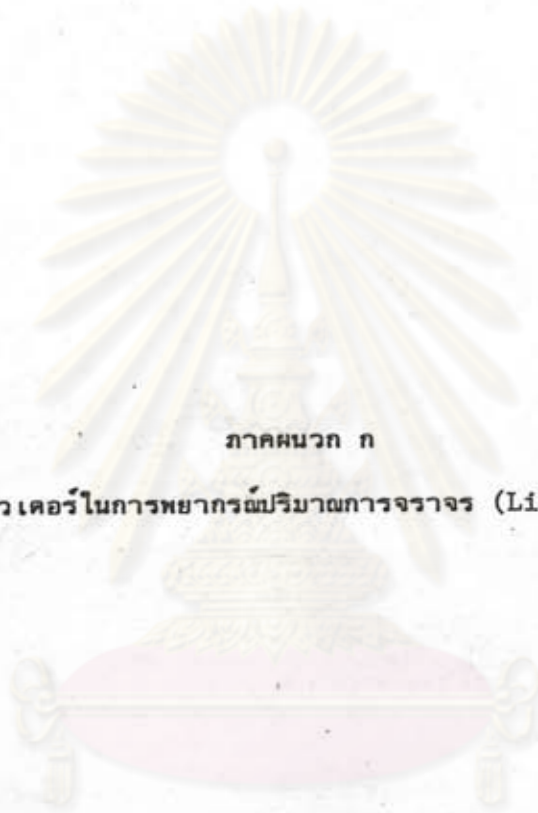
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ศูนย์วิทยทรัพยากร  
จุฬาลงกรณ์มหาวิทยาลัย



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ภาคผนวก ก

โปรแกรมคอมพิวเตอร์ในการพยากรณ์ปริมาณการจราจร (List of TRAFFIC)

ศูนย์วิจัยทรัพยากร  
จุฬาลงกรณ์มหาวิทยาลัย



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C*****
C   TRAFEG - TRAFFIC GROWTH PROGRAM
C
C   1=HF01/SECTOR/TRAFINP,UNIT=DISK,RECORD=90,BLOCKING=20,LOCK
C   2=hf01/sector/trafoup,UNIT=DISK,NEW,LOCK
C   3=hf01/sector/mconsth,UNIT=DISK,RECORD=90,BLOCKING=20,LOCK
C   9=hf01/sector/tempfil,UNIT=DISK,RANDOM,RECORD=180,NEW,LOCK
C   10=hf01/sector/tdebug,UNIT=DISK,RECORD=90,BLOCKING=20,NEW,LOCK
C   11=hf01/sector/sumup,UNIT=DISK,RANDOM,RECORD=180,LOCK
C
C   COMMON KIN,KTRAF,KONST,KVOC,KPRNT,KTEM,KDEBUG,KSUM
CHARACTER * 20 INFILE,OUTFIL
WRITE (*,100)
100 FORMAT(' ENTER INPUT FILENAME ')
READ (*,'(A)') INFILE
WRITE (*,200)
200 FORMAT(' ENTER OUTPUT FILENAME ')
READ (*,'(A)') OUTFIL
OPEN(6,FILE='PRN')
OPEN(1,FILE=INFILE,STATUS='OLD',ACCESS='SEQUENTIAL',FORM='FORMATTE
1D',RECL=72)
OPEN(2,FILE=OUTFIL,STATUS='NEW',FORM='UNFORMATTED')
OPEN(3,FILE='CONS',STATUS='OLD',ACCESS='SEQUENTIAL',FORM='FORMATTE
1D',RECL=72)
OPEN(9,FILE='TEMPFIL',STATUS='NEW',ACCESS='DIRECT',FORM='UNFORMATT
1ED',RECL=180)
OPEN(10,FILE='TDEBUG',STATUS='NEW')
OPEN(11,FILE='SUMUP',STATUS='NEW',ACCESS='DIRECT',FORM='UNFORMATTE
1D',RECL=180)
C
C   kin=1
C   ktraf=2
C   konst=3
C   kvoc=4
C   kprnt=6
C   ktem=9
C   kdebug=10
C   ksum=11
C   call trag
C   CLOSE (9,STATUS='DELETE')
C   CLOSE (10,STATUS='DELETE')
C   CLOSE (11,STATUS='DELETE')
C   end
C
C
C   subroutine trag
C
C   main subroutine to calculate traffic growth and maintenance
C
C   CHARACTER*72 ITITLE
C   CHARACTER*5 APJ
C   common kin,ktraf,konst,kvoc,kprnt,ktem,kdebug,ksum
C   common/blk 1/NRT,NPJ,ELEN,IMP,ISEAL,IR,DLEN,NY(5),LXN
C   common/blk 2/trf(31,7),gth(10,7),iyr(10),mcons(7,2),MMAIN(31),
C   1tott(31),iyear(31),itot(31),itf(31,7),many(31),zmain(31),
C   2esa(4,7),zesa(31),ztesa(31),zpcu(31),zgen(31),pcu(7),trkpc(31),
C   3gtrf(31,7),TOTAL(31),GEN(7,7),MOLD(31),IOLD(31,7),AMOLD(31)
C   dimension grate(10,7)
C
C   CHARACTER*4 SA(4,5),SB(3)
C   data sa(1,1),sa(1,2),sa(1,3),sa(1,4),sa(1,5) / 'ASPH', 'ALT', '
1
C   data sa(2,1),sa(2,2),sa(2,3),sa(2,4),sa(2,5) / 'SURF', 'ACE', 'TREA
1
C   TMEN', 'T' /
C   data sa(3,1),sa(3,2),sa(3,3),sa(3,4),sa(3,5) / 'LATE', 'RITE', '
1
C   data sa(4,1),sa(4,2),sa(4,3),sa(4,4),sa(4,5) / 'EART', 'H
1
C   data sb(1),sb(2),sb(3) / 'GOOD', 'FAIR', 'POOR' /
C   if (idebug.gt.0) write (kdebug,3999)

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3999 format(' START THE PROGRAM')
      IDEBUG=1
      JKL=0
      JJ=0
      LXN = 0
C
C      READ BASIC DATA FOR TRAFFIC PROGRAM
C
C      READ MAINTENANCE CONSTANTS
      DO 7000 I=1,7
      READ (KONST,7001) (MCONS(I,J),J=1,2)
7000 CONTINUE
7001 FORMAT(2I6)
C
C      READ EQUIVALENT STANDARD AXLE LOAD
      DO 7002 I=1,4
      READ (KONST,7003) (ESA(I,J),J=1,7)
7002 CONTINUE
C
C      READ PASSENGER CAR UNITS
      READ (KONST,7003) (PCU(I),I=1,7)
7003 FORMAT(7F7.2)
C
C      READ PERCENTAGE OF GENERATED TRAFFIC
      DO 7004 I=1,7
      READ (KONST,7003) (GEN(I,J),J=1,7)
7004 CONTINUE
C
C      READ AND WRITE LEAD DATA
C
      969 read (kin,30) nrt,Apj,nel,nil,(ny(i),i=1,3)
      IF (NRT.EQ.99) GO TO 1500
                                     ny(5)=ny(3)
                                     ny(4)=ny(2)
                                     ny(3)=ny(1)
                                     ntv = 7
      NPJ = 30
      30 format(i4,A,2i2,3i4)
      npyrs=ny(4)-ny(3)+1
C      write (ktraf) nel,nil,ny(3),npyrs,ntv
      if (idebug.gt.0)write (kdebug,6002)nel,nil,ny(3),npyrs,ntv
6002 format(' ktraf:',2i2,i5,i3,i3)
C
C      read title and define output formats
C
      read (kin,1)ititle
      if (idebug.gt.0)write(kdebug,1)ititle
1      format(a)
13 format(1h1,/,a)
14 format('0',35x,'existing link',i3)
15 format('0',35x,'improved link',i3)
16 format(/,1x,'year'21x,'vehicle type')
17 format(8x,'mc 1',3x,'pc 2',3x,'lt 3',3x,'mt 4',3x,'ht 5',3x,
1'b 6',3x,'hb 7',2x,'total',/)
C
      IF (IDEBUG .GT.0) WRITE (KDEBUG,3004)
      WRITE (KPRNT,3898)
3898 FORMAT (1H1)
      write (kprnt,3899)
3899 format ('0', ' ---- REVISION H')
      write (kprnt,3901)
      do 3990 i=1,5
3990 write (kprnt,3902)
      write (kprnt,3903)Apj,nrt
      do 3991 i=1,5
3991 write (kprnt,3902)
      write (kprnt,3901)
3901 format(15x,'***** TRAFFIC GROWTH CALCU
1 L A T I O N S *****')
3902 FORMAT(15X,'*',82X,'*')

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3903 FORMAT(15X,'*',15X,'STUDY ROAD',1X,A,29X'ROUTE',15,12X,'*')
3004 FORMAT(' TITLE AND OUTPUT FORMAT OK')
C
C
LINKNO = 0
50 READ(KIN,3) ELEN, IRES, INEW, IEXT
   ICONT=ICOND
   IMP=2
C
   IF (IEXT.GT.3) IMP=3
   IYRSRF=NY(5)+IYRSRF-1
   IF (IYRSRF.LT.NY(5)) IYRSRF=NY(5)
   IF (IRESRF.EQ.0) IRESRF=INEW
3   FORMAT(F5.3,3I2)
   IF (ELEN.GE.99.) GO TO 1500
   IF (LXN.GT.0) GO TO 697
   WRITE (KTRAF) NEL,NIL,NY(3),NPYRS,NTV
697 LINKNO = LINKNO+1
   LXN = LXN+1
   IPASS=LINKNO
   IF (IDEBUG.GT.0) WRITE (KDEBUG,3005) IPASS,ELEN,IRES,IMP,INEW,
1 IEXT,ICOND,IYRSRF,IRESRF
   IRES=IRES-2
3005 FORMAT(' LINK ELEN IMP INEW ',12,F6.2,6I2,11)
C
C
INITIALISE ARRAYS
C
   IF (IDEBUG.GT.0) WRITE (KDEBUG,3006)
3006 FORMAT(' INIALIZE ARRAYS')
   DO 60 I = 1,31
   IYEAR(I) = 0.
   TOTT(I) = 0.
   TOTAL(I) = 0
   DO 60 M = 1,7
   GTRF(I,M)=0
60 TRF(I,M)=0.
C
C
READ BASE TRAFFIC AND GROWTH RATES
C
   IF (IDEBUG.GT.0) WRITE (KDEBUG,3007)
3007 FORMAT (' READ BASE TRAFFIC AND GROWTH RATES')
   READ(KIN,5) (TRF(1,M),M=1,7)
5   FORMAT(7F6.0)
   ZESA(1)=0
   DO 120 M=2,7
   ZESA(1)=ZESA(1)+TRF(1,M)*ESA(IRES,M)*365
120 TOTT(1)=TOTT(1)+TRF(1,M)
   TOTAL(1)=TOTT(1)
   DO 240 I=1,3
   READ(KIN,7) IYR(I), (GTH(I,M),M=1,7)
C
7   FORMAT(14,7F5.1)
   IF (IYR(I).EQ.9999) GOTO 242
   NRATES=I
   JJ = JJ+1
   DO 210 M = 1,7
   GRATE(I,M) =GTH(I,M)
210 GTH(I,M) = GTH(I,M)/100.+1.
240 CONTINUE
C
242 CONTINUE
   IF (IMP .EQ. 3) GOTO 250
C
C
PRINT THE GROWTH RATES FOR THE LINK
C
C
WRITE (KPRNT,8600)
C8600 FORMAT(1H1,10X,'
   WRITE (KPRNT,8601)
8601 FORMAT(1H1)
   WRITE (KPRNT,8310)
   WRITE (KPRNT,777)
777 FORMAT(10X,'TRAFFIC GROWTH RATES AND FORECAST VOLUMES')
   WRITE (KPRNT,888)
888 FORMAT(10X,'
   WRITE (KPRNT,3000)

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TABLE 2.1-1'

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3000 FORMAT('0',/' ROAD')
WRITE (KPRNT,8000)
8000 FORMAT(' SECT. IDENTIFIER LOCATION LENGT
1H KM. TO KM.')
WRITE (KPRNT,8001)
8001 FORMAT('-----')
1-----')
WRITE (KPRNT,8002) ITITLE
8002 FORMAT('0',A)
WRITE (KPRNT,8310)
8310 FORMAT('0')
WRITE (KPRNT,8003)
8003 FORMAT('0',//,' TRAFFIC GROWTH RATE % PER ANNUM')
WRITE (KPRNT,8004)
8004 FORMAT('-----')
WRITE (KPRNT,244)
244 FORMAT('0',//,' YEARS MC PC LT MT HT L9
1 HB')
WRITE (KPRNT,8020)
8020 FORMAT('0',/)
INTL = 85
DO 245 I=1,NRATES
IF (I.EQ.1) INTL=INTL+4
IF (I.EQ.2) INTL=INTL+5
IF (I.EQ.3) INTL=INTL+9
IF (I.EQ.3) GO TO 8070
8060 FORMAT(' ',I4,'-03',7F7.1)
WRITE (KPRNT,246) IYR(I),INTL,(GRATE(I,M),M=1,7)
GO TO 245
8070 WRITE (KPRNT,8060) IYR(I),(GRATE(I,M),M=1,7)
245 CONTINUE
246 FORMAT(' ',I4,'-',I2,7F7.1)
WRITE (KPRNT,8022)
8022 FORMAT('0',///)
C READ MAINTENANCE DATA
C
C 250 CONTINUE
250 IM = 0
IF (IDEBUG.GT.0) WRITE (KDEBUG,3009)
3009 FORMAT(' ZERO THE MAINTENANCE ARRAY')
DO 270 I =1,31
MANY(I)=0
MMAIN(I)=0
C
C 270 CONTINUE
MANY(1)=NY(1)
TRAFFIC=TOTT(1)
IF (IEXT.GT.5 .AND. TRAFFIC.GT.1000) TRAFFIC=1000
ZMAIN(1)=MCONS(IEXT,1)*ELEN
ZMAIN(1)=ZMAIN(1)+MCONS(IEXT,2)*TRAFFIC*.01*ELEN
MMAIN(1)=ZMAIN(1)
C
C IF (IDEBUG.GT.0) WRITE (KDEBUG,3010)
3010 FORMAT (' INTERPOLATE TRAFFIC')
IYEAR(1) = IYR(1)
IY = 1
DO 400 I = 1,JJ
IF (IDEBUG.GT.1)WRITE (KDEBUG,4001)I,JJ
4001 FORMAT(' I LOOP TO LINE 400 I,JJ=',I5,I5)
IF (I.EQ.JJ) GO TO 360
INC = IYR(I+1) - IYR(I)
IF (I.EQ.1) INC = IYR(I+1) - NY(1)
GO TO 370
360 IF (IYR(I).GE.NY(2)) GO TO 440
INC = NY(2) - IYR(I)
370 DO 390 J = 1,INC
IF (IDEBUG.GT.1)WRITE (KDEBUG,4002)J,INC,IY
4002 FORMAT (' J LOOP TO LINE 390 J,INC,IY = ',I5,I5,I5)
IF ((IY+J).GT.31) GO TO 440
IYEAR(IY+J) = IYEAR(IY) + J
ZERO THE CURRENT TRAFFIC THIS YEAR
C
TOTT(IY+J)=0
ZESA(IY+J)=0
ZTESA(IY+J)=0
ZPCU(IY+J)=0

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ZGEN(IY+J)=0
DO 380 M =1,7
C   GROW THE TRAFFIC FOR CURRENT INCREMENT
TRF(IY+J,M) = TRF(IY,M)*(GTH(I,M)**J)
GTRF(IY+J,M)=0
GTRF(IY+J,M)=TRF(IY+J,M)*GEN(IEXT,M)
IF (IYEAR(IY+J) .LT. NY(5)) GTRF(IY+J,M)=0
TOTT(IY+J) = TOTT(IY+J) + TRF(IY+J,M)
ZESA(IY+J) =ZESA(IY+J)+(GTRF(IY+J,M)+TRF(IY+J,M))*ESA(IREG,M)*3&5
ZPCU(IY+J) = ZPCU(IY+J) + (GTRF(IY+J,M)+ TRF(IY+J,M))*PCU(M)
ZGEN(IY+J) = ZGEN(IY+J) + GTRF(IY+J,M)
IF (IDEBUG.GT.1) WRITE (KDEBUG,4003) IY,I,M,J,TRF(IY,M),
1 TRF(IY+J,M),TOTT(IY+J),ZPCU(IY+J),GTRF(IY+J,M)
4003 FORMAT (' LOOP 380 ',I3,I3,I3,I3,F8.1,F8.1,F8.1,F8.1,F8.1)
380 CONTINUE
C   NOW REMOVE THE MOTORCYCLES (VEHICLE 1)
TOTT(IY+J) =TOTT(IY+J)-TRF(IY+J,1)
ZGEN(IY+J) = ZGEN(IY+J) - GTRF(IY+J,1)
TOTAL(IY+J)=TOTT(IY+J)+ZGEN(IY+J)
TRKPC(IY+J)=100*(TRF(IY+J,4)+ TRF(IY+J,5)+TRF(IY+J,7))/TOTT(IY+J)
IF (IYEAR(IY+J) .GE. NY(5)) ZTESA(IY+J) = ZTESA(IY+J)+ZESA(IY+J)
1 +ZTESA(IY+J-1)
C***** NEW MAINTENANCE COST CALC BASED ON ANNUAL ESA
C
ISURF = IEXT
IF (IYEAR(IY+J) .LT. NY(5)) GO TO 384
IF (IMP .NE. 3) GO TO 384
ISURF = INEW
ICOND = 1
IF (IYEAR(IY+J) .GE. IYRSRF) ISURF =IRESRF
384 ZMAIN(IY+J)=MCONS(ISURF,1)*ELEN
TRAFFIC=TOTAL(IY+J)
IF (ISURF.GT.5.AND. TRAFFIC.GT.1000) TRAFFIC=1000
ZMAIN(IY+J)=ZMAIN(IY+J)+MCONS(ISURF,2)+TRAFFIC*.01+ELEN
C
385 MANY(IY+J)=IYEAR(IY+J)
C
MMAIN(IY+J)=ZMAIN(IY+J)
- IYJ=IY+J-----
IF (IDEBUG.GT.1) WRITE (KDEBUG,3011) MANY(IYJ),ZMAIN(IYJ),TOTT(IYJ),
IELEN,MCONS(ISURF,1),MCONS(ISURF,2),ISURF,MMAIN(IYJ)
3011 FORMAT (' NEW MAINTENANCE ',I4,F9.1,F9.1,F7.2,I8,I4,I2,I8)
C
MMAIN(IY+J)=ZMAIN(IY+J).
390 .CONTINUE
IY = IY + INC
400 CONTINUE
C
C
C   INTERPOLATE MAINTENANCE
C
440 CONTINUE
MANY(1)=NY(1)
C
C
C   SHUFFLE TO PRINT
C
510 IF (IMP.EQ.3) GO TO 640
IF (NY(1).EQ.NY(3)) GO TO 640
IF (NY(1).LT.NY(3)) GO TO 600
IF (IDEBUG.GT.0) WRITE (KDEBUG,3013)
3013 FORMAT(' SHUFFLE TO PRINT')
IDF = NY(1) - NY(3)
DO 520 I = IDF,30
J= 31 + IDF - I
IYEAR(J) = IYEAR(J-IDF)
DO 520 M = 1,7
520 TRF(J,M) = TRF(J-IDF,M)
DO 530 I = 1,IDF
DO 530 M = 1,7
530 TRF(I,M) = 0
GO TO 640
C
600 IDF = NY(3) - NY(1)
DO 620 I = 1,31-IDF
IYEAR(I) = IYEAR(I+IDF)
DO 620 M = 1,7
620 TRF(I,M) = TRF(I+IDF,M)

```

```

C
C
C
C
C      SHUFFLE MAINTENANCE
640 IF (NY(1).EQ.MANY(1)) GO TO 725 -
    IF (NY(1).LT.MANY(1)) GO TO 700
    IDF = NY(1) - MANY(1)
    IF (IDEBUG.GT.0) WRITE (KDEBUG,3014)
3014 FORMAT('SHUFFLE MAINTENANCE')
    DO 660 I = 1,31
    IF (I.GT.31-IDF) GO TO 650
    MANY(I) = MANY(I+IDF)
    MMAIN(I) = MMAIN(I+IDF)
    GO TO 660
650 MANY(I) = 0
    MMAIN(I) = 0
    IF (IDEBUG.BT.1) WRITE (KDEBUG,4007) MANY(I),MMAIN(I),ZMAIN(I)
4007 FORMAT(' ZERO MAINT COST 650-660',I9,I9,F9.1)
660 CONTINUE
    GO TO 725
C
700 IDF= MANY(1)-NY(1)
    DO 720 I = 1,31
    J = 32 - I
    IF (J.GT.IDF) GO TO 710
    MANY(J) = 0
    MMAIN(J) = 0
    IF (IDEBUG.BT.1) WRITE (KDEBUG,4006)MANY(J),MMAIN(J),ZMAIN(J)
--4006 - FORMAT(' ZERO MAINT COST 700-710',I9,I9,F9.1)
C
    MACY(J) = 0
    GO TO 720
710 MANY(J) = MANY(J-IDF)
    MMAIN(J) = MMAIN(J-IDF)
C
    MACY(J) = MACY(J-IDF)
C
720 CONTINUE
725 IF (IMP.NE.3) GO TO 760
C
C
C
C      PRINT AND WRITE
750 CONTINUE
    IF (IDEBUG.GT.0) WRITE (KDEBUG,3015)
3015 FORMAT(' WRITE AND PRINT SECTION')
C
C
C
C
756 CONTINUE
    WRITE (KPRNT,8005)
8005 FORMAT(// ' FORECAST TRAFFIC VOLUME')
    WRITE (KPRNT,8006)
8006 FORMAT( ' _____ //')
    WRITE (KPRNT,116)
    WRITE (KPRNT,117)
116 FORMAT('0',/, ' YEAR',21X, 'VEHICLE TYPE',17X, 'TOTAL')
117 FORMAT(8X, ' MC',3X, ' PC',3X, ' LT',3X, ' MT',3X, ' HT',3X,
1 ' LB',3X, ' HB',2X, 'EXCL MC')
    WRITE (KPRNT,8050)
8050 FORMAT('0',/)
C
760 IF (NY(3).LT.NY(1)) NY(3) = NY(1)
    IF (NY(4).GT.NY(2)) NY(4) = NY(2)
    MY1 = NY(3) - NY(1) + 1
    MY2 = NY(4) - NY(1) + 1
    MY3 = NY(5) - NY(1) + 1
    IF (MY3.LT.1) MY3 = 1
    IF (IMP.LT.3) MY3 = 1
    DO 780 I=MY1,MY2
    RMAIN = MMAIN(I)
    ITOT(I)=TOTAL(I)
    IF (I.GE.MY3) GO TO 775
    TOT(I) = 0.
    DO 770 M =1,7
770 TRF(I,M)=0.
775 IF (IMP.LT.3) GOTO 778

