DEVELOPMENT OF A DESIGN PROCEDURE FOR RESIDENTIAL AND LIGHT COMMERCIAL SLABS-ON-GROUND CONSTRUCTED OVER EXPANSIVE SOILS

VOLUME II

A Dissertation

by

WARREN KENT WRAY

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(Chairman of Committee)

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(Member)

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APPENDIX B

COMPLETE LISTING OF COMPUTER PROGRAM *SOILSUK*

```
//$OPTIONS
C
C+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
C                                                                      +
C   THIS PROGRAM ESTIMATES THE DIFFERENTIAL SWELLING THAT MIGHT BE      +
C   EXPECTED TO OCCUR BENEATH A SLAB-ON-GROUND CONSTRUCTED OVER EXPAN- +
C   SIVE SOILS.  IT IS BASED ON LYTTON'S APPLICATION OF GARDNER'S WORK +
C   TO THE PROBLEM AND THE THEORY IS DESCRIBED IN "NUMERICAL METHODS   +
C   IN GEOTECHNICAL ENGINEERING", EDITED BY C. S. DESAI AND J. T.      +
C   CHRISTIAN, CHAPTER 13, MCGRAW-HILL BOOK CO., 1977.                 +
C                                                                      +
C   THE METHOD WAS APPLIED IN THIS FORTRAN IV COMPUTER PROGRAM IN      +
C   DECEMBER, 1977, BY W. K. WRAY.  TABLES OF CENTER LIFT AND EDGE LIFT+
C   RESULTS ARE GIVEN IN WRAY'S DOCTORAL DISSERTATION, ENTITLED        +
C   "A DESIGN PROCEDURE FOR RESIDENTIAL AND LIGHT COMMERCIAL SLABS-ON- +
C   GROUND CONSTRUCTED OVER EXPANSIVE SOILS", AT TEXAS A & M UNIVER-   +
C   SITY, COLLEGE STATION, TX, 1978.                                   +
C                                                                      +
C+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
C
C DEFINITION OF PRINCIPLE VARIABLES
C
C   A           GARDNER'S SUCTION CONSTANT
C   CLAY        PERCENTAGE OF CLAY IN SOIL BEING ANALYZED, IN PERCENT
C   DELHH       CHANGE IN HORIZONTAL SUCTION
C   DELHV       CHANGE IN VERTICAL SUCTION
C   DELOGP      CHANGE IN OVERBURDEN AND SURCHARGE PRESSURE (COMMON LOG)
C   DELPFH      CHANGE IN HORIZONTAL SUCTION EXPRESSED IN PF
C   DELX1       LENGTH OF EACH VERTICAL INCREMENT OF DEPTH
C   DELX3       LENGTH OF EACH HORIZONTAL INCREMENT OF EDGE PENETRATION
C   DEPTH       DEPTH BELOW ORIGINAL SOIL SURFACE
C   GAMMA       UNIT WEIGHT OF SOIL, IN LBS PER CUBIC FOOT
C   HPFH        HORIZONTAL SUCTION EXPRESED IN PF
C   HPFV        VERTICAL SUCTION EXPRESSED IN PF
C   HPFVV       VERTICAL SUCTION DUE TO WATER ENTERING FROM SURFACE (PF)
C   HV          VERTICAL SUCTION EXPRESSED  IN NEGATIVE CM'S OF WATER
C   HVEL        HORIZONTAL VELOCITY OF MOISTURE FLOW, IN CM/SEC
C   HVV         HORIZONTAL SUCTION DUE TO WATER ENTERING FROM SURFACE (CM)
C   IH          NUMBER OF HORIZONTAL INCREMENTS (TO LESSER WHOLE NO.)
C   IV          NUMBER OF VERTICAL INCREMENTS (TO LESSER WHOLE NO.)
C   KCLAY       NUMBER OF DIFFERENT CLAY %'S TO BE STUDIED
C   KH          HORIZONTAL PERMEABILITY, IN CM/SEC
C   KLAY        TYPE OF PREDOMINATE CLAY MINERAL ( -1 = SMECTITE;
C                       0 = ILLITE; +1 = KAOLINITE )
C   KO          FIELD PERMEABILITY, IN CM/SEC
C   KV          VERTICAL PERMEABILITY, IN CM/SEC
C   KVEL        NUMBER OF DIFFERENT MOISTURE VELOCITIES TO BE STUDIED
C   M           EXPONENT IN EXPONENTIAL EQUATION OF HORIZONTAL MOISTURE
C                   VARIATION
C   P           SUM OF OVERBURDEN AND SURCHARGE AT ANY GIVEN DEPTH
C   PCON        RATE OF CHANGE OF STRAIN DUE TO OVERBURDEN AND SURCAHRGE.
C   PUSH        UPWARD MOVEMENT OR SWELL DUE TO CHANGE IS SOIL SUCTION
C   Q           SURCHARGE, IN LBS PER SQUARE INCH
C   RESIST      RESISTANCE TO SWELL DUE TO OVERBURDEN AND SURCHARGE
C   SWCON       RATE OF CHANGE OF STRAIN DUE TO CHANGE IN SUCTION, DECIMAL
C   SWDIF       DIFFERENTIAL SWELL, IN CENTIMETERS
C   SWDIFI      DIFFERENTIAL SWELL, IN INCHES
C   SWELL       DIFFERENCE BETWEEN "PUSH" AND "RESIST"
C   VVEL        VERTICAL VELOCITY OF MOISTURE MOVEMENT, IN CM/SEC (NEGA-
C                   TIVE VELOCITY INDICATES MOISTURE ENTERING FROM SURFACE)
```

```
      C    X1          HORIZONTAL DISTANCE OF SUCTION VARIATION BENEATH SLAB. FT
      C    X3          VERTICAL DEPTH TO EQUILIBRIUM SUCTION. IN FT
      C
      C+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
      C
 1          DIMENSION HVEL(100).KH(20.20).HPFVV(20).HH(20.20).DELHH(20.20).
           *PUSH(20). HPFH(20.20).HV(20).DEPTH(20).HPFV(20).KV(20).DELHV(20).
           *HVV(20).  DELPFH(20.20).SWELL(20).DELOGP(20).LOGP(20.20)
 2          DIMENSION SUR(20.20).P(20.20).RESIST(20).SSWELL(20).DIFFSW(20)
      C
 3          REAL KV.KH.KO.LOGP.KI
      C
 4      100 FORMAT(5E15.6)
 5      101 FORMAT(I5.5E15.6)
 6      102 FORMAT('1'.///10X.'CALCULATE HORIZONTAL SUCTION PROFILE AFTER SURF
           *ACE IS COVERED'./10X.61('-').
           *    //15X.'HORIZONTAL VELOCITY ='.E11.4.' CM/SEC'.//15X.'VERTICAL
           *PROFILE OF HORIZONTAL VELOCITY'. /15X .39('-' ).//49X. 'HORIZONTAL
           * VELOCITY'./25X.'NODE #'.5X.'DEPTH (CM)'.10X.'(CM/SEC)'./25X.6('-'
           *).5X.10('-').3X.19('-'))
 7      103 FORMAT(26X.I3.9X.F7.2. 8X.E11.4)
 8      104 FORMAT(/////20X.   'HORIZONTAL SUCTION PROFILE (NEGATIVE CENTIMETE
           *RS OF WATER)'./20X.58('-'))
 9      105 FORMAT(  20X.'VERT'.16X.58('-')./20X.'NODE'.6X.'1'.9X.'2'.9X.'3'.9
           *X.'4'.9X.'5'.9X.'6'.9X.'7'.9X.'8'.9X.'9'.8X.'10'./20X.4('-').10(2X
           *.9('-')))
10      106 FORMAT(20X.I3.1X.10(1X.F9.2))
11      107 FORMAT(/////20X.'HORIZONTAL SUCTION PROFILE (PF)'./20X.31('-')./)
12      108 FORMAT(20X.I3.5X.F4.2.9(6X.F4.2))
13      109 FORMAT(/////15X.'VERTICAL SUCTION PROFILE AT EQUILIBRIUM UNDER COV
           *ERED SURFACE'./15X.61('-').//15X.'NODE'.5X. 'DEPTH (CM)'.5X.'SUCTI
           *ON (CM)'.5X.'SUCTION (PF)'./15X.'----'.5X.10('-').5X.12('-').5X.12
           *('-'))
14      110 FORMAT(15X.I3.7X.F7.2. 9X.F8.2.11X.F4.2)
15      111 FORMAT(/20X          .//25X.'LENGTH OF EDGE PENETRATION ='.F8.3.' CM
           *'.//25X.'NUMBER OF INCREMENTS ='.I3.//25X.'LENGTH OF EACH HORIZONT
           *AL INCREMENT ='.F8.3.' CM'.///)
16      112 FORMAT(40X.'H-O-R-I-Z-O-N-T-A-L   S-U-C-T-I-O-N  (CM OF WATER)  AT
           * NODE . . .')
17      113 FORMAT(40X.'H-O-R-I-Z-O-N-T-A-L   S-U-C-T-I-O-N  (PF)  AT NODE . .
           * . ')
18      114 FORMAT(//15X.'RESISTANCE TO SWELL OR COMPENSATION TO SHRINK (BY SO
           *IL COLUMNS)'.//20X.9F9.6)
19      115 FORMAT(/////15X.'VERTICAL SUCTION PROFILE FOR MOISTURE ENTERING SY
           *STEM FROM SURFACE'./15X.66('-').///15X.'NODE'.5X.'DEPTH (CM)'.5X.'
           *SUCTION (CM)'.5X.'SUCTION (PF)'./15X.'----'.5X.10('-').5X.12('-').
           *5X.12('-'))
20      116 FORMAT(14I5)
21      150 FORMAT('1'.10X.   'CALCULATION OF VERTICAL AND HORIZONTAL SUCTION
           *PROFILES BY METHOD OF LYTTON AND GARDNER'.///10X.        'CALCULATE
           * VERTICAL SUCTON PROFILE BEFORE SURFACE IS COVERED'./10X.60('-'))
22      151 FORMAT(//15X.'DEPTH TO EQUILIBRIUM SUCTION='.F8.3.' CM'.//15X.'NUM
           *BER OF VERTICAL INCREMENTS='.I3.//15X.'LENGTH OF EACH VERTICAL INC
           *REMENT ='.F7.3.' CM'.////15X.'SOIL PERMEABILITY AT DEPTH OF EQUILI
           *BRIM SUCTION ='.E11.4.' CM/SEC'.//15X.'VERTICAL VELOCITY OF MOISTU
           *RE FLOW ='.E11.4.' CM/SEC'.////15X.'EQUILIBRIUM SUCTION ='.F10.4.'
           * CM OF WATER')
23      152 FORMAT(/////15X.10X.'DEPTH'.6X.'CHANGE IN'.7X.'PERMEABILITY'.5X.'S
           *UCTION'.5X.'SUCTION'./15X.'NODE #'.5X.'(CM)'.5X.'SUCTION (CM)'.7X.
           *'(CM/SEC)'.9X.'(CM)'.8X.'(PF)'./15X.6('-').4X.5('-').5X.12('-').5X
           *.12('-').5X.7('-').5X.7('-'))
```

```
24        153 FORMAT(15X,I3,5X,F9.2,20X,E11.4,4X,F10.3,5X,F6.2)                 00001210
25        154 FORMAT(37X,F9.3)                                                  00001220
26        155 FORMAT(15X,I3,5X,F9.2,35X,F10.3,5X,F5.2)                          00001230
27        156 FORMAT('1')                                                       00001240
28       8000 FORMAT('1',4X,'CALCULATE CHANGE IN SURFACE ELEVATION DUE TO SOIL S00001250
             *HRINK OR SWELL',/4X, 65('-'),/// 4X,'SHRINK OR SWELL PER VERTICAL 00001260
             *INCREMENT', /4X,38('-'),///4X, 'VERT',2X,50X,'HORIZONTAL NODE', /400001270
             *X,'NODE',7X,'1',11X,'2',11X,'3',11X,'4',11X,'5',11X,'6',11X,'7',1100001280
             *X,'8',11X,'9',10X,'10')                                           00001290
29       8001 FORMAT(/4X,I3,10(2X,F10.6))                                       00001300
30       8002 FORMAT(10X,118('-'))                                              00001310
31       8003 FORMAT(/7X,10(2X,F10.6))                                          00001320
32       8004 FORMAT(/////4X,'CALCULATE REDUCTION IN SWELL DUE TO OVERBURDEN AND00001330
             *SURCHARGE',/4X,60('-'),//15X,'SOIL TYPE:  MONTMORILLONITE',10X,'P 00001340
             *ERCENT CLAY =',F8.3,' %',//15X,'UNIT WEIGHT OF SOIL =',F7.2,      00001350
             *                                                         ' LBS/C00001360
             *F',//15X,'SURCHARGE PRESSURE =',F7.2,' LBS/SI',//15X,'RATE OF STRA00001370
             *IN FOR SWELLING =',E13.6,' PERCENT',//15X,'RATE OF STRAIN FOR OVER00001380
             *BURDEN-SURCHARGE PRESSURE =',E13.6,' PERCENT',////15X,'TOTAL SWELL00001390
             * REDUCTION/SHRINK COMPENSATION =',F9.6,' CM')                     00001400
33       8005 FORMAT(/////10X,'TOTAL CHANGE IN SURFACE ELEVATION DUE TO SHRINK-S00001410
             *WELL',/10X,53('-'),///13X,10(2X,'NODE COLM'),/19X,'1',10X,'2',10X,00001420
             *'3',10X,'4',10X,'5',10X,'6',10X,'7',10X,'8',10X,'9',9X,'10',/15X,100001430
             *10('-'))                                                          00001440
34       8006 FORMAT(/8X,'(CM) ',10(2X,F9.6))                                   00001450
35       8007 FORMAT(/////30X,'MAXIMUM DIFFERENTIAL SWELL =',F8.3,' CM',5X,'(',F00001460
             *7.2,' IN)')                                                       00001470
36       8008 FORMAT(/8X,'(IN) ',10(2X,F9.6))                                   00001480
37       8009 FORMAT(/////4X,'CALCULATE REDUCTION IN SWELL DUE TO OVERBURDEN AND00001490
             * SURCHARGE',/4X,60('-'),//15X,'SOIL TYPE: ILLITE',10X,'PERCENT CLA00001500
             *Y =',F8.3,'%',//15X, 'UNIT WEIGHT OF SOIL =',F7.2,        ' LBS/C00001510
             *F',//15X,'SURCHARGE PRESSURE =',F7.2,' LBS/SI',//15X,'RATE OF STRA00001520
             *IN FOR SWELLING =',E13.6,' PERCENT',//15X,'RATE OF STRAIN FOR OVER00001530
             *BURDEN-SURCHARGE PRESSURE =',E13.6,' PERCENT',////15X,'TOTAL SWELL00001540
             * REDUCTION/SHRINK COMPENSATION =',F9.6,' CM')                     00001550
38       8010 FORMAT(/////4X,'CALCULATE REDUCTION IN SWELL DUE TO OVERBURDEN AND00001560
             * SURCHARGE',/4X,60('-'),//15X,'SOIL TYPE: KAOLINITE',10X,'PERCENT 00001570
             *CLAY =',F8.3,'%',//15X,'UNIT WEIGHT OF SOIL = ',F7.2,     ' LBS/C00001580
             *F',//15X,'SURCHARGE PRESSURE =',F7.2,' LBS/SI',//15X,'RATE OF STRA00001590
             *IN FOR SWELLING =',E13.6,' PERCENT',//15X,'RATE OF STRAIN FOR OVER00001600
             *BURDEN-SURCHARGE PRESSURE =',E13.6,' PERCENT',////15X,'TOTAL SWELL00001610
             * REDUCTION/SHRINK COMPENSATION =',F9.6,' CM')                     00001620
39       8011 FORMAT(/////5X,'DIFFERENTIAL SWELL (IN INCHES)',/15X,110('-'),/13X00001630
             *,10(2X,F9.4))                                                     00001640
         C                                                                      00001650
40             READ 100,X3,X1,HV(1)                                             00001660
41             READ 101,M,KO,KI,DELX1,DELX3                                     00001670
42             READ 101,KLAY,GAMMA,Q,A                                          00001680
43             READ 116,KCLAY, KVEL                                             00001690
44             IH=X1/30.48                                                      00001700
45             IV=X3/30.48                                                      00001710
46             DO 9000 KY=1,KCLAY                                               00001720
47             READ 100,CLAY                                                    00001730
48             DO 9000 KX=1,KVEL                                                00001740
49             READ 100,VVEL,HVEL(1)                                            00001750
         C                                                                      00001760
         C-----------DETERMINE THE RATE OF STRAIN CHANGE AS A FUNCTION OF       00001770
         C-----------CLAY CONTENT                                               00001780
50             CALL STRAIN(KLAY, CLAY, SWCON, PCON)                             00001790
         C                                                                      00001800
         C-----CALCULATE VERTICAL SUCTION PROFILE BEFORE SURFACE IS COVERED.    00001810
```

```
C-----------READ IN BASIC DATA OF ORIGINAL PERMEABILITY.
C-----------EQUILIBRIUM SUCTION, DEPTH, AND LENGTH OF EACH VERTICAL
C-----------INCREMENT (GRAVITY POTENTIAL), AND VERTICAL FLOW VELOCITY
C-----------OF MOISTURE TRANSFER.
      DEPTH(1)=0.0
      HV(1)=ABS(HV(1))
      HPFV(1)=ALOG10(HV(1))
      AVEL=ABS(VVEL)
C
C-----------FIND CHANGE IN PERMEABILITY DUE TO CHANGE IN SUCTION
      DO 10 J=1,IV
C-------------------CALCULATE CHANGE IN PERMEABILITY DUE TO CHANGE
C-------------------IN SUCTION
      SUCK=ABS(HV(J))
      KV(J)=KO/(1.+(A*(SUCK **3)))
C-------------------CALCULATE CHANGE IN SUCTION DUE TO GRAVITY
C-------------------POTENTIAL AND CHANGE IN PERMEABILITY
      DEPTH(J+1)=DEPTH(J)+DELX3
      DELHV(J)=DELX3*(1.+(AVEL/KV(J)))
C-------------------CALCULATE NEW SUCTION
      HV(J+1)=HV(J)+DELHV(J)
      HPFV(J+1)=ALOG10(HV(J+1))
   10 CONTINUE
C---------------PRINT OUTPUT
      PRINT 150
      PRINT 151,X3,IV,DELX3,KC,VVEL,HV(1)
      PRINT 152
      KK=IV+1
      NN=IH+1
      DO 20 J=1,KK
      IF(J.EQ.1)PRINT 155,J,DEPTH(J),HV(KK-J+1),HPFV(KK-J+1)
      IF(J.EQ.1)GO TO 15
      PRINT 153,J,DEPTH(J),KV(KK-J+1),HV(KK-J+1),HPFV(KK-J+1)
   15 IF(J.EQ.KK)GO TO 20
      PRINT 154,DELHV(KK-J)
   20 CONTINUE
C
C----------DETERMINE HORIZONTAL VELOCITY OF MOISTURE FLOW
C------------VELOCITY IS ASSUMED TO VARY ACCORDING TO EXPONENTIAL
C-----------EQUATION OF FORM:  Y = C*X**M
      C=HVEL(1)/X3**M
C---------------------DISTRIBUTE HORIZONTAL VELOCITY WITH DEPTH
      KKK=KK+1
      DO 30 J=1,KK
      HVEL(KKK-J)=C*(DEPTH(J)**M)
   30 CONTINUE
      PRINT 102,HVEL(1)
      DO 40 J=1,KK
      PRINT 103,J,DEPTH(J),HVEL(J)
   40 CONTINUE
C
C----------CALCULATE HORIZONTAL SUCTION AT EACH DEPTH
C-----CALCULATE VERTICAL SUCTION PROFILE AT EQUILIBRIUM AFTER SLAB IS
C-----PLACED AND EVAPO-TRANSIPIRATION PREVENTED.
C-----------SINCE NO EVAPO-TRANSIPIRATION OCCURS, VERTICAL VELOCITY IS
C               ASSUMED TO BE NEGLIGIBLE.
C
C-----------CALCULATE EQUILIBRIUM SUCTION PROFILE BENEATH SLAB DUE TO
C-----------MOISTURE ACCUMULATING BENEATH THE SLAB
      HH(KKK-1,1)=HV(1)
      HPFH(KKK-1,1)=ALOG10(HH(KKK-1,1))
```

```
      DO 55 I=2,KK
      HH(KKK-I,1)=HH(KKK-I+1,1)+DELX3
      HPFH(KKK-I,1)=ALOG10(HH(KKK-I,1))
   55 CONTINUE
      PRINT 109
      DO 57 J=1,KK
      PRINT 110,J,DEPTH(J),HH(J,1),HPFH(J,1)
   57 CONTINUE
      IF(VVEL.GT.0.0)GO TO 67
C
C----------IF MOISTURE IS ENTERING SOIL FROM THE SURFACE AND MOVING
C----------UNDER THE SLAB, DIFFERENT "INITIAL" CONDITIONS ARE IN EFFECT.
C------------------CALCULATE EQUILIBRIUM SUCTION PROFILE DUE TO
C------------------MOISTURE ENTERING SOIL FROM THE SURFACE
      HVV(1)=HV(1)
      HPFVV(1)=ALOG10(HVV(1))
      DO 60 I=1,IV
      SUCK=ABS(HVV(I))
      KV(I)=KI/(1.+(A*(SUCK**3)))
      DELHV(I)=DELX3+(DELX3*VVEL/KV(I))
      HVV(I+1)=HVV(I)+DELHV(I)
      HPFVV(I+1)=ALOG10(HVV(I+1))
   60 CONTINUE
      PRINT 115
      DO 64 I=1,KK
      PRINT 110,I,DEPTH(I      ),HVV(KKK-I),HPFVV(KKK-I)
   64 CONTINUE
C
C------------------DETERMINE HORIZONTAL SUCTION PROFILE DUE TO MOISTURE
C------------------ENTERING HORIZONTALLY BENEATH THE SLAB
      DO 63 I=1,KK
      HH(KKK-I,NN)=HVV(I)
      HPFH(KKK-I,NN)=ALOG10(HH(KKK-I,NN))
   63 CONTINUE
      NNN=NN+1
      DO 65 I=1,KK
      DO 65 J=1,IH
      SUCK=ABS(HH(KKK-I,NNN-J))
      KH(KKK-I,NNN-J)=KO/(1.+(A*(SUCK**3)))
      DELHH(KKK-I,NNN-J)=DELX1*HVEL(KKK-I)/KH(KKK-I,NNN-J)
      HH(KKK-I,NNN-J-1)=HH(KKK-I,NNN-J)+DELHH(KKK-I,NNN-J)
      IF(HH(KKK-I,NNN-J-1).LT.0.0)HPFH(KKK-I,NNN-J-1)=0.0
      IF(HH(KKK-I,NNN-J-1).LT.0.0)GO TO 65
      HPFH(KKK-I,NNN-J-1)=ALOG10(HH(KKK-I,NNN-J-1))
   65 CONTINUE
C--------------DETERMINE HORIZONTAL SUCTION PROFILE DUE TO MOISTURE
C--------------ACCUMULATING BENEATH THE SLAB AND LEAVING HORIZONTALLY.
      GO TO 69
   67 DO 68 I=1,KK
      DO 68 J=1,NN
      SUCK=ABS(HH(KKK-I,J))
      KH(KKK-I,J)=KO/(1.+(A*(SUCK**3)))
      DELHH(KKK-I,J)=DELX1*HVEL(KKK-I)/KH(KKK-I,J)
      HH(KKK-I,J+1)=HH(KKK-I,J)+DELHH(KKK-I,J)
C----THE FOLLOWING STATEMENT WILL LIMIT SUCTION TO THE SUCTION VALUE
C-----EQUAL TO THE VERTICAL SUCTION BEFORE SURFACE IS COVERED
C     IF(HH(KKK-I,J+1).GT.HV(    I   ))HH(KKK-I,J+1)=HV(    I   )
      IF(HH(KKK-I,J+1).LT.0.0)HPFH(KKK-I,J+1)=0.0
      IF(HH(KKK-I,J+1).LT.0.0)GO TO 68
      HPFH(KKK-I,J+1)=ALOG10(HH(KKK-I,J+1))
   68 CONTINUE
```

```
C--------------PRINT OUTPUT
   69 PRINT 156
      PRINT 104
      PRINT 111,X1,IH,DELX1
      PRINT 112
      PRINT 105
      DO 70 I=1,KK
      WRITE(6,106) I,(HH(I,J),J=1,NN)
   70 CONTINUE
      PRINT 107
      PRINT 113
      PRINT 105
      DO 75 I=1,KK
      WRITE(6,108) I,(HPFH(I,J),J=1,NN)
   75 CONTINUE
C
C----------CALCULATE CHANGE IN STRAIN DUE TO CHANGE IN SUCTION
C-----------READ IN UNIT WEIGHT OF SOIL, AMOUNT OF SURCHARGE, AND
C-------------AND STRAIN CONSTANTS
      DO 80 I=1,KK
      DO 80 J=1,NN
      DELPFH(I,J)=SWCON*(HPFH(I,J)-HPFV(KKK-I))
      IF(VVEL.LT.0.0)DELPFH(I,J)=SWCON*(HPFH(I,J)-HPFVV(KKK-I))
   80 CONTINUE
C--------------PRINT CHANGE IN ELEVATION DUE TO CHANGE IN SUCTION
      PRINT 8000
      PRINT 8002
      DO 7000 I=1,KK
      WRITE(6,8001) I,(DELPFH(I,J),J=1,NN)
 7000 CONTINUE
      PRINT 8002
      DO 85 J=1,NN
      HOLD=0.0
      DO 85 I=1,KK
      HOLD=DELPFH(I,J)+HOLD
      PUSH(J)=HOLD
   85 CONTINUE
      WRITE(6,8003)(PUSH(I),I=1,NN)
C
C----------CALCULATE REDUCTION IN SWELL DUE TO OVERBURDEN
C----------CALCULATE LOAD AT MIDPOINT OF 1ST SOIL INCREMENT
   87 DO 88 I=1,IV
      DO 88 J=1,NN
      SUR(I,J)=0.0
   88 CONTINUE
   89 DO 890 J=1,NN
      P(1,J)=(Q/6.4516)+0.5*(GAMMA/28316.85)*DELX3
      LOGP(1,J)=ALOG10(P(1,J))
  890 CONTINUE
C----------CALCULATE LOAD AT MIDPOINT OF REMAINING VERTICAL INCREMENTS
      DO 90 J=1,NN
      DO 90 I=2,IV
      P(I,J)=P(I-1,J)+(GAMMA/28316.85)*DELX3+SUR(I,J)
      LOGP(I,J)=ALOG10(P(I,J))
   90 CONTINUE
      MM=IV-1
C----------CALCULATE CHANGE IN ELEVATION DUE TO OVERBURDEN AND SURCHARGE
      DO 95 J=1,NN
      DUMMY=0.0
      DO 95 I=1,MM
      DELOGP(I)=(LOGP(I+1,J)-LOGP(I,J))*PCON
```

```
      RESIST(J)=DELOGP(I)+DUMMY
      DUMMY=RESIST(J)
   95 CONTINUE
      AA=100.0*SWCON
      BB=100.0*PCON
      IF (KLAY.EQ.-1)PRINT 8004.CLAY.GAMMA.Q.AA.BB.DUMMY
      IF(KLAY.EQ.0)PRINT 8005.CLAY.GAMMA.Q.AA.BB.DUMMY
      IF(KLAY.EQ.1)PRINT 8010.CLAY.GAMMA.Q.AA.BB.DUMMY
      WRITE(6.114)(RESIST(J).J=1.NN)
C--------------CALCULATE CHANGE IN SURFACE ELEVATION
      DO 99 I=1.NN
      SWELL(I)=RESIST(I)-(PUSH(I)*K3)
   99 CONTINUE
C---------------PRINT OUTPUT
      PRINT 8005
      WRITE(6.8006)(SWELL(I).I=1.NN)
      DO 199 I=1.NN
  199 SSWELL(I)=SWELL(I)/2.54
      WRITE(6.8008)(SSWELL(I).I=1.NN)
      DIFFSW(NN)=0.0
      DO 198 I=1.IH
  198 DIFFSW(NN-I)=SSWELL(NN)-SSWELL(NN-I)
      WRITE(6.8011)(DIFFSW(I).I=1.NN)
C
C-----DETERMINE MAXIMUM DIFFERENTIAL SWELL
      SWDIF=SWELL(1)-SWELL(NN)
      SWDIFI=SWDIF/2.54
C--------------PRINT OUTPUT
      PRINT 8007.SWDIF, SWDIFI
      PRINT 156
 9000 CONTINUE
 9999 CONTINUE
      STOP
      END

      SUBROUTINE STRAIN(KLAY, CLAY, SWCON, PCON)
C
C-----IF KLAY = -1, THE TYPE OF SOIL MINERAL BEING CONSIDERED IS 2:1
C-----EXPANDING LATTICE SOILS (PRINCIPALLY SMECTITES)
C-----IF KLAY = 0, THE TYPE OF SOIL MINERAL BEING CONSIDERED IS A
C-----CLAY-MICA (PRINCIPALLY ILLITE)
C-----IF KLAY = +1, THE TYPE OF SOIL MINERAL BEING CONSIDERED IS 1:1
C-----EXPANDING LATTICE SOILS (PRINCIPALLY KAOLINITE)
C
      IF(KLAY)1.2.3
    1 SWCON=0.00056*CLAY-0.00433
      GO TO 5
    2 SWCON=0.00047*CLAY-0.00351
      GO TO 5
    3 SWCON=0.00018*CLAY-0.000098
    5 PCON=SWCON
      RETURN
      END

//$DATA
```

APPENDIX C

USER'S GUIDE FOR COMPUTER PROGRAM *SOILSUK*

COMMENTS ON THE USE OF THE GUIDE FOR DATA INPUT FOR PROGRAM SOILSUK.

General Program Notes

1. The data cards must be stacked in the proper order for the program to run.
2. Input data must be in the units specified.
3. All integer variables are input in 5-column fields (I5) and should be right-justified, e.g., "bbbb5". All other input variables are input in exponential format (E15.6), e.g., "-0.432688E-07."
4. The program was written in FORTRAN IV language specifically for use with the WATFIV compiler. Typically, 5,000 lines of output can be obtained in approximately 1 second of execution time.

First Input Data Card

1. X3 and X1 are input in feet and internally converted to centimeters.
2. Equilibrium suction at depth X3 is in negative centimeters.

Second Input Data Card

1. The velocity of horizontal moisture movement is assumed to vary exponentially with depth; m defines the equation exponent.

2. The velocity of moisture transfer may differ if the soil is drying rather than wetting. KI is the permeability if moisture is moving downward or inward from the edge of the slab (wetting) and KO is the permeability if moisture is moving upward or outward towards the slab edge (drying).
3. DELX1 and DELX3 define the number of horizontal and vertical increments into which X1 and X3 will be divided. Output format limits the number of horizontal increments to ten.

Third Input Data Card

1. KLAY defines the predominate type of clay mineral in the soil (-1 = Smectite; 0 = Illite; +1 = Kaolinite).
2. GAMMA is the unit weight of the soil and has dimensions of lbs/ft^3.
3. Q is any surcharge load in lbs/ft^2 that is being applied to the soil.
4. A is a constant used in the Lytton-Gardner method and, unless measured, is usually taken as 1×10^{-9}.

Fourth Input Data Card

The program can iteratively investigate several different clay percentages, moisture movement velocities, or combinations of both in a single run. KCLAY defines the number of different clay percentages to be studied and KVEL defines the number of velocities to be investigated. There must be KVEL velocity cards following each CLAY card in the order of the input deck.

Fifth Input Data Card (s)

CLAY specifies the percentage of clay in the soil being analyzed. There must be KCLAY clay percentage cards.

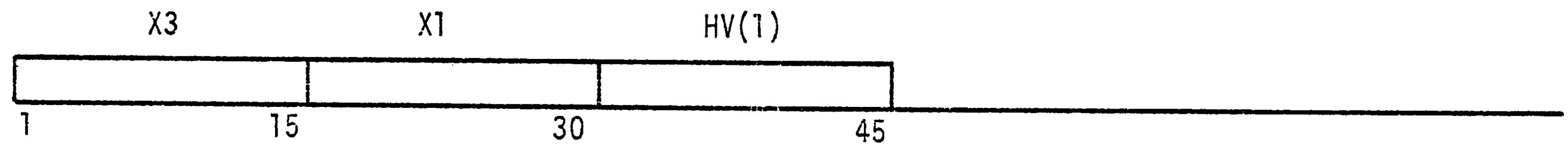
Sixth Input Data Card (s)

VVEL defines the velocity of moisture transfer in the vertical direction. HVEL (1) defines the velocity of moisture transfer in the horizontal direction at or near the surface. A negative value of VVEL indicates moisture is entering from the surface. There must be KVEL velocity cards following each of KCLAY clay percentage cards.

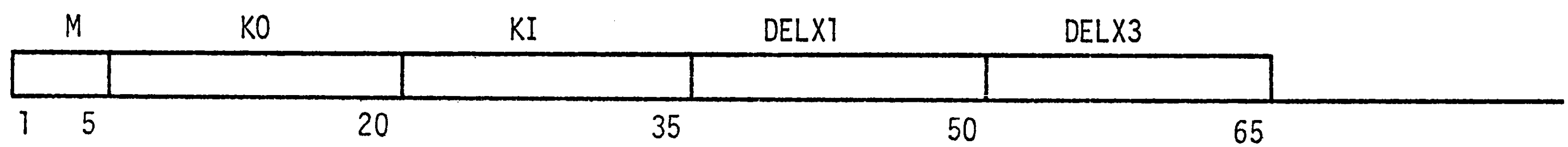
Output/Results

1. The results shown in the table titled "Total Change in Surface Elevation Due to Shrink-Swell" are the calculated changes in the surface elevation due to the total movement in a column of soil represented by a line of nodes in a grid system. There are (X1 + 1) nodes and the largest node number is located at the slab edge; node No. 1 is the interior-most node.
2. Differential swell is calculated as the difference between the movement at the slab edge and each respective nodal soil column. A positive number indicates swelling and a negative number indicates shrinkage.
3. A negative value of maximum differential swell indicates an edge lift condition. A positive value indicates a center lift condition.

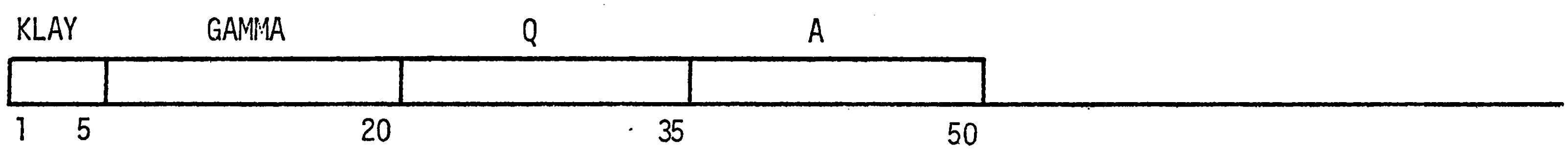
1. FIRST INPUT DATA CARD



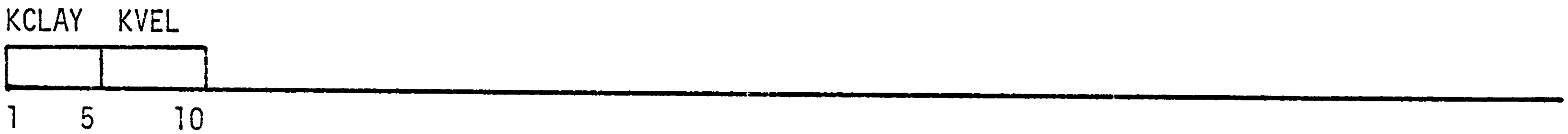
2. SECOND INPUT DATA CARD



3. THIRD INPUT DATA CARD

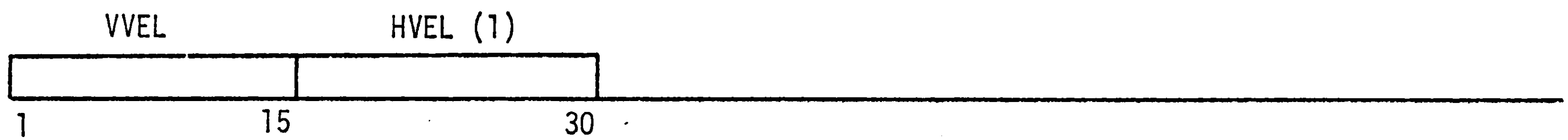


4. FOURTH INPUT DATA CARD



5. FIFTH INPUT DATA CARD(S). REPEAT KCLAY TIMES WITH EACH VALUE OF CLAY FOLLOWED BY KVEL CARDS CONTAINING VALUES OF VVEL AND HVEL (1)

6. SIXTH INPUT DATA CARD(S). REPEAT KVEL TIMES.



APPENDIX D

TYPICAL RESULTS FROM COMPUTER PROGRAM *SOILSUK*

CALCULATION OF VERTICAL AND HORIZONTAL SUCTION PROFILES BY METHOD OF LYTTON AND GARDNER

CALCULATE VERTICAL SUCTON PROFILE BEFORE SURFACE IS COVERED

DEPTH TO EQUILIBRIUM SUCTION= 213.360 CM

NUMBER OF VERTICAL INCREMENTS= 7

LENGTH OF EACH VERTICAL INCREMENT = 30.480 CM

SOIL PERMEABILITY AT DEPTH OF EQUILIBRIM SUCTION = 0.2000E-05 CM/SEC

VERTICAL VELOCITY OF MOISTURE FLOW = 0.9799E-07 CM/SEC

EQUILIBRIUM SUCTION = 6300.0000 CM OF WATER

NODE #	DEPTH (CM)	CHANGE IN SUCTION (CM)	PERMEABILITY (CM/SEC)	SUCTION (CM)	SUCTION (PF)
1	0.00			12645.620	4.10
		1890.110			
2	30.48		0.1606E-08	10755.510	4.03
		1296.073			
3	60.96		0.2360E-08	9459.449	3.98
		951.651			
4	91.44		0.3242E-08	8507.801	3.93
		733.657			
5	121.92		0.4248E-08	7774.145	3.89
		586.522			
6	152.40		0.5372E-08	7187.625	3.86
		482.227			
7	182.88		0.6612E-08	6705.398	3.83
		405.400			
8	213.36		0.7967E-08	6300.000	3.80

CALCULATE HORIZONTAL SUCTION PROFILE AFTER SURFACE IS COVERED

HORIZONTAL VELOCITY = 0.9799E-07 CM/SEC

VERTICAL PROFILE OF HORIZONTAL VELOCITY

NODE #	DEPTH (CM)	HORIZONTAL VELOCITY (CM/SEC)
1	0.00	0.9799E-07
2	30.48	0.6171E-07
3	60.96	0.3571E-07
4	91.44	0.1828E-07
5	121.92	0.7714E-08
6	152.40	0.2286E-08
7	182.88	0.2857E-09
8	213.36	0.0000E 00

VERTICAL SUCTION PROFILE AT EQUILIBRIUM UNDER COVERED SURFACE

NODE	DEPTH (CM)	SUCTION (CM)	SUCTION (PF)
1	0.00	6513.34	3.81
2	30.48	6482.86	3.81
3	60.96	6452.38	3.81
4	91.44	6421.91	3.81
5	121.92	6391.43	3.81
6	152.40	6360.95	3.80
7	182.88	6330.48	3.80
8	213.36	6300.00	3.80

HORIZONTAL SUCTION PROFILE (NEGATIVE CENTIMETERS OF WATER)

LENGTH OF EDGE PENETRATION = 243.840 CM

NUMBER OF INCREMENTS = 8

LENGTH OF EACH HORIZONTAL INCREMENT = 30.480 CM

H-O-R-I-Z-O-N-T-A-L S-U-C-T-I-O-N (CM OF WATER) AT NODE . . .

VERT NODE	1	2	3	4	5	6	7	8	9	10
1	6513.34	6927.49	7425.47	8038.40	8815.59	9840.23	11264.70	13400.92	16996.48	
2	6482.86	6740.04	7028.93	7356.47	7731.82	8167.46	8680.79	9296.93	10053.59	
3	6452.38	6599.13	6756.08	6924.46	7105.70	7301.50	7513.90	7745.32	7998.75	
4	6421.91	6495.98	6572.64	6652.04	6734.34	6819.73	6908.39	7000.54	7096.42	
5	6391.43	6422.24	6453.49	6485.20	6517.38	6550.04	6583.20	6616.85	6651.02	
6	6360.95	6369.95	6378.98	6388.06	6397.17	6406.32	6415.52	6424.75	6434.02	
7	6330.48	6331.58	6332.69	6333.80	6334.91	6336.02	6337.13	6338.24	6339.35	
8	6300.00	6300.00	6300.00	6300.00	6300.00	6300.00	6300.00	6300.00	6300.00	

HORIZONTAL SUCTION PROFILE (PF)

H-O-R-I-Z-O-N-T-A-L S-U-C-T-I-O-N (PF) AT NODE . . .

VERT NODE	1	2	3	4	5	6	7	8	9	10
1	3.81	3.84	3.87	3.91	3.95	3.99	4.05	4.13	4.23	
2	3.81	3.83	3.85	3.87	3.89	3.91	3.94	3.97	4.00	
3	3.81	3.82	3.83	3.84	3.85	3.86	3.88	3.89	3.90	
4	3.81	3.81	3.82	3.82	3.83	3.83	3.84	3.85	3.85	
5	3.81	3.81	3.81	3.81	3.81	3.82	3.82	3.82	3.82	
6	3.80	3.80	3.80	3.81	3.81	3.81	3.81	3.81	3.81	
7	3.80	3.80	3.80	3.80	3.80	3.80	3.80	3.80	3.80	
8	3.80	3.80	3.80	3.80	3.80	3.80	3.80	3.80	3.80	

CALCULATE CHANGE IN SURFACE ELEVATION DUE TO SOIL SHRINK OR SWELL

SHRINK OR SWELL PER VERTICAL INCREMENT

VERT NODE	HORIZONTAL NODE 1	2	3	4	5	6	7	8	9
1	-0.002565	-0.002327	-0.002058	-0.001752	-0.001395	-0.000970	-0.000447	0.000224	0.001143
2	-0.001957	-0.001807	-0.001645	-0.001468	-0.001276	-0.001064	-0.000829	-0.000563	-0.000261
3	-0.001479	-0.001392	-0.001301	-0.001206	-0.001106	-0.001001	-0.000890	-0.000773	-0.000648
4	-0.001087	-0.001043	-0.000998	-0.000951	-0.000904	-0.000855	-0.000805	-0.000754	-0.000701
5	-0.000757	-0.000739	-0.000720	-0.000701	-0.000682	-0.000662	-0.000643	-0.000623	-0.000603
6	-0.000472	-0.000467	-0.000461	-0.000456	-0.000450	-0.000445	-0.000439	-0.000434	-0.000428
7	-0.000222	-0.000222	-0.000221	-0.000220	-0.000220	-0.000219	-0.000218	-0.000218	-0.000217
8	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	-0.008541	-0.007996	-0.007404	-0.006755	-0.006033	-0.005216	-0.004271	-0.003141	-0.001716

CALCULATE REDUCTION IN SWELL DUE TO OVERBURDEN AND SURCHARGE

SOIL TYPE: KAOLINITE   PERCENT CLAY = 50.000%

UNIT WEIGHT OF SOIL = 125.00 LBS/CF

SURCHARGE PRESSURE = 0.00 LBS/SI

RATE OF STRAIN FOR SWELLING = 0.890200E 00 PERCENT

RATE OF STRAIN FOR OVERBURDEN-SURCHARGE PRESSURE = 0.890200E 00 PERCENT

TOTAL SWELL REDUCTION/SHRINK COMPENSATION = 0.009916 CM

TOTAL CHANGE IN SURFACE ELEVATION DUE TO SHRINK-SWELL

	NODE COLM 1	NODE COLM 2	NODE COLM 3	NODE COLM 4	NODE COLM 5	NODE COLM 6	NODE COLM 7	NODE COLM 8	NODE COLM 9
(CM)	1.832142	1.715916	1.589651	1.451087	1.297054	1.122874	0.921279	0.679991	0.376028
(IN)	0.721316	0.675557	0.625847	0.571294	0.510651	0.442076	0.362708	0.267713	0.148043

DIFFERENTIAL SWELL (IN INCHES)

-0.5733	-0.5275	-0.4778	-0.4233	-0.3626	-0.2940	-0.2147	-0.1197	0.0000

MAXIMUM DIFFERENTIAL SWELL = 1.456 CM (0.57 IN)