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JKL = JKL + 1
WRITE (KTEM,REC=JKL) (TRF(I,M),M=1,NTV),RMAIN,RMACY,TOTT(I)
GOTO 780
778 WRITE(KTRAF) (TRF(I,M),M=1,NTV),RMAIN,RMACY,TOTT(I)
IF (IDEBUG.GT.0)
1WRITE (KDEBUG,6001) JKL,(TRF(I,M),M=1,NTV),RMAIN,RMACY,TOTT(I)
6001 FORMAT('KTRAF',I3,7F5.0,2F8.0,F6.0)
780 CONTINUE
DO 801 I = MY1,MY2
DO 790 M = 1,7
790 ITF(I,M) = IFIX(TRF(I,M)+GTRF(I,M))
JY = NY(3) + I - 1
IZGEN=ZGEN(I)
ITOTAL=TOTAL(I)
IF (IMP.EQ.3) GO TO 800
DO 799 M=1,7
799 IOLD(I,M)=ITF(I,M)
GO TO 801
800 IF (IMP.EQ.3)WRITE (KPRNT,23) JY, (IOLD(I,M),M=1,7),ITOT(I)
801 CONTINUE
23 FORMAT(I5,7I7,I8) -----
C
C PRINTOUT FOR MAINTENANCE
IF (IMP.NE.3) GO TO 9026
IF (IDEBUG.GT.0) WRITE (KDEBUG,3016) MY1,MY2
3016 FORMAT(' PRINT MAINTENANCE',I5,I5)
9026 CONTINUE
C
DO 900 I=MY1,MY2
JY=NY(3)+I-1
AMOLD(I)=MOLD(I)
MOLD(I)=MMAIN(I)
IF (IDEBUG.GT.0)WRITE (KDEBUG,4005) JY,MANY(I),MMAIN(I),ZMAIN(I),I
900 CONTINUE
IF (IMP.NE.3) GO TO 2000
WRITE (KPRNT,8500)
8500 FORMAT('0')
WRITE (KPRNT,29)
WRITE (KPRNT,8200)
8200 FORMAT('-----')
WRITE (KPRNT,8220)
8220 FORMAT('0')
WRITE (KPRNT,8222)
WRITE (KPRNT,8221)
29 FORMAT('0','ANNUAL PCU , ESA AND MAINTENANCE COSTS')
8222 FORMAT(
1 MAINT COST(000 BAHT)')
WRITE (KPRNT,31)
8221 FORMAT(
1 -----)
31 FORMAT('0','YEAR PCU HVZ ANNUAL CUMUL.
1 EXISTING IMPROVED')
WRITE (KPRNT,8223)
8223 FORMAT('0')
902 DO 901 I=MY1,MY2
JY=NY(3)+I-1
NZPCU=IFIX(ZPCU(I))
MZESA=IFIX(ZESA(I)/1000)
NZESA=IFIX(ZTESA(I)/1000)
NAOLD=IFIX(AMOLD(I)/1000)
NMAIN=MMAIN(I)/1000
IF (JY.GE.NY(5))WRITE (KPRNT,27) JY,NZPCU,TRKPC(I),MZESA,NZESA,NAOLD,
1NMAIN
901 CONTINUE
27 FORMAT(' ',I4,5X,I8,5X,F8.1,5X,I7,4X,I7,5X,I8.5X,I8)
25 FORMAT(' ',I4,23X,I9,2X,I9)
4005 FORMAT(' MAINT COST YR,YR,MAIN,ZMAIN,I',I5,I5,I9,F9.1,I3)
2000 IF (IMP.EQ.3) GO TO 1002
1001 IF (IMP.NE.2) GO TO 1000
IMP = 3
GO TO 250
1000 GO TO 1500

```

```

C
C
1002 WRITE TO SUMMARY FILE ON IMP=3
      IBASE=7*(NPJ-1)+1
      IREC=IBASE+IPASS
      IF (IPASS.GT.6) GO TO 1001
      WRITE (KSUM,REC=IREC)NPJ,NRT,IPASS,ELEN,ITOT(1),ITOT(5),ITOT(11),
1ITOT(19),ZPCU(11),ZPCU(19),ZTESA(11),ZTESA(19),INew,IEXT,ICOND,
2IRESRF
      GO TO 1001

C
C
      WRITE IMPROVED LINK DATA ON END OF KTRAF FILE

C
C
1500 JKL = 0
      IF (IDEBUG.GT.0) WRITE (KDEBUG,3017) NIL
3017 -FORMAT-('MOVE IMPROVED LINKS TO END OF FILE',I3)
      DO 1600 I LINK = 1,NIL
      DO 1600 I = MY1,MY2
      JKL = JKL + 1
      READ (KTEM,REC=JKL) (TRF(I,M),M=1,7),RMAIN,RMACY,TOTVEH
      WRITE (KTRAF) (TRF(I,M),M=1,7),RMAIN,RMACY,TOTVEH
      IF (IDEBUG.GT.0)
1WRITE (KDEBUG,6001)JKL, (TRF(I,M),M=1,NTV),RMAIN,RMACY,TOTT(I)
1600 CONTINUE

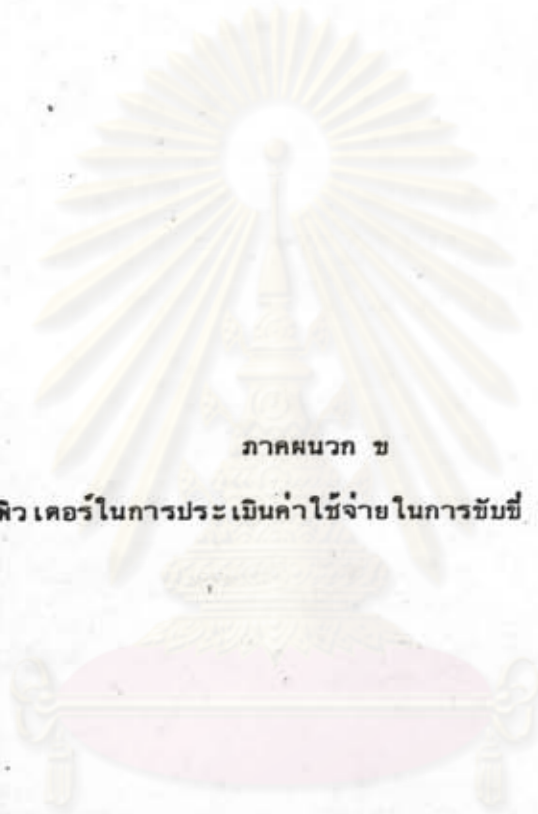
C
C
      RETURN TO CALLING PROGRAM

C
C
1700 RETURN
      END

```

ศูนย์วิทยทรัพยากร  
จุฬาลงกรณ์มหาวิทยาลัย





ภาคผนวก ข

โปรแกรมคอมพิวเตอร์ในการประเมินค่าใช้จ่ายในการขับขี่ (Listing of VOC)

ศูนย์วิทยทรัพยากร  
จุฬาลงกรณ์มหาวิทยาลัย







C  
C  
C

## READ IN LINK DATA AND SET YEAR INTERVAL

```

55 READ (KIN,60) K,SCZ,FCZ,CZI,PWL,PWS,JYEAR,LYEAR,JK,JVT,PROP,ICON
60 FORMAT(I2,2F6.0,F3.0,F4.2,F3.2,2I4,2I2,F3.2,I1)
   IF (K.EQ.22) GO TO 80
   CALL CARD(22,K)
   IRUT = 1
   GO TO 55
80 IF (CZI.EQ.0) CZI=500.
C *****
   NLSW = NLSW + 1
   IF (NLSW.GT.1) GO TO 82
   JJM = LYEAR - JYEAR + 1
   WRITE (KVOC) NEL,NIL,JYEAR,JJM,JVT
82 CONTINUE
C *****
   IF (FCZ.GT.SCZ) GO TO 84
   CALL ERROR(1)
   IRUT = 1
84 IF (JVT.NE.0) GO TO 86
   CALL ERROR(2)
   GO TO 2020
86 DO 120 I=1,JVT
90 READ (KIN,100) K,JV(I),VMA(I)
100 FORMAT(2I2,F3.0)
   IF (K.EQ.23) GO TO 120
   CALL CARD(23,K)
   IRUT=1
   GO TO 90
120 CONTINUE
   IF (JK.NE.0.AND.LYEAR.GT.JYEAR.AND.JYEAR.GT.0) GO TO 122
   CALL ERROR(3)
   IRUT = 1
122 YYJK = JK
   YJ = (LYEAR-JYEAR)/YYJK
   JY = IFIX(YJ)
   IF (JY.EQ.YJ) GO TO 124
   JY = JY + 1
124 JY = JY + 1

```

C  
C  
C  
CCALCULATE PAVEMENT AND SHOULDER WIDTH FACTORS  
FOR CAPACITY ADJUSTMENT

```

   IF (IUNIT.EQ.1) GO TO 62
   PWL = PWL/3.
   PWS = PWS/3.
62 PRL = 0.68
   IF (PWL.LE.2.8) GO TO 70
   DO 64 I=2,11
   AI = I
   IF (PWL.LE.(2.7+AI/10.)) GO TO 68
64 CONTINUE
   PRL = 1.
   GO TO 70
68 PRL = PL(12-I)-(2.7+AI/10.-PWL)*(PL(12-I)-PL(13-I))*10.
70 PRL = PRL
   PRS = 0.75
   IF (PWS.LE.0.4) GO TO 78
   DO 74 I=2,9
   AI = I
   IF (PWS.LE.(0.2+AI/5.)) GO TO 76
74 CONTINUE
   PRS = 1.
   GO TO 78
76 PRS = PS(10-I)-(0.2+AI/5.-PWS)*(PS(10-I)-PS(11-I))*5.
78 PWS = PRS

```

C  
C  
C

## READ IN TRAFFIC DATA AND PAVEMENT CONDITION

```

DO 160 I=1,JY
130 READ (KIN,140) K,VL(I),PET(I),ICRS(I),NW(I),JS(I),CP(I)
140 FORMAT(I2,F6.0,F3.1,I4,2I2,F4.0)
   JF(I)=1
   IF (K.EQ.24) GO TO 150

```



```

CALL CARD (24,K)
IRUT = 1
GO TO 130
150 IF (VL(I).NE.0) GO TO 132
CALL ERROR(4)
IRUT = 1
132 IF (PET(I).NE.0) GO TO 136
IF (I.NE.1) GO TO 134
PET(I) = 15.
WRITE(KPRNT,1309)
1309 FORMAT('0',TRUCK PROP. SET AT 15% ')
GO TO 136
134 PET (I) = PET(I-1)
136 IF (JF(I).EQ.3) ICRS(I) = 1
160 CONTINUE
IF (CP(1).NE.0) GO TO 162
CP(1) = 2000.
WRITE(KPRNT,1609)
1609 FORMAT('0', 'CAPACITY HAS BEEN SET AT 2000')
162 IF (JF(1).NE.0.AND .ICRS(1).NE.0) GO TO 166
CALL ERROR(5)
IRUT = 1
166 IF (NW(1).EQ.0) NW(1)=1
IF (JS(1).EQ.0) JS(1) =1

C
C
C
READ IN CURVE DATA

I = 1
170 READ (KIN,180)K,C1(I),C2(I),C3(I)
180 FORMAT(I2,2F8.0,F6.0)
IC = I
IF (K.EQ.25) GO TO 200
CALL CARD(25,K)
IRUT = 1
GO TO 170
200 IF (C1(I).GE.999990.) GO TO 221
IF(C1(I).GT.FCZ) GO TO 205
IF(C2(I).GT.FCZ) C2(I) = FCZ
GO TO 210
205 WRITE (KPRNT,2220) I,C1(I),C2(I),FCZ
2220 FORMAT('0', ' CURVE ',I2,' CHAINAGE",2F10.2, ' GREATER THAN END CHAI
*NAGE',F10.2)
IRUT = 1
GO TO 170
210 IF (I.GT.1 .AND.C1(I).LT.C2(I-1) ) GO TO 215
IF(C1(I).GT.SCZ) GO TO 212
IF(C2(I).LE.SCZ) GO TO 216
IF(I.GT.1) GO TO 216
C1(I) = SCZ

C
C
C
SRT CURVE SPEED

212 C4(I) = 5.04 * SQRT(C3(I))
IF (IUNIT.EQ.2) C4(I)=1.726 * SQRT(C3(I))
IF(C4(I).GT.SMAX) C4(I)=SMAX

C
C
C
C*****
IF(NFLAG.NE.5) GO TO 214
IF (I.EQ.1) WRITE (KPRNT,211)
211 FORMAT (1H1,5(/))
WRITE (KPRNT,213) I,C1(I),C2(I),C3(I),C4(I)
213 FORMAT('0',, 'CURVE ',I3,4X,3F10.2,4X,F6.1)

C
C
C
C*****
C
214 I = I + 1
GO TO 170
215 WRITE (KPRNT.2230) I.C1(I).C2(I-1)

```

```

2230 FORMAT('0', ' CURVE ',I2, ' CHAINAGE ERROR,',F10.2, ' AFTER ',F10.2)
      GO TO 218
216 WRITE (KPRNT,2235) I,C1(I),C2(I),SCZ
2235 FORMAT('0', ' CURVE ',I2, ' START CHAINAGE ',F10.2, ' AND/OR END CHAI
      *NAGE ',F10.2, ' BEFORE LINK START ',F10.2)
218 IRUT = 1
      GO TO 170
221 C1(I) = 999999.
C
C      READ IN GRADE DATA AND CALCULATE GRADIENTS
C
C
      J = 0
      IG1 = 0
230 J = J+1
C
C
C*****
C*****
C
C
240 READ (KIN,250) K,GX,RL
250 FORMAT(I2,F8.0,F6.2)
      IF (K.EQ.26) GO TO 270
      CALL CARD (26,K)
      IRUT = 1
      GO TO 240
270 IF (GX.GE.999990.) GO TO 340
      IF (GX.GT. (SCZ-3*ZM)) GO TO 275
      CALL ERROR(6)
      IRUT = 1
      GO TO 240
275 IF (GX.LE.FCZ) GO TO 290
      IF (IG1.EQ.1) GO TO 302
      IF (J.EQ.1) GO TO 340
      IG1 = 1
280 IF (J.GT.1) GO TO 300
      G1(J) = GX
      GX0 = GX
      RLO = RL
      GO TO 230
300 G2(J-1) = GX
      IF (GX.GE.G1(J-1)) GO TO 305
302 WRITE (KPRNT,2240) J,G1(J-1),GX
2240 FORMAT('0', ' VIP ',I2, ' , GRADE CHAINAGE ERROR,',F10.2, ' AFTER ',F10
      1.2)
      IRUT = 1
      GO TO 230
305 G3(J-1) = (RL-RLO)/(GX-GX0)*100.
      IF (NFLAG.NE.5) GO TO 307
      WRITE (KPRNT,234) J-1,G1(J-1),G2(J-1),G3(J-1)
234 FORMAT('0', ' GRADE ',I3,4X,2F10.2,F8.2)
307 IF (IG1.EQ.1) GX = FCZ
      IK = 1
      IF (RL.LT.RLO) IK = -1
      L = ABS(G3(J-1))
      IF (L.LE.7) GO TO 330
      WRITE (KPRNT,320) GX,L,IK
320 FORMAT('0', ' WARNING : GRADE AT CH ',F10.2, ' IS',I3, ' AND HAS BEEN
      1 SET AT 7 PERCENT ( *,I3, ' )')
      G3(J-1) = 7. * IK
330 G1(J) = GX
      GX0 = GX
      RLO = RL
      GO TO 230
340 IF (J.GT.1) GO TO 341
      G1(1) = SCZ
      G2(1) = FCZ
      G3(1) = 0.
      G3(2) = 999.
      GO TO 342
341 G3(J-1) = 999.
C
C      READ IN NARROW BRIDGE CHAINAGES
C

```



```

342 IB = 0
344 IB = IB + 1
    READ (KIN,345) K,BN(IB)
345 FORMAT(I2,FB.0)
C
C*****
    IF(K.EQ.27) GO TO 347
    CALL CARD(27,K)
    IRUT=1
    GO TO 344
347 IF(BN(IB).GE.999990.) GO TO 349
    IF(BN(IB).GE.SCZ.AND.BN(IB).LE.FCZ) GO TO 348
    WRITE(KPRNT,3459) BN(IB)
3459 FORMAT('0',' BRIDGE AT CHAINAGE ',F10.0,' NOT ACCEPTED')
    GO TO 344
348 IF(NFLAG.NE.5) GO TO 344
    WRITE(KPRNT,3460) IB,BN(IB)
3460 FORMAT('0',' BRIDGE ',I3,F10.2)
    GO TO 344
349 BN(IB) = 999999.
C
C CHECK FOR ERRORS
C
C IF(IRUT.NE.0) GO TO 20
C
C READ IN GENERAL VOC DATA
C
    READ (KSTV,REC=1) INV,IRS,(IDUM(M),M=1,7)
    IF(INV.EQ.JVT) GO TO 404
    WRITE (KPRNT,4049) JVT,INV
4049 FORMAT('0','ERROR IN VEHICLE TYPE NUMBER',I4,'ON INPUT',I4,
*ON DISC')
    IRUT = 1
    GO TO 20
404 READ (KSTV,REC=2) ((KA (M,N),M=1,8),N=1,INV)
    READ (KSTV,REC=3) ((LE1 (M,N),M=1,8),N=1,5)
    READ (KSTV,REC=4) ((LE2 (M,N),M=1,8),N=1,5)
    READ (KSTV,REC=5) ((LE3 (M,N),M=1,8),N=1,5)
    READ (KSTV,REC=6) ((VEH(M,N),M=1,INV),N=1,9)
    READ (KSTV,REC=7) PTR1,PADT1,PTR2,PADT2,PTR3,PADT3
C
C SET DEFAULT VALUES
C
    JVS = JV(1)
    JJ = JVS
    CAP = CP(1)
    JSS = JS(1)
500 IF (JJ.GT.JVT) GO TO 2010
C
C*****
    IF(NFLAG.NE.5) GO TO 510
    WRITE(KPRNT,211)
C*****
C
C CALL VEHICLE LOOP ROUTINE
C
510 CALL REVEH
C
C CALL CALN
C
C
C JJ = JJ + 1
    GO TO 500
2010 CONTINUE
C
C
    IF (ICK.GT.0) GOTO 7200
    DO 7201 J=1,INV
    DO 7201 I=1,JY
    DO 7201 LL=1,5
        XX(J,LL,I)=QQ(J,LL,I)
7201 CONTINUE
    ICK=ICK+1
    GOTO 20

```

```

7200 WRITE (KPRNT,7000)
      WRITE (KPRNT,7001)
      WRITE (KPRNT,7002)
      WRITE (KPRNT,7003)
      WRITE (KPRNT,7004)
      WRITE (KPRNT,7005)
      WRITE (KPRNT,7006) TITLE
      WRITE (KPRNT,7007)
      WRITE (KPRNT,7008)
      WRITE (KPRNT,7009)
      WRITE (KPRNT,7010)
      WRITE (KPRNT,7011)
      WRITE (KPRNT,7012)
      WRITE (KPRNT,7013)
      WRITE (KPRNT,7014)
      WRITE (KPRNT,7015)
7000 FORMAT (1H1,/)
7001 FORMAT (32X, 'VEHICLE OPERATING COSTS')
7002 FORMAT (32X, '-----')
7003 FORMAT ('0',/ 'ROAD')
7004 FORMAT (' SECT. IDENTIFIER LOCATION
1LENGTH KM. TO KM. ')
7005 FORMAT ('-----')
7006 FORMAT (8X,A)
7007 FORMAT ('0',/)
7008 FORMAT (16X, 'EXISTING', 40X, 'IMPROVED')
7009 FORMAT (16X, '-----', 40X, '-----')
7010 FORMAT ('0',/)
7011 FORMAT (' YEAR SPEED TIME RUNNING FIXED TOTAL SPEE
1D TIME RUNNING FIXED TOTAL')
7012 FORMAT ('-----')
7013 FORMAT (' (KPH) (MINS) COST COST COST (KPH
3) (MINS) COST COST COST')
7014 FORMAT ('-----')
7015 FORMAT (' (BT) (BT) (BT) (BT)
5 (BT) (BT) (BT)')
      DO 2500 J=1, INV
      WRITE (KPRNT,2239)
2239 FORMAT (1H0)
      WRITE (KPRNT,2599) (VEH(J,N), N=1,9)
2599 FORMAT (1X,9A2)
      KYEAR=JYEAR-JK
      DO 2500 I=1, JY
      KYEAR=KYEAR+JK
2400 M=J
      WRITE (KPRNT,2499) KYEAR, (XX(J,LL,I), LL=1,5), (QQ(J,LL,I), LL=1,5)
2499 FORMAT (1X, I4, 2F7.1, 3F8.2, 9X, 2F7.1, 3F8.2)
2500 CONTINUE
      GOTO 20
2020 RETURN
      END
C WRITE (KPRNT,2209)
C WRITE (KPRNT,2219) TITLE
C WRITE (KPRNT,2229)
C2209 FORMAT (1H1,/)
C2219 FORMAT (18X,A,/)
C2229 FORMAT (,38X, 'VEHICLE OPERATING COSTS FOR LINK', ///, 18X,
C *'VEHICLE TYPE', 6X, 'YEAR', 4X, 'SPEED', 4X, 'TIME', 3X, 'RUNNING',
C *4X, 'FIXED', 5X, 'TOTAL', /, 44X, ' (KPH) ', 3X, ' (MINS) ', 2X, ' COST (B) ',
C *3X, ' COST (B) ', 5X, ' (B) ')
C DO 2500 J = 1, INV
C WRITE (KPRNT,2239)
C2239 FORMAT (1H0)
C KYEAR = JYEAR - JK
C DO 2500 I = 1, JY
C KYEAR = KYEAR + JK
C IF (I.NE.1) GO TO 2400
C WRITE (KPRNT,2599) (VEH(J,N), N=1,9), KYEAR, (QQ(J,LL,I), LL=1,5)
C2599 FORMAT (18X,9A2, I4, F9.2, F8.2, 2F10.2, F8.2)
C GO TO 2500

```



```

C2400 M=J
C WRITE (KPRNT,2499) KYEAR,(QQ(J,LL,I),LL=1,5)
C2499 FORMAT (3&X,I4,F9.2,FB.2.2F10.2,FB.2)
C2500 CONTINUE

```

C

C

SUBROUTINE REVEH

C

CHARACTER\*70 TITLE

CHARACTER\*2 VEH

COMMON KIN,KTRAF,KSTV,KVOC,KPRNT

COMMON /BLK1/IUNIT,MLINE,J,I,PROP,KYEAR,JM,JSV,VM,INV,KODE,JK,K,

\* IISW,KJ,SCZ,FCZ,CZ1,PWL,PWS,JYEAR,LYEAR,JY,IC,L,PTR1,PADT1,PTR2,

\* PADT2,PTR3,PADT3,JVS,JJ,AA,BB,CC,DD,EE,FF,AAA,BBB,CAP,JSS,IRS,ICK

COMMON /BLK2/A(7,30),B(7,30),VL(30),QQ(10,6,30),XX(10,6,30)

\*ICRS(30),SMAX,SMIN,NWAY,ZM

COMMON /BLK4/LE1(8,5),LE2(8,5),LE3(8,5),KA(8,10),CM(10,10)

COMMON /BLK5/UGM(10,7),DGM(10,7),SCM(10,10),TCM(10,10),VT(8,6)

COMMON /BLK6/C1(90),C2(90),C3(90),C4(90),G1(90),G2(90),G3(90)

COMMON /BLK7/IA(1,30),NFLAG,BN(50),NB,ICON,CF(10,10),CV(10,10)

COMMON /BLK8/TITLE,VEH(10,9)

C

C

C

START OF VEHICLE LOOP

KYEAR = JYEAR

JM = LYEAR - JYEAR + 1

JSV = JV(JJ)

VM = VMA(JJ)

IF (VM.GT.SMAX.OR.VM.EQ.0.)VM = SMAX

C

C

C

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C

```

520 KJ = KA(1,JSV)
READ (KSTV,REC=KJ) ((CM(M,N),M=1,10),N=1,10)

```

C

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C

C

C

C

C

C

C

IF (NFLAG.NE.5) GO TO 540

WRITE (KPRNT,505) (KA(M,JSV),M=1,8)

505 FORMAT ('0', 'KA = ',8I3)

WRITE (KPRNT,515) KJ, (CM(1,N),N=1,10)

515 FORMAT ('0', 'KJ= ',I3, ' CC= ',10(F7.4,1X))

C

C

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C

C

C

C

```

600 RETURN
END

```



## SUBROUTINE CALN

```

C
CHARACTER*70 TITLE
CHARACTER*2 VEH
COMMON KIN,KTRAF,KSTV,KVOC,KPRNT
COMMON /BLK1/IUNIT,MLINE,J,I,PROP,KYEAR,JM,JSV,VM,INV,KODE,JK,K,
* IISW,KJ,SCZ,FCZ,CZI,PWL,PWS,JYEAR,LYEAR,JY,IC,L,PTR1,PADT1,PTR2,
* PADT2,PTR3,PADT3,JVS,JJ,AA,BB,CC,DD,EE,FF,AAA,BBB,CAP,JSS,IRS,ICK
COMMON /BLK2/A(7,30),B(7,30),VL(30),QQ(10,6,30),XX(10,6,30)
COMMON /BLK3/JV(10),VMA(10),JS(30),CP(30),PET(30),JF(30),NW(30),
*ICRS(30),SMAX,SMIN,NWAY,ZM
COMMON /BLK4/LE1(8,5),LE2(8,5),LE3(8,5),KA(8,10),
*CM(10,10)
COMMON /BLK5/UGM(10,7),DGM(10,7),SCM(10,10),TCM(10,10),VT(8,6)
COMMON /BLK6/C1(90),C2(90),C3(90),C4(90),G1(90),G2(90),G3(90)
COMMON /BLK7/IA(1,30),NFLAG,BN(50),NB,ICON,CF(10,10),CV(10,10)
COMMON /BLK8/TITLE,VEH(10,9)