APPENDIX E

COMPLETE LISTING OF COMPUTER PROGRAM *SLAB2*

```
C
C
C************************************************************************
C                                                                       *
C        THE ORIGINAL APPLICATION OF THIS PROGRAM IS DESCRIBED IN       *
C   TWO PAPERS BY THE AUTHOR, Y.HUANG:  (1)  "FINITE ELEMENT ANALYSIS   *
C   OF SLABS ON ELASTIC SOLIDS".  TRANSPORTATION ENGINEERING JOURNAL    *
C   OF ASCE, VOL 100, NO. TE28, MAY, 1974, PAGES 403-406; AND (2) "REC-*
C   TANGULAR PLATES PARTIALLY SUPPORTED ON AN ELASTIC HALF SPACE", PRO-*
C   CEEDINGS, 1ST INTERNATIONAL CONFERENCE ON COMPUTATIONAL METHODS IN *
C   NONLINEAR MECHANICS, 1974, PAGES 405-414.                           *
C                                                                       *
C        ORIGINAL PROGRAM BY HUANG WAS MODIFIED TO ITS PRESENT FORM     *
C   AND GIVEN THE NAME "SLAB2" BY W. K. WRAY AND R. L. LYTTON, JULY,    *
C   1977.  A DESCRIPTION OF THE MODIFICATIONS AND EXAMPLE PROBLEMS ARE *
C   GIVEN IN W. K. WRAY'S DOCTORAL DISSERTATION ENTITLED:  "A DESIGN    *
C   PROCEDURE FOR STIFFENED SLABS CONSTRUCTED OVER EXPANSIVE SOILS",    *
C   AT TEXAS A & M UNIVERSITY, COLLEGE STATION, TX, 1978                *
C                                                                       *
C************************************************************************
C                                                                       *
C        THIS PROGRAM PROVIDES SOLUTIONS FOR THE STRESSES, DEFLEC-      *
C   TIONS, BENDING MOMENTS, AND SHEAR FORCES DUE TO LOADING AND/OR      *
C   WARPING IN A SINGLE RECTANGULAR SLAB, OR TWO SLABS CONNECTED BY     *
C   DOWEL BARS AT THE JOINT, RESTING ON A FOUNDATION OF THE ELASTIC     *
C   SOLID TYPE.                                                         *
C                                                                       *
C        THE SLABS ARE DIVIDED INTO RECTANGULAR FINITE ELEMENTS OF      *
C   VARIOUS SIZES.  THE ELEMENTS AND NODES ARE NUMBERED CONSECUTIVELY   *
C   FROM BOTTOM TO TOP ALONG THE Y AXIS AND FROM LEFT TO RIGHT ALONG    *
C   THE X AXIS.  IF TWO SLABS ARE CONNECTED BY DOWEL BARS AT THE JOINT,*
C   EACH NODE AT THE DOWELLED JOINT MUST BE NUMBERED TWICE, ONE FOR     *
C   THE LEFT SLAB AND THE OTHER FOR THE RIGHT SLAB.  THE DOWELS ARE     *
C   ASSUMED 100% EFFICIENT, SO THAT THE DEFLECTIONS AT THE JOINT ARE    *
C   THE SAME FOR BOTH SLABS.  LOADS MAY BE APPLIED TO EITHER OR BOTH    *
C   SLABS, AND THE STRESSES AT ANY NODE IN EITHER SLAB MAY BE COM-      *
C   PUTED.  THE PROGRAM CAN DETERMINE THE STRESSES AND DEFLECTIONS DUE *
C   TO DEAD LOAD, TEMPERATURE WARPING, OR LIVE LOAD, EITHER COMBINED    *
C   OR SEPARATELY.                                                      *
C                                                                       *
C        THE PROGRAM PROVIDES THE FOLLOWING FOUR OPTIONS:               *
C             OPTION 1:  SLAB AND SUBGRADE ARE IN FULL CONTACT, AS      *
C                        ORIGINALLY ASSUMED BY PICKETT. --> SET NOTCON*
C                        TO 0, NWT TO 0, AND CYCLE TO 1.                *
C             OPTION 2:  SLAB AND SUBGRADE ARE IN FULL CONTACT AT       *
C                        SOME POINTS BUT COMPLETELY OUT OF CONTACT AT *
C                        THE REMAINING POINTS BECAUSE OF LARGE GAPS     *
C                        BETWEEN THE SLAB AND THE SUBGRADE. --> SET     *
C                        NOTCON TO THE NUMBER OF POINTS NOT IN CON-     *
```

```
C                    TACT, NGAP TO 0, NWT TO 0, AND NCYCLE TO 1.  *00000500
C          OPTION 3: SLAB AND SUBRADE MAY OR MAY NOT BE IN CON-   *00000510
C                    TACT BECAUSE OF WARPING OF THE SLAB.  WHEN   *00000520
C                    THE SLAB IS REMOVED, THE SUBGRADE WILL FORM  *00000530
C                    A SMOOTH SURFACE WITH NO DEPRESSIONS OR INI- *00000540
C                    TIAL GAPS. --> SET NOTCON TO 0, NGAP TO 0,   *00000550
C                    NCYCLE TO MAXIMUM NUMBER OF CYCLES FOR CHECK-*00000560
C                    ING CONTACT.                                 *00000570
C          OPTION 4: WHEN THE SLAB IS REMOVED, THE SUBGRADE WILL  *00000580
C                    NOT FORM A SMOOTH SURFACE BUT SHOWS IRREGULAR*00000590
C                    DEFORMATION. --> SET NOTCON TO 0, NGAP TO    *00000600
C                    NUMBER OF NODES WITH INITIAL GAPS, NCYCLE TO *00000610
C                    MAXIMUM NUMBER OF CYCLES FOR CHECKING CONTACT*00000620
C                                                                 *00000630
C                                                                 *00000640
C*****************************************************************00000650
C                                                                 *00000660
C-----INPUT DATA:                                                 *00000670
C           NORMALLY, INPUT DATA IS IN CONSISTENT UNITS OF POUNDS,*00000680
C   INCHES, POUNDS PER SQUARE INCH (PSI), ETC.  HOWEVER, SLAB WIDTH AND*00000690
C   LENGTH OF THE SLAB AND THEIR RESPECTIVE NODAL DISTANCES ARE INPUT *00000700
C   IN FEET.  THE INPUT DIMENSIONS (IN FEET) ARE CONVERTED INTERNALLY *00000710
C   TO INCHES FOR PROGRAM CALCULATIONS.                           *00000720
C                                                                 *00000730
C*****************************************************************00000740
C                                                                 *00000750
C-----NOTES ON DIMENSIONS TO BE SPECIFIED BY THE USERS:           *00000760
C                                                                 *00000770
C   THE DIMENSIONS OF C AND G SHOULD NOT BE LESS THAN:            *00000780
C               NOB(2)=(NX1+NX2)*NY*NB                            *00000790
C   THE DIMENSION OF H AN HD SHOULD NOT BE LESS THAN:             *00000800
C               NCO=(NONY+1)*NONY/2; IF NSLAB=1, NONY=NX1*NY; IF  *00000810
C               NSLAB=2, NONY=NX1+NX2-1)*NY                       *00000820
C   THE DIMENSION OF CO SHALL NOT BE LESS THAN NY*NB*3            *00000830
C   THE DIMENSION OF F SHALL NOT BE LESS THAN NO2, WHERE:         *00000840
C               NO2=(NX1+NX2)*NY*3                                *00000850
C   THE DIMENSION OF DF, GAP, PPF, PF, CURL, FO, DEF, AB, AND NCC *00000860
C               SHOULD NOT BE LESS THAN (NX1+NX2)*NY              *00000870
C                                                                 *00000880
C*****************************************************************00000890
C                                                                  00000900
C-----PRINCIPAL NOTATION FOR SLAB2                                 00000910
C                                                                  00000920
C       A                    DISTANCE BETWEEN MIDPOINTS OF ADJACENT 00000930
C                            ELEMENTS, IN X-DIRECTION              00000940
C       AB( )                SLAB AREA INFLUENCED BY EACH NODE     00000950
C       ADB                  A( ) DIVIDED BY B( )                  00000960
C       ADB2                 ADB SQUARED                           00000970
C       ASPACE               CENTER-TO-CENTER SPACING OF LONGITUDINAL 00000980
```

```
C                   STIFFENING BEAMS
C      ATB          A(  ) MULTIPLIED BY B(  )
C      ATB2         ATB SQUARED
C      B            DISTANCE BETWEEN MIDPOINTS OF ADJACENT
C                   ELEMENTS, IN Y-DIRECTION
C      BDA          B(  ) DIVIDED BY A(  )
C      BDA2         BDA SQUARED
C      BEAML, BEAMS LONG DIMENSION AND SHORT DIMENSION OF GRADE
C                   BEAM, IN INCHES.
C      BEAMLL       LONG DIMENSION OF LONGITUDINAL BEAM CROSS-
C                   SECTION
C      BEAMLW       LONG DIMENSION OF TRANSVERSE BEAM CROSS-
C                   SECTION
C      BEAMSL       SHORT DIMENSION OF LONGITUDINAL CROSS-
C                   SECTION
C      BEAMSW       SHORT DIMENSION OF TRANSVERSE BEAM CROSS-
C                   SECTION
C      BSPACE       CENTER-TO-CENTER SPACING OF TRANSVERSE
C                   STIFFENING BEAMS
C      C(  )        (1) SLAB STIFFNESS MATRIX, OR (2) OVERALL
C                   STIFFNESS MATRIX OF SYSTEM
C      CO(  )       STIFFNESS COEFFICIENTS AT THE JOINT
C      CURL(NGAP))  AMOUNT OF GAP BETWEEN SLAB AND SUBGRADE
C      DEF(  )      UNIT DEFLECTIONS FROM SUBGRADE FLEXIBILITY
C                   MATRIX
C      DEFF         WORKING VARIABLE WHOSE VALUE IS DEPENDENT
C                   UPON DEF(  ) AND LOCATION IN FINITE ELEMENT
C                   GRID
C      DEL          TOLERANCE TO CONTROL CONVERGENC, GENERAL-
C                   LY USE 0.001 FOR COARSE CONTROL
C      DELF         TOLERANCE TO CONTROL CONVERGENCE, GENERAL-
C                   LY USE 0.0001 FOR FINE CONTROL
C      DF(  )       DIFFERENCE IN DEFLECTIONS AT THE SAME NODE
C                   BETWEEN TWO CONSECUTIVE ITERATIONS
C      DX(  )       DISTANCE BETWEEN ADJACENT NODES IN THE
C                   X-DIRECTION
C      DXYFAC, DYFAC FORMS OF THE ELASTIC CONSTANTS OF AN ORTHO-
C                   TROPIC SLAB (WHOSE PRINCIPAL DIRECTIONS OF
C                   OF ORTHOTROPY COINCIDE WITH THE X- AND Y-
C                   AXES)
C      DY(  )       DISTANCE BETWEEN ADJACENT NODES IN THE
C                   Y-DIRECTION
C      EIX          FLEXURAL RIGIDITY IN LONGITUDINAL DIRECTION
C      EIY          FLEXURAL RIGIDITY IN TRANSVERSE DIRECTION
C      F(  )        DEFLECTION AT A NODE
C      FO(  )       FORCE DUE TO WEIGHT OF SLAB AND/OR UNI-
C                   FORMLY DISTRIBUTED LIVE LOAD ON ELEMENT
C      FRX          FLEXURAL RIGIDITY PER UNIT WIDTH, IN LONGI-
C                   ITUDINAL DIRECTION
```

```
C     H( )                SUBGRADE STIFFNESS MATRIX                  00001480
C     ICL                 MAXIMUM NUMBER OF ITERATIONS ALLOWED, GEN- 00001490
C                         ERALLY USE 10 FOR COARSE CONTROL.          00001500
C     ICLP                MAXIMUM NUMBER OF ITERATIONS ALLOWED, GEN- 00001510
C                         ERALLY USE 30 FOR FINE CONTROL             00001520
C     IER                 INSTABILITY ERROR OCCURRING DURING MATRIX  00001530
C                         INVERSION                                  00001540
C     ISOTRY              SWITCH TO DETERMINE IF STIFFNESS OF CON-   00001550
C                         STANT THICKNESS SLAB OR OF STIFFENED SLAB  00001560
C                         IS TO BE USED IN PROBLEM SOLUTION--> ASSIGN00001570
C                         0 IF CONSTANT THICKNESS; ASSIGN 1 IF       00001580
C                         STIFFENED SLAB                             00001590
C     LIFT                DETERMINES MODE OF SOIL SWELLING:  ASSIGN  00001600
C                         1 IF CENTER LIFT, AND ASSIGN 2 IF EDGE LIFT00001610
C     MOIX                MOMENT OF INERTIA OF STIFFENED SLAB SECTION00001620
C                         IN LONGITUDINAL DIRECTION                  00001630
C     MOIY                MOMENT OF INERTIA OF STIFFENED SLAB SECTION00001640
C                         IN TRANSVERSE DIRECTION                    00001650
C     MNM                 EXPONENT OF EXPONENTIAL EQUATION DESCRIBING00001660
C                         PROFILE OF SWOLLEN SUBGRADE.  EQUATION IS  00001670
C                         OF THE FORM Y=C*X**M                       00001680
C     MXDIF( )            NUMERICAL DIFFERENCE BETWEEN MOMENTS AT    00001690
C                         ADJACENT NODES IN THE X-DIRECTION          00001700
C     MXYDIF( )           NUMERICAL DIFFERENCE BETWEEN TWISTING      00001710
C                         MOMENTS AT ADJACENT NODES                  00001720
C     MYDIF( )            NUMERICAL DIFFERENCE BETWEEN MOMENTS AT    00001730
C                         ADJACENT NODES IN THE Y-DIRECTION          00001740
C     MYXDIF( )           NUMERICAL DIFFERENCE BETWEEN TWISTING      00001750
C                         MOMENTS AT ADJACENT NODES                  00001760
C     NB                  HALF BAND WIDTH, EQUAL TO OR GREATER THAN  00001770
C                         (NY + 2)*3                                 00001780
C     NCK                 NUMBER OF NODAL POINTS FOR CHECKING THE    00001790
C                         CONVERGENCE                                00001800
C     NCYCLE              MAXIMUM NUMBER OF CYCLES FOR CHECKING SUB- 00001810
C                         GRADE CONTACT, GENERALLY USE 10            00001820
C     NELEM               NUMBER OF ELEMENTS IN FINITE ELEMENT GRID  00001830
C     NGAP                TOTAL NUMBER OF NODES AT WHICH A GAP EXISTS00001840
C                         BETWEEN SLAB AND SUBGRADE.  ASSIGN 0 IF NO 00001850
C                         GAP EXISTS OR THE GAP IS VERY LARGE        00001860
C     NG(NGAP)            NODAL NUMBER OF THE NODE AT WHICH THE GAP  00001870
C                         GAP BETWEEN SLAB AND SUBGRADE IS SPECIFIED 00001880
C     NKENT               COUNTER TO CALL SUBROUTINE 'SHEAR'         00001890
C     NL(NLOAD)           ELEMENT NUMBER OVER WHICH LOAD IS APPLIED  00001900
C     NLOAD               NUMBER OF ELEMENTS ON WHICH LOAD IS APPLIED00001910
C                         USE 0 IF THERE IS NO LOAD                  00001920
C     NO(1)               TOTAL NUMBER OF COMPONENTS CONTRIBUTING TO 00001930
C                         INTERNAL WORK IN SLAB #1                   00001940
C     NO(2)               TOTAL NUMBER OF COMPONENTS CONTRIBUTING TO 00001950
C                         INTERNAL WORK IN BOTH SLABS                00001960
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C        NOB(1)               NO(1)*NB                                        00001970
C        NOB(2)               NO(2)*NB                                        00001980
C        NONY                 NUMBER OF NODES IN SLAB #1 OR NUMBER OF         00001990
C                             NODES IN BOTH SLABS LESS NY                     00002000
C        NOO                  (NONY + 1) * (NONY) / 2                         00002010
C        NODCK(NCK)           NODAL NUMBER OF THE POINTS FOR CHECKING         00002020
C                             CONVERGENCE                                     00002030
C        NOTCON               TOTAL NUMBER OF NODES AT WHICH REACTIVE         00002040
C                             PRESSURE IS PRESUMED TO BE 0.  IF NCYCLE=1,00002050
C                             THESE NODES WILL NEVER BE IN CONTACT; IF        00002060
C                             NCYCLE > 1, THESE NODES MAY OR MAY NOT BE       00002070
C                             IN CONTACT, DEPENDING ON CALCULATED RESULTS00002080
C        NO1                  NX1*NY*3                                        00002090
C        NO13                 TOTAL NUMBER OF NODES IN SLAB #1                00002100
C        NO2                  NX*NY*3                                         00002110
C        NO23                 TOTAL NUMBER OF NODES IN BOTH SLABS             00002120
C        NP(NPRINT)           NODAL NUMBER OF THE PRINTED POINTS.             00002130
C        NPRINT               NUMBER OF NODES AT WHICH STRESSES ARE TO BE00002140
C                             PRINTED                                         00002150
C        NPROB                NUMBER OF PROBLEMS TO BE SOLVED.  (NOTE:        00002160
C                             OPTIONS 3 AND 4 MAY BE SOLVED IN TWO SEPA-      00002170
C                             RATE PROBLEMS.  THE FIRST PROBLEM COMPUTES      00002180
C                             THE GAPS AND PRECOMPRESSIONS DUE TO WEIGHT      00002190
C                             OF SLAB AND TEMPERATURE BY SETTING NWT TO       00002200
C                             1, AND THE SECOND PROBLEM COMPUTES              00002210
C                             STRESSES AND DEFLECTIONS DUE TO LIVE LOAD       00002220
C                             ONLY BY SETTING NWT TO 0.)                      00002230
C        NPUNCH               ANY GAPS OR PRECOMPRESSION TO BE PUNCHED?       00002240
C                             ASSIGN 1 IF YES AND ASSIGN 0 IF NO.             00002250
C        NREAD                ANY GAPS OR PRECOMPRESSIONS TO BE READ IN?      00002260
C                             ASSIGN 1 IF YES, ASSIGN 2 IF GAPS AND PRE-      00002270
C                             COMPRESSIONS ARE FROM THE PREVIOUS PROBLEM,00002280
C                             AND ASSIGN 0 IF OTHERWISE.                      00002290
C        NSLAB                NUMBER SLABS, EITHER 1 OR 2                     00002300
C        NSYM                 CONDITION OF SYMMETRY.  ASSIGN 1 WHEN NO        00002310
C                             SYMMETRY EXISTS, 2 WHEN SYMMETRIC WITH RE-      00002320
C                             SPECT TO Y AXIS, 3 WHEN SYMMETRIC WITH RE-      00002330
C                             SPECT TO X AXIS, 4 WHEN SYMMETRIC WITH RE-      00002340
C                             SPECT TO BOTH X AND Y AXES, AND 5 FOR FOUR      00002350
C                             SLABS SYMMETRICALLY LOADED.                     00002360
C        NTEMP                CONDITION OF WARPING.  ASSIGN 0 IF TEMPERA-00002370
C                             TURE GRADIENT IS 0 AND ASSIGN 1 IF GRADIENT00002380
C                             IS NOT 0                                        00002390
C        NWT                  METHOD EMPLOYED.  ASSIGN 0 WHEN WEIGHT IS       00002400
C                             NOT CONSIDERED, ASSIGN 1 WHEN WEIGHT IS         00002410
C                             CONSIDERED FOR SLAB OF NON-CONSTANT CROSS-      00002420
C                             SECTION, AND ASSIGN -1 WHEN SLAB IS OF CON-00002430
C                             STANT, RECTANGULAR CROSS-SECTION                00002440
C        NX                   TOTAL NUMBER NODES IN THE X DIRECTION           00002450
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C         NX1                   NUMBER OF NODES IN X DIRECTION FOR SLAB #1
C         NX2                   NUMBER OF NODES IN X DIRECTION FOR SLAB #2.
C                               ASSIGN 0 WHEN THERE IS ONLY ONE SLAB.
C         NY                    NUMBER OF NODES IN Y DIRECTION
C         NYNB                  NY*3*NB
C         NZ(NOTCON)            NODAL NUMBER OF THE NODES AT WHICH REACTIVE
C                               PRESSURE IS INITIALLY SET TO ZERO
C         PA                    WORKING VARIABLE, EQUAL TO A
C         PB                    WORKING VARIABLE, EQUAL TO B
C         PP( )                  A PREVIOUS NODAL DEFLECTION
C         PPP( )                 A PREVIOUS NODAL DEFLECTION
C         PR                    POISSON'S RATIO OF THE CONCRETE
C         PRS                   POISSON'S RATIO OF THE SOIL
C         Q                     LOADING ON SLAB, EXPRESSED AS A PRESSURE
C         QK                    FORCE DUE TO APPLIED LOAD ON AN ELEMENT
C         QQ                    WK
C         QSLAB                 WEIGHT OF SLAB EXPRESSED AS A UNIFORMLY
C                               DISTRIBUTED LOAD.  (THIS INPUT IS USED WHEN
C                               SLAB IS NOT CONSTANT DEPTH RECTANGLULAR
C                               CROSS-SECTION AND NWT=-1.)
C         RPJ                   RELAXATION FACTOR AT THE JOINT, USUALLY 0.5
C         RM                    RIGIDITY MODULUS
C         SM( )                 STIFFNESS MATRIX FOR A RECTANGULAR ELEMENT
C                               OF AN ORTHOTROPIC MATERIAL
C         STR( , )              CALCULATED STRESSES DUE TO LOADING AND
C                               SUPPORT CONDITIONS
C         T                     THICKNESS OF THE CONSTANT DEPTH SLAB
C         TEMP                  DIFFERENCE IN TEMPERATURE BETWEEN TOP AND
C                               BOTTOM OF SLAB.  USE POSITIVE IF CURLED
C                               UPWARD AND NEGATIVE IF CURLED DOWNWARD.
C         TEX                   EQUIVALENT CONSTANT THICKNESS SLAB DEPTH IN
C                               LONGITUDINAL DIRECTION
C         TEY                   EQUIVALENT CONSTANT THICKNESS SLAB DEPTH IN
C                               TRANSVERSE DIRECTION
C         TRBL                  TORSIONAL RIGIDITY OF BEAM IN LONGITUDINAL
C                               DIRECTION
C         TRBW                  TORSIONAL RIGIDITY OF BEAM IN TRANSVERSE
C                               DIRECTION
C         VL, VM                LOAD MATRICES USED TO DETERMINE ELEMENTAL
C                               STIFFNESS MATRIX
C         VX( )                 SHEAR FORCE IN THE X-DIRECTION
C         VXMAXN                MAXIMUM NEGATIVE SHEAR FORCE IN X-DIRECTION
C         VXMAXP                MAXIMUM POSITIVE SHEAR FORCE IN X-DIRECTION
C         VY( )                 SHEAR FORCE IN THE Y-DIRECTION
C         VYMAXN                MAXIMUM NEGATIVE SHEAR FORCE IN Y-DIRECTION
C         VYMAXP                MAXIMUM POSITIVE SHEAR FORCE IN Y-DIRECTION
C         XT( )                 TEMPORARY STORAGE FILE FOR X( )
C         YT( )                 TEMPORARY STORAGE FILE FOR Y( )
C         WK                    WEIGHT OF CONCRETE IN PSI
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C        X(NX1+NX2)             X COORDINATES STARTING FROM 0 AND INCREAS-
C                               ING FROM LEFT TO RIGHT.  (NOTE:  X MUST BE
C                               READ TWICE AT JOINT IF TWO SLABS.  COORDI-
C                               NATE DISTANCES ARE INPUT IN FEET.)
C        XDA(NLOAD, 1) AND      LOWER AND UPPER LIMITS OF LOADED AREA IN X
C        XDA(NLOAD, 2)          X DIRECTION.  USE -1 TO +1 IF THE LOAD COV-
C                               ERS THE WHOLE LENGTH OF ELEMENT.
C        XEC                    EDGE PENETRATION DISTANCE, IN FEET.
C        XMOM                   BENDING MOMENT IN X-DIRECTION
C        XYMOM                  TWISTING MOMENT
C        XX(1)                  X-COORDINATES OF CENTROID OF SLAB #1
C        XX(2)                  X-COORDINATES OF CENTROID OF SLAB #2
C        XXL                    SLAB LENGTH, IN FEET
C        XXS                    SLAB WIDTH, IN FEET
C        XYMX                   AMOUNT OF DIFFERENTIAL SHRINK OR SWELL, IN
C                               INCHES
C        Y(NY)                  Y COORDINATES STARTING FROM ZERO AND IN-
C                               CREASING TO TOP, IN FEET
C        YDA(NLOAD, 1) AND      LOWER AND UPPER LIMITS OF LOADED AREA IN Y
C        YDA(NLOAD, 2)          DIRECTION.  USE -1 TO +1 IF THE LOAD COVERS
C                               WHOLE WIDTH OF ELEMENT.
C        YM                     YOUNG'S MODULUS OF THE CONCRETE
C        YMOM                   BENDING MOMENT IN Y-DIRECTION
C        YMS                    YOUNG'S MODULUS OF THE SOIL
C        YY(1)                  Y-COORDINATES OF CENTROID OF SLAB #1
C        YY(2)                  Y-COORDINATES OF CENTROID OF SLAB #2
C
C***********************************************************************
C
C
      DIMENSION SM(90),SM1(90),SM2(90),SM3(90),SM4(90),XMOM(200),YMOM(20
     *0),XYMOM(200),MXDIF(200),MYDIF(200),MXYDIF(200),MYXDIF(200),X(200)
     *,Y(200),XT(200),YT(200),DX(200),DY(200),RD(19110),DF(200),NL(200),
     *NOD(4),NOB(2),C(26325),GAP(200),H(19110),PPP(200),F(600),G(26325),
     *CO(1800),PP(200),CURL(200),NODCK(40),XX(2),YY(2),YYY(21),FO(200)
      DIMENSION XDA(50,2),YDA(50,2),XD(4),YD(4),NP(200),NO(2),ZZ(21),DEF
     *(200),AB(200),NCC(200),NZ(200),STR(200,6),NG(200),YXMOM(200),VX(20
     *0).VY(200)
C
      COMMON C,F,G,NO,NB,X,Y,STR,NP,XMOM,YMOM,XYMOM,XT,YT,DX,DY,MXDIF,
     *MYDIF,MXYDIF,MYXDIF,YXMOM,VX,VY
C
      REAL MXDIF, MYDIF, MXYDIF, MYXDIF
C
C-----FOR REFERENCE ON DATA BLOCKS, SEE ZIENKIEWICZ, O.C., "THE FINITE
C-----ELEMENT METHOD IN ENGINEERING SCIENCE", CHAPTER 10, MCGRAW-HILL
C-----BOOK CO., 1971.
C
      DATA SM1/60., 0., 30.,5*0., 20., 30., 0., 15., 3*0., 15., 0.,
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     * 10., -60., 0., 30., 3*0., -30., 0., 10., -30., 0., 15., 3*0.,
     * -15., 0., 5., 60., 0., 30., 5*0., 20., -30., 0., 15., 3*0., -15.,
     * 0., 5., -60., 0., 30., 3*0., -30., 0., 10., 60., 0., -30., 5*0.,
     * 20., 30., 0., -15., 3*0., -15., 0., 10., 60., 0., -30., 5*0.,20./
C
      DATA SM2/60., -30., 0., 0., 20., 4*0., -60., -30., 0., 30., 10.,
     * 4*0., 30.,-15., 0., -15., 10., 4*0., -30., -15., 0., 15., 5.,
     * 4*0., 60., 30., 0., 0., 20., 4*0., -30., 15., 0., -15., 5., 4*0.,
     * 30., 15., 0., 15., 10., 4*0., 60., -30., 0., 0., 20., 4*0., -60.,
     * -30., 0., 30., 10., 4*0., 60., 30., 0., 0., 20., 4*0./
C
      DATA SM3/30.,-15.,15.,0.,0.,-15., 3*0., -30., 0., -15., 3*0., -15.
     * , 0., 0., -30., 15., 0., 15., 5*0., 30., 8*0., 30., 15., 15., 0.,
     * 0., 15., 3*0., 30., 8*0., -30., -15., 0., -15., 5*0., 30., -15.,
     * -15., 0., 0., 15., 3*0.,-30., 0., 15., 3*0., 15., 0., 0., 30.,
     * 15., -15., 0., 0., -15., 3*0./
C
      DATA SM4/ 84., -6., 6., 0., 8., 3*0., 8., -84., -6., -6., 6., -2.,
     * 0., -6., 0., -8., -84., 3*6., -8., 0., -6., 0., -2., 84., 6.,
     * -6., -6., 2., 0., 6., 0., 2., 84., 6., 6., 0., 8., 3*0., 8., 84.,
     * -6., -6., 6., 2., 0., 6., 0., 2., -84., -6., 6., -6., -8., 0.,
     * -6., 0., -2., 84., -6., -6., 0., 8., 3*0., 8., -84., -6., 6., 6.,
     * -2., 0., 6., 0., -8., 84., 6., -6., 0., 8., 3*0., 8./
C
  101 FORMAT ('1', 5X, 'FINITE ELEMENT ANALYSIS OF CONCRETE SLABS', //,
     *  15X, 'NO. OF SLABS =', I10, 2X, 'POISSON RATIO OF CONCRETE=',
     * F10.4, 7X, 'THICKNESS OF CONCRETE= ', F10.4,/,
     *  9X, 'MODULUS OF CONCRETE=', E10.3, 8X, 'MODULUS OF SUBGRADE=',
     *  E10.3, 3X, 'POISSON RATIO OF SUBGRADE=', F10.4,//, 5X, 'NSYM=',
     * I10, 5X, 'NPROB=', I10, 5X,'NREAD=', I10, 5X,'NPUNCH=',I10)
  102 FORMAT (I5, 2F10.4, 2E10.3,F10.4,5I5)
  103 FORMAT (14I5)
  104 FORMAT (9F8.3)
  105 FORMAT (6X, 'NX1=',I10, 7X, 'NX2=',I10, 8X,'NY=',I10,6X,'NCYLE=',
     * I10, 5X, 'NOTCON=', I10, 5X, 'NB=', I10)
  106 FORMAT(//,3X,'LOADS ARE APPLIED ON THE FOLLOWING ELEMENTS AND COOR
     *DINATES:',/)
  107 FORMAT (3X, 'VALUES OF X ARE:',/, 10(3X,F8.3))
  108 FORMAT(/,3X,'VALUES OF Y ARE:',/, 10(3X,F8.3))
  109 FORMAT(/,3X,' STRESSES AT THE FOLLOWING NODES ARE TO BE PRINTED:',
     *    /, 10(5X, I5))
  110 FORMAT (9F8.4)
  111 FORMAT(//5X,'DIMENSIONS OF GRADE BEAMS',//40X,'LONG DIMENSION',10X
     *,'SHORT DIMENSION',10X,'SPACING',/40X,14('-'),10X,15('-'),10X,7('-
     *'),//10X,'TRANSVERSE GRADE BEAM',11X,F10.5,15X,F10.5,10X,F10.5,//1
     *0X,'LONGITUDINAL GRADE BEAM',9X,F10.5,15X,F10.5,10X,F10.5,//)
  112 FORMAT (//, 6X, 'NODE', 7X, 'DEFLECTION', 6X, 'NODE', 7X,
     *  'DEFLECTION', 6X, 'NODE', 7X, 'DEFLECTION', 6X, 'NODE', 7X,
     *  'DEFLECTION')
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```
113 FORMAT (//, 6X, 'NODE', 8X, 'STRESS X', 10X, 'STRESS Y', 10X,
   *  'STRESS XY', 12X, 'MAJOR', 13X, 'MINOR', 13X, 'SHEAR',/)
114 FORMAT (7F10.5)
115 FORMAT (10X, I5, 4F15.5)
116 FORMAT (10X, 'IC=', I10)
118 FORMAT(6E13.6)
119 FORMAT (4(4X,I5,5X,E13.6))
120 FORMAT(/,5X,'AMOUNT OF INITIAL CURLING AND GAP AT THE NODES IS:',
   * /, 7(I5,F10.5))
121 FORMAT(///,5X,'NGAP=',I5,6X,    'NTEMP=', I5, 8X, 'NLOAD=', I5,
   * 10X, 'ICL=', I5,10X, 'NCK=', I5,10X,  'NWT=', I5,/,
   * 5X, 'TEMP=', F10.5, 5X, 'Q=', F10.5, 5X, 'RPJ=', F10.5, 5X,
   * 'DEL=', F10.5, 4X, 'DELF=', F10.5, 4X, 'ICLP=', I5)
122 FORMAT (6I5,4F10.5,F5.2,I5)
123 FORMAT (/, 5X, 'WHEN IC=', I5, ' DEFLECTION=', E13.4,
   *  ' WHICH IS NOT REASONABLE SO THE EXECUTION IS TERMINATED')
124 FORMAT (/,5X,'THE FOLLOWING NODES ARE USED TO CHECK CONVERGENCE:',
   *  /, 12I10)
127 FORMAT (10X, 'IER=', I10)
129 FORMAT(/,5X,'AMOUNT OF FINAL CURLING AND GAP AT THE NODES IS:',
   * /, 7(I5,F10.5))
132 FORMAT (/,3X,'REACTIONS AT THE FOLLOWING NODES ARE ASSUMED',
   * ' INITIALLY ZERO:',/, 10(5X,I5))
133 FORMAT (//,' THE DIFFERENCES BETWEEN TWO ITERATIONS ARE ',
   *  'TABULATED BELOW, THE LAST INTEGER BEING THE ITERATION NO.',//,
   *  6X, 'NODE', 3X, 'DEFLECTION DIFFERENCE')
134 FORMAT (/,3X, 'NODAL NUMBERS AND INITIAL GAPS ARE TABULATED AS ',
   * 'FOLLOWS:', /, 7(I5,F10.5))
136 FORMAT (6E13.6)
138 FORMAT (//, 5X, 'THE GAP OR PRECOMPRESSION OF THE NODES IS:',/)
139 FORMAT (//, 5X, 'NIC=', I10,//)
140 FORMAT(4F10.4,3I5)
141 FORMAT(////2X,'SUMMARY OF VARIABLES:')
142 FORMAT(     5X,'SLAB LENGTH =',F7.2,' FT',4X,'EDGE EFFECT =',F7.2,'
   * FT',4X,'YM =',F5.2,' IN')
143 FORMAT(5X,'SLAB WIDTH =',F7.2,' FT',4X,'BEAM DEPTH =',F7.2,' IN',3
   *X,'UNIFORM LOAD =',F5.2,' PSI',4X,'PERIMETER LOAD =',F5.2,' PSI')
144 FORMAT(5X,'PARABOLIC EQUATION EXPONENT "M" =',I4,/////)
145 FORMAT(F7.3)
146 FORMAT(5X,'SLAB WIDTH =',F7.2,' FT',4X,'BEAM DEPTH =',F7.2,' IN')
147 FORMAT('+',80X,'----- NO SWELL -----')
148 FORMAT('+',80X,'----- CENTER HEAVE -----')
149 FORMAT('+',80X,'----- EDGE HEAVE -----')
C
C
C-----READ IN THE NUMBER OF PROBLEMS TO BE SOLVED ON THIS RUN
C
      READ (5, 103) NPROB
C***************************************************************************
```

```
C
C-----BEGIN PROBLEM SOLUTION
C
      DO 950 LLL=1, NPROB
C
C-----READ IN SLAB DIMENSIONS AND OTHER DESCRIPTIVE VARIALBE OF SLB-ON-G
C-----TO BE ANALYZED
C
      READ 140,XXL,XXS,XEC,XYMX,MMM,ISOTRY,LIPT
C***********************************************************************
C
      NKENT=0
      IF(ISOTRY.EQ.0)GO TO 8
C
C-----READ IN DIMENSIONS OF GRADE BEAMS AND GRADE BEAM SPACINGS
C
      READ 104,BEAMLW,BEAMSW,BEAMLL,BEAMSL,ASPACE,BSPACE
C***********************************************************************
C
C-----READ IN MOMENT OF INERTIA IN LONG AND SHORT DIRECTIONS
      READ 118,MOIX,MOIY
C **********************************************************************
C
C-----READ IN SLAB GEOMETRY, ELASTIC CONSTANTS, AND OTHER CONSTANTS
C
    8 READ(5,102) NSLAB,PR, T, YM, YMS, PRS, NSYM,NOTCON,NREAD,NPUNCH,NB
C***********************************************************************
C
      WRITE(6,101)NSLAB,PR, T, YM, YMS, PRS, NSYM, NPROB, NREAD, NPUNCH
      PRINT 141
      PRINT 142,XXL,XEC,XYMX
      PRINT 146,XXS,T
      PRINT 144,MMM
C
C-----CALCULATE RIGIDITY MODULUS
C
      RM= YM*T**3/(12*(1-PR**2))
C
C-----CALCULATE ELASTICITY OF SOIL
C
      YMSPRS=YMS/(1.-PRS**2)
C
      IF(ISOTRY.EQ.0)GO TO 9
      PRINT 111, BEAMLW,BEAMSW,BSPACE,BEAMLL,BEAMSL,ASPACE
C
C-----CALCUALTE FLEXURAL RIGIDITY
C
      EIX = YM * MOIX
      EIY = YM * MOIY
```

```
      PRX = EIX / (12. * XXL )
C
C-----CALCULATE CONCRETE WEIGHT CONSTANT FOR SLAB OF CONSTANT THICKNESS
C
    9 WK= 0.087*T
      IF(ISOTRY.EQ.0)GO TO 7
C
C-----CALCULATE TORSIONAL RIGIDITY OF TEE SECTION
C
C----------TRANSVERSE GRADE BEAM
      TRBW=(BEAMLW* BEAMSW**3 / 16.)*((16./3.) - (3.36 * BEAMSW/ BEAMLW)
     **(1. - (BEAMSW**4 / (12. * BEAMLW**4))))/BSPACE
C----------LONGITUDINAL GRADE BEAM
      TRBL=(BEAMLL* BEAMSL**3 / 16.)*((16./3.) - (3.36 * BEAMSL/ BEAMLL)
     **(1. - (BEAMSL**4 / (12. * BEAMLL**4))))/ASPACE
      DXYFAC=((6.*XXL*RM*(1.-PR)) + (TRBL+TRBW)) / EIX
      DYFAC = (XXL /XXS) * (MOIY / MOIX)
C
C-----CALCULATE AN EQUIVALENT SLAB DEPTH
C
      TEX = ((1.-PR**2) * MOIX / XXL) **0.333333
      TEY = TEX * (DYFAC**0.333333)
C
C-----READ IN NUMBER OF NODES IN EACH DIRECTION AND NODAL PRINTING INFO
C
    7 READ (5,103) NX1,NX2,NY,NCYLE,NPRINT,(NP(I),I=1, NPRINT)
C***********************************************************************
C
      WRITE (6, 105) NX1, NX2, NY, NCYLE, NOTCON, NB
      WRITE(7,103)NX1,NY
      WRITE (6, 109) (NP(I), I=1, NPRINT)
      NX= NX1+ NX2
      NO(2)= NX*NY*3
      NO2= NO(2)
      NO23= NO2/3
      NO(1)=  NX1*NY*3
      NO1= NO(1)
      NO13= NO1/3
C
C-----READ IN COORDINATES OF FINITE ELEMENT GRID SYSTEM
C
      READ (5,104)(X(  I),I=1, NX), (Y(I), I=1, NY)
C***********************************************************************
C
      WRITE (6,107)(X(  I),I=1, NX)
      WRITE(7,104)(X(I),I=1,NX)
      WRITE (6,108)  (Y(I), I=1, NY)
      WRITE(7,104)(Y(I),I=1,NY)
C
```

```
C-----CONVERT GRID SYSTEM COORDINATES FROM FEET TO INCHES
C
      DO 150 I=1,NX
      X(I)=X(I)*12.
  150 CONTINUE
      DO 151 I=1,NY
      Y(I)=Y(I)*12.
  151 CONTINUE
C
C-----CALCULATE THE VARIOUS CONSTANTS USED THROUGHOUT THE SOLUTION
C
      LA= NB-1
      NOB(1)= NO(1)*NB
      NOB(2)= NO(2)*NB
      NOB1= NOB(1)
      NOB2= NOB(2)
      NO13P= NO13+1
      NO1P= NO1+1
      NO13NY= NO13+ NY
C
C-----INITIALIZE AND SET TO ZERO THE MATRIX OF NODES NOT IN CONTACT INIT
C
      DO 5200 I=1, NO23
 5200 NCC(I)=0
      IF(NOTCON .EQ. 0) GO TO 5220
C
C-----READ IN THE NODAL NUMBERS AT WHICH SUBGRADE REACTION IS PRESUMED 0
C
      READ (5,103) (NZ(I), I=1, NOTCON)
C************************************************************************
C
      WRITE(6,132) (NZ(I), I=1, NOTCON)
      DO 5210 I=1, NOTCON
 5210 NCC(NZ(I))=1
 5220 IF( NSLAB-1) 11, 11, 13
   11 NONY= NO13
      GO TO 15
   13 NONY= NO23 - NY
   15 NOO= (NONY+1)*NONY/2
C
C-----INITIALIZE VARIABLES AND MATRICES
C
      ICC=0
      ICCC=0
      NIC=0
      DO 955 I=1, NO23
  955 F((I-1)*3+1)=0
C
C-----DETERMINE NUMBER OF ELEMENTS IN FINITE ELEMENT MESH
```

```
C
      NELEM= (NY-1)*(NX-NSLAB)
      NY1= NY-1
C
C-----IF THE SLAB AND SUBGRADE ARE NOT ASSUMED IN FULL CONTACT, ITERATE
C-----UNTIL THE SAME CONTACT CONDITIONS ARE OBTAINED
C
  965 NIC= NIC+1
C
C-----INITIALIZE SUBGRADE STIFFNESS MATRIX
C
      DO 16 I=1, NOO
   16 H(I)=0
      IC=0
      DO 55 I=1, NO23
      PPF(I)= F((I-1)*3+1)
   55 AB(I)=0
C
C-----INITIALIZE SLAB STIFFNESS MATRIX
C
      DO 19 I=1, NOB2
   19 C(I)=0
      PA=0
      PB=0
C
C-----GENERATE STIFFNESS MATRIX OF EACH ELEMENT
C
      DO 200 K=1, NELEM
      I1= (K-1)/NY1
      I2= K-I1*NY1
      IF( NSLAB-2) 21, 22, 22
   21 NOD(1)= K+I1
      GO TO 27
   22 IF( K-NY1*(NX1-1)) 21, 21, 23
   23 I1= I1+1
      NOD(1)= K+ I1+ NY1
   27 NOD(2)= NOD(1)+1
      NOD(3)= NOD(1)+ NY
      NOD(4)= NOD(3)+ 1
      A= (X(  I1+2)-X(  I1+1))/2
      B=( Y(I2+1)- Y(I2))/2
C
C-----TEST FOR DUPLICITY OF CALCULATIONS
C
      IF( ABS(A-PA) .LT. 0.001 .AND. ABS(B-PB) .LT. 0.001) GO TO 100
      PA=A
      PB= B
      ATB= A*B
      ATB2= ATB**2
```

```
      ADB= A/B
      BDA= B/A
      ADB2= ADB**2
      BDA2= BDA**2
C
C-----COMPUTE THE ELEMENT FLEXIBILITY MATRIX OF SUBGRADE
      XXX=0
      YYY(1)=ALOG(2.0)
      DO 24 I=2, 21
      XXX= XXX+ 0.05
   24 YYY(I)=ALOG(1+ SQRT(1+BDA**2*XXX**2))
      CALL QSF( 0.05,YYY, ZZ, 21)
      DEF(K)=  (ZZ(21)- ALOG(BDA)+1)/(4*3.141593*A)
      IJ=0
C
C-----FORMULATE LOAD MATRICES VL AND VM
C
      DO 95 I=1, 4
      DO 95 J=I, 4
      IJ=IJ+1
      DO 95 L=1, 3
      IF( L-2) 20, 30, 40
   20 VL=1
      GO TO 50
   30 VL=2*B
      GO TO 50
   40 VL= 2*A
   50 DO 95 M=1, 3
      IJLM=M+(L-1)*3+(IJ-1)*9
      IF( I .EQ. J .AND. L .GT. M) GO TO 95
      IF(M-2) 60, 70, 80
   60 VM=1
      GO TO 90
   70 VM= 2*B
      GO TO 90
   80 VM=2*A
   90 CONTINUE
C
C-----CALCULATE THE ELEMENTAL STIFFNESS MATRIX (IF SLAB HAS GRADE BEAMS,
C-----ISOTRY=1; IF SLAB IS CONSTANT THICKNESS, ISOTRY=0.)
C
C-----IF SLAB HAS GRADE BEAMS, ISOTRY=1; IF SLAB IS CONSTANT THICKNESS,
C
      IF(ISOTRY)950,92,93
   92 SM(IJLM) = RM * (BDA2 * SM1(IJLM) + ADB2 * SM2(IJLM) + PR*SM3(IJLM
     *) + 0.5 * (1. - PR) * SM4(IJLM)) * VL * VM / (60. * ATB)
      GO TO 95
   93 SM(IJLM) = PRX* (BDA2 * SM1(IJLM)+DYFAC*ADB2*SM2(IJLM)+DXYFAC*SM4(
     *IJLM))*VL*VM/(60.*ATB)
```

```
   95 CONTINUE
      GO TO 189
  100 DEP(K) = DEP(K-1)
  189 IJ=0
      DO 200 I= 1, 4
      AB(NOD(I))= AB(NOD(I)) + ATB
C
C-----SUPERIMPOSE THE ELEMENT STIFFNESS MATRIX TO FORM THE OVERALL
C-----STIFFNESS MATRIX
C
      DO 200 J= I, 4
      IJ=IJ+1
      DO 200 L=1, 3
      DO 200 M=1, 3
      IJLM=M+(L-1)*3+(IJ-1)*9
      IF( I .EQ. J .AND. M .LT. L) GO TO 200
      IH= (NOD(I)      -1)*NB*3+1+ (L-1)*NB+ (NOD(J)-NOD(I))*3+ M- L
      C(    IH)= C(    IH)+ SM(IJLM)
  200 CONTINUE
C
C-----SUPERIMPOSE THE ELEMENT FLEXIBILITY MATRIX TO FORM THE OVERALL
C-----FLEXIBILITY MATRIX OF THE SUBGRADE
C
      DO 541 I=1, NONY
      I1= (I-1)/NY+1
      I2= I-(I1-1)*NY
      IF( I .GT. NX1*NY) I1= I1+1
      IF(NCC((I1-1)*NY+I2) .EQ. 0) GO TO 1502
      H((I+1)*I/2)= H((I+1)*I/2)+1
      GO TO 541
 1502 IF( I-(I-1)/NY*NY-1) 512, 502, 512
  502 IF( I-1) 506, 504, 506
  504 DEFF= 4*DEP(1)
      GO TO 600
  506 IF( I-NONY+ NY1) 510, 508, 510
  508 DEFF=4*DEF((NX-1-NSLAB)*NY1+1)
      GO TO 600
  510 DEFF= 2*(DEF(I-I/NY)+ DEF(I-I/NY-NY1))
      GO TO 600
  512 IF( I-(I-1)/NY*NY-NY) 522, 514, 522
  514 IF( I-NY) 518, 516, 518
  516 DEFF= 4*DEF(NY1)
      GO TO 600
  518 IF(I-NONY) 510, 520, 510
  520 DEFF= 4*DEF((NX-NSLAB)* NY1)
      GO TO 600
  522 IF( I-NY) 524, 600, 526
  524 DEFF= 2*(DEF(I)+ DEF(I-1))
      GO TO 600
```

```
526 IF(I-NONY+ NY1) 530, 600, 528
528 DEFF= 2*(DEF(I-I/NY-NY1)+ DEF(I-I/NY-NY))
    GO TO 600
530 DEFF= DEF(I-I/NY)+ DEF(I-I/NY-1)+ DEF(I-I/NY-NY1)+ DEF(I-I/NY-NY)
600 DO 542 L=1, NSYM
    IF( L .EQ. 5) GO TO 542
    IF( L-2) 270, 272, 274
270 SIGX=1
    SIGY=1
    GO TO 290
272 IF( NSYM .EQ. 3) GO TO 542
    SIGX=-1
    SIGY= 1
    GO TO 290
274 IF(L-3) 276, 276, 278
276 SIGX= 1
    SIGY=-1
    GO TO 290
278 SIGX= -1
    SIGY=-1
290 DO 540 J=I, NONY
    J1= (J-1)/NY+1
    J2= J-(J1-1)*NY
    IF( J .GT. NX1*NY) J1= J1+1
    IF ( L .EQ. 1 .AND. I .EQ. J .OR. L .EQ. 2 .AND. I .LE. NY .AND. I
   *  .EQ. J .OR. L .EQ. 3 .AND. I .EQ. (I-1)/NY*NY+1 .AND. I .EQ. J
   *  .OR. L .EQ. 4.AND. I .EQ. 1 .AND. J .EQ. 1) GO TO 222
    GO TO 224
222 AAA= DEFF
    GO TO 226
224 AAA= 1/ (3.141593*SQRT((X(I1)-SIGX*X(J1))**2+(Y(I2)-SIGY*Y(J2))**
   *  2))
226 H((J+1)*J/2-J+I)= H((J+1)*J/2-J+I)+ AAA
540 CONTINUE
542 CONTINUE
541 CONTINUE
C
C-----STORE THE FLEXIBILITY MATRIX OF THE SUBGRADE
C
    DO 9541 I=1, NOO
9541 HD(I)= H(I)/YMSPRS
C
C-----INVERT THE FLEXIBILITY MATRIX TO OBTAIN THE STIFFNESS MATRIX OF
C-----THE SUBGRADE
C
    CALL SINV( H, NONY, 1.0E-07, IER,NOO)
    WRITE(6, 127) IER
    IF( IER .NE. 0) GO TO 6000
    DO 545 I=1, NOO
```

```
  545 H(I)=H (I)*YMSPRS
C
C-----STIFFNESS MATRIX OF THE SUBGRADE IS ADDED TO THE STIFFNESS MATRIX
C-----OF THE SLAB TO OBTAIN THE STIFFNESS MATRIX OF THE SYSTEM
C
      DO 172 I=1, NO2, 3
      IF(NCC((I-1)/3+1) .NE. 0) GO TO 172
      IF( I .GT. NO1  .AND. I .LE. NO1 +NY*3) GO TO 172
      IF( I- NO1) 190, 190, 191
  190 IK= (I-1)/3+1
      GO TO 192
  191 IK= (I-1)/3+1-NY
  192 DO 171 J=1, NB, 3
      IG= IK+ (J-1)/3
      IF( I .LE. NO1 .AND. IG .GT. NO13 .OR. IG .GT. NONY) GO TO 171
      IF(NCC((I-1)/3+1+(J-1)/3) .NE. 0) GO TO 171
      IH= (I-1)*NB+J
      C(   IH)= C(   IH)+ H((IG+1)*IG/2-(J-1)/3)
  171 CONTINUE
  172 CONTINUE
      IF( NSLAB .EQ. 1) GO TO 207
      NYNB= NY*3*NB
C
C-----STORE THE STIFFNESS COEFFICIENTS AT THE JOINT
C
      DO 203 I=1, NYNB
  203 CO(I)= C(NOB1+I)
C
C-----ADJUST THE STIFFNESS COEFFICIENTS AS A RESULT OF SYMMETRY
C
      DO 205 I=1, NY
  205 C(    (I-1)*NB*3+ 1+NOB1)= 1.0E 20
  207 IF( NSYM .EQ. 1 .OR. NSYM .EQ. 5) GO TO 208
      IF( NSYM-3) 173, 175, 173
  173 DO 174 I=1, NY
  174 C(   ((I-1)*3+2)*NB+1)= 1.0E 20
      IF(NSYM .EQ. 2) GO TO 208
  175 DO 176 I=1, NO23,NY
  176 C(    ((I-1)*3+1)*NB+1)= 1.0E 20
C
C-----APPLY GAUSS ELIMINATION TO FORM AN UPPER TRIANGULAR COEFFICIENT
C-----MATRIX, WHICH WILL BE USED LATER FOR ITERATION
C
  208 DO 215 N=1,NSLAB
  215 CALL TRIG(N)
      IF(NIC .GT. 1) GO TO 931
C
C-----DETERMINE THE COORDINATES OF THE CENTER OF EACH SLAB FOR COMPUTING
C-----WARPING
```

```
C
      IF(NSYM-2) 7020, 7030, 7040
 7020 XX(1)= X(NX1)/2.
      YY(1)= Y(NY)/2.
      GO TO 7070
 7030 XX(1)=0.
      YY(1)= Y(NY)/2.
      GO TO 7070
 7040 IF(NSYM-4) 7050, 7060, 7020
 7050 XX(1)= X(NX1)/2.
      YY(1)=0.
      GO TO 7070
 7060 XX(1)=0.
      YY(1)= 0.
 7070 IF(NSLAB .EQ.1) GO TO 7080
      XX(2)= (X(NX)+X(NX1))/2.
      YY(2)= Y(NY)/2.
      IF(NSYM .EQ. 3 .OR. NSYM .EQ. 4) YY(2)=0.
C
C-----READ IN GAP, TEMP, AND LOAD DATA
C
 7080 READ (5,122) NGAP, NTEMP, NLOAD, ICL, NCK, NWT , TEMP, Q, DEL,
     *  DELF, RPJ, ICLP.
C***********************************************************************
C
      WRITE(6,121) NGAP, NTEMP, NLOAD, ICL, NCK, NWT , TEMP, Q, RPJ, DEL
     * ,DELF, ICLP
C
C-----READ IN NODE LOCATIONS USED TO CHECK CONVERGENCE
C
      READ (5, 103) (NODCK(I), I=1, NCK)
C***********************************************************************
C
      WRITE (6,124) (NODCK(I), I=1, NCK)
      IF(NREAD-1) 678, 677, 981
C
C-----READ IN LOCATIONS OF SPECIFIED OR PRE-CALCULATED CURL
C
  677 READ (5,136) (CURL(I), I=1, NO23)
C***********************************************************************
C
      WRITE(6,120) (I, CURL(I), I=1, NO23)
      GO TO 983
  678 DO 680 I=1, NO23
  680 CURL(I)=0.
      IF(NGAP .EQ. 0) GO TO 1069
C
C-----READ IN GAP LOCATIONS
C
```

```
      READ(5,103) (NG(I), I=1,NGAP)
C***********************************************************************
C
C-----READ IN LOCATIONS OF SPECIFIED OR PRE-CALCULATED CURL
C
      READ(5,110) (CURL(NG(I)), I=1, NGAP)
C***********************************************************************
C
      WRITE(6,134) (NG(I), CURL(NG(I)), I=1, NGAP)
C-----COMPUTE THE CURLING OF SLAB DUE TO TEMPERATURE DIFFERENTIALS AND
C-----ADD IT TO THE GAP TO FORM TOTAL CURLING AND GAP
C
 1069 IF(NTEMP .EQ. 0) GO TO 981
      DO 3 I=1, NX
      IF(I-NX1) 7100, 7100, 7200
 7100 N=1
      GO TO 7300
 7200 N=2
 7300 DO 3 J=1, NY
    3 CURL((I-1)*NY+J)= 0.0000025*TEMP*((X(I)-XX(N))**2+ ( Y(J)-YY(N))**
     *  2)/T+ CURL((I-1)*NY+J)
  981 WRITE(6,120) (I, CURL(I), I=1, NO23)
      IF(NWT)296,983,292
C
C-----IF NWT IS NOT ZERO, COMPUTE THE VERTICAL NODAL FORCES DUT TO THE
C-----WEIGHT OF SLAB
C
C-----READ IN WEIGHT OF SLAB FOUNDATION OF NON-CONSTANT CROSS-SECTION
C-----AND/OR LIVE LOAD AS UNIFORMLY DISTRIBUTED LOADING
C
  292 READ 145,QSLAB
C***********************************************************************
C
      QQ=QSLAB
      DO 295 I=1, NO23
  295 FO(I)=QSLAB*AB(I)
      GO TO 931
C-----DISTRIBUTE  WEIGHT OF SLAB OF CONSTANT, RECTANGUALR CROSS SECTION
C
  296 DO 297 I=1,NO23
  297 FO(I)=WK*AB(I)
      QQ=WK
      GO TO 931
C
C-----IF NWT IS ZERO, INITIALIZE THE NODAL FORCES TO ZERO
C
  983 DO 952 I=1, NO23
  952 FO(I)=0
  931 DO 1931 I=1, NO23
```

```
 1931 PP(I)=0.
      DO 18 I=1, NO2
   18 P(   I)= 0
      IF(NIC .GT. 1) GO TO 871
      IF( NLOAD .EQ. 0) GO TO 933
C
C-----COMPUTE NODAL FORCES DUE TO APPLIED LOADINGS
C
C-----READ IN LOCATION OF APPLIED LOADS
C
      READ (5,103) (NL(I), I=1, NLOAD)
C***********************************************************************
C
      DO 201 I=1, NLOAD
C
C-----READ IN DISTRIBUTION OF LOAD ON EACH LOADED ELEMENT
C
  201 READ(5,114)  XDA(I,1), XDA(I,2), YDA(I,1), YDA(I,2)
C***********************************************************************
C
      WRITE(6,106)
      DO 202 I=1, NLOAD
  202 WRITE(6,115) NL(I), XDA(I,1), XDA(I,2), YDA(I,1), YDA(I,2)
C
C-----FIND FORCE DUE TO APPLIED LIVE LOAD
C
      DO 300 K=1, NLOAD
      IF (NSLAB .EQ. 1) GO TO 803
      IF( NL(K)-(NX1-1)*NY1) 803, 803, 801
  801 I1= (NL(K)-1)/NY1+1
      I2= NL(K)-(I1-1)*NY1
      NOD(1)= NL(K)+ NY1+ I1
      GO TO 804
  803 I1= (NL(K)-1)/NY1
      I2= NL(K)-I1*NY1
      NOD(1)= NL(K)+ I1
  804 NOD(2)= NOD(1)+ 1
      NOD(3)= NOD(1)+ NY
      NOD(4)= NOD(3)+ 1
C
C-----FIND CONTRIBUTING LOADED AREA FOR EACH NODE
C
      A= (X(  I1+2)- X(  I1+1))/2
      B= (Y(I2+1)-Y(I2))/2
C
C-----DETERMINE FORCE ACTING ON NODE DUE TO APPLIED LOADING
C
      QK= Q    *A*B
      NOD13= (NOD(1)-1)*3
```

```
      NOD33= (NOD(3)-1)*3
      XD(1)= XDA(K,2)- XDA(K,1)
      YD(1)= YDA(K,2)- YDA(K,1)
      XD(2)= (XDA(K,2)+ XDA(K,1))/2
      YD(2)= (YDA(K,2)+ YDA(K,1))/2
      DO 300 I=1, 4
      IF(I-2) 210, 220, 230
  210 XI=-1
      YI= -1
      GO TO 260
  220 XI= -1
      YI= 1
      GO TO 260
  230 IF(I-3) 240, 240, 250
  240 XI= 1
      YI= -1
      GO TO 260
  250 XI= 1
      YI= 1
  260 FO(NOD(I))  =FO( NOD(I)  )+ 0.25*QK*(1+ XI*XD(2))*(1+ YI*YD(2))*
     *  XD(1)*YD(1)
  300 CONTINUE
  933 IF( NSLAB .EQ. 1) GO TO 871
      DO 873 I=1, NY
  873 FO(NO13-NY+I)= FO(NO13-NY+I)+ FO(NO13+I)
C
C-----FIND DEFLECTION DUE TO SLAB WEIGHT AND/OR UNIFORMLY DISTRIBUTED
C-----LIVE LOAD
C
  871 DO 302 I=1, NO23
  302 F((I-1)*3+1)=FO(I)
      IF(NLOAD .EQ. 0 .AND. NWT .EQ. 0 ) GO TO 1303
C
C-----COMPUTE DEFLECTIONS AS IF ONLY ONE SLAB EXISTS
C
      CALL LOADM(1)
 1303 WRITE(6,139) NIC
      WRITE(6,133)
C
C-----UNDER A GIVE CONTACT CONDITION, APPLY ITERATION PROCESS UNTIL THE
C-----DEFLECTIONS CONVERGE
C
  310 IC= IC+ 1
      DO   2 I=1, NO23
      IF(IC .EQ. 1 .AND. I .GT. NO13) GO TO 1932
    2 PF(  I)= F(    (I-1)*3+1)
 1932 IF( NSLAB .EQ. 1) GO TO 326
      IF ( IC .EQ. 1) GO TO 311
      DO 945 I=NO1P, NO2
```

```
  945 F(   I)=0
      DO 947 I=NO13P, NO23
  947 F(   (I-1)*3+1)= FO(I)
C
C-----IF TWO SLABS EXIST, DETERMINE THE NODAL FORCES IN THE RIGHT SLAB
C-----DUE TO THE DEFLECTIONS OF THE SUBGRADE.
C
      DO 797 I=NO13P, NO23
      IF(NCC(I) .NE. 0) GO TO 797
      IF( I .LE. NO13+NY) GO TO 797
      K= I- NY
      DO 795 J=1, NO23
      IF(NCC(J) .NE. 0) GO TO 795
      IF( J .GT. NO13 .AND. J .LE. NO13+NY) GO TO 795
      IF( J- NO13) 1030, 1030, 1032
 1030 M=J
      GO TO 1034
 1032 M=J-NY
 1034 IF (J .GT. I-NB/3 .AND.J .LT. I+NB/3 .AND. J .GT. NO13) GO TO 748
      IF(K-M) 742, 742, 744
  742 HH= H((M+1)*M/2-M+K)
      GO TO 754
  744 HH= H((K+1)*K/2-K+M)
  754 IF(NTEMP.EQ.0.AND.NLOAD.NE.0.AND.CURL(J).LE.0)GO TO 746
      F((I-1)*3+1)= F((I-1)*3+1)-(PF(J)-CURL(J))*HH
      GO TO 795
  746 F((I-1)*3+1)= F((I-1)*3+1)- PF(J)*HH
      GO TO 795
  748 IF (K-M) 786, 786, 788
  786 HH= H((M+1)*M/2-M+K)
      GO TO 792
  788 HH= H((K+1)*K/2-K+M)
  792 IF(NTEMP .EQ. 0 .AND. NLOAD .NE. 0 .AND. CURL(J ) .LE. 0)GO TO 795
      F(    (I-1)*3+1)= F(   (I-1)*3+1)+ CURL(J)*HH
  795 CONTINUE
  797 CONTINUE
C
C-----EQUATE THE DEFLECTIONS OF THE JOINT AT THE RIGHT SLAB TO THOSE AT
C-----THE LEFT SLAB
C
  311 DO 312 I=NO13P, NO13NY
  312 F((I-1)*3+1)= 1.0E 20*(PF(I)+ RFJ*(F((I-NY-1)*3+1)-PF(I)))
C
C-----COMPUTE DEFLECTIONS OF THE RIGHT SLAB
C
      CALL LOADM(2)
C
C-----DETERMINE THE NDOAL FORCES IN THE LEFT SLAB DUE TO THE DEFLECTIONS
C-----OF THE SUBGRADE
```

```
C
  326 DO 315 I=1, NO1
  315 F(  I)= 0
      DO 1100 I=1, NO13
 1100 F(  (I-1)*3+1)= FO(I)
      DO1395 I=1, NO13
      IF(NCC(I) .NE. 0) GO TO 1395
      DO 395 J=1, NO23
      IF(NCC(J) .NE. 0) GO TO 395
      IF( J .GT. NO13 .AND. J .LE. NO13+NY) GO TO 395
      IF( J- NO13) 2030, 2030, 2032
 2030 M=J
      GO TO 2034
 2032 M=J-NY
 2034 IF (J .GT. I-NB/3 .AND.J .LT. I+NB/3 .AND. J .LE. NO13) GO TO 348
      IF(I-M) 342, 342, 344
  342 HH= H(( M+1)*M/2- M+ I)
      GO TO 354
  344 HH= H((I+1)*I/2- I+ M)
  354 IF(NTEMP .EQ. 0 .AND. NLOAD .NE. 0 .AND. CURL(J ) .LE. 0)GO TO 346
      F((I-1)*3+1)= F((I-1)*3+1)-(PF(J)-CURL(J))*HH
      GO TO 395
  346 F((I-1)*3+1)= F((I-1)*3+1)- PF(J)*HH
      GO TO 395
  348 IF (I-M) 386, 386, 388
  386 HH= H((M+1)*M/2-M+I)
      GO TO 392
  388 HH= H((I+1)*I/2-I+M)
  392 IF(NTEMP .EQ. 0 .AND. NLOAD .NE. 0 .AND. CURL(J ) .LE. 0)GO TO 395
      F(   (I-1)*3+1)= F(   (I-1)*3+1)+ CURL(J)*HH
  395 CONTINUE
 1395 CONTINUE
      IF( NSLAB .EQ. 1)  GO TO 324
C
C-----COMPUTE THE VERTICAL NODAL FORCES ALONG THE JOINT IN THE LEFT SLAB
C-----DUE TO THE DEFLECTIONS OF THE RIGHT SLAB
C
      DO 316 I=1, NY
      J= (I-1)*NB*3+ 1
      N3= (NO13- NY- 1+ I)*3+ 1
      DO 314 K=1, NB
      JLBK= J-(LA+1-K)*LA
      IF( JLBK .LE. 0) GO TO 314
      F(   N3)= F(   N3)- CO(JLBK)* F(   (I-1)*3- LA+ K +NO1)
  314 CONTINUE
      DO 316 K=1, LA
      IF(I .EQ. NY .AND. K .GT. LA-3) GO TO 324
  316 F(   N3)= F(   N3)- CO(J+K)* F(   (I-1)*3+1+ K +NO1)
C
```

```
C-----COMPUTE DEFLECTIONS OF THE LEFT SLAB
C
  324 CALL LOADM(1)
C
C-----COMPUTE THE DIFFERENCE IN DEFLECTIONS AT SEVERAL SPECIFIED NODES
C-----BETWEEN TWO ITERATIONS AND WRITE OUT THE RESULTS FOR VISUAL
C-----INSPECTION
C
      DO 934 I=1, NCK
  934 DF(   NODCK(I))=F(   (NODCK(I)-1)*3+1)  -PF(  NODCK(I))
      WRITE(6,119)  (NODCK(I), DF(  NODCK(I)), I=1, NCK), IC
      IF( ABS(F(   (NODCK(1)-1)*3+1))  .LT. 5.0    ) GO TO 331
      WRITE(6, 123)  IC, F(   (NODCK(1)-1)*3+1)
      GO TO 900
C
C-----CHECK CONVERGENCE UNDER A GIVE CONTACT CONDITION AND REPEAT THE
C-----PROCESS IF DESIRED ACCURACY IS NOT OBTAINED.
  331 DO 340 I=1, NCK
      IF(F((NODCK(I)-1)*3+1).EQ.0.)GO TO 340
      IF(ABS(DF(  NODCK(I))/F(   (NODCK(I)-1)*3+1)) .GT. DEL .AND. IC
     *  .LT. ICL)  GO TO 310
  340 CONTINUE
      IF( ICCC .EQ. 1 .OR. NCYLE .EQ. 1)  GO TO 9341
C
C-----ASSIGN A NEW CONTACT CONDITION
C
      DO 3430 I=1, NO23
      GAP(I)= F((I-1)*3+1)- CURL(I)
      IF(GAP(I))  3410, 3420, 3420
 3410 NCC(I)=1
      GO TO 3430
 3420 NCC(I)= 0
 3430 CONTINUE
C
C-----WRITE OUT THE VALUE OF THE GAP AT EACH NODE
C
      WRITE(6,138)
      WRITE(6,119)  (I,GAP(I), I=1, NO23)
C
C-----CHECK CONVERGENCE BETWEEN TWO DIFFERENT CONTACT CONDITIONS AND
C----REPEAT THE PROCESS IF DESIRED ACCURACY IS NOT OBTAINED
C
      DO 3432 I=1, NCK
      IF(F((NODCK(I)-1)*3+1).EQ.0.)GO TO 3432
      IF( ABS((F((NODCK(I)-1)*3+1)- PPF(NODCK(I)))/F((NODCK(I)-1)*3+1))
     * .GT. DEL     .AND. NIC .LT. NCYLE) GO TO 965
 3432 CONTINUE
C
C-----UNDER THE FINAL CONTACT CONDITION, CHANGE ICF  TO ICLF AND DEL TO
```

```
C-----DELP TO OBTAIN MORE ACCURATE RESULTS
 9341 IF(ICCC .EQ. 1) GO TO 341
      ICCC=ICCC+1
      ICL=ICLP
      DEL=DELP
      GO TO 310
  341 ICC= ICC+1
C
C-----WRITE OUT DEFLECTION AT EACH NODE
C
      WRITE(6, 116) IC
      WRITE( 6,112)
      WRITE(6,119) (I, F(   (I-1)*3+ 1), I=1, NO23)
      IF( ICC .EQ. 1) GO TO 330
      IF(NWT .EQ. 0) GO TO 330
C
C-----DETERMINE THE FINAL CURL AS THE DIFFERENCE BETWEEN THE INITIAL
C-----CURL AND THE DEFLECTION AT EACH NODE
C
      DO 938 I=1, NO23
  938 CURL(I)= F((I-1)*3+1)- CURL(I)
      WRITE(6,129) (I,CURL(I), I=1, NO23)
C
C-----CHANGE SIGN ON VALUE OF CURL; NEGATIVE SIGN INDICATES GAP BETWEEN
C-----SLAB AND SUBGRADE
C
      DO 3820 I=1, NO23
 3820 CURL(I) = -CURL(I)
      IF(NPUNCH .EQ. 1) WRITE (7,136) (CURL(I), I=1, NO23)
  330 WRITE (6,113)
C
C-----COMPUTE THE STRESSES AT DESIGNATED NODAL POINTS
C
      IF(ISOTRY) 950,8000,8100
C
C-----CALL SUBROUTINE SOLID IF SLAB IS CONSTANT THICKNESS SLAB
C
 8000 CALL SOLID(NPRINT,NY,NX1,NX,PR,RM,T,NSYM,NKENT)
      GO TO 8500
C
C-----CALL SUBROUTINE TEE IF SLAB IS STIFFENED SECTION SLAB
C
 8100 CALL TEE(NPRINT,NY,NX1,NX,DXYFAC,FRX,TEX,TEY,NSYM,DYFAC,NKENT)
 8500 NKENT=1
      IF(ICC.LT.2)GO TO 310
  900 CONTINUE
C
C-----ECHO-PRINT SLAB DIMENSIONS AND OTHER PROBLEM VARIABLES USED IN
C-----ANALYZING SLAB-ON-GROUND CONSTRUCTED OVER EXPANSIVE SOIL FOR EASY
```

```
C-----REFERENCE
C
      PRINT 141
      PRINT 142,XXL,XEC,XYMX
      IF(LIFT.EQ.0) PRINT 147
      IF(LIFT.EQ.1) PRINT 148
      IF(LIFT.EQ.2) PRINT 149
      PRINT 143,XXS,T,QQ,Q
      PRINT 144,MMM
  950 CONTINUE
 6000 CONTINUE
      STOP
      END
      SUBROUTINE SOLID(NPRINT,NY,NX1,NX,PR,RM,T,NSYM,NKENT)
C
C-----SUBROUTINE CALCULATES STRESSES FOR SLAB OF CONSTANT THICKNESS
C
      DIMENSION C(26325),F(600),G(26325),NO(2),X(200),Y(200),STR(200,6),
     *NP(200),XMOM(200),YMOM(200),XYMOM(200),MXDIF(200),MYDIF(200),XT(20
     *0),YT(200),DX(200),DY(200),MXYDIF(200),MYXDIF(200),VX(200),VY(200)
     *,YXMOM(200)
C
      COMMON C,F,G,NO,NB,X,Y,STR,NP,XMOM,YMOM,XYMOM,XT,YT,DX,DY,MXDIF,
     *MYDIF,MXYDIF,MYXDIF,YXMOM,VX,VY
C
      REAL MXDIF, MYDIF, MXYDIF, MYXDIF
C
    2 FORMAT(//6X,'NODE',8X,'MOMENT X',10X,'MOMENT Y',9X,'MOMENT XY',/)
    4 FORMAT(/////)
    7 FORMAT(I5,6E12.5)
  111 FORMAT (5X, I5, 6(5X,E13.6))
C
      NO1=NX1 * NY * 3
      NO13 = NO1 / 3
C
C-----BEGIN SOLVING STRESS MATRIX FOR INTERNAL MOMENTS
C
      DO 450 I=1, NPRINT
      I1= (NP(I)-1)/NY+ 1
      I2= NP(I)-(I1-1)*NY
      IF( NP(I)- NO13) 355, 355, 357
  355 N=0
      K1=0
      NXX= NX1
      NP1= (NP(I)-1)*3
      GO TO 358
  357 N=NO1
      N1= NO13
      NXX= NX
```

```
      NP1= (NP(I)-NO13-1)*3
  358 NP2= NP1+ 3*NY
      NP3= NP1- 3*NY
C
C----------ZERO OUT OLD STRESS MATRIX
C
      DO 1359 J=1, 3
 1359 STR(I,J)=0.
C-----DETERMINE IF NODE IS ON PERIMETER OF SLAB
C----------CORNER NODE?
      IF( NP(I) .EQ. NY*NXX)GO TO 430
C----------TOP EDGE NODE?
      IF( NP(I) .EQ. (NP(I)-1)/NY*NY+NY) GO TO 375
C----------SIDE EDGE NODE?
      IF( NP(I) .GE. NY*(NXX-1)+1) GO TO 420
C
C---------DETERMINE CONTRIBUTING AREAL DIMENSIONS AND SOLVE FOR M(I)
      A= (X(  I1+1)- X(  I1))/2
      B= (Y(I2+1)- Y(I2))/2
      ADB= A/B
      BDA= B/A
      STR(I,1)    = (6*(BDA+ PR*ADP)*F(N+  NP1+1)- 8*A*PR*F(N+  NP1+2)+
     *  8*B*    F(N+  NP1+3)- 6*ADB*PR*F(N+  NP1+4)- 4*A*PR*F(N+  NP1+5)-
     *  6*BDA*    F(N+  NP2+1)+ 4*B*    F(N+  NP2+3))/(4*A*B)
      STR(I,2)    = (6*(ADB+ PR*BDA)*F(N+  NP1+1)- 8*A*    F(N+  NP1+2)+
     *  8*B*PR*F(N+  NP1+3)- 6*ADB*    F(N+  NP1+4)- 4*A*    F(N+  NP1+5)-
     *  6*BDA*PR*F(N+  NP2+1)+ 4*B*PR*F(N+  NP2+3))/(4*A*B)
      STR(I,3)     = 0.5*(1-PR)*(-2*F(N+  NP1+1)+ 4*B*F(N+  NP1+2)- 4*A*
     *  F(N+  NP1+3)+ 2*F(N+  NP1+4)+ 4*A*F(N+  NP1+6)+ 2*F(N+  NP2+1)-
     *  4*B*F(N+  NP2+2)- 2*F(N+  NP2+4))/(4*A*B)
C----------DETERMINE LOCATION OF NODE IN NODAL GRIDWORK
      IF( NP(I)-1-N1) 370, 360, 370
  360 CON=6
      GO TO 435
  370 IF(NP(I) .EQ. (NP(I)-1)/NY*NY+1 ) GO TO 420
C
C---------DETERMINE CONTRIBUTING AREAL DIMENSIONS AND SOLVE FOR M(J)
C
  375 A= (X(I1+1)- X(I1))/2
      B= (Y(I2)-Y(I2-1))/2
      ADB= A/B
      BDA= B/A
      STR(I,1)    = STR(I,1)    + (-6*ADB*PR*F(N+  NP1-2)+ 4*A*PR*F(N+  NP1-
     *  1)+ 6*(BDA+ PR*ADB)*F(N+  NP1+1)+ 8*A*PR*F(N+  NP1+2)+ 8*B*
     *  F(N+  NP1+3)- 6*BDA*    F(N+  NP2+1)+ 4*B*    F(N+  NP2+3))/
     *  (4*A*B)
      STR(I,2)    = STR(I,2)    + (-6*ADB*    F(N+  NP1-2)+ 4*A*    F(N+  NP1-
     *  1)+ 6*(ADB+ PR*BDA)*F(N+  NP1+1)+ 8*A*    F(N+  NP1+2)+ 8*B*PR*
     *  F(N+  NP1+3)- 6*BDA*PR*F(N+  NP2+1)+ 4*B*PR*F(N+  NP2+3))/
```

```
      *  (4*A*B)
       STR(I,3)    = STR(I,3)    + 0.5*(1-PR)*(-2*F(N+   NP1-2)- 4*A*F(N+
      *  NP1)+ 2*F(N+   NP1+1)+ 4*B*F(N+   NP1+2)+ 4*A*F(N+   NP1+3)+ 2*
      *  F(N+   NP2-2)- 2*F(N+   NP2+1)- 4*B*F(N+   NP2+2))/(4*A*B)
C----------DETERMINE LOCATION OF NODE IN NODAL GRIDWORK
       IF (NP(I) .EQ. NY+ N1) GO TO 360
       IF( NP(I) .EQ. (NP(I)-1)/NY*NY+NY) GO TO 430
       IF( NP(I)-NY-N1) 410, 410, 420
  410 CON=3
       GO TO 435
C
C---------DETERMINE CONTRIBUTING AREAL DIMENSIONS AND SOLVE FOR M(K)
C
  420 A=(X(  I1)- X(  I1-1))/2
       B= (Y(I2+1)-Y(I2))/2
       ADB= A/B
       BDA= B/A
       STR(I,1)    = STR(I,1)    + (-6*BDA*    F(N+   NP3+1)- 4*B*    F(N+   NP3+
      *  3)+ 6*(BDA+ PR*ADB)*F(N+   NP1+1)-8*A*PR*F(N+   NP1+2)- 8*B*
      *  F(N+   NP1+3)- 6*ADB*PR*F(N+   NP1+4)- 4*A*PR*F(N+   NP1+5))/
      *  (4*A*B)
       STR(I,2)    = STR(I,2)    + (-6*BDA*PR*F(N+   NP3+1)- 4*B*PR*F(N+   NP3+
      *  3)+ 6*(ADB+ PR*BDA)*F(N+   NP1+1)- 8*A*   F(N+   NP1+2)- 8*B*PR*
      *  F(N+   NP1+3)- 6*ADB*    F(N+   NP1+4)- 4*A*    F(N+   NP1+5))/
      *  (4*A*B)
       STR(I,3)    = STR(I,3)    +0.5*(1-PR)*(-2*F(N+   NP3+1)+ 4*B*F(N+
      *  NP3+2)+ 2*F(N+   NP3+4)+ 2*F(N+   NP1+1)- 4*B*F(N+   NP1+2)- 4*A*
      * F(N+   NP1+3)- 2*F(N+   NP1+4)+ 4*A*F(N+   NP1+6))/(4*A*B)
       IF (NP(I) .EQ. NY*(NXX-1)+1)  GO TO 360

C---------DETERMINE CONTRIBUTING AREAL DIMENSIONS AND SOLVE FOR M(L)
C
  430 B= (Y(I2)-Y(I2-1))/2
       A= (X(I1)-X(I1-1))/2
       ADB= A/B
       BDA= B/A
       STR(I,1)    = STR(I,1)    + (-6*BDA*    F(N+   NP3+1)- 4*B*    F(N+   NP3+
      *  3)- 6*ADB*PR*F(N+   NP1-2)+ 4*A*PR*F(N+   NP1-1)+ 6*(BDA+ PR*ADB)*
      *  F(N+   NP1+1)+8*A*PR*F(N+   NP1+2)- 8*B*   F(N+   NP1+3))/(4*A*B)
       STR(I,2)    = STR(I,2)    + (-6*BDA*PR*F(N+   NP3+1)- 4*B*PR*F(N+   NP3+
      *  3)- 6*ADB*    F(N+   NP1-2)+ 4*A*    F(N+   NP1-1)+ 6*(ADB+ PR*BDA)*
      *  F(N+   NP1+1)+ 8*A*   F(N+   NP1+2)-8*B*PR*F(N+   NP1+3))/(4*A*B)
       STR(I,3)    = STR(I,3)    + 0.5*(1-PR)*(-2*F(N+   NP3-2)+ 2*F(N+   NP3
      *  +1)+ 4*B*F(N+   NP3+2)+ 2*F(N+   NP1-2)- 4*A*F(N+   NP1)- 2*F(N+
      *  NP1+1)- 4*B*F(N+   NP1+2)+ 4*A*F(N+   NP1+3))/(4*A*B)
C----------DETERMINE LOCATION OF NODE IN NODAL GRIDWORK
       IF( NP(I) .EQ. NY*NXX)GO TO 360
       IF( NP(I) .EQ. (NP(I)-1)/NY*NY+NY .OR. NP(I) .GE. NY*(NXX-1)+1)
      *    GO TO 410
```

```
      CON= 1.5
C
C-----SOLUTION OF STRESS MATRIX COMPLETED
C
C-----CONVERT INTERNAL MOMENT TO STRESS
C
  435 DO 436 J=1, 3
  436 STR(I,J) = RM*CON*STR(I,J)/T**2
      IF( NP(I) .EQ. (NP(I)-1)/NY*NY+1 .AND. NSYM .NE. 3 .AND. NSYM .NE.
     * 4 .OR. NP(I) .EQ. (NP(I)-1)/NY*NY+ NY) STR(I,2)=0.
      IF( NP(I) .LE. NY .AND. NSYM .NE. 2 .AND. NSYM .NE. 4 .OR. NP(I)
     * .GT. (NX1-1)*NY .AND. NP(I) .LE. (NX1+1)*NY .OR. NP(I) .GT.
     *  (NX-1)*NY) STR(I,1)=0.
      IF( STR(I,1) .EQ. 0 .OR. STR(I,2) .EQ. 0) STR(I,3)=0.
C-----DETERMINE MAJOR AND MINOR STRESSES AND HORIZONTAL SHEAR (X-Y PLANE
      STR(I,6)=SQRT(0.25*(STR(I,1)-STR(I,2))**2+ STR(I,3)**2)
      STR(I,4)= (STR(I,1)+ STR(I,2))/2.- STR(I,6)
      STR(I,5)= (STR(I,1)+ STR(I,2))/2.+ STR(I,6)
C
C-----PRINT STRESS RESULTS
C
      WRITE(6,111) NP(I), (STR(I,J), J=1,6)
 9876 CONTINUE
  450 CONTINUE
C
C-----CONVERT STRESS TO MOMENT
C
      PZQP=T*T/6.
      PRINT 4
      PRINT 2
      DO 475 LP=1,NPRINT
      XMOM(LP)=STR(LP,1)*PZQP
      YMOM(LP)=STR(LP,2)*PZQP
      XYMOM(LP)=STR(LP,3)*PZQP
C
C-----PRINT PRINCIPAL DIRECTION MOMENTS PLUS TWISTING MOMENT
C
  475 PRINT 111,NP(LP),XMOM(LP),YMOM(LP),XYMOM(LP)
      IF(NKENT.EQ.0)GO TO 600
C
C-----CALCULATE SHEAR FORCES
C
      CALL SHEAR (NX, NY)
C
  600 RETURN
      END
      SUBROUTINE TEE(NPRINT,NY,NX1,NX,DXYFAC,FRX,TEX,TEY,NSYM,DYFAC,NKEN
     *T)
C
```

```
C-----SUBROUTINE CALCULATES STRESSES FOR SLAB WITH GRADE BEAMS
C
      DIMENSION C(26325),F(600),G(26325),NO(2),X(200),Y(200),STR(200,6),
     *NP(200),XMOM(200),YMOM(200),XYMOM(200),MXDIF(200),MYDIF(200),XT(200
     *0),YT(200),DX(200),DY(200),MXYDIF(200),MYXDIF(200),VX(200),VY(200)
     *,YXMOM(200)
C
      COMMON C,F,G,NO,NB,X,Y,STR,NP,XMOM,YMOM,XYMOM,XT,YT,DX,DY,MXDIF,
     *MYDIF,MXYDIF,MYXDIF,YXMOM,VX,VY
C
      REAL MXDIF, MYDIF, MXYDIF, MYXDIF
C
    1 FORMAT (5X, I5, 6(5X,E13.6))
    2 FORMAT(//6X,'NODE',8X,'MOMENT X',10X,'MOMENT Y',9X,'MOMENT XY',/)
    3 FORMAT(5X,I5,5(5X,E13.6))
    4 FORMAT(/////)
    7 FORMAT(I5,6E12.5)
C
      NO1=NX1 * NY * 3
      NO13 = NO1 / 3
C
C-----BEGIN SOLVING STRESS MATRIX FOR INTERNAL MOMENTS
C
      DO 500 I=1, NPRINT
      I1= (NP(I)-1)/NY+ 1
      I2= NP(I)-(I1-1)*NY
      IF( NP(I)- NO13) 5,5,10
    5 N=0
      N1=0
      NXX= NX1
      NP1= (NP(I)-1)*3
      GO TO 15
   10 N=NO1
      N1= NO13
      NXX= NX
      NP1= (NP(I)-NO13-1)*3
   15 NP2= NP1+ 3*NY
      NP3= NP1- 3*NY
C
C----------ZERO OUT OLD STRESS MATRIX
C
      DO 50 J=1,3
   50 STR(I,J)=0.
C
C-----DETERMINE IF NODE IS ON PERIMETER OF SLAB
C
C----------CORNER NODE?
      IF( NP(I) .EQ. NY*NXX) GO TO 300
C----------TOP EDGE NODE?
```

```
      DENOM=4.*A*B
      ADB= A/B
      BDA= B/A
      STR(I,1)=STR(I,1)+(-6*BDA*F(N+NP3+1)-4*B*F(N+NP3+3)+6*BDA*F(N+NP1+
     *1)-8*B*F(N+NP1+3))/DENOM
      STR(I,2)=STR(I,2)+(6*ADB*F(N+NP1+1)-8*A*F(N+NP1+2)-6*ADB*F(N+NP1+4
     *)-4*A*F(N+NP1+5))*(DYFAC/DENOM)
      STR(I,3)    = STR(I,3)     +   DXYFAC   *(-2*F(N+   NP3+1) + 4*B*F(N+
     *   NP3+2) + 2*F(N+   NP3+4) + 2*F(N+   NP1+1) - 4*B*F(N+   NP1+2) - 4*A*
     * F(N+   NP1+3) - 2*F(N+   NP1+4) + 4*A*F(N+   NP1+6))/(4*A*B)
      IF (NP(I) .EQ. NY*(NXX-1)+1)  GO TO 100
      IF( NP(I)-(NP(I)-1)/NY*NY-1)  300,200,300
C
C----------DETERMINE CONTRIBUTING AREAL DIMENSIONS AND SOLVE FOR M(L)
C
  300 B= (Y(I2)-Y(I2-1))/2
      A= (X(I1)-X(I1-1))/2
      DENOM=4.*A*B
      ADB= A/B
      BDA= B/A
      STR(I,1)=STR(I,1)+(-6*BDA*F(N+NP3+1)-4*B*F(N+NP3+3)+6*BDA*F(N+NP1+
     *1)-8*B*F(N+NP1+3))/DENOM
      STR(I,2)=STR(I,2)+(-6*ADB*F(N+NP1-2)+4*A*F(N+NP1-1)+6*ADB*F(N+NP1+
     *1)+8*A*F(N+NP1+2))*(DYFAC/DENOM)
      STR(I,3)    = STR(I,3)     +   DXYFAC    *(-2*F(N+   NP3-2) + 2*F(N+   NP3
     *   +1) + 4*B*F(N+   NP3+2) + 2*F(N+   NP1-2) - 4*A*F(N+   NP1) - 2*F(N+
     *   NP1+1) - 4*B*F(N+   NP1+2) + 4*A*F(N+   NP1+3))/(4*A*B)
C----------DETERMINE LOCATION OF NODE IN NODAL GRIDWORK
      IF( NP(I) .EQ. NY*NXX)GO TO 100
      IF( NP(I) .EQ. (NP(I)-1)/NY*NY+NY .OR. NP(I) .GE. NY*(NXX-1)+1)
     * GO TO 200
      CON= 1.5
C
C-----SOLUTION OF STRESS MATRIX COMPLETED
C
C-----CONVERT INTERNAL MOMENT TO STRESS
C
  400 STR(I,1) =(FRX * CON * STR(I,1))/(TEX**2)
      STR(I,2) =(FRX * CON * STR(I,2))/(TEY**2)
  450 STR(I,3) =(FRX * CON * STR(I,3))/(TEX**2)
      IF( NP(I) .EQ. (NP(I)-1)/NY*NY+1 .AND. NSYM .NE. 3 .AND. NSYM .NE.
     * 4 .OR. NP(I) .EQ. (NP(I)-1)/NY*NY+ NY) STR(I,2)=0.
      IF( NP(I) .LE. NY .AND. NSYM .NE. 2 .AND. NSYM .NE. 4 .OR. NP(I)
     *  .GT. (NX1-1)*NY .AND. NP(I) .LE. (NX1+1)*NY .OR. NP(I) .GT.
     *  (NX-1)*NY) STR(I,1)=0.
      IF( STR(I,1) .EQ. 0 .OR. STR(I,2) .EQ. 0) STR(I,3)=0.
C
C-----DETERMINE MAJOR AND MINOR STRESSES AND HORIZONTAL SHEAR (X-Y PLANE
C
```

```
      STR(I,6)=SQRT(0.25*(STR(I,1)-STR(I,2))**2+ STR(I,3)**2)
      STR(I,4)= (STR(I,1)+ STR(I,2))/2.- STR(I,6)
      STR(I,5)= (STR(I,1)+ STR(I,2))/2.+ STR(I,6)
C
C-----PRINT STRESS RESULTS
C
      WRITE(6, 1 ) NP(I), (STR(I,J), J=1,6)
 9876 CONTINUE
  500 CONTINUE
C
C-----CONVERT STRESS TO MOMENT
C
      PRINT 4
      PRINT 2
      DO 490 I=1,NPRINT
      XMOM(I)=(STR(I,1)  * TEX**2)/6.
      YMOM(I)=(STR(I,2)  * TEY**2)/6.
      XYMOM(I)=(STR(I,3)  * TEX**2)/6.
C
C-----PRINT PRINCIPAL DIRECTION MOMENTS PLUS TWISTING MOMENT
C
  490 PRINT 3, NP(I),XMOM(I),YMOM(I),XYMOM(I)
      IF(NKENT.EQ.0)GO TO 600
C
C-----CALCULATE SHEAR FORCES
C
      CALL SHEAR (NX, NY)
C
  600 RETURN
      END
      SUBROUTINE MFSD(A,N,EPS,IER,NT)
C
C-----SUBROUTINE IS ALGORITHM TO FACTOR A SYMMETRICAL POSITIVE DEFINITE
C-----MATRIX
C
      DIMENSION A(NT)
C
      DOUBLE PRECISION DPIV,DSUM,DSQRT,DBLE
C
C-----TEST ON WRONG INPUT PARAMETER N
C
    1 IER=0
C
C-----INITIALIZE DIAGONAL LOOP
C
      KPIV=0
      DO 11 K=1,N
      KPIV=KPIV+K
      IND=KPIV
```

```
      LEND=K-1
C
C-----CALCULATE TOLERANCE
C
      TOL=ABS(EPS*A(KPIV))
C
C-----START FACTORIZATION LOOP OVER THE KTH ROW
C
      DO 11 I=K,N
      DSUM=0.D0
      IF(LEND) 2,4,2
C
C-----START INNER LOOP
C
    2 DO 3 L=1,LEND
      LANF=KPIV-L
      LIND=IND-L
    3 DSUM=DSUM+DBLE(A(LANF)*A(LIND))
C
C-----END OF INNER LOOP
C
C-----TRANSFORM ELEMENT A(IND)
C
    4 DSUM=DBLE(A(IND))-DSUM
      IF(I-K) 10,5,10
C
C-----TEST FOR NEGATIVE PIVOT ELEMENT AND FOR LOSS OF SIGNIFICANCE
C
    5 IF(SNGL(DSUM)-TOL) 6,6,9
    6 IF(DSUM) 12,12,7
    7 IF(IER) 8,8,9
    8 IER=K-1
C
C-----COMPUTE PIVOT ELEMENT
C
    9 DPIV=DSQRT(DSUM)
      A(KPIV)=DPIV
      DPIV=1.D0/DPIV
      GO TO 11
C
C-----CALCULATE TERMS IN ROW
C
   10 A(IND)=DSUM*DPIV
   11 IND=IND+I
C
C-----END OF DIAGONAL LOOP
C
      RETURN
C
```

```
C-----NEGATIVE PIVOT ELEMENT FOUND
C
   12 IER=-1
      RETURN
      END
      SUBROUTINE TRIG(N)
C
C-----THIS SUBROUTINE APPLIES THE GAUSS ELIMINATION METHOD TO FORM A
C-----UPPER TRIANGULAR BAND MATRIX.  FOR A GIVEN CONTACT CONDITION, THIS
C-----TRIANGULATION IS PERFORMED ONLY ONCE AND THE RESULTS CAN BE USED
C-----REPEATEDLY.
C
      DIMENSION C(26325),P(600),G(26325),NO(2),X(200),Y(200),STR(200,6),
     *NP(200),XMOM(200),YMOM(200),XYMOM(200),MXDIF(200),MYDIF(200),XT(200
     *0),YT(200),DX(200),DY(200),MXYDIF(200),MYXDIF(200),VX(200),VY(200)
     *,YXMOM(200)
C
      COMMON C,P,G,NO,NB,X,Y,STR,NP,XMOM,YMOM,XYMOM,XT,YT,DX,DY,MXDIF,
     *MYDIF,MXYDIF,MYXDIF,YXMOM,VX,VY
C
      REAL MXDIF, MYDIF, MXYDIF, MYXDIF
C
      NOE=NO(N)
      LA= NB    -1
      LB= NOE- LA
      IF( N-1) 2, 2, 4
    2 IB=1
      GO TO 6
    4 IB= NO(1)+1
    6 DO 30 I=IB,LB
      J= NB    *I- LA
      G(J)= C(J)
      DO 10 K=1, LA
      G(J+K)= C(J+K)
   10 C(J+K)= C(J+K)/G(J)
      LC= LA
      DO 30 L=1, LA
      MI= J+L*NB    - 1
      DO 20 K=1, LC
   20 C(     MI+K)= C(     MI+K)- C(     J+K+LA-LC)*G(J+L)
   30 LC= LC-1
      LB= LB+ 1
      LD= LA- 1
      DO 90 I= LB, NOE
      J= NB    *I- LA
      G(J)= C(J)
      IF( 1-LD) 32, 32, 36
   32 DO 34 K=1, LD
   34 G(J+K)= C(J+K)
```

```
   36 DO 40 K=1, LA
   40 C(J+K)= C(J+K)/G(J)
      LC= LA- 1
      IF(I- NOE) 50, 90, 50
   50 DO 70 L=1, LD
      MI= J+L*NB    - 1
      DO 60 K=1, LC
   60 C(     MI+K)= C(     MI+K)- C(     J+K+LA-LC-1)*G(J+L)
      LC= LC- 1
      IF( 1-LC) 70, 70, 80
   70 CONTINUE
   80 LD= LD-1
   90 CONTINUE
      RETURN
      END
      SUBROUTINE LOADM(N)
C
C-----THIS SUBROUTINE USED THE TRIANGULARIZED MATRIX FROM SUBROUTINE
C-----TRIG AND COMPUTES THE DEFLECTIONS OF THE SLAB.
C
      DIMENSION C(26325),F(600),G(26325),NO(2),X(200),Y(200),STR(200,6),
     *NP(200),XMOM(200),YMOM(200),XYMOM(200),MXDIF(200),MYDIF(200),XT(20
     *0),YT(200),DX(200),DY(200),MXYDIF(200),MYXDIF(200),VX(200),VY(200)
     *,YXMOM(200)
C
      COMMON C,F,G,NO,NB,X,Y,STR,NP,XMOM,YMOM,XYMOM,XT,YT,DX,DY,MXDIF,
     *MYDIF,MXYDIF,MYXDIF,YXMOM,VX,VY
C
      REAL MXDIF, MYDIF, MXYDIF, MYXDIF
C
      NOE= NO(N)
      LA= NB    -1
      LB= NOE- LA
      IF( N-1) 2, 2, 4
C
C-----ONLY ONE SLAB TO BE CONSIDERED
C
    2 IB=1
      GO TO 6
C
C-----TWO SLABS TO BE CONSIDERED
C
    4 IB= NO(1)+1
    6 DO 20 I=IB,LB
      J= NB*I-LA
      F(I)= F(I)/G(J)
      DO 20 L=1, LA
   20 F(I+L)= F(I+L)- F(I)*G(J+L)
      LB= LB+ 1
```

```
      LD= LA- 1
      DO 60 I= LB, NOE
      J= NB*I-LA
      F(I) = F(I)/G(J)
      LC= LA- 1
      IF( I-NOE) 30, 70, 30
   30 DO 40 L=1, LD
      F(I+L) = F(I+L) - F(I) *G(J+L)
      LC= LC- 1
      IF(1-LC) 40, 40, 50
   40 CONTINUE
   50 LD= LD- 1
   60 CONTINUE
   70 DO 80 IK=IB,NOE
      I= NOE- IK+ 1+ (N-1)*NO(1)
      J= NB   *I- NB   + 2
      DO 80 K=1, LA
      IF( I+K .GT. NOE) GO TO 80
      F(I) = F(I) - F(I+K) *C(J+K-1)
   80 CONTINUE
      RETURN
      END
      SUBROUTINE SINV(A,N,EPS,IER,NT)
C
C-----THIS SUBROUTINE INVERTS A SYMMETRICAL POSITIVE DEFINITE MATRIX
C
      DIMENSION A(NT)
C
      DOUBLE PRECISION DIN,WORK,DBLE
C
C-----FACTORIZE GIVEN MATRIX BY MEANS OF SUBROUTINE MFSD
C-----A = TRANSPOSE(T) * T
C
      CALL MFSD(A,N,EPS,IER,NT)
C
C-----CHECK FOR INSTABILITY
      IF(IER) 9,1,1
C
C-----INVERT UPPER TRIANGULAR MATRIX "T"
C
C-----PREPARE INVERSION LOOP
C
    1 IPIV=N*(N+1)/2
      IND=IPIV
C
C
C-----INITIALIZE INVERSION LOOP
C
      DO 6 I=1,N
```

```
      DIN=1.DO/DBLE(A(IPIV))
      A(IPIV)=DIN
      MIN=N
      KEND=I-1
      LANF=N-KEND
      IF(KEND) 5,5,2
    2 J=IND
C
C-----INITIALIZE ROW LOOP
C
      DO 4 K=1,KEND
      WORK=0.DO
      MIN=MIN-1
      LHOR=IPIV
      LVER=J
C
C-----START INNER LOOP
C
      DO 3 L=LANF,MIN
      LVER=LVER+1
      LHOR=LHOR+L
    3 WORK=WORK+DBLE(A(LVER)*A(LHOR))
C
C-----END OF INNER LOOP .
C
      A(J)=-WORK*DIN
    4 J=J-MIN
C
C-----END OF ROW LOOP
C
    5 IPIV=IPIV-MIN
    6 IND=IND-1
C
C-----END OF INVERSION LOOP
C
C-----CALCULATE INVERSE(A) BY MEANS OF INVERSE(T), WHERE INVERSE(A) =
C-----INVERSE(T) * TRANSPOSE(INVERSE(T)).
C
C-----INITIALIZE MULTIPLICATION LOOP
C
      DO 8 I=1,N
      IPIV=IPIV+I
      J=IPIV
C
C-----INITIALIZE ROW LOOP
C
      DO 8 K=I,N
      WORK=0.DO
      LHOR=J
```

```
C
C-----START INNER LOOP
C
      DO 7 L=K,N
      LVER=LHOR+K-I
      WORK=WORK+DBLE(A(LHOR)*A(LVER))
    7 LHOR=LHOR+L
C
C-----END OF INNER LOOP
C
      A(J)=WORK
    8 J=J+K
C
C-----END OF ROW AND MULTIPLICATION LOOP
C
    9 RETURN
      END
      SUBROUTINE QSF(H,Y,Z,NDIM)
C
C-----THIS SUBROUTINE COMPUTES THE VECTOR OF INTEGRAL VALUES FOR A
C-----GIVEN EQUIDISTANT TABLE OF FUNCTION VALUES.
C
      DIMENSION Y(NDIM),Z(NDIM)
C
      HT=.3333333*H
      IF(NDIM-5)7,8,1
C
C-----NDIM IS GREATER THAN 5.
C
C----------PREPARATION OF INTEGRATION LOOP
C
    1 SUM1=Y(2)+Y(2)
      SUM1=SUM1+SUM1
      SUM1=HT*(Y(1)+SUM1+Y(3))
      AUX1=Y(4)+Y(4)
      AUX1=AUX1+AUX1
      AUX1=SUM1+HT*(Y(3)+AUX1+Y(5))
      AUX2=HT*(Y(1)+3.875*(Y(2)+Y(5))+2.625*(Y(3)+Y(4))+Y(6))
      SUM2=Y(5)+Y(5)
      SUM2=SUM2+SUM2
      SUM2=AUX2-HT*(Y(4)+SUM2+Y(6))
      Z(1)=0.
      AUX=Y(3)+Y(3)
      AUX=AUX+AUX
      Z(2)=SUM2-HT*(Y(2)+AUX+Y(4))
      Z(3)=SUM1
      Z(4)=SUM2
      IF(NDIM-6)5,5,2
C
```

```
C----------INTEGRATION LOOP
C
    2 DO 4 I=7,NDIM,2
      SUM1=AUX1
      SUM2=AUX2
      AUX1=Y(I-1)+Y(I-1)
      AUX1=AUX1+AUX1
      AUX1=SUM1+HT*(Y(I-2)+AUX1+Y(I))
      Z(I-2)=SUM1
      IF(I-NDIM) 3,6,6
    3 AUX2=Y(I)+Y(I)
      AUX2=AUX2+AUX2
      AUX2=SUM2+HT*(Y(I-1)+AUX2+Y(I+1))
    4 Z(I-1)=SUM2
C
C-----END OF INTEGRATION LOOP,
C
    5 Z(NDIM-1)=AUX1
      Z(NDIM)=AUX2
      RETURN
    6 Z(NDIM-1)=SUM2
      Z(NDIM)=AUX1
      RETURN
C
C-----NDIM  IS LESS THAN 5
C
    7 IF(NDIM-3) 12,11,8
C
C-----NDIM IS EQUAL TO 4 OR 5
C
    8 SUM2=1.125*HT*(Y(1)+Y(2)+Y(2)+Y(2)+Y(3)+Y(3)+Y(3)+Y(4))
      SUM1=Y(2)+Y(2)
      SUM1=SUM1+SUM1
      SUM1=HT*(Y(1)+SUM1+Y(3))
      Z(1)=0.
      AUX1=Y(3)+Y(3)
      AUX1=AUX1+AUX1
      Z(2)=SUM2-HT*(Y(2)+AUX1+Y(4))
      IF(NDIM-5) 10,9,9
    9 AUX1=Y(4)+Y(4)
      AUX1=AUX1+AUX1
      Z(5)=SUM1+HT*(Y(3)+AUX1+Y(5))
   10 Z(3)=SUM1
      Z(4)=SUM2
      RETURN
C
C-----NDIM IS EQUAL TO 3
C
   11 SUM1=HT*(1.25*Y(1)+Y(2)+Y(2)-.25*Y(3))
```

```
      SUM2=Y(2)+Y(2)
      SUM2=SUM2+SUM2
      Z(3)=HT*(Y(1)+SUM2+Y(3))
      Z(1)=0.
      Z(2)=SUM1
   12 RETURN
      END
      SUBROUTINE SHEAR (NX, NY)
C
C-----SUBROUTINE USES A NUMERICAL INTEGRATION TECHNIQUE TO CALCULATE
C-----SHEAR FORCE.  UNITS ARE FORCE PER LENGTH, E.G., KIPS PER FOOT.
C
C-----SUBROUTINE WAS WRITTEN SPECIFICALLY FOR USE WITH A RECTANGULAR
C-----SLAB SYMMETRICAL TO BOTH THE X AND Y AXES.  IT HAS NOT BEEN TESTED
C-----FOR SLABS WITH OTHER SYMMETRY.
C
      DIMENSION C(26325),F(600),G(26325),NO(2),X(200),Y(200),STR(200,6),
     *NP(200),XMOM(200),YMOM(200),XYMOM(200),MXDIF(200),MYDIF(200),XT(200
     *0),YT(200),DX(200),DY(200),MXYDIF(200),MYXDIF(200),VX(200),VY(200)
     *,YXMOM(200)
C
      COMMON C,F,G,NO,NB,X,Y,STR,NP,XMOM,YMOM,XYMOM,XT,YT,DX,DY,MXDIF,
     *MYDIF,MXYDIF,MYXDIF,YXMOM,VX,VY
C
      REAL MXDIF, MYDIF, MXYDIF, MYXDIF
C
  100 FORMAT(//35X,'MAX NEGATIVE SHEAR FORCE IN X-DIRECTION=',F8.3,
     *        ,/35X,'MAX POSITIVE SHEAR FORCE IN X-DIRECTION=',F8.3,
     *         ,//35X,'MAX NEGATIVE SHEAR FORCE IN Y-DIRECTION=',F8.3,
     *           ,/35X,'MAX POSITIVE SHEAR FORCE IN Y-DIRECTION=',F8.3,
     *            )
  101 FORMAT(6(6X,I3,3X,F8.3))
  102 FORMAT(//10X,'CALCULATED SHEAR IN LONG DIRECTION (KIPS/FT)',//,6(6
     *X,'INCR',3X,'SHEAR X'),/)
  103 FORMAT(//10X,'CALCULATED SHEAR IN SHORT DIRECTION (KIPS/FT)',//,6(
     *6X,'INCR',3X,'SHEAR Y'),/)
  104 FORMAT('1')
C
      PRINT 104
C
C-----STORE NODAL COORDINATES
C
      DO 600 I=1,NX
      XT(I)=X(I)
  600 CONTINUE
      DO 605 I=1,NY
      YT(I)=Y(I)
  605 CONTINUE
C
```

```
C-----ESTABLISH WORKING VARIABLES
C
      NZ1=NX*NY
      NXX=NX-1
      NYY=NY-1
      NYX=(NY-1)*NX
      NXY=(NX-1)*NY
      NZZ=(NX-1)*(NY-1)
      KX=NX+1
      KY=NY+1
      KZ=KX*KY
      KXY=NY*(NX+1)
      KYY=NX*(NY+1)
      DO 608 I=1,NZ1
  608 YXMOM(I)=-1.*XYMOM(I)
C
C
C-----NUMBER THE COLUMNS AND ROWS OF THE FINITE ELEMENT GRID
C
      DO 610 J=1,NX
      DO 610 I=1,NY
  610 Y(I+(J*NY)-NY)=YT(I)
      L=0
      DO 615 J=1,NX
      DO 615 I=1,NY
      L=L+1
  615 X(L)=XT(J)
      JJJ=0
C
C-----BEGIN SOLUTION FROM UPPER RIGHT CORNER (NODE NZ1) OF UPPER RIGHT
C-----QUADRANT.  NUMBERING OF DIFFERENCE ELEMENTS INCREASES FROM TOP TO
C-----TO BOTTOM OF GRID PATTERN, THEN FROM RIGHT TO LEFT.  NODE NUMBER-
C-----ING REMAINS THE SAME.
C
C----------CALCULATE DELTA-Y'S
      DO 700 I=1,NYY
  700 DY(I)=Y(NZ1-I+1)-Y(NZ1-I)
C----------DISTRIBUTE DELTA-Y'S THROUGHOUT GRID.  ALSO GENERATE IMAGINAR
C----------DELTA-Y'S BELOW HORIZONTAL LINE OF SYMMETRY.
      DY(NY)=DY(NY-1)
      DO 710 J=1,NY
      DO 710 I=1,NX
      DY((I*NYY)+J+I)=DY(J)
  710 CONTINUE
C----------CALCULATE DELTA-X'S
      DO 720 J=1,NXX
      DX(J)=X(NZ1-(J*NY)+NY)-X(NZ1-((J+1)*NY)+NY)
  720 CONTINUE
C----------DISTRIBUTE DELTA-X'S THROUGHOUT GRID.
```

```
      DO 730 J=1,NXX
      DO 730 I=1,NY
      DX(I+(J*NY)-NY) =DX(J)
  730 CONTINUE
C----------GENERATE IMAGINARY DELTA-X'S TO THE LEFT OF VERTICAL LINE OF
      NT=(NY*NXX)+1
      NPP=NT+NYY
      DO 740 I=NT,NPP
      DX(I)=DX(I-NY)
  740 CONTINUE
C----------CALCULATE DELTA-XMOM'X AND DELTA-XYMOM'X
      L=0
      DO 750 J=1,NXX
      DO 750 I=1,NY
      L=L+1
      MXDIF(L)=XMOM(NZ1-(J*NY)+NY-I+1)-XMOM(NZ1-(J*NY)-I+1)
      MXYDIF(L)=XYMOM(NZ1-(J*NY)+NY-I+1)-XYMOM(NZ1-(J*NY)-I+1)
  750 CONTINUE
C----------CALCULATE IMAGINARY DELTA-XYMOM'S
      DO 755 I=NT,NPP
      MXYDIF(I)=MXYDIF(I-NY)
  755 CONTINUE
C----------CALCULATE DELTA-YMOM'S
      L=0
      DO 765 J=1,NX
      DO 760 I=1,NYY
      L=L+1
      MYDIF(L)=YMOM(NZ1-(J*NY)+NY-I+1)-YMOM(NZ1-(J*NY)+NY-I)
  760 CONTINUE
      MYDIF(J*NY)=MYDIF((J*NY)-1)
      L=L+1
  765 CONTINUE
C----------CALCULATE DELTA-YXMOM'S
      L=0
      DO 775 J=1,NX
      DO 770 I=1,NYY
      L=L+1
      MYXDIF(L)=YXMOM(NZ1-(J*NY)+NY-I+1)-YXMOM(NZ1-(J*NY)+NY-I)
  770 CONTINUE
      MYXDIF(J*NY)=MYXDIF((J*NY)-1)
      L=L+1
  775 CONTINUE
C
C-----CALCULATE SHEARS
C
C-----INCREMENTS OVER WHICH SHEARS ARE CALCULATED ARE NUMBERED BEGINNING
C-----AT THE UPPER RIGHT CORNER OF THE SLAB PORTION IN THE UPPER RIGHT
C-----QUADRANT.  INCREMENT NUMBERING INCREASES FROM TOP TO BOTTOM AND
C-----FROM RIGHT TO LEFT.  NODAL NUMBERING REMAINS UNCHANGED.
```

```
C
C---------CALCULATE SHEAR IN X-DIRECTION AND WRITE RESULTS
  857 DO 870 I=1,NXY
  870 VX(I)=(MXDIF(I)/DX(I))+(MYXDIF(I)/DY(I))
      PRINT 102
      WRITE(6,101) (I,VX(I),I=1,NXY)
C----------CALCULATE SHEAR IN Y-DIRECTION
      K=0
      L=0
      DO 875 J=1,NX
      DO 875 I=1,NY
      L=L+1
      IF(I.EQ.NY)GO TO 875
      K=K+1
      VY(K)=(MYDIF(L)/DY(L))-(MXYDIF(L)/DX(L))
  875 CONTINUE
      JJJ=1
      PRINT 103
      WRITE(6,101) (I,VY(I),I=1,NYX)
C
C-----SORT TO FIND MAXIMUM SHEAR FORCE IN EACH DIRECTION
C
      VXMAXN=0.0
      VXMAXP=0.0
      VYMAXN=0.0
      VYMAXP=0.0
      DO 880 I=1,NXY
      IF(VXMAXN.GT.VX(I))VXMAXN=VX(I)
  880 IF(VXMAXP.LT.VX(I))VXMAXP=VX(I)
      DO 885 I=1,NYX
      IF(VYMAXN.GT.VY(I))VYMAXN=VY(I)
  885 IF(VYMAXP.LT.VY(I))VYMAXP=VY(I)
C
C-----PRINT MAXIMUM SHEAR VALUES
C
      PRINT 100, VXMAXN, VXMAXP, VYMAXN, VYMAXP
      PRINT 104
      RETURN
      END
```

APPENDIX F

USER'S GUIDE FOR COMPUTER PROGRAM *SLAB2*

Comments on the Use of the Guide for Data Input for Program SLAB2.

General Program Notes

1. The data cards must be stacked in the proper order for the program to run.
2. A consistent set of units must be used for all input data, e.g., pounds and inches, except where specified otherwise.
3. The input data cards, or sets of data cards, are presented in the order in which they would be required to be arranged if the analysis option selected (Option 1, 2, 3, or 4) required that particular data. For example, Option 2 would require the nodal numbers at which subgrade reaction is assumed to be zero as input data; this data would be Data Set 6. Option 1 does not require nodal numbers of zero reaction and, thus, the input data deck for this option would not contain a Data Set 6.

Data Set 1.

Defines the number of problems to be solved (data decks to read in) without recompiling the source deck.

Data Set 2.

This data Set identifies the problem: slab length and width,

APPENDIX F

USER'S GUIDE FOR COMPUTER PROGRAM *SLAB*2

Comments on the Use of the Guide for Data Input for Program SLAB2.

General Program Notes

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2. A consistent set of units must be used for all input data, e.g., pounds and inches, except where specified otherwise.
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Data Set 1.

Defines the number of problems to be solved (data decks to read in) without recompiling the source deck.

Data Set 2.

This data Set identifies the problem: slab length and width, beam depth, edge moisture variation distance, maximum amount of soil movement, the swelling mode, the exponent in the exponential equation that describes the shape of the swelling soil profile, and whether the structural stiffness will be determined as a stiffened slab section or as a constant depth section.

Data Set 3.

1. Provides dimensions of the stiffening beams and their spacing, dimensions of the slab portion of the total cross-section, and moments of inertia in both directions.
2. This Data Set is not included if a constant-depth section is being analyzed.

Data Set 4.

1. The first card of this two-card data set identifies the number of slabs to be analyzed (1 or 2), material properties (Poisson's ratio and modulus of elasticity of soil and concrete), and several programming constants, e.g., type of symmetry, if any; presence of non-contact locations; if pre-calculated deflections are to be input; and if punched output is desired.
2. The second card defines the number of x and y coordinates occurring in each slab, the number of iterations to be allowed in establishing subgrade contact, the number of nodes and the nodal numbers at which output calculations are to be printed.
3. The coordinates in the x-direction begin at zero and increase from left to right. Coordinates at the joint

must be counted twice if two slabs are being analyzed. Y coordinates also begin at zero and increase from bottom to top. The number and coordinates of the y-direction nodes is the same whether one or two slabs are being analyzed.

Data Set 5.

The coordinates of the x- and y-direction nodes are read in according to F8.3 format. If two slabs are being analyzed, coordinates for the nodes at the joint must be read in twice. More than one card may be necessary to read in all of the coordinates.

Data Set 6.

If NOTCON is not zero, the nodal numbers at which there is no soil-slab contact are input in accordance with I5 format. More than one card may be necessary to define all nodal numbers.

Data Set 7.

This single card data set identifies the total number of nodes at which a gap exists between the soil and the slab, the number of elements experiencing loading, the amount of loading (as a pressure, e.g., psi or psf), whether temperature is to be considered in the solution, the temperature difference between the slab top and bottom, the number of nodes at which convergence will be checked, and iteration and tolerance limits.

Data Set 8.

Input the nodal numbers at which convergence will be checked in accordance with I5 format. More than one card may be required to input all check nodes.

Data Set 9.

This data set reads in the amount of gap previously calculated as existing between the slab and subgrade at each node where a gap exists. More than one data card may be required to read in all gap data. If NREAD = 0, there are no previously calculated gaps and this Data Set will not be included in the problem data deck.

Data Set 10.

If gaps exist at specified nodes, this Data Set identifies those nodes in I5 format. More than one card may be necessary to identify all nodal locations. If NREAD = 2, this Data Set is not needed and will not be included in the problem data deck.

Data Set 11.

This Data Set assigns the magnitude of the gap at each location specified in Data Set 10. The input format is F8.4 and more than one card may be required to input all data. There must be as many gap values as there were gap locations in Data Set 10. If NREAD = 2, this Data Set is not needed and will not be included in the problem deck.

Data Set 12.

If a uniformly distributed load acting over the entire slab surface in addition to any live loading specified in Data Set 7, is to be considered in the analysis, set NWT = 1 and the uniformly distributed load will be read in on a single card in F8.3 format.

Data Set 13.

1. The elemental numbers which are to receive some loading Q are identified in I5 format. More than one card may be

necessary to identify all loaded elements.

2. Elemental numbers increase from bottom to top and from left to right. There are (NX - 1) x (NY - 1) elements.

Data Set 14.

1. The area being loaded by Q is described by XDA and YDA. The load is distributed over the elemental area from the center of the rectangular element on a fractional basis in both directions ranging from -1.00 to +1.00. For example, if the load were to be applied over the right-most 75 percent of the element in the x-direction, the input values would be: XDA (1) = - 0.50 and XDA (2) = + 1.00. If the same load were to cover only the bottom half of the element in the y-direction, the input values would be: YDA (1) = - 1.00 and YDA = 0.00. If the entire element is to be loaded, the load distribution would be - 1.00 and + 1.00 in both directions.

2. The distribution cards must be stacked in the proper order to ensure distribution of load over the corresponding element, NL (I).

DATA SET NO.1

NPROB
1 5

DATA SET NO. 2

UNITS: XXL, XXC, XEC, IN FEET
XYMX, IN INCHES
MMM, ISOTRY, LIFT, DIMENSIONLESS

XXL	XXS	XEC	XYMX	MMM	ISOTRY	LIFT
1 10	20	30	40	45	50	55

DATA SET NO. 3

BEAMLW	BEAMSW	BEAMLL	BEAMSL	ASPACE	BSPACE
1 8	16	24	32	40	48

MOIX	MOIY
1 – 13	13 – 26

DATA SET NO. 4

NSLAB	PR	T	YM	YMS	PRS	NSYM	NOTCON	NREAD	NPUNCH	NB
1 – 5	5 – 15	15 – 25	25 – 35	35 – 45	45 – 50	50 – 55	55 – 60	60 – 65	65 – 70	70 – 75

NX1	NX2	NY	NCYCLE	NPRINT	NP(I)→								
1 – 5	5 – 10	10 – 15	15 – 20	20 – 25	25 – 30	30 – 35	35 – 40	40 – 45	45 – 50	50 – 55	55 – 60	60 – 70	70 – 80

NOTE: CONTINUATION CARDS MAY BE NECESSARY TO LIST ALL NODES TO BE PRINTED

DATA SET NO. 5

X (I)→ ; Y (I)→

1	8	16	24	32	40	48	56	64	72

NOTE: LIST X COORDINATES FIRST: Y COORDINATES FOLLOW IN THE FIELD IMMEDIATELY FOLLOWING THE LAST X COORDINATE FIELD. CONTINUATION CARDS MAY BE NECESSARY TO LIST ALL COORDINATES.

DATA SET NO. 6

NZ (I)→

1	5	10	15	20	25	30	35	40	45	50	55	60	65	70

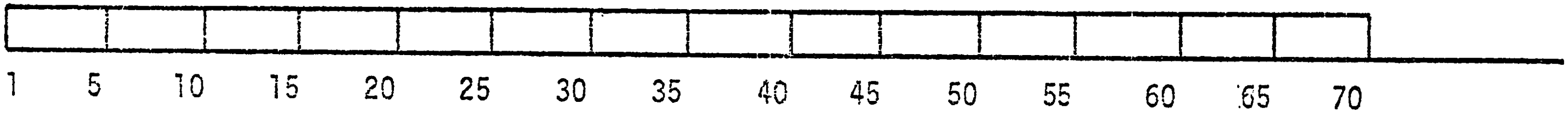
NOTE: CONTINUATION CARDS MAY BE NECESSARY TO LIST ALL NODES OF NO CONTACT.

DATA SET NO. 7

NGAP	NTEMP	NLOAD	ICL	NCK	NWT	TEMP	Q	DEL	DELF	RFJ	ICLF
1–5	10	15	20	25	30	40	50	60	70	75	80

DATA SET NO. 8

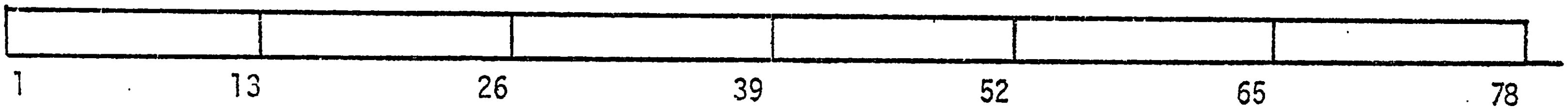
NODCK (I) →



NOTE: CONTINUATION CARDS MAY BE NECESSARY TO LIST ALL NODES.

DATA SET NO. 9

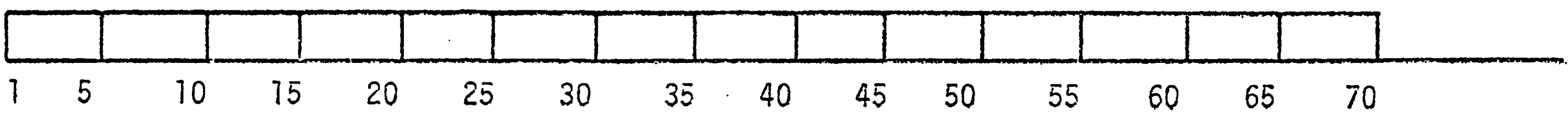
CURL (I) →



NOTE: CONTINUATION CARDS MAY BE NECESSARY TO LIST ALL VALUES OF CURL (I)

DATA SET NO. 10

NG (I) →



NOTE: CONTINUATION CARDS MAY BE NECESSARY TO LIST ALL NODES WHEN GAPS ARE PRESENT.

DATA SET NO. 11

CURL (NG (I)) →

1	8	16	24	32	40	48	56	64	72

NOTE: CONTINUATION CARDS MAY BE NECESSARY TO LIST ALL GAPS.

DATA SET NO. 12

QSLAB

1 8

DATA SET NO. 13

NL (I) →

1	5	10	15	20	25	30	35	40	45	50	55	60	65	70

NOTE: CONTINUATION CARDS MAY BE NECESSARY TO LIST ALL ELEMENTS TO BE LOADED.

DATA SET NO. 14

XDA (1)	XDA (2)	YDA (1)	YDA (2)
1–10	11–20	21–30	31–40

NOTE: THERE MUST BE NLOAD DISTRIBUTION CARDS ARRANGED IN THE PROPER ORDER TO CORRESPOND WITH THE LOADED ELEMENTS OF DATA SET NO. 13.

APPENDIX G

TYPICAL RESULTS FROM COMPUTER PROGRAM *SLAB2*

```
FINITE ELEMENT ANALYSIS OF CONCRETE SLABS

        NO. OF SLABS =          1  POISSON RATIO OF CONCRETE=     0.1500      THICKNESS OF CONCRETE=     11.1000
   MODULUS OF CONCRETE= 0.150E+07        MODULUS OF SUBGRADE= 0.100E+04   POISSON RATIO OF SUBGRADE=     0.4000

 NSYM=          4     NPROB=          1     NREAD=          0     NPUNCH=          0


SUMMARY OF VARIABLES:
   SLAB LENGTH =  48.00 FT     EDGE EFFECT =    5.00 FT      YM = 4.00 IN
   SLAB WIDTH =  40.00 FT     BEAM DEPTH =   11.10 IN
   PARABOLIC EQUATION EXPONENT "M" =    3


  NX1=        15     NX2=          0     NY=          13     NCYLE=          10     NOTCON=          0     NB=          45

 STRESSES AT THE FOLLOWING NODES ARE TO BE PRINTED:
     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        53        54        55        56        57        58        59        60
    61        62        63        64        65        66        67        68        69        70
    71        72        73        74        75        76        77        78        79        80
    81        82        83        84        85        86        87        88        89        90
    91        92        93        94        95        96        97        98        99       100
   101       102       103       104       105       106       107       108       109       110
   111       112       113       114       115       116       117       118       119       120
   121       122       123       124       125       126       127       128       129       130
   131       132       133       134       135       136       137       138       139       140
   141       142       143       144       145       146       147       148       149       150
   151       152       153       154       155       156       157       158       159       160
   161       162       163       164       165       166       167       168       169       170
   171       172       173       174       175       176       177       178       179       180
   181       182       183       184       185       186       187       188       189       190
   191       192       193       194       195
 VALUES OF X ARE:
   0.0       2.000     4.000     6.000     8.000    10.000    12.000    14.000    16.000    17.500
  19.000    20.500    22.000    23.000    24.000

 VALUES OF Y ARE:
   0.0       2.000     4.000     6.000     8.000    10.000    12.000    13.500    15.000    16.500
  18.000    19.000    20.000
```

IER= 0

NGAP=	96	NTEMP=	0	NLOAD=	25	ICL=	10	NCR=	15	NWT=	1
TEMP=	0.0	Q=	4.25000	RPJ=	0.50000	DEL=	0.00100	DELF=	0.00010	ICLF=	30

THE FOLLOWING NODES ARE USED TO CHECK CONVERGENCE:
1 14 27 40 53 66 79 92 105 118 131 144

THE FOLLOWING NODES ARE USED TO CHECK CONVERGENCE:
157 170 183

NODAL NUMBERS AND INITIAL GAPS ARE TABULATED AS FOLLOWS:

10	0.10800	11	0.86400	12	2.04800	13	4.00000	23	0.10800	24	0.86400	25	2.04800
26	4.00000	36	0.10800	37	0.86400	38	2.04800	39	4.00000	49	0.10800	50	0.86400
51	2.04800	52	4.00000	62	0.10800	63	0.86400	64	2.04800	65	4.00000	75	0.10800
76	0.86400	77	2.04800	78	4.00000	88	0.10800	89	0.86400	90	2.04800	91	4.00000
101	0.10800	102	0.86400	103	2.04800	104	4.00000	114	0.10800	115	0.86400	116	2.04800
117	4.00000	127	0.10800	128	0.86400	129	2.04800	130	4.00000	140	0.10800	141	0.86400
142	2.04800	143	4.00000	144	0.10800	145	0.10800	146	0.10800	147	0.10800	148	0.10800
149	0.10800	150	0.10800	151	0.10800	152	0.10800	153	0.10800	154	0.86400	155	2.04800
156	4.00000	157	0.86400	158	0.86400	159	0.86400	160	0.86400	161	0.86400	162	0.86400
163	0.86400	164	0.86400	165	0.86400	166	0.86400	167	0.86400	168	2.04800	169	4.00000
170	2.04800	171	2.04800	172	2.04800	173	2.04800	174	2.04800	175	2.04800	176	2.04800
177	2.04800	178	2.04800	179	2.04800	180	2.04800	181	2.04800	182	4.00000	183	4.00000
184	4.00000	185	4.00000	186	4.00000	187	4.00000	188	4.00000	189	4.00000	190	4.00000
191	4.00000	192	4.00000	193	4.00000	194	4.00000	195	4.00000				

AMOUNT OF INITIAL CURLING AND GAP AT THE NODES IS:

1	0.0	2	0.0	3	0.0	4	0.0	5	0.0	6	0.0	7	0.0
8	0.0	9	0.0	10	0.10800	11	0.86400	12	2.04800	13	4.00000	14	0.0
15	0.0	16	0.0	17	0.0	18	0.0	19	0.0	20	0.0	21	0.0
22	0.0	23	0.10800	24	0.86400	25	2.04800	26	4.00000	27	0.0	28	0.0
29	0.0	30	0.0	31	0.0	32	0.0	33	0.0	34	0.0	35	0.0
36	0.10800	37	0.86400	38	2.04800	39	4.00000	40	0.0	41	0.0	42	0.0
43	0.0	44	0.0	45	0.0	46	0.0	47	0.0	48	0.0	49	0.10800
50	0.86400	51	2.04800	52	4.00000	53	0.0	54	0.0	55	0.0	56	0.0
57	0.0	58	0.0	59	0.0	60	0.0	61	0.0	62	0.10800	63	0.86400
64	2.04800	65	4.00000	66	0.0	67	0.0	68	0.0	69	0.0	70	0.0
71	0.0	72	0.0	73	0.0	74	0.0	75	0.10800	76	0.86400	77	2.04800
78	4.00000	79	0.0	80	0.0	81	0.0	82	0.0	83	0.0	84	0.0
85	0.0	86	0.0	87	0.0	88	0.10800	89	0.86400	90	2.04800	91	4.00000
92	0.0	93	0.0	94	0.0	95	0.0	96	0.0	97	0.0	98	0.0
99	0.0	100	0.0	101	0.10800	102	0.86400	103	2.04800	104	4.00000	105	0.0
106	0.0	107	0.0	108	0.0	109	0.0	110	0.0	111	0.0	112	0.0
113	0.0	114	0.10800	115	0.86400	116	2.04800	117	4.00000	118	0.0	119	0.0
120	0.0	121	0.0	122	0.0	123	0.0	124	0.0	125	0.0	126	0.0
127	0.10800	128	0.86400	129	2.04800	130	4.00000	131	0.0	132	0.0	133	0.0

1	0.223915E+00	2	0.231730E+00	3	0.255896E+00	4	0.298914E+00
5	0.366731E+00	6	0.467975E+00	7	0.613048E+00	8	0.757190E+00
9	0.935996E+00	10	0.104311E+01	11	0.534196E+00	12	-0.474605E+00
13	-0.225002E+01	14	0.226007E+00	15	0.233732E+00	16	0.257632E+00
17	0.300376E+00	18	0.367963E+00	19	0.468986E+00	20	0.613825E+00
21	0.757766E+00	22	0.936315E+00	23	0.104310E+01	24	0.533761E+00
25	-0.475350E+00	26	-0.225108E+01	27	0.232686E+00	28	0.240207E+00
29	0.263359E+00	30	0.305404E+00	31	0.372355E+00	32	0.472728E+00
33	0.616843E+00	34	0.760147E+00	35	0.937913E+00	36	0.104373E+01
37	0.533241E+00	38	-0.476727E+00	39	-0.225338E+01	40	0.245449E+00
41	0.252560E+00	42	0.274949E+00	43	0.316101E+00	44	0.382096E+00
45	0.481401E+00	46	0.624265E+00	47	0.766457E+00	48	0.942911E+00
49	0.104716E+01	50	0.534818E+00	51	-0.476542E+00	52	-0.225474E+01
53	0.267607E+00	54	0.274432E+00	55	0.296103E+00	56	0.336256E+00
57	0.401017E+00	58	0.498830E+00	59	0.639884E+00	60	0.780459E+00
61	0.955025E+00	62	0.105707E+01	63	0.542154E+00	64	-0.471162E+00
65	-0.225150E+01	66	0.304998E+00	67	0.311571E+00	68	0.332516E+00
69	0.371531E+00	70	0.434763E+00	71	0.530638E+00	72	0.669292E+00
73	0.807714E+00	74	0.979782E+00	75	0.107895E+01	76	0.560722E+00
77	-0.455081E+00	78	-0.223817E+01	79	0.365451E+00	80	0.371751E+00
81	0.391885E+00	82	0.429563E+00	83	0.490929E+00	84	0.584385E+00
85	0.720015E+00	86	0.855730E+00	87	0.102469E+01	88	0.112032E+01
89	0.598132E+00	90	-0.420593E+00	91	-0.220689E+01	92	0.458638E+00
93	0.464624E+00	94	0.483812E+00	95	0.519900E+00	96	0.579016E+00
97	0.669531E+00	98	0.801486E+00	99	0.933932E+00	100	0.109917E+01
101	0.119068E+01	102	0.663950E+00	103	-0.358055E+00	104	-0.214792E+01
105	0.595651E+00	106	0.601269E+00	107	0.619342E+00	108	0.653545E+00
109	0.709983E+00	110	0.796998E+00	111	0.924601E+00	112	0.105320E+01
113	0.121414E+01	114	0.130099E+01	115	0.769315E+00	116	-0.256153E+00
117	-0.204963E+01	118	0.734011E+00	119	0.739315E+00	120	0.756430E+00
121	0.789004E+00	122	0.843125E+00	123	0.927123E+00	124	0.105099E+01
125	0.117630E+01	126	0.133357E+01	127	0.141656E+01	128	0.881107E+00
129	-0.146769E+00	130	-0.194265E+01	131	0.907327E+00	132	0.912278E+00
133	0.928315E+00	134	0.959060E+00	135	0.101058E+01	136	0.109123E+01
137	0.121100E+01	138	0.133270E+01	139	0.148589E+01	140	0.156463E+01
141	0.102540E+01	142	-0.452614E-02	143	-0.180218E+01	144	0.100912E+01
145	0.101367E+01	146	0.102848E+01	147	0.105717E+01	148	0.110581E+01
149	0.118277E+01	150	0.129816E+01	151	0.141611E+01	152	0.156511E+01
153	0.174719E+01	154	0.120401E+01	155	0.172536E+00	156	-0.162578E+01
157	0.494677E+00	158	0.498766E+00	159	0.512170E+00	160	0.538522E+00
161	0.583936E+00	162	0.656895E+00	163	0.767659E+00	164	0.881962E+00
165	0.102728E+01	166	0.120546E+01	167	0.141426E+01	168	0.382099E+00
169	-0.141492E+01	170	-0.518147E+00	171	-0.514421E+00	172	-0.502085E+00
173	-0.477496E+00	174	-0.434475E+00	175	-0.364414E+00	176	-0.256877E+00
177	-0.144876E+00	178	-0.154114E-02	179	0.175126E+00	180	0.383218E+00
181	0.535537E+00	182	-0.125874E+01	183	-0.229797E+01	184	-0.229464E+01
185	-0.228350E+01	186	-0.226087E+01	187	-0.222050E+01	188	-0.215361E+01
189	-0.204944E+01	190	-0.193974E+01	191	-0.179813E+01	192	-0.162212E+01
193	-0.141279E+01	194	-0.125774E+01	195	-0.109504E+01		

IER= 0

NIC= 3

THE DIFFERENCES BETWEEN TWO ITERATIONS ARE TABULATED BELOW, THE LAST INTEGER BEING THE ITERATION NO.

NODE	DEFLECTION DIFFERENCE						
1	-0.110672E+00	14	-0.111739E+00	27	-0.114295E+00	40	-0.116848E+00
53	-0.116979E+00	66	-0.111104E+00	79	-0.944628E-01	92	-0.613328E-01
105	-0.557816E-02	118	0.544728E-01	131	0.131824E+00	144	0.225984E+00
157	0.331940E+00	170	0.403993E+00	183	0.475945E+00	1	
1	0.657318E-02	14	0.807408E-02	27	0.124454E-01	40	0.195722E-01
53	0.292822E-01	66	0.411688E-01	79	0.545510E-01	92	0.685388E-01
105	0.821905E-01	118	0.917297E-01	131	0.100482E+00	144	0.108508E+00
157	0.116034E+00	170	0.120884E+00	183	0.125581E+00	2	
1	0.645649E-01	14	0.650227E-01	27	0.663199E-01	40	0.683515E-01
53	0.709715E-01	66	0.739548E-01	79	0.770169E-01	92	0.798574E-01
105	0.822121E-01	118	0.835567E-01	131	0.845267E-01	144	0.851826E-01
157	0.856466E-01	170	0.859117E-01	183	0.861351E-01	3	
1	0.699021E-01	14	0.699694E-01	27	0.701543E-01	40	0.704083E-01
53	0.706520E-01	66	0.707828E-01	79	0.706885E-01	92	0.702634E-01
105	0.694283E-01	118	0.685133E-01	131	0.673699E-01	144	0.660566E-01
157	0.646650E-01	170	0.637389E-01	183	0.628093E-01	4	
1	0.604491E-01	14	0.604098E-01	27	0.602912E-01	40	0.600657E-01
53	0.596823E-01	66	0.590857E-01	79	0.582255E-01	92	0.570616E-01
105	0.555737E-01	118	0.542495E-01	131	0.527709E-01	144	0.511846E-01
157	0.495622E-01	170	0.484951E-01	183	0.474334E-01	5	
1	0.488418E-01	14	0.487820E-01	27	0.486071E-01	40	0.482997E-01
53	0.478250E-01	66	0.471458E-01	79	0.462348E-01	92	0.450737E-01
105	0.436591E-01	118	0.424410E-01	131	0.411082E-01	144	0.396999E-01
157	0.382702E-01	170	0.373344E-01	183	0.364062E-01	6	
1	0.385130E-01	14	0.384575E-01	27	0.382965E-01	40	0.380180E-01
53	0.375955E-01	66	0.370027E-01	79	0.362217E-01	92	0.352435E-01
105	0.340676E-01	118	0.330651E-01	131	0.319778E-01	144	0.308352E-01
157	0.296777E-01	170	0.289169E-01	183	0.281624E-01	7	
1	0.300922E-01	14	0.300470E-01	27	0.299152E-01	40	0.296873E-01
53	0.293431E-01	66	0.288627E-01	79	0.282333E-01	92	0.274488E-01
105	0.265112E-01	118	0.257152E-01	131	0.248539E-01	144	0.239501E-01
157	0.230370E-01	170	0.224371E-01	183	0.218420E-01	8	
1	0.234274E-01	14	0.233909E-01	27	0.232850E-01	40	0.231033E-01
53	0.228297E-01	66	0.224501E-01	79	0.219543E-01	92	0.213378E-01
105	0.206022E-01	118	0.199783E-01	131	0.193038E-01	144	0.185975E-01
157	0.178879E-01	170	0.174243E-01	183	0.169621E-01	9	
1	0.182112E-01	14	0.181829E-01	27	0.181009E-01	40	0.179594E-01
53	0.177470E-01	66	0.174509E-01	79	0.170638E-01	92	0.165830E-01

105	0.160093E-01	118	0.155230E-01	131	0.149975E-01	144	0.144464E-01
157	0.138898E-01	170	0.135235E-01	183	0.131607E-01	10	

THE GAP OR PRECOMPRESSION OF THE NODES IS:

1	0.320520E+00	2	0.324372E+00	3	0.336607E+00	4	0.359264E+00
5	0.395677E+00	6	0.450316E+00	7	0.528381E+00	8	0.605402E+00
9	0.700038E+00	10	0.704264E+00	11	0.737171E-01	12	-0.102431E+01
13	-0.289007E+01	14	0.321058E+00	15	0.324911E+00	16	0.337152E+00
17	0.359823E+00	18	0.396264E+00	19	0.450949E+00	20	0.529084E+00
21	0.606171E+00	22	0.700864E+00	23	0.705127E+00	24	0.745975E-01
25	-0.102342E+01	26	-0.288918E+01	27	0.323109E+00	28	0.326968E+00
29	0.339233E+00	30	0.361954E+00	31	0.398484E+00	32	0.453313E+00
33	0.531656E+00	34	0.608934E+00	35	0.703817E+00	36	0.708247E+00
37	0.778549E-01	38	-0.102009E+01	39	-0.288581E+01	40	0.328031E+00
41	0.331906E+00	42	0.344222E+00	43	0.367045E+00	44	0.403750E+00
45	0.458845E+00	46	0.537564E+00	47	0.615188E+00	48	0.710454E+00
49	0.715288E+00	50	0.852779E-01	51	-0.101244E+01	52	-0.287800E+01
53	0.338130E+00	54	0.342034E+00	55	0.354446E+00	56	0.377452E+00
57	0.414454E+00	58	0.469993E+00	59	0.549326E+00	60	0.627529E+00
61	0.723468E+00	62	0.729042E+00	63	0.998028E-01	64	-0.997438E+00
65	-0.286262E+01	66	0.356690E+00	67	0.360645E+00	68	0.373221E+00
69	0.396531E+00	70	0.434014E+00	71	0.490259E+00	72	0.570565E+00
73	0.649687E+00	74	0.746703E+00	75	0.753504E+00	76	0.125593E+00
77	-0.970770E+00	78	-0.283518E+01	79	0.388001E+00	80	0.392040E+00
81	0.404879E+00	82	0.428665E+00	83	0.466893E+00	84	0.524218E+00
85	0.606008E+00	86	0.686536E+00	87	0.785221E+00	88	0.793961E+00
89	0.168229E+00	90	-0.926625E+00	91	-0.278965E+01	92	0.437269E+00
93	0.441436E+00	94	0.454675E+00	95	0.479174E+00	96	0.518507E+00
97	0.577421E+00	98	0.661378E+00	99	0.743958E+00	100	0.845101E+00
101	0.856740E+00	102	0.234348E+00	103	-0.858118E+00	104	-0.271882E+01
105	0.510274E+00	106	0.514630E+00	107	0.528447E+00	108	0.553968E+00
109	0.594861E+00	110	0.656004E+00	111	0.742984E+00	112	0.828406E+00
113	0.932939E+00	114	0.948600E+00	115	0.330889E+00	116	-0.758132E+00
117	-0.261543E+01	118	0.583973E+00	119	0.588518E+00	120	0.602912E+00
121	0.629435E+00	122	0.671849E+00	123	0.735150E+00	124	0.825032E+00
125	0.913133E+00	126	0.102080E+01	127	0.104018E+01	128	0.426919E+00
129	-0.658769E+00	130	-0.251268E+01	131	0.675791E+00	132	0.680571E+00
133	0.695673E+00	134	0.723424E+00	135	0.767690E+00	136	0.833612E+00
137	0.927000E+00	138	0.101828E+01	139	0.112950E+01	140	0.115289E+01
141	0.544650E+00	142	-0.537157E+00	143	-0.238726E+01	144	0.677645E+00
145	0.682710E+00	146	0.698646E+00	147	0.727844E+00	148	0.774306E+00
149	0.843348E+00	150	0.940912E+00	151	0.103600E+01	152	0.115129E+01
153	0.128644E+01	154	0.682463E+00	155	-0.395617E+00	156	-0.224272E+01
157	0.449674E-01	158	0.503515E-01	159	0.672030E-01	160	0.980210E-01
161	0.146981E+00	162	0.219635E+00	163	0.322071E+00	164	0.421742E+00
165	0.542155E+00	166	0.681622E+00	167	0.835139E+00	168	-0.242027E+00
169	-0.208755E+01	170	-0.105448E+01	171	-0.104891E+01	172	-0.103145E+01

173	-0.999518E+00	174	-0.948807E+00	175	-0.873574E+00	176	-0.767536E+00
177	-0.664440E+00	178	-0.540091E+00	179	-0.396842E+00	180	-0.242417E+00
181	-0.136292E+00	182	-0.198176E+01	183	-0.292187E+01	184	-0.291613E+01
185	-0.289811E+01	186	-0.286515E+01	187	-0.281278E+01	188	-0.273505E+01
189	-0.262542E+01	190	-0.251887E+01	191	-0.239066E+01	192	-0.224441E+01
193	-0.208842E+01	194	-0.198224E+01	195	-0.187569E+01		

IER= 0

NIC= 4

THE DIFFERENCES BETWEEN TWO ITERATIONS ARE TABULATED BELOW, THE LAST INTEGER BEING THE ITERATION NO.

NODE	DEFLECTION DIFFERENCE						
1	-0.818485E-01	14	-0.822476E-01	27	-0.828996E-01	40	-0.825204E-01
53	-0.790100E-01	66	-0.692499E-01	79	-0.490790E-01	92	-0.134533E-01
105	0.431077E-01	118	0.102333E+00	131	0.177491E+00	144	0.268106E+00
157	0.369342E+00	170	0.437777E+00	183	0.505999E+00	1	
1	0.319498E-01	14	0.332356E-01	27	0.369558E-01	40	0.429551E-01
53	0.509910E-01	66	0.605815E-01	79	0.709829E-01	92	0.812615E-01
105	0.904525E-01	118	0.961612E-01	131	0.100709E+00	144	0.104232E+00
157	0.107097E+00	170	0.108836E+00	183	0.110474E+00	2	
1	0.713347E-01	14	0.715899E-01	27	0.723013E-01	40	0.733827E-01
53	0.747094E-01	66	0.760961E-01	79	0.773216E-01	92	0.781620E-01
105	0.784273E-01	118	0.781850E-01	131	0.775678E-01	144	0.766469E-01
157	0.755489E-01	170	0.747866E-01	183	0.740029E-01	3	
1	0.680250E-01	14	0.680096E-01	27	0.679564E-01	40	0.678268E-01
53	0.675529E-01	66	0.670555E-01	79	0.662559E-01	92	0.650857E-01
105	0.635005E-01	118	0.620341E-01	131	0.603549E-01	144	0.585195E-01
157	0.566161E-01	170	0.553524E-01	183	0.540920E-01	4	
1	0.559897E-01	14	0.559202E-01	27	0.557156E-01	40	0.553550E-01
53	0.547948E-01	66	0.539900E-01	79	0.529043E-01	92	0.515129E-01
105	0.498081E-01	118	0.483333E-01	131	0.467146E-01	144	0.449983E-01
157	0.432490E-01	170	0.420961E-01	183	0.409509E-01	5	
1	0.440923E-01	14	0.440230E-01	27	0.438219E-01	40	0.434744E-01
53	0.429485E-01	66	0.422139E-01	79	0.412487E-01	92	0.400416E-01
105	0.385939E-01	118	0.373605E-01	131	0.360218E-01	144	0.346128E-01
157	0.331838E-01	170	0.322455E-01	183	0.313149E-01	6	
1	0.342075E-01	14	0.341506E-01	27	0.339842E-01	40	0.336975E-01
53	0.332674E-01	66	0.326710E-01	79	0.318938E-01	92	0.309297E-01
105	0.297800E-01	118	0.288058E-01	131	0.277517E-01	144	0.266445E-01
157	0.255213E-01	170	0.247814E-01	183	0.240484E-01	7	
1	0.263957E-01	14	0.263504E-01	27	0.262193E-01	40	0.259942E-01
53	0.256570E-01	66	0.251909E-01	79	0.245848E-01	92	0.238343E-01
105	0.229427E-01	118	0.221884E-01	131	0.213737E-01	144	0.205193E-01
157	0.196550E-01	170	0.190873E-01	183	0.185242E-01	8	

1	0.203347E-01	14	0.202996E-01	27	0.201976E-01	40	0.200229E-01
53	0.197614E-01	66	0.194001E-01	79	0.189307E-01	92	0.183504E-01
105	0.176607E-01	118	0.170782E-01	131	0.164489E-01	144	0.157901E-01
157	0.151235E-01	170	0.146853E-01	183	0.142508E-01	9	
1	0.156519E-01	14	0.156249E-01	27	0.155463E-01	40	0.154108E-01
53	0.152085E-01	66	0.149294E-01	79	0.145671E-01	92	0.141194E-01
105	0.135876E-01	118	0.131374E-01	131	0.126519E-01	144	0.121424E-01
157	0.116311E-01	170	0.112952E-01	183	0.109596E-01	10	

THE GAP OR PRECOMPRESSION OF THE NODES IS:

1	0.353877E+00	2	0.357509E+00	3	0.369044E+00	4	0.390394E+00
5	0.424705E+00	6	0.476212E+00	7	0.549885E+00	8	0.622678E+00
9	0.712255E+00	10	0.710644E+00	11	0.736354E-01	12	-0.102891E+01
13	-0.289922E+01	14	0.354500E+00	15	0.358123E+00	16	0.369629E+00
17	0.390935E+00	18	0.425180E+00	19	0.476599E+00	20	0.550158E+00
21	0.622841E+00	22	0.712265E+00	23	0.710446E+00	24	0.731823E-01
25	-0.102955E+01	26	-0.290004E+01	27	0.356749E+00	28	0.360345E+00
29	0.371770E+00	30	0.392935E+00	31	0.426977E+00	32	0.478119E+00
33	0.551312E+00	34	0.623638E+00	35	0.712598E+00	36	0.710189E+00
37	0.722172E-01	38	-0.103103E+01	39	-0.290207E+01	40	0.361813E+00
41	0.365362E+00	42	0.376644E+00	43	0.397565E+00	44	0.431248E+00
45	0.481895E+00	46	0.554428E+00	47	0.626121E+00	48	0.714297E+00
49	0.710941E+00	50	0.718460E-01	51	-0.103223E+01	52	-0.290417E+01
53	0.371718E+00	54	0.375195E+00	55	0.386264E+00	56	0.406815E+00
57	0.439953E+00	58	0.489849E+00	59	0.561383E+00	60	0.632135E+00
61	0.719182E+00	62	0.714485E+00	63	0.738301E-01	64	-0.103142E+01
65	-0.290462E+01	66	0.389373E+00	67	0.392753E+00	68	0.403523E+00
69	0.423559E+00	70	0.455929E+00	71	0.504770E+00	72	0.574913E+00
73	0.644371E+00	74	0.729886E+00	75	0.723409E+00	76	0.807197E-01
77	-0.102603E+01	78	-0.290087E+01	79	0.418625E+00	80	0.421877E+00
81	0.432252E+00	82	0.451597E+00	83	0.482940E+00	84	0.530365E+00
85	0.598656E+00	86	0.666412E+00	87	0.749945E+00	88	0.741218E+00
89	0.960315E-01	90	-0.101253E+01	91	-0.288931E+01	92	0.464207E+00
93	0.467295E+00	94	0.477165E+00	95	0.495622E+00	96	0.525639E+00
97	0.571235E+00	98	0.637126E+00	99	0.702684E+00	100	0.783693E+00
101	0.772160E+00	102	0.123952E+00	103	-0.986734E+00	104	-0.286578E+01
105	0.531446E+00	106	0.534334E+00	107	0.543580E+00	108	0.560937E+00
109	0.589301E+00	110	0.632600E+00	111	0.695457E+00	112	0.758209E+00
113	0.835990E+00	114	0.820916E+00	115	0.168977E+00	116	-0.944220E+00
117	-0.282587E+01	118	0.599241E+00	119	0.601955E+00	120	0.610657E+00
121	0.627041E+00	122	0.653940E+00	123	0.695190E+00	124	0.755305E+00
125	0.815468E+00	126	0.890215E+00	127	0.871818E+00	128	0.216525E+00
129	-0.898831E+00	130	-0.278265E+01	131	0.683735E+00	132	0.686254E+00
133	0.694339E+00	134	0.709626E+00	135	0.734867E+00	136	0.773804E+00
137	0.830799E+00	138	0.887959E+00	139	0.959047E+00	140	0.938521E+00
141	0.277196E+00	142	-0.840608E+00	143	-0.272676E+01	144	0.676914E+00
145	0.679220E+00	146	0.686612E+00	147	0.700666E+00	148	0.724076E+00

149	0.760482E+00	150	0.814072E+00	151	0.867951E+00	152	0.934927E+00
153	0.101531E+01	154	0.350896E+00	155	-0.769755E+00	156	-0.265837E+01
157	0.344524E-01	158	0.365170E-01	159	0.431094E-01	160	0.557857E-01
161	0.771897E-01	162	0.110903E+00	163	0.160935E+00	164	0.211503E+00
165	0.274453E+00	166	0.349743E+00	167	0.435166E+00	168	-0.688480E+00
169	-0.257940E+01	170	-0.107192E+01	171	-0.107006E+01	172	-0.106407E+01
173	-0.105241E+01	174	-0.103245E+01	175	-0.100064E+01	176	-0.952977E+00
177	-0.904530E+00	178	-0.844045E+00	179	-0.771632E+00	180	-0.689225E+00
181	-0.630589E+00	182	-0.252276E+01	183	-0.294626E+01	184	-0.294462E+01
185	-0.293931E+01	186	-0.292875E+01	187	-0.291036E+01	188	-0.288058E+01
189	-0.283537E+01	190	-0.278905E+01	191	-0.273092E+01	192	-0.266101E+01
193	-0.258096E+01	194	-0.252360E+01	195	-0.246462E+01		

IER= 0

NIC= 5

THE DIFFERENCES BETWEEN TWO ITERATIONS ARE TABULATED BELOW, THE LAST INTEGER BEING THE ITERATION NO.

NODE	DEFLECTION DIFFERENCE						
1	-0.818485E-01	14	-0.822476E-01	27	-0.828996E-01	40	-0.825204E-01
53	-0.790100E-01	66	-0.692499E-01	79	-0.490790E-01	92	-0.134533E-01
105	0.431077E-01	118	0.102333E+00	131	0.177491E+00	144	0.268106E+00
157	0.369342E+00	170	0.437777E+00	183	0.505999E+00	1	
1	0.319498E-01	14	0.332356E-01	27	0.369558E-01	40	0.429551E-01
53	0.509910E-01	66	0.605815E-01	79	0.709829E-01	92	0.812615E-01
105	0.904525E-01	118	0.961612E-01	131	0.100709E+00	144	0.104232E+00
157	0.107097E+00	170	0.108836E+00	183	0.110474E+00	2	
1	0.713347E-01	14	0.715899E-01	27	0.723013E-01	40	0.733827E-01
53	0.747094E-01	66	0.760961E-01	79	0.773216E-01	92	0.781620E-01
105	0.784273E-01	118	0.781850E-01	131	0.775678E-01	144	0.766469E-01
157	0.755489E-01	170	0.747866E-01	183	0.740029E-01	3	
1	0.680250E-01	14	0.680096E-01	27	0.679564E-01	40	0.678268E-01
53	0.675529E-01	66	0.670555E-01	79	0.662559E-01	92	0.650857E-01
105	0.635005E-01	118	0.620341E-01	131	0.603549E-01	144	0.585195E-01
157	0.566161E-01	170	0.553524E-01	183	0.540920E-01	4	
1	0.559897E-01	14	0.559202E-01	27	0.557156E-01	40	0.553550E-01
53	0.547948E-01	66	0.539900E-01	79	0.529043E-01	92	0.515129E-01
105	0.498081E-01	118	0.483333E-01	131	0.467146E-01	144	0.449983E-01
157	0.432490E-01	170	0.420961E-01	183	0.409509E-01	5	
1	0.440923E-01	14	0.440230E-01	27	0.438219E-01	40	0.434744E-01
53	0.429485E-01	66	0.422139E-01	79	0.412487E-01	92	0.400416E-01
105	0.385939E-01	118	0.373605E-01	131	0.360218E-01	144	0.346128E-01
157	0.331838E-01	170	0.322455E-01	183	0.313149E-01	6	
1	0.342075E-01	14	0.341506E-01	27	0.339842E-01	40	0.336975E-01
53	0.332674E-01	66	0.326710E-01	79	0.318938E-01	92	0.309297E-01

105	0.297800E-01	118	0.288058E-01	131	0.277517E-01	144	0.266445E-01
157	0.255213E-01	170	0.247814E-01	183	0.240484E-01	7	
1	0.263957E-01	14	0.263504E-01	27	0.262193E-01	40	0.259942E-01
53	0.256570E-01	66	0.251909E-01	79	0.245848E-01	92	0.238343E-01
105	0.229427E-01	118	0.221884E-01	131	0.213737E-01	144	0.205193E-01
157	0.196550E-01	170	0.190873E-01	183	0.185242E-01	8	
1	0.203347E-01	14	0.202996E-01	27	0.201976E-01	40	0.200229E-01
53	0.197614E-01	66	0.194001E-01	79	0.189307E-01	92	0.183504E-01
105	0.176607E-01	118	0.170782E-01	131	0.164489E-01	144	0.157901E-01
157	0.151235E-01	170	0.146853E-01	183	0.142508E-01	9	
1	0.156519E-01	14	0.156249E-01	27	0.155463E-01	40	0.154108E-01
53	0.152085E-01	66	0.149294E-01	79	0.145671E-01	92	0.141194E-01
105	0.135876E-01	118	0.131374E-01	131	0.126519E-01	144	0.121424E-01
157	0.116311E-01	170	0.112952E-01	183	0.109596E-01	10	

THE GAP OR PRECOMPRESSION OF THE NODES IS:

1	0.353877E+00	2	0.357509E+00	3	0.369044E+00	4	0.390394E+00
5	0.424705E+00	6	0.476212E+00	7	0.549885E+00	8	0.622678E+00
9	0.712255E+00	10	0.710644E+00	11	0.736354E-01	12	-0.102891E+01
13	-0.289922E+01	14	0.354500E+00	15	0.358123E+00	16	0.369629E+00
17	0.390935E+00	18	0.425180E+00	19	0.476599E+00	20	0.550158E+00
21	0.622841E+00	22	0.712265E+00	23	0.710446E+00	24	0.731823E-01
25	-0.102955E+01	26	-0.290004E+01	27	0.356749E+00	28	0.360345E+00
29	0.371770E+00	30	0.392935E+00	31	0.426977E+00	32	0.478119E+00
33	0.551312E+00	34	0.623638E+00	35	0.712598E+00	36	0.710189E+00
37	0.722172E-01	38	-0.103103E+01	39	-0.290207E+01	40	0.361813E+00
41	0.365362E+00	42	0.376644E+00	43	0.397565E+00	44	0.431248E+00
45	0.481895E+00	46	0.554428E+00	47	0.626121E+00	48	0.714297E+00
49	0.710941E+00	50	0.718460E-01	51	-0.103223E+01	52	-0.290417E+01
53	0.371718E+00	54	0.375195E+00	55	0.386264E+00	56	0.406815E+00
57	0.439953E+00	58	0.489849E+00	59	0.561383E+00	60	0.632135E+00
61	0.719182E+00	62	0.714485E+00	63	0.738301E-01	64	-0.103142E+01
65	-0.290462E+01	66	0.389373E+00	67	0.392753E+00	68	0.403523E+00
69	0.423559E+00	70	0.455929E+00	71	0.504770E+00	72	0.574913E+00
73	0.644371E+00	74	0.729886E+00	75	0.723409E+00	76	0.807197E-01
77	-0.102603E+01	78	-0.290087E+01	79	0.418625E+00	80	0.421877E+00
81	0.432252E+00	82	0.451597E+00	83	0.482940E+00	84	0.530365E+00
85	0.598656E+00	86	0.666412E+00	87	0.749945E+00	88	0.741218E+00
89	0.960315E-01	90	-0.101253E+01	91	-0.288931E+01	92	0.464207E+00
93	0.467295E+00	94	0.477165E+00	95	0.495622E+00	96	0.525639E+00
97	0.571235E+00	98	0.637126E+00	99	0.702684E+00	100	0.783693E+00
101	0.772160E+00	102	0.123952E+00	103	-0.986734E+00	104	-0.286578E+01
105	0.531446E+00	106	0.534334E+00	107	0.543580E+00	108	0.560937E+00
109	0.589301E+00	110	0.632600E+00	111	0.695457E+00	112	0.758209E+00
113	0.835990E+00	114	0.820916E+00	115	0.168977E+00	116	-0.944220E+00
117	-0.282587E+01	118	0.599241E+00	119	0.601955E+00	120	0.610657E+00
121	0.627041E+00	122	0.653940E+00	123	0.695190E+00	124	0.755305E+00

125	0.815468E+00	126	0.890215E+00	127	0.871818E+00	128	0.218525E+00
129	-0.898831E+00	130	-0.278265E+01	131	0.683735E+00	132	0.686254E+00
133	0.694339E+00	134	0.709626E+00	135	0.734867E+00	136	0.773804E+00
137	0.830799E+00	138	0.887959E+00	139	0.959047E+00	140	0.936521E+00
141	0.277196E+00	142	-0.840608E+00	143	-0.272676E+01	144	0.676914E+00
145	0.679220E+00	146	0.686612E+00	147	0.700666E+00	148	0.724076E+00
149	0.760482E+00	150	0.814072E+00	151	0.867951E+00	152	0.934927E+00
153	0.101531E+01	154	0.350896E+00	155	-0.769755E+00	156	-0.265837E+01
157	0.344524E-01	158	0.365170E-01	159	0.431094E-01	160	0.557857E-01
161	0.771897E-01	162	0.110903E+00	163	0.160935E+00	164	0.211503E+00
165	0.274453E+00	166	0.349743E+00	167	0.435166E+00	168	-0.688480E+00
169	-0.257940E+01	170	-0.107192E+01	171	-0.107006E+01	172	-0.106407E+01
173	-0.105241E+01	174	-0.103245E+01	175	-0.100064E+01	176	-0.952977E+00
177	-0.904530E+00	178	-0.844045E+00	179	-0.771632E+00	180	-0.689225E+00
181	-0.630589E+00	182	-0.252276E+01	183	-0.294626E+01	184	-0.294462E+01
185	-0.293931E+01	186	-0.292875E+01	187	-0.291036E+01	188	-0.288058E+01
189	-0.283537E+01	190	-0.278905E+01	191	-0.273092E+01	192	-0.266101E+01
193	-0.258096E+01	194	-0.252360E+01	195	-0.246462E+01		
1	0.120440E-01	14	0.120230E-01	27	0.119621E-01	40	0.118580E-01
53	0.117027E-01	66	0.114881E-01	79	0.112101E-01	92	0.108655E-01
105	0.104566E-01	118	0.101113E-01	131	0.973862E-02	144	0.934833E-02
157	0.895357E-02	170	0.869441E-02	183	0.843716E-02	11	
1	0.926900E-02	14	0.925320E-02	27	0.920671E-02	40	0.912708E-02
53	0.900733E-02	66	0.884247E-02	79	0.862843E-02	92	0.836331E-02
105	0.804865E-02	118	0.778282E-02	131	0.749588E-02	144	0.719541E-02
157	0.689089E-02	170	0.669092E-02	183	0.649357E-02	12	
1	0.713128E-02	14	0.711882E-02	27	0.708318E-02	40	0.702202E-02
53	0.693017E-02	66	0.680333E-02	79	0.663841E-02	92	0.643516E-02
105	0.619346E-02	118	0.598902E-02	131	0.576824E-02	144	0.553668E-02
157	0.530320E-02	170	0.514942E-02	183	0.499725E-02	13	
1	0.548708E-02	14	0.547761E-02	27	0.545013E-02	40	0.540286E-02
53	0.533211E-02	66	0.523430E-02	79	0.510758E-02	92	0.495040E-02
105	0.476432E-02	118	0.460678E-02	131	0.443643E-02	144	0.425810E-02
157	0.407702E-02	170	0.395858E-02	183	0.384140E-02	14	
1	0.422335E-02	14	0.421590E-02	27	0.419438E-02	40	0.415784E-02
53	0.410342E-02	66	0.402844E-02	79	0.393051E-02	92	0.380951E-02
105	0.366533E-02	118	0.354385E-02	131	0.341308E-02	144	0.327587E-02
157	0.313663E-02	170	0.304413E-02	183	0.295258E-02	15	
1	0.325018E-02	14	0.324476E-02	27	0.322866E-02	40	0.320029E-02
53	0.315815E-02	66	0.310016E-02	79	0.302517E-02	92	0.293279E-02
105	0.282329E-02	118	0.273019E-02	131	0.262988E-02	144	0.252467E-02
157	0.241768E-02	170	0.234699E-02	183	0.227737E-02	16	
1	0.250095E-02	14	0.249654E-02	27	0.248384E-02	40	0.246221E-02
53	0.242978E-02	66	0.238478E-02	79	0.232619E-02	92	0.225359E-02
105	0.216699E-02	118	0.209415E-02	131	0.201523E-02	144	0.193232E-02
157	0.184917E-02	170	0.179482E-02	183	0.174141E-02	17	
1	0.192279E-02	14	0.191921E-02	27	0.190938E-02	40	0.189292E-02
53	0.186831E-02	66	0.183433E-02	79	0.179029E-02	92	0.173616E-02
105	0.167203E-02	118	0.161791E-02	131	0.155962E-02	144	0.149876E-02