C
C
C
C
START OF YEAR LOOP
C*****
IF(NFLAG.NE.5) GO TO 635
DO 615 I =1,10
615 WRITE (KPRNT,605) (CV(I,N),N = 1,7)
605 FORMAT('0',10(F7.3,1X))
WRITE (KPRNT,620)JSV
620 FORMAT('0','VEHICLE NO.',I3)
WRITE(KPRNT,630)
630 FORMAT(/,3X,'YEAR CAP VM IVC I M CZ CZA L ET VCR
*P ST N NO EDI CV CF CCB CG CS CBS')
C*****
C
635 DO 1920 II=1,JY
C
C
C
INITIALISE VARIABLES
VOL = VL(II)
PT = PET(II)
NSW = NW(II)
JSF = JF(II)
C
C
C
VT = MAXIMUM TRUCK SPEED ON GRADE
IF (KODE.EQ.1) GO TO 640
IF (II.GT.1.AND.JSF.EQ.JF(II-1)) GO TO 640
IF (JSF.EQ.0.AND.II.NE.1)JSF = JF(II-1)
IF (JSF.GT.1)KJ = KJ+1
READ (KSTV,REC=KJ) ((VT(M,N),M=1,8),N=1,6)
IF (JSF.GT.1) KJ = KJ-1
C
640 ISC = ICRS(II)
ISC = 3*(JSF-1) + ISC
IF (JS(II).EQ.0) GO TO 650
JSS = JS(II)
650 IF (CP(II).EQ.0.) GO TO 670
CAP = CP(II)
670 CZ = SCZ
IISW = 0
ISW1 = 0
ISW = 0
NO = 0
JSW = 0
KSW = 0
MSW = 0
I = 1
J = 1
K = 0
IPSW = 1
C = CAP * PWL * PWS
ET01 = 2.
ET02 = 2.
ET03 = 2.
ACT1 = 0.

```



ACT2 = 0.  
 ACT3 = 0.  
 ACFC1 = 0.  
 ACFC2 = 0.  
 ACFC3 = 0.  
 ACVC1 = 0.  
 ACVC2 = 0.  
 ACVC3 = 0.  
 TACC1 = 0.  
 TACC2 = 0.  
 TACC3 = 0.  
 SP1 = VM  
 SP2 = VM  
 SP3 = VM  
 NB = 1  
 K1 = 0

C  
 C START CHAINAGE LOOP  
 C

690 NOJSS = 0  
 CZ0 = CZ  
 LSW = 0  
 L=1

C  
 C INCREMENT CHAINAGE  
 C

700 CZ = CZ + CZI  
 CZA = CZ  
 IF (CZ.LT.FCZ) GO TO 730  
 IF (IISW.NE.0) GO TO 1900  
 CZ = FCZ  
 IISW = 1

C  
 C CHECK IF ON GRADE  
 C

730 CIS = G1(J)  
 IF (G3(J).EQ.999.) GO TO 780  
 L = G3(J)  
 IF (CZ.LT.G2(J)) GO TO 780  
 CZ = G2(J)  
 J = J + 1  
 IF (CZA.NE.CZ) GO TO 780  
 JSW = 1

C  
 C CHECK IF ON A CURVE AND SET CURVE SPEED  
 C

780 IF (I.GE.IC) GO TO 870  
 IISW = 0  
 IF (CZ.LT.C1(I)) GO TO 870  
 IF (KSW.NE.0) GO TO 940  
 KSW = 1  
 CZ = C1(I)  
 IF (CZ.EQ.C20) CZ = CZ + CZI  
 IF (CZA.NE.CZ) GO TO 830  
 JSW = 1  
 830 R = C3(I)  
 VC = C4(I)  
 IVC = VC

C  
 C  
 C 840 IF (J.LE.1) GO TO 860  
 IF (CZ.GE.G2(J-1)) GO TO 860  
 J = J - 1  
 GO TO 840

C  
 C SET RADIUS RANGE  
 C

860 IF (R.LE.0) GO TO 870  
 M = 1500./R  
 IF (IUNIT.EQ.2) M = 4500./R  
 IF (M.LE.0) GO TO 870  
 GO TO 890  
 870 IVC = 0  
 VC = 0.



```

875 M = 0
    GO TO 1000
880 IF (M.LE.7) GO TO 1000
    IF (M.GE.10) GO TO 910
    M = 7
    GO TO 1000
910 IF (M.GE.15) GO TO 930
    M = 8
    GO TO 1000
930 IF (M.GE.45) GO TO 935
    M = 9
    GO TO 1000
935 M = 10
    GO TO 1000
940 LSW = 1
    VC = C4(I)
    IVC = VC
    IF (CZ.LT.C2(I)) GO TO 1000
    CZ = C2(I)
    IF (CZA.NE.CZ) GO TO 970
    JSW = 1
    I = I + 1
    KSW = 0
    IF (J.LE.1) GO TO 1000
    IF (CZ.GE.62(J-1)) GO TO 1000
    J = J-1

```

C  
C  
C  
C  
C

SET LENGTH ALONG THIS GRADE

```

1000 IF (L.GE.2) GO TO 1040
    IF (CZA.NE.CZ) GO TO 1150
    IF (JSW.EQ.0) GO TO 700
    JSW = 0
    GO TO 1150
1040 CZG = CZ - CZS
    CK = CZG / 200.
    IF (IUNIT.EQ.2) CK = CZG/600.
    K = IFIX(CK)
    IF (K.GE.24) GO TO 1090
    IF (K.LT.1) GO TO 1150
    IF (K.LE.2) GO TO 1100
    IF (K.GT.5) GO TO 1050
    CK = CK/2. + 1.
    GO TO 1054
1050 CK = CK/4. + 3.
1054 K = IFIX(CK)
    GO TO 1100
1090 K = 8
1100 CONTINUE

```

C  
C  
C

ADJUST LENGTH FOR LAST GRADE IF ADJACENT

```

IKI = K + K1
IF (K1.LE.1) IKI = K
IF (IKI.GT.8) IKI = 8

```

C  
C  
C  
C

LOOP TO ADJUST LEVEL OF SERVICE TO AGREE WITH VCR RANGE

```

1105 NOJSS = NOJSS + 1
    IF (NOJSS.LE.5) GO TO 1106
    GO TO (1230,1330,1350),JSS
1106 IF (IKI.LE.0) GO TO 1150
    IF (L.LE.2.OR.NWAY.EQ.2) GO TO 1150

```

C  
C  
C  
C  
C

CALCULATE PASSENGER CAR EQUIVALENT  
THIS CHAINAGE INTERVAL

```

    GO TO (1120,1130,1140),JSS
1120 ET = LE1(IKI,L-2)
    GO TO 1160
1130 ET = LE2(IKI,L-2)

```

```

GO TO 1160
1140 ET = LE3(IKI.L-2)
GO TO 1160
1150 ET = 2.
K1 = 0
IKI = 0

```

C  
C  
C  
C

START HISTOGRAM LOOP - CALCULATE VOLUME

```

1160 GO TO (1170,1180,1190),IPSW
1170 VOLL = PADT1*VOL
IF (ISW1.EQ.0) GO TO 1200
NO = N1
GO TO 1200
1180 VOLL = PADT2 * VOL
IF (ISW1.EQ.0) GO TO 1200
NO = N2
GO TO 1200
1190 VOLL = PADT3 * VOL
IF (ISW1.EQ.0) GO TO 1200
NO = N3
1200 IF (NO.LT.0) NO = 0

```

C  
C  
C

CALCULATE VCR AND CHECK LEVEL OF SERVICE

```

1213 P = VOLL * (100. - PT + PT +PT*ET/2)/100.
VCR = P/C
IF (VCR.GE.0.5) GO TO 1260
IF (JSS.EQ.1) GO TO 1230
JSS = 1.
GO TO 1105
1230 IF (JSF.GT.1) GO TO 1250
X = AA
Y = BB
GO TO 1370
1250 X = AAA
Y = BBB
GO TO 1370
1260 IF (VCR.GE.0.7) GO TO 1310
IF (JSS.EQ.1) GO TO 1290
IF (JSS.EQ.2) GO TO 1330
1290 JSS = 2
GO TO 1105
1310 IF (JSS.GT.2) GO TO 1330
JSS = 3
GO TO 1105
1330 IF (VCR.GT.1) GO TO 1350
X = CC
Y = DD
GO TO 1370
1350 IF (VCR.GT.1.25) GO TO 1380
X = EE
Y = FF

```

C  
C  
C  
C

CALCULATE SPEED BASED ON VCR AND SIXTH DISTANCE

```

1370 SP = (X* (1.-VCR)) + Y*VCR
IF (VCR.GE.1) GO TO 1390
IF (NWAY.NE.1) GO TO 1390
SP=((1-PROP)*SP)+PROP*(((0.4*(Y+X))*VCR*VCR)+(((0.6*Y)-
1*VCR)+X)
GO TO 1390
1380 SP = SMIN
1390 IF (LSW.EQ.0) GO TO 1420
IF (SP.LT.VC) GO TO 1420
SP = VC

```

C  
C  
C

ADJUST SPEED OF TRUCKS ON GRADE

```

1420 IF (KODE.EQ.1) GO TO 1520
IF (L.LT.2) GO TO 1520
IF (K.LT.1) GO TO 1520
IF (J.LE.1) GO TO 1480

```



LO = 63(J-1)  
 IF (LO.LE.2) GO TO 1480  
 IF (K.GE.IKI) GO TO 1480

C

ST = VT(IKI,L-1)  
 GO TO (1441,1442,1443),IPSW

C

C

CHECK THAT SPEED IS NOT GREATER THAN PREVIOUS CHAINAGE

C

1441 STA1 = SP1  
 GO TO 1444  
 1442 STA1 = SP2  
 GO TO 1444  
 1443 STA1 = SP3  
 1444 IF (ST.GT.STA1) ST = STA1  
 GO TO 1500  
 1480 STA = VT(K,L-1)  
 STB = VT(K+1,L-1)  
 ST = STA + (CK-K)\*(STB-STA)  
 1500 IF (SP.LT.ST) GO TO 1520

C

C

C

SET SPEED RANGE

SP = ST  
 1520 IF (SP.GT.SMAX) SP = SMAX  
 IF (SP.GT.VM) SP = VM  
 IF (SP.LT.SMIN) SP = SMIN  
 N = IFIX(SP/10.-1.)  
 IF (IUNIT.EQ.2) N = IFIX(SP/5.-1.)  
 IF (N.GT.10) N = 10  
 NN = N + 1  
 IF (N.EQ.10) NN = N  
 IF (N.GT.0) GO TO 1560  
 N = 1  
 1560 IF (LSW.NE.0) GO TO 1575

C

C

C

FIND COST ADJUSTMENT FACTORS FOR CURVE, GRADE, SPEED CHANGE, BRIDGES

1570 CCB = 0.  
 CCA = 0.  
 GO TO 1590  
 1575 IF (M.LE.0) GO TO 1570  
 CCB=CM(N,M)  
 CCA=CM(NN,M)  
 1590 IF (L.EQ.0) GO TO 1610  
 IF (NWAY.NE.1) GO TO 1600  
 ML = L  
 IF (L.LT.0) ML = -L  
 CG = (DGM(N,ML) + UGM(N,ML))/2  
 CGA = (DGM(NN,ML) + UGM(NN,ML))/2  
 GO TO 1630  
 1600 IF (L.GT.0) GO TO 1620  
 ML = -L  
 CG = DGM(N,ML)  
 CGA = DGM(NN,ML)  
 GO TO 1630  
 1610 CG = 0.  
 CGA = 0.  
 GO TO 1630  
 1620 CS = UGM(N,L)  
 CGA = UGM(NN,L)  
 1630 IF (ISW1.LE.0) GO TO 1640  
 IF (N.LT.NO) GO TO 1650  
 1640 CS = 0.  
 CSA = 0.  
 CT = 0.  
 CTA = 0.  
 GO TO 1651  
 1650 CS = SCM(NO,N+1)  
 CSA = SCM(NO,NN+1)  
 CT = TCM(NO,N+1)  
 CTA = TCM(NO,NN+1)  
 1651 IF (BN(NB).GE.999990.) GO TO 1656  
 NNB = 0  
 1652 IF (BN(NB).GE.CZO) GO TO 1653  
 NB = NB + 1



```

GO TO 1652
1653 IF (BN(NB).GE.CI) GO TO 1654
      NNB = NNB + 1
      NB = NB + 1
      GO TO 1653
1654 IF (NNB.EQ.0) GO TO 1656
      CBS = SCM(N,1)*NNB*VCR/100.
      CBT = TCM(N,1)*NNB*VCR
      CBTA = TCM(NN,1)*NNB*VCR
      GO TO 1660
1656 CBS = 0.
      CBT = 0.
      CBTA = 0.
1660 CS = (CS + CBS)*CV(N,ISC)/100.
      CT = CT + CBT
      CTA = CTA + CBTA
C
      DIST = CI - CZ0
      IF (DIST.EQ.0.) GO TO 690
      DIST = SQRT(DIST*DIST*FLOAT(1 + L*L/10000))
      IF -(ICON.NE.1) GO TO 1664
C
      EXTRA ALLOWANCE FOR CONGESTION
C
      IF (IUNIT.EQ.2.) GO TO 1661
      ETIM = (15.75*VCR**3 + 2.25) * DIST/ZM
      EDIST = DIST + SP*ETIM*0.28
      GO TO 1666
1661 ETIM = (25.21*VCR**3 + 3.6) * DIST/ZM
      EDIST = DIST + SP*ETIM*1.47
      GO TO 1666
C
      CALCULATE COST AND TIME THIS CHAINAGE.
C
      1664 EDIST = DIST
      1666 COSTV = EDIST*CV(N,ISC)*(100 + CCB + CB)/(100*ZM)
      COSTVA = EDIST*CV(NN,ISC)*(100 + CCA + CBA)/(100*ZM)
      COSTF = DIST*CF(N,ISC)/ZM
      COSTFA = DIST*CF(NN,ISC)/ZM
      KL = 10
      IF (IUNIT.EQ.2) KL = 5
      VF = (SP - FLOAT((NN)*KL))/10
      IF (IUNIT.EQ.2.AND.N.EQ.10) VF = VF/2
      COSTV = COSTV + VF*(COSTVA - COSTV) + CS
      COSTF = COSTF + VF*(COSTFA - COSTF)
      TIM = EDIST*60. / (SP*ZM)
      TIM = TIM + CT + VF*(CT - CTA)
      ESP = DIST * 60. / (TIM*ZM)
      IF (ESP.LT.SMIN) ESP = SMIN
      TIM = DIST * 60. / (ESP*ZM)
C
      SUM COST AND TIME FOR EACH HISTOGRAM
C
      GO TO (1720,1730,1740),IPSW
1720 ACVC1 = ACVC1 + COSTV
      ACFC1 = ACFC1 + COSTF
      COSTT = COSTV + COSTF
      ACT1 = ACT1 + TIM
      TACC1 = TACC1 + COSTV + COSTF
      N1 = N
      VCR1 = VCR
      COSTV1 = COSTV
      COSTF1 = COSTF
      TIM1 = TIM
      IPSW = 2
      ESP1 = ESP
      SP1 = SP
C
      *****
      IF (NFLAG.NE.5) GO TO 1725
      PCOSV = COSTV*ZM/EDIST
      PCOSF = COSTF*ZM/EDIST
      WRITE(6,15&2) II,C,VM,IVC,I,M,CZ,CZA,L,ET,VCR,SP,ST,N,NO,EDIST,
      *PCOSV,PCOSF,CCS,CG,CS,CBS

```

```

1562 FORMAT(5X,I2,F6.0,1X,F3.0,I3,I2,I3,2F7.0,I3,F4.0,1X,F5.3,2F5.1,2I3
*,F6.0,1X,2(F6.3,1X),2(F6.2,1X),F6.4,1X,F6.3)
C *****
C
1725 GO TO 1160
C
C          END HISTOGRAM LOOP 1
C
1730 ACVC2 = ACVC2 + COSTV
ACT2 = ACT2 + TIM
ACFC2 = ACFC2 + COSTF
TACC2 = TACC2 + COSTV + COSTF
N2 = N
IPSW = 3
SP2 = SP
GO TO 1160
C
C          END HISTOGRAM LOOP 2
1740 ACVC3 = ACVC3 + COSTV
ACT3 = ACT3 + TIM
ACFC3 = ACFC3 + COSTF
TACC3 = TACC3 + COSTV + COSTF
N3 = N
IPSW = 1
ISW1 = 1
SP3 = SP
C
K1 = K
C
C          END HISTOGRAM LOOP 3 AND RETURN FOR NEXT CHAINAGE
IF (NSW.LE.0.OR.NSW.EQ.2) GO TO 690
IF (KSW.EQ.0) GO TO 1750
IF (LSW.NE.0) GO TO 1750
VC = 0.
1750 GO TO (1753,1751,1752,1751,1751),NFLAG
1751 GO TO 690
1752 IF (JSV.NE.2) GO TO 690
1753 IF (MSW.GT.0) GO TO 1820
C
C          PRINT CURVE AND GRADE DATA IF REQUIRED
C
WRITE(KPRNT,1790)
1790 FORMAT(1H1)
C      IDATE = TIME(4)
C      MIN = TIME(1)/600
C      IHR = MIN/60
C      MIN = MIN - IHR*60
C      WRITE(KPRNT,1785) IDATE,IHR,MIN
1785 FORMAT(1H,85X,'DATE : ',I6,5X,'TIME : ',I2,':',I2)
WRITE(KPRNT,1791)
1791 FORMAT(34X,'ROAD USER COST CALCULATION')
WRITE(KPRNT,1800) TITLE
1800 FORMAT(18X,A)
MSW = 1
WRITE(KPRNT,1810) KYEAR,(VEH(JSV,JJSV1),JJSV1=1,9),JSV
1810 FORMAT(/,22X,'CALCULATION OVER THE YEAR ',I4,' FOR A ',9A2,' OR A
1 VEHICLE CLASS ',I2,/,52X,'PEAK HISTOGRAM',/)
NLIN = 8
GO TO 1850
1820 IF (NLINE.LT.MLINE) GO TO 1870
WRITE (KPRNT,1840)
1840 FORMAT('1')
1850 WRITE(KPRNT,1860)
1860 FORMAT(' CHAINAGE INTERIM GRADE VCR SPEED CURVE TIME THIS
* VARIABLE FIXED TOTAL CUMULATIVE CUMULATIVE '/10X,'DISTANCE
* (Z)',14X,'SPEED DISTANCE COST COST COST TIME
* TOTAL COST')
NLINE = NLIN + 3
NLIN = 0
1870 WRITE (KPRNT,1880) CZ,DIST,L,VCR1,ESP1,VC,TIM1,COSTV1,COSTF1,
1COSTT,ACT1,TACC1
1880 FORMAT(1X,2F8.0,I7,F6.2,F7.2,F7.0,F10.2,F11.3,F9.3,F8.3,F9.2,F11.3
1)

```



```

      NLINE = NLINE + 1
      GO TO 690
C
C
C      END CHAINAGE LOOP
1900 IF (JY.LE.1) GO TO 2000
      A(1,II) = KYEAR
      IA(1,II) = KYEAR
      A(3,II) = PTR1*ACT1 + PTR2*ACT2 + PTR3*ACT3
      A(2,II) = ((FCI-SCZ)/16.667) / A(3,II)
      IF (IUNIT.EQ.2) A(2,II) = A(2,II) / 5.28
      A(4,II) = PTR1*ACVC1 + PTR2*ACVC2 + PTR3*ACVC3
      A(5,II) = PTR1*ACFC1 + PTR2*ACFC2 + PTR3*ACFC3
      A(6,II) = A(4,II) + A(5,II)
      A(7,II) = A(6,II) * ZM / (FCI-SCZ)
C
      DO 1905 IM = 1,5
      QQ(JSV,IM,II) = A(IM+1,II)
1905 CONTINUE
C
C
C      INTERPOLATE THE FINAL OUTPUT
      KYEAR = KYEAR + JK
      IF (II.GT.1) GO TO 1912
      I1 = 0
      GO TO 1918
1912 IF (JK.LE.1) GO TO 1918
      JL = A(1,II) - A(1,II-1)
      DO 1916 K=1,7
      I2 = I1
      Q = (A(K,II) - A(K,II-1)) / JL
      JL1 = JL - 1
      DO 1916 LL=1,JL1
      I2 = I2 + 1
      B(K,I2) = B(K,I2-1) + Q
1916 CONTINUE
      I1 = I2
1918 I1 = I1 + 1
      DO 1920 K=1,7
      B(K,I1) = A(K,II)
1920 CONTINUE
C
C
C      END YEAR LOOP
C
C
C      PRINT COST FOR EACH VEHICLE TYPE
C
      GO TO (1922,1922,1921,1970,1922),NFLAG
1921 IF (JSV.NE.2) GO TO 1970
1922 DO 1926 I1=1,8
      WRITE (KPRNT,1924)
1924 FORMAT(2X)
1926 CONTINUE
      WRITE (KPRNT,1790)
      IDATE = TIME(4)
      MIN = TIME(1)/600
      IHR = MIN/60
      MIN = MIN - IHR*60
      WRITE (KPRNT,1785) IDATE,IHR,MIN
      WRITE (KPRNT,1800) TITLE
      IF (IUNIT.EQ.2) GO TO 1932
      WRITE (KPRNT,1930) (VEH(JSV,JJSV1),JJSV1=1,9),JSV
      GO TO 1937
1932 WRITE (KPRNT,1935) (VEH(JSV,JJSV1),JJSV1=1,9),JSV
1930 FORMAT(/,18X,'CALCULATION OF AVERAGES FOR A ',9A2,' OR A VEHICLE C
      *LASS ',I2,/,7X,'YEAR',7X,'AVERAGE SPEED',7X,'TIME',6X,'VARIABLE C
      *OST',6X,'FIXED COST',7X,'TOTAL COST',6X,'AVERAGE COST',/37X,'(MI
      *N)',9X,'( B )',12X,'( B )',12X,'( B )',11X,'PER KLMTR'/)
1935 FORMAT(/,18X,'CALCULATION OF AVERAGES FOR A ',9A2,' OR A VEHICLE C
      *LASS ',I2,/,7X,'YEAR',7X,'AVERAGE SPRRD',7X,'TIME',6X,'VARIABLE C
      *OST',6X,'FIXED COST',7X,'TOTAL COST',6X,'AVERAGE COST',/37X,'(MI
      *N)',9X,'( B )',12X,'( B )',12X,'( B )',11X,'PER MILE'/)
1937 DO 1940 I1=1,JM
      WRITE (KPRNT,1940) IA(1,II), (B(MK,II),MK=2,7)
1940 FORMAT(6X,I5,F16.2,2F15.2,3F18.3)
      IA(1,II+1) = IA(1,II) + 1

```



IF (NSW.EQ.2) GO TO 1965  
 1960 CONTINUE  
 1965 NLINE = MLINE

C  
 C  
 C

WRITE LINK TIME AND TOTAL COST TO OUTPUT FILE

1970 WRITE (KVOC) (3(3,II),II=1,JM)  
 WRITE (KVOC) (3(6,II),II=1,JM)  
 2000 RETURN

END

SUBROUTINE CARD(M,M1)  
 COMMON KIN,KTRAF,KSTV,KVOC,KPRNT

WRITE(KPRNT,1) M1,M

1 FORMAT(' RECORD NUMBER CODED ',I5,' SHOULD BE ',I5)

RETURN

END

SUBROUTINE ERROR(I)

COMMON KIN,KTRAF,KSTV,KVOC,KPRNT

WRITE(KPRNT,10) I

10 FORMAT('0', 'DATA CODING ERROR NO. ',I2,' CHECK INPUT')

RETURN

END



ศูนย์วิทยทรัพยากร  
 จุฬาลงกรณ์มหาวิทยาลัย



ภาคผนวก ค

โปรแกรมคอมพิวเตอร์ในการประเมินผลทางเศรษฐกิจ (Listing of ECONAL)



ศูนย์วิจัยทรัพยากร  
จุฬาลงกรณ์มหาวิทยาลัย



C  
C  
C  
C  
C  
C

## ECONAL - ECONOMIC ANALYSIS FOR ROAD FEASIBILITY STUDIES