157	0.143784E-02	170	0.139809E-02	183	0.135803E-02	18	
1	0.147843E-02	14	0.147599E-02	27	0.146860E-02	40	0.145572E-02
53	0.143659E-02	66	0.141019E-02	79	0.137579E-02	92	0.133300E-02
105	0.128263E-02	118	0.124019E-02	131	0.119412E-02	144	0.114638E-02
157	0.109839E-02	170	0.106716E-02	183	0.103474E-02	19	
1	0.113839E-02	14	0.113666E-02	27	0.113136E-02	40	0.112200E-02
53	0.110716E-02	66	0.108659E-02	79	0.106049E-02	92	0.102830E-02
105	0.990212E-03	118	0.958025E-03	131	0.922978E-03	144	0.886023E-03
157	0.847638E-03	170	0.822067E-03	183	0.798225E-03	20	
1	0.876546E-03	14	0.874817E-03	27	0.870347E-03	40	0.862658E-03
53	0.851572E-03	66	0.836313E-03	79	0.816047E-03	92	0.791192E-03
105	0.760794E-03	118	0.734985E-03	131	0.707567E-03	144	0.678539E-03
157	0.649393E-03	170	0.630379E-03	183	0.611305E-03	21	
1	0.674248E-03	14	0.673115E-03	27	0.669420E-03	40	0.663459E-03
53	0.654578E-03	66	0.642657E-03	79	0.627220E-03	92	0.608027E-03
105	0.585198E-03	118	0.566006E-03	131	0.545263E-03	144	0.523686E-03
157	0.501812E-03	170	0.487328E-03	183	0.473022E-03	22	
1	0.518978E-03	14	0.518024E-03	27	0.515342E-03	40	0.511050E-03
53	0.504613E-03	66	0.495136E-03	79	0.482857E-03	92	0.467658E-03
105	0.449836E-03	118	0.434756E-03	131	0.418544E-03	144	0.401318E-03
157	0.384569E-03	170	0.373840E-03	183	0.362396E-03	23	
1	0.397861E-03	14	0.397384E-03	27	0.395894E-03	40	0.392616E-03
53	0.387251E-03	66	0.380278E-03	79	0.371158E-03	92	0.359535E-03
105	0.346184E-03	118	0.334799E-03	131	0.322163E-03	144	0.308871E-03
157	0.295579E-03	170	0.286102E-03	183	0.276566E-03	24	
1	0.306606E-03	14	0.306070E-03	27	0.304341E-03	40	0.301540E-03
53	0.297904E-03	66	0.292420E-03	79	0.285506E-03	92	0.277340E-03
105	0.267148E-03	118	0.258565E-03	131	0.249386E-03	144	0.240266E-03
157	0.229836E-03	170	0.223160E-03	183	0.217438E-03	25	
1	0.236750E-03	14	0.236154E-03	27	0.234842E-03	40	0.232518E-03
53	0.229359E-03	66	0.225365E-03	79	0.219882E-03	92	0.213027E-03
105	0.205159E-03	118	0.198603E-03	131	0.191867E-03	144	0.184655E-03
157	0.178039E-03	170	0.173569E-03	183	0.169754E-03	26	
1	0.182748E-03	14	0.182390E-03	27	0.181317E-03	40	0.179708E-03
53	0.177085E-03	66	0.173509E-03	79	0.169516E-03	92	0.164568E-03
105	0.158966E-03	118	0.153840E-03	131	0.148118E-03	144	0.141919E-03
157	0.134885E-03	170	0.130653E-03	183	0.125885E-03	27	
1	0.139832E-03	14	0.139832E-03	27	0.139117E-03	40	0.138044E-03
53	0.136375E-03	66	0.134051E-03	79	0.130594E-03	92	0.126421E-03
105	0.120938E-03	118	0.116408E-03	131	0.111580E-03	144	0.106692E-03
157	0.102162E-03	170	0.991821E-04	183	0.963211E-04	28	
1	0.109732E-03	14	0.109375E-03	27	0.108898E-03	40	0.107884E-03
53	0.106633E-03	66	0.104547E-03	79	0.101507E-03	92	0.976920E-04
105	0.931025E-04	118	0.893474E-04	131	0.855327E-04	144	0.812411E-04
157	0.767708E-04	170	0.734329E-04	183	0.705719E-04	29	
1	0.815392E-04	14	0.814795E-04	27	0.812411E-04	40	0.804067E-04
53	0.792146E-04	66	0.778437E-04	79	0.763535E-04	92	0.746846E-04
105	0.725389E-04	118	0.704527E-04	131	0.678897E-04	144	0.652671E-04
157	0.627637E-04	170	0.610352E-04	183	0.600815E-04	30	

IC= 30

NODE	DEFLECTION	NODE	DEFLECTION	NODE	DEFLECTION	NODE	DEFLECTION
1	0.405848E+00	2	0.409354E+00	3	0.420517E+00	4	0.441257E+00
5	0.474723E+00	6	0.525162E+00	7	0.597558E+00	8	0.669273E+00
9	0.757689E+00	10	0.862866E+00	11	0.980628E+00	12	0.106127E+01
13	0.114215E+01	14	0.406380E+00	15	0.409878E+00	16	0.421016E+00
17	0.441714E+00	18	0.475119E+00	19	0.525473E+00	20	0.597760E+00
21	0.669369E+00	22	0.757635E+00	23	0.862603E+00	24	0.980110E+00
25	0.106057E+01	26	0.114127E+01	27	0.408368E+00	28	0.411841E+00
29	0.422904E+00	30	0.443470E+00	31	0.476681E+00	32	0.526768E+00
33	0.598701E+00	34	0.669960E+00	35	0.757767E+00	36	0.862147E+00
37	0.978946E+00	38	0.105889E+01	39	0.113904E+01	40	0.412984E+00
41	0.416413E+00	42	0.427339E+00	43	0.447672E+00	44	0.480537E+00
45	0.530145E+00	46	0.601433E+00	47	0.672069E+00	48	0.759100E+00
49	0.862538E+00	50	0.978217E+00	51	0.105733E+01	52	0.113659E+01
53	0.422218E+00	54	0.425579E+00	55	0.436299E+00	56	0.456276E+00
57	0.488612E+00	58	0.537488E+00	59	0.607795E+00	60	0.677503E+00
61	0.763417E+00	62	0.865523E+00	63	0.979650E+00	64	0.105760E+01
65	0.113560E+01	66	0.438948E+00	67	0.442215E+00	68	0.452648E+00
69	0.472123E+00	70	0.503712E+00	71	0.551554E+00	72	0.620494E+00
73	0.688925E+00	74	0.773321E+00	75	0.873660E+00	76	0.985765E+00
77	0.106222E+01	78	0.113860E+01	79	0.466999E+00	80	0.470141E+00
81	0.480191E+00	82	0.498994E+00	83	0.529579E+00	84	0.576033E+00
85	0.643149E+00	86	0.709898E+00	87	0.792332E+00	88	0.890440E+00
89	0.100007E+01	90	0.107473E+01	91	0.114917E+01	92	0.511095E+00
93	0.514079E+00	94	0.523637E+00	95	0.541574E+00	96	0.570861E+00
97	0.615515E+00	98	0.680264E+00	99	0.744842E+00	100	0.824777E+00
101	0.920105E+00	102	0.102673E+01	103	0.109928E+01	104	0.117149E+01
105	0.576569E+00	106	0.579359E+00	107	0.588312E+00	108	0.605174E+00
109	0.632838E+00	110	0.675229E+00	111	0.736981E+00	112	0.798783E+00
113	0.875521E+00	114	0.967341E+00	115	0.107027E+01	116	0.114032E+01
117	0.120993E+01	118	0.642873E+00	119	0.645495E+00	120	0.653917E+00
121	0.669828E+00	122	0.696051E+00	123	0.736421E+00	124	0.795462E+00
125	0.854700E+00	126	0.928431E+00	127	0.101695E+01	128	0.111655E+01
129	0.118446E+01	130	0.125192E+01	131	0.725757E+00	132	0.728190E+00
133	0.736013E+00	134	0.750847E+00	135	0.775439E+00	136	0.813525E+00
137	0.869476E+00	138	0.925736E+00	139	0.995837E+00	140	0.108026E+01
141	0.117586E+01	142	0.124134E+01	143	0.130648E+01	144	0.825249E+00
145	0.827477E+00	146	0.834623E+00	147	0.848249E+00	148	0.871035E+00
149	0.906618E+00	150	0.959193E+00	151	0.101220E+01	152	0.107822E+01
153	0.115758E+01	154	0.124813E+01	155	0.131078E+01	156	0.137348E+01
157	0.937080E+00	158	0.939075E+00	159	0.945439E+00	160	0.957709E+00
161	0.978513E+00	162	0.101143E+01	163	0.106048E+01	164	0.111019E+01
165	0.117221E+01	166	0.124652E+01	167	0.133093E+01	168	0.139061E+01
169	0.145102E+01	170	0.101359E+01	171	0.101538E+01	172	0.102114E+01
173	0.103242E+01	174	0.105179E+01	175	0.108282E+01	176	0.112952E+01
177	0.117713E+01	178	0.123670E+01	179	0.130815E+01	180	0.138956E+01

181	0.144753E+01	182	0.150669E+01	183	0.109014E+01	184	0.109171E+01
185	0.109682E+01	186	0.110699E+01	187	0.112481E+01	188	0.115383E+01
189	0.119809E+01	190	0.124359E+01	191	0.130081E+01	192	0.136977E+01
193	0.144884E+01	194	0.150555E+01	195	0.156386E+01		

NODE	STRESS X	STRESS Y	STRESS XY	MAJOR	MINOR	SHEAR
1	-0.289138E+02	-0.102579E+03	0.102628E+00	-0.102579E+03	-0.289137E+02	0.368327E+02
2	-0.300911E+02	-0.112103E+03	-0.229882E-01	-0.112103E+03	-0.300911E+02	0.410061E+02
3	-0.336169E+02	-0.140473E+03	-0.206824E-01	-0.140473E+03	-0.336169E+02	0.534282E+02
4	-0.394384E+02	-0.187155E+03	0.145140E-02	-0.187155E+03	-0.394384E+02	0.738584E+02
5	-0.471578E+02	-0.250405E+03	-0.992568E-02	-0.250405E+03	-0.471577E+02	0.101624E+03
6	-0.560873E+02	-0.325745E+03	-0.269678E-01	-0.325744E+03	-0.560873E+02	0.134829E+03
7	-0.644340E+02	-0.401396E+03	0.388911E-01	-0.401395E+03	-0.644340E+02	0.168481E+03
8	-0.682287E+02	-0.444477E+03	0.494412E-01	-0.444477E+03	-0.682285E+02	0.188124E+03
9	-0.656930E+02	-0.456238E+03	-0.272175E-01	-0.456237E+03	-0.656929E+02	0.195272E+03
10	-0.466018E+02	-0.371483E+03	-0.606778E-01	-0.371482E+03	-0.466017E+02	0.162440E+03
11	0.118753E+02	-0.346414E+02	-0.834006E-01	-0.346415E+02	0.118755E+02	0.232585E+02
12	0.212017E+02	-0.772021E+01	0.412007E-02	-0.772021E+01	0.212017E+02	0.144610E+02
13	0.276091E+02	0.0	0.0	0.953674E-06	0.276091E+02	0.138046E+02
14	-0.347058E+02	-0.103288E+03	0.110610E-01	-0.103288E+03	-0.347058E+02	0.342910E+02
15	-0.358542E+02	-0.112753E+03	-0.419241E+00	-0.112755E+03	-0.358519E+02	0.384515E+02
16	-0.394018E+02	-0.141079E+03	-0.851305E+00	-0.141086E+03	-0.393947E+02	0.508456E+02
17	-0.451085E+02	-0.187706E+03	-0.131038E+01	-0.187718E+03	-0.450965E+02	0.713108E+02
18	-0.527006E+02	-0.250929E+03	-0.186281E+01	-0.250947E+03	-0.526831E+02	0.991317E+02
19	-0.614270E+02	-0.326162E+03	-0.247621E+01	-0.326185E+03	-0.614039E+02	0.132391E+03
20	-0.691886E+02	-0.401694E+03	-0.325273E+01	-0.401726E+03	-0.691568E+02	0.166284E+03
21	-0.718964E+02	-0.443826E+03	-0.435041E+01	-0.443876E+03	-0.718455E+02	0.186016E+03
22	-0.691044E+02	-0.455166E+03	-0.593186E+01	-0.455257E+03	-0.690133E+02	0.193122E+03
23	-0.510816E+02	-0.370767E+03	-0.760530E+01	-0.370947E+03	-0.509008E+02	0.160023E+03
24	0.563411E+01	-0.353605E+02	-0.875889E+01	-0.371535E+02	0.742711E+01	0.222903E+02
25	0.144984E+02	-0.885484E+01	-0.912133E+01	-0.119952E+02	0.176387E+02	0.148169E+02
26	0.214106E+02	0.0	0.0	0.0	0.214106E+02	0.107053E+02
27	-0.517867E+02	-0.105129E+03	0.253643E-01	-0.105129E+03	-0.517867E+02	0.266714E+02
28	-0.529305E+02	-0.114600E+03	-0.848861E+00	-0.114612E+03	-0.529188E+02	0.308465E+02
29	-0.563199E+02	-0.142842E+03	-0.176203E+01	-0.142878E+03	-0.562841E+02	0.432968E+02
30	-0.618174E+02	-0.189326E+03	-0.276689E+01	-0.189386E+03	-0.617574E+02	0.638143E+02
31	-0.691270E+02	-0.252344E+03	-0.392913E+01	-0.252428E+03	-0.690428E+02	0.916926E+02
32	-0.772801E+02	-0.327284E+03	-0.532695E+01	-0.327397E+03	-0.771666E+02	0.125115E+03
33	-0.843473E+02	-0.402221E+03	-0.716904E+01	-0.402382E+03	-0.841857E+02	0.159098E+03
34	-0.865028E+02	-0.443058E+03	-0.912718E+01	-0.443291E+03	-0.862692E+02	0.178511E+03
35	-0.835733E+02	-0.453957E+03	-0.115074E+02	-0.454314E+03	-0.832162E+02	0.185549E+03
36	-0.660232E+02	-0.369718E+03	-0.141365E+02	-0.370375E+03	-0.653666E+02	0.152504E+03
37	-0.101198E+02	-0.356620E+02	-0.163776E+02	-0.436593E+02	-0.212245E+01	0.207684E+02
38	-0.208794E+01	-0.993627E+01	-0.175053E+02	-0.239518E+02	0.119276E+02	0.179397E+02
39	0.401416E+01	0.0	0.0	0.0	0.401416E+01	0.200708E+01
40	-0.808606E+02	-0.108177E+03	0.219933E-01	-0.108177E+03	-0.808606E+02	0.136583E+02
41	-0.819353E+02	-0.117626E+03	-0.139368E+01	-0.117681E+03	-0.818809E+02	0.178999E+02

42	-0.851426E+02	-0.145772E+03	-0.286461E+01	-0.145907E+03	-0.850075E+02	0.304497E+02
43	-0.903150E+02	-0.192003E+03	-0.448247E+01	-0.192201E+03	-0.901178E+02	0.510414E+02
44	-0.970654E+02	-0.254634E+03	-0.638581E+01	-0.254892E+03	-0.968070E+02	0.790425E+02
45	-0.104586E+03	-0.329086E+03	-0.872443E+01	-0.329424E+03	-0.104247E+03	0.112589E+03
46	-0.110814E+03	-0.403065E+03	-0.116387E+02	-0.403527E+03	-0.110351E+03	0.146588E+03
47	-0.112460E+03	-0.442976E+03	-0.142625E+02	-0.443590E+03	-0.111845E+03	0.165872E+03
48	-0.109234E+03	-0.453563E+03	-0.172820E+02	-0.454428E+03	-0.108369E+03	0.173030E+03
49	-0.908507E+02	-0.368499E+03	-0.205979E+02	-0.370018E+03	-0.893310E+02	0.140344E+03
50	-0.348687E+02	-0.360971E+02	-0.239196E+02	-0.594104E+02	-0.115554E+02	0.239275E+02
51	-0.258976E+02	-0.989105E+01	-0.259924E+02	-0.450910E+02	0.930238E+01	0.271967E+02
52	-0.186507E+02	0.0	0.0	-0.186507E+02	-0.286102E-05	0.932534E+01
53	-0.122910E+03	-0.112556E+03	0.238076E-01	-0.122910E+03	-0.112556E+03	0.517664E+01
54	-0.123944E+03	-0.121961E+03	-0.201827E+01	-0.125202E+03	-0.120704E+03	0.224865E+01
55	-0.126967E+03	-0.149873E+03	-0.415655E+01	-0.150604E+03	-0.126236E+03	0.121836E+02
56	-0.131748E+03	-0.195735E+03	-0.657188E+01	-0.196403E+03	-0.131080E+03	0.326617E+02
57	-0.137935E+03	-0.257864E+03	-0.938787E+01	-0.258594E+03	-0.137204E+03	0.606950E+02
58	-0.144670E+03	-0.331531E+03	-0.126922E+02	-0.332389E+03	-0.143812E+03	0.942885E+02
59	-0.150072E+03	-0.404623E+03	-0.166786E+02	-0.405711E+03	-0.148983E+03	0.128364E+03
60	-0.150879E+03	-0.443909E+03	-0.201133E+02	-0.445283E+03	-0.149505E+03	0.147889E+03
61	-0.146463E+03	-0.453517E+03	-0.238917E+02	-0.455365E+03	-0.144615E+03	0.155375E+03
62	-0.127311E+03	-0.368517E+03	-0.278974E+02	-0.371702E+03	-0.124127E+03	0.123787E+03
63	-0.702355E+02	-0.349852E+02	-0.320652E+02	-0.892002E+02	-0.160204E+02	0.365899E+02
64	-0.615753E+02	-0.983029E+01	-0.349202E+02	-0.791633E+02	0.775763E+01	0.434604E+02
65	-0.545472E+02	0.0	0.0	-0.545471E+02	0.0	0.272736E+02
66	-0.179153E+03	-0.118302E+03	0.219582E-01	-0.179153E+03	-0.118302E+03	0.304258E+02
67	-0.180102E+03	-0.127632E+03	-0.273285E+01	-0.180244E+03	-0.127490E+03	0.263768E+02
68	-0.182850E+03	-0.155205E+03	-0.568775E+01	-0.183974E+03	-0.154080E+03	0.149471E+02
69	-0.187188E+03	-0.200516E+03	-0.903261E+01	-0.205077E+03	-0.182627E+03	0.112249E+02
70	-0.192663E+03	-0.261967E+03	-0.129132E+02	-0.264294E+03	-0.190335E+03	0.369797E+02
71	-0.198458E+03	-0.334792E+03	-0.173651E+02	-0.336969E+03	-0.196281E+03	0.703441E+02
72	-0.202729E+03	-0.406963E+03	-0.225266E+02	-0.409418E+03	-0.200274E+03	0.104572E+03
73	-0.202760E+03	-0.445417E+03	-0.267950E+02	-0.448340E+03	-0.199837E+03	0.124252E+03
74	-0.197851E+03	-0.454787E+03	-0.312069E+02	-0.458523E+03	-0.194115E+03	0.132204E+03
75	-0.178549E+03	-0.369677E+03	-0.355647E+02	-0.376080E+03	-0.172145E+03	0.101967E+03
76	-0.122118E+03	-0.359766E+02	-0.399004E+02	-0.137759E+03	-0.203351E+02	0.587121E+02
77	-0.114206E+03	-0.106395E+02	-0.430314E+02	-0.129752E+03	0.490636E+01	0.673290E+02
78	-0.108247E+03	0.0	0.0	-0.108247E+03	0.0	0.541237E+02
79	-0.249039E+03	-0.125230E+03	0.213495E-01	-0.249038E+03	-0.125230E+03	0.619045E+02
80	-0.249901E+03	-0.134423E+03	-0.355430E+01	-0.250010E+03	-0.134313E+03	0.578484E+02
81	-0.252389E+03	-0.161489E+03	-0.745306E+01	-0.252996E+03	-0.160882E+03	0.460567E+02
82	-0.256246E+03	-0.206088E+03	-0.118925E+02	-0.258923E+03	-0.203411E+03	0.277559E+02
83	-0.261069E+03	-0.266652E+03	-0.170245E+02	-0.281113E+03	-0.246609E+03	0.172518E+02
84	-0.265916E+03	-0.338574E+03	-0.229125E+02	-0.345196E+03	-0.259294E+03	0.429507E+02
85	-0.268740E+03	-0.409910E+03	-0.294681E+02	-0.415814E+03	-0.262835E+03	0.764897E+02
86	-0.267311E+03	-0.447768E+03	-0.345674E+02	-0.454163E+03	-0.260915E+03	0.966238E+02
87	-0.261191E+03	-0.457355E+03	-0.394389E+02	-0.464987E+03	-0.253558E+03	0.105714E+03
88	-0.240818E+03	-0.372731E+03	-0.436708E+02	-0.385877E+03	-0.227670E+03	0.791037E+02
89	-0.183794E+03	-0.390752E+02	-0.474264E+02	-0.197951E+03	-0.249179E+02	0.865166E+02
90	-0.175321E+03	-0.115436E+02	-0.505044E+02	-0.189643E+03	0.277821E+01	0.962104E+02

91	-0.169197E+03	0.0	0.0	-0.169197E+03	-0.152588E-04	0.845987E+02
92	-0.328953E+03	-0.132737E+03	0.370808E-01	-0.328953E+03	-0.132737E+03	0.981077E+02
93	-0.329810E+03	-0.141623E+03	-0.445137E+01	-0.329915E+03	-0.141517E+03	0.941989E+02
94	-0.332117E+03	-0.168072E+03	-0.941205E+01	-0.332655E+03	-0.167534E+03	0.825606E+02
95	-0.335647E+03	-0.211808E+03	-0.150801E+02	-0.337457E+03	-0.209998E+03	0.637298E+02
96	-0.339831E+03	-0.271194E+03	-0.216787E+02	-0.346104E+03	-0.264920E+03	0.405921E+02
97	-0.343744E+03	-0.342019E+03	-0.293026E+02	-0.372197E+03	-0.313566E+03	0.293153E+02
98	-0.345204E+03	-0.412417E+03	-0.378232E+02	-0.429406E+03	-0.328214E+03	0.505963E+02
99	-0.342402E+03	-0.450581E+03	-0.442872E+02	-0.466398E+03	-0.326584E+03	0.699072E+02
100	-0.334057E+03	-0.460883E+03	-0.498488E+02	-0.478130E+03	-0.316809E+03	0.806606E+02
101	-0.311454E+03	-0.378004E+03	-0.542151E+02	-0.408341E+03	-0.281117E+03	0.636120E+02
102	-0.250776E+03	-0.443199E+02	-0.568203E+02	-0.265381E+03	-0.297151E+02	0.117833E+03
103	-0.240489E+03	-0.137779E+02	-0.589594E+02	-0.254906E+03	0.638519E+00	0.127772E+03
104	-0.232329E+03	0.0	0.0	-0.232329E+03	0.0	0.116164E+03
105	-0.408208E+03	-0.139142E+03	-0.626128E-01	-0.408208E+03	-0.139142E+03	0.134533E+03
106	-0.409118E+03	-0.147678E+03	-0.541552E+01	-0.409230E+03	-0.147566E+03	0.130832E+03
107	-0.411242E+03	-0.173133E+03	-0.114505E+02	-0.411792E+03	-0.172584E+03	0.119604E+03
108	-0.414414E+03	-0.215765E+03	-0.185143E+02	-0.416124E+03	-0.214054E+03	0.101035E+03
109	-0.418122E+03	-0.273660E+03	-0.267965E+02	-0.422932E+03	-0.268850E+03	0.770414E+02
110	-0.421215E+03	-0.343017E+03	-0.364940E+02	-0.435600E+03	-0.328632E+03	0.534839E+02
111	-0.420987E+03	-0.411835E+03	-0.478433E+02	-0.464472E+03	-0.368349E+03	0.480616E+02
112	-0.415515E+03	-0.450172E+03	-0.568380E+02	-0.492264E+03	-0.373422E+03	0.594207E+02
113	-0.403822E+03	-0.463620E+03	-0.642176E+02	-0.504558E+03	-0.362884E+03	0.708368E+02
114	-0.376657E+03	-0.381953E+03	-0.682825E+02	-0.447639E+03	-0.310971E+03	0.683338E+02
115	-0.316032E+03	-0.553505E+02	-0.680040E+02	-0.332706E+03	-0.386768E+02	0.147014E+03
116	-0.304131E+03	-0.163342E+02	-0.678961E+02	-0.319344E+03	-0.112061E+01	0.159112E+03
117	-0.297499E+03	0.0	0.0	-0.297499E+03	0.0	0.148749E+03
118	-0.452668E+03	-0.141089E+03	-0.327110E-01	-0.452667E+03	-0.141089E+03	0.155789E+03
119	-0.453303E+03	-0.149115E+03	-0.609591E+01	-0.453425E+03	-0.148993E+03	0.152216E+03
120	-0.455222E+03	-0.173686E+03	-0.130238E+02	-0.455823E+03	-0.173085E+03	0.141369E+03
121	-0.458317E+03	-0.215321E+03	-0.211596E+02	-0.460146E+03	-0.213493E+03	0.123327E+03
122	-0.461820E+03	-0.271833E+03	-0.306584E+02	-0.466644E+03	-0.267008E+03	0.998183E+02
123	-0.465128E+03	-0.339741E+03	-0.420409E+02	-0.477919E+03	-0.326950E+03	0.754845E+02
124	-0.465017E+03	-0.406187E+03	-0.560704E+02	-0.498920E+03	-0.372285E+03	0.633176E+02
125	-0.459542E+03	-0.444840E+03	-0.681567E+02	-0.520742E+03	-0.383638E+03	0.685519E+02
126	-0.444916E+03	-0.461758E+03	-0.790078E+02	-0.532792E+03	-0.373882E+03	0.794552E+02
127	-0.414359E+03	-0.387053E+03	-0.829557E+02	-0.484778E+03	-0.316635E+03	0.840717E+02
128	-0.349644E+03	-0.658444E+02	-0.780395E+02	-0.369688E+03	-0.458006E+02	0.161944E+03
129	-0.335932E+03	-0.207130E+02	-0.750063E+02	-0.352869E+03	-0.377541E+01	0.174547E+03
130	-0.328022E+03	0.0	0.0	-0.328022E+03	0.0	0.164011E+03
131	-0.463490E+03	-0.137420E+03	-0.464446E-01	-0.463490E+03	-0.137420E+03	0.163035E+03
132	-0.464217E+03	-0.144904E+03	-0.680145E+01	-0.464361E+03	-0.144759E+03	0.159801E+03
133	-0.465851E+03	-0.168415E+03	-0.147035E+02	-0.466576E+03	-0.167690E+03	0.149443E+03
134	-0.468503E+03	-0.208830E+03	-0.237577E+02	-0.470658E+03	-0.206674E+03	0.131992E+03
135	-0.472386E+03	-0.264128E+03	-0.342009E+02	-0.477858E+03	-0.258655E+03	0.109602E+03
136	-0.476586E+03	-0.330035E+03	-0.468334E+02	-0.490274E+03	-0.316347E+03	0.869637E+02
137	-0.478823E+03	-0.393477E+03	-0.629456E+02	-0.512196E+03	-0.360103E+03	0.760468E+02
138	-0.476600E+03	-0.429404E+03	-0.785315E+02	-0.535002E+03	-0.371001E+03	0.820004E+02
139	-0.466237E+03	-0.450955E+03	-0.965367E+02	-0.555434E+03	-0.361757E+03	0.968386E+02

140	-0.424723E+03	-0.392238E+03	-0.104925E+03	-0.514655E+03	-0.302305E+03	0.106175E+03
141	-0.355025E+03	-0.808571E+02	-0.929547E+02	-0.383569E+03	-0.523132E+02	0.165628E+03
142	-0.335299E+03	-0.260976E+02	-0.827173E+02	-0.356036E+03	-0.535991E+01	0.175338E+03
143	-0.326707E+03	0.0	0.0	-0.326707E+03	-0.305176E-04	0.163353E+03
144	-0.375377E+03	-0.118783E+03	0.656717E-01	-0.375377E+03	-0.118783E+03	0.128297E+03
145	-0.376311E+03	-0.124800E+03	-0.766482E+01	-0.376544E+03	-0.124566E+03	0.125989E+03
146	-0.377053E+03	-0.147438E+03	-0.166512E+02	-0.378254E+03	-0.146236E+03	0.116009E+03
147	-0.379189E+03	-0.186855E+03	-0.264043E+02	-0.382748E+03	-0.183296E+03	0.997258E+02
148	-0.382827E+03	-0.240853E+03	-0.371915E+02	-0.391979E+03	-0.231700E+03	0.801398E+02
149	-0.388650E+03	-0.304335E+03	-0.504078E+02	-0.412205E+03	-0.280779E+03	0.657130E+02
150	-0.392760E+03	-0.364612E+03	-0.668183E+02	-0.446970E+03	-0.310401E+03	0.682844E+02
151	-0.396819E+03	-0.397375E+03	-0.824474E+02	-0.479545E+03	-0.314649E+03	0.824478E+02
152	-0.401843E+03	-0.408351E+03	-0.104807E+03	-0.509954E+03	-0.300240E+03	0.104857E+03
153	-0.400562E+03	-0.389661E+03	-0.130575E+03	-0.525800E+03	-0.264423E+03	0.130689E+03
154	-0.298340E+03	-0.104775E+03	-0.117003E+03	-0.353401E+03	-0.497130E+02	0.151844E+03
155	-0.282587E+03	-0.419510E+02	-0.886031E+02	-0.311691E+03	-0.128470E+02	0.149422E+03
156	-0.280948E+03	0.0	0.0	-0.280948E+03	-0.457764E-04	0.140474E+03
157	-0.369444E+02	-0.622392E+02	-0.262686E+00	-0.622419E+02	-0.369417E+02	0.126501E+02
158	-0.350201E+02	-0.651454E+02	-0.939568E+01	-0.678356E+02	-0.323299E+02	0.177528E+02
159	-0.344760E+02	-0.879243E+02	-0.190226E+02	-0.940031E+02	-0.283971E+02	0.328030E+02
160	-0.359797E+02	-0.126174E+03	-0.292675E+02	-0.134839E+03	-0.273150E+02	0.537620E+02
161	-0.391700E+02	-0.180034E+03	-0.402209E+02	-0.190709E+03	-0.284948E+02	0.811073E+02
162	-0.435086E+02	-0.239595E+03	-0.522905E+02	-0.252668E+03	-0.304357E+02	0.111116E+03
163	-0.556651E+02	-0.300507E+03	-0.659717E+02	-0.317151E+03	-0.390208E+02	0.139065E+03
164	-0.664058E+02	-0.330232E+03	-0.778554E+02	-0.351493E+03	-0.451442E+02	0.153175E+03
165	-0.802076E+02	-0.337049E+03	-0.937004E+02	-0.367598E+03	-0.496578E+02	0.158970E+03
166	-0.103026E+03	-0.286044E+03	-0.117460E+03	-0.343433E+03	-0.456368E+02	0.148898E+03
167	-0.174710E+03	-0.177064E+03	-0.108939E+03	-0.284832E+03	-0.669420E+02	0.108945E+03
168	-0.169652E+03	-0.575553E+02	-0.813262E+02	-0.212373E+03	-0.148344E+02	0.987693E+02
169	-0.173600E+03	0.0	0.0	-0.173600E+03	0.0	0.868001E+02
170	-0.732010E+01	-0.519733E+02	-0.203008E+00	-0.519742E+02	-0.731918E+01	0.223275E+02
171	-0.601075E+01	-0.550185E+02	-0.109125E+02	-0.573385E+02	-0.369072E+01	0.268239E+02
172	-0.641316E+01	-0.781064E+02	-0.211702E+02	-0.838909E+02	-0.628571E+00	0.416312E+02
173	-0.603293E+01	-0.115407E+03	-0.319336E+02	-0.124048E+03	0.260791E+01	0.633281E+02
174	-0.666857E+01	-0.168608E+03	-0.432170E+02	-0.179419E+03	0.414302E+01	0.917811E+02
175	-0.748752E+01	-0.227566E+03	-0.543598E+02	-0.240261E+03	0.520718E+01	0.122734E+03
176	-0.108956E+02	-0.286159E+03	-0.656152E+02	-0.301000E+03	0.394504E+01	0.152473E+03
177	-0.136989E+02	-0.313714E+03	-0.750717E+02	-0.331450E+03	0.403749E+01	0.167744E+03
178	-0.198031E+02	-0.316241E+03	-0.840652E+02	-0.338421E+03	0.237698E+01	0.170399E+03
179	-0.357397E+02	-0.269812E+03	-0.897697E+02	-0.300275E+03	-0.527654E+01	0.147499E+03
180	-0.534087E+02	-0.173074E+03	-0.816246E+02	-0.214447E+03	-0.120361E+02	0.101205E+03
181	-0.706215E+02	-0.755451E+02	-0.629291E+02	-0.136060E+03	-0.101061E+02	0.629772E+02
182	-0.894574E+02	0.0	0.0	-0.894574E+02	0.0	0.447287E+02
183	0.0	-0.445888E+02	0.0	-0.445888E+02	0.0	0.222944E+02
184	0.0	-0.483383E+02	0.0	-0.483383E+02	0.0	0.241692E+02
185	0.0	-0.706555E+02	0.0	-0.706555E+02	0.0	0.353277E+02
186	0.0	-0.107651E+03	0.0	-0.107651E+03	0.0	0.538257E+02
187	0.0	-0.160649E+03	0.0	-0.160649E+03	0.0	0.803244E+02
188	0.0	-0.220513E+03	0.0	-0.220513E+03	0.0	0.110256E+03

189	0.0	-0.277634E+03	0.0	-0.277633E+03	-0.152588E-04	0.138817E+03
190	0.0	-0.305147E+03	0.0	-0.305147E+03	-0.152588E-04	0.152574E+03
191	0.0	-0.307702E+03	0.0	-0.307702E+03	-0.152588E-04	0.153851E+03
192	0.0	-0.268123E+03	0.0	-0.268122E+03	-0.152588E-04	0.134061E+03
193	0.0	-0.177564E+03	0.0	-0.177564E+03	0.0	0.887818E+02
194	0.0	-0.972597E+02	0.0	-0.972596E+02	0.0	0.486298E+02
195	0.0	0.0	0.0	0.0	0.0	0.0

NODE	MOMENT X	MOMENT Y	MOMENT XY
1	-0.593744E+03	-0.210646E+04	0.210746E+01
2	-0.617921E+03	-0.230204E+04	-0.472063E+00
3	-0.690323E+03	-0.288462E+04	-0.424712E+00
4	-0.809866E+03	-0.384323E+04	0.298046E-01
5	-0.968385E+03	-0.514207E+04	-0.203824E+00
6	-0.115175E+04	-0.668916E+04	-0.553784E+00
7	-0.132315E+04	-0.824265E+04	0.798629E+00
8	-0.140108E+04	-0.912734E+04	0.101527E+01
9	-0.134900E+04	-0.936883E+04	-0.558912E+00
10	-0.956967E+03	-0.762839E+04	-0.124602E+01
11	0.243860E+03	-0.711360E+03	-0.171263E+01
12	0.435377E+03	-0.158535E+03	0.846056E-01
13	0.566953E+03	0.0	0.0
14	-0.712682E+03	-0.212101E+04	0.227138E+00
15	-0.736265E+03	-0.231538E+04	-0.860912E+01
16	-0.809116E+03	-0.289705E+04	-0.174815E+02
17	-0.926303E+03	-0.385454E+04	-0.269087E+02
18	-0.108221E+04	-0.515282E+04	-0.382528E+02
19	-0.126140E+04	-0.669773E+04	-0.508489E+02
20	-0.142079E+04	-0.824878E+04	-0.667948E+02
21	-0.147639E+04	-0.911396E+04	-0.893357E+02
22	-0.141906E+04	-0.934683E+04	-0.121811E+03
23	-0.104896E+04	-0.761369E+04	-0.156175E+03
24	0.115696E+03	-0.726127E+03	-0.179864E+03
25	0.297724E+03	-0.181834E+03	-0.187306E+03
26	0.439667E+03	0.0	0.0
27	-0.106344E+04	-0.215883E+04	0.520856E+00
28	-0.108693E+04	-0.235331E+04	-0.174314E+02
29	-0.115653E+04	-0.293326E+04	-0.361833E+02
30	-0.126942E+04	-0.388781E+04	-0.568180E+02
31	-0.141952E+04	-0.518187E+04	-0.806847E+02
32	-0.158695E+04	-0.672077E+04	-0.109389E+03

33	-0.173207E+04	-0.825960E+04	-0.147216E+03
34	-0.177633E+04	-0.909819E+04	-0.187427E+03
35	-0.171618E+04	-0.932200E+04	-0.236305E+03
36	-0.135579E+04	-0.759215E+04	-0.290292E+03
37	-0.207810E+03	-0.732318E+03	-0.336314E+03
38	-0.428759E+02	-0.204041E+03	-0.359470E+03
39	0.824308E+02	0.0	0.0
40	-0.166047E+04	-0.222142E+04	0.451633E+00
41	-0.168254E+04	-0.241546E+04	-0.286192E+02
42	-0.174840E+04	-0.299343E+04	-0.588248E+02
43	-0.185462E+04	-0.394279E+04	-0.920475E+02
44	-0.199324E+04	-0.522890E+04	-0.131133E+03
45	-0.214766E+04	-0.675777E+04	-0.179156E+03
46	-0.227557E+04	-0.827693E+04	-0.239001E+03
47	-0.230936E+04	-0.909650E+04	-0.292879E+03
48	-0.224311E+04	-0.931391E+04	-0.354885E+03
49	-0.186562E+04	-0.756711E+04	-0.422977E+03
50	-0.716028E+03	-0.741253E+03	-0.491189E+03
51	-0.531806E+03	-0.203113E+03	-0.533754E+03
52	-0.382991E+03	0.0	0.0
53	-0.252395E+04	-0.231134E+04	0.488888E+00
54	-0.254520E+04	-0.250448E+04	-0.414451E+02
55	-0.260727E+04	-0.307763E+04	-0.853548E+02
56	-0.270544E+04	-0.401942E+04	-0.134953E+03
57	-0.283249E+04	-0.529523E+04	-0.192780E+03
58	-0.297080E+04	-0.680798E+04	-0.260634E+03
59	-0.308172E+04	-0.830893E+04	-0.342495E+03
60	-0.309830E+04	-0.911566E+04	-0.413026E+03
61	-0.300761E+04	-0.931297E+04	-0.490615E+03
62	-0.261434E+04	-0.756750E+04	-0.572872E+03
63	-0.144229E+04	-0.718420E+03	-0.658458E+03
64	-0.126445E+04	-0.201865E+03	-0.717087E+03
65	-0.112013E+04	0.0	0.0
66	-0.367891E+04	-0.242933E+04	0.450911E+00
67	-0.369839E+04	-0.262093E+04	-0.561190E+02
68	-0.375482E+04	-0.318713E+04	-0.116798E+03
69	-0.384391E+04	-0.411759E+04	-0.185484E+03
70	-0.395633E+04	-0.537948E+04	-0.265173E+03
71	-0.407534E+04	-0.687496E+04	-0.356593E+03
72	-0.416304E+04	-0.835698E+04	-0.462583E+03
73	-0.416368E+04	-0.914662E+04	-0.550235E+03
74	-0.406287E+04	-0.933905E+04	-0.640833E+03
75	-0.366650E+04	-0.759131E+04	-0.730322E+03
76	-0.250769E+04	-0.738780E+03	-0.819354E+03
77	-0.234521E+04	-0.218482E+03	-0.883650E+03
78	-0.222286E+04	0.0	0.0
79	-0.511400E+04	-0.257159E+04	0.438412E+00
80	-0.513171E+04	-0.276037E+04	-0.729876E+02
81	-0.518280E+04	-0.331618E+04	-0.153049E+03

82	-0.526201E+04	-0.423202E+04	-0.244212E+03
83	-0.536105E+04	-0.547570E+04	-0.349597E+03
84	-0.546058E+04	-0.695261E+04	-0.470507E+03
85	-0.551856E+04	-0.841750E+04	-0.605126E+03
86	-0.548922E+04	-0.919491E+04	-0.709842E+03
87	-0.536355E+04	-0.939178E+04	-0.809878E+03
88	-0.494518E+04	-0.765402E+04	-0.896779E+03
89	-0.377420E+04	-0.802409E+03	-0.973901E+03
90	-0.360021E+04	-0.237047E+03	-0.103711E+04
91	-0.347447E+04	0.0	0.0
92	-0.675504E+04	-0.272576E+04	0.761453E+00
93	-0.677264E+04	-0.290822E+04	-0.914089E+02
94	-0.682002E+04	-0.345136E+04	-0.193276E+03
95	-0.689252E+04	-0.434946E+04	-0.309669E+03
96	-0.697842E+04	-0.556896E+04	-0.445171E+03
97	-0.705878E+04	-0.702336E+04	-0.601729E+03
98	-0.708875E+04	-0.846897E+04	-0.776698E+03
99	-0.703121E+04	-0.925267E+04	-0.909436E+03
100	-0.685985E+04	-0.946423E+04	-0.102364E+04
101	-0.639570E+04	-0.776230E+04	-0.111331E+04
102	-0.514968E+04	-0.910109E+03	-0.116680E+04
103	-0.493844E+04	-0.282929E+03	-0.121073E+04
104	-0.477087E+04	0.0	0.0
105	-0.838255E+04	-0.285727E+04	-0.128575E+01
106	-0.840124E+04	-0.303257E+04	-0.111208E+03
107	-0.844486E+04	-0.355529E+04	-0.235137E+03
108	-0.850998E+04	-0.443073E+04	-0.380192E+03
109	-0.858614E+04	-0.561961E+04	-0.550266E+03
110	-0.864964E+04	-0.704385E+04	-0.749404E+03
111	-0.864495E+04	-0.845702E+04	-0.982461E+03
112	-0.853260E+04	-0.924427E+04	-0.116717E+04
113	-0.829248E+04	-0.952044E+04	-0.131871E+04
114	-0.773466E+04	-0.784339E+04	-0.140218E+04
115	-0.648971E+04	-0.113662E+04	-0.139646E+04
116	-0.624532E+04	-0.335423E+03	-0.139425E+04
117	-0.610913E+04	0.0	0.0
118	-0.929552E+04	-0.289727E+04	-0.671720E+00
119	-0.930858E+04	-0.306206E+04	-0.125179E+03
120	-0.934797E+04	-0.356664E+04	-0.267444E+03
121	-0.941153E+04	-0.442162E+04	-0.434513E+03
122	-0.948346E+04	-0.558208E+04	-0.629570E+03
123	-0.955141E+04	-0.697659E+04	-0.863309E+03
124	-0.954912E+04	-0.834105E+04	-0.115141E+04
125	-0.943668E+04	-0.913477E+04	-0.139960E+04
126	-0.913635E+04	-0.948220E+04	-0.162242E+04
127	-0.850886E+04	-0.794814E+04	-0.170349E+04
128	-0.717994E+04	-0.135211E+04	-0.160254E+04
129	-0.689836E+04	-0.425341E+03	-0.154025E+04
130	-0.673592E+04	0.0	0.0

131	-0.951776E+04	-0.282193E+04	-0.953740E+00
132	-0.953268E+04	-0.297559E+04	-0.139668E+03
133	-0.956625E+04	-0.345840E+04	-0.301936E+03
134	-0.962070E+04	-0.428831E+04	-0.487865E+03
135	-0.970043E+04	-0.542386E+04	-0.702314E+03
136	-0.978670E+04	-0.677727E+04	-0.961723E+03
137	-0.983261E+04	-0.808004E+04	-0.129259E+04
138	-0.978698E+04	-0.881780E+04	-0.161264E+04
139	-0.957416E+04	-0.926035E+04	-0.198238E+04
140	-0.872168E+04	-0.805459E+04	-0.215464E+04
141	-0.729044E+04	-0.166040E+04	-0.190882E+04
142	-0.688536E+04	-0.535914E+03	-0.169860E+04
143	-0.670892E+04	0.0	0.0
144	-0.770837E+04	-0.243920E+04	0.134857E+01
145	-0.772755E+04	-0.256276E+04	-0.157397E+03
146	-0.774277E+04	-0.302763E+04	-0.341931E+03
147	-0.778664E+04	-0.383707E+04	-0.542212E+03
148	-0.786134E+04	-0.494590E+04	-0.763726E+03
149	-0.798092E+04	-0.624951E+04	-0.103512E+04
150	-0.806532E+04	-0.748730E+04	-0.137211E+04
151	-0.814867E+04	-0.816009E+04	-0.169306E+04
152	-0.825184E+04	-0.838548E+04	-0.215220E+04
153	-0.822554E+04	-0.800168E+04	-0.268135E+04
154	-0.612640E+04	-0.215155E+04	-0.240266E+04
155	-0.580293E+04	-0.861463E+03	-0.181946E+04
156	-0.576927E+04	0.0	0.0
157	-0.758653E+03	-0.127808E+04	-0.539426E+01
158	-0.719137E+03	-0.133776E+04	-0.192940E+03
159	-0.707964E+03	-0.180552E+04	-0.390628E+03
160	-0.738842E+03	-0.259099E+04	-0.601008E+03
161	-0.804356E+03	-0.369700E+04	-0.825935E+03
162	-0.893448E+03	-0.492009E+04	-0.107378E+04
163	-0.114308E+04	-0.617091E+04	-0.135473E+04
164	-0.136364E+04	-0.678130E+04	-0.159876E+04
165	-0.164706E+04	-0.692129E+04	-0.192414E+04
166	-0.211564E+04	-0.587391E+04	-0.241203E+04
167	-0.358766E+04	-0.363601E+04	-0.223705E+04
168	-0.348380E+04	-0.118190E+04	-0.167003E+04
169	-0.356488E+04	0.0	0.0
170	-0.150318E+03	-0.106727E+04	-0.416876E+01
171	-0.123431E+03	-0.112980E+04	-0.224087E+03
172	-0.131694E+03	-0.160391E+04	-0.434730E+03
173	-0.123886E+03	-0.236989E+04	-0.655755E+03
174	-0.136939E+03	-0.346235E+04	-0.887461E+03
175	-0.153756E+03	-0.467307E+04	-0.111628E+04
176	-0.223741E+03	-0.587628E+04	-0.134741E+04
177	-0.281306E+03	-0.644212E+04	-0.154160E+04
178	-0.406657E+03	-0.649400E+04	-0.172628E+04
179	-0.733915E+03	-0.554059E+04	-0.184342E+04

180	-0.109675E+04	-0.355408E+04	-0.167616E+04
181	-0.145021E+04	-0.155132E+04	-0.129225E+04
182	-0.183701E+04	0.0	0.0
183	0.0	-0.915631E+03	0.0
184	0.0	-0.992627E+03	0.0
185	0.0	-0.145091E+04	0.0
186	0.0	-0.221062E+04	0.0
187	0.0	-0.329892E+04	0.0
188	0.0	-0.452823E+04	0.0
189	0.0	-0.570120E+04	0.0
190	0.0	-0.626619E+04	0.0
191	0.0	-0.631865E+04	0.0
192	0.0	-0.550589E+04	0.0
193	0.0	-0.364626E+04	0.0
194	0.0	-0.199723E+04	0.0
195	0.0	0.0	0.0

1	0.627637E-04	14	0.626445E-04	27	0.621080E-04	40	0.616908E-04
53	0.610948E-04	66	0.598431E-04	79	0.584126E-04	92	0.564456E-04
105	0.541806E-04	118	0.523925E-04	131	0.506043E-04	144	0.486374E-04
157	0.479817E-04	170	0.486374E-04	183	0.467300E-04	31	

IC= 31

NODE	DEFLECTION	NODE	DEFLECTION	NODE	DEFLECTION	NODE	DEFLECTION
1	0.405911E+00	2	0.409417E+00	3	0.420579E+00	4	0.441318E+00
5	0.474783E+00	6	0.525221E+00	7	0.597616E+00	8	0.669329E+00
9	0.757743E+00	10	0.862918E+00	11	0.980678E+00	12	0.108132E+01
13	0.114220E+01	14	0.406443E+00	15	0.409941E+00	16	0.421079E+00
17	0.441775E+00	18	0.475178E+00	19	0.525532E+00	20	0.597817E+00
21	0.669425E+00	22	0.757689E+00	23	0.862655E+00	24	0.980160E+00
25	0.106062E+01	26	0.114131E+01	27	0.408430E+00	28	0.411903E+00
29	0.422965E+00	30	0.443531E+00	31	0.476740E+00	32	0.526827E+00
33	0.598757E+00	34	0.670016E+00	35	0.757820E+00	36	0.862199E+00
37	0.978995E+00	38	0.105893E+01	39	0.113908E+01	40	0.413046E+00
41	0.416474E+00	42	0.427400E+00	43	0.447732E+00	44	0.480596E+00
45	0.530203E+00	46	0.601489E+00	47	0.672123E+00	48	0.759153E+00
49	0.862589E+00	50	0.978266E+00	51	0.105738E+01	52	0.113664E+01
53	0.422279E+00	54	0.425640E+00	55	0.436360E+00	56	0.456335E+00
57	0.488670E+00	58	0.537544E+00	59	0.607850E+00	60	0.677557E+00
61	0.763469E+00	62	0.865573E+00	63	0.979699E+00	64	0.105765E+01
65	0.113565E+01	66	0.439008E+00	67	0.442274E+00	68	0.452707E+00
69	0.472181E+00	70	0.503769E+00	71	0.551609E+00	72	0.620547E+00
73	0.688977E+00	74	0.773372E+00	75	0.873709E+00	76	0.985813E+00
77	0.106227E+01	78	0.113864E+01	79	0.467057E+00	80	0.470200E+00
81	0.480249E+00	82	0.499051E+00	83	0.529634E+00	84	0.576087E+00
85	0.643200E+00	86	0.709949E+00	87	0.792381E+00	88	0.890487E+00
89	0.100011E+01	90	0.107477E+01	91	0.114922E+01	92	0.511151E+00
93	0.514135E+00	94	0.523694E+00	95	0.541630E+00	96	0.570915E+00
97	0.615568E+00	98	0.680315E+00	99	0.744891E+00	100	0.824825E+00

101	0.920152E+00	102	0.102678E+01	103	0.109933E+01	104	0.117153E+01
105	0.576623E+00	106	0.579414E+00	107	0.588367E+00	108	0.605227E+00
109	0.632890E+00	110	0.675281E+00	111	0.737031E+00	112	0.798832E+00
113	0.875568E+00	114	0.967386E+00	115	0.107031E+01	116	0.114037E+01
117	0.120998E+01	118	0.642926E+00	119	0.645548E+00	120	0.653970E+00
121	0.669880E+00	122	0.696102E+00	123	0.736472E+00	124	0.795511E+00
125	0.854747E+00	126	0.928477E+00	127	0.101700E+01	128	0.111660E+01
129	0.118451E+01	130	0.125196E+01	131	0.725808E+00	132	0.728241E+00
133	0.736064E+00	134	0.750899E+00	135	0.775490E+00	136	0.813576E+00
137	0.869525E+00	138	0.925783E+00	139	0.995882E+00	140	0.108031E+01
141	0.117590E+01	142	0.124138E+01	143	0.130652E+01	144	0.825298E+00
145	0.827526E+00	146	0.834674E+00	147	0.848300E+00	148	0.871085E+00
149	0.906668E+00	150	0.959242E+00	151	0.101224E+01	152	0.107826E+01
153	0.115763E+01	154	0.124817E+01	155	0.131082E+01	156	0.137352E+01
157	0.937128E+00	158	0.939123E+00	159	0.945489E+00	160	0.957759E+00
161	0.978563E+00	162	0.101148E+01	163	0.106052E+01	164	0.111024E+01
165	0.117226E+01	166	0.124656E+01	167	0.133097E+01	168	0.139065E+01
169	0.145106E+01	170	0.101363E+01	171	0.101543E+01	172	0.102119E+01
173	0.103246E+01	174	0.105184E+01	175	0.108287E+01	176	0.112957E+01
177	0.117718E+01	178	0.123674E+01	179	0.130819E+01	180	0.138960E+01
181	0.144757E+01	182	0.150673E+01	183	0.109019E+01	184	0.109175E+01
185	0.109686E+01	186	0.110704E+01	187	0.112486E+01	188	0.115388E+01
189	0.119814E+01	190	0.124363E+01	191	0.130086E+01	192	0.136982E+01
193	0.144889E+01	194	0.150559E+01	195	0.156390E+01		

AMOUNT OF FINAL CURLING AND GAP AT THE NODES IS:

1	0.40591	2	0.40942	3	0.42058	4	0.44132	5	0.47478	6	0.52522	7	0.59762
8	0.66933	9	0.75774	10	0.75492	11	0.11668	12	-0.98668	13	-2.85780	14	0.40644
15	0.40994	16	0.42108	17	0.44178	18	0.47518	19	0.52553	20	0.59782	21	0.66943
22	0.75769	23	0.75465	24	0.11616	25	-0.98738	26	-2.85869	27	0.40843	28	0.41190
29	0.42296	30	0.44353	31	0.47674	32	0.52683	33	0.59876	34	0.67002	35	0.75782
36	0.75420	37	0.11500	38	-0.98907	39	-2.86092	40	0.41305	41	0.41647	42	0.42740
43	0.44773	44	0.48060	45	0.53020	46	0.60149	47	0.67212	48	0.75915	49	0.75459
50	0.11427	51	-0.99062	52	-2.86336	53	0.42228	54	0.42564	55	0.43636	56	0.45634
57	0.48867	58	0.53754	59	0.60785	60	0.67756	61	0.76347	62	0.75757	63	0.11570
64	-0.99035	65	-2.86435	66	0.43901	67	0.44227	68	0.45271	69	0.47218	70	0.50377
71	0.55161	72	0.62055	73	0.68898	74	0.77337	75	0.76571	76	0.12181	77	-0.98573
78	-2.86136	79	0.46706	80	0.47020	81	0.48025	82	0.49905	83	0.52963	84	0.57609
85	0.64320	86	0.70995	87	0.79238	88	0.78249	89	0.13611	90	-0.97323	91	-2.85078
92	0.51115	93	0.51414	94	0.52369	95	0.54163	96	0.57091	97	0.61557	98	0.68032
99	0.74489	100	0.82483	101	0.81215	102	0.16278	103	-0.94868	104	-2.82847	105	0.57662
106	0.57941	107	0.58837	108	0.60523	109	0.63289	110	0.67528	111	0.73703	112	0.79883
113	0.87557	114	0.85939	115	0.20631	116	-0.90763	117	-2.79002	118	0.64293	119	0.64555
120	0.65397	121	0.66988	122	0.69610	123	0.73647	124	0.79551	125	0.85475	126	0.92848
127	0.90900	128	0.25260	129	-0.86349	130	-2.74804	131	0.72581	132	0.72824	133	0.73606
134	0.75090	135	0.77549	136	0.81358	137	0.86952	138	0.92578	139	0.99588	140	0.97231
141	0.31190	142	-0.80662	143	-2.69348	144	0.71730	145	0.71953	146	0.72667	147	0.74030
148	0.76309	149	0.79867	150	0.85124	151	0.90424	152	0.97026	153	1.04962	154	0.38417
155	-0.73718	156	-2.62648	157	0.07313	158	0.07512	159	0.08149	160	0.09376	161	0.11456

162	0.14748	163	0.19652	164	0.24624	165	0.30826	166	0.38256	167	0.46697	168	-0.65735
169	-2.54894	170	-1.03437	171	-1.03257	172	-1.02581	173	-1.01554	174	-0.99616	175	-0.96513
176	-0.91844	177	-0.87082	178	-0.81126	179	-0.73981	180	-0.65840	181	-0.60043	182	-2.49327
183	-2.90981	184	-2.90825	185	-2.90314	186	-2.89296	187	-2.87514	188	-2.84612	189	-2.80186
190	-2.75637	191	-2.69914	192	-2.63018	193	-2.55111	194	-2.49441	195	-2.43610		

NODE	STRESS X	STRESS Y	STRESS XY	MAJOR	MINOR	SHEAR
1	-0.289260E+02	-0.102606E+03	0.104875E+00	-0.102606E+03	-0.289259E+02	0.368399E+02
2	-0.300660E+02	-0.112082E+03	-0.232457E-01	-0.112082E+03	-0.300660E+02	0.410082E+02
3	-0.336169E+02	-0.140472E+03	-0.168666E-01	-0.140472E+03	-0.336169E+02	0.534277E+02
4	-0.394466E+02	-0.187160E+03	0.696434E-02	-0.187160E+03	-0.394466E+02	0.738569E+02
5	-0.471552E+02	-0.250417E+03	-0.636740E-02	-0.250417E+03	-0.471551E+02	0.101631E+03
6	-0.560750E+02	-0.325719E+03	-0.258442E-01	-0.325719E+03	-0.560750E+02	0.134822E+03
7	-0.643887E+02	-0.401359E+03	0.402021E-01	-0.401359E+03	-0.643888E+02	0.168485E+03
8	-0.682365E+02	-0.444490E+03	0.434482E-01	-0.444490E+03	-0.682363E+02	0.188127E+03
9	-0.656995E+02	-0.456297E+03	-0.282161E-01	-0.456296E+03	-0.656996E+02	0.195298E+03
10	-0.465878E+02	-0.371476E+03	-0.546849E-01	-0.371475E+03	-0.465878E+02	0.162444E+03
11	0.117956E+02	-0.346021E+02	-0.858976E-01	-0.346023E+02	0.117958E+02	0.231990E+02
12	0.210806E+02	-0.786775E+01	0.220986E-01	-0.786776E+01	0.210806E+02	0.144742E+02
13	0.276014E+02	0.0	0.0	0.953674E-06	0.276013E+02	0.138007E+02
14	-0.346874E+02	-0.103274E+03	0.122856E-01	-0.103274E+03	-0.346874E+02	0.342930E+02
15	-0.358626E+02	-0.112754E+03	-0.418179E+00	-0.112756E+03	-0.358604E+02	0.384477E+02
16	-0.393849E+02	-0.141066E+03	-0.848340E+00	-0.141073E+03	-0.393779E+02	0.508475E+02
17	-0.451085E+02	-0.187708E+03	-0.131175E+01	-0.187720E+03	-0.450965E+02	0.713118E+02
18	-0.527135E+02	-0.250950E+03	-0.186393E+01	-0.250967E+03	-0.526960E+02	0.991356E+02
19	-0.614190E+02	-0.326133E+03	-0.247439E+01	-0.326156E+03	-0.613960E+02	0.132380E+03
20	-0.691808E+02	-0.401680E+03	-0.325204E+01	-0.401712E+03	-0.691490E+02	0.166282E+03
21	-0.718759E+02	-0.443830E+03	-0.434866E+01	-0.443880E+03	-0.718251E+02	0.186028E+03
22	-0.690864E+02	-0.455151E+03	-0.593738E+01	-0.455242E+03	-0.689949E+02	0.193124E+03
23	-0.510650E+02	-0.370780E+03	-0.761744E+01	-0.370961E+03	-0.508837E+02	0.160039E+03
24	0.570968E+01	-0.353114E+02	-0.874964E+01	-0.370997E+02	0.749799E+01	0.222988E+02
25	0.146291E+02	-0.878947E+01	-0.910639E+01	-0.119137E+02	0.177533E+02	0.148335E+02
26	0.214136E+02	0.0	0.0	0.953674E-06	0.214136E+02	0.107068E+02
27	-0.517887E+02	-0.105135E+03	0.271668E-01	-0.105135E+03	-0.517887E+02	0.266733E+02
28	-0.529220E+02	-0.114580E+03	-0.849417E+00	-0.114591E+03	-0.529102E+02	0.308406E+02
29	-0.563283E+02	-0.142851E+03	-0.176338E+01	-0.142887E+03	-0.562924E+02	0.432974E+02
30	-0.618199E+02	-0.189312E+03	-0.276690E+01	-0.189372E+03	-0.617599E+02	0.638060E+02
31	-0.691094E+02	-0.252339E+03	-0.393398E+01	-0.252424E+03	-0.690250E+02	0.916993E+02
32	-0.772943E+02	-0.327291E+03	-0.532993E+01	-0.327404E+03	-0.771807E+02	0.125112E+03
33	-0.843563E+02	-0.402212E+03	-0.717123E+01	-0.402373E+03	-0.841946E+02	0.159089E+03
34	-0.864788E+02	-0.443042E+03	-0.912147E+01	-0.443274E+03	-0.862456E+02	0.178514E+03
35	-0.835648E+02	-0.453958E+03	-0.115054E+02	-0.454315E+03	-0.832078E+02	0.185554E+03
36	-0.660196E+02	-0.369687E+03	-0.141400E+02	-0.370344E+03	-0.653627E+02	0.152491E+03
37	-0.101519E+02	-0.357073E+02	-0.163728E+02	-0.436983E+02	-0.216086E+01	0.207687E+02
38	-0.213815E+01	-0.989850E+01	-0.175086E+02	-0.239517E+02	0.119151E+02	0.179334E+02
39	0.398488E+01	0.0	0.0	0.0	0.398488E+01	0.199244E+01
40	-0.808671E+02	-0.108189E+03	0.204483E-01	-0.108189E+03	-0.808671E+02	0.136609E+02

41	-0.819235E+02	-0.117616E+03	-0.139555E+01	-0.117671E+03	-0.818690E+02	0.179008E+02
42	-0.851252E+02	-0.145767E+03	-0.286392E+01	-0.145902E+03	-0.849903E+02	0.304558E+02
43	-0.903132E+02	-0.191991E+03	-0.448631E+01	-0.192188E+03	-0.901155E+02	0.510363E+02
44	-0.970741E+02	-0.254624E+03	-0.639053E+01	-0.254882E+03	-0.968153E+02	0.790336E+02
45	-0.104570E+03	-0.329067E+03	-0.871923E+01	-0.329405E+03	-0.104232E+03	0.112586E+03
46	-0.110823E+03	-0.403069E+03	-0.116336E+02	-0.403531E+03	-0.110380E+03	0.146586E+03
47	-0.112476E+03	-0.442970E+03	-0.142641E+02	-0.443584E+03	-0.111862E+03	0.165861E+03
48	-0.109245E+03	-0.453573E+03	-0.172816E+02	-0.454437E+03	-0.108379E+03	0.173029E+03
49	-0.908515E+02	-0.368475E+03	-0.205934E+02	-0.369994E+03	-0.893322E+02	0.140331E+03
50	-0.348373E+02	-0.360925E+02	-0.239152E+02	-0.593883E+02	-0.115415E+02	0.239234E+02
51	-0.258359E+02	-0.980718E+01	-0.259990E+02	-0.450277E+02	0.938466E+01	0.272062E+02
52	-0.186866E+02	0.0	0.0	-0.186865E+02	-0.953674E-06	0.934328E+01
53	-0.122892E+03	-0.112554E+03	0.204600E-01	-0.122892E+03	-0.112554E+03	0.516901E+01
54	-0.123937E+03	-0.121968E+03	-0.201680E+01	-0.125197E+03	-0.120708E+03	0.224441E+01
55	-0.126956E+03	-0.149861E+03	-0.415633E+01	-0.150592E+03	-0.126225E+03	0.121833E+02
56	-0.131732E+03	-0.195727E+03	-0.657180E+01	-0.196395E+03	-0.131064E+03	0.326654E+02
57	-0.137905E+03	-0.257833E+03	-0.938648E+01	-0.258563E+03	-0.137175E+03	0.606941E+02
58	-0.144664E+03	-0.331546E+03	-0.126996E+02	-0.332405E+03	-0.143805E+03	0.943003E+02
59	-0.150063E+03	-0.404645E+03	-0.166740E+02	-0.405732E+03	-0.148976E+03	0.128378E+03
60	-0.150851E+03	-0.443884E+03	-0.201045E+02	-0.445256E+03	-0.149478E+03	0.147889E+03
61	-0.146407E+03	-0.453504E+03	-0.238864E+02	-0.455350E+03	-0.144560E+03	0.155395E+03
62	-0.127322E+03	-0.368528E+03	-0.278885E+02	-0.371710E+03	-0.124139E+03	0.123786E+03
63	-0.702326E+02	-0.349541E+02	-0.320666E+02	-0.891913E+02	-0.159954E+02	0.365979E+02
64	-0.616233E+02	-0.999187E+01	-0.349330E+02	-0.792445E+02	0.762929E+01	0.434369E+02
65	-0.544439E+02	0.0	0.0	-0.544439E+02	0.0	0.272219E+02
66	-0.179158E+03	-0.118294E+03	0.219114E-01	-0.179158E+03	-0.118294E+03	0.304318E+02
67	-0.180115E+03	-0.127636E+03	-0.273307E+01	-0.180256E+03	-0.127494E+03	0.263811E+02
68	-0.182853E+03	-0.155193E+03	-0.568773E+01	-0.183977E+03	-0.154069E+03	0.149537E+02
69	-0.187164E+03	-0.200509E+03	-0.903341E+01	-0.205067E+03	-0.182606E+03	0.112303E+02
70	-0.192674E+03	-0.261960E+03	-0.129140E+02	-0.264289E+03	-0.190345E+03	0.369719E+02
71	-0.198459E+03	-0.334774E+03	-0.173701E+02	-0.336953E+03	-0.196280E+03	0.703365E+02
72	-0.202708E+03	-0.406968E+03	-0.225345E+02	-0.409424E+03	-0.200251E+03	0.104587E+03
73	-0.202771E+03	-0.445419E+03	-0.267926E+02	-0.448342E+03	-0.199848E+03	0.124247E+03
74	-0.197875E+03	-0.454782E+03	-0.312117E+02	-0.458519E+03	-0.194137E+03	0.132191E+03
75	-0.178536E+03	-0.369653E+03	-0.355627E+02	-0.376056E+03	-0.172133E+03	0.101962E+03
76	-0.122066E+03	-0.359679E+02	-0.398891E+02	-0.137706E+03	-0.203283E+02	0.586888E+02
77	-0.114102E+03	-0.103675E+02	-0.430210E+02	-0.129622E+03	0.515222E+01	0.673872E+02
78	-0.108372E+03	0.0	0.0	-0.108372E+03	0.0	0.541860E+02
79	-0.249027E+03	-0.125227E+03	0.215368E-01	-0.249027E+03	-0.125227E+03	0.618999E+02
80	-0.249869E+03	-0.134390E+03	-0.355371E+01	-0.249978E+03	-0.134281E+03	0.578486E+02
81	-0.252390E+03	-0.161490E+03	-0.745364E+01	-0.252997E+03	-0.160883E+03	0.460571E+02
82	-0.256264E+03	-0.206104E+03	-0.118944E+02	-0.258942E+03	-0.203426E+03	0.277580E+02
83	-0.261075E+03	-0.266636E+03	-0.170211E+02	-0.281102E+03	-0.246609E+03	0.172467E+02
84	-0.265916E+03	-0.338574E+03	-0.229126E+02	-0.345196E+03	-0.259294E+03	0.429509E+02
85	-0.268765E+03	-0.409923E+03	-0.294761E+02	-0.415831E+03	-0.262857E+03	0.764867E+02
86	-0.267299E+03	-0.447771E+03	-0.345718E+02	-0.454167E+03	-0.260903E+03	0.966320E+02
87	-0.261199E+03	-0.457348E+03	-0.394418E+02	-0.464982E+03	-0.253565E+03	0.105709E+03
88	-0.240837E+03	-0.372709E+03	-0.436723E+02	-0.385861E+03	-0.227686E+03	0.790874E+02
89	-0.183857E+03	-0.391293E+02	-0.474235E+02	-0.198012E+03	-0.249743E+02	0.865189E+02

90	-0.175307E+03	-0.115170E+02	-0.505071E+02	-0.189629E+03	0.280530E+01	0.962170E+02
91	-0.169158E+03	0.0	0.0	-0.169158E+03	0.0	0.845791E+02
92	-0.328948E+03	-0.132715E+03	0.389535E-01	-0.328948E+03	-0.132715E+03	0.981166E+02
93	-0.329833E+03	-0.141651E+03	-0.445036E+01	-0.329938E+03	-0.141545E+03	0.941966E+02
94	-0.332121E+03	-0.168066E+03	-0.940725E+01	-0.332659E+03	-0.167529E+03	0.825651E+02
95	-0.335635E+03	-0.211814E+03	-0.150744E+02	-0.337444E+03	-0.210005E+03	0.637192E+02
96	-0.339845E+03	-0.271197E+03	-0.216772E+02	-0.346117E+03	-0.264925E+03	0.405960E+02
97	-0.343742E+03	-0.342024E+03	-0.292986E+02	-0.372194E+03	-0.313572E+03	0.293112E+02
98	-0.345210E+03	-0.412427E+03	-0.378272E+02	-0.429419E+03	-0.328218E+03	0.506007E+02
99	-0.342376E+03	-0.450564E+03	-0.442882E+02	-0.466381E+03	-0.326559E+03	0.699111E+02
100	-0.334036E+03	-0.460870E+03	-0.498454E+02	-0.478114E+03	-0.316791E+03	0.806614E+02
101	-0.311461E+03	-0.378010E+03	-0.542075E+02	-0.408341E+03	-0.281130E+03	0.636054E+02
102	-0.250756E+03	-0.441698E+02	-0.568094E+02	-0.265347E+03	-0.295783E+02	0.117885E+03
103	-0.240589E+03	-0.140492E+02	-0.589591E+02	-0.255015E+03	0.376755E+00	0.127696E+03
104	-0.232348E+03	0.0	0.0	-0.232348E+03	-0.152588E-04	0.116174E+03
105	-0.408213E+03	-0.139156E+03	-0.651098E-01	-0.408213E+03	-0.139156E+03	0.134528E+03
106	-0.409108E+03	-0.147672E+03	-0.540962E+01	-0.409219E+03	-0.147561E+03	0.130829E+03
107	-0.411246E+03	-0.173122E+03	-0.114459E+02	-0.411795E+03	-0.172573E+03	0.119611E+03
108	-0.414417E+03	-0.215762E+03	-0.185065E+02	-0.416126E+03	-0.214052E+03	0.101037E+03
109	-0.418130E+03	-0.273658E+03	-0.267883E+02	-0.422937E+03	-0.268851E+03	0.770435E+02
110	-0.421224E+03	-0.343014E+03	-0.364924E+02	-0.435606E+03	-0.328631E+03	0.534874E+02
111	-0.420971E+03	-0.411823E+03	-0.478383E+02	-0.464453E+03	-0.368340E+03	0.480565E+02
112	-0.415540E+03	-0.450176E+03	-0.568462E+02	-0.492283E+03	-0.373432E+03	0.594256E+02
113	-0.403830E+03	-0.463640E+03	-0.642209E+02	-0.504577E+03	-0.362892E+03	0.708425E+02
114	-0.376642E+03	-0.381947E+03	-0.682804E+02	-0.447626E+03	-0.310962E+03	0.683318E+02
115	-0.316026E+03	-0.553250E+02	-0.679993E+02	-0.332697E+03	-0.386547E+02	0.147021E+03
116	-0.304276E+03	-0.165658E+02	-0.678997E+02	-0.319495E+03	-0.134650E+01	0.159074E+03
117	-0.297390E+03	0.0	0.0	-0.297390E+03	-0.305176E-04	0.148695E+03
118	-0.452661E+03	-0.141117E+03	-0.257193E-01	-0.452661E+03	-0.141117E+03	0.155772E+03
119	-0.453283E+03	-0.149091E+03	-0.609079E+01	-0.453404E+03	-0.148970E+03	0.152217E+03
120	-0.455236E+03	-0.173693E+03	-0.130265E+02	-0.455837E+03	-0.173092E+03	0.141373E+03
121	-0.458298E+03	-0.215303E+03	-0.211613E+02	-0.460127E+03	-0.213473E+03	0.123327E+03
122	-0.461847E+03	-0.271840E+03	-0.306464E+02	-0.466667E+03	-0.267019E+03	0.998241E+02
123	-0.465111E+03	-0.339714E+03	-0.420305E+02	-0.477895E+03	-0.326929E+03	0.754830E+02
124	-0.465039E+03	-0.406205E+03	-0.560705E+02	-0.498940E+03	-0.372303E+03	0.633188E+02
125	-0.459521E+03	-0.444816E+03	-0.681590E+02	-0.520723E+03	-0.383614E+03	0.685544E+02
126	-0.444928E+03	-0.461804E+03	-0.790076E+02	-0.532823E+03	-0.373909E+03	0.794569E+02
127	-0.414357E+03	-0.387063E+03	-0.829644E+02	-0.484789E+03	-0.316631E+03	0.840793E+02
128	-0.349712E+03	-0.660543E+02	-0.780458E+02	-0.369767E+03	-0.459988E+02	0.161884E+03
129	-0.335690E+03	-0.202543E+02	-0.749976E+02	-0.352614E+03	-0.333093E+01	0.174641E+03
130	-0.328057E+03	0.0	0.0	-0.328057E+03	-0.305176E-04	0.164029E+03
131	-0.463475E+03	-0.137447E+03	-0.421997E-01	-0.463475E+03	-0.137446E+03	0.163014E+03
132	-0.464227E+03	-0.144932E+03	-0.679132E+01	-0.464371E+03	-0.144787E+03	0.159792E+03
133	-0.465813E+03	-0.168410E+03	-0.146955E+02	-0.466537E+03	-0.167685E+03	0.149426E+03
134	-0.468517E+03	-0.208815E+03	-0.237525E+02	-0.470672E+03	-0.206661E+03	0.132005E+03
135	-0.472406E+03	-0.264128E+03	-0.342015E+02	-0.477878E+03	-0.258655E+03	0.109611E+03
136	-0.476584E+03	-0.330024E+03	-0.468337E+02	-0.490272E+03	-0.316336E+03	0.869678E+02
137	-0.478809E+03	-0.393448E+03	-0.629446E+02	-0.512179E+03	-0.360078E+03	0.760504E+02
138	-0.476640E+03	-0.429437E+03	-0.785288E+02	-0.535037E+03	-0.371040E+03	0.819988E+02

139	-0.466250E+03	-0.450950E+03	-0.965407E+02	-0.555443E+03	-0.361757E+03	0.968433E+02
140	-0.424857E+03	-0.392297E+03	-0.104936E+03	-0.514768E+03	-0.302385E+03	0.106191E+03
141	-0.355129E+03	-0.809900E+02	-0.929710E+02	-0.383684E+03	-0.524346E+02	0.165625E+03
142	-0.335327E+03	-0.259659E+02	-0.827169E+02	-0.356054E+03	-0.523796E+01	0.175408E+03
143	-0.326653E+03	0.0	0.0	-0.326653E+03	0.0	0.163326E+03
144	-0.375376E+03	-0.118810E+03	0.606776E-01	-0.375376E+03	-0.118810E+03	0.128283E+03
145	-0.376350E+03	-0.124791E+03	-0.766560E+01	-0.376583E+03	-0.124558E+03	0.126013E+03
146	-0.377047E+03	-0.147410E+03	-0.166408E+02	-0.378247E+03	-0.146210E+03	0.116018E+03
147	-0.379193E+03	-0.186865E+03	-0.263993E+02	-0.382751E+03	-0.183307E+03	0.997218E+02
148	-0.382808E+03	-0.240830E+03	-0.371934E+02	-0.391961E+03	-0.231676E+03	0.801423E+02
149	-0.388654E+03	-0.304335E+03	-0.504069E+02	-0.412208E+03	-0.280781E+03	0.657136E+02
150	-0.392746E+03	-0.364585E+03	-0.668190E+02	-0.446951E+03	-0.310379E+03	0.682863E+02
151	-0.396780E+03	-0.397347E+03	-0.824602E+02	-0.479524E+03	-0.314603E+03	0.824606E+02
152	-0.401893E+03	-0.408427E+03	-0.104806E+03	-0.510017E+03	-0.300303E+03	0.104857E+03
153	-0.400486E+03	-0.389581E+03	-0.130568E+03	-0.525715E+03	-0.264351E+03	0.130682E+03
154	-0.298258E+03	-0.104802E+03	-0.116990E+03	-0.353329E+03	-0.497311E+02	0.151799E+03
155	-0.282497E+03	-0.418488E+02	-0.885651E+02	-0.311577E+03	-0.127685E+02	0.149404E+03
156	-0.281066E+03	0.0	0.0	-0.281066E+03	-0.457764E-04	0.140533E+03
157	-0.369617E+02	-0.622732E+02	-0.280415E+00	-0.622763E+02	-0.369586E+02	0.126588E+02
158	-0.349629E+02	-0.651654E+02	-0.941472E+01	-0.678598E+02	-0.322685E+02	0.177956E+02
159	-0.345003E+02	-0.879191E+02	-0.190151E+02	-0.939964E+02	-0.284230E+02	0.327867E+02
160	-0.359709E+02	-0.126186E+03	-0.292568E+02	-0.134843E+03	-0.273137E+02	0.537648E+02
161	-0.391665E+02	-0.180022E+03	-0.402138E+02	-0.190694E+03	-0.284942E+02	0.810998E+02
162	-0.434160E+02	-0.239540E+03	-0.522911E+02	-0.252611E+03	-0.303450E+02	0.111133E+03
163	-0.557282E+02	-0.300551E+03	-0.659622E+02	-0.317191E+03	-0.390871E+02	0.139052E+03
164	-0.664069E+02	-0.330173E+03	-0.778521E+02	-0.351437E+03	-0.451427E+02	0.153147E+03
165	-0.801914E+02	-0.337121E+03	-0.937043E+02	-0.367665E+03	-0.496476E+02	0.159008E+03
166	-0.102799E+03	-0.285942E+03	-0.117429E+03	-0.343283E+03	-0.454577E+02	0.148913E+03
167	-0.174758E+03	-0.176972E+03	-0.108933E+03	-0.284803E+03	-0.669261E+02	0.108938E+03
168	-0.169757E+03	-0.577940E+02	-0.813334E+02	-0.212513E+03	-0.150382E+02	0.987372E+02
169	-0.173831E+03	0.0	0.0	-0.173831E+03	-0.152588E-04	0.869155E+02
170	-0.698584E+01	-0.517105E+02	-0.266307E+00	-0.517121E+02	-0.698427E+01	0.223639E+02
171	-0.612080E+01	-0.552187E+02	-0.109353E+02	-0.575441E+02	-0.379539E+01	0.268744E+02
172	-0.636651E+01	-0.780481E+02	-0.211708E+02	-0.838338E+02	-0.580811E+00	0.416265E+02
173	-0.597186E+01	-0.115386E+03	-0.319403E+02	-0.124027E+03	0.266974E+01	0.633484E+02
174	-0.674491E+01	-0.168621E+03	-0.432176E+02	-0.179436E+03	0.407069E+01	0.917535E+02
175	-0.749991E+01	-0.227563E+03	-0.543430E+02	-0.240251E+03	0.518817E+01	0.122719E+03
176	-0.107335E+02	-0.286134E+03	-0.656151E+02	-0.300968E+03	0.410049E+01	0.152534E+03
177	-0.137659E+02	-0.313713E+03	-0.750450E+02	-0.331441E+03	0.396202E+01	0.167701E+03
178	-0.195915E+02	-0.316133E+03	-0.840690E+02	-0.338308E+03	0.258371E+01	0.170446E+03
179	-0.361402E+02	-0.270096E+03	-0.897747E+02	-0.300574E+03	-0.566196E+01	0.147456E+03
180	-0.530959E+02	-0.172639E+03	-0.815662E+02	-0.213990E+03	-0.117454E+02	0.101122E+03
181	-0.705714E+02	-0.758077E+02	-0.629515E+02	-0.136195E+03	-0.101836E+02	0.630059E+02
182	-0.893235E+02	0.0	0.0	-0.893235E+02	0.0	0.446617E+02
183	0.0	-0.445789E+02	0.0	-0.445789E+02	0.0	0.222895E+02
184	0.0	-0.483983E+02	0.0	-0.483983E+02	0.0	0.241991E+02
185	0.0	-0.706379E+02	0.0	-0.706379E+02	0.0	0.353190E+02
186	0.0	-0.107705E+03	0.0	-0.107705E+03	0.0	0.538526E+02
187	0.0	-0.160477E+03	0.0	-0.160477E+03	-0.152588E-04	0.802385E+02

188	0.0	-0.220594E+03	0.0	-0.220594E+03	0.0	0.110297E+03
189	0.0	-0.277736E+03	0.0	-0.277736E+03	-0.152588E-04	0.138868E+03
190	0.0	-0.304892E+03	0.0	-0.304892E+03	-0.457764E-04	0.152446E+03
191	0.0	-0.307817E+03	0.0	-0.307817E+03	-0.305176E-04	0.153909E+03
192	0.0	-0.268183E+03	0.0	-0.268183E+03	-0.457764E-04	0.134092E+03
193	0.0	-0.177484E+03	0.0	-0.177484E+03	-0.152588E-04	0.887417E+02
194	0.0	-0.974196E+02	0.0	-0.974196E+02	0.0	0.487098E+02
195	0.0	0.0	0.0	0.0	0.0	0.0

NODE	MOMENT X	MOMENT Y	MOMENT XY
1	-0.593995E+03	-0.210700E+04	0.215361E+01
2	-0.617404E+03	-0.230161E+04	-0.477351E+00
3	-0.690323E+03	-0.288460E+04	-0.346356E+00
4	-0.810035E+03	-0.384334E+04	0.143013E+00
5	-0.968330E+03	-0.514231E+04	-0.130754E+00
6	-0.115150E+04	-0.668864E+04	-0.530710E+00
7	-0.132222E+04	-0.824190E+04	0.825549E+00
8	-0.140124E+04	-0.912759E+04	0.892208E+00
9	-0.134914E+04	-0.937004E+04	-0.579418E+00
10	-0.956681E+03	-0.762825E+04	-0.112295E+01
11	0.242223E+03	-0.710554E+03	-0.176391E+01
12	0.432890E+03	-0.161564E+03	0.453795E+00
13	0.566793E+03	0.0	0.0
14	-0.712306E+03	-0.212072E+04	0.252286E+00
15	-0.736439E+03	-0.231539E+04	-0.858730E+01
16	-0.808769E+03	-0.289679E+04	-0.174206E+02
17	-0.926303E+03	-0.385458E+04	-0.269368E+02
18	-0.108247E+04	-0.515325E+04	-0.382758E+02
19	-0.126124E+04	-0.669714E+04	-0.508116E+02
20	-0.142063E+04	-0.824850E+04	-0.667805E+02
21	-0.147597E+04	-0.911404E+04	-0.892997E+02
22	-0.141869E+04	-0.934653E+04	-0.121924E+03
23	-0.104862E+04	-0.761395E+04	-0.156424E+03
24	0.117248E+03	-0.725118E+03	-0.179674E+03
25	0.300408E+03	-0.180492E+03	-0.187000E+03
26	0.439728E+03	0.0	0.0
27	-0.106348E+04	-0.215895E+04	0.557871E+00
28	-0.108675E+04	-0.235289E+04	-0.174428E+02
29	-0.115670E+04	-0.293345E+04	-0.362110E+02
30	-0.126947E+04	-0.388752E+04	-0.568183E+02
31	-0.141916E+04	-0.518178E+04	-0.807842E+02

32	-0.158724E+04	-0.672091E+04	-0.109450E+03
33	-0.173226E+04	-0.825941E+04	-0.147261E+03
34	-0.177584E+04	-0.909785E+04	-0.187309E+03
35	-0.171600E+04	-0.932203E+04	-0.236263E+03
36	-0.135571E+04	-0.759152E+04	-0.290365E+03
37	-0.208468E+03	-0.733249E+03	-0.336216E+03
38	-0.439069E+02	-0.203266E+03	-0.359539E+03
39	0.818295E+02	0.0	0.0
40	-0.166060E+04	-0.222166E+04	0.419905E+00
41	-0.168230E+04	-0.241525E+04	-0.286576E+02
42	-0.174805E+04	-0.299332E+04	-0.588106E+02
43	-0.185458E+04	-0.394253E+04	-0.921263E+02
44	-0.199342E+04	-0.522869E+04	-0.131230E+03
45	-0.214735E+04	-0.675738E+04	-0.179049E+03
46	-0.227574E+04	-0.827702E+04	-0.238897E+03
47	-0.230970E+04	-0.909638E+04	-0.292913E+03
48	-0.224333E+04	-0.931411E+04	-0.354878E+03
49	-0.186563E+04	-0.756664E+04	-0.422885E+03
50	-0.715384E+03	-0.741160E+03	-0.491098E+03
51	-0.530539E+03	-0.201390E+03	-0.533889E+03
52	-0.383728E+03	0.0	0.0
53	-0.252358E+04	-0.231129E+04	0.420146E+00
54	-0.254505E+04	-0.250461E+04	-0.414150E+02
55	-0.260704E+04	-0.307739E+04	-0.853503E+02
56	-0.270512E+04	-0.401926E+04	-0.134952E+03
57	-0.283188E+04	-0.529459E+04	-0.192751E+03
58	-0.297067E+04	-0.680829E+04	-0.260786E+03
59	-0.308155E+04	-0.830938E+04	-0.342400E+03
60	-0.309772E+04	-0.911514E+04	-0.412845E+03
61	-0.300647E+04	-0.931269E+04	-0.490507E+03
62	-0.261455E+04	-0.756772E+04	-0.572690E+03
63	-0.144223E+04	-0.717781E+03	-0.658487E+03
64	-0.126543E+04	-0.205183E+03	-0.717348E+03
65	-0.111800E+04	0.0	0.0
66	-0.367901E+04	-0.242918E+04	0.449950E+00
67	-0.369865E+04	-0.262101E+04	-0.561235E+02
68	-0.375488E+04	-0.318690E+04	-0.116797E+03
69	-0.384342E+04	-0.411745E+04	-0.185501E+03
70	-0.395655E+04	-0.537934E+04	-0.265189E+03
71	-0.407534E+04	-0.687459E+04	-0.356694E+03
72	-0.416260E+04	-0.835708E+04	-0.462747E+03
73	-0.416390E+04	-0.914668E+04	-0.550186E+03
74	-0.406336E+04	-0.933894E+04	-0.640932E+03
75	-0.366623E+04	-0.759082E+04	-0.730281E+03
76	-0.250663E+04	-0.738600E+03	-0.819122E+03
77	-0.234309E+04	-0.212897E+03	-0.883435E+03
78	-0.222542E+04	0.0	0.0
79	-0.511376E+04	-0.257153E+04	0.442258E+00
80	-0.513105E+04	-0.275970E+04	-0.729755E+02

81	-0.518282E+04	-0.331619E+04	-0.153060E+03
82	-0.526238E+04	-0.423233E+04	-0.244252E+03
83	-0.536118E+04	-0.547536E+04	-0.349529E+03
84	-0.546059E+04	-0.695262E+04	-0.470510E+03
85	-0.551909E+04	-0.841777E+04	-0.605291E+03
86	-0.548898E+04	-0.919496E+04	-0.709931E+03
87	-0.536371E+04	-0.939164E+04	-0.809936E+03
88	-0.494559E+04	-0.765358E+04	-0.896810E+03
89	-0.377550E+04	-0.803521E+03	-0.973842E+03
90	-0.359992E+04	-0.236501E+03	-0.103716E+04
91	-0.347366E+04	0.0	0.0
92	-0.675494E+04	-0.272530E+04	0.799911E+00
93	-0.677312E+04	-0.290879E+04	-0.913880E+02
94	-0.682010E+04	-0.345124E+04	-0.193178E+03
95	-0.689227E+04	-0.434961E+04	-0.309552E+03
96	-0.697871E+04	-0.556903E+04	-0.445141E+03
97	-0.705874E+04	-0.702345E+04	-0.601646E+03
98	-0.708887E+04	-0.846918E+04	-0.776781E+03
99	-0.703070E+04	-0.925232E+04	-0.909457E+03
100	-0.685942E+04	-0.946395E+04	-0.102358E+04
101	-0.639584E+04	-0.776243E+04	-0.111315E+04
102	-0.514927E+04	-0.907027E+03	-0.116658E+04
103	-0.494050E+04	-0.288500E+03	-0.121072E+04
104	-0.477126E+04	0.0	0.0
105	-0.838266E+04	-0.285757E+04	-0.133703E+01
106	-0.840102E+04	-0.303245E+04	-0.111086E+03
107	-0.844493E+04	-0.355506E+04	-0.235041E+03
108	-0.851005E+04	-0.443066E+04	-0.380031E+03
109	-0.858630E+04	-0.561955E+04	-0.550096E+03
110	-0.864982E+04	-0.704378E+04	-0.749371E+03
111	-0.864464E+04	-0.845677E+04	-0.982359E+03
112	-0.853310E+04	-0.924435E+04	-0.116734E+04
113	-0.829263E+04	-0.952085E+04	-0.131878E+04
114	-0.773434E+04	-0.784327E+04	-0.140214E+04
115	-0.648960E+04	-0.113610E+04	-0.139636E+04
116	-0.624829E+04	-0.340178E+03	-0.139432E+04
117	-0.610691E+04	0.0	0.0
118	-0.929539E+04	-0.289784E+04	-0.528146E+00
119	-0.930815E+04	-0.306159E+04	-0.125074E+03
120	-0.934826E+04	-0.356679E+04	-0.267500E+03
121	-0.941115E+04	-0.442123E+04	-0.434548E+03
122	-0.948402E+04	-0.558223E+04	-0.629323E+03
123	-0.955105E+04	-0.697602E+04	-0.863095E+03
124	-0.954957E+04	-0.834141E+04	-0.115141E+04
125	-0.943625E+04	-0.913429E+04	-0.139964E+04
126	-0.913659E+04	-0.948315E+04	-0.162242E+04
127	-0.850882E+04	-0.794834E+04	-0.170367E+04
128	-0.718132E+04	-0.135642E+04	-0.160267E+04
129	-0.689340E+04	-0.415922E+03	-0.154007E+04

130	-0.673665E+04	0.0	0.0
131	-0.951745E+04	-0.282246E+04	-0.866570E+00
132	-0.953289E+04	-0.297617E+04	-0.139460E+03
133	-0.956546E+04	-0.345829E+04	-0.301771E+03
134	-0.962100E+04	-0.428802E+04	-0.487757E+03
135	-0.970084E+04	-0.542386E+04	-0.702327E+03
136	-0.978665E+04	-0.677703E+04	-0.961730E+03
137	-0.983234E+04	-0.807945E+04	-0.129257E+04
138	-0.978780E+04	-0.881849E+04	-0.161259E+04
139	-0.957444E+04	-0.926026E+04	-0.198246E+04
140	-0.872443E+04	-0.805580E+04	-0.215486E+04
141	-0.729257E+04	-0.166313E+04	-0.190916E+04
142	-0.688593E+04	-0.533209E+03	-0.169859E+04
143	-0.670781E+04	0.0	0.0
144	-0.770834E+04	-0.243976E+04	0.124601E+01
145	-0.772835E+04	-0.256259E+04	-0.157413E+03
146	-0.774266E+04	-0.302706E+04	-0.341719E+03
147	-0.778673E+04	-0.383728E+04	-0.542110E+03
148	-0.786095E+04	-0.494543E+04	-0.763766E+03
149	-0.798100E+04	-0.624951E+04	-0.103510E+04
150	-0.806502E+04	-0.748675E+04	-0.137213E+04
151	-0.814787E+04	-0.815951E+04	-0.169332E+04
152	-0.825287E+04	-0.838705E+04	-0.215219E+04
153	-0.822397E+04	-0.800004E+04	-0.268122E+04
154	-0.612473E+04	-0.215211E+04	-0.240238E+04
155	-0.580107E+04	-0.859365E+03	-0.181868E+04
156	-0.577168E+04	0.0	0.0
157	-0.759009E+03	-0.127878E+04	-0.575832E+01
158	-0.717963E+03	-0.133817E+04	-0.193331E+03
159	-0.708462E+03	-0.180542E+04	-0.390474E+03
160	-0.738661E+03	-0.259123E+04	-0.600787E+03
161	-0.804283E+03	-0.369674E+04	-0.825789E+03
162	-0.891546E+03	-0.491895E+04	-0.107380E+04
163	-0.114438E+04	-0.617180E+04	-0.135453E+04
164	-0.136366E+04	-0.678011E+04	-0.159869E+04
165	-0.164673E+04	-0.692278E+04	-0.192422E+04
166	-0.211097E+04	-0.587182E+04	-0.241141E+04
167	-0.358864E+04	-0.363411E+04	-0.223693E+04
168	-0.348596E+04	-0.118680E+04	-0.167018E+04
169	-0.356962E+04	0.0	0.0
170	-0.143454E+03	-0.106187E+04	-0.546862E+01
171	-0.125690E+03	-0.113392E+04	-0.224556E+03
172	-0.130736E+03	-0.160272E+04	-0.434742E+03
173	-0.122632E+03	-0.236944E+04	-0.655894E+03
174	-0.138507E+03	-0.346263E+04	-0.887473E+03
175	-0.154011E+03	-0.467299E+04	-0.111593E+04
176	-0.220413E+03	-0.587576E+04	-0.134741E+04
177	-0.282683E+03	-0.644209E+04	-0.154105E+04
178	-0.402311E+03	-0.649179E+04	-0.172636E+04

179	-0.742139E+03	-0.554643E+04	-0.184352E+04
180	-0.109032E+04	-0.354515E+04	-0.167496E+04
181	-0.144918E+04	-0.155671E+04	-0.129271E+04
182	-0.183426E+04	0.0	0.0
183	0.0	-0.915427E+03	0.0
184	0.0	-0.993858E+03	0.0
185	0.0	-0.145055E+04	0.0
186	0.0	-0.221173E+04	0.0
187	0.0	-0.329539E+04	0.0
188	0.0	-0.452989E+04	0.0
189	0.0	-0.570330E+04	0.0
190	0.0	-0.626095E+04	0.0
191	0.0	-0.632102E+04	0.0
192	0.0	-0.550714E+04	0.0
193	0.0	-0.364462E+04	0.0
194	0.0	-0.200051E+04	0.0
195	0.0	0.0	0.0

CALCULATED SHEAR IN LONG DIRECTION

INCR	SHEAR X	INCR	SHEAR X	INCR	SHEAR X	INCR	SHEAR X	INCR	SHEAR X	INCR	SHEAR X
1	152.855	2	120.765	3	90.860	4	61.845	5	33.526	6	23.557
7	18.368	8	12.834	9	11.542	10	10.219	11	10.895	12	10.474
13	11.955	14	36.888	15	137.877	16	198.829	17	120.579	18	113.996
19	100.840	20	86.642	21	70.980	22	65.130	23	60.550	24	56.902
25	58.485	26	60.425	27	44.324	28	145.697	29	201.648	30	536.482
31	568.596	32	578.915	33	588.417	34	601.121	35	597.431	36	596.102
37	594.397	38	592.014	39	586.926	40	-73.547	41	41.763	42	81.829
43	71.096	44	135.624	45	154.504	46	161.319	47	161.776	48	162.560
49	161.205	50	159.579	51	156.989	52	157.370	53	-139.146	54	-16.925
55	-22.920	56	-8.390	57	-15.938	58	-11.517	59	-9.780	60	-8.825
61	-9.129	62	-9.738	63	-11.337	64	-12.953	65	-12.730	66	-180.818
67	-58.975	68	-63.255	69	-60.026	70	-57.954	71	-61.471	72	-63.398
73	-65.361	74	-66.694	75	-68.131	76	-69.343	77	-70.405	78	-70.872
79	-227.497	80	-109.153	81	-112.015	82	-106.910	83	-111.021	84	-114.924
85	-119.939	86	-124.287	87	-126.879	88	-128.774	89	-130.238	90	-131.085
91	-131.070	92	-209.027	93	-108.036	94	-111.512	95	-115.878	96	-118.303
97	-121.106	98	-123.518	99	-126.658	100	-129.145	101	-130.975	102	-132.199
103	-132.999	104	-132.924	105	-190.450	106	-99.459	107	-101.460	108	-101.787
109	-102.807	110	-104.610	111	-107.425	112	-110.396	113	-112.666	114	-114.447
115	-115.657	116	-116.307	117	-116.503	118	-165.904	119	-84.446	120	-83.765
121	-82.676	122	-83.033	123	-83.990	124	-85.669	125	-88.244	126	-90.402
127	-91.996	128	-93.126	129	-93.776	130	-93.928	131	-120.969	132	-56.336
133	-55.804	134	-57.844	135	-59.280	136	-61.755	137	-63.750	138	-65.775
139	-67.464	140	-68.812	141	-69.752	142	-70.153	143	-70.172	144	-83.287
145	-36.987	146	-38.453	147	-38.715	148	-40.502	149	-41.487	150	-42.797
151	-44.684	152	-46.225	153	-47.371	154	-48.022	155	-48.417	156	-48.549
157	-59.786	158	-26.749	159	-24.596	160	-22.585	161	-22.056	162	-22.764
163	-24.394	164	-25.972	165	-27.059	166	-27.739	167	-28.212	168	-28.443
169	-28.514	170	-26.172	171	-10.430	172	-9.123	173	-5.745	174	-3.983
175	-4.977	176	-7.535	177	-8.623	178	-9.039	179	-9.293	180	-9.502
181	-9.551	182	-9.491								

CALCULATED SHEAR IN SHORT DIRECTION

INCR	SHEAR Y	INCR	SHEAR Y	INCR	SHEAR Y	INCR	SHEAR Y	INCR	SHEAR Y	INCR	SHEAR Y
1	166.709	2	29.284	3	-36.107	4	-108.411	5	-147.200	6	-159.401
7	-161.176	8	-144.432	9	-119.109	10	-86.374	11	-55.257	12	-21.981
13	129.726	14	134.247	15	64.351	16	5.196	17	-19.249	18	-36.267
19	-50.709	20	-46.921	21	-40.409	22	-27.355	23	-15.844	24	-0.400
25	98.900	26	191.567	27	110.530	28	35.902	29	-26.924	30	-41.680

31	-53.668	32	-47.701	33	-40.894	34	-27.852	35	-15.406	36	0.519
37	71.614	38	117.736	39	365.987	40	65.364	41	1.503	42	-30.648
43	-44.922	44	-48.222	45	-41.053	46	-29.230	47	-16.024	48	-3.622
49	44.434	50	107.370	51	380.689	52	104.513	53	5.461	54	-23.312
55	-42.504	56	-48.162	57	-41.243	58	-30.138	59	-17.233	60	-5.206
61	34.660	62	90.521	63	383.409	64	110.395	65	5.923	66	-24.690
67	-42.804	68	-48.598	69	-41.772	70	-31.059	71	-18.345	72	-5.657
73	28.348	74	81.626	75	391.769	76	117.281	77	9.239	78	-22.265
79	-41.743	80	-47.032	81	-40.791	82	-30.610	83	-18.287	84	-5.645
85	24.042	86	66.007	87	396.917	88	112.557	89	6.046	90	-26.880
91	-45.948	92	-49.673	93	-42.842	94	-31.990	95	-19.259	96	-6.111
97	19.708	98	60.062	99	393.452	100	110.436	101	3.157	102	-29.866
103	-49.169	104	-52.068	105	-44.764	106	-33.277	107	-20.165	108	-6.436
109	17.741	110	57.649	111	394.065	112	110.250	113	1.854	114	-32.421
115	-51.742	116	-54.309	117	-46.543	118	-34.560	119	-20.958	120	-6.767
121	17.099	122	58.005	123	394.501	124	109.427	125	0.327	126	-34.770
127	-53.920	128	-56.260	129	-48.012	130	-35.676	131	-21.654	132	-6.992
133	16.783	134	59.510	135	392.100	136	108.125	137	-2.211	138	-36.720
139	-55.682	140	-57.896	141	-49.386	142	-36.608	143	-22.203	144	-7.132
145	16.939	146	58.544	147	394.060	148	107.301	149	-2.926	150	-38.413
151	-57.397	152	-59.244	153	-50.385	154	-37.263	155	-22.624	156	-7.343
157	15.041	158	61.007	159	397.539	160	109.196	161	-2.804	162	-40.570
163	-59.006	164	-60.139	165	-50.932	166	-37.652	167	-22.802	168	-7.435
169	13.464	170	61.370	171	399.142	172	109.708	173	-3.357	174	-41.689
175	-59.085	176	-60.241	177	-50.945	178	-37.691	179	-22.868	180	-7.433

MAX NEGATIVE SHEAR FORCE IN X-DIRECTION=-227.497
MAX POSITIVE SHEAR FORCE IN X-DIRECTION= 601.121

MAX NEGATIVE SHEAR FORCE IN Y-DIRECTION=-161.176
MAX POSITIVE SHEAR FORCE IN Y-DIRECTION= 399.142

```
SUMMARY OF VARIABLES:
   SLAB LENGTH =  48.00 FT    EDGE EFFECT =   5.00 FT    YM = 4.00 IN            ----- CENTER HEAVE -----
   SLAB WIDTH =  40.00 FT    BEAM DEPTH =  11.10 IN   UNIFORM LOAD = 0.86 PSI    PERIMETER LOAD = 4.25 PSI
   PARABOLIC EQUATION EXPONENT "M" =   3
```

APPENDIX H

ESTIMATING CREEP MODULUS OF ELASTICITY FOR CONCRETE

Assume: (1) 48 ft x 24 ft slab with 18 in stiffening beams on 12 ft centers

(2) f'_c = 2500 psi

(3) f'_{ci} = 2000 psi

(4) Average Relative Humidity, H = 60%

(5) Maximum Service Moment = 4 in-kips/in

or

$$\text{Stress Under Service Load} = \frac{6\,M_{max}}{h_e^{\,2}}$$

$$= 194 \text{ psi}$$

say, 200 psi

A. Creep Modulus of Elasticity $= \dfrac{\text{Stress}}{\varepsilon_{elastic} + \varepsilon_{ultimate}}$

B. 28-Day Strength Modulus of Elasticity

$$E_{28} = 57{,}000\sqrt{f'_c} = 57{,}000\sqrt{2500} = 2.85\text{x}10^6 \text{ psi}$$

C. Elastic Strain at Service Stress $= \dfrac{200 \text{ psi}}{2.85\text{x}10^6 \text{ psi}}$

$$\varepsilon_{elastic} = 7.0175 \times 10^{-5} \text{ in/in}$$

D. Ultimate Creep Strain (46)

$$\varepsilon_{ult} = \left[\text{CREEP RATIO}\right]\left[\begin{matrix}\text{MATURITY}\\\text{COEFFICIENT}\end{matrix}\right]\left[\begin{matrix}\text{CREEP SIZE}\\\text{COEFFICIENT}\end{matrix}\right]\left[\begin{matrix}\text{ELASTIC STRAIN}\\\text{AT STRESSING}\end{matrix}\right]$$

1. From Libby (46, page 54)

$$\text{Creep Ratio} = 1.25 + 2.75\ \frac{100 - 60}{65} = 2.942$$

2. From Libby (46, page 54)

$$\text{Creep Maturity Coefficient} = 1.80 - 1.28\left(\frac{f'_{ci}}{f'_c} - 0.375\right)$$

$$= 1.80 - 1.28\left(\frac{2000}{2500} - 0.375\right)$$

$$= 1.256$$

3. Modulus of Elasticity at Time of Stressing

$$= 57{,}000\sqrt{f'_{ci}}$$

$$= 2.549 \times 10^6 \text{ psi}$$

4. Volume to Area Ratio $= \dfrac{1{,}147{,}992 \text{ in}^3}{319{,}152 \text{ in}^2} = 3.60$

From Libby (46, page 54) Creep Size Coefficient = 1.24

5. Elastic Strain $= \dfrac{200 \text{ psi}}{2.549 \times 10^6 \text{ psi}} = 7.8459 \times 10^{-5}$ in/in

$$\varepsilon_{ult} = (2.942)(1.256)(1.24)(7.8459\times10^{-5} \text{ in/in}) = 4.0589\times10^{-4} \text{ in/in}$$

E. Creep Modulus and Termination of Creep $= \dfrac{\text{Stress}}{E_{elastic} + E_{ult}}$

$$= \frac{200 \text{ psi}}{7.0175\times10^{-5} + 4.0589\times10^{-4}} = 4.20\times10^{5} \text{ psi}$$

F. But Creep is a long term effect. The time required for the total creep strain to occur can be estimated by (46, page 52):

$$\frac{\text{Creep Strain at Time t}}{\text{Ultimate Creep Strain}} = \frac{t^{a'}}{b' + t^{a'}}$$

where t = time in days

a' = 0.60

b' = 10

and

ELAPSED TIME YEARS	DAYS	PERCENT CREEP STRAIN ATTAINED
1	365	78
5	1,825	90
10	3,650	93
20	7,300	95
50	18,250	98

G. Assume Effective Creep Modulus of Elasticity to be the Average of the Initial and Final Moduli:

$$Ec = \frac{2.549 \times 10^6 + 4.200 \times 10^5}{2} = 1.48 \times 10^6 \text{ psi}$$