```
*****
1=HF01/SECTOR/FSTINP,UNIT=DISK,RECORD=90,BLOCKING=20,LOCK
2=HF01/SECTOR/TRAF0UP,UNIT=DISK,LOCK
4=HF01/SECTOR/VOCOUP,UNIT=DISK,LOCK
```

```
COMMON KIN,KTRAF,KSTV,KVOC,KPRNT,NELV,NELT,NILV,NILT,NVV,NVT
COMMON /BLK3/BENF(30,6),JYEAR,LYEAR
CHARACTER*20 INFILE,TRAOUT,VOCOUT
WRITE(*,'(A)') ' ENTER INPUT FILENAME
READ(*,'(A)') INFILE
WRITE(*,'(A)') ' ENTER TRAFFIC OUT
READ(*,'(A)') TRAOUT
WRITE(*,'(A)') ' ENTER VOC OUT
READ(*,'(A)') VOCOUT
OPEN(1,FILE=INFILE,STATUS='OLD',ACCESS='SEQUENTIAL',FORM='FORMATTE
10',RECL=72)
OPEN(2,FILE=TRAOUT,FORM='UNFORMATTED')
OPEN(4,FILE=VOCOUT,FORM='UNFORMATTED')
OPEN(6,FILE='PRN')
KIN = 1
KTRAF = 2
KSTV = 3
KVOC = 4
KPRNT = 6
CALL FSTEX
CALL EVASEX
CALL EXIT
END
SUBROUTINE FSTEX
```

C

C

```
REAL LTM(10,30)
COMMON KIN,KTRAF,KSTV,KVOC,KPRNT,NELV,NELT,NILV,NILT,NVV,NVT
COMMON /BLK1/ VO(10,30),TR(30,10),TOT(30),PC(10),AVOCC(10),
* TIV(30,10),CEX(30,6),CIM(30,6)
COMMON /BLK2/ VOT(30,10),AMC(30),AC(30),TI(30),PGT(10)
COMMON /BLK3/ BENF(30,6),JYEAR,LYEAR
KX = 1
```

C

C

C

```
SET ARRAYS CEX, CIM AND BENF TO ZERO

DO 10 I=1,30
DO 10 J=1,6
CEX(I,J) = 0.
CIM(I,J) = 0.
10 BENF(I,J) = 0.
```

C

C

C

```
READ LEAD RECORDS FROM VOC AND TRAFFIC FILES
```

```
READ (KVOC) NELV,NILV,NSYV,NOYV,NVV
READ (KTRAF) NELT,NILT,NSYT,NOYT,NVT
```

C

C

```
CHECK CONSISTENCY OF NUMBERS OF LINKS & VEHICLE TYPES
```

```
IF (NELV.EQ.NELT) GO TO 25
WRITE (KPRNT,20) NELV,NELT
20 FORMAT('0 NO. OF EXISTING LINKS FROM VOC (' ,I2,
*') NOT EQUAL TO NO. FROM TRAF (' ,I2,')')
GO TO 1000
25 IF (NILV.EQ.NILT) GO TO 35
WRITE (KPRNT,30) NILV,NILT
30 FORMAT('0 NO. OF IMPROVED LINKS FROM VOC (' ,I2,
*') NOT EQUAL TO NO. FROM TRAF (' ,I2,')')
-- GO TO -1000 -
35 IF (NVV.EQ.NVT) GO TO 45
WRITE (KPRNT,40) NVV,NVT
40 FORMAT('0 NO. OF VEHICLE TYPES FROM VOC (' ,I2,
*') NOT EQUAL TO NO. FROM TRAF (' ,I2,')')
GO TO 1000
45 IVEH = NVV
```

C

C

```
IDENTIFY GOVERNING START YEAR.NO. OF YEARS
```

```

C
  JYEAR = NSYV
  IF (NSYT.GT.JYEAR) JYEAR = NSYT
  NFYV = NSYV + NOYV - 1
  NMYT = NSYT + NOYT - 1
  LYEAR = NFYV
  IF (NFYT.LT.LYEAR) LYEAR = NMYT
  NYR = LYEAR - JYEAR + 1

C
C
C
  READ ARRAYS FOR PERSON TIME COST, AVERAGE VEHICLE OCCUPANCY
  AND PERCENT GENERATED TRAFFIC, BY VEHICLE TYPE

C
C
C
  READ (KIN,50) (PC(J),J=1,IVEH)
50  FORMAT(10F3.1)
  READ (KIN,50) (AVOCC(J),J=1,IVEH)
  READ (KIN,50) (PST(J),J=1,IVEH)

C
C
C
  START LINKS LOOP

  NLNK = NELV
100 DO 190 IK=1,NLNK
  DO 110 I=1,30
110  TI(I) = 0.

C
C
C
  READ IN LINK TIME, TOTAL COST AND TRAFFIC VOLUME

  DO 120 J=1,NVV
  READ (KVOC) (LTM(J,I),I=1,NOYV)
120  READ (KVOC) (VO(J,I),I=1,NOYV)
  DO 125 I=1,NOYT
125  READ (KTRAF) (TR(I,J),J=1,NVT),AMC(I),AC(I),TOT(I)

C
C
C
  ADJUST FOR GOVERNING START YEAR, NO. OF YEARS

  IF (JYEAR.EQ.NSYV) GO TO 135
  NYD = JYEAR - NSYV
  DO 130 I = 1,NYR
  IP = I + NYD
  DO 130 J = 1,IVEH
  LTM(J,I)=LTM(J,IP)
130  VO(J,I) = VO(J,IP)
135  IF (JYEAR.EQ.NSYT) GO TO 145
  NYD = JYEAR - NSYT
  DO 140 I = 1,NYR
  IP = I + NYD
  AMC(I) = AMC(IP)
  AC(I) = AC(IP)
  TOT(I) = TOT(IP)
  DO 140 J=1,10
140  TR(I,J) = TR(IP,J)
145  CONTINUE

C
C
C
  COMPUTE BENEFIT ARRAYS

  DO 150 I=1,NYR
  DO 150 J=1,IVEH
-- 150  TIV(I,J)=PC(J)*AVOCC(J)*LTM(J,I)*TR(I,J)/60.*365.
  * *(1. + PST(J)/200.)
  DO 160 I=1,NYR
  DO 160 J=1,IVEH
  TI(I) = TI(I) + TIV(I,J)
  TOT(I,J) = TR(I,J)*VO(J,I)*365.
160  CONTINUE
  IF (KK.EQ.2) GO TO 170
  CALL LSADD(CEX,NYR,IVEH)
  GO TO 180
170  CALL LSADD(CIM,NYR,IVEH)
180  CONTINUE
190  CONTINUE
  KK = KK+1
  IF (KK.GT.2) GO TO 200
  NLNK = NILV
  GO TO 100

C
C
C
  SUBTRACT NEW LINKS FROM EXISTING LINKS

```













```

RR1(I) = RR
CALL KKRATE(CASH,DCASH,IYEAR(IY),IYEAR(IY+1),ILYRI,RATE,TOT)
TOT1(I) = TOT
CALL KKRATE(BENF1,DBENF1,IYEAR(IY),IYEAR(IY+1),ILYRI,RATE,TOT11)
CALL KKRATE(COST,DCOST,IYEAR(IY),IYEAR(IY+1),ILYRI,RATE,TOT12)
BCR(I) = TOT11 / TOT12
450 CONTINUE
IY=IYR
DO 455 I=1,IY
KYR(I) = IYEAR(I+2) - IFYB + 1
455 CONTINUE
FYRR = 0.
IYCON = IFYB - IFYPNT + 1
DO 460 I=1,IYCON
460 FYRR = FYRR + DCOST(I)
FYRR = (DBENF1(IYCON) / FYRR) * 100.
XFYRR(JJ)=FYRR
DO 511 I = 1,IY
XRR1(JJ,I) = RR1(I)
XBCR(JJ,I) = BCR(I)
XTOT1(JJ,I) = TOT1(I)
511 CONTINUE
C WRITE (KPRNT,510) (KYR(I),I=1,IY)
510 FORMAT(/' ',51X,4(I3,1X,'YEARS',5X))
C WRITE (KPRNT,520) (RR1(I),I=1,IY)
520 FORMAT(' ',33X,'INTERNAL RATE OF RETURN Z',3X,F8.1,3(8X,F8.1))
C WRITE (KPRNT,530) IRATE,(BCR(I),I=1,IY)
530 FORMAT(' ',33X,'BENEFIT COST RATIO',I3,' Z',6X,F8.2,3(5X,F9.2))
C WRITE (KPRNT,540) FYRR
540 FORMAT(' ',33X,'FIRST YEAR RATE OF RETURN',3X,F8.1)
C WRITE (KPRNT,550) IRATE,(TOT1(I),I=1,IY)
550 FORMAT(' ',33X,'NET PRESENT VALUE AT ',I3,' Z',2X,F8.1,3(5X,F9.1))
GO TO 190
560 WRITE(KPRNT,1000)
1000 FORMAT(1H1)
WRITE(KPRNT,1010)
1010 FORMAT(1H0,47X,'COST BENEFIT ANALYSIS')
WRITE(KPRNT,1020)
1020 FORMAT(48X,23(1H-))
WRITE(KPRNT,1030)
1030 FORMAT(1H0,25X,'ROAD')
WRITE(KPRNT,1040)
1040 FORMAT(26X,'SECT. IDENTIFIER LOCATION LEN
1GTH KM. TO KM.')
WRITE(KPRNT,1050)
1050 FORMAT(26X,'-----')
WRITE(KPRNT,1061) LTITLE
1061 FORMAT(1H0,25X,A)
WRITE(KPRNT,1060)
1060 FORMAT(1H0)
WRITE(KPRNT,1064)
1064 FORMAT(42X,'DECEMBER 1985 PRICE LEVEL 000 BAHT')
WRITE(KPRNT,1075)
1075 FORMAT(1H0,31X,'B E N E F I T S',32X,'TOTALS DISCNTD',4X,'CUMLTVE'
1)
1070 FORMAT(22X,'NORMAL',4X,'GENER.',5X,'MAIN-',12X,'TOTAL TOTAL
1 AT 15% P.A. DISCNTD')
WRITE(KPRNT,1080)
1080 FORMAT(15X,'YEAR TRAFFIC TRAFFIC TENANCE OTHER BENEFITS
1 COSTS BENEFITS COSTS CASH FLOW')
IFYR1 = IFYPNT
WRITE(KPRNT,1300)
1300 FORMAT(/)
DO 3000 I=1,IYT1
WRITE(KPRNT,1100) IFYR1,IBENF(I,1),(IBENF(I,J),J=4,6),IBENF1(I),IC
1OST(I),IDBENF(I),IDCOST(I),ICUMDC(I)
1100 FORMAT(15X,I4,I9,2I10,I8,1X,I10,I8,2X,I10,I7,1X,I10)
IFYR1 = IFYR1 + 1
3000 CONTINUE
WRITE(KPRNT,1060)
WRITE(KPRNT,1060)
WRITE(KPRNT,1060)
WRITE(KPRNT,1120)
1120 FORMAT(1H0,48X,'FEASIBILITY RESULTS')
WRITE(KPRNT,1400)

```



```

1400 FORMAT(49X, '-----')
      WRITE(KPRNT,1060)
      WRITE(KPRNT,1130)
1130 FORMAT(75X, 'SENSITIVITY TESTS')
      WRITE(KPRNT,1140)
1140 FORMAT(75X,18(1H-))
      WRITE(KPRNT,1150)
1150 FORMAT(15X, 'CRITERION',31X, 'BASE CASE',7X, '1',11X, '2',11X, '3')
      WRITE(KPRNT,1160)
1160 FORMAT(15X, '-----',31X, '-----')
      WRITE(KPRNT,1200)((XRR1(JJ,I),I=1,IY),JJ=1,4)
1200 FORMAT(1H0,14X, 'INTERNAL RATE OF RETURN %',16(F11.1,1X)
      1)
      WRITE(KPRNT,1210)((XBCR(JJ,I),I=1,IY),JJ=1,4)
1210 FORMAT(15X, 'BENEFIT COST RATIO 12 %',16(F12.2))
      WRITE(KPRNT,1220)(XFYR(JJ),JJ=1,4)
1220 FORMAT(15X, 'FIRST YEAR RATE OF RETURN %',4(F11.1,1X)
      1)
      DO 1240 I=1,4
      DO 1240 J=1,IY
1240 IXTOT(I,J)=IFIX(XTOT1(I,J))
      WRITE(KPRNT,1230)((IXTOT(JJ,I),I=1,IY),JJ=1,4)
1230 FORMAT(15X, 'NET PRESENT VALUE IN 1986 AT 12 %',16(F11.1,1X)
      WRITE(KPRNT,1270)
1270 FORMAT(1H0,44X, 'COSTS:          ACTUAL          +20 %          ACTUAL
1+20 %')
      WRITE(KPRNT,1280)
1280 FORMAT(1H0,44X, 'BENEFITS:       ACTUAL          ACTUAL          -20 %
1-20 %')
600 RETURN
      END
      SUBROUTINE KKIRR(BEN1,BEN2,IFYR,ILYR,IYRI,RR,TOT)
      DIMENSION BEN1(30),BEN2(30),BEN3(30)
      IYEAR = ILYR - IFYR + 1
      IEXP = IFYR - IYRI
      DISC = -0.2
      ACC1 = 0.
      ACC2 = 0.
      ISW = 0
      ISW1 = 0
10  ACC1 = ACC2
      DO 20 I = 1,IYEAR
      BEN3(I) = BEN2(I)
20  CONTINUE
25  ACC2 = 0.
      RATE = 1. + DISC
      DO 30 I=1,IYEAR
      BEN2(I) = BEN1(I) * (1./RATE**IEXP)
      ACC2 = ACC2 + BEN2(I)
      IEXP = IEXP+1
30  CONTINUE
      IEXP = IFYR - IYRI
      IF (ISW.EQ.1) GO TO 35
      ISW = 1
      DISC = DISC + 0.01
      GO TO 10
35  IF (ACC1.GE.0.) GO TO 40
      IF (ACC2.GE.0.) GO TO 60
      GO TO 50
40  IF (ACC2.LT.0.) GO TO 60
50  IF (ISW1.EQ.1) GO TO 70
      DISC = DISC + 0.01
      GO TO 10
60  IF (ISW1.EQ.1) GO TO 80
      DISC = DISC - 0.01 + 0.001
      ISW1 = 1
      GO TO 25
70  DISC = DISC + 0.001
      GO TO 10
80  TOT = ABS(ACC1)
      TOT1 = ABS(ACC2)
      IF (TOT.LT.TOT1) GO TO 90
      RR = DISC * 100
      TOT = ACC2
      GO TO 110

```

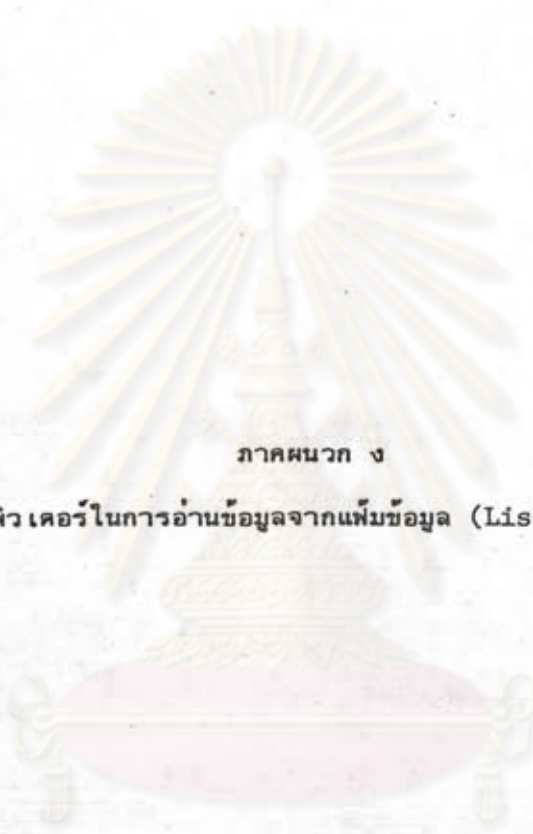
```

90  RR = (DISC - 0.001) * 100.
    DO 100 I=1,IYEAR
    BEN2(I) = BEN3(I)
100  CONTINUE
    TOT = ACC1
110  RETURN
    END
    SUBROUTINE KCRATE(BEN1,BEN2,IFYR,ILYR,IYRI,RR,TOT)
    DIMENSION BEN1(30),BEN2(30)
    IYEAR = ILYR - IFYR + 1
    IEXP = IFYR - IYRI
    TOT = 0.
    DO 10 I =1,IYEAR
    BEN2(I) = BEN1(I) / (RR**IEXP)
    IEXP = IEXP + 1
    TOT = TOT + BEN2(I)
10  CONTINUE
    RETURN
    END

```



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จุฬาลงกรณ์มหาวิทยาลัย



ภาคผนวก ง

โปรแกรมคอมพิวเตอร์ในการอ่านข้อมูลจากแฟ้มข้อมูล (Listing of STOVOC)

ศูนย์วิทยทรัพยากร  
จุฬาลงกรณ์มหาวิทยาลัย





```

000 RECORD NO. 6 - VEHICLE DESCRIPTION
DO 150 I=1,INV
READ (KIN,130) K,L,(VEH(I,J),J=1,9) -
150 FORMAT(2I2,9A2)
IF (K.EQ.3) GO TO 150
WRITE (KPRNT,998) K,KNO
150 CONTINUE
WRITE (KSTV,REC=ISEEK) ((VEH(I,J),I=1,INV),J=1,9)
ISEEK = ISEEK+1
KNO = KNO+1

000 RECORD NO. 7 - HISTOGRAM
READ (KIN,180) K,(P(J),J=1,6)
180 FORMAT(I2,3(F2.0,F6.3))
IF (K.EQ.4) GO TO 200
WRITE (KPRNT,998) K,KNO
200 CONTINUE
DO 210 I = 1,6,2
P(I+1) = P(I-1)/100.
210 P(I) = P(I)*P(I+1)
WRITE (KSTV,REC=ISEEK) (P(J),J=1,6)
ISEEK = ISEEK + 1
KNO = KNO + 1

000 ADDITIONAL CURVE COST FACTOR
IREC1 = IREC(1)
DO 260 L=1,IREC1
DO 250 I=1,10
READ (KIN,230) K,(CM(I,J),J=1,10)
230 FORMAT(I2,10F5.2)
IF (K.EQ.5) GO TO 250
WRITE (KPRNT,998) K,KNO
250 CONTINUE
WRITE (KSTV,REC=ISEEK) ((CM(I,J),I=1,10),J=1,10)
ISEEK = ISEEK + 1
260 CONTINUE
KNO = KNO+1

000 UPHILL ADDITIONAL GRADE COST FACTOR
DO 310 L=1,IREC(2)
DO 300 I=1,10
READ (KIN,280) K,(UGM(I,J),J=1,7)
280 FORMAT(I2,7F5.2)
IF (K.EQ.6) GO TO 300
WRITE (KPRNT,998) K,KNO
300 CONTINUE
WRITE (KSTV,REC=ISEEK) ((UGM(I,J),I=1,10),J=1,7)
ISEEK = ISEEK + 1
310 CONTINUE
KNO=KNO + 1

000 DOWNHILL ADDITIONAL GRADE COST FACTOR
DO 360 L = 1,IREC(3)
DO 350 I = 1,10
READ (KIN,330) K,(DGM(I,J),J=1,7)
330 FORMAT(I2,7F5.2)
IF (K.EQ.7) GO TO 350
WRITE (KPRNT,998) K,KNO
350 CONTINUE
WRITE (KSTV,REC=ISEEK) ((DGM(I,J),I=1,10),J=1,7)
ISEEK = ISEEK + 1
360 CONTINUE
KNO= KNO + 1

000 SPEED CHANGE CYCLE ADDITIONAL COST FACTOR
DO 410 L=1,IREC(4)
DO 400 I=1,10
READ (KIN,380) K,(SCM(I,J),J=1,10)

```



```

380 FORMAT (I2,10F3.2)
   IF (K.EQ.8) GO TO 400
   WRITE (KPRNT,999) K,KNO
400 CONTINUE
   WRITE (KSTV,REC=ISEEK) ((SCM(I,J),I=1,10),J=1,10)
   ISEEK = ISEEK + 1
410 CONTINUE
   KNO = KNO - 1

0000
   ADDITIONAL TIME FOR SPEED CHANGE CYCLE

   DO 460 L=1,IREC(5)
   DO 450 I=1,10
   READ (KIN,430) K,(TCM(I,J),J=1,10)
430 FORMAT (I2,10F3.4)
   IF (K.EQ.9) GO TO 450
   WRITE (KPRNT,999) K,KNO
450 CONTINUE
   WRITE (KSTV,REC=ISEEK) ((TCM(I,J),I=1,10),J=1,10)
   ISEEK = ISEEK + 1
460 CONTINUE
   KNO = KNO + 1

000
   V.O.C VARIABLE COST

   DO 510 L =1,IREC(6)
   DO 500 I =1,10
   READ (KIN,480) K,(CV(I,J),J=1,IRS)
480 FORMAT (I2,10F3.3)
   IF (K.EQ.10) GO TO 500
   WRITE (KPRNT,999) K,KNO
500 CONTINUE
   WRITE (KSTV,REC=ISEEK) ((CV(I,J),I=1,10),J=1,IRS)
   ISEEK = ISEEK + 1
510 CONTINUE
   KNO = KNO + 1

000
   V.O.C FIXED COST

   DO 560 L=1,IREC(7)
   DO 550 I=1,10
   READ (KIN,530) K,(CF(I,J),J=1,IRS)
530 FORMAT (I2,10F3.3)
   IF (K.EQ.11) GO TO 550
   WRITE (KPRNT,999) K,KNO
550 CONTINUE
   WRITE (KSTV,REC=ISEEK) ((CF(I,J),I=1,10),J=1,IRS)
   ISEEK = ISEEK + 1
560 CONTINUE
   KNO = KNO + 1

000
   PARAMETERS FOR VCR/SPEED RELATIONSHIP

   DO 610 I=1,2
   READ (KIN,580) K,(A(J),J=1,8),KODE
580 FORMAT (I2,8F4.0,I2)
   IF (K.EQ.12) GO TO 600
   WRITE (KPRNT,999) K,KNO
600 CONTINUE
   WRITE (KSTV,REC=ISEEK) (A(J),J=1,8),KODE
   ISEEK = ISEEK+1
610 CONTINUE
   KNO = KNO+1

0000
   MATRIX GIVING UPHILL SPEED FOR TRUCKS
   DEPENDING ON GRADE FOR BIT AND LATERITE ROADS

   DO 660 L=1,2
   DO 650 I=1,8
   READ (KIN,630) K,(VT(I,J),J=1,8)
630 FORMAT (I2,8F3.0)
   IF (K.EQ.13) GO TO 650
   WRITE (KPRNT,999) K,KNO
650 CONTINUE


```



```
450 CONTINUE
  WRITE (KSTV,REC=ISEEK) ((VT(I,J),I=1,2),J=1,6)
  ISEEK = ISEEK - 1
460 CONTINUE
  RETURN TO CALLING PROGRAM
  WRITE (KPRNT,800)
800 FORMAT(1H0,' ***FINISHED NSTORD ***')
810 RETURN
  END
```



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ภาคผนวก จ

โปรแกรมคอมพิวเตอร์ในการพิมพ์ข้อมูล Base VOC DATA (Listing of PRTVOC)

ศูนย์วิทยทรัพยากร  
จุฬาลงกรณ์มหาวิทยาลัย

```

C *** PRTVOC - PROGRAM TO PRINT INFORMATION FROM BINARY FILE
C          DATVOC CREATED BY STOVOC
C          PROGRAM DEVELOPED BY R.VAN DEN HEUVEL & G.H.CONOR-V.01
C          CONVERTED FOR BURROUGHS 18255 BY D.W.SENENETT, FEBRUARY 1982
C          LATEST MODIFICATION: SEPT 1982 BY GHC-NV.01
C FILE- J=HF01/HPLANN/DATVOC,UNIT=DISK,RANDOM,RECORD=540,LOCK
C
C          COMMON KIN,KTRAF,KSTV,KVOC,KPRNT
C          COMMON /BLK/ CM(10,10),IK(10,10)
C          KIN = 1
C          KTRAF=2
C          KSTV =3
C          KVOC =4
C          KPRNT=6
C          READ(KSTV, ISEEK) INV, IRS, ICM, IUG, IDG, ISC, IST, ICV, ICF
C          WRITE(KPRNT,100) ISEEK
C          8 FORMAT(, , , RECORD TYPE 0 ,/, , , INPUT PARAMETERS')
C          WRITE(KPRNT,6) INV, ICM, IUG, IDG, ISC, IST, ICV, ICF
C          6 FORMAT(' ',4X,BI5//)
C          12 FORMAT(' ', RECORD TYPE 1',/, , DISK ADDRESS FOR TABLES ')
C          WRITE(KPRNT,12)
C          CALL INREAD(IK,8,IN,ISEEK)
C          ISEEK = ISEEK + 1
C          WRITE(KPRNT,14)
C          14 FORMAT(' ', RECORD TYPE 2',/, , PCU VALUE OF TRUCKS ,)
C          DO 10 I=1,3
C
C          CALL INREAD(IK,8,5,ISEEK)
C          ISEEK = ISEEK + 1
C          10 CONTINUE
C
C          WRITE(KPRNT,16)
C          16 FORMAT(' ', RECORD TYPE 3',/, , VEHICLE DESCRIPTION ')
C          CALL INREAD(IK,INV,9,ISEEK)
C          ISEEK = ISEEK + 1
C
C          WRITE(KPRNT,18)
C          18 FORMAT(' ', RECORD TYPE 4',/, , HISTOGRAM DESCRIPTION. ,)
C          CALL INREAD(CM,1,5,ISEEK)
C          ISEEK = ISEEK + 1
C
C          WRITE(KPRNT,19)
C          19 FORMAT(' ', RECORD TYPE 5',/, , CURVE FACTOR TABLES ')
C          DO 20 I=1,ICM
C          CALL RREAD(CM,10,10,ISEEK)
C          ISEEK = ISEEK + 1
C          20 CONTINUE
C
C          WRITE(KPRNT,22)
C          22 FORMAT(' ', RECORD TYPE 6',/, , UPHILL GRADE FACTOR TABLES')
C          DO 30 I=1,IUG
C          CALL RREAD(CM,10,7,ISEEK)
C          ISEEK = ISEEK + 1
C          30 CONTINUE
C
C          WRITE(KPRNT,32)
C          32 FORMAT(' ', RECORD TYPE 7',/, , DOWNHILL GRADE FACTOR TABLES')
C          DO 33 I =1,IDG
C          CALL RREAD(CM,10,7,ISEEK)
C          ISEEK = ISEEK +1
C          33 CONTINUE
C
C          WRITE(KPRNT,38)
C          38 FORMAT(' ', RECORD TYPE 8',/, , SPEED CHANGE COST FACTORS :
C          DO 40 I=1,ISC
C          CALL RREAD(CM,10,10,ISEEK)
C          ISEEK = ISEEK +1
C          40 CONTINUE

```



```

C
WRITE(KPRNT,42)
42 FORMAT(' ', ' RECORD TYPE 9',/, ' SPEED CHANGE TIME(MIN) ')
DO 45 I=1, IST
CALL RREAD(CM,10,10,ISEEK)
ISEEK=ISEEK+1
45 CONTINUE

C
WRITE(KPRNT,48)
48 FORMAT(' ', ' RECORD TYPE 10',/, ' VARIABLE VOC(B) ')
DO 50 I=1,ICV
CALL RREAD(CM,10,IRS,ISEEK)
ISEEK=ISEEK+1
50 CONTINUE

C
WRITE(KPRNT,58)
58 FORMAT(' ', ' RECORD TYPE 11',/, ' FIXED VOC(B) ')
DO 60 I=1,ICF
CALL RREAD(CM,10,IRS,ISEEK)
ISEEK=ISEEK+1
60 CONTINUE

C
WRITE(KPRNT,62)
62 FORMAT(' ', ' RECORD TYPE 12',/, ' VCR/SPEED CURVE FACTORS ')
DO 70 I=1,2
READ(KSTV,ISEEK) (CM(1,J),J=1,8),K
WRITE(KPRNT,100) ISEEK
ISEEK=ISEEK+1
100 FORMAT(' ',I4)
WRITE(KPRNT,65) (CM(1,J),J=1,8),K
65 FORMAT(' ',4X,9F10.5,IS//)
70 CONTINUE

C
WRITE(KPRNT,102)
102 FORMAT(' ', ' RECORD TYPE 13',/, ' SPEED OF TRUCKS ON GRADE ')
CALL RREAD(CM,8,6,ISEEK)
ISEEK=ISEEK+1
CALL RREAD(CM,8,6,ISEEK)