Say, 1.5×10^6 psi

APPENDIX I

COMPLETE LISTING OF COMPUTER PROGRAM *PRESS2*

```
C
C
C*****************************************************************
C
C      PROGRAM PRESS2 WAS WRITTEN BY D. M. PIERCE IN 1968.  THE*
C  PROGRAM, THEN TITLED "PRESS1", WAS WRITTEN IN FORTRAN II LANG*
C  FOR USE ON THE CDC SYSTEM. THE PROGRAM PRESENTS A NUMERICAL  *
C  TECHNIQUE FOR DETERMINING THE DEFLECTED SHAPE OF A POST TENSIONED *
C  PRESSTRESSED CONCRETE BEAM CONTAINING FROM 0 TO 12 UNBONDED TENDONS.*
C  THE METHOD PERMITS THE MEMBER TO BE LOADED AND SUPPORTED IN ANY  *
C  REASONABLE MANNER. A MAXIMUM OF 20 ADDITIONAL PIECES OF BONDED   *
C  REINFORCEMENT MAY BE CONSIDERED, AND EACH PIECE OF SUPPLEMENTARY *
C  REINFORCEMENT MAY BE EITHER UNSTRESSED OR PRE-STRESSED.          *
C                                                                   *
C      THE PROGRAM WAS CONVERTED FOR USE ON THE IBM-AMDAHL  SYSTEM  *
C  AND THE PROGRAM LANGUAGE UPDATED TO FORTRAN IV WITH DOUBLE PRE-  *
C       &   && 3  A &- 0    03  &  &          & 0 &  &S & 7 0       *
C  EXPANSIVE CLAY SOIL BY W.K. WRAY AND R.L. LYTTON IN 1978.   THE  *
C  MODIFIED PROGRAM, WITH THE UPGRADED NAME OF PRESS2, MAKES PRO-   *
C  VISION FOR THE SOIL SUPPORT CONDITIONS COMMONLY ENCOUNTERED IN   *
C  EXPANSIVE CLAY AREAS AND WILL CONSIDER THE THREE SOIL SUPPORT CON- *
C  DITIONS OF (1) NO SWELL, (2) CENTER LIFT, AND (3) EDGE LIFT.     *
C                                                                   *
C       COMPLETE EXPLANATION OF THE NUMERICAL TECHNIQUE WITH EXAMPLE *
C  PROBLEMS IS GIVEN IN D.M. PIERCE'S DOCTORAL DISSERTATION,        *
C  ENTITLED: "A NUMERICAL METHOD OF ANALYZING PRESTRESSED CONCRETE  *
C  MEMBERS CONTAINING UNBONDED TENDONS", AT THE UNIVERSITY  OF      *
C  TEXAS AT AUSTIN, AUSTIN, TX. EXPLANATION OF THE  MODIFICATIONS   *
C  AND AN EXAMPLE PROBLEM IS GIVEN IN W.K. WRAY'S DOCTORAL DISSER-  *
C  TATION, ENTITLED: "A DESIGN PROCEDURE FOR RESIDENTIAL AND LIGHT  *
C  COMMERCIAL STIFFENED SLABS-ON-GROUND CONSTRUCTED OVER EXPANSIVE  *
C  SOILS", AT TEXAS A&M UNIVERSITY, COLLEGE STATION, TX.            *
C
C*****************************************************************
C
C---NOTATION FOR PRESS2
C
C     A( ), ATEMP, AREV   CONTINUITY COEFFICIENT
C     AA                  COEFFICIENT IN STIFFNESS MATRIX
C     AAAA                SLAB LENGTH, IN FEET
C     AC( , )             AREA OF A PARTICULAR CONCRETE INCREMENT
C     ADDLD               COMPENSATING LOAD ADDED TO ACCOUNT  FOR
C                         SPRING COMPRESSIONS EQUAL TO DEF(I)
C     AN1(N), AN2(N)      INDENTIFICATION AND REMARKS (ALPHA-NUM)
C     AR                  CONSTANT IN EQUATION OF TENDON PROFILE
C     AREA( )             AREA OF A PARTICULAR BONDED BAR OR STRAND
C     AXTOL               FORCE CLOSURE TOLERANCE
C     AY                  INCREMENT AREA TIMES DIST FROM TOP
C     B( ), BTEMP, BREV   FIBER CONTINUITY COEFFICIENT
```

```
C  BB                   COEFFICIENT IN STIFFNESS MATRIX
C  BBBB                 SLAB WIDTH, IN FEET
C  BER                  REVISED SUM OF HORIZONTAL FORCE ERROR
C  BFOR( )              FORCE IN A GIVEN BONDED BAR OR STRAND
C  BM( )                BENDING MOMENT AT STA J
C  BMB                  MOMENT CONTRIBUTION OF ONE BAR OR STRAND
C  BMC                  MOMENT CONTRIBUTION OF ONE CONC INCREMENT
C  BMOM                 MOMENT DUE TO BONDED UNSTRESSED BARS
C  BMT                  MOMENT CONTRIBUTION - ONE UNBONDED TENDON
C  BR                   COEFF OF DIST IN TENDON PROFILE EQUATION
C  BSTN                 STRAIN IN BONDED BAR OR STRAND DUE TO PHI
C  C( ), CTEMP, CREV    CONTINUITY COEFFICIENT
C  CC                   COEFFICIENT IN STIFFNESS MATRIX
C  CCCC                 DEPTH OF SLAB TEE SECTION, IN INCHES
C  CEN( , )             DIST FROM TOP TO CENTER OF THIS INCREMENT
C  CFOR( )              FORCE IN A GIVEN CONCRETE INCREMENT
C  CLT( )               TOTAL LENGTH OF CONCRETE ALONG A TENDON
C  CMOM                 MOMENT DUE TO TOTAL FORCE ON THE CONCRETE
C  COMP                 TOTAL CALCULATED COMPRESSION
C  CR                   COEFF OF DIST SQUARED IN PROFILE EQUATION
C  CSSS                 STRESS AT CENTER OF A CONCRETE INCREMENT
C  CSTN                 STRAIN AT CENTER OF A CONCRETE INCREMENT
C  CTRY                 TOTAL COMPRESSION FORCE FROM LAST CYCLE
C  D , DTEMP, DREV      MULTIPLIER IN CONTINUITY COEFFICIENT EQS
C  DBM( )               FIRST DERIVATIVE OF THE BENDING MOMENT
C  DD                   COEFFICIENT IN STIFFNESS MATRIX
C  DDDD                 AMOUNT OF DIFFERENTIAL SOIL MOVEMENT
C  DEF( )               DEFLECTIONS FROM HORIZONTAL TO THEORETICAL
C                       PARABOLIC SWOLLEN SUBGRADE PROFILE
C  DELF( )              CHANGE IN TENDON TENSION PER INCREMENT
C  DELS( )              CHANGE IN TENDON LENGTH PER INCREMENT
C  DELT( )              SECOND STAGE CHANGE OF TENDON TENSION
C  DELW                 DIFFERENCE BETWEEN PRESENT AND PRIOR DEFL
C  DE-                  δE - δ5 T
C  DIFF                 DIFFERENCE
C  DW( )                FIRST DERIVATIVE OF BMCOL DEFL ( SLOPE )
C  DWS( )               SPECIFIED VALUE OF SLOPE AT STA JS
C  E                    TERM IN CONTINUITY COEFFICIENT EQUATIONS
C  EC                   MODULUS OF ELASTICITY FOR CONCRETE
C  EDEF                 ELASTIC SHORTENING DUE TO AXIAL FORCE
C  EE                   COEFFICIENT IN STIFFNESS MATRIX
C  EEEE                 EDGE PENETRATION OF MOISTURE, IN FEET
C  EMAXT                MAXIMUM CONCRETE TENSILE STRAIN
C  EPO                  CONCRETE STRAIN AT MAXIMUM STRESS
C  EPULT                ULTIMATE CONCRETE STRAIN IN COMPRESSION
C  ER                   ERROR IN SUM OF HORIZONTAL FORCES
C  ERRL                 ERROR BETWEEN NEW AND OLD TENDON LENGTHS
C  ES( )                MODULUS OF ELASTICITY FOR STEEL TYPES
C  EXPO                 MOUND EXPONENT
```

```
C     F( )              TOTAL FLEXURAL STIFFNESS PER STA             00009900
C     FCC               COEFF OF FRICTION DUE TO CURVATURE (MU)      00010000
C     FF                COEFFICIENT IN LOAD VECTOR                   00010100
C     FFFF              EDGE LOADING, IN PSI                         00010200
C     FIBB( )           FINAL VALUE OF BOTTOM FIBER STRAIN           00010300
C     FIBT( )           FINAL VALUE OF TOP FIBER STRAIN              00010400
C     FPC               STANDARD CYLINDER COMPRESSIVE STRESS         00010500
C     FPCM              MAX STRESS REDUCTION FACTOR FOR CONCRETE     00010600
C     FPT               MAXIMUM CONCRETE TENSILE STRESS              00010700
C     GDELT             FIRST GROSS ESTIMATE OF A TENSION CHANGE     00010800
C     GGGG              UNIFORM SLAB LOADING, IN PSI                 00010900
C     H                 INCREMENT LENGTH                             00011000
C     HCREV             REVISED HORIZONTAL CONC INCREMENT LENGTH     00011100
C     HE2               H SQUARED                                    00011200
C     HE3               H CUBED                                      00011300
C     HIGHL( ), HIGHLL  MAXIMUM JACKING STRESS AT THE LEFT END       00011400
C     HIGHR( ), HIGHRL  MAXIMUM JACKING STRESS AT THE RIGHT END      00011500
C     HLCOR( )          HORIZONTAL COMPONENT OF CONC LG CHANGE       00011600
C     HT2               H TIMES 2                                    00011700
C     IB1( )            LEFT STA FOR A PARTICULAR BONDED BAR         00011800
C     IB2( )            RIGHT STA FOR A PARTICULAR BONDED BAR        00011900
C     ICYC              CYCLE COUNTER FOR GEOMETRIC COMPATIBILITY    00012000
C     IEND              SWITCH SET EQUAL TO STA NUM AT LAST STA      00012100
C     IFIRST( )         FIRST BEAM STA IN A PARTICULAR SEQUENCE      00012200
C     ILAST( )          LAST BEAM STA IN A PARTICULAR SEQUENCE       00012300
C     IMM               END STA FOR A PARTICULAR CURVE SEGMENT       00012400
C     IM4               EXTERNAL STA NUMBER = INTERNAL STA - 4       00012500
C     IN13( )           EXTERNAL STA NUMBER FOR SPECIFIED SLOPE      00012600
C                       OR DEFLECTION                                00012700
C     IN14( )           INITIAL EXTERNAL STA USED IN TABLE 4         00012800
C     IN19( , ), MN19   FIRST STA OF CURVE SEGMENT - TABLE 9         00012900
C     IN24( )           FINAL EXTERNAL STA USED IN TABLE 4           00013000
C     IN29( , ), MN29   INTERMEDIATE OR LAST STA OF CURVE SEGMENT    00013100
C     IN39( , ), MN39   LAST STA OF CURVE SEGMENT - TABLE 9          00013200
C     IPOP              INDEX OF FINAL STRAIN CHECK 1-TEN, 2-COMP    00013300
C     ISTA              CUTEUT VALUE FOR STATION NUMBER              00013400
C     ISW               ROUTING SWITCH                               00013500
C     ITER              STAGE CONTROL PARAMETER                      00013600
C     ITEST             PARAMETER TO STOP PROGRAM (5H     )          00013700
C     ITMAX             MAXIMUM NUMBER OF ITERATIONS IN SLIDE        00013800
C     IYE               TEMPORARY LAST BEAM STA INDEX                00013900
C     IYS               TEMPORARY FIRST BEAM STA INDEX               00014000
C     J1                INITIAL STA IN THE DISTRIBUTION SEQUENCE     00014100
C     J2                FINAL STA IN THE DISTRIBUTION SEQUENCE       00014200
C     JB                FIRST TENDON IN GROUP BEING CONSIDERED       00014300
C     JCYC              CYCLE COUNTER FOR DEFLECTION ITERATIONS      00014400
C     JDEF              NUMBER OF INTERIOR STATIONS HAVING           00014500
C                       SPECIFIED SWELL DEFLECTIONS                  00014600
C     JE                LAST TENDON IN GROUP BEING CONSIDERED        00014700
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```
C  JEND                  LAST VERTICAL INCREMENT OF A GIVEN WIDTH
C  JFIRST( , )           FIRST VERTICAL INCREMENT OF A GIVEN WIDTH
C  JINCR                 INCREMENTATION INDEX
C  JLAST( , )            LAST VERTICAL INCREMENT OF A GIVEN WIDTH
C  JSTART                FIRST VERTICAL INCREMENT OF A GIVEN WIDTH
C  JSTOP( )              LAST VERTICAL INCREMENT FOR A SECTION
C  JV                    INITIAL STA NUMBER ON THE PREVIOUS CARD
C  JS                    STA OF SPECIFIED DEFLECTION OR SLOPE
C  KALL                  SWITCH THAT CALLS SUBROUTINE "SPRING"
C  KASE( )               CASE NUMBER FOR SPECIFIED CONDITIONS
C  KASS                  TEMPORARY VALUE FOR KASE( ) OR KSW4( )
C  KE                    LAST TENDON OF GROUP ONE
C  KEEPF                 IF = 1, KEEP PRIOR FLEXURAL STIFFNESS
C  KEEP2 THRU KEEP11     IF = 1, KEEP PRIOR DATA, TABLES 2 - 11
C  KER                   FLAB GIVING SIGN OF FORCE ERROR (0,-1,+1)
C  KEY(J), KEYJ          ROUTING SWITCH FOR SPECIFIED CONDITIONS
C  KEY3                  ROUTING SWITCH TO PRINT PREVIOUS TABLE 3
C  KEY7                  ROUTING SWITCH TO PRINT PREVIOUS TABLE 7
C  KFLAG                 STAGE CONTROL PARAMETER
C  KOP                   CONTROL ON TM( , ) OR RT( , ) COMPUT
C  KOUNT                 PARAMETER THAT CONTROLS A CLOSED SOLUTION
C  KPOP                  CONCRETE OVER STRESS SWITCH (0-NO, 1-YES)
C  KR1                   PRIOR VALUE OF KR24( )
C  KR24( )               CONTINUE SWITCH IN TABLE 4
C  KRIP                  CONTROL ON ORDERING SECONDARY TENSIONS
C  KS                    FIRST TENDON OF GROUP ONE
C  KSE( )                INDEX OF END BEING STRESSED (0-L,1-R,2-B)
C  KSM AND LSM           SWITCH THAT DISTRIBUTES AXIAL LOADS TO
C                        HALF-STATIONS
C  KSO( )                INDEX FOR ORDERS OF STRESSING (1, 2 OR 3)
C  KSW4( )               ROUTING SWITCH IN TABLE 4
C  KT1( )                FIRST TENDON IN A STRESSING GROUP
C  KT2( )                LAST TENDON IN A STRESSING GROUP
C  KTAP                  CONTROL ON ADDITIONAL RT( , ) COMPUT
C  KTERM                 CONTROL FOR INITIAL TENSION DISTRIBUTION
C  KTYPE                 PARAMETER INDICATING THE SIGN OF PHI( )
C  LE                    LAST TENDON OF GROUP TWO
C  LIFT                  SWITCH THAT DETERMINES TYPE OF SWELLING
C                        (1=NONE; 2=CENTER LIFT; 3=EDGE LIFT)
C  LIMIT( )              FLAG OF ELASTIC OR INELASTIC STRAIN (0,1)
C  LOP1( , )             CURVE OPTION ** 0 LINEAR ** 1 PARABOLIC
C  LS                    FIRST TENDON OF GROUP TWO
C  M                     TOTAL NUMBER OF INCREMENTS OF BMCOL
C  MHO                   TOTAL NUMBER OF INCREMENTS ( MHO = M )
C  MMZZ,NNZZ             NUMBER OF INCREMENTS AFFECTED BY EEEE
C  MO                    INDEX FOR NUM OF CRV SEGMENTS PER TENDON
C  MO2                   STA INDEX WHEN TENSIONING FROM BOTH ENDS
C  MP1, MP4 THRU MP7     M + 1, M + 4 THRU M + 7
C  NC                    NUMBER OF CARD BEING INTERPOLATED
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C  NCD3, NCD4         TOTAL NUMBER OF CARDS IN TABLES 3 AND 4          00019700
C  NCI1               STRESS STRAIN CURVE INDEX NUMBER 1               00019800
C  NCI2               STRESS STRAIN CURVE INDEX NUMBER 2               00019900
C  NCI3               STRESS STRAIN CURVE INDEX NUMBER 3               00020000
C  NCT                NUMBER OF CARDS TO BE INTERPOLATED               00020100
C  NCT2 THRU NCT4     NUM CARDS IN TABLES 2 THRU 4, THIS PROB          00020200
C  NC1                PREVIOUS CARD NUMBER                             00020300
C  NC14               INITIAL INDEX VALUE FOR INPUT TO TABLE 4         00020400
C  NEWZ               SWITCH USED IN CALCULATING PRESTRESS MOM         00020500
C  NPROB              PROBLEM  NUMBER (PROGRAM STOPS IF BLANK)         00020600
C  NG                 NUM OF PRESTRESSING STAGES                       00020700
C  NHB                NUM OF BONDED REINFORCING BARS OR STRANDS        00020800
C  NNZZ, MMZZ         NUMBER OF INCREMENTS AFFECTED BY EEEE            00020900
C  NS                 INDEX NUM FOR SPECIFIED CONDITIONS               00021000
C  NSEC               NUM OF DIFFERENT CONCRETE CROSS SECTIONS         00021100
C  NSSC               NUM OF STEEL STRESS-STRAIN CURVES                00021200
C  NUBC( )            CURVE INDEX FOR BONDED REINFORCEMENT             00021300
C  NUT                NUM OF UNBONDED PRESTRESSED TENDONS              00021400
C  NUMC( )            STEEL STRESS-STRAIN CURVE NUMBER                 00021500
C  NUMP( ), NUMPN     NUM OF POINTS PER STEEL STRESS-STRAIN CRV        00021600
C  NUMP1              NUMBER OF POINTS FOR A TYPE 1 CURVE              00021700
C  NUMP2              NUMBER OF POINTS FOR A TYPE 2 CURVE              00021800
C  NUMP3              NUMBER OF POINTS FOR A TYPE 3 CURVE              00021900
C  NVCW( ), NVCWN     NUMBER OF VERTICAL CONCRETE WIDTHS               00022000
C  NW                 ITERATION COUNTER                                00022100
C  P( )               EXTERNAL AXIAL LOAD (TOTAL PER STA)              00022200
C  PART               INTERPOLATION FACTOR                             00022300
C  PDEL               CHANGE IN TENDON TENSION (NOW - INITIAL)         00022400
C  PHI( )             CURVATURE AT A PARTICULAR STATION                00022500
C  PHIM( )            CONSTANT SET TO ZERO IF TPHI( ) IS ZERO          00022600
C  PN2( )             INPUT VALUE OF EXTERNAL AXIAL LOAD               00022700
C  PSINC              UNALTERED VALUE OF STRAIN INCREMENT              00022800
C  PZ( , )            FINAL PRESTRESS FOR ZERO APPLIED LOAD            00022900
C  Q( )               TRANSVERSE LOAD (TOTAL PER STA)                  00023000
C  QN2( )             INPUT VALUE OF TRANSVERSE LOAD                   00023100
C  R( )               ROTATIONAL RESTRAINT (TOTAL PER STA)             00023200
C  RBRC( , )          PRIOR VALUE OF TENDON RADIUS OF CURVATURE        00023300
C  RCOL               TOTAL CONCRETE LENGTH ALONG A TENDON             00023400
C  REACT( )           NET REACTION ON THE BMCOL AT EACH STA            00023500
C  RFCS               REDUCTION FAC FOR CONC STRESS AT EPULT           00023600
C  RL( , )            INCREMENT LENGTH OF CONCRETE ALONG A TEN         00023700
C  RN2( )             INPUT VALUE OF ROTATIONAL RESTRAINT              00023800
C  RT( , )            TENDON TENSION AT ANY GIVEN TIME                 00023900
C  S( )               SPRING SUPPORT STIFFNESS (TOTAL PER STA)         00024000
C  SA( )              AREA OF UNBONDED TENDON                          00024100
C  SB                 BOTTOM FIBER STRAIN                              00024200
C  SBMAX              MAXIMUM BOT FIBER STRAIN THIS ITERATION          00024300
C  SBMIN              MINIMUM BOT FIBER STRAIN THIS ITERATION          00024400
C  SER                HORIZONTAL FORCE ERROR DURING SLIDE              00024500
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C  SFOR( )              PRESTRESS FORCE IN A BONDED STRAND          00024600
C  SHIML( ), SHIMLL     SHIM STRESS AT THE LEFT END                 00024700
C  SHIMR( ), SHIMRL     SHIM STRESS AT THE RIGHT END                00024800
C  SINC                 STRAIN INCREMENT FOR STIFFNESS COMPUT       00024900
C  SK                   SPRING CONSTANT, IN LBS/IN                  00025000
C  SLIDE                RATIO OF FORCE ERRORS FOR NEXT CYCLE        00025100
C  SLT( )               TOTAL LENGTH OF AN UNBONDED TENDON          00025200
C  SMUL                 MULTIPLIER FOR STRAIN                       00025300
C  SN2( )               INPUT VALUE OF SPRING SUPPORT STIFFNESS     00025400
C  ST                   TOP FIBER STRAIN                            00025500
C  STAR                 MAXIMUM ELASTIC CONC COMPRESSIVE STRAIN     00025600
C  STEMP(  )            TEMPORARY STORAGE OF INITIAL VALUE OF       00025700
C                       SPRING CONSTANT, S                          00025800
C  STMAX                MAXIMUM TOP FIBER STRAIN THIS ITERATION     00025900
C  STMIN                MINIMUM TOP FIBER STRAIN THIS ITERATION     00026000
C  STRAIN( , )          INPUT VALUE OF STEEL STRAIN                 00026100
C  STRESS( , )          INPUT VALUE OF STEEL STRESS                 00026200
C  T( )                 TRANSVERSE TORQUE (TOTAL PER STA)           00026300
C  TAC( )               TOTAL CONCRETE CROSS SECTIONAL AREA         00026400
C  TCCL                 TOTAL CHANGE IN CONCRETE LENGTH             00026500
C  TCSL                 TOTAL CHANGE IN STEEL LENGTH                00026600
C  TENS                 TOTAL CALCULATED TENSION                    00026700
C  TIN( )               INITIAL TENSION STRAIN IN A BONDED STRAND   00026800
C  TM( , )              TENDON TENSION DUE TO MAXIMUM JACK STRESS   00026900
C  TMOM                 MOMENT DUE TO UNBONDED TENDONS              00027000
C  TN2( )               INPUT VALUE OF TRANSVERSE TORQUE            00027100
C  TOLL                 LENGTH CLOSURE TOLERANCE                    00027200
C  TPHI( , )            TENDON CURVATURE PER INCREMENT              00027300
C  TRAD( )              TENDON RADIUS OF CURVATURE PER INCREMENT    00027400
C  TRESS                STRESS IN TENDON AFTER EQUILIBRIUM CHECK    00027500
C  TREV                 REVISED CONC INC LENGTH ALONG A TENDON      00027600
C  TTF                  FINAL TENDON TENSILE STRESS                 00027700
C  TTI                  INITIAL TENDON TENSILE STRESS               00027800
C  TTMOM                TOTAL MOMENT ON THE CROSS SECTION           00027900
C  U( )                 INTERPOLATED VALUE IN SUBROUTINE INTERP6    00028000
C  UN( )                VALUE INPUT FOR INTERPOLATION               00028100
C  UNITWT               UNIT WEIGHT OF CONCRETE (LB/FT**3)          00028200
C  VCREV                REVISED VERTICAL CONC INCREMENT LENGTH      00028300
C  VINC( )              HEIGHT OF THE VERTICAL INCREMENT            00028400
C  VLCOR( )             VERTICAL COMPONENT OF CONC LENGTH CHANGE    00028500
C  W( )                 VERTICAL DEFLECTION OF BMCOL AT STA J       00028600
C  WIDTH( , )           WIDTH OF CONCRETE FROM JFIRST TO JLAST      00028700
C  WO                   WOBBLE FRICTION COEFF PER INCH OF TENDON    00028800
C  WOB                  INPUT VALUE OF WOBBLE FRICTION (PER FOOT)   00028900
C  WS( )                SPECIFIED VALUE OF DEFLECTION AT STA JS     00029000
C  WTEMP( )             PREVIOUS VALUE OF VERTICAL DEFLECTION       00029100
C  WTOL                 DEFLECTION CLOSURE TOLERANCE                00029200
C  X                    DISTANCE ALONG BEAM FROM THE LEFT END       00029300
C  XXI( )               GROSS MOMENT OF INERTIA ABOUT CGC           00029400
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C         YBAR( )                 LOCATION OF NEUTRAL SURFACE FROM THE TOP
C         YBAX( )                 LOCATION OF ELASTIC CGC FROM THE TCP
C         YR( , )                 DIST FROM TOP OF BEAM TO AN UNBONDED TEN
C         YSHOP1( , )             DISTANCE FROM TOP FIBER TO TENDON AT MN19
C         YSHOP2( , )             DISTANCE FROM TOP FIBER TO TENDON AT MN29
C         YSHOP3( , )             DISTANCE FROM TOP FIBER TO TENDON AT MN39
C         YSTEEL( )               DIST FROM TOP OF BEAM TO A BONDED BAR
C         YTEMP( )                DIST FROM TOP OF BEAM TO DEFLECTED TENDON
C         Z( )                    TOTAL PRESTRESSING MOMENT AT A GIVEN STA
C         ZI                      DECIMAL VALUE FOR ISTA
C         ZT                      PRESTRESS MOMENT OF ONE TENDON OR STRAND
C
C************************************************************************
C
C
C
      IMPLICIT REAL*8(A-H,C-Z)
      DIMENSION AN1(32), AN2(18), KEY(307), IN13(20), KASE(20),
     1          WS(20),DWS(20), IN14(100), IN24(100), KR24(100),
     2          QN2(100), SN2(100), TN2(100), BN2(100), PN2(100),
     3          KSW4(100), IFIRST(30), ILAST(30), NVCW(100),
     4          DEPTH(30), VINC(30), JFIRST(30,100), JLAST(30,100),
     5          WIDTH(30,100), NUME(20), NUMC(3), STRESS(20,3)
      DIMENSION STRAIN(20,3), LCE1(12,20), IN19(12,20), SA(12),
     7          YSHOP1(12,20), IN29(12,20), YSHOP2(12,20),
     8          IN39(12,20), YSHOP3(12,20), KT1(3), KT2(3), KSG(3),
     9          KSE(3), HIGHL(3), SHIML(3), HIGHR(3), SHIMR(3)
      DIMENSION SLT(12), IB1(20), IB2(20), AREA(20), YSTEEL(20),
     1          TIN(20), F(307), Q(307), S(307), T(307), R(307),
     2          P(307), ES(3), TAC(307), AC(10,100), CEN(10,100),
     3          YBAX(10), YBAR(307), XXI(10), CLT(12), YR(307,12),
     4          RL(307,12),TEHI(307,12), RBRC(307,12), TM(307,12),
     5          RT(307,12),DELT(307), DELS(307), TRAD(307,12)
      DIMENSION Z(307), A(307), B(307), C(307), W(307), DW(307),
     7          BM(307), DEM(307), REACT(307), WTEMP(307),
     8          YTEMP(307), HLCOR(307), VLCOR(307), PHI(307),
     9          BFOR(20), CFCR(100), Z1(307), NUBC(20), JSTOP(10)
      DIMENSION DELF(307), FIEE(307), FIBT(307), SFOR(20),
     1          LIMIT(307), PHIM(307), PZ(307,12), DEF(307), STEMP(307)
      DIMENSION IS(500)
      DIMENSION DEFF(307)
C
   20 FORMAT(14I5)
   21 FORMAT(5X,I5,10X,E10.3,10X,3E10.3)
   31 FORMAT(2(5X,I5),2E10.3)
   41 FORMAT(5X,3I5,10X,5E10.3)
   51 FORMAT(5X,5I5,10X,2E10.3)
   61 FORMAT(10X,7E10.3)
   71 FORMAT(5X,3I5,10X,2E10.3)
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 72 FORMAT(5X,2I5,15X,E10.3)                                              00034400
 81 FORMAT(5X,2I5)                                                        00034500
 82 FORMAT(20X,6E10.3)                                                    00034600
 91 FORMAT(10X,E10.3)                                                     00034700
 92 FORMAT(5X,I5,3(5X,I5,E10.3))                                          00034800
 93 FORMAT(5X,4I5,5X,4E10.3)                                              00034900
 94 FORMAT(5X,3I5,10X,3E10.3)                                             00035000
100 FORMAT(///10X,'TABLE - PROGRAM CONTROL DATA',/47X,    'FLEXURAL',1400035100
   *X,'TABLE NUMBER',/47X,   'STIFFNESS     2  3  4  5  6  7  8  9 10 00035200
   *11',//15X,'PRIOR DATA OPTIONS (1=HOLD)',7X,I3,7X,10I3,/15X,'NUM CA00035300
   *RDS INPUT THIS PROBLEM',16X,3I3)                                      00035400
102 FORMAT(35X,'----------  NO SWELL  ----------')                        00035500
103 FORMAT(35X,'----------  CENTER LIFT  ----------')                     00035600
104 FORMAT(35X,'----------  EDGE LIFT  ----------')                       00035700
105 FORMAT(8(F10.4))                                                      00035800
106 FORMAT(    '1',10X,'SLAB LENGTH =',F7.2,' FT',10X,'SLAB WIDTH =',F600035900
   1.2,' FT',10X,'TEE SECTION DEPTH =',F6.2,' IN',/10X,'YM =',F5.2,' I00036000
   2N',21X,'EDGE PENETRATION =',F5.2,' FT',5X,'EDGE LOAD + UNIFORM LOA00036100
   3D=',F7.3,' +',F6.3,' PSI',/10X,'MOUND EXPONENT =',F5.2,/)            00036200
108 FORMAT('1',//10X,'TABLE 12 - SWELLING SOIL PROFILE INFORMATION',//00036300
   115X,'DIFFERENTIAL HEAVE =',7X,F8.3,' INCHES',//15X,'EDGE PENETRATI00036400
   2ON DISTANCE =',F8.3,' FEET',//15X,'MOUND EXPONENT =',16X,F8.4,//1500036500
   3X,'SWELLING MODE:',/)                                                 00036600
200 FORMAT(///10X,'TABLE 2 - CONSTANTS AND CLOSURE TOLERANCES' ,/)      00036700
201 FORMAT(/15X,'NUM INCREMENTS',55X,I5,/15X,'INCREMENT LENGTH',48X,E100036800
   *0.3,/15X,'DEFLECTION CLOSURE TOLERANCE',36X,E10.3,/15X,'FORCE CLOS00036900
   *URE TOLERANCE',41X,E10.3,/15X,'LENGTH CLOSURE TOLERANCE',40X,E10.300037000
   *)                                                                     00037100
300 FORMAT(///10X,'TABLE 3 - SPECIFIED DEFLECTIONS AND SLOPES',//15X,'00037200
   *STA',6X,'CASE',7X,'DEFLECTION',8X,'SLOPE')                            00037300
311 FORMAT(13X,I5,4X,I5,8X,E10.3,8X,'NONE')                               00037400
312 FORMAT(13X,I5,4X,I5,10X,'NONE',8X,E10.3)                              00037500
313 FORMAT(13X,I5,4X,I5,3X,2(5X,F10.3))                                   00037600
400 FORMAT(///10X,'TABLE 4 - LOAD AND RESTRAINT DATA',//10X,'FROM TO C00037700
   *ONTD',  10X,'Q',10X,'S',10X,'T',10X,'R',10X,'F',/)                    00037800
411 FORMAT(10X,2I4,I3,12X,5F11.3)                                         00037900
412 FORMAT(10X,I4,4X,I3,12X,5E11.3)                                       00038000
413 FORMAT(14X,I4,I3,12X,5E11.3)                                          00038100
500 FORMAT(///10X,'TABLE 5 - GENERAL PROBLEM CONTROL AND FRICTION DATA00038200
   *')                                                                    00038300
511 FORMAT(/15X,'NUMBER OF DIFFERENT CONCRETE CROSS SECTIONS',25X,I5,/00038400
   *15X,'NUMBER OF STEEL TYPES',47X,I5,/15X,'NUMBER OF UNBONDED TENDON00038500
   *S',42X,I5,/15X,'NUMBER OF PRESTRESSING STAGES',39X,I5,/15X,'NUMBER00038600
   * OF BONDED REINFORCING BARS AND/OR STRANDS',20X,I5,//15X,'COEFFICI00038700
   *ENT OF FRICTION DUE TO CURVATURE',22X,E11.3,/15X,'WOBBLE FRICTION 00038800
   *COEFFICIENT PER FOOT OF TENDON',16X,E11.3)                            00038900
550 FORMAT(//25X,'***** ITERATIVE SOLUTION HAS NOT CLOSED FOR SPECIFIE00039000
   *D',/28X,'DEFLECTION TOLERANCE IN 99 ITERATIONS *****')                00039100
551 FORMAT(//10X,'TABLE 13 - COMPUTED RESULTS    --    ITERATION',I3,//1000039200
```

```
     *0X,'STA I     DISTANCE      DEFLECTION',8X,'SLOPE',11X,'MOMENT',10X,
     *'SHEAR',6X,'SUPPORT REACTION',/)
552  FORMAT(11X,I3,4X,E10.3,2X,E13.6,2(19X,E13.6))
553  FORMAT(46X,E13.6,19X,E13.6)
560  FORMAT(//10X,'TABLE 14 - COMPUTED RESULTS   (CONTINUED)',//10X,'TEN
    2DON     STA I      INITIAL STRESS       FINAL STRESS     DISTANCE FROM
    3 TOP    PRESTRESS MOMENT        STIFFNESS',//)
561  FORMAT(11X,I3,7X,I3,5(6X,E13.6))
562  FORMAT(5X//)
563  FORMAT(//10X,'TOTAL ELASTIC SHORTENING DUE TO DIRECT STRESS =',E13
    1.6)
564  FORMAT(10X,'NONE',15X,'THIS PROBLEM DOES NOT CONTAIN UNBONDED TEND
     *ONS',//)
565  FORMAT(21X,I3,42X,2(E10.3,2X))
600  FORMAT(///10X,'TABLE 6 - ASSUMED MATERIAL PROPERTIES FOR THE CONCR
     *ETE')
611  FORMAT(/15X,'STANDARD CYLINDER COMPRESSIVE STRESS   (PSI)',19X,E11.
     *3,/15X,'MAX STRESS REDUCTION FACTOR FOR CONCRETE',22X,E11.3,/15X,'
     *ULTIMATE CONCRETE STRAIN IN COMPRESSION',23X,E11.3,/15X,'REDUCTION
     *FAC FOR CONC STRESS AT ULTIMATE STRAIN',15X,E11.3,/15X,'UNIT WEIGH
     *T OF THE CONCRETE (PCF)',29X,E11.3,/15X,'MAXIMUM ELASTIC CONCRETE 
     *COMPRESSIVE STRAIN',19X,E11.3,/15X,'INCREMENT OF STRAIN FOR STIFFN
     *ESS CALCULATION',17X,E11.3)
700  FORMAT(///10X,'TABLE 7 - CROSS-SECTION PROPERTIES OF THE BEAM')
701  FORMAT(//15X,'VERTICAL INCREMENT DATA FOR SECTION',I3,//30X,'FROM 
     *      TO         WIDTH',/30X,'VINC     VINC',/)
711  FORMAT(/15X,'BEAM CROSS        FROM        TO        NUM OF',9X,'DEPTH OF 
     *    DEP OF VERTICAL',/17X,'SECTION',7X,'STA       STA       WIDTHS',11X
     *,'BEAM',9X,'INCREMENTS',/18X,'NUM',//17X,I3,10X,I3,6X,I3, 6X,I3,
     *  9X,E10.3,9X,E10.3)
C    *3,7X,E10.3,9X,E10.3)
C    *,'BEAM',9X,'INCREMENTS',/18X,'NUM',//21X,I3,7X,I3,5X,I3,8X,I3,8X,I
712  FORMAT(31X,I3,5X,I3,1X,E10.3)
770  FORMAT(/10X,'SLIDE ROUTINE HAS FAILED TO CONVERGE AT STATION',I4)
800  FORMAT(///10X,'TABLE 8 - STEEL STRESS-STRAIN PROPERTIES')
801  FORMAT(//24X,'STRESS',8X,'STRAIN',12X,'STRESS',8X,'STRAIN',/25X,'(
     *LB)',9X,'(IN/IN)',13X,'(LB)',8X,'(IN/IN)',/)
802  FORMAT(21X,E10.3,4X,E10.3,9X,E10.3,4X,E10.3)
803  FORMAT(//15X,'TENDON',I3,' HAS FAILED AT STATION',I3)
811  FORMAT(/35X,'STRESS-STRAIN CHARACTERISTICS',/35X,'FOR UNBONDED TEN
     *DON STEEL',/43X,'CURVE TYPE',I2)
812  FORMAT(/35X,'STRESS-STRAIN CHARACTERISTICS',/35X,'FOR BONDED PREST
     *RESSING STRAND',/43X,'CURVE TYPE',I2)
813  FORMAT(/35X,'STRESS-STRAIN CHARACTERISTICS',/35X,'FOR MILD STEEL R
     *EINFORCEMENT',/43X,'CURVE TYPE',I2)
850  FORMAT(//10X,'TABLE 15 - COMPUTED RESULTS   (CONCLUDED)',//10X,'FRO
    1M',8X,'TO',10X,'CROSS.           MOMENT OF',/11X,'STA          STA',9X,'S
    2ECTION          INERTIA',/35X,'AREA',//)
855  FORMAT(11X,I3,7X,I3,6X,E13.6,2X,E13.6,/)
```

```
860 FORMAT(///10X,'MAXIMUM TENSILE STRAIN IN CONCRETE EXCEEDED AT ----
   *--',9X,'STA     STRAIN',//)
861 FORMAT(70X,I5,2X,E13.6)
865 FORMAT(//10X,'MAXIMUM COMPRESSIVE STRAIN IN CONCRETE EXCEEDED AT -
   *-',9X,'STA     STRAIN',//)
866 FORMAT(70X,' ****  NONE   ****')
900 FORMAT(///10X,'TABLE 9 - TENDON AREA AND INITIAL GEOMETRY DATA')
903 FORMAT(/25X,'NONE')
904 FORMAT(//10X,'TOO MUCH DATA FOR AVAILABLE STORAGE',//)
905 FORMAT(/15X,'USING DATA FROM THE PREVIOUS PROBLEM')
906 FORMAT(15X,'ADDITIONAL DATA FOR THIS PROBLEM')
907 FORMAT(//10X,'ERROR STOP -- SLOPES AND DEFLECTIONS IMPROPERLY SPEC
   *IFIED')
908 FORMAT(//10X,'ERROR -- NON-ZERO TABLE 4 DATA BEYOND END')
909 FORMAT(//10X,'TOTAL COMPATIBILITY BETWEEN CONCRETE AND TENDON LENG
   *TH HAS NOT BEEN',/10X,'SATISFIED FOR THE SPECIFIED LENGTH TOLERANC
   *E')
911 FORMAT(/34X,'AREA OF TENDON',I2,' =',E11.3)
912 FORMAT(/20X,'KNOWN CONTROL POINTS FOR TENDON',I3,//22X,'CURVE    F
   *ROM        DIST       THRU        DIST         TO          DIST',/23X,'TYPE
   *     STA         FROM        STA          FROM.        STA         FROM',/43X,
   *'TOP',17X,'TOP',17X,'TOP',/)
913 FORMAT(/22X,'LINEAR',3X,I3,3X,E11.3,23X,I3,3X,E11.3)
914 FORMAT(/20X,'PARABOLIC',3(3X,I3,3X,E11.3))
950 FORMAT(///10X,'TABLE 10 - STRESSING HISTORY FOR THE UNBONDED TENDO
   *NS')
955 FORMAT(//11X,'STRESS    FROM      TO      JACKING      LEFT MAX    LEFT
   *SHIM     RIGHT MAX   RIGHT SHIM',/11X,'ORDER      TENDON   TENDON      END
   *          STRESS        STRESS        STRESS        STRESS',//)
960 FORMAT(13X,I2,6X,I3,5X,I3,5X,' LEFT    ',3(E10.3,2X),E10.3)
965 FORMAT(13X,I2,6X,I3,5X,I3,4X,'RIGHT    ',3(E10.3,2X),E10.3)
970 FORMAT(13X,I2,6X,I3,5X,I3,5X,'BOTH    ',3(E10.3,2X),E10.3)
980 FORMAT(///10X,'UNDESIGNATED ERROR STOP  --  PROBLEM TERMINATED')
990 FORMAT(///10X,'TABLE 11 - SUPPLEMENTARY BONDED REINFORCEMENT DATA'
   *)
991 FORMAT(//21X,'BAR      FROM      TO    STRESS-STRAIN    AREA      DIST
   *          INITIAL',/20X,'NUMBER    STA    STA    CURVE NUM',17X,'FROM
   *',7X,'PRESTRESS',/70X,'TOP',//)
992 FORMAT(21X,I3,6X,I3,4X,I3,7X,I2,4X,3(2X,E10.3))
C
C-----START EXECUTION OF THE PROGRAM - SEE GENERAL FLOW CHART
C
      KALL=-1
      ITEST = 0
      JCYC = 0
      KEY3 = 0
      KEY7 = 0
      DO 998 I=1,100
      CFOR(I)=0.0
```

```
  998 CONTINUE
      DO 999 I=1,20
      BFOR(I)=0.0
  999 CONTINUE
 1000 CONTINUE
C-----PROGRAM AND PROBLEM IDENTIFICATION
 1010 READ 105,AAAA,BBBB,CCCC,DDDD,EEEE,FFFF,GGGG,EXPO
      IF(AAAA.EQ.0.)GO TO 9990
      PRINT 106, AAAA,BBBB,CCCC,DDDD,EEEE,FFFF,GGGG
      READ 20,LIFT
      GO TO (120,121,122),LIFT
  120 PRINT 102
      GO TO 123
  121 PRINT 103
      GO TO 123
  122 PRINT 104
  123 CONTINUE
C
C-----INPUT AND PRINT TABLE 1
C
 1100 READ 20, KEEPF, KEEP2, KEEP3, KEEP4, KEEP5, KEEP6, KEEP7, KEEP8,
     *    KEEP9, KEEP10, KEEP11, NCT2, NCT3, NCT4
      PRINT 100, KEEPF, KEEP2, KEEP3, KEEP4, KEEP5, KEEP6, KEEP7, KEEP8,
     *    KEEP9, KEEP10, KEEP11, NCT2, NCT3, NCT4
C
C-----INPUT AND PRINT TABLE 2
C
 1200 PRINT 200
      IF ( KEEP2 ) 9980, 1210, 1220
 1210 READ 21, M, H, WTOL, AXTOL, TOLL
C
C-----COMPUTE CONSTANTS AND INDEXES
C
      HT2 = H + H
      HE2 = H * H
      HE3 = HE2 * H
      MP1 = M + 1
      MP3 = M + 3
      MP4 = M + 4
      MP5 = M + 5
      MP6 = M + 6
      MP7 = M + 7
      MHO = M
 1160 DO 1170 I=1,MP7
      DEF(I)=0.0
 1170 CONTINUE
      GO TO 1230
 1220 PRINT 905
 1230 PRINT 201, MHO, H, WTOL, AXTOL, TOLL
```

```
C
C-----CLEAR DIMENSIONED STORAGE TO ZERO AS REQUIRED
C
      IF ( KEEPF ) 9980, 1240, 1300
 1240 DO 1250 J = 1, MP7
      STEMP(J)=0.0
      WTEMP(J) = 0.0
      F(J) = 0.0
      Z(J) = 0.0
      FIBB(J) = 0.0
      FIBT(J) = 0.0
      LIMIT(J) = 0
 1250 CONTINUE
C
C-----INPUT AND PRINT TABLE 3
C
 1300 PRINT 300
      IF ( KEEP3 ) 9980, 1310, 1305
 1305 PRINT 905
      KEY3 = 1
      GO TO 1340
 1310 DO 1315 J = 3, MP5
      KEY(J) = 1
 1315 CONTINUE
      NCD3 = NCT3
      IF ( NCD3 ) 9980, 1320, 1325
 1320 PRINT 903
      GO TO 1400
 1325 IF ( NCD3 - 20 ) 1335, 1335, 1330
 1330 PRINT 904
      GO TO 9990
 1335 JS = 3
 1340 DO 1399 N = 1, NCD3
      IF ( KEY3 ) 9980, 1345, 1360
 1345 READ 31, IN13(N), KASE(N), WS(N), DWS(N)
      KASS = KASE(N)
      IF ( IN13(N) + 4 - JS ) 1350, 1350, 1355
 1350 PRINT 907
      GO TO 9990
 1355 JS = IN13(N) + 4
C
C-----SET INDEXES FOR FUTURE CONTROL OF SPECIFIED CONDITION ROUTINES
C
      GO TO 1365
 1360 KASS = KASE(N)
      GO TO ( 1375, 1385, 1395 ), KASS
 1365 GO TO ( 1370, 1380, 1390 ), KASS
 1370 KEY(JS) = 2
 1375 PRINT 311, IN13(N), KASE(N), WS(N)
```

```
      GO TO 1399
 1380 KEY(JS-1) = 3
      KEY(JS+1) = 5
 1385 PRINT 312, IN13(N), KASE(N), DWS(N)
      GO TO 1399
 1390 KEY(JS-1) = 3
      KEY(JS) = 4
      KEY(JS+ 1) = 5
 1395 PRINT 313, IN13(N), KASE(N), WS(N), DWS(N)
 1399 CONTINUE
C
C-----INPUT AND PRINT TABLE 4
C
 1400 PRINT 400
      IF ( KEEP4 ) 9980, 1405, 1410
 1405 NC14 = 1
      NCD4 = NCT4
      GO TO 1455
 1410 PRINT 905
      IF ( NCD4 - 1 ) 1450, 1415, 1415
 1415 DO 1445 N = 1, NCD4
      KASS = KSW4(N)
      IF ( KASS - 1 ) 1430, 1420, 1420
 1420 IF ( KASS - 4 ) 1425, 1425, 1440
 1425 GO TO ( 1430, 1435, 1440, 1440 ), KASS
 1430 PRINT 411, IN14(N), IN24(N), KR24(N), QN2(N), SN2(N), TN2(N),
     *     RN2(N), PN2(N)
      GO TO 1445
 1435 PRINT 412, IN14(N), KR24(N), QN2(N), SN2(N), TN2(N), RN2(N),
     *     PN2(N)
      GO TO 1445
 1440 PRINT 413, IN24(N), KR24(N), QN2(N), SN2(N), TN2(N), RN2(N),
     *     PN2(N)
 1445 CONTINUE
 1450 CONTINUE
      PRINT 906
      NC14 = NCD4 + 1
      NCD4 = NCD4 + NCT4
 1455 IF ( NCD4 - 100 ) 1465, 1465, 1460
 1460 PRINT 904
      GO TO 9990
 1465 IF ( NCT4 ) 9980, 1470, 1475
 1470 PRINT 903
      GO TO 1500
 1475 KR1 = 0
      IF ( NC14 - NCD4 ) 1480, 1480, 1500
 1480 DO 1499 N = NC14, NCD4
      READ 41, IN14(N), IN24(N), KR24(N), QN2(N), SN2(N), TN2(N),
     *     RN2(N), PN2(N)
```

```
      KSW4(N) = 1 + KR24(N) + 2 * KR1
      KR1 = KR24(N)
      KASS = KSW4(N)
      IF ( KASS - 1 ) 1495, 1485, 1485
 1485 IF ( KASS - 4 ) 1490, 1490, 1497
 1490 GO TO (1495,1496,1497,1497),KASS
 1495 PRINT 411, IN14(N), IN24(N), KR24(N), CN2(N), SN2(N), TN2(N),
     *    RN2(N), PN2(N)
      GO TO 1499
 1496 PRINT 412, IN14(N), KR24(N), CN2(N), SN2(N), TN2(N), RN2(N),
     *    PN2(N)
      GO TO 1499
 1497 PRINT 413, IN24(N), KR24(N), CN2(N), SN2(N), TN2(N), RN2(N),
     *    PN2(N)
 1499 CONTINUE
C
C-----INPUT AND PRINT TABLE 5
C
 1500 PRINT 500
      IF ( KEEP5 ) 9980, 1510, 1505
 1505 PRINT 905
      GO TO 1515
 1510 READ 51, NSEC, NSSC, NUT, NG, NHB, FCC, WOB
 1515 PRINT 511, NSEC, NSSC, NUT, NG, NHB, FCC, WOB
C
C-----CHANGE WOBBLE COEFFICIENT TO PER INCH UNITS
C
      WO = WOB / 12.0
C
C-----INPUT AND PRINT TABLE 6
C
 1600 PRINT 600
      IF ( KEEP6 ) 9980, 1610, 1605
 1605 PRINT 905
      GO TO 1615
 1610 READ 61, FPC, FPCM, EFULT, RFCS, UNITWT, STAR, SINC
 1615 PRINT 611, FPC, FPCM, EFULT, RFCS, UNITWT, STAR, SINC
      PSINC = SINC
C
C-----INPUT AND PRINT TABLE 7
C
 1700 PRINT 700
      IF ( KEEP7 ) 9980, 1710, 1705
 1705 PRINT 905
      KEY7 = 1
 1710 DO 1740 N = 1, NSEC
      IF ( KEY7 ) 9980, 1715, 1720
 1715 READ 71,IFIRST(N),ILAST(N),NVCW(N),DEPTH(N),VINC(N)
 1720 PRINT 711, N, IFIRST(N), ILAST(N), NVCW(N), DEPTH(N); VINC(N)
```

```
      PRINT 701,N
      NVCWN = NVCW(N)
      DO 1735 K = 1, NVCWN
      IF ( KEY7 ) 9980, 1725, 1730
 1725 READ 72, JFIRST(N,K) , JLAST(N,K) , WIDTH(N,K)
 1730 PRINT 712, JFIRST(N,K) , JLAST(N,K) , WIDTH(N,K)
 1735 CONTINUE
 1740 CONTINUE
C
C-----INPUT AND PRINT TAPLE 8
C
 1800 PRINT 800
      IF ( KEEP8 ) 9980, 1810, 1805
 1805 PRINT 905
      GO TO 1820
 1810 DO 1815 N = 1, NSSC
      READ 81, NUMP(N) , NUMC(N)
      NUMPN = NUMP(N)
      READ 82, (    STRESS(M,N) , STRAIN(M,N)    , M = 1, NUMPN )
 1815 CONTINUE
 1820 DO 1845 N = 1, NSSC
      NUMCN = NUMC(N)
      IF ( NUMC(N) - 2 ) 1825, 1830, 1835
 1825 PRINT 811, NUMC(N)
      PRINT 801
      NCI1 = N
      NUMP1 = NUMP(N)
 1827 ES(NUMCN) = ( STRESS(2,N) - STRESS(1,N) ) / ( STRAIN(2,N)
     *     - STRAIN(1,N) )
      GO TO 1840
 1830 PRINT 812, NUMC(N)
      PRINT 801
      NCI2 = N
      NUMP2 = NUMP(N)
      GO TO 1827
 1835 PRINT 813, NUMC(N)
      PRINT 801
      NCI3 = N
      NUMP3 = NUMP(N)
 1840 NUMPN = NUMP(N)
      PRINT 802, (    STRESS(M,N) , STRAIN(M,N)    , M = 1, NUMPN )
 1845 CONTINUE
C
C-----INPUT AND PRINT TABLE 9
C
 1900 PRINT 900
      IF ( NUT ) 9980, 1901, 1902
 1901 PRINT 903
      GO TO 2000
```

```
1902 IF ( KEEP9 ) 9980, 1910, 1905
1905 PRINT 905
     GO TO 1940
1910 DO 1935 J = 1, NUT
     READ 91, SA(J)
     MO = 1
1915 READ 92, LOP1(J,MO), IN19(J,MO), YSHOP1(J,MO), IN29(J,MO),
    *     YSHOP2(J,MO), IN39(J,MO), YSHOP3(J,MO)
     IF ( LOP1(J,MO) ) 9980, 1920, 1925
1920 IF ( IN29(J,MO) - MHC ) 1930, 1935, 9980
1925 IF ( IN39(J,MO) - MHC ) 1930, 1935, 9980
1930 MO = MO + 1
     GO TO 1915
1935 CONTINUE
1940 CONTINUE
     DO 1980 J = 1, NUT
     PRINT 911, J, SA(J)
     PRINT 912, J
     MO = 1
1945 IF ( LOP1(J,MO) ) 9980, 1950, 1955
1950 PRINT 913, IN19(J, MO), YSHOP1(J, MO), IN29(J, MO),
    *     YSHOP2(J,MO)
     GO TO 1960
1955 PRINT 914, IN19(J, MO), YSHOP1(J, MO), IN29(J, MO),
    *     YSHOP2(J,MO), IN39(J,MO), YSHOP3(J,MO)
1960 IF ( LOP1(J,MO) ) 9980,1965, 1970
1965 IF ( IN29(J,MO) - MHC ) 1975, 1980, 9980
1970 IF ( IN39(J,MO) - MHC ) 1975, 1980, 9980
1975 MO = MO + 1
     GO TO 1945
1980 CONTINUE
C
C-----INPUT AND PRINT TABLE 10
C
2000 PRINT 950
     IF ( NG ) 9980, 2001, 2002
2001 PRINT 903
     GO TO 2100
2002 IF ( KEEP10 ) 9980, 2010, 2005
2005 PRINT 905
     GO TO 2020
2010 DO 2015 N = 1, NG
     READ 93, KT1(N), KT2(N), KSC(N), KSE(N), HIGHL(N), SHIML(N),
    *     HIGHR(N), SHIMR(N)
2015 CONTINUE
2020 PRINT 955
     DO 2040 N = 1, NG
     IF ( KSE(N) - 1 ) 2025, 2030, 2035
2025 PRINT 960, KSO(N), KT1(N), KT2(N), HIGHL(N), SHIML(N)
```

```
      GO TO 2040
 2030 PRINT 965, KSO(N), KT1(N), KT2(N), HIGHR(N), SHIMR(N)
      GO TO 2040
 2035 PRINT 970, KSO(N), KT1(N), KT2(N), HIGHL(N), SHIML(N), HIGHR(N),
     *    SHIMR(N)
 2040 CONTINUE
C
C-----INPUT AND PRINT TABLE 11
C
 2100 PRINT 990
      IF ( NHB ) 9980, 2101, 2102
 2101 PRINT 903
      GO TO 399
 2102 IF ( KEEP11 ) 9980, 2110, 2105
 2105 PRINT 905
      GO TO 2120
 2110 DO 2115 N = 1, NHB
      READ 94, IB1(N), IB2(N), NUBC(N), AREA(N), YSTEEL(N), TIN(N)
 2115 CONTINUE
 2120 PRINT 991
      DO 2125 N = 1, NHB
      PRINT 992, N, IB1(N), IB2(N), NUBC(N), AREA(N), YSTEEL(N), TIN(N)
 2125 CONTINUE
  399 CONTINUE
C
C-----ALL STRUCTURAL INPUT DATA HAS BEEN READ IN
C
C-----INTERPOLATE AND DISTRIBUTE VALUES FROM TABLE 4
C
       LSM = 0
       CALL INTERP  ( MP7, NCD4, IN14, IN24, KR24, QN2, Q, LSM )
       CALL INTERP  ( MP7, NCD4, IN14, IN24, KR24, SN2, S, LSM )
       CALL INTERP  ( MP7, NCD4, IN14, IN24, KR24, TN2, T, LSM )
       CALL INTERP  ( MP7, NCD4, IN14, IN24, KR24, RN2, R, LSM )
       LSM = 1
       CALL INTERP  ( MP7, NCD4, IN14, IN24, KR24, PN2, P, LSM )
C
       DO 2200 JK=4, MP7
 2200  STEMP(JK)=S(JK)
C
C-----DETERMINE DEFLECTIONS OF SWELLING SOIL PROFILE
C
C-----DETERMINE IF PROBLEM INVOLVES NO LIFT, EDGE LIFT, OR CENTER LIFT
C-----AND CALCULATE THE APPROPRIATE SWELL PROFILE
C
C-----PRINT TABLE 12
C
       PRINT 108,DDDD,EEEE,EXEC
       IF(LIFT.EQ.1)PRINT 102
```

```
      IF(LIFT.EQ.2) PRINT 103
      IF(LIFT.EQ.3) PRINT 104
      CALL SOILSW (EXPO,LIFT,ME1,ME4,MP7,DDDD,EEEE,H,DEF )
C
C-----TEST TO SEE IF A NEW BEAM IS BEING CONSIDERED
C
      IF ( KEEPF ) 9980, 2500, 5000
C
C-----COMPUTE CONCRETE MATERIAL PROPERTIES
C
 2500 EC = 33.0 *DSQRT  ( UNITWT ** 3 * ( - FPC ) )
      FPPC = FPCM * FPC
      EPO = 2.0 * FPPC / EC
      FPT = 3000.0 / ( 3.0 - 12000.0 / FPC )
      EMAXT = FPT / EC
C
C
C-----COMPUTE THE ELASTIC SECTION PROPERTIES FOR THE BEAM
      IEND = 0
      DO 3030 N = 1, NSEC
      TAC(N) = 0.0
      IYS = IFIRST(N) + 4
      IYE = ILAST(N) + 4
      NVCWN = NVCW(N)
      DO 3005 K = 1, NVCWN
      JSTART = JFIRST(N,K)
      JEND = JLAST(N,K)
      DO 3000 J = JSTART, JEND
      AC(N,J) = WIDTH(N,K) * VINC(N)
      TAC(N) = TAC(N) + AC(N,J)
 3000 CONTINUE
 3005 CONTINUE
      CEN(N,1) = VINC(N) / 2.0
      AY = CEN(N,1) * AC(N,1)
      DO 3010 J = 2, JEND
      CEN(N,J) = CEN(N,J-1) + VINC(N)
      AY = AY + AC(N,J) * CEN(N,J)
 3010 CONTINUE
      YBAR(N) = AY / TAC(N)
      XXI(N) = 0.0
      DO 3015 J = 1, JEND
      XXI(N) = XXI(N) + ( ( AC(N,J) * VINC(N) ** 2 ) / 12.0 )
     *    + ( AC(N,J) * ( YBAR(N) - CEN(N,J) ) ** 2 )
 3015 CONTINUE
C
C-----ELASTIC STIFFNESS FOR FIRST BMCOL SOLUTION
C
      DO 3025 I = IYS, IYE
      IF ( IEND ) 9980, 3016, 3020
```

```
3016 IF ( I - IYE ) 3022, 3017, 9980
3017 IF ( IYE - MP4 ) 3018, 3022, 9980
3018 IEND = 1
     IF ( IYS - 4 ) 9980, 3025, 3020
3020 YBAR(I) = YBAX(N)
     TAC(I) = TAC(N)
     F(I) = 0.50 * EC * ( XXI(N-1) + XXI(N) )
     IEND = 0
     GO TO 3025
3022 YBAR(I) = YBAX(N)
     TAC(I) = TAC(N)
     F(I) = EC * XXI(N)
3025 CONTINUE
     JSTOP(N) = JEND
3030 CONTINUE
     IF ( NUT ) 9980, 4906, 3500
C
C-----DESCRIBE THE INITIAL GEOMETRY OF THE TENDONS
C
3500 DO 3560 J = 1, NUT
     MO = 1
3505 MN19 = IN19(J,MO) + 4
     MN29 = IN29(J,MO) + 4
     MN39 = IN39(J,MO) + 4
     IF ( LOP1(J,MO) ) 9980, 3510, 3515
3510 IMM = MN29
     CR = 0.0
     GO TO 3520
3515 IMM = MN39
     CR = ( MN19 * ( YSHOP2(J,MO) - YSHOP3(J,MO) ) + MN29 *
    1     ( YSHOP3(J,MO) - YSHOP1(J,MO) ) + MN39 *
    2     ( YSHOP1(J,MO) - YSHOP2(J,MO) ) ) / ( MN19 ** 2 *
    3     ( MN39 - MN29 ) + MN29 ** 2 * ( MN19 - MN39 ) +
    4     MN39 ** 2 * ( MN29 - MN19 ) )
3520 BR = ( CR * ( MN19 ** 2 - MN29 ** 2 ) + YSHOP2(J,MO) -
    *     YSHOP1(J,MO) ) / ( MN29 - MN19 )
3525 AR = YSHOP1(J,MO) - BR * MN19 - CR * MN19 ** 2
C
C-----COMPUTE THE DIST FROM TOP OF BEAM TO CENTER OF TENDON (MN19-IMM)
C
     DO 3530 I = MN19, IMM
     YR(I,J) = AR + BR * I + CR * I ** 2
3530 CONTINUE
C
C-----TEST TO SEE IF THE END OF THE BEAM HAS BEEN REACHED
C
     IF ( LOP1(J,MO) ) 9980, 3535, 3540
3535 MN39 = MN29
3540 IF ( MN39 - MP4 ) 3545, 3550, 9980
```

```
 3545 MO = MO + 1
      GO TO 3505
C
C-----THE END OF THE BEAM HAS BEEN REACHED
C
 3550 CLT(J) = 0.0
      YR(3,J) = 2.0 * YR(4,J) - YR(5,J)
      YR(MP5,J) = 2.0 * YR(MP4,J) - YR(MP3,J)
      DO 3555 I = 5, MP4
      RL(I,J) =DSQRT  ( HE2 + ( YR(I,J) - YR(I-1,J) ) ** 2 )
      CLT(J) = CLT(J) + RL(I,J)
      TPHI(I,J) =DABS  ( - YR(I-1,J) + 2.0 * YR(I,J) -
     *     YR(I+1,J) ) / HE2
      IF ( TPHI(I,J) - 1.0E-07 ) 3552, 3552, 3554
 3552 RBRC(I,J) = 1.0E+07
C
C-----WHEN TENDON CURVATURE IS ZERO DELTA R / R IS IGNORED
C
      PHIM(I) = 0.0
      GO TO 3555
 3554 RBRC(I,J) = 1.0 / TPHI(I,J)
      PHIM(I) = 1.0
 3555 CONTINUE
      SLT(J) = CLT(J)
 3560 CONTINUE
C
C-----START OF INITIAL TENSION DISTRIBUTION
C
 4000 EDEF = 0.0
      DO 4900 L = 1, NG
      KTERM = 0
      KOP = 0
      KTAP = 0
      KRIP = 0
      JB = KT1(L)
      JE = KT2(L)
      HIGHLL = HIGHL(L)
      SHIMLL = SHIML(L)
      HIGHRL = HIGHR(L)
      SHIMRL = SHIMR(L)
      IF ( KSE(L) - 1 ) 4005, 4015, 4005
 4005 DO 4010 J = JB, JE
      TM(4,J) = SA(J) * HIGHLL
      RT(4,J) = SA(J) * SHIMLL
 4010 CONTINUE
      IF ( KSE(L) ) 9980, 4025, 4015
 4015 DO 4020 J = JB, JE
      TM(MP4,J) = SA(J) * HIGHRL
      RT(MP4,J) = SA(J) * SHIMRL
```

```
 4020 CONTINUE
 4025 IF ( KSE(L) - 1 ) 4100, 4200, 4295
C
C-----TENDONS IN THIS GROUP ARE STRESSED FROM THE LEFT END ONLY
C
 4100 DO 4130 J = JB, JE
      DO 4130 I = 4, MP3
      IF ( KOP - 1 ) 4105, 4110, 4110
 4105 TM(I+1,J) = TM(I,J) * ( 1.0 - FCC * TPHI(I+1,J) - WO *
     *    RL(I+1,J) )
      GO TO 4130
 4110 IF ( KTAP ) 9980, 4115, 4125
 4115 RT(I+1,J) = RT(I,J) * ( 1.0 + FCC * TPHI(I+1,J) + WO *
     *    RL(I+1,J) )
      IF ( RT(I+1,J) - TM(I+1,J) ) 4130, 4120, 4120
 4120 KTAP = 1
 4125 RT(I+1,J) = TM(I+1,J)
 4130 CONTINUE
      IF ( KRIP - 1 ) 4150, 4900, 4845
 4150 KOP = 1
      IF ( KTERM ) 9980, 4500, 4540
C
C-----TENDONS IN THIS GROUP ARE STRESSED FROM THE RIGHT END ONLY
C
 4200 DO 4230 J = JB, JE
      DO 4230 K = 4, MP3
      I = MHO + 8 - K
      IF ( KOP - 1 ) 4205, 4210, 4210
 4205 TM(I-1,J) = TM(I,J) * ( 1.0 - FCC * TPHI(I,J) - WO *
     *    RL(I,J) )
      GO TO 4230
 4210 IF ( KTAP ) 9980, 4215, 4225
 4215 RT(I-1,J) = RT(I,J) * ( 1.0 + FCC * TPHI(I,J) + WO *
     *    RL(I,J) )
      IF ( RT(I-1,J) - TM(I-1,J) ) 4230, 4220, 4220
 4220 KTAP = 1
 4225 RT(I-1,J) = TM(I-1,J)
 4230 CONTINUE
      IF ( KRIP - 1 ) 4250, 4900, 4845
 4250 KOP = 1
      IF ( KTERM ) 9980, 4500, 4540
C
C-----TENDONS IN THIS GROUP ARE STRESSED FROM BOTH ENDS
C
 4295 MO2 = MHO/2 + 3
 4300 DO 4430 J = JB, JE
      DO 4330 I = 4, MO2
      IF ( KOP - 1 ) 4305, 4310, 4310
 4305 TM(I+1,J) = TM(I,J) * ( 1.0 - FCC * TPHI(I+1,J) - WO *
```

```
      *      RL(I+1,J) )
       GO TO 4330
 4310 IF ( KTAP ) 9980, 4315, 4325
 4315 RT(I+1,J) = RT(I,J) * ( 1.0 + FCC * TPHI(I+1,J) + WO *
      *      RL(I+1,J) )
       IF ( RT(I+1,J) - TM(I+1,J) ) 4330, 4320, 4320
 4320 KTAP = 1
 4325 RT(I+1,J) = TM(I+1,J)
 4330 CONTINUE
       KTAP = 0
       DO 4430 K = 4, MO2
       I = MHO + 8 - K
       IF ( KOP - 1 ) 4405, 4410, 4410
 4405 TM(I-1,J) = TM(I,J) * ( 1.0 - FCC * TPHI(I,J) - WO *
      *      RL(I,J) )
       GO TO 4430
 4410 IF ( KTAP ) 9980, 4415, 4425
 4415 RT(I-1,J) = RT(I,J) * ( 1.0 + FCC * TPHI(I,J) + WO *
      *      RL(I,J) )
       IF ( RT(I-1,J) - TM(I-1,J) ) 4430, 4420, 4420
 4420 KTAP = 1
 4425 RT(I-1,J) = TM(I-1,J)
 4430 CONTINUE
       IF ( KRIP - 1 ) 4450, 4900, 4845
 4450 KOP = 1
       IF ( KTERM ) 9980, 4500, 4540
 4500 KTERM = 1
       IF ( KSE(L) - 1 ) 4505, 4510, 4515
 4505 IF ( HIGHLL - SHIMLL ) 9980, 4525, 4100
 4510 IF ( HIGHRL - SHIMRL ) 9980, 4525, 4200
 4515 IF ( HIGHLL - SHIMLL ) 9980, 4520, 4300
 4520 IF ( HIGHRL - SHIMRL ) 9980, 4525, 4300
C
C-----THIS FOLOWING LOOP PUTS ALL TENSION IN TO RT(I,J) TERMS
C
 4525 DO 4535 J = JB, JE
       DO 4535 I = 4, MP4
       RT(I,J) = TM(I,J)
 4535 CONTINUE
C
C-----ELASTIC SHORTENING DUE TO AXIAL FORCE ONLY
C
 4540 DO 4545 J = JB, JE
       EDEF = EDEF + ( RT(4,J) * H / 2.0 ) / ( TAC(4) * EC )
       EDEF = EDEF + ( RT(MP4,J) * H / 2.0 ) / ( TAC(MP4) * EC )
 4545 CONTINUE
       DO 4550 J = JB, JE
       DO 4550 I = 5, MP3
       EDEF = EDEF + ( RT(I,J) * H ) / ( TAC(I) * EC )
```

```
 4550 CONTINUE
C
C-----CALCULATE CHANGE IN TENSION DUE TO STRESSING ANOTHER TENDON
C
      IF ( KSO(L) - 2 ) 4600, 4700, 4800
C
C-----FIRST STRESSING GROUP
C
 4600 KS = JB
      KE = JE
      GO TO 4900
C
C-----SECOND STRESSING GROUP
C
 4700 LS = JB
      LE = JE
      IF ( KSE(L) - 1 ) 4705, 4715, 4705
 4705 DO 4710 K = KS, KE
      DO 4710 J = LS, LE
      DELT(K) = ( SA(K) * ES(1) ) / ( TAC(4) * EC ) *
     *     RT(4,J)
      RT(4,K) = RT(4,K) - DELT(K)
 4710 CONTINUE
      IF ( KSE(L) ) 9980, 4725, 4715
 4715 DO 4720 K = KS, KE
      DO 4720 J = LS, LE
      DELT(K) = ( SA(K) * ES(1) ) / ( TAC(MP4) * EC ) *
     *     RT(MP4,J)
      RT(MP4,K) = RT(MP4,K) - DELT(K)
 4720 CONTINUE
 4725 JB = KS
      JE = KE
      KTAP = 0
      KRIP = 1
      IF ( KSE(L) - 1 ) 4100, 4200, 4300
C
C-----THIRD STRESSING GROUP
C
 4800 IF ( KSE(L) - 1 ) 4805, 4820, 4805
 4805 DO 4810 K = LS, LE
      DO 4810 J = JB, JE
      DELT(K) = ( SA(K) * ES(1) ) / ( TAC(4) * EC ) *
     *     RT(4,J)
      RT(4,K) = RT(4,K) - DELT(K)
 4810 CONTINUE
      DO 4815 K = KS, KE
      DO 4815 J = JB, JE
      DELT(K) = ( SA(K) * ES(1) ) / ( TAC(4) * EC ) *
     *     RT(4,J)
```

```
      RT(4,K) = RT(4,K) - DELT(K)
 4815 CONTINUE
      IF ( KSE(L) ) 9980, 4835, 4820
 4820 DO 4825 K = LS, LE
      DO 4825 J = JB, JE
      DELT(K) = ( SA(K) * ES(1) ) / ( TAC(MP4) * EC ) *
     *     RT(MP4,J)
      RT(MP4,K) = RT(MP4,K) - DELT(K)
 4825 CONTINUE
      DO 4830 K = KS, KE
      DO 4830 J = JB, JE
      DELT(K) = ( SA(K) * ES(1) ) / ( TAC(MP4) * EC ) *
     *     RT(MP4,J)
      RT(MP4,K) = RT(MP4,K) - DELT(K)
 4830 CONTINUE
 4835 KTAP = 0
      KRIP = 2
      JB = KS
      JE = KE
 4840 IF ( KSE(L) - 1 ) 4100, 4200, 4300
 4845 KTAP = 0
      KRIP = 1
      JB = LS
      JE = LE
      GO TO 4840
 4900 CONTINUE
C
C-----A FIRST ESTIMATE TENSION IS NOW KNOWN FOR EACH TENDON AT EACH STA
C
      DO 4905 I = 4, MP4
      Z(I) = 0.0
      DO 4905 J = 1, NUT
      PZ(I,J) = RT(I,J)
      ZT = RT(I,J) * ( YBAR(I) - YR(I,J) )
      Z(I) = Z(I) + ZT
 4905 CONTINUE
 4906 NEWZ = 0
      IF ( NHB ) 9980, 4911, 4907
 4907 DO 4909 I = 4, MP4
      DO 4909 J = 1, NHB
      SFOR(J) = 0.0
      IF ( TIN(J) ) 9980, 4909, 4908
 4908 SFOR(J) = TIN(J) * ES(2) * AREA(J)
      ZT = SFOR(J) * ( YBAR(I) - YSTEEL(J) )
      Z(I) = Z(I) + ZT
      NEWZ = 1
 4909 CONTINUE
 4911 CONTINUE
C
```

```
C-----A FIRST ESTIMATE PRESTRESS MOMENT IS NOW KNOWN AT EACH STA
C
C-----SET HALF VALUE OF STIFFNESS AND PRESTRESS MOMENT AT END STATIONS
C
      F(4) = F(4) / 2.0
      Z(4) = Z(4) / 2.0
      F(MP4) = F(MP4) / 2.0
      Z(MP4) = Z(MP4) / 2.0
C
C-----TEST FOR DATA ERRONEOUSLY STORED BEYOND END STATIONS (F AND Z)
C
      IF ( F(1) + F(2) + F(3) + F(MP5) + F(MP6) + F(MP7) + Z(1) +
     *     Z(2) + Z(3) + Z(MP5) + Z(MP6) + Z(MP7) ) 4910, 4999, 4910
 4910 PRINT 908
      GO TO 9990
 4999 CONTINUE
C
C-----START OF THE BEAM-COLUMN SOLUTION
C
C
C////////////////////////////////////////////////////////////////////////
C
C-----ALGORITHM BETWEEN SLASHED LINES CALCULATES/COMPARES DEFLECTIONS
C
 5000 NS = 1
      ADDLD=0.0
      NW=0
      A(1) = 0.0
      A(2) = 0.0
      B(1) = 0.0
      B(2) = 0.0
      C(1) = 0.0
      C(2) = 0.0
 5002 CONTINUE
      NW=NW+1
      DO 5060 J = 3, MP5
C
C-----TEST TO DETERMINE IF SLAB HAS COMPRESSED SOIL SUFFICIENTLY
C-----TO BE IN CONTACT IN EDGE PENETRATION REGION
C
      IF(NW.LE.1)GO TO 5003
C---------IF SOIL HAS BEEN COMPRESSED SO THAT SLAB IS NOW IN CONTACT,
C---------SOIL SPRING CONSTANT MUST BE GREATER THAN ZERO
      IF(DABS(W(J)).GE.DEF(J))S(J)=STEMP(J)
C---------IF SOIL HAS BEEN COMPRESSED SO THAT SLAB IS NOW IN CONTACT,
C---------COMPENSATE BY ADDING TO LOAD VECTOR
      IF(DABS(W(J)).GE.DEF(J))ADDLD=S(J)*DEF(J)*HEJ
C---------IF SOIL HAS NOT BEEN COMPRESSED SO THAT SLAB IS NOW IN CONTACT
C---------ELIMINATE SOIL SUPPORT
```

```
      IF(DABS(W(J)).LT.DEF(J))S(J)=0.0
      IF(ADDLD.LE.0.0.AND.ITFL.EQ.3)S(J)=0.0
 5003 CONTINUE
C
C-----COMPUTE MATRIX COEFFS AT EACH STA J
C
      AA = F(J-1)  - 0.25  * H * R(J-1)
      BB = - 2.0 * ( F(J-1)  + F(J)  )  - HE2 * F(J)
      CC = F(J-1)  + 4.0 * F(J)  + F(J+1)  + HE3 * S(J)  +
     1     0.25 * H * ( R(J-1)  + F(J+1)  )  + HE2 *  ( P(J)  +
     2     P(J+1)  )
      DD = - 2.0 * ( F(J)  + F(J+1)  )  - HE2 * P(J+1)
      EE = F(J+1)  - 0.25 * H * R(J+1)
      FF = HE3 * Q(J)  - 0.5 * HE2 * ( T(J-1)  - T(J+1)  )  +
     *     HE2 * ( Z(J-1)  - 2.0 * Z(J)  + Z(J+1)  )  - ADDLD
C
C-----COMPUTE RECURSION OR CONTINUITY COEFFS AT EACH STA
C
      E = AA * B(J-2)  + BB
      DENOM = E * B(J-1)  + AA * C(J-2)  + CC
      IF ( DENOM ) 5010, 5005, 5010
C
C-----NOTE IF DENOM IS ZERO, BEAM DCES NOT EXIST, D = 0 SETS DEFL = 0
C
 5005 D = 0.0
      GO TO 5015
 5010 D = - 1.0 / DENOM
 5015 C(J)  = D * EE
      B(J)  = D * ( E * C(J-1)  + DD )
      A(J)  = D * ( E * A(J-1)  + AA * A(J-2)  - FF )
C
C-----CONTROL RESET ROUTINES FCR SPECIFIED CONDITIONS
C
      KEYJ = KEY(J)
      GO TO ( 5060, 5020, 5030, 5020, 5050 ), KEYJ
C
C-----RESET FOR SPECIFIED DEFLECTICN
C
 5020 C(J)  = 0.0
      B(J)  = 0.0
      A(J)  = WS(NS)
      IF ( KEYJ - 3 ) 5055, 5030, 5060
C
C-----RESET FOR SPECIFIED SICFE AT NEXT STA
C
 5030 DTEMP = D
      CTEMP = C(J)
      BTEMP = B(J)
      ATEMP = A(J)
```

```
      C(J)  = 1.0
      B(J)  = 0.0
      A(J)  = - HT2 * DWS(NS)
      GO TO 5060
C
C-----RESET FOR SPECIFIED SLOPE AT PRECEDING STATION
C
 5050 DREV = 1.0 / ( 1.0 - ( BTEMP * B(J-1) + CTEMP - 1.0 ) *
     *     D / DTEMP )
      CREV = DREV * C(J)
      BREV = DREV * ( B(J) + ( BTEMP * C(J-1) ) * D / DTEMP )
      AREV = DREV * ( A(J) + ( HT2 * DWS(NS) + ATEMP + BTEMP
     *     * A(J-1) ) * D / DTEMP )
      C(J)  = CREV
      B(J)  = BREV
      A(J)  = AREV
 5055 NS = NS + 1
 5060 CONTINUE
C
C-----COMPUTE DEFLECTIONS
C
      W(MP7)  = 0.0
      W(MP6)  = 0.0
      DO 5100 L = 3, MP5
      J = MHO + 8 - L
      W(J)  = A(J)  + B(J)  * W(J+1)  + C(J)  * W(J+2)
 5100 CONTINUE
      W(2)  = 2.0 * W(3)  - W(4)
      W(MP6)  = 2.0 * W(MP5)  - W(MP4)
C
C-----COMPUTE SLOPES AND CURVATURES
C
      DO 5150 J = 3, MP5
      DW(J)  = ( - W(J-1)  + W(J)  ) / H
      PHI(J)  = ( W(J-1)  - 2.0 * W(J)  + W(J+1)  ) / HE2
      BM(J)  = F(J)  * PHI(J)  - Z(J)
 5150 CONTINUE
      IF(NW.LE.5)GO TO 5195
C
C-----TEST PREVIOUS DEFLECTIONS AGAINST CURRENT DEFLECTIONS
C
      KOUNT = 0
      DO 5180 J = 4, MP4
      DELW = W(J)  - WTEMP(J)
      IF (DABS  ( DELW )  - WTOL ) 5170, 5170, 5160
 5160 KOUNT = 1
 5170 WTEMP(J)  = W(J)
 5180 CONTINUE
      JCYC = JCYC + 1
```

```
      IF ( JCYC - 99 ) 5190, 5500, 9980
 5190 IF ( KOUNT ) 9980, 5500, 5200
 5195 IF(NW.LE.5)GO TO 5002
 5200 IF(NUI)9980,6215,5205
 5205 DO 5300 J = 1, NUI
      DO 5210 I = 4, MP5
      YTEMP(I) = YR(I,J) - W(I)
 5210 CONTINUE
      DO 5250 I = 5, MP4
      TPHI(I,J) =DABS ( ( - YTEMP(I-1) + 2.0 * YTEMP(I)
     *     - YTEMP(I+1) ) / HE2 )
      IF ( TPHI(I,J) - 1.0E-07 ) 5220, 5220, 5230
 5220 TRAD(I,J) = 1.0E+07
      GO TO 5250
 5230 TRAD(I,J) = 1.0 / TPHI(I,J)
 5250 CONTINUE
C
C-----FOLLOWING STATEMENT INSERTED TO COMPENSATE FOR PIERCE'S CDC PROGRA
C-----TO BE RUN WITH IBM COMPILER
      TRAD(4,J)=TRAD(5,J)
C
 5300 CONTINUE
      GO TO 6000
C
C///////////////////////////////////////////////////////////////////////
C
C-----COMPUTE AND PRINT RESULTS
C
 5500 PRINT 106, AAAA,BBBB,CCCC,DDDD,EEEE,FFFF,GGGG,EXPO
      IF ( KOUNT ) 9980, 5510, 5505
 5505 PRINT 550
C
C-----PRINT TABLE 13
C
 5510 PRINT 551, JCYC
      BM(2) = 0.0
      BM(MP6) = 0.0
C
C-----COMPUTE THE DERIVATIVE OF EM(J) AND THE REACTIONS
C
      DO 5540 J = 3, MP5
      DBM(J) = ( - BM(J-1) + EM(J) ) / H
     *     - P(J) * ( - W(J-1) + W(J) ) / H
      KEYJ = KEY(J)
      GO TO ( 5530, 5520, 5530, 5520, 5530 ), KEYJ
 5520 REACT(J) = ( BM(J-1) - 2.0 * EM(J) + BM(J+1) ) / H
     1     - Q(J) + ( T(J-1) - T(J+1) ) / HT2
     2     - ( R(J-1) * W(J-2) - R(J-1) * W(J) - R(J+1)
     3     * W(J) + R(J+1) * W(J+2)) / ( 4.0 * HE2 )
```

```
     4      - ( P(J)  * W(J-1)  - E(J)  * W(J)  - P(J+1)
     5        * W(J)  + P(J+1)  * W(J+1)  ) / H  - S(J)  * DEF(J)
      GO TO 5540
 5530 REACT(J) = - S(J) *(W(J) + DEF(J) )
 5540 CONTINUE
      ISTA = -1
      Z(3)=ISTA
      X=Z(3)*H
      PRINT 552,ISTA,X,W(3),BM(3),REACT(3)
      DO 5550  J = 4, MP5
      ISTA = J - 4
      ZI(J) = ISTA
      X = ZI(J) * H
      PRINT 553, DW(J), DBM(J)
      PRINT 552, ISTA, X, W(J), BM(J), REACT(J)
 5550 CONTINUE
      PRINT 106, AAAA,BBBB,CCCC,DDDD,EEEE,FFFF,GGGG,EXPO
C
C-----PRINT TABLE 14
C
      PRINT 560
      K = 1
      IF ( NUT ) 9980, 5580, 5552
 5552 DO 5575 J = 1, NUT
      DO 5570 I = 4, MP4
      IM4 = I - 4
 5555 IF ( IM4 - ILAST(K) ) 5565, 5565, 5560
 5560 K = K+ 1
      IF ( NSEC - K ) 9980, 5555, 5555
 5565 TTI = TM(I,J) / SA(J)
     0
      PRINT 561, J, ISTA, TTI, TTF, YR(I,J), Z(I), F(1)
 5570 CONTINUE
      PRINT 562
 5575 CONTINUE
      GO TO 5700
 5580 PRINT 564
      DO 5600 I = 4, MP4
      IM4 = I - 4
 5585 IF ( IM4 - ILAST(K) ) 5595, 5595, 5590
 5590 K = K + 1
      IF ( NSEC - K ) 9980, 5585, 5585
 5595 PRINT 565, IM4, Z(I), F(1)
 5600 CONTINUE
 5700 PRINT 106, AAAA,BBBB,CCCC,DDDD,EEEE,FFFF,GGGG,EXPO
C
C-----PRINT TABLE 15
C
      PRINT 850
```

```
      DO 5710 K = 1, NSEC
      PRINT 855, IFIRST(K), ILAST(K), TAC(K), XXI(K)
 5710 CONTINUE
      PRINT 562
C
C-----PRINT TOTAL ELASTIC SHORTENING
C
      PRINT 563, EDEF
      PRINT 860
      KPOP = 0
      DO 5800 IPOP = 1, 2
C
C-----FIRST PASS TENSION CHECK -- SECOND PASS COMPRESSION CHECK
C
      IF ( IPOP - 1 ) 9980, 5720, 5715
 5715 PRINT 865
 5720 DO 5790 I = 4, MP4
      IM4 = I - 4
      IF ( PHI(I) ) 5725, 5755, 5755
C
C-----CONSIDERATIONS FOR NEGATIVE CURVATURE
C
 5725 IF ( FIBB(I) - EPULT ) 5730, 5740, 5740
 5730 IF ( IPOP - 1 ) 9980, 5740, 5735
 5735 PRINT 861, IM4, FIBB(I)
      KPOP = 1
      GO TO 5790
 5740 IF ( FIBT(I) - EMAXT ) 5790, 5790, 5745
 5745 IF ( IPOP - 1 ) 9980, 5750, 5790
 5750 PRINT 861, IM4, FIBT(I)
      KPOP = 1
      GO TO 5790
C
C-----CONSIDERATIONS FOR POSITIVE CURVATURE
C
 5755 IF ( FIBT(I) - EPULT ) 5760, 5770, 5770
 5760 IF ( IPOP - 1 ) 9980, 5770, 5765
 5765 PRINT 861, IM4, FIBT(I)
      KPOP = 1
      GO TO 5790
 5770 IF ( FIBB(I) - EMAXT ) 5790, 5790, 5775
 5775 IF ( IPOP - 1 ) 9980, 5780, 5790
 5780 PRINT 861, IM4, FIBB(I)
      KPOP = 1
 5790 CONTINUE
      IF ( KPOP ) 9980, 5795, 5799
 5795 PRINT 866
 5799 KPOP = 0
 5800 CONTINUE
```

```
C
C-----RETURN TO READ NEXT PROBLEM
C
      KALL=-1
      ICYC = 1
      JCYC = 0
      KEY3 = 0
      KEY7 = 0
      KALL=-1
      GO TO 1010
C
C-----BEGIN THE ITERATIVE SOLUTION FOR A NEW TENDON TENSION AND LENGTH
C
 6000 DO 6200 J = 1, NUT
C
C-----COMPUTE CHANGE IN CONCRETE LENGTH
C
      DO 6005 I = 4, MP4
      HLCOR(I) = ( YBAR(I) - YR(I,J) ) * DW(I)
      VLCOR(I) = ( YP(I,J) - W(I) )
 6005 CONTINUE
      RCOL = 0.0
      DO 6010 I = 5, MP4
      HCREV = H + HLCOR(I-1) - HLCCR(I)
      VCREV = VLCOR(I-1) - VLCCR(I)
      TREV =DSQRT  ( HCREV ** 2 + VCREV ** 2 )
      RCOL = RCOL + TREV
 6010 CONTINUE
      TCCL = RCOL - CLT(J)
      GDELT = ( TCCL * SA(J) * ES(1) ) / RCOL
C
C-----COMPUTE CHANGE IN TENDON LENGTH
C
 6015 TCSL = 0.0
      DO 6030 I = 5, MP4
 6020 DELF(I) = GDELT
 6025 DELS(I)=(2.0-WO*RL(I,J)-FCC*H*TPHI(I,J)) / (2.*SA(J)*ES(1)/
     *RL(I,J)+RT(I,J)*WO+FCC*RT(I,J)/TRAD(I,J))*DELF(I)-(FCC*H*RT(I,J)*
     *TPHI(I,J))/(2.*SA(J)*ES(1)/RL(I,J)+RT(I,J)*WO+FCC*RT(I,J)/TRAD(I,J
     *))*((RBRC(I,J)-TRAD(I,J))/TRAD(I,J))*PHIM(I)
      TCSL = TCSL + DELS(I)
      RL(I,J) = RL(I,J) + DELS(I)
 6030 CONTINUE
      ICYC = 1
 6035 IF ( ICYC - 99 ) 6045, 6045, 6040
 6040 PRINT 909
C
C-----RESULTS ARE PRINTED EVEN THOUGH THE SOLUTION IS NOT CLOSED
C
```

```
      GO TO 5500
 6045 IF ( TCSL ) 6046, 6060, 6046
 6046 SLT(J) = SLT(J) + TCSL
      ERRL = RCOL - SLT(J)
C
C-----TEST FOR TOTAL LENGTH COMPATIBILITY
C
      IF (DABS  ( ERRL ) - TCLL ) 6060, 6060, 6050
C
C-----LINEARLY ADJUST STEEL LENGTHS TO ACHIEVE OVERALL COMPATIBILITY
C
 6050 DO 6055 I = 5, MP4
      DELS(I) = DELS(I) * ERRL / TCSL
      RL(I,J) = RL(I,J) + DELS(I)
 6055 CONTINUE
      TCSL = 0.0
      DO 6058 I = 5, MP4
      TCSL = TCSL + DELS(I)
 6058 CONTINUE
      ICYC = ICYC + 1
      GO TO 6035
C
C-----ADJUST TENSION KNOWING OVERALL LENGTH COMPATIBILITY IS SATISFIED
C
 6060 DO 6070 I = 5, MP4
      DELF(I) = DELS(I) / ( 2.0 - WC * RL(I,J) - FCC * H *
     1    TPHI(I,J) ) * ( 2.0 * SA(J) * ES(1) / RL(I,J)
     2    + RT(I,J) * WO + FCC * RT(I,J) / TRAD(I,J) )
     3    + ( FCC * H * TPHI(I,J) * RT(I,J) ) / ( 2.0
     4    - WO * RL(I,J) - FCC * H * TPHI(I,J) ) *
     5    ( ( RBRC(I,J) - TRAD(I,J) ) / TRAD(I,J) )*PHIM(I)
      RT(I,J) = RT(I,J) + DELF(I)
      PHIM(I) = 1.0
 6070 CONTINUE
 6075 RT(4,J) = 2.0 * RT(5,J) - RT(6,J)
C
C-----TEST THE FORCE JUST COMPUTED FOR POSSIBLE TENDON FAILURE

      PRESS = RT(I,J) / SA(J)
      N = NC11
      NUMPN = NUMP1
      IF ( PRESS - STRESS(NUMPN,N) ) 6120, 6120, 6080
 6080 PRINT 803, J, I
C
C-----SET TENSION IN FAILED TENDON EQUAL TO ZERO
C
      DO 6085 K = 4, MP4
      RT(K,J) = 0.0
 6085 CONTINUE
```

```
 6120 RBRC(I,J) = TRAD(I,J)
      IF ( RBRC(I,J) - 1.0E+07 ) 6125, 6122, 6122
 6122 PHIM(I) = 0.0
 6125 CONTINUE
      CLT(J) = RCOL
 6200 CONTINUE
      IF ( NEWZ ) 9980, 6205, 6215
C
C-----FINAL ESTIMATE FOR THE PRIMARY PRESTRESS MOMENT
C
 6205 DO 6210 I = 4, MP4
      Z(I) = 0.0
      DO 6210 J = 1, NUT
      PZ(I,J) = RT(I,J)
      ZT = RT(I,J) * ( YBAR(I) - YB(I,J) )
      Z(I) = Z(I) + ZT
 6210 CONTINUE
C
C-----SET HALF VALUES OF PRESTRESSING MOMENT Z( ) AT END STATIONS
C
      Z(4) = Z(4) / 2.0
      Z(MP4) = Z(MP4) / 2.0
 6215 NEWZ = 1
C
C-----NOW HAVING LOADS DETERMINE THE NEW STIFFNESS VALUES    ( SLIDE )
C
      K = 1
 7000 DO 7800 I = 4, MP4
C
C-----TEST FOR EXTREMELY SMALL CURVATURES ** SMALL PHI ** NEW F = OLD F
C
      IF (DABS  ( PHI(I) ) - 1.0D-07 ) 7800, 7800, 7003
C
C-----SWITCH TO SELECT THE PROPER CROSS-SECTION
C
 7003 IM4 = I - 4
 7005 IF ( IM4 - ILAST(K) ) 7015, 7015, 7010
 7010 K = K+ 1
      IF ( NSEC - K ) 9980, 7005, 7005
 7015 JEND = JSTOP(K)
      IF ( PHI(I) ) 7020, 7800, 7025
 7020 IF ( LIMIT(I) ) 9980, 7021, 7022
C
C-----TEST FOR POSSIBLE ELASTIC STIFFNESS -- NEGATIVE CURVATURE
C
 7021 SB = STAR
      GO TO 7023
C
C-----USE PREVIOUS BOTTOM FIBER STRAIN AS STARTING POINT FOR THIS CYCLE
```

```
C
 7022 SB = FIBB(I)
 7023 ST = SB - ( PHI(I) * DEPTH(K) )
      KTYPE = 0
      GO TO 7030
 7025 IF ( LIMIT(I) ) 9980, 7026, 7027
C
C-----TEST FOR POSSIBLE ELASTIC STIFFNESS -- POSITIVE CURVATURE
C
 7026 ST = STAR
      GO TO 7028
C
C-----USE PREVIOUS TOP FIBER STRAIN AS STARTING POINT FOR THIS CYCLE
C
 7027 ST = FIBT(I)
 7028 SB = ST + ( PHI(I) * DEPTH(K) )
      KTYPE = 1
 7030 KFLAG = 0
      ITER = 1
      ITMAX = 0
C
C-----START OF CALCULATIONS FOR TENSION AND COMPRESSION
C
 7035 COMP = 0.0
      TENS = 0.0
      ITMAX = ITMAX + 1
      IF ( ITMAX - 300 ) 7038, 7036, 9980
 7036 PRINT 770, IM4
      GO TO 7800
C
C-----CONSIDER ANY BONDED REINFORCEMENT
C
 7038 IF ( NHB ) 9980, 7160, 7040
 7040 DO 7150 J = 1, NHB
      M = 0
      IF ( IM4 - IB1(J) ) 7150, 7045, 7045
 7045 IF ( IM4 - IB2(J) ) 7050, 7050, 7150
 7050 IF ( KTYPE ) 9980, 7055, 7060
 7055 BSTN = SB - ( PHI(I) * ( DEPTH(K) - YSTEEL(J) ) )
      GO TO 7065
 7060 BSTN = ST + (PHI(I) * YSTEEL(J))
 7065 BSTN = BSTN + FIN(J)
      IF ( NUBC(J) - 2 ) 9980, 7066, 7067
 7066 NUMPN = NUMP2
      N = NC12
      GO TO 7068
 7067 NUMPN = NUMP3
      N = NC13
 7068 IF ( BSTN ) 7070, 7110, 7075
```

```
 7070 SMUL = - 1.0
      GO TO 7080
 7075 SMUL = + 1.0
 7080 BSTN = BSTN * SMUL
C
C-----CONVERT BAR STRAIN TO FORCE IN THE BAR USING STRESS-STRAIN DATA
C
      IF ( BSTN - STRAIN(NUMPN,N) ) 7085, 7085, 7095
 7085 IF ( BSTN - STRAIN(M+1,N) ) 7105, 7100, 7090
 7090 M = M + 1
      GO TO 7085
C
C-----CALCULATED BAR STRAIN EXCEEDS MAXIMUM ALLOWED
C
 7095 CONTINUE
      GO TO 7110
 7100 BFOR(J) = STRESS(M+1,N) * AREA(J) * SMUL
      GO TO 7115
 7105 BFOR(J) = ( STRESS(M,N) + ( STRESS(M+1,N) - STRESS(M,N) )
     1     * ( BSTN - STRAIN(M,N) ) / ( STRAIN(M+1,N)
     2     - STRAIN(M,N) ) ) * AREA(J) * SMUL
      GO TO 7115
 7110 BFOR(J) = 0.0
 7115 IF ( BFOR(J) ) 7120, 7150, 7130
 7120 COMP = COMP + BFOR(J)
      GO TO 7150
 7130 TENS = TENS + BFOR(J)
 7150 CONTINUE
 7160 CONTINUE
C
C-----CONSIDER FORCES DEVELOPED IN THE CONCRETE
C
 7200 DO 7300 J = 1, JEND
 7210 CSTN = ST + ( PHI(I) * CEN(K,J) )
 7215 IF ( CSTN ) 7240, 7220, 7225
C
C-----CONCRETE HAS CRACKED OR CRUSHED
C
 7220 CSSS = 0.0
      GO TO 7300
 7225 IF ( CSTN - EMAXT ) 7230, 7230, 7220
 7230 CSSS = CSTN * EC
      GO TO 7270
 7240 IF ( CSTN - EPULT ) 7220, 7220, 7250
 7250 IF ( CSTN - EPO ) 7255, 7255, 7260
 7255 CSSS = FPPC * ( 1.0 - FFCS * ( CSTN - EPO ) / ( EPULT
     *     - EPO ) )
      GO TO 7270
 7260 CSSS = FPPC * ( 2.0 * ( CSTN / EPO ) - ( CSTN / EPO )
```

```
     *        ** 2 )
 7270 CFOR(J) = CSSS * AC(K,J)
      IF ( CFOR(J) ) 7280, 73CC, 7290
 7280 COMP = COMP + CFOR(J)
      GO TO 7300
 7290 TENS = TENS + CFOR(J)
 7300 CONTINUE
C
C-----FINALLY CONSIDER THE TENSICN IN THE UNBONDED TENDONS
C
      IF ( NUT ) 9980, 7316, 7311
 7311 DO 7315 J = 1, NUT
      TENS = TENS + RT(I,J)
 7315 CONTINUE
 7316 CONTINUE
C
C-----END OF TENSION AND COMPRESSICN CALCULATIONS
C
      IF ( ITER - 1 ) 7600, 732C, 7500
 7320 ER = TENS + COMP + P(I)
      CTRY = COMP
      SINC = PSINC
C
C-----TEST FOR CLOSURE OF HCRIZCNTAL FORCES
C
      IF (DABS  ( ER ) - AXTCI ) 7700, 7700, 7330
C
C-----LOCATE THE SIGNS OF CURVATURE AND ERROR
C
 7330 IF ( KFLAG ) 9980, 7332, 7380
 7332 IF ( LIMIT(I) ) 9980, 7335, 7400
 7335 IF ( KTYPE ) 9980, 734C, 7345
 7340 IF ( ST ) 7350, 7350, 74CC
 7345 IF ( SB ) 7350, 7350, 74CC
 7350 IF ( ER ) 7355, 7355, 7415
 7355 IF ( KTYPE ) 9980, 736C, 7370
C
C-----STATEMENTS 7360 TO 7380 USED CNLY IF FIRST ELASTIC TEST IS PASSED
C
 7360 ST = 0.0
      SB = PHI(I) * DEPTH(K)
 7365 KFLAG = 1
      GO TO 7035
 7370 SB = 0.0
      ST = - PHI(I) * DEPTH(K)
      GO TO 7365
 7380 IF ( ER ) 7405, 7385, 7385
C
C-----SECTION IS STILL ELASTIC AT THIS STA AND F(I) = OLD F(I) = EC*XXI
```

```
C
 7385 GO TO 7800
C
C-----BEGIN ADJUSTMENTS TO DETERMINE A NEW FLEXURAL STIFFNESS
C
 7400 IF ( ER ) 7405, 7700, 7415
 7405 KER = 0
 7410 ST = ST + SINC
      SB = SB + SINC
      GO TO 7425
 7415 KER = 1
 7420 ST = ST - SINC
      SB = SB - SINC
 7425 ITER = ITER + 1
      GO TO 7035
 7500 BER = TENS + COMP + E(I)
      IF (DABS  ( BER ) - AXICL ) 7700, 7700, 7505
 7505 IF ( KER - 1 ) 7510, 7520, 9980
 7510 IF ( BER ) 7515, 7700, 7550
 7515 ER = BER
      GO TO 7410
 7520 IF ( BER ) 7550, 7700, 7525
 7525 ER = BER
C
C-----ADDITIONAL CONSIDERATIONS WHEN TWO CONSECUTIVE CYCLES SHOW T GT C
C
      IF ( COMP - CTRY ) 7530, 7530, 7535
 7530 CTRY = COMP
      GO TO 7420
C
C-----COMPRESSION FORCE HAS DECREASED DUE TO OVERCORRECTION
C
 7535 SINC = SINC / 2.0
      CTRY = COMP
      GO TO 7410
C
C-----TO REACH THE FOLLOWING STATEMENT MEANS THE SIGN OF ER HAS CHANGED
C
 7550 SLIDE = SINC * ( BER / ( FER - ER ) )
      IF ( KER - 1 ) 7555, 7560, 9980
C
C-----ESTABLISH MAXIMUM AND MINIMUM BOUNDS FOR ITERATIVE STRAINS
C
 7555 STMAX = ST
      SBMAX = SB
      STMIN = STMAX - SINC
      SBMIN = SBMAX - SINC
      ST = ST - SLIDE
      SB = SB - SLIDE
```

```
      GO TO 7565
 7560 STMIN = ST
      SBMIN = SB
      STMAX = STMIN + SINC
      SBMAX = SBMIN + SINC
      ST = ST + SLIDE
      SB = SB + SLIDE
 7565 ITER = 0
      GO TO 7035
C
C-----REFINE THE NEUTRAL SURFACE LOCATION
C
 7600 SER = TENS + COMP + E(I)
      IF (DABS  ( SER ) - AXICL ) 7700, 7700, 7605
 7605 IF ( SER ) 7610, 7700, 7630
C
C-----CORRECTION WHEN COMPRESSION IS GREATER THAN TENSION
C
 7610 IF ( BER ) 7625, 7700, 7615
 7615 SLIDE = SLIDE / 5.0
 7625 ST = ST + SLIDE
      SB = SB + SLIDE
      IF ( ST - STMAX ) 7650, 7650, 7626
 7626 ST = STMAX
      SB = SBMAX
      GO TO 7650
C
C-----CORRECTION WHEN TENSION IS GREATER THAN COMPRESSION
C
 7630 IF ( BER ) 7635, 7700, 7645
 7635 SLIDE = SLIDE / 5.0
 7645 ST = ST - SLIDE
      SB = SB - SLIDE
      IF ( ST - STMIN ) 7646, 7650, 7650
 7646 ST = STMIN
      SB = SBMIN
 7650 BER = SER
      GO TO 7035
C
C-----AT THIS STATEMENT SUFFICIENT CLOSURE OF AXIAL FORCES IS PRESENT
C
 7700 FIBT(I) = ST
      FIBB(I) = SB
      BMOM = 0.0
C
C-----COMPUTE BONDED BARS CONTRIBUTION TO THE TOTAL MOMENT
C
      IF ( NHB ) 9980, 7725, 7705
 7705 DO 7720 J = 1, NHB
```

```
      BMB = ( BFOR(J) - SFOR(J) ) * ( YSTEEL(J) - YBAX(K) )
 7715 BMOM = BMOM + BMB
 7720 CONTINUE
C
C-----COMPUTE CONCRETE CONTFIBUTICN TO THE TOTAL MOMENT
C
 7725 CMOM = 0.0
      DO 7730 J = 1, JEND
      BMC = CFCR(J) * ( CEN(K,J) - YBAX(K) )
      CMOM = CMOM + BMC
 7730 CONTINUE
C
C-----COMPUTE UNBONDED TENDCNS CCNTRIBUTION TO THE TOTAL MOMENT
C
      TMOM = 0.0
      IF ( NUT ) 9980, 7734, 7731
 7731 DO 7735 J = 1, NUT
      PDEL = RT(I,J) - PZ(I,J)
      BMT = PDEL * ( YR(I,J) - YBAX(K) )
      TMOM = TMOM + BMT
 7735 CONTINUE
 7734 CONTINUE
C
C-----SUM THREE CONTRIBUTICNS TC OBTAIN TOTAL MOMENT
C
      TTMOM = BMOM + CMOM + TMCM
C
C-----COMPUTE A NEW STIFFNESS
C
 7736 IF ( PHI(I) ) 7738, 7800, 7738
 7738 F(I) = TTMOM / PHI(I)
      LIMIT(I) = 1
C
C-----SET HALF VALUES OF STIFFNESS F( ) AT THE END STATIONS
C
 7739 IF ( I - 4 ) 9980, 7740, 7745
 7740 F(I) = F(I) / 2.0
      GO TO 7750
 7745 IF ( I - MP4 ) 7750, 7740, 9980
C
C-----CALCULATE LOCATION OF NEW NEUTRAL SURFACE
C
 7750 IF ( PHI(I) ) 7755, 7800, 7765
 7755 IF ( ST - EMAXT ) 7800, 7800, 7760
 7760 YBAR(I) = - ST / PHI(I)
      GO TO 7800
 7765 IF ( SB - EMAXT ) 7800, 7800, 7760
 7800 CONTINUE
C
```

```
C-----RETURN TO BMCOL WITH REVISED VALUES OF FLEXURAL SIFFNESS          00191200
C                                                                       00191300
      GO TO 5000                                                        00191400
C-----UNDESIGNATED ERROR STCF                                           00191500
C                                                                       00191600
 9980 PRINT 980                                                         00191700
C                                                                       00191800
C-----COMPLETION OF RUN                                                 00191900
C                                                                       00192000
 9990 CONTINUE                                                          00192100
 9999 CONTINUE                                                          00192200
      STOP                                                              00192300
      END                                                               00192400
      SUBROUTINE SOILSW (EXEO,LIFT,MP1,MP4,MP7,DDDD,EEEE,H,DEF )        00192500
C                                                                       00192600
C-----SUBROUTINE CALCULATES SOIL PROFILE OF SWELLING SOIL "MOUND"       00192700
C-----FOR EITHER CENTER LIFT OR EDGE LIFT SWELLING CONDITIONS AND THEN  00192800
C-----CALCULATES "DEFLECTIONS" FROM INITIAL HORIZONTAL POSITION TO      00192900
C-----SWELLING SOIL PROFILE, DESCRIBED BY AN EXPONENTIAL EQUATION OF    00193000
C-----FORM:  Y=C*X**M, AT EACH STATION                                  00193100
C                                                                       00193200
      IMPLICIT REAL*8(A-H,O-Z)                                          00193300
      DIMENSION DEF(500), DEFF(500), IS(500)                            00193400
  102 FORMAT(35X,'----------  NC SWELL  ----------')                    00193500
  103 FORMAT(35X,'----------  CENTER LIFT  ----------')                 00193600
  104 FORMAT(35X,'----------  EDGE LIFT  ----------')                   00193700
  107 FORMAT(///15X,'INITIAL DIFFERENTIAL HEAVE AT EACH STATICN',//3X,6(00193800
     17X,'STA     DEF(I)'),/)                                           00193900
  109 FORMAT(10X,I3,3X,F8.2,6X,I3,3X,F8.2,6X,I3,3X,F8.2,6X,I3,3X,F8.2,6X00194000
     1,I3,3X,F8.2,6X,I3,3X,F8.2)                                        00194100
  211 FORMAT(14I5)                                                      00194200
  212 FORMAT(5(I5,F10.6))                                               00194300
      IK=-1                                                             00194400
      GO TO (8000,8005,8005),LIFT                                       00194500
C                                                                       00194600
C-----NO SWELL SITUATION                                                00194700
C                                                                       00194800
 8000 DO 8001 I=1,MP7                                                   00194900
      DEF(I)=0.0                                                        00195000
 8001 CONTINUE                                                          00195100
      GO TO 8300                                                        00195200
C                                                                       00195300
C-----DETERMINE EXPONENTIAL SWELL EQUATION                              00195400
C                                                                       00195500
 8005 CONST=DDDD/((12.*EEEE)**EXEO)                                     00195600
C                                                                       00195700
C-----DETERMINE THE NUMBER OF STATIONS OVER WHICH EDGE PENETRATION ACTS 00195800
C                                                                       00195900
      NNZZ=(12.*EEEE/H)+4                                               00196000
```

```
      MMZZ=MP4-NNZZ+3
      XXAA=0
      IF(LIFT.EQ.3)GO TO 8100
C
C-----CENTER LIFT SITUATION
C
C---------DETERMINE PARABOLIC DEFLECTION AT EACH STATION
C--------------(RIGHT SIDE FIRST)
C
      DO 8010 I=MMZZ,MP4
      DEF(I)=CONST*XXAA**EXPO
      XXAA=XXAA+H
 8010 CONTINUE
C
C----------MAKE LEFT SIDE SYMMETRICAL TO RIGHT SIDE
C
      MPPP=MP4
      DO 8020 I=4,NNZZ
      DEF(I)=DEF(MPPP)
      MPPP=MPPP-1
 8020 CONTINUE
      GO TO 8300
C
C-----EDGE LIFT SITUATION
C---------DETERMINE PARABOLIC DEFLECTION AT EACH STATION
C--------------(LEFT SIDE FIRST)
C
 8100 MMZZ=MMZZ+1
      DO 8105 I=4,NNZZ
      DEF(I)=CONST*XXAA**EXPO
      XXAA=XXAA+H
 8105 CONTINUE
C
C--------------(MAKE RIGHT SIDE SYMMETRICAL TO LEFT SIDE)
C
      MPPP=NNZZ
      DO 8110 I=MMZZ,MP4
      DEF(I)=DEF(MPPP)
      MPPP=MPPP-1
 8110 CONTINUE
C
C---------ASSIGN "DEFLECTION" TO INTERIOR INCREMENTAL ELEMENTS
C
      DO 8200 I=NNZZ, MMZZ
 8200 DEF(I)=DDDD
C
C-----CHECK TO SEE IF ANY SPECIFIED SHRINK-SWELL DEFLECTIONS ARE TO BE
C-----ASSIGNED (JDEF = 0 ---> "NC")
C
```

```
 8300 READ 211,JDEF
      IF(JDEF.EQ.0)GO TO 8500
      DO 8350 I=1,JDEF
      READ 212,J,DEF(J+4)
 8350 CONTINUE
 8500 CONTINUE
      PRINT 107
      IF(LIFT.EQ.1)PRINT 102
      IF(LIFT.EQ.2)PRINT 103
      IF(LIFT.EQ.3)PRINT 104
      DO 8550 I=1,MP7
 8550 IS(I)=IK+I
      WRITE(6,109)(IS(I),DEF(I+3),I=1,MP1)
      RETURN
      END
      SUBROUTINE INTERP  ( MP7, NCT, JN1, JN2, KR2, UN, U, LSM )
C
C-----SUBROUTINE "INTERPERATES" THE FORCE, SPRING, ROTATION, ETC., DATA
C-----AND DISTRIBUTES IT TO THE VARIOUS STATIONS AS SPECIFIED IN THE
C-----INPUT DATA "INSTRUCTIONS"
C
      IMPLICIT REAL*8(A-H,O-Z)
      DIMENSION JN1(100), JN2(100), KR2(100), UN(100), U(207)
  255 FORMAT (// 46H          ERROR STOP -- STATIONS NOT IN ORDER )
  258 FORMAT (// 48H          UNDESIGNATED ERROR STOP IN SUBROUTINE )
      DO 2200 J = 1, MP7
      U(J) = 0.0
 2200 CONTINUE
      M = MP7 - 7
      KR1 = 0
      IF ( NCT - 1 ) 2300, 2210, 2210
 2210 DO 2299 NC = 1, NCT
      IF ( KR1 ) 2310, 2220, 2230
 2220 NC1 = NC
      JV = JN1(NC1)
      KSM = 0
      IF ( KR2(NC) ) 2310, 2230, 2295
 2230 J1 = JV + 4
      J2 = JN2(NC) + 4
      JS = J1 + KSM
      DENOM = J2 - J1
      JINCR = 1
      ESM = 1.0
      ISW = 1 - LSM
      IF ( DENOM ) 2305, 2240, 2250
 2240 DENOM = 1.0
      ISW = 0
 2250 DO 2260 J = JS, J2, JINCR
      DIFF = J - J1
```

```
      PART = DIFF / DENOM
      U(J) = U(J) + ( UN(NC1) + EART * ( UN(NC) - UN(NC1) ) )
     *      * ESM
 2260 CONTINUE
      KSM = LSM
      IF ( ISW ) 2310, 2280, 2270
 2270 JINCR = J2 - J1
      ESM = - 0.5
      ISW = 0
      GO TO 2250
 2280 IF ( KR2(NC) ) 2310, 2295, 2290
 2290 JV = JN2(NC)
 2295 KR1 = KR2(NC)
      NC1 = NC
 2299 CONTINUE
 2300 RETURN
 2305 PRINT 255
      GO TO 2330
 2310 PRINT 258
 2330 CONTINUE
      RETURN
      END
```

APPENDIX J

USER'S GUIDE FOR COMPUTER PROGRAM *PRESS2*

Comments On The Use Of The Guide For Data Input For Program PRESS2

General Program Notes

1. The data cards must be stacked in the proper order for the program to run.
2. A consistent set of units must be used for all input data, for example: pounds and inches. (The unit weight of concrete in Table 6, however, should always be input as pounds per cubic foot.)
3. All 5-column fields are understood to be right-justified integers or whole decimal numbers (I5), e.g., "bbbb5".
4. All 10-column fields are floating-point decimal numbers input in exponential format (E10.3), e.g., "-4.321E+03" except where specified otherwise.