C
CALL EXIT
END
SUBROUTINE INREAD(I,M,N,IS)
COMMON KIN,KTRAF,KSTV,KVOC,KPRNT
DIMENSION L(M,N)
READ(KSTV,IS) ((I(I,J),I=1,M),J=1,N)
WRITE(KPRNT,40) IS
40 FORMAT(' ',I4)
DO 30 I=1,M
IF(IS.NE.6) GO TO 15
WRITE(KPRNT,10) (I(I,J),J=1,9)
10 FORMAT(' ',4X,9A2)
GO TO 30
15 WRITE(KPRNT,20) (I(I,J),J=1,N)
20 FORMAT(' ',4X,10IS)
30 CONTINUE
WRITE(KPRNT,50)
50 FORMAT(/)
RETURN
END -
SUBROUTINE RREAD(C,M,N,IS)
COMMON KIN,KTRAF,KSTV,KVOC,KPRNT
DIMENSION C(M,N)
READ(KSTV,IS) ((C(I,J),I=1,M),J=1,N)
WRITE(KPRNT,40) IS
40 FORMAT(' ',I4)
DO 30 I=1,M
WRITE(KPRNT,20) (C(I,J),J=1,N)
20 FORMAT(' ',4X,11F10.5)
30 CONTINUE
WRITE(KPRNT,50)
50 FORMAT(/)
RETURN
END

```



ภาคผนวก ฉ

แบบฟอร์มที่ใช้และการกรอกข้อมูลปริมาณการจราจร (TRAFFIC CODING SHEET)

ศูนย์วิจัยทรัพยากร  
จุฬาลงกรณ์มหาวิทยาลัย

# TRAFFIC CODING SHEET

## PROJECT DATA

ROUTE	PROJ.	NEL	NIL	YEAR START	YEAR END	YEAR OPEN
12345678910111213141516171819202122232425						
2246E-038	1	1	1	9852003	1989	

## TITLE

STD.RD.NO	DIST.	RT.	CSN.	ORIGIN	DESTINATION	LENGTH	KM. TO KM.
123456789101112131415161718192021222324252627282930313233343536373839404142434445464748495051525354555657585960616263646566676869707172							
E-038	614	2246	0100	J.R.2	KHOK SI	340	-

## LINK DATA

LENGTH	REG.	IMP.	EXT.
	SUR	SUR	SUR
1	2	3	4
5	6	7	8
9	10	11	
34050	6	1	6

## BASE YEAR TRAFFIC

MC(1)	PC(2)	LT(3)	MT(4)	HT(5)	LB(6)	HB(7)
1	2	3	4	5	6	7
1	2	3	4	5	6	7
1	2	3	4	5	6	7
172	15	69	64	58	35	10

## TRAFFIC GROWTH RATE

YEAR	MC(1)	PC(2)	LT(3)	MT(4)	HT(5)	LB(6)	HB(7)
1	2	3	4	5	6	7	8
1	2	3	4	5	6	7	8
1	2	3	4	5	6	7	8
1985	9.2	8.5	10.0	6.1	5.7	6.1	4.8
1989	5.3	8.0	7.6	4.4	4.3	4.4	3.8
1994	4.1	8.2	6.6	3.6	3.6	3.6	3.6





ภาคผนวก ข

แฟ้มข้อมูลปริมาณการจราจร (TRAFFIC INPUT หรือ E 038.DAT)



ศูนย์วิทยพัชการ  
จุฬาลงกรณ์มหาวิทยาลัย

2246E-038 1 1198520031989  
 E-038 614 2246 0100 J.R. 2  
 34050 6 1 6 KHOK SI 34.0 0.0 - 34.0  
 172 15 69 64 58 33 10  
 1985 92 85 100 61 57 61 48  
 1989 53 80 76 44 43 44 38  
 1994 41 82 66 36 36 36 36



ศูนย์วิทยทรัพยากร  
 จุฬาลงกรณ์มหาวิทยาลัย



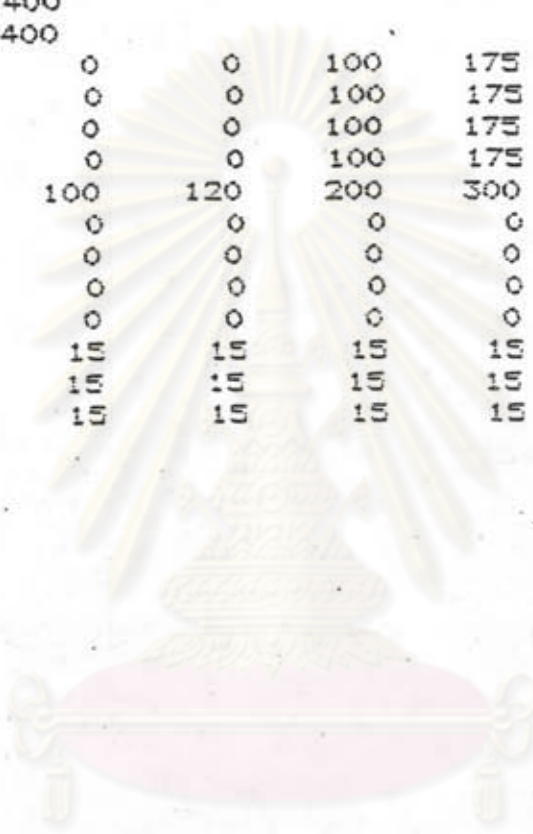
ภาคผนวก ข

แฟ้มข้อมูลของปริมาณการจราจร (CONS)

ศูนย์วิทยทรัพยากร  
จุฬาลงกรณ์มหาวิทยาลัย



15500	175						
18000	175						
19700	175						
21400	175						
9600	1400						
9600	1400						
9600	1400						
0	0	0	100	175	0	25	
0	0	0	100	175	0	25	
0	0	0	100	175	0	25	
0	0	0	100	175	0	25	
33	100	120	200	300	120	200	
0	0	0	0	0	0	0	
0	0	0	0	0	0	0	
0	0	0	0	0	0	0	
0	0	0	0	0	0	0	
15	15	15	15	15	15	15	
15	15	15	15	15	15	15	
15	15	15	15	15	15	15	



ศูนย์วิทยทรัพยากร  
จุฬาลงกรณ์มหาวิทยาลัย



ภาคผนวก ๓

แบบฟอร์มที่ใช้และการกรอกข้อมูลพื้นฐานค่าใช้จ่ายในการใช้รถ (Base VOC DATA)

ศูนย์วิทยทรัพยากร  
จุฬาลงกรณ์มหาวิทยาลัย

SHEET .....! OF.....  
 CODED BY *Bornchai*

STORE BASE VOC DATA  
 INPUT PARAMETERS ( NO. OF TABLES ) RECORD TYPE 0

DATE *Jan 4, 1986*  
 PROJECT *Thesis*

COL.	No. of VEHICLE ROAD TYPES STATES			CURVE			UPHILL GRADE			DOWNHILL GRADE			SPEED CHANGE			TIME CHANGE			VARIABLE COST			FIXED COST																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41				
	0			7			4			4			4			4			4			4			4			4			4			7			7			7			7		

(C) (UG) (DG) (SC) (TC) (VC) (FC)

ADDRESS ON DISK FOR FACTOR TABLES  
 RECORD TYPE 1.

VEHICLE TYPE

COL.	2			3			4			5			6			7			8			9			10																													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52		
C	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1			
UG	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
DG	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
SC	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
TC	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
VC	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
FC	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
V S	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1



DATE *Jan 4 1986* SHEET.....OF.....  
 PROJECT *Thesis* RECORDED BY *Bornchai*  
 STORE BASE VOC DATA RECORD TYPE 2  
 P.C.U. VALUE OF TRUCKS VCR RANGE  $< 0.5$

DISTANCE ALONG GRADE IN METRES	GRADE %																														
	col 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27				
200	2	2	2	2	2	2	2	2	2	2	2	3	4	6	8	8	6	4	2	1	1	2	2	2	2	2	2	2	2	2	2
400	2	2	2	2	2	2	2	2	2	2	2	3	4	6	8	8	6	4	2	1	1	2	2	2	2	2	2	2	2	2	2
800	2	2	2	2	2	2	2	2	2	2	2	3	4	6	8	8	6	4	2	1	1	2	2	2	2	2	2	2	2	2	2
1200	2	2	2	2	2	2	2	2	2	2	2	3	4	6	8	8	6	4	2	1	1	2	2	2	2	2	2	2	2	2	2
1600	2	2	2	2	2	2	2	2	2	2	2	3	4	6	8	8	6	4	2	1	1	2	2	2	2	2	2	2	2	2	2
2400	2	2	2	2	2	2	2	2	2	2	2	3	4	6	8	8	6	4	2	1	1	2	2	2	2	2	2	2	2	2	2
3200	2	2	2	2	2	2	2	2	2	2	2	3	4	6	8	8	6	4	2	1	1	2	2	2	2	2	2	2	2	2	2
4800	2	2	2	2	2	2	2	2	2	2	2	3	4	6	8	8	6	4	2	1	1	2	2	2	2	2	2	2	2	2	2

REPEAT FOR EACH VCR RANGE  
 $< 0.5$   
 $0.5 - 0.7$   
 $> 0.7$

STORE BASE VOC DATA  
 RECORD TYPE 2  
 P.C.U. VALUE OF TRUCKS  
 VCR RANGE 0.5 - 0.7

SHEET.....OF.....  
 CODED BY *Bornchai*

DATE *Jan 4, 1986*  
 PROJECT *Thesis*

DISTANCE ALONG GRADE IN METRES	GRADE %																												
	1		2		3		4		5		6		7																
	col	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	
200			2					2					3					5										1	0
400			2					4					5					7										1	7
800			2					7					2					5										2	4
1200			2					0					7					9										2	9
1600			2					3					0					3										3	3
2400			2					5					2					5										3	7
3200			2					7					3					7										3	2
4800			2					8					4					8										3	3

REPEAT FOR EACH VCR RANGE  
 ( 0.5  
 0.5 - 0.7  
 > 0.7

STORE BASE VOC DATA  
 RECORD TYPE 2  
 P.C.U. VALUE OF TRUCKS  
 VCR RANGE > 0.7

SHEET.....OF.....  
 CODED BY *Bomohai*

DATE *Jan 4, 1986*  
 PROJECT *Thesis*

DISTANCE ALONG GRADE IN METRES	GRADE %																																	
	3							4							5							6							7					
	col 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27							
200	2	2				2	2					4					6					9					1	4						
400	2	2				4	4					5					7					10					1	7						
800	2	2				7	7					13					17					23					2	9						
1200	2	2				10	10					19					23					30					3	6						
1600	2	2				13	13					24					29					37					4	3						
2400	2	2				16	16					28					34					42					4	8						
3200	2	2				18	18					30					38					46					5	2						
4800	2	2				20	20					31					41					50					5	8						

REPEAT FOR EACH VCR RANGE

- < 0.5
- 0.5 - 0.7
- > 0.7













STORE BASE VOC. DATA  
RECORD TYPE 5

SHEET ..... OF .....  
CODED BY *B. Somchai*

DATE *Jan 5, 1986*  
PROJECT *Thesis*

CURVE FACTORS

		RADIUS (mi.)											
		1500	750	500	375	300	250	215	150	100	33		
col.													
1	20	34	89	13	18	22	28	33	38	43	48	50	51
2	30	56	10	14	19	22	29	33	39	44	48	50	51
3	40	30	9	13	17	22	28	33	39	44	48	50	51
4	50	35	10	14	18	22	29	33	39	44	48	50	51
5	60	37	11	15	19	24	30	35	41	47	51	52	
6	70	39	12	16	20	26	32	38	44	49	53		
7	80	41	13	17	21	28	34	40	46	50			
8	90	48	14	18	22	30	36	42	48				
9	100	59	15	19	24	33	40	47					
10	110	91	16	20	26	35	43						

REPEAT FOR EACH GROUP OF VEHICLE TYPES AS SPECIFIED IN RECORD NO.1

SPEED

STORE BASE VOC DATA  
RECORD TYPE 5

SHEET ..... OF .....  
CODED BY *Bornchai*

DATE *Jan 6, 1986*  
PROJECT *Truss*

CURVE FACTORS

		RADIUS (mi.)											
		1500	750	500	375	300	250	215	150	100	33		
col.													
20	1	3	9	13	18	22	28	33	38	44	45	48	52
30	2	4	10	14	19	22	29	33	39	44	45	48	52
40	3	5	11	15	20	22	30	33	40	44	45	48	52
k 50	4	6	12	16	21	22	32	34	41	44	45	48	52
p 60	5	7	13	17	22	22	34	35	42	44	45	48	52
h 70	6	8	14	18	23	22	35	36	43	44	45	48	52
80	7	9	15	19	24	22	36	37	44	44	45	48	52
90	8	10	16	20	25	22	37	38	45	44	45	48	52
100	9	11	17	21	26	22	38	39	46	44	45	48	52
110	10	12	18	22	27	22	39	40	47	44	45	48	52

REPEAT FOR EACH GROUP OF VEHICLE TYPES AS SPECIFIED IN RECORD NO.1



SHEET ..... OF .....  
 CODED BY *Soan chai*

STORE BASE VOC DATA  
 RECORD TYPE 6

DATE *Jan 6, 1986*  
 PROJECT *Thesis*

FACTORS FOR UPHILL GRADES

SPEED (Kph)	COL.	GRADE %																					
		1	2	3	4	5	6	7															
20	1	4.70	9.80	15.20	20.60	26.10	32.50	39.30	46.10	53.00	60.00	67.00	74.00	81.00	88.00	95.00	102.00	109.00	116.00	123.00	130.00	137.00	
30	6	5.40	1.30	1.74	2.35	3.01	3.71	4.45	5.23	6.05	6.91	7.81	8.74	9.71	10.71	11.74	12.81	13.91	15.04	16.20	17.39	18.61	19.86
40	6	6.70	1.30	1.95	2.62	3.33	4.08	4.87	5.69	6.55	7.45	8.39	9.36	10.37	11.41	12.49	13.60	14.74	15.91	17.11	18.34	19.60	20.89
50	6	6.00	1.25	1.90	2.60	3.33	4.08	4.87	5.69	6.55	7.45	8.39	9.36	10.37	11.41	12.49	13.60	14.74	15.91	17.11	18.34	19.60	20.89
60	6	5.90	1.23	1.85	2.54	3.27	4.03	4.82	5.64	6.50	7.40	8.34	9.31	10.31	11.34	12.40	13.49	14.61	15.76	16.93	18.13	19.36	20.61
70	6	5.70	1.20	1.80	2.48	3.21	3.96	4.75	5.57	6.43	7.33	8.27	9.24	10.24	11.27	12.33	13.42	14.53	15.66	16.81	17.99	19.19	20.41
80	6	5.50	1.15	1.75	2.42	3.15	3.89	4.68	5.50	6.36	7.26	8.19	9.15	10.14	11.16	12.21	13.29	14.39	15.51	16.65	17.81	18.99	20.19
90	6	5.50	1.15	1.75	2.42	3.15	3.89	4.68	5.50	6.36	7.26	8.19	9.15	10.14	11.16	12.21	13.29	14.39	15.51	16.65	17.81	18.99	20.19
100	6	5.50	1.15	1.75	2.42	3.15	3.89	4.68	5.50	6.36	7.26	8.19	9.15	10.14	11.16	12.21	13.29	14.39	15.51	16.65	17.81	18.99	20.19
110	6	5.50	1.15	1.75	2.42	3.15	3.89	4.68	5.50	6.36	7.26	8.19	9.15	10.14	11.16	12.21	13.29	14.39	15.51	16.65	17.81	18.99	20.19

REPEAT FOR EACH GROUP OF VEHICLE TYPES AS SPECIFIED IN RECORD 1.



SHEET ..... OF .....  
 CODED BY *Bornchai*

STORE BASE VOC DATA  
 RECORD TYPE 6

DATE *Jan 6, 1986*  
 PROJECT *Thesis*

FACTORS FOR UPHILL GRADES

SPEED (Kph)	COL.	GRADE %																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
		1	2	3	4	5	6	7																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
20	1	4.10	8.60	13.10	17.60	22.10	26.60	31.10	35.60	40.10	44.60	49.10	53.60	58.10	62.60	67.10	71.60	76.10	80.60	85.10	89.60	94.10	98.60	103.10	107.60	112.10	116.60	121.10	125.60	130.10	134.60	139.10	143.60	148.10	152.60	157.10	161.60	166.10	170.60	175.10	179.60	184.10	188.60	193.10	197.60	202.10	206.60	211.10	215.60	220.10	224.60	229.10	233.60	238.10	242.60	247.10	251.60	256.10	260.60	265.10	269.60	274.10	278.60	283.10	287.60	292.10	296.60	301.10	305.60	310.10	314.60	319.10	323.60	328.10	332.60	337.10	341.60	346.10	350.60	355.10	359.60	364.10	368.60	373.10	377.60	382.10	386.60	391.10	395.60	400.10	404.60	409.10	413.60	418.10	422.60	427.10	431.60	436.10	440.60	445.10	449.60	454.10	458.60	463.10	467.60	472.10	476.60	481.10	485.60	490.10	494.60	499.10	503.60	508.10	512.60	517.10	521.60	526.10	530.60	535.10	539.60	544.10	548.60	553.10	557.60	562.10	566.60	571.10	575.60	580.10	584.60	589.10	593.60	598.10	602.60	607.10	611.60	616.10	620.60	625.10	629.60	634.10	638.60	643.10	647.60	652.10	656.60	661.10	665.60	670.10	674.60	679.10	683.60	688.10	692.60	697.10	701.60	706.10	710.60	715.10	719.60	724.10	728.60	733.10	737.60	742.10	746.60	751.10	755.60	760.10	764.60	769.10	773.60	778.10	782.60	787.10	791.60	796.10	800.60	805.10	809.60	814.10	818.60	823.10	827.60	832.10	836.60	841.10	845.60	850.10	854.60	859.10	863.60	868.10	872.60	877.10	881.60	886.10	890.60	895.10	899.60	904.10	908.60	913.10	917.60	922.10	926.60	931.10	935.60	940.10	944.60	949.10	953.60	958.10	962.60	967.10	971.60	976.10	980.60	985.10	989.60	994.10	998.60	1003.10	1007.60	1012.10	1016.60	1021.10	1025.60	1030.10	1034.60	1039.10	1043.60	1048.10	1052.60	1057.10	1061.60	1066.10	1070.60	1075.10	1079.60	1084.10	1088.60	1093.10	1097.60	1102.10	1106.60	1111.10	1115.60	1120.10	1124.60	1129.10	1133.60	1138.10	1142.60	1147.10	1151.60	1156.10	1160.60	1165.10	1169.60	1174.10	1178.60	1183.10	1187.60	1192.10	1196.60	1201.10	1205.60	1210.10	1214.60	1219.10	1223.60	1228.10	1232.60	1237.10	1241.60	1246.10	1250.60	1255.10	1259.60	1264.10	1268.60	1273.10	1277.60	1282.10	1286.60	1291.10	1295.60	1300.10	1304.60	1309.10	1313.60	1318.10	1322.60	1327.10	1331.60	1336.10	1340.60	1345.10	1349.60	1354.10	1358.60	1363.10	1367.60	1372.10	1376.60	1381.10	1385.60	1390.10	1394.60	1399.10	1403.60	1408.10	1412.60	1417.10	1421.60	1426.10	1430.60	1435.10	1439.60	1444.10	1448.60	1453.10	1457.60	1462.10	1466.60	1471.10	1475.60	1480.10	1484.60	1489.10	1493.60	1498.10	1502.60	1507.10	1511.60	1516.10	1520.60	1525.10	1529.60	1534.10	1538.60	1543.10	1547.60	1552.10	1556.60	1561.10	1565.60	1570.10	1574.60	1579.10	1583.60	1588.10	1592.60	1597.10	1601.60	1606.10	1610.60	1615.10	1619.60	1624.10	1628.60	1633.10	1637.60	1642.10	1646.60	1651.10	1655.60	1660.10	1664.60	1669.10	1673.60	1678.10	1682.60	1687.10	1691.60	1696.10	1700.60	1705.10	1709.60	1714.10	1718.60	1723.10	1727.60	1732.10	1736.60	1741.10	1745.60	1750.10	1754.60	1759.10	1763.60	1768.10	1772.60	1777.10	1781.60	1786.10	1790.60	1795.10	1799.60	1804.10	1808.60	1813.10	1817.60	1822.10	1826.60	1831.10	1835.60	1840.10	1844.60	1849.10	1853.60	1858.10	1862.60	1867.10	1871.60	1876.10	1880.60	1885.10	1889.60	1894.10	1898.60	1903.10	1907.60	1912.10	1916.60	1921.10	1925.60	1930.10	1934.60	1939.10	1943.60	1948.10	1952.60	1957.10	1961.60	1966.10	1970.60	1975.10	1979.60	1984.10	1988.60	1993.10	1997.60	2002.10	2006.60	2011.10	2015.60	2020.10	2024.60	2029.10	2033.60	2038.10	2042.60	2047.10	2051.60	2056.10	2060.60	2065.10	2069.60	2074.10	2078.60	2083.10	2087.60	2092.10	2096.60	2101.10	2105.60	2110.10	2114.60	2119.10	2123.60	2128.10	2132.60	2137.10	2141.60	2146.10	2150.60	2155.10	2159.60	2164.10	2168.60	2173.10	2177.60	2182.10	2186.60	2191.10	2195.60	2200.10	2204.60	2209.10	2213.60	2218.10	2222.60	2227.10	2231.60	2236.10	2240.60	2245.10	2249.60	2254.10	2258.60	2263.10	2267.60	2272.10	2276.60	2281.10	2285.60	2290.10	2294.60	2299.10	2303.60	2308.10	2312.60	2317.10	2321.60	2326.10	2330.60	2335.10	2339.60	2344.10	2348.60	2353.10	2357.60	2362.10	2366.60	2371.10	2375.60	2380.10	2384.60	2389.10	2393.60	2398.10	2402.60	2407.10	2411.60	2416.10	2420.60	2425.10	2429.60	2434.10	2438.60	2443.10	2447.60	2452.10	2456.60	2461.10	2465.60	2470.10	2474.60	2479.10	2483.60	2488.10	2492.60	2497.10	2501.60	2506.10	2510.60	2515.10	2519.60	2524.10	2528.60	2533.10	2537.60	2542.10	2546.60	2551.10	2555.60	2560.10	2564.60	2569.10	2573.60	2578.10	2582.60	2587.10	2591.60	2596.10	2600.60	2605.10	2609.60	2614.10	2618.60	2623.10	2627.60	2632.10	2636.60	2641.10	2645.60	2650.10	2654.60	2659.10	2663.60	2668.10	2672.60	2677.10	2681.60	2686.10	2690.60	2695.10	2699.60	2704.10	2708.60	2713.10	2717.60	2722.10	2726.60	2731.10	2735.60	2740.10	2744.60	2749.10	2753.60	2758.10	2762.60	2767.10	2771.60	2776.10	2780.60	2785.10	2789.60	2794.10	2798.60	2803.10	2807.60	2812.10	2816.60	2821.10	2825.60	2830.10	2834.60	2839.10	2843.60	2848.10	2852.60	2857.10	2861.60	2866.10	2870.60	2875.10	2879.60	2884.10	2888.60	2893.10	2897.60	2902.10	2906.60	2911.10	2915.60	2920.10	2924.60	2929.10	2933.60	2938.10	2942.60	2947.10	2951.60	2956.10	2960.60	2965.10	2969.60	2974.10	2978.60	2983.10	2987.60	2992.10	2996.60	3001.10	3005.60	3010.10	3014.60	3019.10	3023.60	3028.10	3032.60	3037.10	3041.60	3046.10	3050.60	3055.10	3059.60	3064.10	3068.60	3073.10	3077.60	3082.10	3086.60	3091.10	3095.60	3100.10	3104.60	3109.10	3113.60	3118.10	3122.60	3127.10	3131.60	3136.10	3140.60	3145.10	3149.60	3154.10	3158.60	3163.10	3167.60	3172.10	3176.60	3181.10	3185.60	3190.10	3194.60	3199.10	3203.60	3208.10	3212.60	3217.10	3221.60	3226.10	3230.60	3235.10	3239.60	3244.10	3248.60	3253.10	3257.60	3262.10	3266.60	3271.10	3275.60	3280.10	3284.60	3289.10	3293.60	3298.10	3302.60	3307.10	3311.60	3316.10	3320.60	3325.10	3329.60	3334.10	3338.60	3343.10	3347.60	3352.10	3356.60	3361.10	3365.60	3370.10	3374.60	3379.10	3383.60	3388.10	3392.60	3397.10	3401.60	3406.10	3410.60	3415.10	3419.60	3424.10	3428.60	3433.10	3437.60	3442.10	3446.60	3451.10	3455.60	3460.10	3464.60	3469.10	3473.60	3478.10	3482.60	3487.10	3491.60	3496.10	3500.60	3505.10	3509.60	3514.10	3518.60	3523.10	3527.60	3532.10	3536.60	3541.10	3545.60	3550.10	3554.60	3559.10	3563.60	3568.10	3572.60	3577.10	3581.60	3586.10	3590.60	3595.10	3599.60	3604.10	3608.60	3613.10	3617.60	3622.10	3626.60	3631.10	3635.60	3640.10	3644.60	3649.10	3653.60	3658.10	3662.60	3667.10	3671.60	3676.10	3680.60	3685.10	3689.60	3694.10	3698.60	3703.10	3707.60	3712.10	3716.60	3721.10	3725.60	3730.10	3734.60	3739.10	3743.60	3748.10	3752.60	3757.10	3761.60	3766.10	3770.60	3775.10	3779.60	3784.10	3788.60	3793.10	3797.60	3802.10	3806.60	3811.10	3815.60	3820.10	3824.60	3829.10	3833.60	3838.10	3842.60	3847.10	3851.60	3856.10	3860.60	3865.10	3869.60	3874.10	3878.60	3883.10	3887.60	3892.10	3896.60	3901.10	3905.60	3910.10	3914.60	3919.10	3923.60	3928.10	3932.60	3937.10	3941.60	3946.10	3950.60	3955.10	3959.60	3964.10	3968.60	3973.10	3977.60	3982.10	3986.60	3991.10	3995.60	4000.10	4004.60	4009.10	4013.60	4018.10	4022.60	4027.10	4031.60	4036.10	4040.60	4045.10	4049.60	4054.10	4058.60	4063.10	4067.60	4072.10	4076.60	4081.10	4085.60	4090.10	4094.60	4099.10	4103.60	4108.10	4112.60	4117.10	4121.60	4126.10	4130.60	4135.10	4139.60	4144.10	4148.60	4153.10	4157.60	4162.10	4166.60	4171.10	4175.60	4180.10	4184.60	4189.10	4193.60	4198.10	4202.60	4207.10	4211.60	4216.10	4220.60	4225.10	4229.60	4234.10	4238.60	4243.10	4247.60	4252.10	4256.60	4261.10	4265.60	4270.10	4274.60	4279.10	4283.60	4288.10	4292.60	4297.10	4301.60	4306.10	4310.60	4315.10	4319.60	4324.10	4328.60	4333.10	4337.60	4342.10	4346.60	4351.10	4355.60	4360.10	4364.60	4369.10	4373.60	4378.10	4382.60	4387.10	4391.60	4396.10	4400.60	4405.10	4409.60	4414.10	4418.60	4423.10	4427.60	4432.10	4436.60	4441.10	4445.60	4450.10	4454.60	4459.10	4463.60	4468.10	4472.60	4477.10	4481.60	4486.10	4490.60	4495.10	4499.60	4504.10	4508.60	4513.10	4517.60	4522.10	4526.60	4531.10	4535.60	4540.10	4544.60	4549.10	4553.60	4558.10	4562.60	4567.10	4571.60	4576.10	4580.60	4585.10	4589.60	4594.10	4

SHEET ..... OF.....  
 CODED BY *Bomrani*

STORE BASE VOC DATA  
 RECORD TYPE 6

DATE *Jan 7, 1986*  
 PROJECT *Thesis*

FACTORS FOR UPHILL GRADES

SPEED (Kph)	COL.	GRADE %																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
		1						2						3						4						5						6						7																																																																																																																																																																																																																																																																																																																																																																																																																																	
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37																																																																																																																																																																																																																																																																																																																																																																																																																																	
20	6	4	8	0	0	0	0	0	0	0	0	0	0	1	5	6	0	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	3	7	3	0	0	0	0	0	0	0	0	0	4	6	9	0	0	0	0	0	0	0	0	0	5	9	0	0	0	0	0	0	0	0	0	0	6	8	7	0	0	0	0	0	0	0	0	0	7	2	9	1	0	0	0	0	0	0	0	0	8	4	8	7	0	0	0	0	0	0	0	0	9	5	9	0	0	0	0	0	0	0	0	0	10	7	1	0	0	0	0	0	0	0	0	0	11	8	4	0	0	0	0	0	0	0	0	0	12	9	9	0	0	0	0	0	0	0	0	0	13	1	5	6	0	0	0	0	0	0	0	0	14	1	9	7	0	0	0	0	0	0	0	0	15	2	4	1	0	0	0	0	0	0	0	0	16	2	8	0	0	0	0	0	0	0	0	0	17	3	4	7	0	0	0	0	0	0	0	0	18	4	3	5	0	0	0	0	0	0	0	0	19	5	5	4	0	0	0	0	0	0	0	0	20	0	0	0	0	0	0	0	0	0	0	0	21	0	0	0	0	0	0	0	0	0	0	0	22	0	0	0	0	0	0	0	0	0	0	0	23	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	25	0	0	0	0	0	0	0	0	0	0	0	26	0	0	0	0	0	0	0	0	0	0	0	27	0	0	0	0	0	0	0	0	0	0	0	28	0	0	0	0	0	0	0	0	0	0	0	29	0	0	0	0	0	0	0	0	0	0	0	30	0	0	0	0	0	0	0	0	0	0	0	31	0	0	0	0	0	0	0	0	0	0	0	32	0	0	0	0	0	0	0	0	0	0	0	33	0	0	0	0	0	0	0	0	0	0	0	34	0	0	0	0	0	0	0	0	0	0	0	35	0	0	0	0	0	0	0	0	0	0	0	36	0	0	0	0	0	0	0	0	0	0	0	37	0	0	0	0	0	0	0	0	0	0	0