Identification of Problem

1. The nine variables defined in the first two input cards describe the stiffened slab-on-ground and the soil conditions.
2. Input format is F10.4 for the first card and I5 for the second card.
3. These two cards must be repeated for each continuation problem.

Table 1. Program Control Data

1. If it is desired to keep the stiffness from the previous problem, KEEPF should be specified as 1; otherwise, it should be zero.
2. If KEEPF is set equal to one, this forces all Tables 2 through 11 to be held also, and only Table 4 can receive additional input.
3. When KEEPF is 1, the number of cards added to Tables 2 and 3 must be zero.
4. Card counts should be rechecked carefully after the coding of each problem is complete.

Table 2. Constants and Closure Tolerances

1. The maximum number of increments into which the beam-column may be divided is 300 unless program dimensioning is modified.
2. The increment length is usually specified in inches.
3. The deflection closure tolerance is normally specified in inches and unreasonably small values should be avoided. A representative value for the deflection closure tolerance in 0.001 inch.
4. The force closure tolerance is usually specified in pounds and should be approximately 1 percent of the initial prestressing force or smaller.
5. The length closure tolerance is usually expressed in inches. The program internally eliminates the need for

this particular tolerance; however, it is included to provide a check on the length compatibility computations.

Table 3. Specified Deflections and Slopes

1. The maximum number of stations at which deflections and slopes may be specified is 20.
2. Cards must be arranged in order of station numbers.
3. Slopes must be specified in radians, and deflections normally in inches.
4. A slope may not be specified closer than 3 increments from another specified slope.
5. A deflection may not be specified closer than 2 increments from a specified slope, except that both a deflection and a slope may be specified at the same station.

Table 4. Loads and Restraints

Variables	Values per station
Q	lb
S	lb/in
T	in.-lb
R	in.-lb/radian
P	lb

1. Data in this table should not be entered (nor held from the preceding problem) which would express effects at fictitious stations beyond the ends of the real beam-column.

2. For the interpolation and distribution process, there are four variations in the station numbering and in referencing for continuation to succeeding cards. A detailed discussion of this topic is presented by Matlock and Haliburton (Pierce (68)).
3. There are no restrictions on the order of cards in Table 4, except that within a distribution sequence the stations must be in regular order.

Table 5. Problem Control and Friction Data

1. NSEC is the total number of different cross sections along the length of the beam-column and may reach a maximum of 20 without modifying the dimensioning.
2. NSSC represents the total number of different steel stress-strain curves and may vary from 1 to 3.
3. NUT is the number of unbonded tendons and may range between 0 and 12.
4. NG may be 1, 2, or 3, and signifies the number of separate prestressing operations.
5. NHB may assume any value between 0 and 20 and represents the number of individual bonded pieces of supplementary reinforcement.
6. FCC (μ) is the estimated constant coefficient of friction between the unbonded tendon and the surrounding duct materials.
7. WOB (κ) represents the assumed wobble coefficient per

foot of tendon.

Table 6. Assumed Material Properties for Concrete

1. FPC is the standard concrete cylinder strength and must be input as a negative value, since it is a compressive stress.
2. FPCM provides a location for entering a multiplier for the standard cylinder strength.
3. RFCS is a multiplier which indicates the percentage of maximum stress reduction occurring between maximum stress and stress at maximum strain. The value of 0.15 has been used throughout this study.
5. UNITWT indicates the weight per cubic foot of the concrete.
6. STAR represents the maximum allowed elastic compression strain and represents the lower bound of the elastic stiffness test. The number, because of compression, must also be input as a negative value.
7. SINC is the initial increment of strain that is employed in the general stiffness evaluation procedure.

Table 7. Cross Section Properties of the Beam-Column

1. Each separate cross section is defined between the beam station limits of IFIRST and ILAST.
2. NVCW represents the total number of different widths which the horizontal segments of a particular cross

section are divided into. Each cross section may contain a maximum of 100 different segment widths.

3. DEPTH is the total depth of the cross section and VINC represents the depth of each horizontal segment. The segment depth is constant for all layers of each cross section.

4. JFIRST and JLAST represent the extreme upper and lower segments for the horizontal segments having width WIDTH. This card is repeated NVCW times and the cards must be stacked so that the top of the beam is considered first.

Table 8. Stress-Strain Relationships for Steel

1. NUMP is the total number of points considered in the immediate stress-strain data that follows:

2. NUMC is a curve number which dictates the echo print heading and establishes the necessary index for future referencing.

   NUMC = 1 . . . . Unbonded tendon

   NUMC = 2 . . . . Bonded prestressed tendon

   NUMC = 3 . . . . Bonded unstressed reinforcement

3. STRESS and STRAIN are the numerical stress-strain coordinates and appear in groups of three points per data card.

Table 9. Unbonded Tendon Area and Profile Data

1. The cross-sectional area of the tendon in square inches

is the first card of Table 9 and is repeated NUT times.

2. Two types of assumed tendon profiles are available. When column 10 is zero, a straight line is passed through all stations between IN10 and IN20. A "1" in Column 10 designates a parabola to be passed from station IN10 through station IN20 and to station IN30. The YSHOP terms define the distances from the top of the beam to the centroid of the tendon at the corresponding control stations.

Table 10. Stressing History for the Unbonded Tendons

1. KT1 and KT2 are respectively the first and the last unbonded tendons contained in a particular stressing group. KT2 must be equal to or greater than KT1.

2. KSO represents the stressing order of the tendon group under consideration. The data cards reflecting the stressing history must be stacked in numerical order. KSO must be either 1, 2, or 3, which corresponds to a first, second, or third sequence of prestressing.

3. KSE defines the end or ends being stressed.

   KSE = 0 . . . . . . Left end only

   KSE = 1 . . . . . . Right end only

   KSE = 2 . . . . . . Both ends

4. HIGHL represents the maximum jacking stress recorded during stressing at the jacking end. SHIML is the magnitude of the final jacking end stress after the unbonded tendons have been anchored and the stressing

sequence for the group under consideration is complete. HIGHL must be equal to or greater than SHIML.

5. HIGHR and SHIMR are the identical terms for the right end of the beam. The value of KSE will determine how much initial stressing information is required.

Table 11. Supplementary Bonded Reinforcement Data

1. Any particular piece of unbonded reinforcement begins at beam station IB1 and runs to station IB2; therefore, IB2 must be greater than IB1. The correct stress-strain relationship is referenced to NUMC of Table 8 by NUBC which should be either 2 or 3.
2. The cross-sectional area (AREA) and the distance from the top of the beam (YSTEEL) are input for each piece of supplementary bonded reinforcement.
3. TIN represents any initial prestressing stress.

Problems may be stacked one behind the other and the subsequent problems may or may not hold information from the previous problem. The program terminates when the problem number (NPROB) is completely blank; thus a blank card at the conclusion of the data deck stops the program.

Table 12. Specified Soil Shrink-Swell Deflection

1. JDEF equals the number of specified soil shrink or swell deflections to read in as input data.

2. If there are specified deflections to be read in, arrange JDEF cards behind the card that specifies the number of cards to be read in. (If JDEF = 2, stack two cards behind the card that defined JDEF as being equal to 2.)
3. Input format for specified deflections is I5, F10.6.
4. If there are no specified deflections, place a card with "0" in column 5 as the last card in each problem deck.

IDENTIFICATION OF PROBLEM

AAAA	BBBB	CCCC	DDDD	EEEE	FFFF	GGGG	EXPO
1–10	20	30	40	50	60	70	80

LIFT

LIFT	
1–5	80

TABLE 1.. PROGRAM CONTROL DATA (one card each problem)

Enter "1" to Hold Previous Table | Num Cards Added for Table

KEEPF	2	3	4	5	6	7	8	9	10	11	2	3	4
5	10	15	20	25	30	35	40	45	50	55	60	65	70

TABLE 2. CONSTANTS AND CLOSURE TOLERANCES (one card, or none if prior Table 2 is held)

		CLOSURE TOLERANCES FOR:		
NUMBER OF INCREMENTS	INCR LENGTH	DEFLECTIONS	FORCES	LENGTH
6–10	21–30	41–50	60	70

TABLE 3. SPECIFIED DEFLECTIONS AND SLOPES (number of cards according to Table 1; none if preceding Table 3 is held)

STATION	CASE	DEFLECTION	SLOPE
6–10	16–20	30	40

CASE = 1 for deflection only, 2 for slope only, 3 for both

TABLE 4. LOADS AND RESTRAINTS (number of cards according to Table 1). Data added to storage as lumped quantities per increment length, linearly interpolated between values input at indicated end stations, with 1/2-values at each end station. Concentrated effects are established as full values at single stations by setting final station = initial station.

FROM STA.	TO STA.	ENTER "1" IF CON'T ON NEXT CARD	Q TRANSVERSE FORCE	S SPRING SUPPORT	T TRANSVERSE COUPLE	R ROTATIONAL RESTRAINT	P AXIAL TENSION OR COMPRESSION
6–10	15	20	31–40	50	60	70	80

TABLE 5. PROBLEM CONTROL AND FRICTION DATA (one card, or none if prior Table 5 is held)

NSEC	NSSC	NUT	NG	NHB	FCC (μ)	WOB (K)
6–10	15	20	25	30	41–50	60

TABLE 6. ASSUMED MATERIAL PROPERTIES FOR CONCRETE (one card, or none if prior Table 6 is held)

	FPC	FPCM	EPULT	RFCS	UNITWT	STAR	SINC
11	20	30	40	50	60	70	80

TABLE 7. CROSS SECTION PROPERTIES OF THE BEAM-COLUMN (follow the first card with NVCW second cards, and continue the sequence for NSEC first cards)

IFIRST	ILAST	NVCW	DEPTH	VINC	(REPEAT NSEC TIMES)

	JFIRST	JLAST		WIDTH	(REPEAT NVCW TIMES)
6	10	15	31	40	

TABLE 8. STRESS-STRAIN RELATIONSHIPS FOR STEEL (follow the first card with the number of cards required to produce NUMP points. Continue the sequence for NSSC first cards)

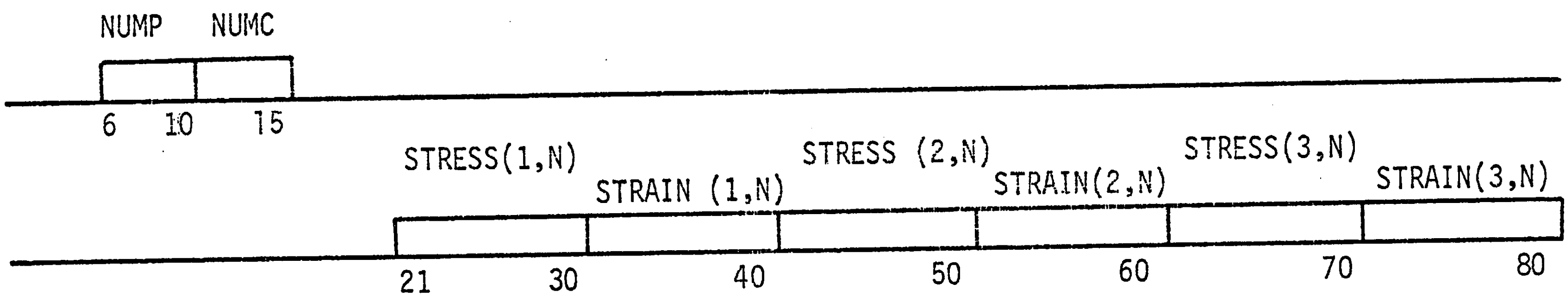


TABLE 9. UNBONDED TENDON AREA AND PROFILE DATA (follow the first card with sufficient profile information until IN30 = M for the parabolic option or IN20 = M for the linear option. Repeat the sequence for NUT first cards)

(REPEAT *NUT* TIMES)

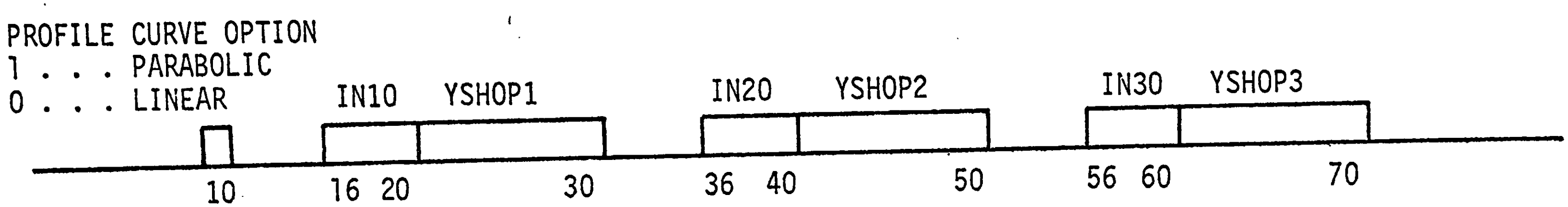


TABLE 10. STRESSING HISTORY OF THE UNBONDED TENDONS (repeat NG times)

KTI	KT2	KSO	KSE	HIGHL	SHIML	HIGHR	SHIMR
6–10	15	20	25	31–40	50	60	70

TABLE 11. SUPPLEMENTARY BONDED REINFORCEMENT DATA (repeat NHB times)

IB1	IB2	NUBC	AREA	YSTEEL	TIN
6–10	15	20	31–40	50	60

TABLE 12. SPECIFIED SOIL SHRINK-SWELL DEFLECTIONS

JDEF
1–5

STOP CARD (ONE BLANK CARD AT END OF RUN)

APPENDIX K

SELECTED TYPICAL RESULTS FROM COMPUTER PROGRAM *PRESS2*

SLAB LENGTH = 60.00 FT   SLAB WIDTH = 40.00 FT   TEE SECTION DEPTH = 10.00 IN
YS = 2.00 IN   EDGE PENETRATION = 4.00 FT   EDGE LOAD + UNIFORM LOAD= 8.333 + 0.786 PSI
MOUND EXPONENT =

---------- CENTER LIFT ----------

TABLE - PROGRAM CONTROL DATA

	FLEXURAL STIFFNESS	TABLE NUMBER 2	3	4	5	6	7	8	9	10	11
PRIOR DATA OPTIONS (1=HOLD)	1	1	1	1	1	1	1	1	1	1	1
NUM CARDS INPUT THIS PROBLEM		0	0	2							

TABLE 2 - CONSTANTS AND CLOSURE TOLERANCES

USING DATA FROM THE PREVIOUS PROBLEM

NUM INCREMENTS	145
INCREMENT LENGTH	0.500D+01
DEFLECTION CLOSURE TOLERANCE	0.100D-02
FORCE CLOSURE TOLERANCE	0.100D+03
LENGTH CLOSURE TOLERANCE	0.100D-03

TABLE 3 - SPECIFIED DEFLECTIONS AND SLOPES

STA	CASE	DEFLECTION	SLOPE
USING DATA FROM THE PREVIOUS PROBLEM			
0	0	0.0	NONE

TABLE 4 - LOAD AND RESTRAINT DATA

USING DATA FROM THE PREVIOUS PROBLEM

FROM	TO	CONTD	Q	S	T	R	P
0	145	0	-0.195D+04	0.480D+04	0.0	0.0	0.0
0	2	0	-0.100D+05	0.0	0.0	0.0	0.0
143	145	0	-0.100D+05	0.0	0.0	0.0	0.0
0	2	0	-0.100D+05	0.0	0.0	0.0	0.0
143	145	0	-0.100D+05	0.0	0.0	0.0	0.0

0	2	0	-0.100D+05	0.0	0.0	0.0	0.0
143	145	0	-0.100D+05	0.0	0.0	0.0	0.0
0	2	0	-0.100D+05	0.0	0.0	0.0	0.0
143	145	0	-0.100D+05	0.0	0.0	0.0	0.0

ADDITIONAL DATA FOR THIS PROBLEM

0	2	0	-0.100D+05	0.0	0.0	0.0	0.0
143	145	0	-0.100D+05	0.0	0.0	0.0	0.0

TABLE 5 - GENERAL PROBLEM CONTROL AND FRICTION DATA

USING DATA FROM THE PREVIOUS PROBLEM

NUMBER OF DIFFERENT CONCRETE CROSS SECTIONS	9
NUMBER OF STEEL TYPES	2
NUMBER OF UNBONDED TENDONS	1
NUMBER OF PRESTRESSING STAGES	1
NUMBER OF BONDED REINFORCING BARS AND/OR STRANDS	4
COEFFICIENT OF FRICTION DUE TO CURVATURE	0.150D+00
WOBBLE FRICTION COEFFICIENT PER FOOT OF TENDON	0.100D-02

TABLE 6 - ASSUMED MATERIAL PROPERTIES FOR THE CONCRETE

USING DATA FROM THE PREVIOUS PROBLEM

STANDARD CYLINDER COMPRESSIVE STRESS (PSI)	-0.250D+04
MAX STRESS REDUCTION FACTOR FOR CONCRETE	0.100D+01
ULTIMATE CONCRETE STRAIN IN COMPRESSION	-0.400D-02
REDUCTIONFAC FOR CONC STRESS AT ULTIMATE STRAIN	0.150D+00
UNIT WEIGHT OF THE CONCRETE (PCF)	0.150D+03
MAXIMUM ELASTIC CONCRETE COMPRESSIVE STRAIN	-0.500D-03
INCREMENT OF STRAIN FOR STIFFNESS CALCULATION	0.100D-04

TABLE 7 - CROSS-SECTION PROPERTIES OF THE BEAM

USING DATA FROM THE PREVIOUS PROBLEM

BEAM CROSS SECTION NUM	FROM STA	TO STA	NUM OF WIDTHS	DEPTH OF BEAM	DEP OF VERTICAL INCREMENTS
1	0	2	1	0.180D+02	0.200D+01

VERTICAL INCREMENT DATA FOR SECTION 1

FROM VINC	TO VINC	WIDTH
1	9	0.480D+03

BEAM CROSS SECTION NUM	FROM STA	TO STA	NUM OF WIDTHS	DEPTH OF BEAM	DEP OF VERTICAL INCREMENTS
2	2	37	2	0.180D+02	0.200D+01

VERTICAL INCREMENT DATA FOR SECTION 2

FROM VINC	TO VINC	WIDTH
1	2	0.480D+03
3	9	0.400D+02

BEAM CROSS SECTION NUM	FROM STA	TO STA	NUM OF WIDTHS	DEPTH OF BEAM	DEP OF VERTICAL INCREMENTS
3	37	39	1	0.180D+02	0.200D+01

VERTICAL INCREMENT DATA FOR SECTION 3

FROM VINC	TO VINC	WIDTH
1	9	0.480D+03

BEAM CROSS SECTION NUM	FROM STA	TO STA	NUM OF WIDTHS	DEPTH OF BEAM	DEP OF VERTICAL INCREMENTS
4	39	71	2	0.180D+02	0.200D+01

VERTICAL INCREMENT DATA FOR SECTION 4

FROM VINC	TO VINC	WIDTH

1	2	0.480D+03
3	9	0.400D+02

BEAM CROSS SECTION NUM	FROM STA	TO STA	NUM OF WIDTHS	DEPTH OF BEAM	DEP OF VERTICAL INCREMENTS
5	71	73	1	0.180D+02	0.200D+01

VERTICAL INCREMENT DATA FOR SECTION 5

FROM VINC	TO VINC	WIDTH
1	9	0.480D+03

BEAM CROSS SECTION NUM	FROM STA	TO STA	NUM OF WIDTHS	DEPTH OF BEAM	DEP OF VERTICAL INCREMENTS
6	73	107	2	0.180D+02	0.200D+01

VERTICAL INCREMENT DATA FOR SECTION 6

FROM VINC	TO VINC	WIDTH
1	2	0.480D+03
3	9	0.400D+02

BEAM CROSS SECTION NUM	FROM STA	TO STA	NUM OF WIDTHS	DEPTH OF BEAM	DEP OF VERTICAL INCREMENTS
7	107	109	1	0.180D+02	0.200D+01

VERTICAL INCREMENT DATA FOR SECTION 7

FROM VINC	TO VINC	WIDTH
1	9	0.480D+03

BEAM CROSS SECTION NUM	FROM STA	TO STA	NUM OF WIDTHS	DEPTH OF BEAM	DEP OF VERTICAL INCREMENTS

8	109	143	2	0.180D+02	0.200D+01

VERTICAL INCREMENT DATA FOR SECTION 8

FROM VINC	TO VINC	WIDTH
1	2	0.480D+03
3	9	0.400D+02

BEAM CROSS SECTION NUM	FROM STA	TO STA	NUM OF WIDTHS	DEPTH OF BEAM	DEP OF VERTICAL INCREMENTS
9	143	145	1	0.180D+02	0.200D+01

VERTICAL INCREMENT DATA FOR SECTION 9

FROM VINC	TO VINC	WIDTH
1	9	0.480D+03

TABLE 8 - STEEL STRESS-STRAIN PROPERTIES

USING DATA FROM THE PREVIOUS PROBLEM

STRESS-STRAIN CHARACTERISTICS
FOR UNBONDED TENDON STEEL
CURVE TYPE 1

STRESS (LB)	STRAIN (IN/IN)	STRESS (LB)	STRAIN (IN/IN)
0.272D+05	0.150D-02	0.543D+05	0.200D-02
0.110D+06	0.400D-02	0.167D+06	0.600D-02
0.221D+06	0.800D-02	0.239D+06	0.900D-02
0.251D+06	0.100D-01	0.260D+06	0.110D-01
0.263D+06	0.120D-01	0.273D+06	0.140D-01
0.276D+06	0.160D-01		

STRESS-STRAIN CHARACTERISTICS
FOR BONDED PRESTRESSING STRAND

CURVE TYPE 2

STRESS (LB)	STRAIN (IN/IN)	STRESS (LB)	STRAIN (IN/IN)
0.0	0.0	0.300D+05	0.100D-02
0.520D+05	0.170D-02	0.540D+05	0.200D-02
0.570D+05	0.600D-02	0.580D+05	0.200D+00

TABLE 9 - TENDON AREA AND INITIAL GEOMETRY DATA

USING DATA FROM THE PREVIOUS PROBLEM

AREA OF TENDON 1 = 0.107D+01

KNOWN CONTROL POINTS FOR TENDON 1

CURVE TYPE	FROM STA	DIST FROM TOP	THRU STA	DIST FROM TOP	TO STA	DIST FROM TOP
PARABOLIC	0	0.200D+01	72	0.220D+01	145	0.200D+01

TABLE 10 - STRESSING HISTORY FOR THE UNBONDED TENDONS

USING DATA FROM THE PREVIOUS PROBLEM

STRESS ORDER	FROM TENDON	TO TENDON	JACKING END	LEFT MAX STRESS	LEFT SHIM STRESS	RIGHT MAX STRESS	RIGHT SHIM STRESS
1	1	1	BOTH	0.216D+06	0.189D+06	0.216D+06	0.189D+06

TABLE 11 - SUPPLEMENTARY BONDED REINFORCEMENT DATA

USING DATA FROM THE PREVIOUS PROBLEM

BAR NUMBER	FROM STA	TO STA	STRESS-STRAIN CURVE NUM	AREA	DIST FROM	INITIAL PRESTRESS

TOP

1	0	145	2	0.310D+00	0.155D+02	0.0
2	0	145	2	0.310D+00	0.155D+02	0.0
3	0	145	2	0.310D+00	0.155D+02	0.0
4	0	145	2	0.310D+00	0.155D+02	0.0

TABLE 12 - SWELLING SOIL PROFILE INFORMATION

DIFFERENTIAL HEAVE = 2.000 INCHES

EDGE PENETRATION DISTANCE = 4.000 FEET

MOUND EXPONENT = 3.0000

SWELLING MODE:

---------- CENTER LIFT ----------

INITIAL DIFFERENTIAL HEAVE AT EACH STATION

---------- CENTER LIFT ----------

STA	DEF(I)	STA	DEF(I)	STA	DEF(I)	STA	DEF(I)	STA	DEF(I)	STA	DEF(I)
0	2.26	1	1.65	2	1.16	3	0.78	4	0.49	5	0.28
6	0.14	7	0.06	8	0.02	9	0.00	10	0.0	11	0.0
12	0.0	13	0.0	14	0.0	15	0.0	15	0.0	17	0.0
18	0.0	19	0.0	20	0.0	21	0.0	22	0.0	23	0.0
24	0.0	25	0.0	26	0.0	27	0.0	28	0.0	29	0.0
30	0.0	31	0.0	32	0.0	33	0.0	34	0.0	35	0.0
36	0.0	37	0.0	38	0.0	39	0.0	40	0.0	41	0.0
42	0.0	43	0.0	44	0.0	45	0.0	46	0.0	47	0.0
48	0.0	49	0.0	50	0.0	51	0.0	52	0.0	53	0.0
54	0.0	55	0.0	56	0.0	57	0.0	58	0.0	59	0.0
60	0.0	61	0.0	62	0.0	63	0.0	64	0.0	65	0.0
66	0.0	67	0.0	68	0.0	69	0.0	70	0.0	71	0.0
72	0.0	73	0.0	74	0.0	75	0.0	76	0.0	77	0.0
78	0.0	79	0.0	80	0.0	81	0.0	82	0.0	83	0.0
84	0.0	85	0.0	86	0.0	87	0.0	88	0.0	89	0.0
90	0.0	91	0.0	92	0.0	93	0.0	94	0.0	95	0.0
96	0.0	97	0.0	98	0.0	99	0.0	100	0.0	101	0.0
102	0.0	103	0.0	104	0.0	105	0.0	106	0.0	107	0.0
108	0.0	109	0.0	110	0.0	111	0.0	112	0.0	113	0.0
114	0.0	115	0.0	116	0.0	117	0.0	118	0.0	119	0.0
120	0.0	121	0.0	122	0.0	123	0.0	124	0.0	125	0.0
126	0.0	127	0.0	128	0.0	129	0.0	130	0.0	131	0.0
132	0.0	133	0.0	134	0.0	135	0.0	136	0.00	137	0.02
138	0.06	139	0.14	140	0.28	141	0.49	142	0.78	143	1.16
144	1.65	145	2.26								

SLAB LENGTH = 60.00 FT SLAB WIDTH = 40.00 FT TEE SECTION DEPTH = 18.00 IN
YM = 2.00 IN EDGE PENETRATION = 4.00 FT EDGE LOAD + UNIFORM LOAD= 8.333 + 0.786 PSI
MOUND EXPONENT = 3.00

***** ITERATIVE SOLUTION HAS NOT CLOSED FOR SPECIFIED
DEFLECTION TOLERANCE IN 99 ITERATIONS *****

TABLE 13 - COMPUTED RESULTS -- ITERATION 99

STA I	DISTANCE	DEFLECTION	SLOPE	MOMENT	SHEAR	SUPPORT REACTION
-1	-0.500D+01	-0.233589D+01		0.100000D+01		0.0
			0.129232D-01		0.200002D+00	
0	0.0	-0.227127D+01		0.200001D+01		0.257096D+02
			0.129337D-01		-0.259471D+05	
1	0.500D+01	-0.220660D+01		-0.129733D+06		0.268155D+04
			0.129433D-01		-0.752115D+05	
2	0.100D+02	-0.214189D+01		-0.505791D+06		0.472551D+04
			0.129423D-01		-0.974320D+05	
3	0.150D+02	-0.207718D+01		-0.992951D+06		0.624866D+04
			0.129220D-01		-0.931294D+05	
4	0.200D+02	-0.201257D+01		-0.145860D+07		0.731657D+04
			0.128852D-01		-0.877588D+05	
5	0.250D+02	-0.194814D+01		-0.189739D+07		0.799874D+04
			0.128324D-01		-0.817101D+05	
6	0.300D+02	-0.188398D+01		-0.230594D+07		0.834865D+04
			0.127643D-01		-0.753074D+05	
7	0.350D+02	-0.182016D+01		-0.268248D+07		0.844379D+04
			0.126819D-01		-0.688096D+05	
8	0.400D+02	-0.175675D+01		-0.302653D+07		0.834558D+04
			0.125862D-01		-0.624100D+05	
9	0.450D+02	-0.169382D+01		-0.333858D+07		0.811947D+04
			0.124784D-01		-0.562366D+05	
10	0.500D+02	-0.163142D+01		-0.361976D+07		0.783084D+04
			0.123594D-01		-0.503517D+05	
11	0.550D+02	-0.156963D+01		-0.387152D+07		0.753421D+04
			0.122303D-01		-0.447635D+05	
12	0.600D+02	-0.150848D+01		-0.409534D+07		0.724069D+04
			0.120922D-01		-0.394688D+05	
13	0.650D+02	-0.144802D+01		-0.429268D+07		0.695047D+04
			0.119459D-01		-0.344644D+05	
14	0.700D+02	-0.138829D+01		-0.446500D+07		0.666377D+04
			0.117925D-01		-0.297466D+05	
15	0.750D+02	-0.132932D+01		-0.461374D+07		0.638075D+04
			0.116329D-01		-0.253118D+05	
16	0.800D+02	-0.127116D+01		-0.474029D+07		0.610156D+04

			0.114680D-01		-0.211563D+05	
17	0.850D+02	-0.121382D+01		-0.484608D+07		0.582633D+04
			0.112986D-01		-0.172759D+05	
18	0.900D+02	-0.115733D+01		-0.493246D+07		0.555516D+04
			0.111255D-01		-0.136668D+05	
19	0.950D+02	-0.110170D+01		-0.500079D+07		0.528815D+04
			0.109495D-01		-0.103246D+05	
20	0.100D+03	-0.104695D+01		-0.505241D+07		0.502536D+04
			0.104482D-01		-0.724527D+04	
21	0.105D+03	-0.994709D+00		-0.508864D+07		0.477460D+04
			0.994099D-02		-0.441667D+04	
22	0.110D+03	-0.945004D+00		-0.511072D+07		0.453602D+04
			0.941907D-02		-0.182665D+04	
23	0.115D+03	-0.897909D+00		-0.511986D+07		0.430996D+04
			0.880209D-02		0.537317D+03	
24	0.120D+03	-0.853499D+00		-0.511717D+07		0.409679D+04
			0.839174D-02		0.268811D+04	
25	0.125D+03	-0.811540D+00		-0.510373D+07		0.389539D+04
			0.790234D-02		0.463750D+04	
26	0.130D+03	-0.772028D+00		-0.508054D+07		0.370574D+04
			0.741119D-02		0.639724D+04	
27	0.135D+03	-0.734972D+00		-0.504856D+07		0.352787D+04
			0.692249D-02		0.797910D+04	
28	0.140D+03	-0.700360D+00		-0.500866D+07		0.336173D+04
			0.644164D-02		0.939483D+04	
29	0.145D+03	-0.668152D+00		-0.496169D+07		0.320713D+04
			0.597346D-02		0.106560D+05	
30	0.150D+03	-0.638284D+00		-0.490841D+07		0.306376D+04
			0.549901D-02		0.117737D+05	
31	0.155D+03	-0.610789D+00		-0.484954D+07		0.293179D+04
			0.499491D-02		0.127595D+05	
32	0.160D+03	-0.585815D+00		-0.478574D+07		0.281191D+04
			0.434527D-02		0.136254D+05	
33	0.165D+03	-0.564088D+00		-0.471761D+07		0.270762D+04
			0.418078D-02		0.143870D+05	
34	0.170D+03	-0.543184D+00		-0.464568D+07		0.260729D+04
			0.401928D-02		0.150483D+05	
35	0.175D+03	-0.523088D+00		-0.457044D+07		0.251082D+04
			0.386091D-02		0.156132D+05	
36	0.180D+03	-0.503784D+00		-0.449237D+07		0.241816D+04
			0.370575D-02		0.160853D+05	
37	0.185D+03	-0.485255D+00		-0.441194D+07		0.232922D+04
			0.368468D-02		0.164685D+05	
38	0.190D+03	-0.466831D+00		-0.432960D+07		0.224079D+04
			0.366402D-02		0.167633D+05	
39	0.195D+03	-0.448511D+00		-0.424578D+07		0.215285D+04
			0.363644D-02		0.169702D+05	
40	0.200D+03	-0.430329D+00		-0.416093D+07		0.206558D+04
			0.296398D-02		0.170898D+05	

41	0.205D+03	-0.415509D+00	0.282586D-02	-0.407548D+07	0.171382D+05	0.199444D+04
42	0.210D+03	-0.401380D+00	0.269120D-02	-0.398979D+07	0.171188D+05	0.192662D+04
43	0.215D+03	-0.387924D+00	0.255998D-02	-0.390420D+07	0.170349D+05	0.186203D+04
44	0.220D+03	-0.375124D+00	0.243218D-02	-0.381902D+07	0.168895D+05	0.180059D+04
45	0.225D+03	-0.362963D+00	0.230775D-02	-0.373458D+07	0.166857D+05	0.174222D+04
46	0.230D+03	-0.351424D+00	0.218664D-02	-0.365115D+07	0.164265D+05	0.168684D+04
47	0.235D+03	-0.340491D+00	0.206879D-02	-0.356902D+07	0.161149D+05	0.163436D+04
48	0.240D+03	-0.330147D+00	0.195412D-02	-0.348844D+07	0.157536D+05	0.158471D+04
49	0.245D+03	-0.320377D+00	0.184255D-02	-0.340967D+07	0.153454D+05	0.153781D+04
50	0.250D+03	-0.311164D+00	0.173400D-02	-0.333295D+07	0.148930D+05	0.149359D+04
51	0.255D+03	-0.302494D+00	0.162835D-02	-0.325848D+07	0.143989D+05	0.145197D+04
52	0.260D+03	-0.294352D+00	0.152552D-02	-0.318649D+07	0.138658D+05	0.141289D+04
53	0.265D+03	-0.286724D+00	0.142538D-02	-0.311716D+07	0.132961D+05	0.137628D+04
54	0.270D+03	-0.279598D+00	0.132782D-02	-0.305068D+07	0.126922D+05	0.134207D+04
55	0.275D+03	-0.272958D+00	0.123271D-02	-0.298722D+07	0.120564D+05	0.131020D+04
56	0.280D+03	-0.266795D+00	0.113993D-02	-0.292694D+07	0.113910D+05	0.128062D+04
57	0.285D+03	-0.261095D+00	0.104935D-02	-0.286998D+07	0.106993D+05	0.125326D+04
58	0.290D+03	-0.255848D+00	0.960815D-03	-0.281649D+07	0.998033D+04	0.122807D+04
59	0.295D+03	-0.251044D+00	0.874197D-03	-0.276659D+07	0.923934D+04	0.120501D+04
60	0.300D+03	-0.246673D+00	0.789347D-03	-0.272039D+07	0.847737D+04	0.118403D+04
61	0.305D+03	-0.242727D+00	0.706117D-03	-0.267800D+07	0.769646D+04	0.116509D+04
62	0.310D+03	-0.239196D+00	0.624356D-03	-0.263952D+07	0.689860D+04	0.114814D+04
63	0.315D+03	-0.236074D+00	0.543910D-03	-0.260503D+07	0.608576D+04	0.113316D+04
64	0.320D+03	-0.233355D+00	0.464624D-03	-0.257460D+07	0.525986D+04	0.112010D+04
65	0.325D+03	-0.231032D+00		-0.254830D+07		0.110895D+04

66	0.330D+03	-0.229100D+00	0.386339D-03	-0.252619D+07	0.442281D+04	0.109968D+04
67	0.335D+03	-0.227555D+00	0.308896D-03	-0.250830D+07	0.357649D+04	0.109227D+04
68	0.340D+03	-0.226395D+00	0.232134D-03	-0.249469D+07	0.272276D+04	0.108670D+04
69	0.345D+03	-0.225615D+00	0.155893D-03	-0.248537D+07	0.186345D+04	0.108295D+04
70	0.350D+03	-0.225215D+00	0.800080D-04	-0.248037D+07	0.100041D+04	0.108103D+04
71	0.355D+03	-0.225194D+00	0.431731D-05	-0.247969D+07	0.135442D+03	0.108093D+04
72	0.360D+03	-0.225209D+00	-0.301842D-05	-0.248334D+07	-0.729628D+03	0.108100D+04
73	0.365D+03	-0.225260D+00	-0.103143D-04	-0.249131D+07	-0.159463D+04	0.108125D+04
74	0.370D+03	-0.225387D+00	-0.252498D-04	-0.250361D+07	-0.245938D+04	0.108186D+04
75	0.375D+03	-0.225896D+00	-0.101815D-03	-0.252023D+07	-0.332352D+04	0.108430D+04
76	0.380D+03	-0.226791D+00	-0.179016D-03	-0.254116D+07	-0.418522D+04	0.108850D+04
77	0.385D+03	-0.228076D+00	-0.257015D-03	-0.256637D+07	-0.504262D+04	0.109476D+04
78	0.390D+03	-0.229756D+00	-0.335975D-03	-0.259584D+07	-0.589386D+04	0.110283D+04
79	0.395D+03	-0.231836D+00	-0.416059D-03	-0.262952D+07	-0.673703D+04	0.111281D+04
80	0.400D+03	-0.234323D+00	-0.497428D-03	-0.266737D+07	-0.757022D+04	0.112475D+04
81	0.405D+03	-0.237224D+00	-0.580243D-03	-0.270933D+07	-0.839147D+04	0.113868D+04
82	0.410D+03	-0.240548D+00	-0.664662D-03	-0.275533D+07	-0.919879D+04	0.115463D+04
83	0.415D+03	-0.244302D+00	-0.750843D-03	-0.280528D+07	-0.999016D+04	0.117265D+04
84	0.420D+03	-0.248497D+00	-0.838939D-03	-0.285909D+07	-0.107635D+05	0.119278D+04
85	0.425D+03	-0.253142D+00	-0.929104D-03	-0.291668D+07	-0.115167D+05	0.121508D+04
86	0.430D+03	-0.258250D+00	-0.102149D-02	-0.297792D+07	-0.122476D+05	0.123960D+04
87	0.435D+03	-0.263831D+00	-0.111623D-02	-0.304269D+07	-0.129540D+05	0.126639D+04
88	0.440D+03	-0.269898D+00	-0.121348D-02	-0.311085D+07	-0.136337D+05	0.129551D+04
89	0.445D+03	-0.276465D+00	-0.131338D-02	-0.318227D+07	-0.142842D+05	0.132703D+04
			-0.141606D-02		-0.149031D+05	

90	0.450D+03	-0.283545D+00	-0.152164D-02	-0.325679D+07	-0.154881D+05	0.136102D+04
91	0.455D+03	-0.291154D+00	-0.163025D-02	-0.333423D+07	-0.160366D+05	0.139754D+04
92	0.460D+03	-0.299305D+00	-0.174202D-02	-0.341441D+07	-0.165459D+05	0.143666D+04
93	0.465D+03	-0.308015D+00	-0.185704D-02	-0.349714D+07	-0.170134D+05	0.147847D+04
94	0.470D+03	-0.317300D+00	-0.197543D-02	-0.358221D+07	-0.174364D+05	0.152304D+04
95	0.475D+03	-0.327177D+00	-0.209729D-02	-0.366939D+07	-0.178119D+05	0.157045D+04
96	0.480D+03	-0.337664D+00	-0.222269D-02	-0.375845D+07	-0.181372D+05	0.162079D+04
97	0.485D+03	-0.348777D+00	-0.235172D-02	-0.384914D+07	-0.184090D+05	0.167413D+04
98	0.490D+03	-0.360536D+00	-0.248445D-02	-0.394118D+07	-0.186244D+05	0.173057D+04
99	0.495D+03	-0.372958D+00	-0.262094D-02	-0.403430D+07	-0.187803D+05	0.179020D+04
100	0.500D+03	-0.386063D+00	-0.276124D-02	-0.412821D+07	-0.188731D+05	0.185310D+04
101	0.505D+03	-0.399869D+00	-0.290538D-02	-0.422257D+07	-0.188998D+05	0.191937D+04
102	0.510D+03	-0.414396D+00	-0.305338D-02	-0.431707D+07	-0.188567D+05	0.198910D+04
103	0.515D+03	-0.429663D+00	-0.320525D-02	-0.441135D+07	-0.187403D+05	0.206238D+04
104	0.520D+03	-0.445689D+00	-0.336099D-02	-0.450506D+07	-0.185470D+05	0.213931D+04
105	0.525D+03	-0.462494D+00	-0.352057D-02	-0.459779D+07	-0.182730D+05	0.221997D+04
106	0.530D+03	-0.480097D+00	-0.368396D-02	-0.468916D+07	-0.179146D+05	0.230446D+04
107	0.535D+03	-0.498517D+00	-0.370762D-02	-0.477873D+07	-0.174677D+05	0.239288D+04
108	0.540D+03	-0.517055D+00	-0.373217D-02	-0.486607D+07	-0.169318D+05	0.248186D+04
109	0.545D+03	-0.535716D+00	-0.376485D-02	-0.495073D+07	-0.163064D+05	0.257143D+04
110	0.550D+03	-0.554540D+00	-0.394267D-02	-0.503226D+07	-0.155906D+05	0.266179D+04
111	0.555D+03	-0.574253D+00	-0.412380D-02	-0.511021D+07	-0.147802D+05	0.275642D+04
112	0.560D+03	-0.594872D+00	-0.430805D-02	-0.518411D+07	-0.138708D+05	0.285539D+04
113	0.565D+03	-0.616412D+00	-0.449525D-02	-0.525347D+07	-0.128580D+05	0.295878D+04
114	0.570D+03	-0.638889D+00		-0.531776D+07		0.306667D+04

115	0.575D+03	-0.665006D+00	-0.522352D-02	-0.537644D+07	-0.117373D+05	0.319203D+04
116	0.580D+03	-0.694506D+00	-0.589998D-02	-0.542890D+07	-0.104913D+05	0.333363D+04
117	0.585D+03	-0.726663D+00	-0.643145D-02	-0.547442D+07	-0.910368D+04	0.349798D+04
118	0.590D+03	-0.761483D+00	-0.696394D-02	-0.551223D+07	-0.756170D+04	0.365512D+04
119	0.595D+03	-0.793047D+00	-0.751281D-02	-0.554149D+07	-0.585258D+04	0.383543D+04
120	0.600D+03	-0.840006D+00	-0.819187D-02	-0.556130D+07	-0.396315D+04	0.403203D+04
121	0.605D+03	-0.884306D+00	-0.885984D-02	-0.557069D+07	-0.187712D+04	0.424467D+04
122	0.610D+03	-0.931229D+00	-0.938472D-02	-0.556858D+07	0.421546D+03	0.446990D+04
123	0.615D+03	-0.980493D+00	-0.985284D-02	-0.555386D+07	0.294545D+04	0.470637D+04
124	0.620D+03	-0.103162D+01	-0.102255D-01	-0.552533D+07	0.570581D+04	0.495178D+04
125	0.625D+03	-0.108531D+01	-0.107387D-01	-0.548177D+07	0.871159D+04	0.520951D+04
126	0.630D+03	-0.114142D+01	-0.112216D-01	-0.542189D+07	0.119751D+05	0.547883D+04
127	0.635D+03	-0.119916D+01	-0.115482D-01	-0.534435D+07	0.155079D+05	0.575598D+04
128	0.640D+03	-0.125781D+01	-0.117287D-01	-0.524776D+07	0.193179D+05	0.603747D+04
129	0.645D+03	-0.131733D+01	-0.119051D-01	-0.513072D+07	0.234094D+05	0.632319D+04
130	0.650D+03	-0.137890D+01	-0.123132D-01	-0.499178D+07	0.277866D+05	0.661871D+04
131	0.655D+03	-0.144134D+01	-0.124887D-01	-0.482949D+07	0.324593D+05	0.691344D+04
132	0.660D+03	-0.150463D+01	-0.126574D-01	-0.464233D+07	0.374317D+05	0.722222D+04
133	0.665D+03	-0.156872D+01	-0.128181D-01	-0.442879D+07	0.427080D+05	0.752985D+04
134	0.670D+03	-0.163357D+01	-0.129599D-01	-0.418733D+07	0.482918D+05	0.784113D+04
135	0.675D+03	-0.169913D+01	-0.131118D-01	-0.391640D+07	0.541869D+05	0.815582D+04
136	0.680D+03	-0.176534D+01	-0.132427D-01	-0.361441D+07	0.603967D+05	0.846279D+04
137	0.685D+03	-0.183215D+01	-0.133614D-01	-0.327984D+07	0.669135D+05	0.970751D+04
138	0.690D+03	-0.189948D+01	-0.134670D-01	-0.291147D+07	0.736750D+05	0.882455D+04
			-0.135581D-01		0.805536D+05	

139	0.695D+03	-0.196727D+01		-0.250870D+07		0.874847D+04
			-0.136339D-01		0.873561D+05	
140	0.700D+03	-0.203544D+01		-0.207192D+07		0.841379D+04
			-0.136932D-01		0.938239D+05	
141	0.705D+03	-0.210391D+01		-0.160280D+07		0.775502D+04
			-0.137352D-01		0.996329D+05	
142	0.710D+03	-0.217259D+01		-0.110464D+07		0.670662D+04
			-0.137595D-01		0.104394D+06	
143	0.715D+03	-0.224138D+01		-0.582669D+06		0.520308D+04
			-0.137534D-01		0.826506D+05	
144	0.720D+03	-0.231015D+01		-0.169416D+06		0.317857D+04
			-0.137441D-01		0.338832D+05	
145	0.725D+03	-0.237887D+01		0.303717D-05		0.0
			-0.137335D-01		-0.607435D-06	
146	0.730D+03	-0.244754D+01		0.0		0.0

SLAB LENGTH = 60.00 FT
YM = 2.00 IN
MOUND EXPONENT = 3.00

SLAB WIDTH = 40.00 FT
EDGE PENETRATION = 4.00 FT

TEE SECTION DEPTH = 18.00 IN
EDGE LOAD + UNIFORM LOAD= 8.333 + 0.786 PSI

TABLE 15 - COMPUTED RESULTS (CONCLUDED)

FROM STA	TO STA	CROSS SECTION AREA	MOMENT OF INERTIA
0	2	0.864000D+04	0.233280D+06
2	37	0.248000D+04	0.468241D+05
37	39	0.864000D+04	0.233280D+06
39	71	0.248000D+04	0.468241D+05
71	73	0.864000D+04	0.233280D+06
73	107	0.248000D+04	0.468241D+05
107	109	0.864000D+04	0.233280D+06
109	143	0.248000D+04	0.468241D+05
143	145	0.864000D+04	0.233280D+06

TOTAL ELASTIC SHORTENING DUE TO DIRECT STRESS = 0.187036D-01

MAXIMUM TENSILE STRAIN IN CONCRETE EXCEEDED AT ------

STA	STRAIN
20	0.106711D-02
21	0.107936D-02
22	0.111916D-02
23	0.116133D-02
24	0.102421D-02
25	0.102230D-02

26	0.102939D-02
27	0.102555D-02
28	0.100739D-02
29	0.976753D-03
30	0.935947D-03
31	0.904441D-03
32	0.136728D-02
40	0.158948D-02
114	0.169947D-02
115	0.154642D-02
116	0.112028D-02
117	0.104786D-02
118	0.109535D-02
119	0.143136D-02
120	0.139679D-02
121	0.103668D-02
122	0.883674D-03
123	0.607842D-03
124	0.994909D-03
125	0.915992D-03
126	0.492282D-03
129	0.737883D-03

MAXIMUM COMPRESSIVE STRAIN IN CONCRETE EXCEEDED AT -- STA STRAIN

**** NONE ****

APPENDIX L

COMPARISON OF MOMENT VALUES RESULTING FROM SUBROUTINE *TEE* TO MOMENT VALUES FROM SUBROUTINE *SOLID* (COMPUTER PROGRAM *SLAB2* FOR A SLAB WITH DIMENSIONS OF 48 FT x 24 FT

COMPARISON OF MOMENT VALUES RESULTING FROM SUBROUTINE *TEE* TO MOMENT VALUES FROM SUBROUTINE *SOLID* (COMPUTER PROGRAM *SLAB2*) FOR A SLAB WITH DIMENSIONS OF 48 FT x 24 FT

DIFFERENTIAL SWELL (IN)	BEAM DEPTH (IN)	PERIMETER LOAD (LB/FT)	EDGE MOISTURE VARIATION DISTANCE (FT)	*TEE* MOMENT[a] FT-KIPS / FT	*SOLID* MOMENT[a] FT/KIPS / FT	RATIO *TEE* / *SOLID*
1	18	613	2	-	-	-
			5	9.10	10.47	0.87
			8	8.55	9.51	0.90
		1477	2	-	-	-
			5	9.88	10.88	0.91
			8	9.06	9.96	0.91
	30	613	2	-	-	-
			5	14.16	13.28	1.07
			8	16.99	15.17	1.12
		1477	2	-	-	-
			5	15.43	18.63	0.83
			8	17.22	15.41	1.12
4	18	613	2	-	-	-
			5	10.79	10.95	0.99
			8	17.15	18.40	0.93
		1477	2	3.17	3.59	0.88
			5	12.13	12.73	0.95
			8	18.78	19.08	0.98
	30	613	2	1.78	1.73	1.03
			5	16.73	14.36	1.17
			8	10.05	9.18	1.09
		1477	2	3.98	3.94	1.01
			5	18.85	16.79	1.12
			8	35.85	32.40	1.11
					AVERAGE	1.00

[a] Negative Moments

APPENDIX M

TABULATED, MOMENT, SHEAR, AND DIFFERENTIAL DEFLECTION RESULTS FROM SOIL-STRUCTURE INTERACTION ANALYSIS USING COMPUTER PROGRAM *SLAB2*

TABLE 23. Maximum Moments Occurring in Center Lift Model with Perimeter Loading

SLAB WIDTH = 24 FT					LONG DIRECTION		SHORT DIRECTION	
SLAB LENGTH (FT)	BEAM DEPTH (IN)	EDGE LOAD (LB/FT)	EDGE MOISTURE VARIATION DISTANCE (FT)	DIFFERENTIAL SWELL (IN)	$-M_{max}$ (FT-KIPS/FT)	$+M_{max}$ (FT-KIPS/FT)	$-M_{max}$ (FT-KIPS/FT)	$+M_{max}$ (FT-KIPS/FT)
24	18	613	2	1	2.758	0	2.508	0
			5		5.725	0	5.547	0
			8		10.534	0	10.699	0
		1477	2	1	3.792	0	3.475	0
			5		10.923	0	10.657	0
			8		11.082	0	10.761	0
48	18	613	2	1	1.709	0.342	1.750	0
			5		5.339	0.492	5.801	0
			8		9.508	0.596	11.602	0
		1477	2	1	3.478	0.386	3.855	0
			5		10.067	0.616	11.396	0
			8		9.681	0.587	11.576	0

TABLE 23. (Continued)

SLAB WIDTH = 24 FT					LONG DIRECTION		SHORT DIRECTION	
SLAB LENGTH (FT)	BEAM DEPTH (IN)	EDGE LOAD (LB/FT)	EDGE MOISTURE VARIATION DISTANCE (FT)	DIFFERENTIAL SWELL (IN)	$- M_{max}$	$+ M_{max}$	$- M_{max}$	$+ M_{max}$
					(FT-KIPS/FT)			
96	18	613	2	1	1.674	0.205	1.716	0
			5		6.598	0.252	5.914	0
			8		9.528	1.068	12.526	0
		1477	2	1	3.806	0	3,812	0
			5		10.740	1.663	16.859	0
			8		9.980	1.006	13.368	0
144	18	613	2	1	1.479	3.347	2.200	0
			5		7.107	2.300	6.972	0
			8		10.288	1.540	12.506	0
		1477	2	1	3.876	3.245	4.089	0
			5		10.740	2.197	16.859	0
			8		10.719	2.376	10.329	0

TABLE 23. (Continued)

SLAB WIDTH = 24 FT					LONG DIRECTION		SHORT DIRECTION	
SLAB LENGTH (FT)	BEAM DEPTH (IN)	EDGE LOAD (LB/FT)	EDGE MOISTURE VARIATION DISTANCE (FT)	DIFFERENTIAL SWELL (IN)	$-M_{max}$ (FT-KIPS/FT)	$+M_{max}$ (FT-KIPS/FT)	$-M_{max}$ (FT-KIPS/FT)	$+M_{max}$ (FT-KIPS/FT)
24	30	613	2	1	2.437	0	2.077	0
			5		5.562	0	5.832	0
			8		9.828	0	9.983	0
		1477	2	1	4.904	0	4.012	0
			5		20.612	0	12.105	0
			8		20.110	0	17.870	0
48	30	613	2	1	2.009	0.156	2.610	0
			5		7.250	0	9.420	0
			8		15.174	0	13.338	0
		1477	2	1	4.644	0	4.559	0
			5		14.593	0	19.871	0
			8		15.336	0	21.628	0

TABLE 23. (Continued)

SLAB WIDTH = 24 FT					LONG DIRECTION		SHORT DIRECTION	
SLAB LENGTH (FT)	BEAM DEPTH (IN)	EDGE LOAD (LB/FT)	EDGE MOISTURE VARIATION DISTANCE (FT)	DIFFERENTIAL SWELL (IN)	$-M_{max}$ (FT-KIPS/FT)	$+M_{max}$ (FT-KIPS/FT)	$-M_{max}$ (FT-KIPS/FT)	$+M_{max}$ (FT-KIPS/FT)
96	30	613	2	1	2.250	0.695	2.418	0
			5		7.257	1.095	9.351	0
			8		14.634	1.566	24.408	0
		1477	2	1	4.793	1.196	5.136	0
			5		14.960	1.179	20.316	0
			8		15.660	1.458	26.730	0
144	30	613	2	1	2.633	4.158	2.966	0
			5		9.004	2.646	9.400	0
			8		16.794	1.836	24.408	0
		1477	2	1	4.882	3.996	5.513	0
			5		15.930	2.646	27.324	0
			8		17.874	1.782	26.676	0

TABLE 23. (Continued)

SLAB WIDTH = 24 FT					LONG DIRECTION		SHORT DIRECTION	
SLAB LENGTH (FT)	BEAM DEPTH (IN)	EDGE LOAD (LB/FT)	EDGE MOISTURE VARIATION DISTANCE (FT)	DIFFERENTIAL SWELL (IN)	$- M_{max}$ (FT-KIPS/FT)	$+ M_{max}$ (FT-KIPS/FT)	$- M_{max}$ (FT-KIPS/FT)	$+ M_{max}$ (FT-KIPS/FT)
24	18	613	2	4	1.561	0	1.453	0
			5		4.500	0	4.360	0
			8		7.947	0	7.762	0
		1477	2	4	3.573	0	3.470	0
			5		13.820	0	13.491	0
			8		22.979	0	21.623	0
48	18	613	2	4	1.622	0.308	1.458	0
			5		10.010	0	4.513	0
			8		18.399	0	13.365	0
		1477	2	4	3.589	0.185	3.532	0
			5		12.732	0.596	14.620	0
			8		19.077	2.526	25.361	0

TABLE 23. (Continued)

SLAB WIDTH = 24 FT					LONG DIRECTION		SHORT DIRECTION	
SLAB LENGTH (FT)	BEAM DEPTH (IN)	EDGE LOAD (LB/FT)	EDGE MOISTURE VARIATION DISTANCE (FT)	DIFFERENTIAL SWELL (IN)	$- M_{max}$	$+ M_{max}$	$- M_{max}$	$+ M_{max}$
					(FT-KIPS/FT)			
96	18	613	2	4	1.294	0.267	1.335	0
			5		11.030	0.883	15.237	0
			8		17.550	1.663	24.724	0
		1477	2	4	3.000	0.185	3.224	0
			5		12.763	0.904	16.839	0
			8		19.154	1.479	26.244	0
144	18	613	2	4	1.294	0.390	1.314	0
			5		11.089	0.554	15.340	0
			8		17.537	1.663	24.880	0
		1477	2	4	2.998	0.575	3.203	0
			5		12.752	0.904	16.941	0
			8		19.139	1.581	26.490	0

TABLE 23. (Continued)

SLAB WIDTH = 24 FT					LONG DIRECTION		SHORT DIRECTION	
SLAB LENGTH (FT)	BEAM DEPTH (IN)	EDGE LOAD (LB/FT)	EDGE MOISTURE VARIATION DISTANCE (FT)	DIFFERENTIAL SWELL (IN)	$-M_{max}$	$+M_{max}$	$-M_{max}$	$+M_{max}$
					(FT-KIPS/FT)			
24	30	613	2	4	1.836	0	1.944	0
			5		9.644	0	7.887	0
			8		18.027	0	13.889	0
		1477	2	4	5.130	0	5.292	0
			5		21.816	0	21.816	0
			8		38.016	0	37.908	0
48	30	613	2	4	1.728	0.432	2.376	0
			5		14.181	0	5.539	0
			8		18.604	0	18.086	0
		1477	2	4	3.942	0	5.940	0
			5		16.794	0	24.084	0
			8		32.400	0	22.356	0

TABLE 23. (Continued)

SLAB WIDTH = 24 FT					LONG DIRECTION		SHORT DIRECTION	
SLAB LENGTH (FT)	BEAM DEPTH (IN)	EDGE LOAD (LB/FT)	EDGE MOISTURE VARIATION DISTANCE (FT)	DIFFERENTIAL SWELL (IN)	$- M_{max}$ (FT-KIPS/FT)	$+ M_{max}$ (FT-KIPS/FT)	$- M_{max}$ (FT-KIPS/FT)	$+ M_{max}$ (FT-KIPS/FT)
96	30	613	2	4	3.132	0.594	1.620	0
			5		13.727	0.907	7.371	0.550
			8		19.200	1.302	17.224	0
		1477	2	4	3.672	0.702	4.806	0
			5		16.848	1.620	25.974	0
			8		29.376	2.430	46.764	0
144	30	613	2	4	1.512	0.918	1.620	0
			5		14.472	1.134	14.418	0
			8		29.808	1.080	22.896	0
		1477	2	4	3.672	1.188	4.806	0
			5		16.902	1.189	24.082	0
			8		28.296	1.944	46.926	0

TABLE 23. (Continued)

SLAB WIDTH = 40 FT					LONG DIRECTION		SHORT DIRECTION	
SLAB LENGTH (FT)	BEAM DEPTH (IN)	EDGE LOAD (LB/FT)	EDGE MOISTURE VARIATION DISTANCE (FT)	DIFFERENTIAL SWELL (IN)	$- M_{max}$ (FT-KIPS/FT)	$+ M_{max}$ (FT-KIPS/FT)	$- M_{max}$ (FT-KIPS/FT)	$+ M_{max}$ (FT-KIPS/FT)
48	18	613	2	1	1.663	0.381	1.591	0
			5		9.469	0.000	9.200	0
			8		9.230	0.534	8.994	0
		1477	2	1	3.842	0.547	3.366	0
			5		10.348	0.537	10.061	0
			8		9.990	0.524	9.718	0
48	30	613	2	1	2.949	0.726	2.453	0.237
			5		7.474	0.141	6.664	0.284
			8		14.008	0	14.445	0
		1477	2	1	4.339	0	4.538	0
			5		15.150	0	14.885	0
			8		20.990	0	14.521	0

TABLE 23. (Continued)

SLAB WIDTH = 40 FT					LONG DIRECTION		SHORT DIRECTION	
SLAB LENGTH (FT)	BEAM DEPTH (IN)	EDGE LOAD (LB/FT)	EDGE MOISTURE VARIATION DISTANCE (FT)	DIFFERENTIAL SWELL (IN)	$-M_{max}$	$+M_{max}$	$-M_{max}$	$+M_{max}$
					(FT-KIPS/FT)			
43	18	613	2	4	5.008	0.476	4.886	0
			5		9.802	0.585	9.472	0
			8		10.207	0	9.832	0
		1477	2	4	6.134	0.457	5.993	0
			5		11.716	0.526	11.378	0
			8		17.664	0.129	19.771	0
43	30	613	2	4	6.739	0	6.388	0.813
			5		14.020	0	7.079	0.752
			8		17.917	0.202	9.747	0
		1477	2	4	8.818	0	8.073	0.542
			5		15.930	0	13.981	0
			8		30.143	0.262	18.603	0

TABLE 24. Maximum Shear Forces Occurring in Center Lift Model with Perimeter Loading

SLAB WIDTH = 24 FT					LONG DIRECTION		SHORT DIRECTION	
SLAB LENGTH (FT)	BEAM DEPTH (IN)	PERIMETER LOAD (LB/FT)	DIFFERENTIAL SWELL (IN)	EDGE MOISTURE VARIATION DISTANCE (FT)	$+V_{max}$ (KIPS/FT)	$-V_{max}$ (KIPS/FT)	$+V_{max}$ (KIPS/FT)	$-V_{max}$ (KIPS/FT)
24	18	613	1	2	0.395	0.338	0.464	0.338
				5	1.354	0.436	1.351	0.425
				8	1.593	0.837	1.585	0.860
		1477	1	2	0.576	0.671	0.745	0.671
				5	1.962	1.203	1.941	2.213
				8	1.697	1.308	1.670	1.316
48	18	613	1	2	0.418	0.331	0.529	0.397
				5	1.322	0.620	2.114	0.474
				8	1.579	1.847	3.600	0.933
		1477	1	2	0.609	0.657	0.850	0.788
				5	1.914	1.503	2.606	1.412
				8	1.631	1.702	3.253	1.635

TABLE 24. (Continued)

SLAB WIDTH = 24 FT.					LONG DIRECTION		SHORT DIRECTION	
SLAB SIZE (FT)	BEAM DEPTH (IN)	PERIMETER LOAD (LB/FT)	DIFFERENTIAL SWELL (IN)	EDGE MOISTURE VARIATION DISTANCE (FT)	$+V_{max}$	$-V_{max}$	$+V_{max}$	$-V_{max}$
					(KIPS/FT)			
96	18	613	1	2	0.559	0.161	0.559	0.129
				5	1.843	0.305	1.895	0.145
				8	1.582	1.066	2.724	0.931
		1477	1	2	0.644	0.643	0.970	0.772
				5	2.228	1.116	4.214	0.976
				8	1.568	1.148	2.710	0.989
144	18	613	1	2	0.553	0.412	0.557	0.433
				5	2.187	1.033	0.916	0.416
				8	1.738	1.133	2.723	0.904
		1477	1	2	0.665	0.636	1.115	0.509
				5	2.229	1.113	0.974	0.736
				8	1.844	1.214	2.711	0.947

TABLE 24. (Continued)

SLAB WIDTH = 24 FT.					LONG DIRECTION		SHORT DIRECTION	
SLAB SIZE (FT)	BEAM DEPTH (IN)	PERIMETER LOAD (LB/FT)	DIFFERENTIAL SWELL (IN)	EDGE MOISTURE VARIATION DISTANCE (FT)	$+V_{max}$ (KIPS/FT)	$-V_{max}$ (KIPS/FT)	$+V_{max}$ (KIPS/FT)	$-V_{max}$ (KIPS/FT)
24	30	613	1	2	0.650	0.168	0.644	0.187
				5	0.894	0.164	0.896	0.153
				8	1.193	0.091	1.198	0.084
		1477	1	2	0.936	0.210	0.918	0.213
				5	2.570	0.860	1.886	0.367
				8	2.280	0.761	2.184	0.851
48	30	613	1	2	0.618	0.247	0.605	0.131
				5	1.512	0.559	2.436	0.315
				8	1.960	0.358	1.685	0.191
		1477	1	2	0.759	0.728	0.941	0.501
				5	2.328	1.203	4.443	0.591
				8	2.081	1.338	5.334	0.750

TABLE 24. (Continued)