REPEAT FOR EACH GROUP OF VEHICLE TYPES AS SPECIFIED IN RECORD 1.







SHEET .....OF.....  
 CODED BY *Bomchai*

STORE BASE VOC DATA  
 RECORD TYPE 7

DATE *Jan 7, 1986*  
 PROJECT *Thesis*

FACTORS FOR DOWNHILL GRADES

SPEED (Kph)	COL.	GRADE %																																					
		1					2					3					4					5					6					7							
		3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37			
20	7	4.1	0	1.1	9	0	1.1	3	0	1.1	9	0	1.3	4	0	1.3	1	0	1.3	1	0	1.2	5	0	1.2	5	0	1.4	7	0	1.4	7	0	1.1	7	0	1.1	7	0
30	7	4.8	0	1.1	3	0	1.1	3	0	1.1	3	0	1.6	3	0	1.6	3	0	1.6	0	0	1.5	4	0	1.5	4	0	1.7	3	0	1.7	3	0	1.4	7	0	1.4	7	0
40	7	5.3	0	1.0	5	0	1.0	5	0	1.0	5	0	1.5	9	0	1.5	9	0	1.8	5	0	1.7	9	0	1.7	9	0	2.0	4	0	2.0	4	0	1.9	7	0	1.9	7	0
50	7	5.5	0	1.0	6	0	1.0	6	0	1.0	6	0	1.5	6	0	1.5	6	0	1.9	6	0	2.2	3	0	2.2	3	0	2.2	0	0	2.2	0	0	2.2	0	0	2.2	0	0
60	7	5.7	0	1.0	7	0	1.0	7	0	1.0	7	0	1.5	6	0	1.5	6	0	1.9	5	0	2.2	9	0	2.2	9	0	2.4	3	0	2.4	3	0	2.4	3	0	2.4	3	0
70	7	5.7	0	1.0	8	0	1.0	8	0	1.0	8	0	1.5	8	0	1.5	8	0	1.9	7	0	2.3	1	0	2.3	1	0	2.6	0	0	2.6	0	0	2.6	0	0	2.6	0	0
80	7	5.8	0	1.0	8	0	1.0	8	0	1.0	8	0	1.5	8	0	1.5	8	0	1.9	7	0	2.3	1	0	2.3	1	0	2.6	0	0	2.6	0	0	2.6	0	0	2.6	0	0
90	7	5.8	0	1.0	8	0	1.0	8	0	1.0	8	0	1.5	8	0	1.5	8	0	1.9	7	0	2.3	1	0	2.3	1	0	2.6	0	0	2.6	0	0	2.6	0	0	2.6	0	0
100	7	5.8	0	1.0	8	0	1.0	8	0	1.0	8	0	1.5	8	0	1.5	8	0	1.9	7	0	2.3	1	0	2.3	1	0	2.6	0	0	2.6	0	0	2.6	0	0	2.6	0	0
110	7	5.8	0	1.0	8	0	1.0	8	0	1.0	8	0	1.5	8	0	1.5	8	0	1.9	7	0	2.3	1	0	2.3	1	0	2.6	0	0	2.6	0	0	2.6	0	0	2.6	0	0

REPEAT FOR EACH GROUP OF VEHICLE TYPES AS SPECIFIED IN RECORD 1.

SHEET .....OF.....  
 CODED BY...*B. Bannachai*.....

STORE BASE VOC DATA  
 RECORD TYPE 7

DATE *Jan 7, 1986*  
 PROJECT *Thesis*.....

FACTORS FOR DOWNHILL GRADES

SPEED (Kph)	COL.	GRADE %																																														
		1							2							3							4							5							6							7				
20	1	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37												
	7				4.10				7.70			1	1.00				1	2.20				1	1.70				1	1.80																				
	7				4.60				8.40			1	2.40				1	4.80				1	4.30				1	6.40																				
	7				5.00				8.80			1	3.10				1	6.60				1	6.90				1	9.00																				
	7				5.20				9.40			1	4.00				1	7.20				2	1.20				2	1.90																				
	7				5.50				9.90			1	4.80				1	7.90				2	2.00				2	2.70																				
	7				5.60				10.50			1	5.90				1	9.40				2	2.70				2	4.70																				
	7				6.00				11.10			1	6.80				2	1.30				2	4.70				2	7.50																				
	7				6.00				11.10			1	6.80				2	1.30				2	4.70				2	7.50																				
	7				6.00				11.10			1	6.80				2	1.30				2	4.70				2	7.50																				
	7				6.00				11.10			1	6.80				2	1.30				2	4.70				2	7.50																				

REPEAT FOR EACH GROUP OF VEHICLE TYPES AS SPECIFIED IN RECORD 1.



SHEET .....OF.....  
 CODED BY... *Bonchari*.....

STORE BASE VOC DATA  
 RECORD TYPE 7

DATE *Jan 8, 1986*  
 PROJECT *Thesis*

FACTORS FOR DOWNHILL GRADES

SPEED (Kph)	COL.	GRADE %																																									
		1					2					3					4					5					6					7											
		3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37							
20	7						1	0	7	0	1	4	8	0	1	7	9	0	1	7	9	0	1	9	1	0	2	2	3	0	2	1	9	0	1	8	4	0	2	0	8	0	
30	7						1	3	2	0	1	7	6	0	2	0	7	0	2	1	8	0	2	3	6	0	2	4	5	0	2	4	5	0	2	3	1	0	2	4	4	0	
40	7						1	5	0	0	1	9	9	0	2	2	4	0	2	2	4	0	2	4	4	0	2	3	9	0	2	5	0	0	2	3	7	0					
50	7						1	6	1	0	2	0	0	0	2	2	4	0	2	2	4	0	2	2	4	0	2	3	9	0													
60	7						1	6	2	0	2	0	0	0	2	2	4	0	2	2	4	0	2	2	4	0	2	3	9	0													
70	7						1	5	5	0	1	9	4	0	1	9	4	0	2	2	4	0	2	2	4	0	2	3	9	0													
80	7						1	4	5	0	1	9	4	0	1	9	4	0	2	2	4	0	2	2	4	0	2	3	9	0													
90	7						1	4	5	0	1	9	4	0	1	9	4	0	2	2	4	0	2	2	4	0	2	3	9	0													
100	7						1	4	5	0	1	9	4	0	1	9	4	0	2	2	4	0	2	2	4	0	2	3	9	0													
110	7						1	4	5	0	1	9	4	0	1	9	4	0	2	2	4	0	2	2	4	0	2	3	9	0													

REPEAT FOR EACH GROUP OF VEHICLE TYPES AS SPECIFIED IN RECORD 1.



DATE *Jan 8, 1986* SHEET .....OF.....  
 PROJECT *Thesis* CODED BY *Bornchai*  
 RECORD TYPE 7

STORE BASE VOC DATA

FACTORS FOR DOWNHILL GRADES

SPEED (Kph)	COL.	GRADE %																																											
		1					2					3					4					5					6					7													
20	7	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37							
30	7	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1					
40	7	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1					
50	7	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1				
60	7	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1			
70	7	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1			
80	7	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
90	7	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
100	7	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
110	7	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

REPEAT FOR EACH GROUP OF VEHICLE TYPES AS SPECIFIED IN RECORD 1.































STORE VOC BASE DATA  
 RECORD TYPE (10) VARIABLE VOC LEVEL TANGENT OPERATING COST (B)  
 PAVEMENT TYPE \_\_\_\_\_

DATE: Jan 10, 1986  
 PROJECT: Thesis

SHEET: ..... OF .....  
 CODED BY: *Bornchai*

COL.	1										2										3										4										5										6										7										8										9										10									
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52																																																
S	20	10	1380	1620	1850	2080	2310	2540	2770	3000	3230	3460	3690	3920	4150	4380	4610	4840	5070	5300	5530	5760	5990	6220	6450	6680	6910	7140	7370	7600	7830	8060	8290	8520	8750	8980	9210	9440	9670	9900	10130	10360	10590	10820	11050																																																							
P	30	10	1180	1410	1630	1860	2090	2320	2550	2780	3010	3240	3470	3700	3930	4160	4390	4620	4850	5080	5310	5540	5770	6000	6230	6460	6690	6920	7150	7380	7610	7840	8070	8300	8530	8760	8990	9220	9450	9680	9910	10140	10370	10600	10830	11060																																																						
E	40	10	1090	1320	1540	1770	2000	2230	2460	2690	2920	3150	3380	3610	3840	4070	4300	4530	4760	4990	5220	5450	5680	5910	6140	6370	6600	6830	7060	7290	7520	7750	7980	8210	8440	8670	8900	9130	9360	9590	9820	10050	10280	10510	10740	10970	11200																																																					
E	50	10	1050	1270	1490	1710	1930	2150	2370	2590	2810	3030	3250	3470	3690	3910	4130	4350	4570	4790	5010	5230	5450	5670	5890	6110	6330	6550	6770	6990	7210	7430	7650	7870	8090	8310	8530	8750	8970	9190	9410	9630	9850	10070	10290	10510	10730	10950																																																				
D	60	10	1030	1250	1470	1690	1910	2130	2350	2570	2790	3010	3230	3450	3670	3890	4110	4330	4550	4770	4990	5210	5430	5650	5870	6090	6310	6530	6750	6970	7190	7410	7630	7850	8070	8290	8510	8730	8950	9170	9390	9610	9830	10050	10270	10490	10710	10930																																																				
K	70	10	1020	1240	1460	1680	1900	2120	2340	2560	2780	3000	3220	3440	3660	3880	4100	4320	4540	4760	4980	5200	5420	5640	5860	6080	6300	6520	6740	6960	7180	7400	7620	7840	8060	8280	8500	8720	8940	9160	9380	9600	9820	10040	10260	10480	10700	10920																																																				
P	80	10	1050	1270	1490	1710	1930	2150	2370	2590	2810	3030	3250	3470	3690	3910	4130	4350	4570	4790	5010	5230	5450	5670	5890	6110	6330	6550	6770	6990	7210	7430	7650	7870	8090	8310	8530	8750	8970	9190	9410	9630	9850	10070	10290	10510	10730	10950																																																				
H	90	10	1080	1300	1520	1740	1960	2180	2400	2620	2840	3060	3280	3500	3720	3940	4160	4380	4600	4820	5040	5260	5480	5700	5920	6140	6360	6580	6800	7020	7240	7460	7680	7900	8120	8340	8560	8780	9000	9220	9440	9660	9880	10100	10320	10540	10760	10980																																																				
	100	10	1080	1300	1520	1740	1960	2180	2400	2620	2840	3060	3280	3500	3720	3940	4160	4380	4600	4820	5040	5260	5480	5700	5920	6140	6360	6580	6800	7020	7240	7460	7680	7900	8120	8340	8560	8780	9000	9220	9440	9660	9880	10100	10320	10540	10760	10980																																																				
	110	10	1080	1300	1520	1740	1960	2180	2400	2620	2840	3060	3280	3500	3720	3940	4160	4380	4600	4820	5040	5260	5480	5700	5920	6140	6360	6580	6800	7020	7240	7460	7680	7900	8120	8340	8560	8780	9000	9220	9440	9660	9880	10100	10320	10540	10760	10980																																																				

REPEAT FOR EACH VEHICLE TYPE AS SPECIFIED IN RECORD 1.







STORE VOC BASE DATA  
 RECORD TYPE (10) VARIABLE VOC LEVEL TANGENT OPERATING COST (H)  
 PAVEMENT TYPE

DATE: Jan 10, 1986  
 PROJECT: Thesis

SHEET: ..... OF .....  
 CODED BY: Somchai

COL.	1										2										3										4										5										6										7										8										9										10									
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52																																																
S	20	10	10	10	10	10	10	10	10	20	40	20	20	20	20	20	20	20	20	30	20	20	20	20	20	20	20	20	20	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30																					
P	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10																															
E	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10																															
E	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10																															
D	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10																															
K	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10																															
P	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10																															
H	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10																															

REPEAT FOR EACH VEHICLE TYPE AS SPECIFIED IN RECORD 1.







STORE VOC BASE DATA  
 RECORD TYPE (10) VARIABLE VOC LEVEL TANGENT OPERATING COST (B)  
 PAVEMENT TYPE

DATE: Jan 11, 1986  
 PROJECT: P-315

SHEET: OF  
 CODED BY: *Bonchai*

COL.	1										2										3										4										5										6										7										8										9										10									
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52																																																
S	20	10	3	2	0	0	3	7	2	0	4	2	3	0	4	2	3	0	5	1	2	0	3	2	0	3	8	8	0	3	8	8	0	4	7	2	0	3	8	8	0	4	7	2	0	3	8	8	0	4	7	2	0																																															
P	30	10	4	6	3	0	3	0	9	0	3	5	4	0	3	9	7	0	4	4	0	0	4	0	0	4	0	5	0	4	9	0	0	5	2	5	0	4	7	2	0	3	8	8	0	4	7	2	0	3	8	8	0	4	7	2	0																																											
E	40	10	2	3	4	0	2	7	7	0	3	2	0	0	3	6	3	0	3	4	6	0	3	0	3	0	3	0	3	0	3	0	8	0	3	0	8	0	3	0	8	0	3	0	8	0	3	0	8	0	3	0	8	0	3	0	8	0																																										
E	50	10	2	2	0	0	2	6	2	0	3	0	3	0	3	4	6	0	3	4	6	0	2	9	6	0	3	0	8	0	3	0	8	0	3	0	8	0	3	0	8	0	3	0	8	0	3	0	8	0	3	0	8	0	3	0	8	0																																										
D	60	10	2	1	4	0	2	5	5	0	2	9	6	0	3	4	6	0	3	4	6	0	3	0	8	0	3	0	8	0	3	0	8	0	3	0	8	0	3	0	8	0	3	0	8	0	3	0	8	0	3	0	8	0	3	0	8	0																																										
K	70	10	2	2	3	0	2	6	2	0	3	0	8	0	3	4	6	0	3	4	6	0	3	0	8	0	3	0	8	0	3	0	8	0	3	0	8	0	3	0	8	0	3	0	8	0	3	0	8	0	3	0	8	0	3	0	8	0																																										
P	80	10	2	4	3	0	2	5	5	0	3	0	8	0	3	4	6	0	3	4	6	0	3	0	8	0	3	0	8	0	3	0	8	0	3	0	8	0	3	0	8	0	3	0	8	0	3	0	8	0	3	0	8	0	3	0	8	0																																										
H	90	10	2	4	3	0	2	6	6	0	3	0	8	0	3	4	6	0	3	4	6	0	3	0	8	0	3	0	8	0	3	0	8	0	3	0	8	0	3	0	8	0	3	0	8	0	3	0	8	0	3	0	8	0	3	0	8	0																																										
	100	10	2	4	3	0	2	6	6	0	3	0	8	0	3	4	6	0	3	4	6	0	3	0	8	0	3	0	8	0	3	0	8	0	3	0	8	0	3	0	8	0	3	0	8	0	3	0	8	0	3	0	8	0	3	0	8	0																																										
	110	10	2	4	3	0	2	6	6	0	3	0	8	0	3	4	6	0	3	4	6	0	3	0	8	0	3	0	8	0	3	0	8	0	3	0	8	0	3	0	8	0	3	0	8	0	3	0	8	0	3	0	8	0	3	0	8	0																																										

REPEAT FOR EACH VEHICLE TYPE AS SPECIFIED IN RECORD 1.











STORE VOC BASE DATA  
 RECORD TYPE (II) FIXED VOC LEVEL TANGENT OPERATING COST (H)  
 PAVEMENT TYPE

DATE: .....  
 PROJECT: .....  
 SHEET: ..... OF .....  
 CODED BY: .....

COL.	1		2		3		4		5		6		7		8		9		10	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
20	4610	4740	4860	4960	4860	5060	5250	5060	4860	4860	5060	5250	5060	5050	5050	5050	5050	5050	5050	5050
30	4060	4170	4270	4430	4270	4650	4430	4430	4270	4270	4590	4590	4590	4900	4900	4900	4900	4900	4900	4900
40	3550	3650	3740	4060	3740	3650	3650	3650	3740	3740	3800	3800	3800	5010	5010	5010	5010	5010	5010	5010
50	3160	3290	3410	3820	3410	3290	3290	3290	3410	3410	4230	4230	4230	5050	5050	5050	5050	5050	5050	5050
60	2910	2990	3060	3820	3060	2990	2990	2990	3060	3060	4230	4230	4230	5050	5050	5050	5050	5050	5050	5050
70	2910	2990	3060	3820	3060	2990	2990	2990	3060	3060	4230	4230	4230	5050	5050	5050	5050	5050	5050	5050
80	2910	2990	3060	3820	3060	2990	2990	2990	3060	3060	4230	4230	4230	5050	5050	5050	5050	5050	5050	5050
90	2910	2990	3060	3820	3060	2990	2990	2990	3060	3060	4230	4230	4230	5050	5050	5050	5050	5050	5050	5050
100	2910	2990	3060	3820	3060	2990	2990	2990	3060	3060	4230	4230	4230	5050	5050	5050	5050	5050	5050	5050
110	2910	2990	3060	3820	3060	2990	2990	2990	3060	3060	4230	4230	4230	5050	5050	5050	5050	5050	5050	5050

REPEAT FOR EACH VEHICLE TYPE AS SPECIFIED IN RECORD 1.



















ภาคผนวก ๘

แฟ้มข้อมูลพื้นฐานค่าใช้จ่ายในการใช้รถ (STDVOC.DAT)

ศูนย์วิทยทรัพยากร  
จุฬาลงกรณ์มหาวิทยาลัย



0	7	7	4	4	4	4	4	4	7	7
1	1	1	1	2	3	4	4	2	7	7
1	1	1	1	2	3	4	4	2	7	7
1	1	1	1	2	3	4	4	2	7	7
1	1	1	1	2	3	4	4	2	7	7
1	1	1	2	3	4	5	5	6	7	7
1	1	1	1	2	3	4	4	2	7	7
2	2	3	4	4	6	8	8	1	2	2
4	4	5	6	6	8	12	12			
7	10	12	15	15	19	19	23			
9	14	17	19	22	27	27	30			
11	16	19	22	24	30	30	32			
12	17	21	24	27	33	33	35			
13	18	22	26	27	33	33	35			
14	19	23	27	30	37	37	40			
2	3	5	7	10	17	17	24			
4	5	7	10	17	24	24	29			
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1 MOTOR CYCLE  
 2 PASSENGER CAR  
 3 LIGHT TRUCK  
 4 MED TRUCK  
 5 SHVY TRUCK  
 6 LGT BUS  
 7 HVY BUS

411	7	4	39	9	810					
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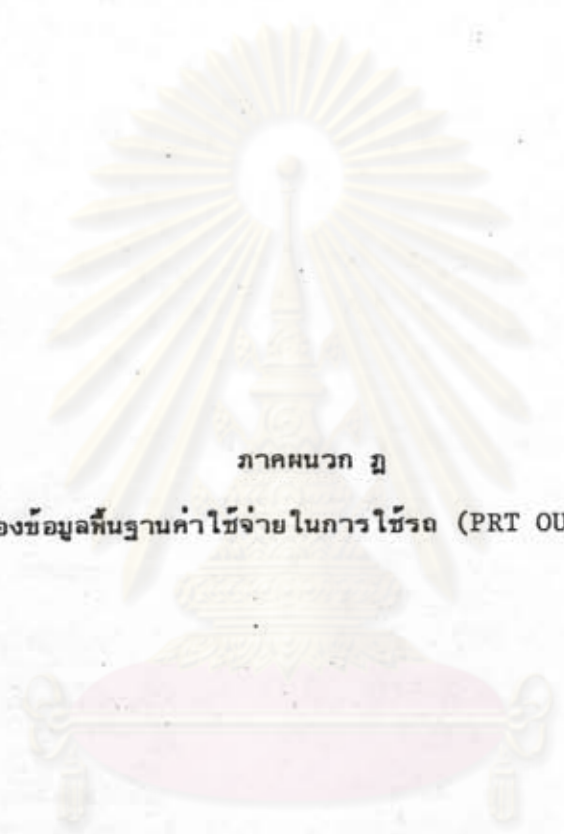


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ศูนย์วิทยทรัพยากร  
จุฬาลงกรณ์มหาวิทยาลัย





ภาคผนวก ข

ผลพิมพ์ของข้อมูลพื้นฐานค่าใช้จ่ายในการใช้รถ (PRT OUTPUT DATA)

ศูนย์วิทยทรัพยากร  
จุฬาลงกรณ์มหาวิทยาลัย

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28	29	30	31	32	33	34
35	36	37	38	39	40	41
42	42	42	43	43	42	43

RECORD TYPE 2  
PCU VALUE OF TRUCKS

3

2	3	4	6	8
4	5	6	8	12
7	10	12	15	19
9	14	17	19	23
11	16	19	22	27
12	17	21	24	30
13	18	22	26	32
14	19	23	27	33

4

2	3	5	7	10
4	5	7	10	17
7	12	15	19	24
10	17	19	24	29
13	20	23	27	33
15	22	25	30	37
17	23	27	32	40
18	24	28	33	42

5

2	4	6	9	14
4	5	7	10	17
7	13	17	23	29
10	19	23	30	36
13	24	29	37	43
16	28	34	42	48
19	30	38	46	52
20	31	41	50	58

RECORD TYPE 3  
VEHICLE DESCRIPTION

6

- MOTOR CYCLE
- PASSENGER CAR
- LIGHT TRUCK
- MED TRUCK
- HVY TRUCK
- LET BUS
- HVY BUS

RECORD TYPE 4  
HISTOGRAM DESCRIPTION

7

.77000	.07000	.15600	.03900	.07290	.00810
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RECORD 5  
 UPHILL GRADE FACTOR TABLES

12

4.70000	9.80000	15.20000	20.60000	26.10000	32.50000	39.30000
5.40000	11.30000	17.40000	23.50000	30.10000	37.10000	45.00000
6.70000	13.00000	19.50000	26.20000	33.30000	41.30000	50.40000
6.00000	12.50000	19.20000	26.00000	33.30000	41.30000	50.40000
5.90000	12.30000	19.00000	26.00000	33.40000	41.60000	50.90000
5.70000	12.00000	18.50000	25.40000	32.90000	41.20000	50.70000
5.50000	11.50000	17.80000	24.60000	32.00000	40.30000	49.80000
5.50000	11.50000	17.80000	24.60000	32.00000	40.30000	49.80000
5.50000	11.50000	17.80000	24.60000	32.00000	40.30000	49.80000
5.50000	11.50000	17.80000	24.60000	32.00000	40.30000	49.80000

13

4.10000	8.60000	13.50000	19.10000	25.40000	32.60000	41.20000
4.80000	9.90000	15.60000	22.00000	29.20000	37.50000	47.30000
5.20000	10.80000	17.10000	24.00000	31.90000	40.90000	51.40000
5.50000	11.60000	18.20000	25.60000	33.80000	44.80000	54.50000
5.90000	12.20000	19.20000	26.90000	35.60000	45.70000	57.20000
6.20000	12.90000	20.20000	28.10000	37.10000	47.40000	59.80000
6.50000	13.50000	21.10000	29.40000	38.80000	49.80000	63.60000
6.50000	13.50000	21.10000	29.40000	38.80000	49.80000	63.60000
6.50000	13.50000	21.10000	29.40000	38.80000	49.80000	63.60000
6.50000	13.50000	21.10000	29.40000	38.80000	49.80000	63.60000

14

4.80000	9.90000	15.60000	22.00000	29.10000	37.30000	46.90000
5.90000	12.30000	19.70000	28.00000	37.30000	48.70000	62.90000
7.10000	14.70000	24.10000	34.70000	48.50000	63.90000	88.30000
8.40000	17.40000	28.80000	43.50000	63.90000	.00000	.00000
9.90000	20.50000	34.10000	55.40000	.00000	.00000	.00000
11.50000	24.10000	39.90000	.00000	.00000	.00000	.00000
13.40000	27.40000	45.70000	.00000	.00000	.00000	.00000
13.40000	27.40000	45.70000	.00000	.00000	.00000	.00000
13.40000	27.40000	45.70000	.00000	.00000	.00000	.00000
13.40000	27.40000	45.70000	.00000	.00000	.00000	.00000

15

10.40000	20.70000	31.10000	41.40000	51.70000	61.90000	73.00000
14.00000	28.10000	42.70000	57.80000	73.50000	90.00000	108.90000
16.50000	33.40000	51.70000	71.90000	95.30000	120.60000	.00000
18.40000	37.60000	59.50000	86.80000	.00000	.00000	.00000
19.80000	41.40000	67.40000	.00000	.00000	.00000	.00000
20.70000	44.60000	.00000	.00000	.00000	.00000	.00000
22.10000	.00000	.00000	.00000	.00000	.00000	.00000
22.10000	.00000	.00000	.00000	.00000	.00000	.00000
22.10000	.00000	.00000	.00000	.00000	.00000	.00000
22.10000	.00000	.00000	.00000	.00000	.00000	.00000

 RECORD TYPE 7  
 DOWNHILL GRADE FACTOR TABLES

16

-4.10000	-11.90000	-13.40000	-13.10000	-12.50000	-11.70000	-10.20000
-4.80000	-11.30000	-16.30000	-16.00000	-15.40000	-14.70000	-10.80000
-5.30000	-10.50000	-15.90000	-18.50000	-17.90000	-17.30000	-16.00000
-5.50000	-10.50000	-15.60000	-19.60000	-20.40000	-19.70000	-18.60000
-5.70000	-10.60000	-15.40000	-19.30000	-22.30000	-22.00000	-20.80000
-5.70000	-10.70000	-15.60000	-19.50000	-22.90000	-24.30000	-23.10000
-5.80000	-10.80000	-15.80000	-19.70000	-23.10000	-26.00000	-25.20000
-5.80000	-10.80000	-15.80000	-19.70000	-23.10000	-26.00000	-25.20000
-5.80000	-10.80000	-15.80000	-19.70000	-23.10000	-26.00000	-25.20000
-5.80000	-10.80000	-15.80000	-19.70000	-23.10000	-26.00000	-25.20000

17

-4.10000	-7.70000	-11.00000	-12.20000	-11.70000	-11.00000	-9.60000
-4.60000	-8.40000	-12.40000	-14.80000	-14.30000	-13.80000	-12.50000
-5.00000	-8.80000	-13.10000	-16.60000	-16.90000	-16.40000	-15.30000
-5.20000	-9.40000	-14.00000	-17.20000	-19.50000	-19.00000	-18.10000
-5.50000	-9.90000	-14.80000	-17.90000	-21.20000	-21.70000	-20.90000
-5.60000	-10.50000	-15.90000	-19.40000	-22.70000	-24.70000	-24.00000
-6.00000	-11.10000	-16.80000	-21.30000	-24.70000	-27.50000	-27.50000
-6.00000	-11.10000	-16.80000	-21.30000	-24.70000	-27.50000	-27.50000
-6.00000	-11.10000	-16.80000	-21.30000	-24.70000	-27.50000	-27.50000
-6.00000	-11.10000	-16.80000	-21.30000	-24.70000	-27.50000	-27.50000





18	-5.10000	-10.70000	-14.80000	-17.90000	-19.10000	-18.40000	-17.80000
	-7.60000	-13.20000	-17.60000	-20.40000	-22.30000	-21.90000	-20.80000
	-8.50000	-15.00000	-20.70000	-21.80000	-23.60000	-24.50000	-23.10000
	-8.90000	-16.10000	-19.90000	-22.40000	-24.40000	-25.00000	-24.40000
	-9.00000	-16.20000	-20.00000	-22.40000	-23.90000	-23.70000	.00000
	-8.90000	-15.50000	-20.00000	-22.00000	.00000	.00000	.00000
	-8.70000	-14.50000	-19.40000	.00000	.00000	.00000	.00000
	-8.70000	-14.50000	-19.40000	.00000	.00000	.00000	.00000
	-8.70000	-14.50000	-19.40000	.00000	.00000	.00000	.00000
	-8.70000	-14.50000	-19.40000	.00000	.00000	.00000	.00000
19	-9.20000	-13.30000	-17.00000	-15.80000	-13.00000	-10.40000	-7.70000
	-11.50000	-17.10000	-20.60000	-19.00000	-16.50000	-13.20000	-9.20000
	-13.10000	-19.80000	-21.70000	-20.40000	-18.50000	-15.00000	.00000
	-13.40000	-20.80000	-21.80000	-20.90000	-19.40000	.00000	.00000
	-12.90000	-20.50000	-22.20000	.00000	.00000	.00000	.00000
	-12.50000	-19.70000	-22.60000	.00000	.00000	.00000	.00000
	-12.00000	-18.40000	.00000	.00000	.00000	.00000	.00000
	-12.00000	-18.40000	.00000	.00000	.00000	.00000	.00000
	-12.00000	-18.40000	.00000	.00000	.00000	.00000	.00000
	-12.00000	-18.40000	.00000	.00000	.00000	.00000	.00000

ศูนย์วิจัยทรัพยากร  
อุทกศาสตร์มหาวิทยาลัย





RECORD TYPE 7  
SPEED CHANGE TIME (MIN)

24

.11000	.01000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000
.14000	.04000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000
.18000	.07000	.01000	.00000	.00000	.00000	.00000	.00000	.00000	.00000
.21000	.10000	.03000	.00000	.00000	.00000	.00000	.00000	.00000	.00000
.25000	.13000	.05000	.02000	.01000	.00000	.00000	.00000	.00000	.00000
.29000	.17000	.08000	.05000	.02000	.01000	.00000	.00000	.00000	.00000
.32000	.21000	.11000	.06000	.03000	.01000	.00000	.00000	.00000	.00000
.36000	.24000	.13000	.08000	.05000	.03000	.00000	.00000	.00000	.00000
.39000	.27000	.16000	.10000	.07000	.04000	.00000	.00000	.00000	.00000
.43000	.31000	.19000	.13000	.09000	.05000	.00000	.00000	.01000	.00000

25

.08000	.01000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000
.11000	.04000	.01000	.00000	.00000	.00000	.00000	.00000	.00000	.00000
.14000	.06000	.03000	.00000	.00000	.00000	.00000	.00000	.00000	.00000
.18000	.09000	.06000	.00000	.00000	.00000	.00000	.00000	.00000	.00000
.21000	.12000	.08000	.01000	.00000	.00000	.00000	.00000	.00000	.00000
.25000	.15000	.11000	.02000	.01000	.00000	.00000	.00000	.00000	.00000
.29000	.19000	.15000	.04000	.02000	.00000	.00000	.00000	.00000	.00000
.34000	.23000	.18000	.07000	.04000	.02000	.00000	.00000	.00000	.00000
.39000	.28000	.23000	.10000	.07000	.04000	.02000	.00000	.00000	.00000
.45000	.34000	.28000	.14000	.10000	.07000	.04000	.02000	.00000	.00000

26

.11000	.02000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000
.16000	.05000	.01000	.00000	.00000	.00000	.00000	.00000	.00000	.00000
.22000	.09000	.04000	.02000	.00000	.00000	.00000	.00000	.00000	.00000
.28000	.14000	.08000	.04000	.01000	.00000	.00000	.00000	.00000	.00000
.33000	.19000	.12000	.08000	.04000	.01000	.00000	.00000	.00000	.00000
.39000	.24000	.17000	.12000	.06000	.03000	.01000	.00000	.00000	.00000
.44000	.29000	.22000	.17000	.08000	.04000	.03000	.00000	.00000	.00000
.49000	.34000	.27000	.22000	.10000	.06000	.04000	.03000	.01000	.00000
.55000	.40000	.33000	.27000	.15000	.10000	.07000	.04000	.03000	.01000
.60000	.47000	.40000	.34000	.27000	.21000	.16000	.10000	.06000	.03000

27

.11000	.02000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000
.18000	.05000	.01000	.00000	.00000	.00000	.00000	.00000	.00000	.00000
.25000	.10000	.04000	.02000	.00000	.00000	.00000	.00000	.00000	.00000
.33000	.16000	.09000	.05000	.01000	.00000	.00000	.00000	.00000	.00000
.43000	.25000	.17000	.10000	.04000	.01000	.00000	.00000	.00000	.00000
.55000	.36000	.27000	.19000	.12000	.06000	.03000	.00000	.00000	.00000
.68000	.48000	.39000	.30000	.21000	.13000	.08000	.04000	.00000	.00000
.91000	.69000	.58000	.48000	.37000	.28000	.15000	.00000	.00000	.00000
.91000	.69000	.58000	.48000	.37000	.28000	.15000	.00000	.00000	.00000
.91000	.69000	.58000	.48000	.37000	.28000	.15000	.00000	.00000	.00000



RECORD TYPE 10  
VARIABLE VDC (9)

28

.31000	.36000	.40000	.46000	.40000	.51000	.62000
.30000	.35000	.40000	.46000	.40000	.51000	.61000
.30000	.35000	.39000	.45000	.39000	.50000	.60000
.30000	.35000	.39000	.45000	.39000	.50000	.60000
.31000	.36000	.41000	.45000	.41000	.50000	.60000
.32000	.38000	.43000	.45000	.43000	.50000	.60000
.34000	.38000	.43000	.45000	.43000	.50000	.60000
.34000	.38000	.43000	.45000	.43000	.50000	.60000
.34000	.38000	.43000	.45000	.43000	.50000	.60000
.34000	.38000	.43000	.45000	.43000	.50000	.60000
.34000	.38000	.43000	.45000	.43000	.50000	.60000

29

1.38000	1.62000	1.85000	2.08000	1.85000	2.31000	2.77000
1.18000	1.41000	1.63000	1.86000	1.63000	2.09000	2.55000
1.09000	1.32000	1.54000	1.77000	1.54000	2.00000	2.45000
1.05000	1.27000	1.49000	1.73000	1.49000	1.96000	2.42000
1.03000	1.26000	1.48000	1.73000	1.48000	1.96000	2.42000
1.02000	1.26000	1.50000	1.73000	1.50000	1.96000	2.42000
1.05000	1.26000	1.50000	1.73000	1.50000	1.96000	2.42000
1.05000	1.26000	1.50000	1.73000	1.50000	1.96000	2.42000
1.08000	1.26000	1.50000	1.73000	1.50000	1.96000	2.42000
1.08000	1.26000	1.50000	1.73000	1.50000	1.96000	2.42000

30

1.35000	1.57000	1.78000	1.97000	1.78000	2.19000	2.60000
1.15000	1.35000	1.54000	1.74000	1.54000	1.94000	2.33000
1.05000	1.25000	1.44000	1.64000	1.44000	1.83000	2.21000
1.01000	1.20000	1.39000	1.59000	1.39000	1.78000	2.16000
.99000	1.18000	1.36000	1.59000	1.36000	1.78000	2.16000
.99000	1.19000	1.38000	1.59000	1.38000	1.78000	2.16000
1.02000	1.19000	1.38000	1.59000	1.38000	1.78000	2.16000
1.02000	1.19000	1.38000	1.59000	1.38000	1.78000	2.16000
1.02000	1.19000	1.38000	1.59000	1.38000	1.78000	2.16000
1.02000	1.19000	1.38000	1.59000	1.38000	1.78000	2.16000

31

2.10000	2.48000	2.86000	3.22000	2.86000	3.58000	4.29000
1.83000	2.19000	2.54000	2.88000	2.54000	3.24000	3.93000
1.70000	2.04000	2.38000	2.73000	2.38000	3.08000	3.77000
1.63000	1.97000	2.30000	2.65000	2.30000	3.00000	3.70000
1.62000	1.96000	2.29000	2.65000	2.29000	3.00000	3.70000
1.68000	1.99000	2.30000	2.65000	2.30000	3.00000	3.70000
1.88000	1.99000	2.30000	2.65000	2.30000	3.00000	3.70000
1.88000	1.99000	2.30000	2.65000	2.30000	3.00000	3.70000
1.88000	1.99000	2.30000	2.65000	2.30000	3.00000	3.70000
1.88000	1.99000	2.30000	2.65000	2.30000	3.00000	3.70000

32

3.64000	4.26000	4.87000	5.42000	4.87000	5.96000	7.05000
3.01000	3.56000	4.11000	4.62000	4.11000	5.13000	6.16000
2.70000	3.21000	3.72000	4.23000	3.72000	4.74000	5.75000
2.54000	3.04000	3.53000	4.04000	3.53000	4.54000	5.55000
2.47000	2.97000	3.46000	4.04000	3.46000	4.54000	5.55000
2.58000	3.09000	3.60000	4.04000	3.60000	4.54000	5.55000
2.79000	3.09000	3.60000	4.04000	3.60000	4.54000	5.55000
2.79000	3.09000	3.60000	4.04000	3.60000	4.54000	5.55000
2.79000	3.09000	3.60000	4.04000	3.60000	4.54000	5.55000
2.79000	3.09000	3.60000	4.04000	3.60000	4.54000	5.55000

33

1.34000	1.53000	1.72000	1.91000	1.72000	2.10000	2.48000
1.12000	1.30000	1.48000	1.67000	1.48000	1.85000	2.21000
1.03000	1.21000	1.38000	1.56000	1.38000	1.73000	2.09000
.98000	1.16000	1.33000	1.51000	1.33000	1.69000	2.05000
.96000	1.13000	1.30000	1.51000	1.30000	1.69000	2.05000
.96000	1.14000	1.32000	1.51000	1.32000	1.69000	2.05000
.99000	1.14000	1.32000	1.51000	1.32000	1.69000	2.05000
.99000	1.14000	1.32000	1.51000	1.32000	1.69000	2.05000
.99000	1.14000	1.32000	1.51000	1.32000	1.69000	2.05000
.99000	1.14000	1.32000	1.51000	1.32000	1.69000	2.05000







40	2.45000	2.58000	2.70000	2.77000	2.70000	2.84000	2.97000
	2.11000	2.22000	2.33000	2.41000	2.33000	2.46000	2.63000
	1.90000	2.00000	2.09000	2.24000	2.09000	2.38000	2.67000
	1.70000	1.81000	1.91000	2.12000	1.91000	2.32000	2.73000
	1.56000	1.66000	1.76000	2.12000	1.76000	2.32000	2.73000
	1.56000	1.66000	1.76000	2.12000	1.76000	2.32000	2.73000
	1.56000	1.66000	1.76000	2.12000	1.76000	2.32000	2.73000
	1.56000	1.66000	1.76000	2.12000	1.76000	2.32000	2.73000
	1.56000	1.66000	1.76000	2.12000	1.76000	2.32000	2.73000
	1.56000	1.66000	1.76000	2.12000	1.76000	2.32000	2.73000

41	5.20000	5.34000	5.47000	5.68000	5.47000	5.89000	6.31000
	4.45000	4.63000	4.80000	4.98000	4.80000	5.15000	5.49000
	3.90000	4.06000	4.21000	4.56000	4.21000	4.91000	5.60000
	3.56000	3.65000	3.74000	4.22000	3.74000	4.70000	5.65000
	3.20000	3.32000	3.44000	4.22000	3.44000	4.70000	5.65000
	3.20000	3.32000	3.44000	4.22000	3.44000	4.70000	5.65000
	3.20000	3.32000	3.44000	4.22000	3.44000	4.70000	5.65000
	3.20000	3.32000	3.44000	4.22000	3.44000	4.70000	5.65000
	3.20000	3.32000	3.44000	4.22000	3.44000	4.70000	5.65000
	3.20000	3.32000	3.44000	4.22000	3.44000	4.70000	5.65000

RECORD TYPE 12  
VCR/SPEED CURVE FACTORS

42	90.00000	50.00000	95.00000	35.00000	110.00000	35.00000	70.00000	60.00000
43	70.00000	40.00000	75.00000	35.00000	110.00000	35.00000	55.00000	55.00000

RECORD TYPE 13  
SPEED OF TRUCKS ON GRADES

44	60.00000	54.00000	52.00000	48.00000	44.00000	40.00000
	54.00000	53.00000	48.00000	42.00000	35.00000	26.00000
	45.00000	43.00000	34.00000	26.00000	21.00000	16.00000
	39.00000	37.00000	28.00000	23.00000	19.00000	16.00000
	35.00000	33.00000	25.00000	21.00000	18.00000	16.00000
	32.00000	30.00000	24.00000	20.00000	17.00000	16.00000
	30.00000	29.00000	23.00000	19.00000	16.00000	16.00000
	29.00000	28.00000	22.00000	19.00000	16.00000	16.00000
45	51.00000	49.00000	47.00000	45.00000	43.00000	40.00000
	49.00000	43.00000	42.00000	40.00000	35.00000	26.00000
	45.00000	37.00000	34.00000	26.00000	21.00000	16.00000
	39.00000	33.00000	28.00000	23.00000	19.00000	16.00000
	35.00000	31.00000	26.00000	21.00000	18.00000	16.00000
	32.00000	28.00000	24.00000	20.00000	16.00000	16.00000
	28.00000	25.00000	22.00000	19.00000	16.00000	16.00000
	25.00000	23.00000	21.00000	18.00000	16.00000	16.00000

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ภาคผนวก ๒

แบบฟอร์มที่ใช้และการกรอกข้อมูลค่าใช้จ่ายในการใช้รถ (VOC PROGRAME CODING SHEET)

ศูนย์วิทยพัธพยาบาล  
จุฬาลงกรณ์มหาวิทยาลัย



























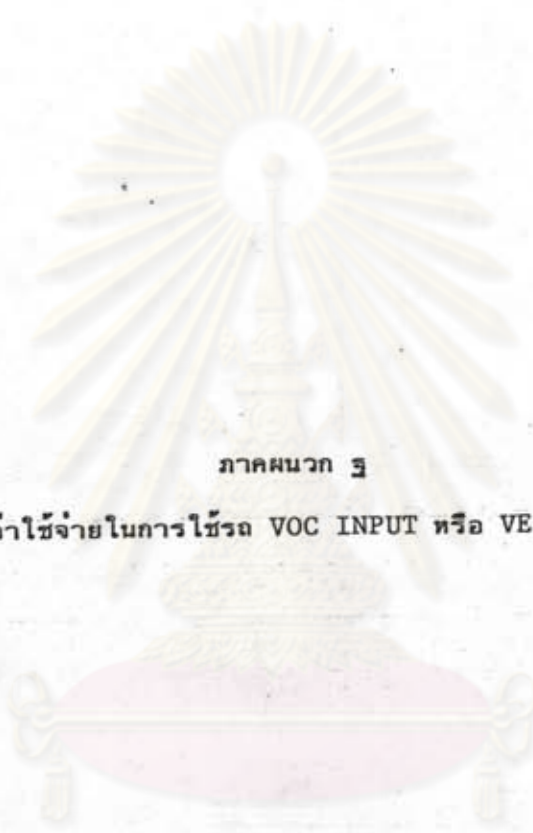












ภาคผนวก ๓

แนบข้อมูลค่าใช้จ่ายในการใช้รถ VOC INPUT หรือ VE 038.DAT)

ศูนย์วิทยทรัพยากร  
จุฬาลงกรณ์มหาวิทยาลัย



201 4 1 1 1 J.R.2 KHOK SI 34.0 0.0 - 34.0

21E-038 614 2246 0100 30000019892003 3 7 0

22 0000 34050 500  
23 1 40  
23 2 45  
23 3 45  
23 4 40  
23 5 40  
23 6 45  
23 7 40

24 391499 6 2 11800  
24 454481 6 0 11800  
24 525463 6 0 11800  
24 598445 7 0 11800  
24 683427 7 0 11800  
24 747415 7 0 11800

25 0900 1310 35  
25 1310 1343 21  
25 1343 1400 35  
25 4159 4230 64  
25 4490 5020 35  
25 5358 5385 48  
25 12900 13600 35  
25 15400 16000 28  
25 16650 17000 25  
25 17600 18100 25  
25 24700 26200 35  
25 30000 30200 35  
25 33600 34050 35

26 999999 999999 9

26 0000 000  
26 0600 500  
26 1000 -700  
26 1125 -700  
26 1300 -180  
26 4525 700  
26 4750 1380  
26 18825 1440  
26 19100 2540  
26 19975 2260  
26 20150 2780  
26 20250 2780  
26 20400 3230  
26 20575 3060  
26 20725 3500  
26 21375 3240  
26 21625 2490  
26 23375 2570  
26 23500 3000  
26 23725 2630  
26 23875 3080  
26 24700 2940  
26 24625 3320  
26 34050 4320  
26 999999 99

201 4 1 1 1 J.R.2 KHOK SI 34.0 0.0 - 34.0

21E-038 614 2246 0100 27517519892003 3 7 0

22 0000 34050 500  
23 1 70  
23 2 90  
23 3 80  
23 4 80  
23 5 80  
23 6 80  
23 7 80

มหาวิทยาลัยราชภัฏวชิรเวศน์  
มหาวิทยาลัยราชภัฏวชิรเวศน์

24	591499	1 2	12000	
24	454481	1 0	12000	
24	525463	2 0	12000	
24	598443	1 0	12000	
24	683427	1 0	12000	
24	747415	2 0	12000	
25	1310	1343		21
25	4159	4230		64
25	4858	4910		99
25	5358	5385		48
25	13190	13220		61
25	999999	999999		9
26	0000	080		
26	0600	580		
26	1000	-620		
26	1125	-600		
26	1260	-180		
26	18925	1520		
26	19100	2440		
26	23725	2730		
26	23875	3150		
26	34050	4400		
26	999999	99		
27	999999			



ศูนย์วิทยทรัพยากร  
จุฬาลงกรณ์มหาวิทยาลัย





ภาคผนวก ท

แบบฟอร์มที่ใช้และการกรอกข้อมูลในการประเมินผลทางเศรษฐกิจ (ECONOMIC EVALUATION)

ศูนย์วิจัยทรัพยากร  
จุฬาลงกรณ์มหาวิทยาลัย













ภาคผนวก ค

เพิ่มข้อมูลในการประเมินผลทาง เศรษฐศาสตร์ (ECONOMIC INPUT หรือ EE 038.DAT)

ศูนย์วิจัยทรัพยากร  
จุฬาลงกรณ์มหาวิทยาลัย







ภาคผนวก ผ.

ศูนย์วิทยทรัพยากร  
จุฬาลงกรณ์มหาวิทยาลัย

หลักการในการหาค่า Income Elasticity Factor (a)

ในการหาค่า Income Elasticity Factor หรือค่า a นี้จะอาศัยความสัมพันธ์ระหว่าง Per Capita Income และ Number of Trip Per Head ดังแสดงไว้ในรูปที่ ๙-1 โดยการคำนวณจากสูตรดังนี้

$$a = \frac{\% \text{ ของการเปลี่ยนแปลงจำนวนการเดินทางต่อคน}}{\% \text{ ของการเปลี่ยนแปลงรายได้ต่อคน}}$$

$$= \frac{\frac{dT}{T}}{\frac{dI}{I}}$$

T คือ Number of Trip Per Head

I คือ Per Capita Income

จากรูปที่ ๙-1 เราสามารถสร้างสมการแสดงความสัมพันธ์ระหว่าง T กับ I ได้ โดยอาศัยหลักการทางคณิตศาสตร์ (Mathematic Model) ว่าความสัมพันธ์ทั้งสองค่านี้จะอยู่ในรูปแบบใด จากความสัมพันธ์ของ Per Capita Income และ Number of Trip Per Head สามารถจัดให้สอดคล้องกับสมการทางคณิตศาสตร์ได้ คือ

$$T = 0.00471 \times I^{1.5}$$

$$\frac{dT}{dI} = 0.00471 \times 1.5 \times I^{1.5-1}$$

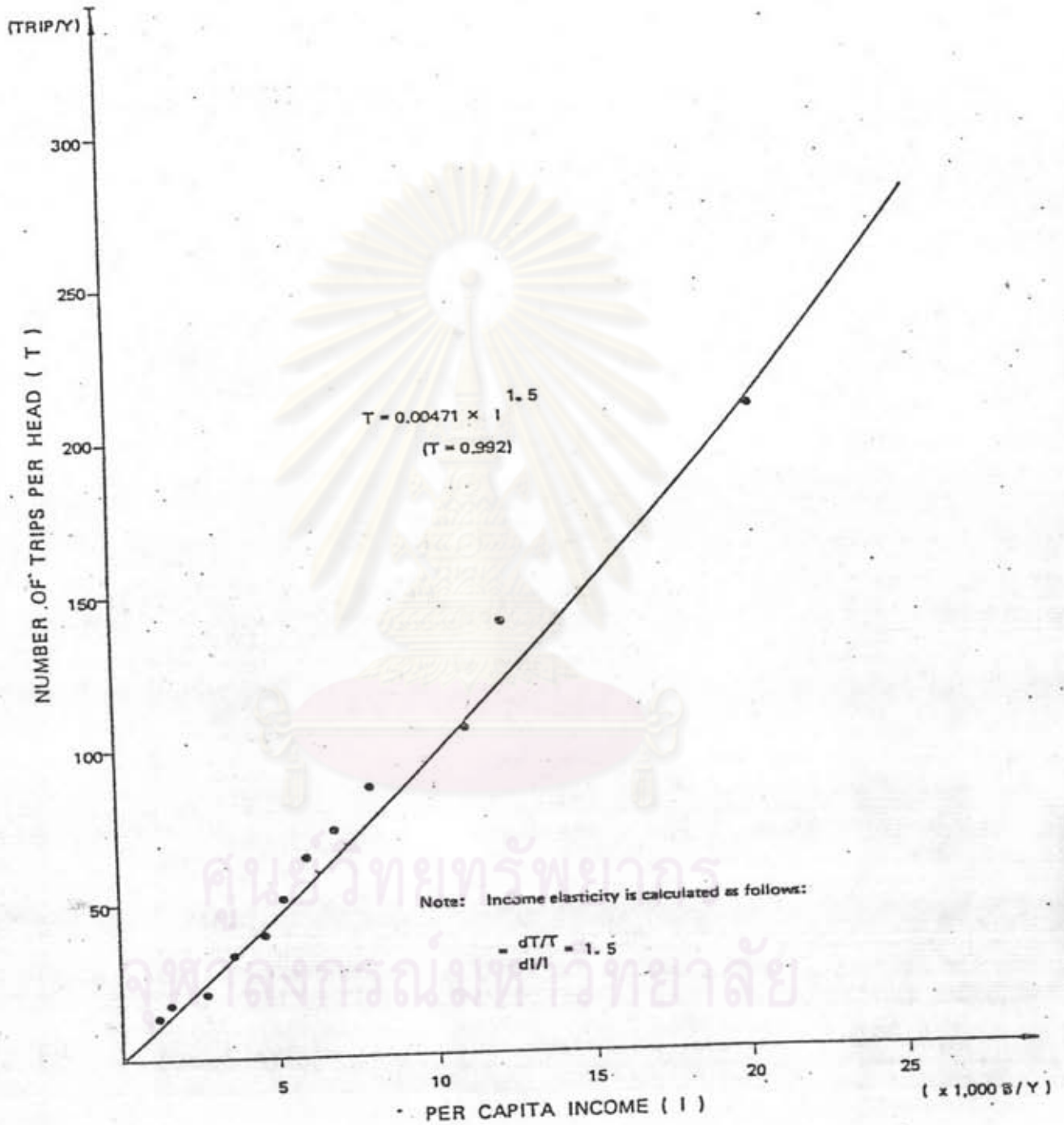
เอาค่า  $\frac{I}{T}$  คูณ  $\frac{dT}{dI} \cdot \frac{I}{T} = 0.00471 \times 1.5 \times I^{0.5}$

แทนค่า T =  $0.00471 \times I^{1.5}$  จะได้  $= \frac{0.00471 \times 1.5 \times I^{0.5}}{0.00471 \times I^{1.5}}$

$$\frac{dT}{dI} \cdot \frac{I}{T} = 1.5$$

$$a = 1.5$$





ที่มา: A Manual of Road Project Evaluation System

รูปที่ ผ-1 แสดงความสัมพันธ์ระหว่าง Per Capita Income (I) และ Number of Trips Per Head (T)



ภาคผนวก ค.

ศูนย์วิทยทรัพยากร  
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งานบำรุงปกติ (Routine maintenance) ใช้สมการ

$$M = Na Ks Km + FE$$

1. Km คือ Factor ของการขนส่งวัสดุจากแหล่งไปยังสายทางที่บำรุงซึ่งจะมีค่าต่าง ๆ กัน ขึ้นกับแต่ละแขวงซึ่งได้กำหนดโดยกองบำรุงซึ่งจากข้อมูลที่ได้นั้นนำมาหาค่าโดยเฉลี่ยแต่ละเขตจะได้ ประมาณ 1 ทุกเขตทั้งของผิวลูกรัง และผิวลาดยาง ในการศึกษาในครั้งนี้ได้กำหนดค่า Km = 1

2. Ks คือ Factor ของลักษณะถนนซึ่งแบ่งออกเป็น 3 ชนิด ผิวลูกรัง ผิวลาดยาง และ ผิวคอนกรีต ในการศึกษาครั้งนี้จะศึกษาเฉพาะผิวลูกรังและผิวลาดยาง

2.1 ผิวลูกรัง

$$Ks = 1 + 0.7(A1 + A2 + A3) + 0.3(B1 + B2 + B3 + B4)$$

A1 (Factor ADT)

$$A1 = 2.32 \times 10^{-3} ADT - 0.16 \quad (500 > ADT > 70)$$

A2 (Weather)

$$A2 = 0$$

A3 (Width)

$$A3 = 0.17W - 1 \quad (12 > W > 6)$$

B1 (R.O.W.)

$$B1 = 0.08 \quad (R.O.W. \geq 30 \text{ เมตร})$$

B2 (Traffic Service Operation)

B3 (Drainage Work)

$$\text{Flat } B2 + B3 = 0.05$$

$$\text{Rolling } B2 + B3 = 0.67$$

$$\text{Mountain } B2 + B3 = 1.06$$

B4 (Wooden Bridge)

$$B4 = 0.02 \quad (\text{Each } 1-20)$$

$$\text{Flat } Ks = 0.233 + 1.624 \times 10^{-3} ADT + 0.119W \quad \dots \dots \dots 1$$

$$\text{Rolling } Ks = 0.419 + 1.624 \times 10^{-3} ADT + 0.119W \quad \dots \dots \dots 2$$

$$\text{Mountain } Ks = 0.536 + 1.624 \times 10^{-3} ADT + 0.119W \quad \dots \dots \dots 3$$

เพื่ออำนวยความสะดวกค่า Ks โดยการใส่ค่า W = 6.0 เมตร แทนใน 1, 2, 3

Flat	Ks	=	$0.947+1.624 \times 10^{-3} \text{ADT}$	.....4,
Rolling	Ks	=	$1.133+1.624 \times 10^{-3} \text{ADT}$	.....5.
Mountain	Ks	=	$1.250+1.624 \times 10^{-3} \text{ADT}$	.....6

2.2 วิศวตขาง (Ks วิศวตขาง = Kb)

$$Kb = 1+0.5 (X1+X2+X3+X4+X5+X6+Y1+Y2+Y3+Y4+Y5+Y6)$$

X1 (Type of Surface and Subbase)

X1 = 1.0 subbase ใช้ soil Aggregate  
surface ใช้ Surface Treatment

X2 (Subgrade)

X2 = 1.5-0.25 CBR      6 > CBR > 2

X3 (ADT)

X3 =  $-0.1898+4.1326 \times 10^{-4} \text{ADT}$       2100 > ADT > 460

X4 (Service Age)

X4 =  $-0.6+0.2 \text{AGE}$       12 > AGE > 3

X5 (Pavemend width)

X5 = 0      W = 5.0-6.0 เมตร

Y1 (R.O.W.)

Y1 = 0      R.O.W. < 40 เมตร

Y2 (Shoulder & Median)

Y2 = 0      W < 1.75 เมตร

Y5 (Bridge work)

Y5 = 0      (Each 1-20)

X6 (Terrain)+Y3(Service Operation)+Y4 (Drainage)+Y6 (Water Way)

Flat = 0

Rolling = 0.66

Mountain = 1.15

Flat Kb =  $[1.8551-0.125 \text{ CBR}+2.0663 \times 10^{-4} \text{ADT}+0.1 \text{ AGE}] \dots\dots 7$

Rolling Kb =  $[2.1851-0.125 \text{ CBR}+2.0663 \times 10^{-4} \text{ADT}+0.1 \text{ AGE}] \dots\dots 8$

Mountain Kb =  $[2.4301-0.125 \text{ CBR}+2.0663 \times 10^{-4} \text{ADT}+0.1 \text{ AGE}] \dots\dots 9$



เพื่อความสะดวกต่อการคำนวณหาค่า  $K_s$  ให้ค่า  $CBR = 5.0$  ,  $AGE = 6$  ปี ในสมการที่ 7,8,9

Flat	$K_b$	=	$[1.830 + 2.0663 \times 10^{-4} ADT]$	.....10
Rolling	$K_b$	=	$[2.160 + 2.0663 \times 10^{-4} ADT]$	.....11
Mountain	$K_b$	=	$[2.405 + 2.0663 \times 10^{-4} ADT]$	.....12

3.  $N_a$  เป็นค่าบำรุงปกติมาตรฐาน ซึ่งจะเท่ากับ Flat rate จากงบประมาณหารด้วยค่า  $K_s \cdot Km$  เฉลี่ย (สำหรับผิวลูกรัง) และ  $K_b \cdot Km$  (สำหรับผิวลาดยาง)

Flat rate	ลูกรัง	13,000 บาท/กม./ปี
Flat rate	ลาดยาง	20,000 บาท/กม./ปี
Flat rate	คอนกรีต	17,000 บาท/กม./ปี

### 3.1 ถนนลูกรัง

	$Km=1$	$ADT = 250$	คัน/วัน	แทนค่าในสมการที่ 4,5,6
Flat	$N_a$	=	$\frac{13,000}{1.353} = 9608$	บาท/กม./ปี
Rolling	$N_a$	=	$\frac{13,000}{1.539} = 8447$	บาท/กม./ปี
Mountain	$N_a$	=	$\frac{13,000}{1.656} = 7850$	บาท/กม./ปี
$N_a$ เฉลี่ย		=	$\frac{9608 + 8447 + 7850}{3} = 8635$	บาท/กม./ปี

### 3.2 ถนนลาดยาง

	$Km = 1$	$ADT = 1250$	คัน/วัน	แทนค่าในสมการที่ 10,11,12
Flat	$N_a$	=	$\frac{20,000}{2.088} = 9,579$	บาท/กม./ปี
Rolling	$N_a$	=	$\frac{20,000}{2.418} = 8,271$	บาท/กม./ปี
Mountain	$N_a$	=	$\frac{20,000}{2.663} = 2,510$	บาท/กม./ปี
$N_a$ เฉลี่ย		=	$\frac{9,579 + 8,271 + 2,510}{3} = 8,453$	บาท/กม./ปี

4. ค่า FE คือค่าเช่าเครื่องจักรและน้ำมันเชื้อเพลิง ซึ่งทางกองบำรุงพิจารณาประมาณ โดยใช้ระยะทางเป็นเกณฑ์ ฉะนั้นไม่ว่าผิวทางจะเป็นอย่างไร งบประมาณที่ใช้ก็เหมือนกัน

## 5.1 ผิวลุกริ่ง

$$\begin{aligned} \text{Flat } M_{\text{lat}} &= 8635 [0.947 + 1.624 \times 10^{-3} \text{ADT}] = 8177 + 14.0 \text{ ADT} \\ \text{Rolling } M_{\text{lat}} &= 8635 [1.133 + 1.624 \times 10^{-3} \text{ADT}] = 9783 + 14.0 \text{ ADT} \\ \text{Mountain } M_{\text{lat}} &= 8635 [1.250 + 1.624 \times 10^{-3} \text{ADT}] = 10794 + 14.0 \text{ ADT} \end{aligned}$$

## 5.2 ผิวลาดยาง

$$\begin{aligned} \text{Flat } M_{\text{B}} &= 8453 [1.830 + 2.0663 \times 10^{-4} \text{ADT}] = 15,469 + 1.75 \text{ ADT} \\ \text{Rolling } M_{\text{B}} &= 8453 [2.160 + 2.0663 \times 10^{-4} \text{ADT}] = 18,258 + 1.75 \text{ ADT} \\ \text{Mountain } M_{\text{B}} &= 8453 [2.405 + 2.0663 \times 10^{-4} \text{ADT}] = 20,329 + 1.75 \text{ ADT} \end{aligned}$$

เพื่อความสะดวกในการใช้ให้สอดคล้องกับงาน

สำหรับผิวลุกริ่ง

$$\text{Good/Fair } M_{\text{Lat}} = 9,600 + 14.0 \text{ ADT} \quad (\text{AGE} = 6.0 \text{ ปี})$$

สำหรับผิวลาดยาง

$$\text{Good/Fair } M_{\text{B}} = 18,000 + 1.75 \text{ ADT} \quad (\text{AGE} = 6.0 \text{ ปี})$$

ในท่านองเดียวกัน

$$\text{Good } M_{\text{B}} = 15,500 + 1.75 \text{ ADT} \quad (\text{AGE} = 3.0 \text{ ปี})$$

$$\text{Fair } M_{\text{B}} = 19,700 + 1.75 \text{ ADT} \quad (\text{AGE} = 8.0 \text{ ปี})$$

$$\text{Poor } M_{\text{B}} = 21,400 + 1.75 \text{ ADT} \quad (\text{AGE} = 10.0 \text{ ปี})$$

ศูนย์วิทยุทรัพยากร  
จุฬาลงกรณ์มหาวิทยาลัย



## ประวัติผู้เขียน

นายบุญชัย ศรีธรรารัตน์ เกิดเมื่อวันที่ 19 กันยายน พ.ศ. 2499 ที่จังหวัด  
พะเยา สำเร็จการศึกษาปริญญาวิศวกรรมศาสตรบัณฑิต สาขาวิชาวิศวกรรมโยธา จากสถาบัน-  
เทคโนโลยีพระจอมเกล้า เมื่อปี พ.ศ. 2522 ปัจจุบันรับราชการในตำแหน่งวิศวกรโยธา  
กองวางแผน กรมทางหลวง กระทรวงคมนาคม



ศูนย์วิทยทรัพยากร  
จุฬาลงกรณ์มหาวิทยาลัย