SLAB WIDTH = 24 FT.					LONG DIRECTION		SHORT DIRECTION	
SLAB SIZE (FT)	BEAM DEPTH (IN)	PERIMETER LOAD (LB/FT)	DIFFERENTIAL SWELL (IN)	EDGE MOISTURE VARIATION DISTANCE (FT)	$+V_{max}$	$-V_{max}$	$+V_{max}$	$-V_{max}$
					(KIPS/FT)			
96	30	613	1	2	0.649	0.335	0.653	0.246
				5	1.535	0.807	1.600	0.458
				8	1.946	1.035	3.766	0.438
		1477	1	2	0.802	0.712	1.074	0.552
				5	2.456	1.778	2.576	0.945
				8	1.957	1.117	3.824	0.458
144	30	613	1	2	0.568	0.355	0.721	0.281
				5	2.616	1.019	1.691	0.381
				8	2.748	1.283	3.747	0.505
		1477	1	2	0.829	0.704	1.160	0.625
				5	2.687	1.096	2.719	0.401
				8	2.878	1.361	3.813	0.526

TABLE 24. (Continued)

SLAB WIDTH = 24 FT.					LONG DIRECTION		SHORT DIRECTION	
SLAB SIZE (FT)	BEAM DEPTH (IN)	PERIMETER LOAD (LB/FT)	DIFFERENTIAL SWELL (IN)	EDGE MOISTURE VARIATION DISTANCE (FT)	$+V_{max}$ (KIPS/FT)	$-V_{max}$ (KIPS/FT)	$+V_{max}$ (KIPS/FT)	$-V_{max}$ (KIPS/FT)
24	18	613	4	2	0.522	0.067	0.505	0.044
				5	0.801	0.047	0.765	0.033
				8	0.851	0.042	0.851	0.000
		1477	4	2	1.063	0.094	1.036	0.504
				5	2.218	0.471	2.171	0.467
				8	3.753	0.902	3.659	0.898
48	18	613	4	2	0.542	0.790	0.539	0.052
				5	1.222	0.437	1.358	0.383
				8	0.851	0.042	0.851	0.000
		1477	4	2	1.098	0.150	1.103	0.063
				5	3.052	0.761	2.779	0.538
				8	3.753	0.902	3.659	0.898

TABLE 24. (Continued)

SLAB WIDTH = 24 FT.					LONG DIRECTION (KIPS/FT)		SHORT DIRECTION (KIPS/FT)	
SLAB SIZE (FT)	BEAM DEPTH (IN)	PERIMETER LOAD (LB/FT)	DIFFERENTIAL SWELL (IN)	EDGE MOISTURE VARIATION DISTANCE (FT)	$+V_{max}$	$-V_{max}$	$+V_{max}$	$-V_{max}$
96	18	613	4	2	0.325	0.092	0.333	0.075
				5	1.979	0.781	2.447	0.563
				8	3.275	1.472	4.098	1.059
		1477	4	2	0.693	0.145	0.714	0.063
				5	2.090	0.843	2.497	0.541
				8	3.436	0.154	4.146	1.037
144	18	613	4	2	0.325	0.094	0.331	0.079
				5	1.977	0.783	2.435	0.563
				8	3.276	1.483	4.078	1.061
		1477	4	2	0.693	0.147	0.711	0.064
				5	2.087	0.841	2.479	0.541
				8	3.435	1.541	4.123	1.039

TABLE 24. (Continued)

SLAB WIDTH = 24 FT					LONG DIRECTION		SHORT DIRECTION	
SLAB SIZE (FT)	BEAM DEPTH (IN)	PERIMETER LOAD (LB/FT)	DIFFERENTIAL SWELL (IN)	EDGE MOISTURE VARIATION DISTANCE (FT)	$+V_{max}$	$-V_{max}$	$+V_{max}$	$-V_{max}$
					(KIPS/FT)			
24	30	613	4	2	0.514	0.027	0.496	0.003
				5	2.709	0.199	2.702	0.187
				8	2.325	0.349	2.251	0.388
		1477	4	2	0.997	0.000	0.987	0.000
				5	2.871	0.154	2.877	0.140
				8	4.845	0.366	4.841	0.349
48	30	613	4	2	0.533	0.085	0.610	0.002
				5	2.822	0.460	1.400	0.498
				8	2.159	0.862	2.365	0.144
		1477	4	2	1.028	0.145	1.176	0.000
				5	3.806	0.781	3.025	0.172
				8	6.340	0.908	2.994	0.083

TABLE 24. (Continued)

SLAB WIDTH = 24 FT					LONG DIRECTION		SHORT DIRECTION	
SLAB SIZE (FT)	BEAM DEPTH (IN)	PERIMETER LOAD (LB/FT)	DIFFERENTIAL SWELL (IN)	EDGE MOISTURE VARIATION DISTANCE (FT)	$+V_{max}$ (KIPS/FT)	$-V_{max}$ (KIPS/FT)	$+V_{max}$ (KIPS/FT)	$-V_{max}$ (KIPS/FT)
96	30	613	4	2	0.342	0.072	0.352	0.041
				5	2.770	0.388	2.259	0.309
				8	2.128	1.017	2.274	0.503
		1477	4	2	0.707	0.140	0.730	0.000
				5	2.610	0.813	3.390	0.176
				8	4.408	1.505	5.710	0.423
144	30	613	4	2	0.343	0.108	0.350	0.046
				5	2.485	0.780	3.215	0.220
				8	4.170	1.142	2.025	0.150
		1477	4	2	0.708	0.118	0.727	0.000
				5	2.608	0.810	3.375	0.175
				8	3.754	0.879	4.703	0.703

TABLE 24. (Continued)

SLAB WIDTH = 40 FT					LONG DIRECTION		SHORT DIRECTION	
SLAB SIZE (FT)	BEAM DEPTH (IN)	PERIMETER LOAD (LB/FT)	DIFFERENTIAL SWELL (IN)	EDGE MOISTURE VARIATION DISTANCE (FT)	$+V_{max}$ (KIPS/FT)	$-V_{max}$ (KIPS/FT)	$+V_{max}$ (KIPS/FT)	$-V_{max}$ (KIPS/FT)
48	18	613	1	2	0.548	0.222	0.539	0.223
				5	1.911	1.474	1.950	1.509
				8	1.615	1.668	1.684	1.693
		1477	1	2	1.894	1.424	1.927	1.437
				5	1.915	1.692	1.966	1.727
				8	1.644	1.874	1.727	1.913
48	30	613	1	2	0.638	0.823	0.628	1.004
				5	1.591	1.551	1.672	1.770
				8	2.194	1.685	1.818	5.902
		1477	1	2	2.596	2.222	2.636	2.020
				5	3.362	1.888	3.467	1.645
				8	3.310	4.927	3.589	6.217

TABLE 24. (Continued)

SLAB WIDTH = 40 FT					LONG DIRECTION		SHORT DIRECTION	
SLAB SIZE (FT)	BEAM DEPTH (IN)	PERIMETER LOAD (LB/FT)	DIFFERENTIAL SWELL (IN)	EDGE MOISTURE VARIATION DISTANCE (FT)	$+V_{max}$ (KIPS/FT)	$-V_{max}$ (KIPS/FT)	$+V_{max}$ (KIPS/FT)	$-V_{max}$ (KIPS/FT)
48	18	613	4	2	1.985	0.606	1.956	0.593
				5	2.416	0.995	2.344	0.938
				8	1.718	0.626	1.679	0.520
		1477	4	2	2.184	0.763	2.155	0.747
				5	2.544	1.077	2.478	0.997
				8	3.909	1.027	3.635	0.772
48	30	613	4	2	2.470	1.500	2.284	1.758
				5	3.172	0.447	2.362	1.713
				8	2.843	0.948	1.955	2.014
		1477	4	2	2.661	1.853	2.525	2.190
				5	3.393	2.242	3.289	2.581
				8	4.357	1.799	3.427	3.623

TABLE 25. Differential Deflection Occurring in Center Lift Model with Perimeter Loading

SLAB SIZE (ft)	DIFFERENTIAL SWELL (in)	PERIMETER LOAD (lb/ft)	EDGE MOISTURE VARIATION DISTANCE (ft)	DIFFERENTIAL DEFLECTION BEAM DEPTH 18 in	30 in
24x24	1	613	2	0.163	0.045
			5	0.484	0.114
			8	0.806	0.178
		1477	2	0.185	0.091
			5	0.864	0.352
			8	0.861	0.370
48x24	1	613	2	0.122	0.238
			5	0.842	0.289
			8	1.012	0.621
		1477	2	0.213	0.114
			5	0.580	0.628
			8	0.979	0.655
96x24	1	613	2	0.138	0.104
			5	0.658	0.193
			8	0.871	0.475
		1477	2	0.245	0.132
			5	0.944	0.495
			8	0.939	0.516
144x24	1	613	2	0.168	0.091
			5	0.551	0.468
			8	0.923	0.552
		1477	2	0.266	0.143
			5	0.928	0.505
			8	0.988	0.586

TABLE 25. (Continued)

SLAB SIZE (ft)	DIFFERENTIAL SWELL (in)	PERIMETER LOAD (lb/ft)	EDGE MOISTURE VARIATION DISTANCE (ft)	DIFFERENTIAL DEFLECTION BEAM DEPTH 18 in	30 in
24x24	4	613	2	0.124	0.044
			5	0.410	0.338
			8	0.621	0.501
		1477	2	0.317	0.113
			5	1.074	0.407
			8	1.755	0.667
48x24	4	613	2	0.099	0.035
			5	0.873	0.561
			8	1.993	0.591
		1477	2	0.313	0.149
			5	1.239	0.679
			8	2.104	1.461
96x24	4	613	2	0.096	0.102
			5	0.979	0.539
			8	1.825	0.665
		1477	2	0.255	0.108
			5	1.181	0.577
			8	2.027	1.061
144x24	4	613	2	0.123	0.144
			5	0.969	0.469
			8	1.814	0.723
		1477	2	0.240	0.159
			5	1.167	0.579
			8	2.012	1.058

TABLE 25. (Continued)

SLAB SIZE (ft)	DIFFERENTIAL SWELL (in)	PERIMETER LOAD (lb/ft)	EDGE MOISTURE VARIATION DISTANCE (ft)	DIFFERENTIAL DEFLECTION BEAM DEPTH 18 in	30 in
48x40	1	613	2	0.076	0.073
			5	0.904	0.318
			8	0.958	0.668
		1477	2	0.957	0.626
			5	1.074	0.723
			8	1.137	0.953
48x40	4	613	2	0.470	0.271
			5	1.156	0.599
			8	1.474	0.831
		1477	2	0.664	0.387
			5	1.446	0.803
			8	2.795	1.468

TABLE 26. Maximum Moments Occurring in Edge Lift Model with Perimeter Loading

SLAB WIDTH = 24 FT					LONG DIRECTION		SHORT DIRECTION	
SLAB LENGTH (FT)	BEAM DEPTH (IN)	EDGE LOAD (LB/FT)	EDGE MOISTURE VARIATION DISTANCE (FT)	DIFFERENTIAL SWELL (IN)	$+ M_{max}$	$- M_{max}$	$+ M_{max}$	$- M_{max}$
					(FT-KIPS/FT)			
24	18	613	0	0.00	0.489	0	0.485	0
			2	0.31	3.760	0	3.776	0
			5	0.74	8.356	0	8.428	0
			8	1.12	8.825	0	8.801	0
	18	1477	0	0.00	0.584	0.560	0.574	0.581
			2	0.31	3.380	0	3.333	0
			5	0.74	7.846	0	7.860	0
			8	1.12	11.844	0	11.824	0
48	18	613	0	0.00	0.459	0	0.506	0
			2	0.31	3.592	0	3.891	0
			5	0.74	7.634	0	9.126	0
			8	1.12	8.178	0	14.536	0
	18	1477	0	0.00	0.563	0	0.573	0
			2	0.31	3.260	0	3.400	0
			5	0.74	7.209	0	8.339	0
			8	1.12	9.644	0	13.559	0

TABLE 26. (Continued)

SLAB WIDTH = 24 FT					LONG DIRECTION		SHORT DIRECTION	
SLAB LENGTH (FT)	BEAM DEPTH (IN)	EDGE LOAD (LB/FT)	EDGE MOISTURE VARIATION DISTANCE (FT)	DIFFERENTIAL SWELL (IN)	+ M_{max} (FT-KIPS/FT)	- M_{max} (FT-KIPS/FT)	+ M_{max} (FT-KIPS/FT)	- M_{max} (FT-KIPS/FT)
96	18	613	0	0.00	0.451	0	0.516	0
			2	0.31	3.587	1.685	3.855	0.196
			5	0.74	7.773	3.887	9.073	0.276
			8	1.12	9.876	5.674	16.178	0
	18	1477	0	0.00	0.559	0.471	0.582	0.786
			2	0.31	3.362	1.864	3.379	1.270
			5	0.74	7.214	2.890	8.223	0.553
			8	1.12	9.713	1.235	15.075	0
144	18	613	0	0.00	0.355	0.029	0.502	0
			2	0.31	3.671	0.116	4.098	0
			5	0.74	8.131	0.140	9.711	0
			8	1.12	10.454	0.152	14.900	0
	18	1477	0	0.00	0.456	0.484	0.475	0.773
			2	0.31	3.533	0.148	3.789	0
			5	0.74	7.542	0.171	8.849	0
			8	1.12	9.828	0.181	13.823	0

TABLE 26. (Continued)

SLAB WIDTH = 24 FT					LONG DIRECTION		SHORT DIRECTION	
SLAB LENGTH (FT)	BEAM DEPTH (IN)	EDGE LOAD (LB/FT)	EDGE MOISTURE VARIATION DISTANCE (FT)	DIFFERENTIAL SWELL (IN)	+ M_{max} (FT-KIPS/FT)	- M_{max} (FT-KIPS/FT)	+ M_{max} (FT-KIPS/FT)	- M_{max} (FT-KIPS/FT)
24	30	613	0	0.00	1.234	0	1.449	0
			2	0.31	6.919	0	7.173	0
			5	0.74	10.880	0	11.112	0
			8	1.12	10.880	0	11.112	0
	30	1477	0	0.00	0.619	0.505	0.344	0.594
			2	0.31	5.471	0	5.893	0
			5	0.74	14.419	0	14.823	0
			8	1.12	13.552	0	13.923	0
48	30	613	0	0.00	1.428	0	1.482	0
			2	0.31	5.225	0	7.345	0
			5	0.74	11.619	0	18.145	0
			8	1.12	10.999	0	18.204	0
	30	1477	0	0.00	1.007	0	0.481	0
			2	0.31	4.390	0	5.832	0
			5	0.74	10.609	0	16.168	0
			8	1.12	15.084	0	26.544	0

TABLE 26. (Continued)

SLAB WIDTH = 24 FT					LONG DIRECTION		SHORT DIRECTION	
SLAB LENGTH (FT)	BEAM DEPTH (IN)	EDGE LOAD (LB/FT)	EDGE MOISTURE VARIATION DISTANCE (FT)	DIFFERENTIAL SWELL (IN)	$+M_{max}$ (FT-KIPS/FT)	$-M_{max}$ (FT-KIPS/FT)	$+M_{max}$ (FT-KIPS/FT)	$-M_{max}$ (FT-KIPS/FT)
96	30	613	0	0.00	0.805	0	1.603	0
			2	0.31	5.220	0.338	7.278	0
			5	0.74	11.640	1.287	18.008	0
			8	1.12	10.883	0.178	28.966	0
	30	1477	0	0.00	0.766	0.431	0.581	1.157
			2	0.31	4.415	0.636	5.927	0
			5	0.74	10.554	1.293	15.824	0
			8	1.12	15.330	0	26.333	0.896
144	30	613	0	0.00	0.907	0	1.414	0
			2	0.31	5.127	0	7.429	0
			5	0.74	11.895	0.071	18.714	0
			8	1.12	15.132	0.160	29.536	0
	30	1477	0	0.00	0.703	0.501	0.481	1.130
			2	0.31	4.331	0	5.657	0
			5	0.74	10.783	0.032	16.540	0
			8	1.12	15.657	0.112	27.354	0

TABLE 26. (Continued)

SLAB WIDTH = 40 FT					LONG DIRECTION		SHORT DIRECTION	
SLAB LENGTH (FT)	BEAM DEPTH (IN)	EDGE LOAD (LB/FT)	EDGE MOISTURE VARIATION DISTANCE (FT)	DIFFERENTIAL SWELL (IN)	$+M_{max}$ (FT-KIPS/FT)	$-M_{max}$ (FT-KIPS/FT)	$+M_{max}$ (FT-KIPS/FT)	$-M_{max}$ (FT-KIPS/FT)
48	18	613	0	0.00	0.476	0	0.487	0
			2	0.31	3.656	0	3.716	0
			5	0.74	7.892	0	8.202	0
			8	1.12	10.605	0	10.806	0
	18	1477	0	0.00	0.544	0	0.552	0
			2	0.31	3.390	0	3.393	0
			5	0.74	7.435	0	7.533	0
			8	1.12	9.978	0	10.150	0
48	30	613	0	0.00	1.715	0	1.999	0
			2	0.31	5.507	0	6.102	0
			5	0.74	12.808	0	14.198	0
			8	1.12	18.629	0	21.563	0
	30	1477	0	0.00	1.032	0	1.274	0
			2	0.31	4.534	0	4.775	0
			5	0.74	11.505	0	12.789	0
			8	1.12	17.446	0	20.026	0

TABLE 27. Maximum Shear Forces Occurring in Edge Lift Model with Perimeter Loading

SLAB WIDTH = 24 FT					LONG DIRECTION		SHORT DIRECTION	
SLAB LENGTH (FT)	BEAM DEPTH (IN)	EDGE LOAD (LB/FT)	EDGE MOISTURE VARIATION DISTANCE (FT)	DIFFERENTIAL SWELL (IN)	$+V_{max}$ (KIPS/FT)	$-V_{max}$ (KIPS/FT)	$+V_{max}$ (KIPS/FT)	$-V_{max}$ (KIPS/FT)
24	18	613	0	0.00	0.216	0.050	0.215	0.052
			2	0.31	1.744	0.432	1.747	0.430
			5	0.74	2.082	1.130	2.088	1.133
			8	1.12	2.078	1.173	2.083	1.177
	18	1477	0	0.00	0.292	0.278	0.291	0.280
			2	0.31	1.690	0.355	1.691	0.353
			5	0.74	2.091	1.096	2.093	1.093
			8	1.12	2.199	1.471	2.021	1.468
48	18	613	0	0.00	0.208	0.060	0.222	0.045
			2	0.31	1.702	0.631	1.817	0.463
			5	0.74	1.989	1.594	2.073	1.239
			8	1.12	2.116	2.152	2.240	1.640
	18	1477	0	0.00	0.292	0.278	0.291	0.280
			2	0.31	1.684	0.517	1.700	0.372
			5	0.74	2.069	1.503	2.133	1.183
			8	1.12	2.264	2.105	2.312	1.647

TABLE 27. (Continued)

SLAB WIDTH = 24 FT					LONG DIRECTION		SHORT DIRECTION	
SLAB LENGTH (FT)	BEAM DEPTH (IN)	EDGE LOAD (LB/FT)	EDGE MOISTURE VARIATION DISTANCE (FT)	DIFFERENTIAL SWELL (IN)	$+V_{max}$ (KIPS/FT)	$-V_{max}$ (KIPS/FT)	$+V_{max}$ (KIPS/FT)	$-V_{max}$ (KIPS/FT)
96	18	613	0	0.00	0.206	0.064	0.225	0.046
			2	0.31	2.786	2.340	1.804	1.336
			5	0.74	2.225	1.906	2.210	1.742
			8	1.12	2.399	2.132	2.310	2.001
	18	1477	0	0.00	0.309	2.230	0.306	0.260
			2	0.31	2.801	2.332	1.701	1.344
			5	0.74	2.285	2.009	2.110	1.377
			8	1.12	2.463	2.212	2.264	2.109
144	18	613	0	0.00	0.178	0.057	0.195	0.041
			2	0.31	1.836	0.513	2.049	0.338
			5	0.74	2.171	1.526	2.252	1.177
			8	1.12	2.328	2.126	2.397	1.649
	18	1477	0	0.00	0.223	0.221	0.257	0.218
			2	0.31	1.766	0.361	1.895	0.264
			5	0.74	2.186	1.374	2.252	1.044
			8	1.12	2.378	1.974	2.426	1.515

TABLE 27. (Continued)

SLAB WIDTH = 24 FT					LONG DIRECTION		SHORT DIRECTION	
SLAB LENGTH (FT)	BEAM DEPTH (IN)	EDGE LOAD (LB/FT)	EDGE MOISTURE VARIATION DISTANCE (FT)	DIFFERENTIAL SWELL (IN)	+ V_{max} (KIPS/FT)	- V_{max} (KIPS/FT)	+ V_{max} (KIPS/FT)	- V_{max} (KIPS/FT)
24	30	613	0	0.00	0.381	0.003	0.371	0.000
			2	0.31	2.234	0.017	2.198	0.006
			5	0.74	2.511	0.083	2.469	0.057
			8	1.12	2.511	0.083	2.469	0.057
	30	1477	0	0.00	0.377	0.283	0.358	0.293
			2	0.31	2.063	0.020	2.016	0.000
			5	0.74	2.784	0.160	2.749	0.141
			8	1.12	2.753	0.140	2.714	0.110
48	30	613	0	0.00	0.381	0.003	0.371	0.000
			2	0.31	2.093	0.310	2.275	0.022
			5	0.74	2.607	1.200	3.117	0.221
			8	1.12	2.579	1.186	3.121	0.195
	30	1477	0	0.00	0.428	0.283	0.358	0.293
			2	0.31	1.967	0.224	2.046	0.004
			5	0.74	2.585	1.074	2.858	0.192
			8	1.12	2.861	1.673	3.469	0.181

TABLE 27. (Continued)

SLAB WIDTH = 24 FT					LONG DIRECTION		SHORT DIRECTION	
SLAB LENGTH (FT)	BEAM DEPTH (IN)	EDGE LOAD (LB/FT)	EDGE MOISTURE VARIATION DISTANCE (FT)	DIFFERENTIAL SWELL (IN)	+ V_{max} (KIPS/FT)	- V_{max} (KIPS/FT)	+ V_{max} (KIPS/FT)	- V_{max} (KIPS/FT)
96	30	613	0	0.00	0.362	0.027	0.377	0.000
			2	0.31	2.799	2.520	2.250	1.781
			5	0.74	2.729	2.392	2.521	2.333
			8	1.12	2.943	2.643	2.761	2.411
	30	1477	0	0.00	0.441	0.285	0.395	0.303
			2	0.31	2.372	2.464	2.027	1.805
			5	0.74	2.802	2.436	2.699	2.321
			8	1.12	3.021	2.748	2.891	2.589
144	30	613	0	0.00	0.240	0.046	0.291	0.000
			2	0.31	2.185	0.378	2.853	0.022
			5	0.74	2.782	1.321	3.203	0.218
			8	1.12	2.951	2.135	3.676	0.473
	30	1477	0	0.00	0.338	0.271	0.366	0.232
			2	0.31	2.072	0.226	2.313	0.037
			5	0.74	2.759	1.154	3.075	0.215
			8	1.12	3.110	1.933	3.474	0.459

TABLE 27. (Continued)

SLAB WIDTH = 40 FT					LONG DIRECTION		SHORT DIRECTION	
SLAB LENGTH (FT)	BEAM DEPTH (IN)	EDGE LOAD (LB/FT)	EDGE MOISTURE VARIATION DISTANCE (FT)	DIFFERENTIAL SWELL (IN)	$+V_{max}$ (KIPS/FT)	$-V_{max}$ (KIPS/FT)	$+V_{max}$ (KIPS/FT)	$-V_{max}$ (KIPS/FT)
48	18	613	0	0.00	0.215	0.058	0.218	0.053
			2	0.31	1.759	0.671	1.776	0.668
			5	0.74	2.075	1.747	2.074	1.748
			8	1.12	2.318	2.451	2.311	2.449
	18	1477	0	0.00	0.335	0.270	0.338	0.258
			2	0.31	1.695	0.527	1.696	0.526
			5	0.74	2.115	1.604	2.114	1.606
			8	1.12	2.413	2.346	2.407	2.347
48	30	613	0	0.00	0.398	0.008	0.351	0.003
			2	0.31	2.191	0.414	2.176	0.243
			5	0.74	2.799	1.561	2.803	1.292
			8	1.12	3.430	2.679	3.426	2.293
	30	1477	0	0.00	0.524	0.243	0.472	0.299
			2	0.31	2.044	0.268	1.985	0.130
			5	0.74	2.770	1.383	2.736	1.105
			8	1.12	3.471	2.480	3.425	2.093

TABLE 28. Differential Deflection Occuring in Edge Lift Model with Perimeter Loading

SLAB SIZE (FT)	DIFFERENTIAL SWELL (IN)	PERIMETER LOAD (LB/FT)	EDGE MOISTURE VARIATION DISTANCE (FT)	DIFFERENTIAL DEFLECTION BEAM DEPTH 18 IN	30 IN
24x24	0.00	613	0	0.021	0.027
	0.31		2	0.314	0.155
	0.74		5	0.661	0.224
	1.12		8	0.686	0.229
	0.00	1477	0	0.026	0.006
	0.31		2	0.257	0.130
	0.74		5	0.610	0.299
	1.12		8	0.804	0.280
48x24	0.00	613	0	0.076	0.070
	0.31		2	0.376	0.258
	0.74		5	0.800	0.530
	1.12		8	1.083	0.522
	0.00	1477	0	0.040	0.032
	0.31		2	0.301	0.207
	0.74		5	0.725	0.476
	1.12		8	1.018	0.648
96x24	0.00	613	0	0.129	0.132
	0.31		2	0.417	0.312
	0.74		5	0.828	0.580
	1.12		8	1.119	0.761
	0.00	1477	0	0.107	0.102
	0.31		2	0.353	0.268
	0.74		5	0.764	0.536
	1.12		8	1.056	0.729
144x24	0.00	613	0	0.163	0.188
	0.31		2	0.403	0.368
	0.74		5	0.870	0.638
	1.12		8	1.154	0.822
	0.00	1477	0	0.153	0.177
	0.31		2	0.400	0.343
	0.74		5	0.818	0.612
	1.12		8	1.101	0.796

TABLE 28. (Continued)

SLAB SIZE (FT)	DIFFERENTIAL SWELL (IN)	PERIMETER LOAD (LB/FT)	EDGE MOISTURE VARIATION DISTANCE (FT)	DIFFERENTIAL DEFLECTION BEAM DEPTH 18 IN	
				18 IN	30 IN
48x40	0.00	613	0	0.113	0.123
	0.31		2	0.448	0.390
	0.74		5	0.966	0.814
	1.12		8	1.408	1.173
	0.00	1477	0	0.045	0.035
	0.31		2	0.338	0.299
	0.74		5	0.852	0.723
	1.12		8	1.297	1.084

APPENDIX N

EFFECT OF TENDON ECCENTRICITY ON DIFFERENTIAL DEFLECTION

TABLE 29. Effect of Tendon Eccentricity on Differential Deflection

SLAB LENGTH (FT)	BEAM DEPTH (IN)	PERIMETER LOADING (LB/FT)	LOCATION OF TENDON	DIFFERENTIAL DEFLECTION (IN)	DECREASE IN DIFFERENTIAL DEFLECTION (IN)	DECREASE DUE TO ECCENTRICITY (%)
24	18	613	NA[a]	0.167	-	-
			H[b]	0.144	0.023	13.8
			MS[c]	0.127	0.040	24.0
		1045	NA	0.243	-	-
			H	0.225	0.018	7.4
			MS	0.207	0.036	14.8
		1477	NA	0.316	-	-
			H	0.296	0.020	6.3
			MS	0.275	0.041	13.0
24	30	613	NA	0.040	-	-
			H	0.031	0.009	22.5
			MS	0.022	0.018	45.0
		1045	NA	0.058	-	-
			H	0.048	0.010	17.2
			MS	0.039	0.019	32.8
		1477	NA	0.074	-	-
			H	0.064	0.010	13.5
			MS	0.054	0.020	27.0

TABLE 29. (Continued)

SLAB LENGTH (FT)	BEAM DEPTH (IN)	PERIMETER LOADING (LB/FT)	LOCATION OF TENDON	DIFFERENTIAL DEFLECTION (IN)	DECREASE IN DIFFERENTIAL DEFLECTION (IN)	DECREASE DUE TO ECCENTRICITY (%)
48	18	613	NA	0.496	-	-
			H	0.461	0.035	7.1
			MS	0.425	0.071	14.3
		1045	NA	0.676	-	-
			H	0.641	0.035	5.2
			MS	0.606	0.070	10.4
		1477	NA	0.904	-	-
			H	0.869	0.035	3.4
			MS	0.833	0.071	7.9
48	30	613	NA	0.212	-	-
			H	0.191	0.021	9.9
			MS	0.156	0.056	26.4
		1045	NA	0.317	-	-
			H	0.280	0.037	11.7
			MS	0.243	0.074	23.3
		1477	NA	0.426	-	-
			H	0.388	0.038	8.9
			MS	0.349	0.077	18.1

[a] Neutral Axis

[b] Halfway Between Neutral Axis and Mid-Plane of Slab

[c] Mid-Plane of 4-Inch Slab

APPENDIX O

RELATIONSHIP BETWEEN BENDING MOMENT, TENSILE CRACKING MOMENT, AND DIFFERENTIAL DEFLECTION FOR A 60 FT x 40 FT STIFFENED SLAB WITH DIFFERENT STIFFENING BEAM DEPTHS

TABLE 30. Relationship Between Bending Moment, Tensile Cracking Moment, and Differential Deflection for a 40 Ft x 60 Ft Stiffened Slab with Different Beam Depths

BEAM DEPTH (IN)	CENTER LIFT (Negative Bending)			EDGE LIFT (Positive Bending)		
	CALCULATED CRACKING MOMENT[a] (FT-KIPS/FT)	ACTUAL CRACKING MOMENT (FT-KIPS/FT)	DIFFERENTIAL DEFLECTION FOLLOWING CRACKING (IN)	CALCULATED CRACKING MOMENT[a] (FT-KIPS/FT)	ACTUAL CRACKING MOMENT (FT-KIPS/FT)	DIFFERENTIAL DEFLECTION FOLLOWING CRACKING (IN)
18	9.80	11.20	2.172	1.85	1.79	0.278
20	11.78	12.55	2.106	2.28	1.97	0.269
22	14.02	17.52	2.839	2.75	2.72	0.323
24	16.35	20.29	2.301	3.27	3.51	0.332
26	18.74	20.22	1.833	3.84	3.66	0.310
28	21.19	22.69	1.633	4.45	5.08	0.426
30	23.68	26.86	1.342	5.11	4.96	0.408

[a] Calculated allowing an extreme fiber concrete tensile stress of 6 f'_c .

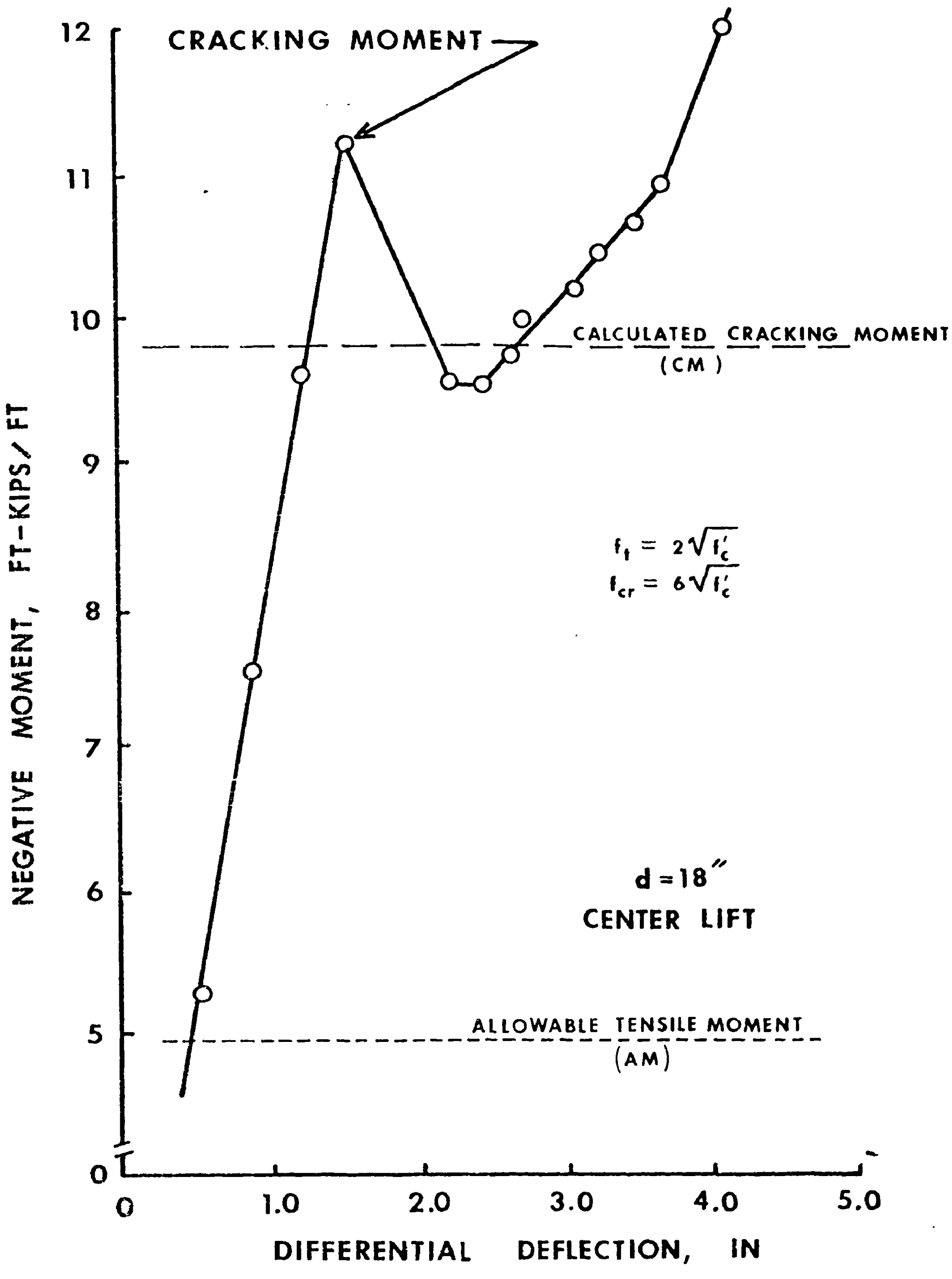


FIG 72a-f. RELATIONSHIP BETWEEN CENTER LIFT BENDING MOMENT, TENSILE CRACKING MOMENT, AND DIFFERENTIAL DEFLECTION FOR A 60 ft × 40 ft SLAB WITH DIFFERENT BEAM DEPTHS.

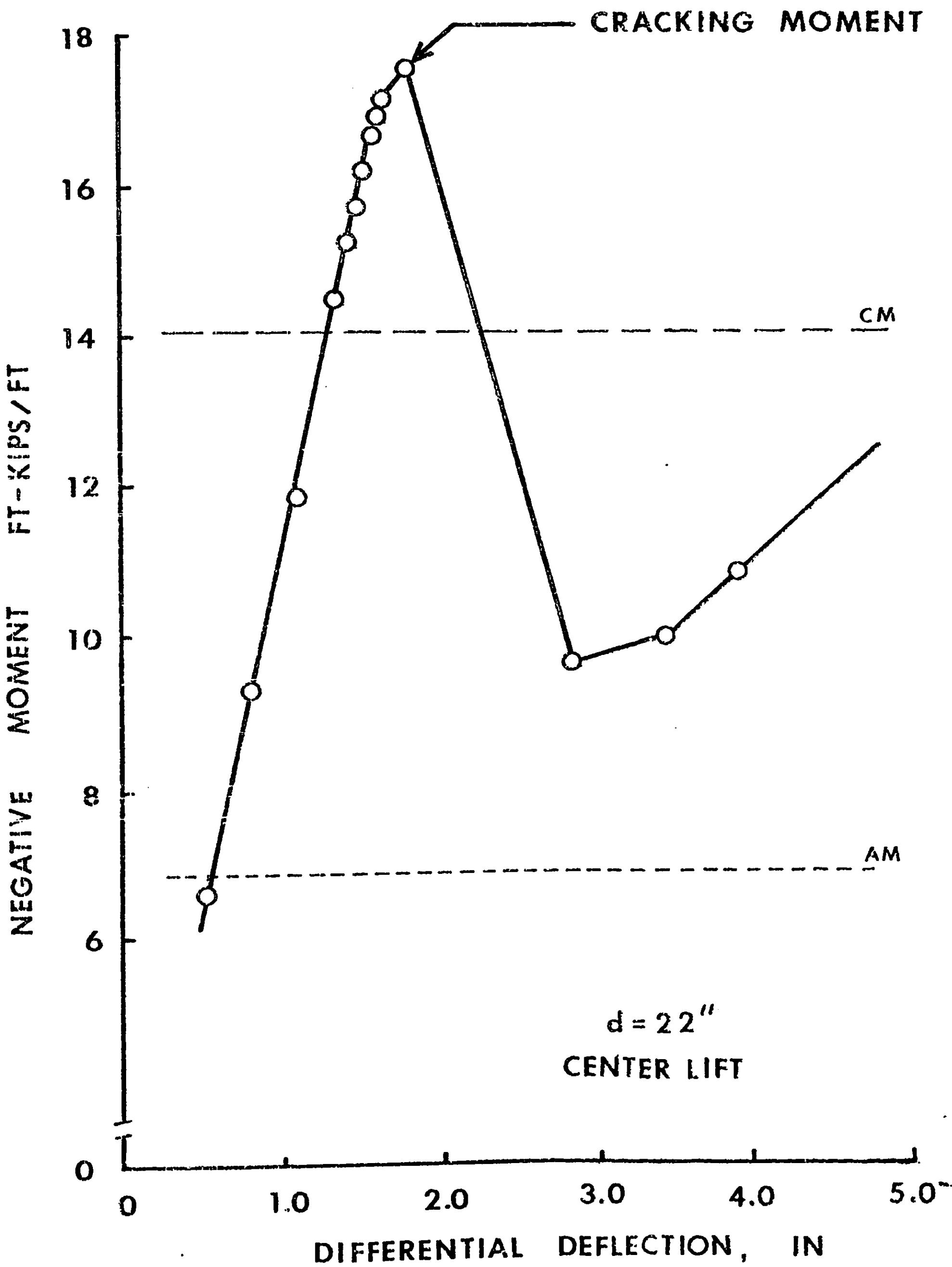
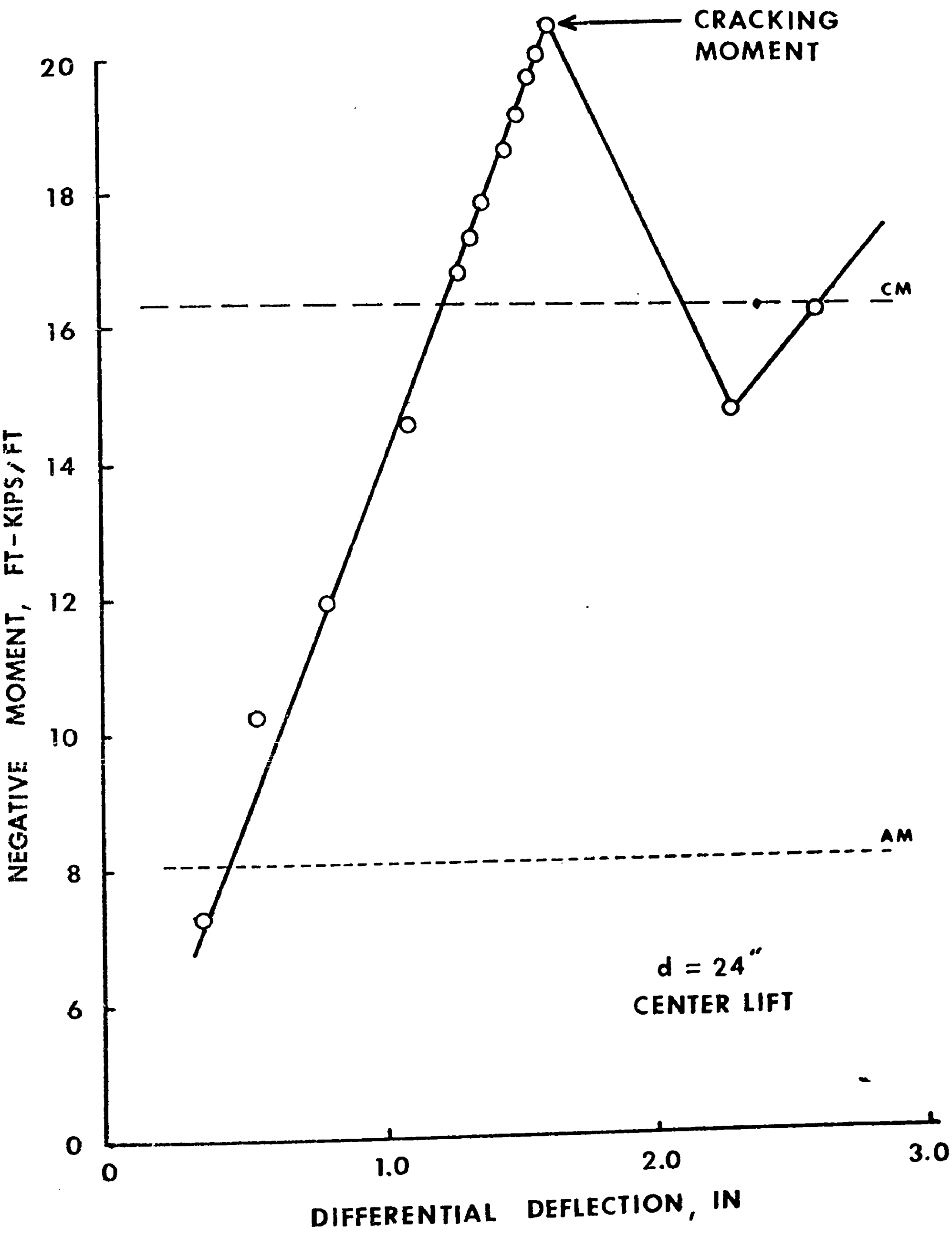
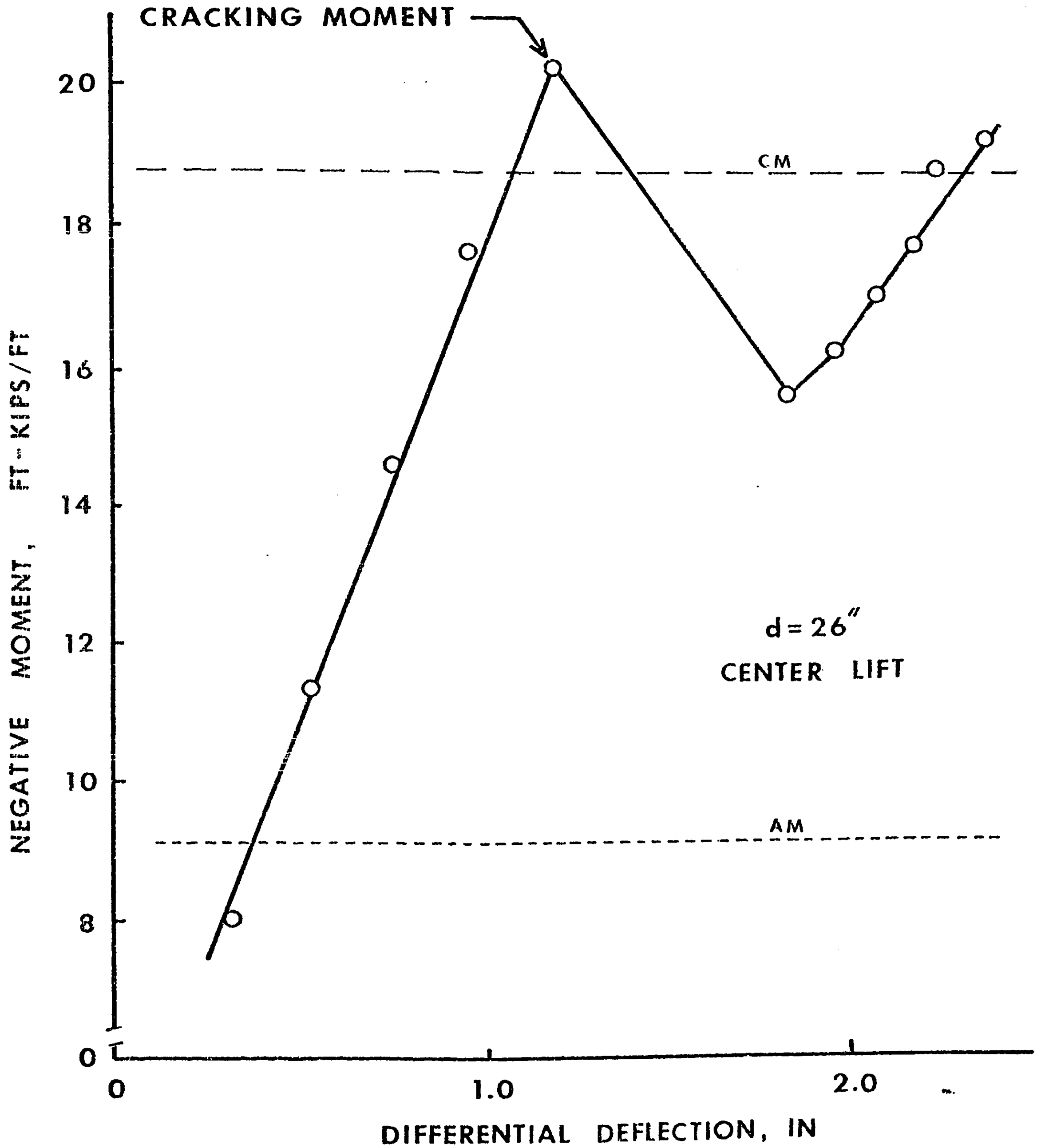

CRACKING MOMENT
18
16
14
12
10
8
6
0
CM
AM
NEGATIVE MOMENT FT-KIPS/FT
d = 22"
CENTER LIFT
0
1.0
2.0
3.0
4.0
5.0"
DIFFERENTIAL DEFLECTION, IN

FIG 72b.



CRACKING
MOMENT
20
18
16
14
12
10
8
6
0
CM
AM
NEGATIVE MOMENT, FT-KIPS/FT
d = 24"
CENTER LIFT
0
1.0
2.0
3.0
DIFFERENTIAL DEFLECTION, IN

FIG 72c.



CRACKING MOMENT
CM
AM
d = 26"
CENTER LIFT
NEGATIVE MOMENT, FT - KIPS/FT
DIFFERENTIAL DEFLECTION, IN
0
8
10
12
14
16
18
20
0
1.0
2.0

FIG 72d.

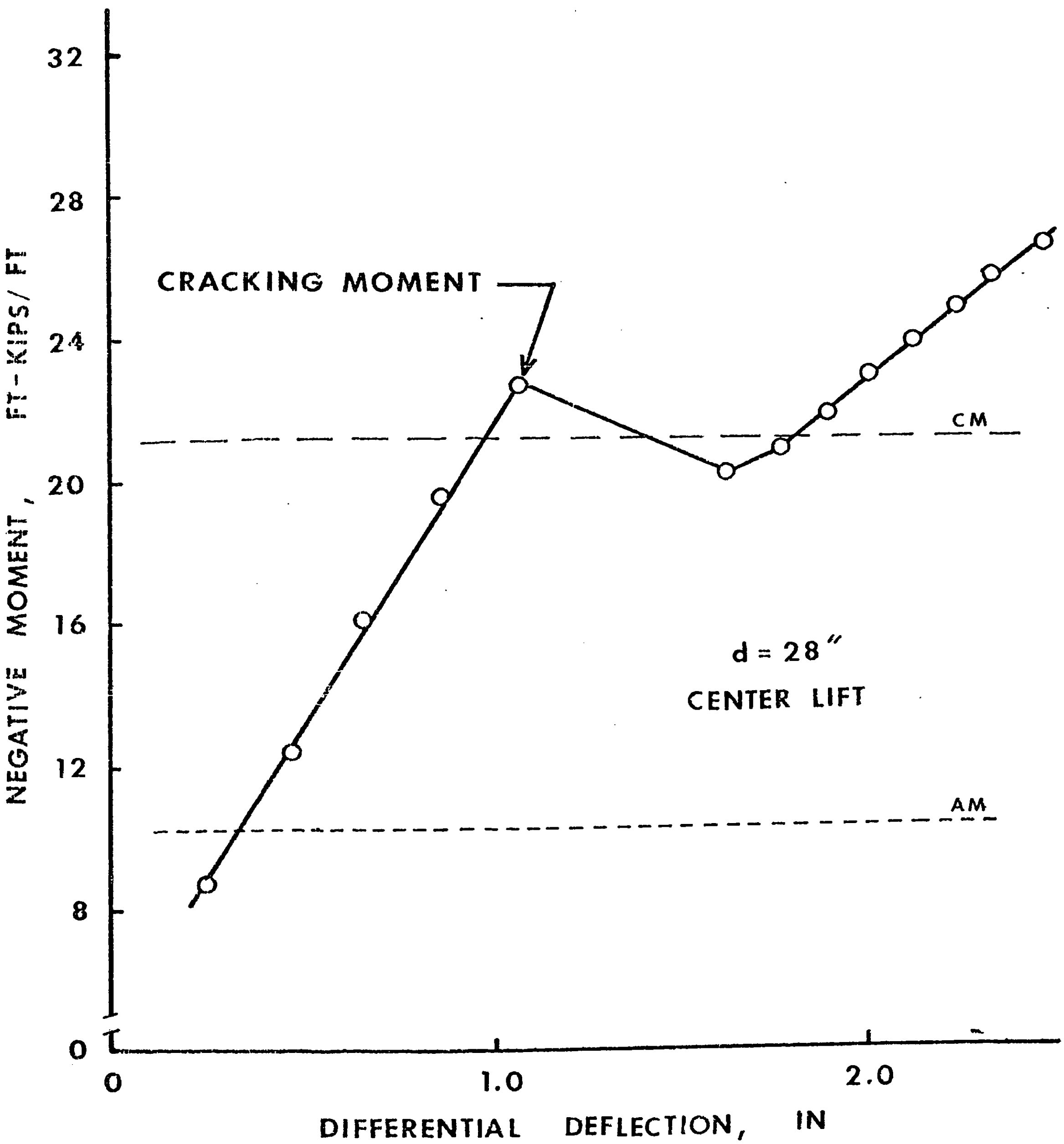
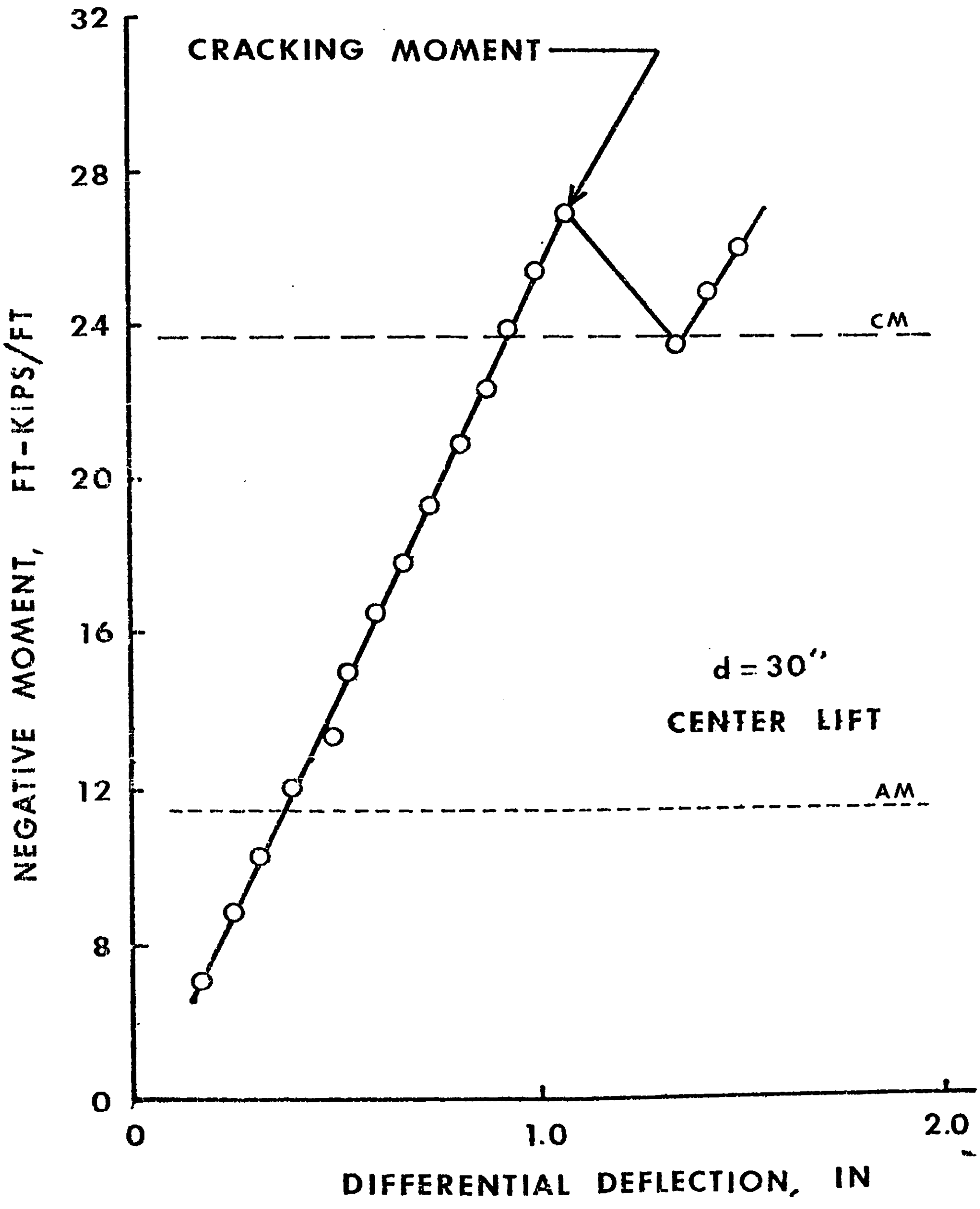

32
28
24
20
16
12
8
0
NEGATIVE MOMENT, FT-KIPS/FT
CRACKING MOMENT
CM
AM
d = 28″
CENTER LIFT
0
1.0
2.0
DIFFERENTIAL DEFLECTION, IN

FIG 72e.



CRACKING MOMENT
32
28
24
20
16
12
8
0
CM
AM
d = 30"
CENTER LIFT
NEGATIVE MOMENT, FT-KIPS/FT
0
1.0
2.0
DIFFERENTIAL DEFLECTION, IN

FIG 72f.

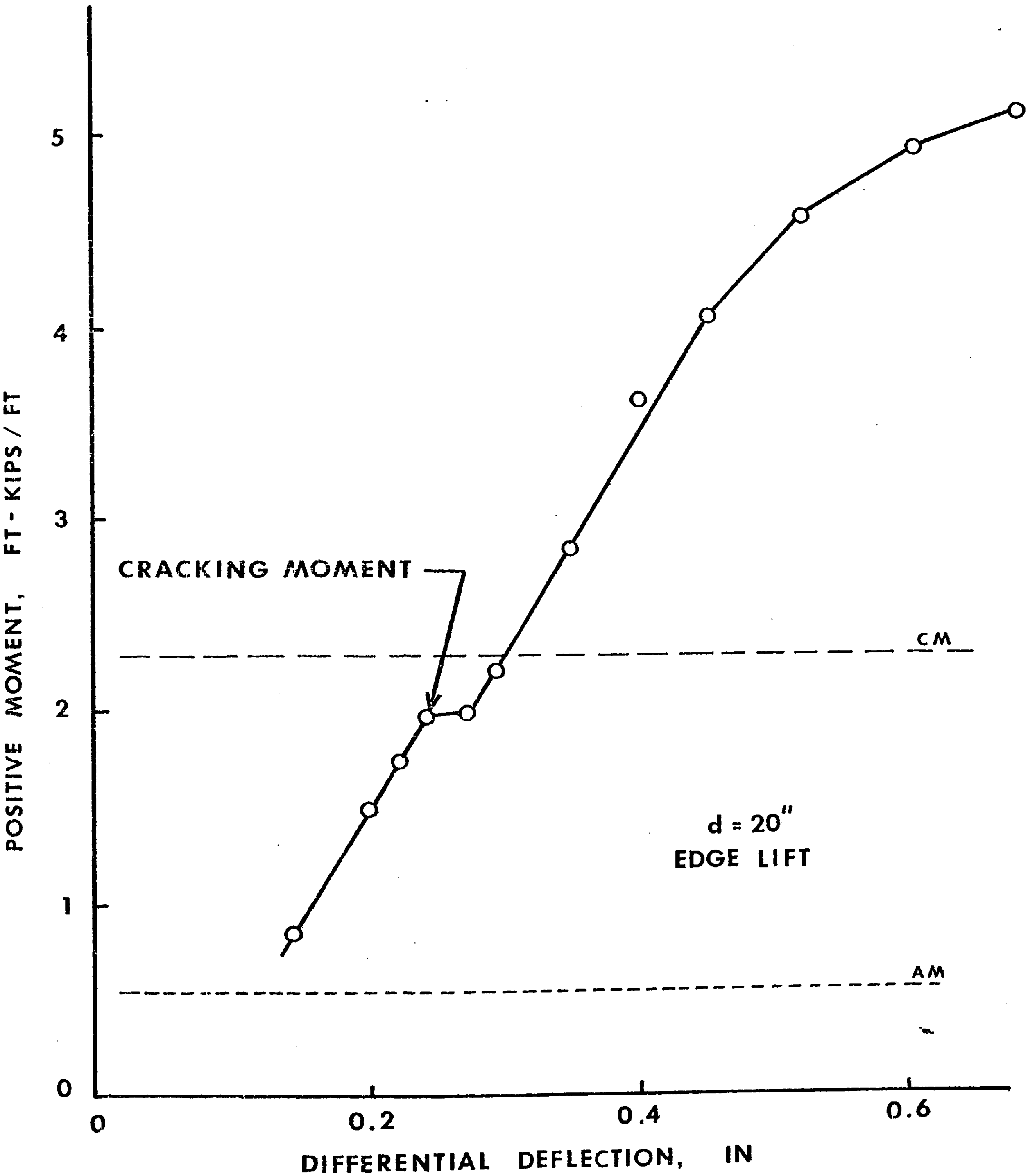
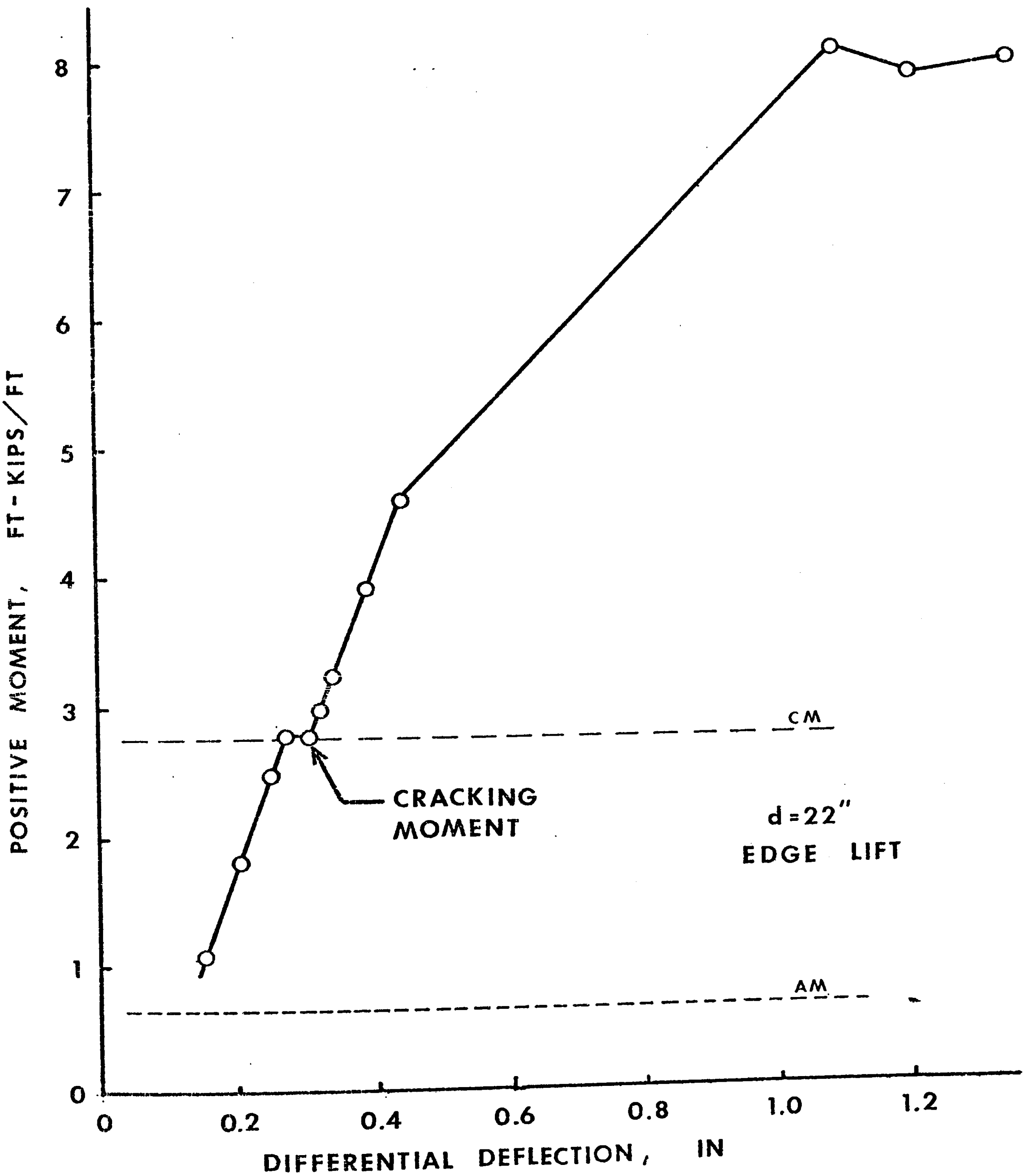
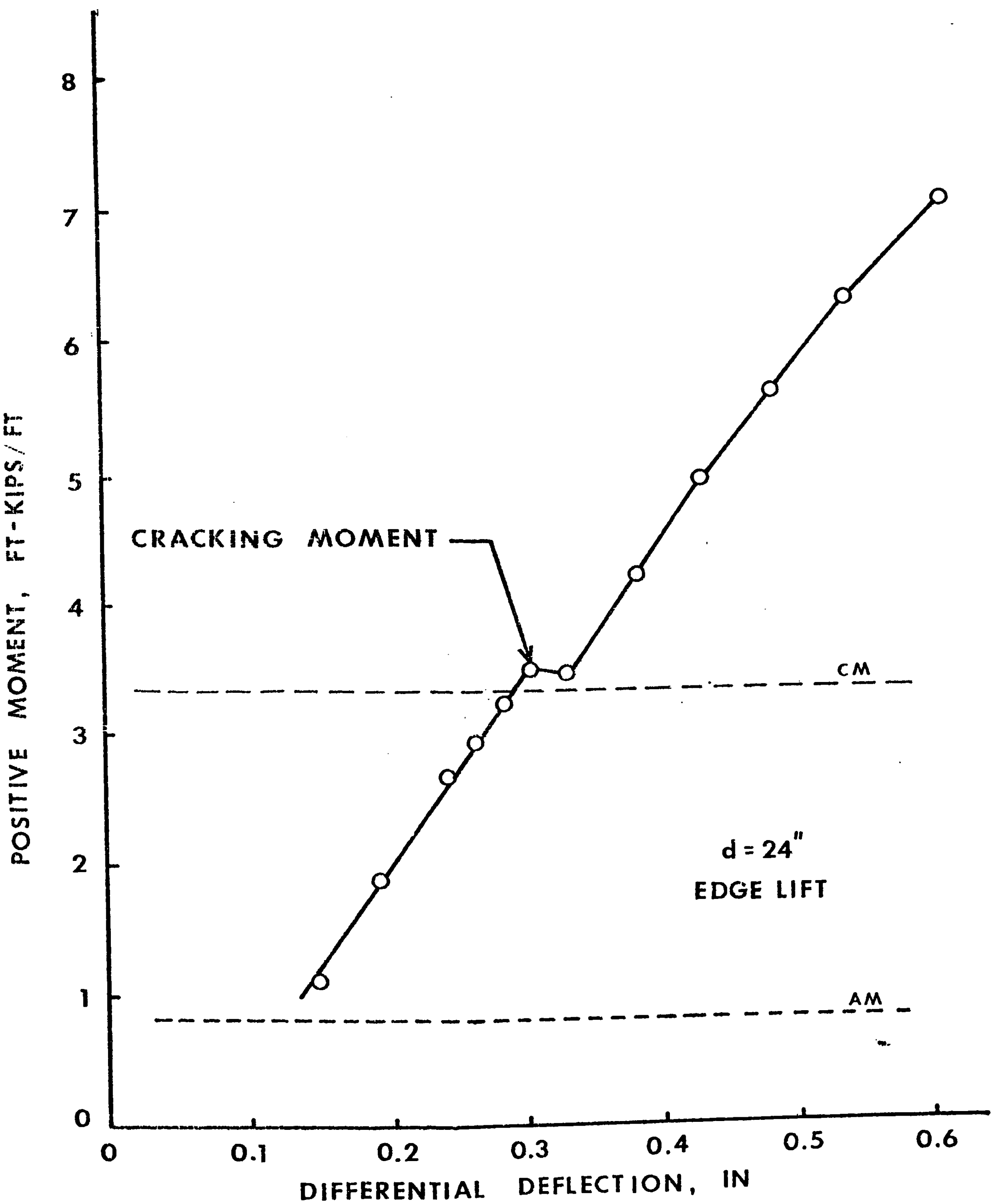


FIG 73 a-f. RELATIONSHIP BETWEEN EDGE LIFT BENDING MOMENT, TENSILE CRACKING MOMENT, AND DIFFERENTIAL DEFLECTION FOR A 60 ft x 40 ft SLAB WITH DIFFERENT BEAM DEPTHS.



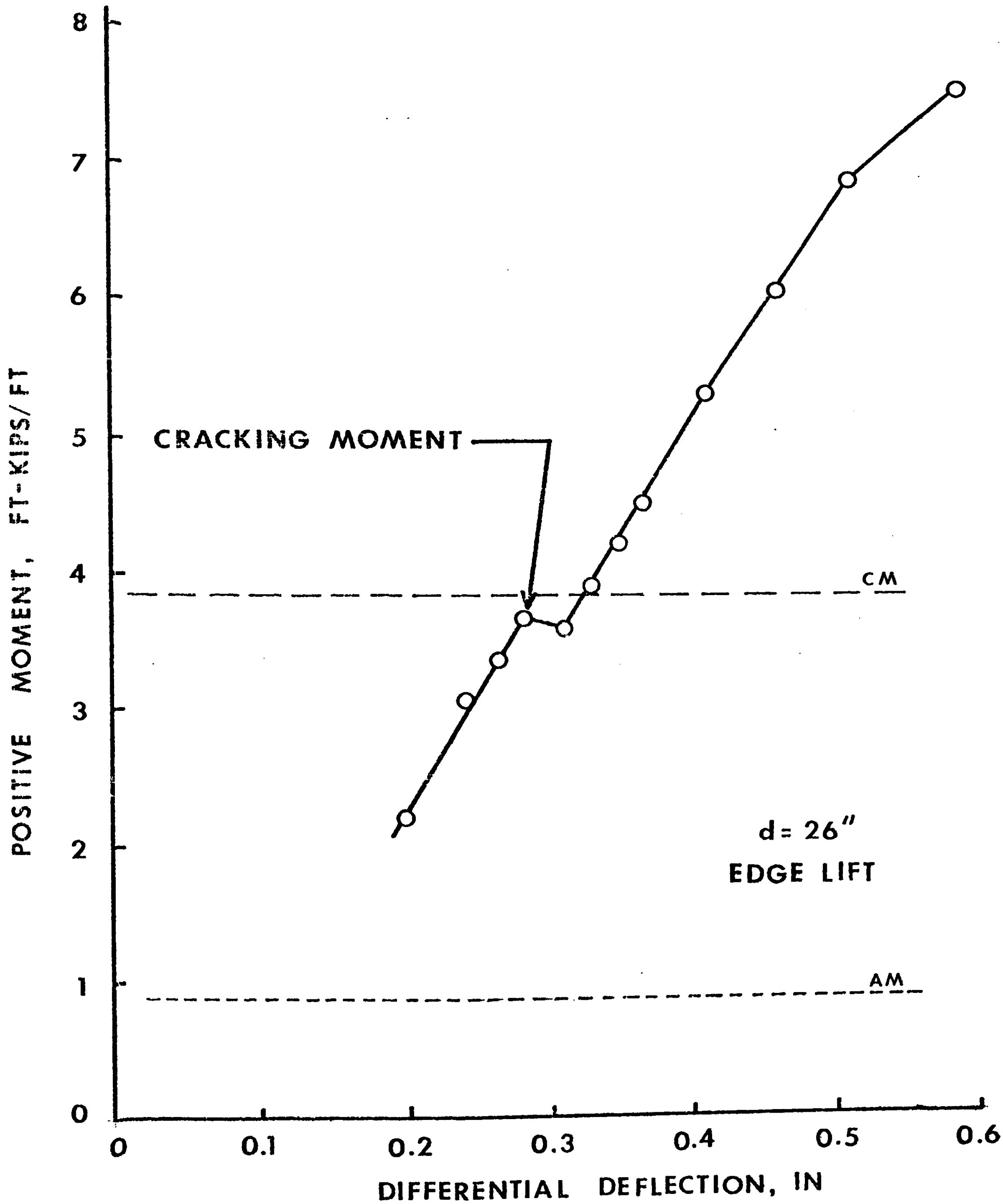
POSITIVE MOMENT, FT-KIPS/FT
8
7
6
5
4
3
2
1
0
CM
AM
CRACKING MOMENT
d = 22"
EDGE LIFT
0
0.2
0.4
0.6
0.8
1.0
1.2
DIFFERENTIAL DEFLECTION, IN

FIG 73b.



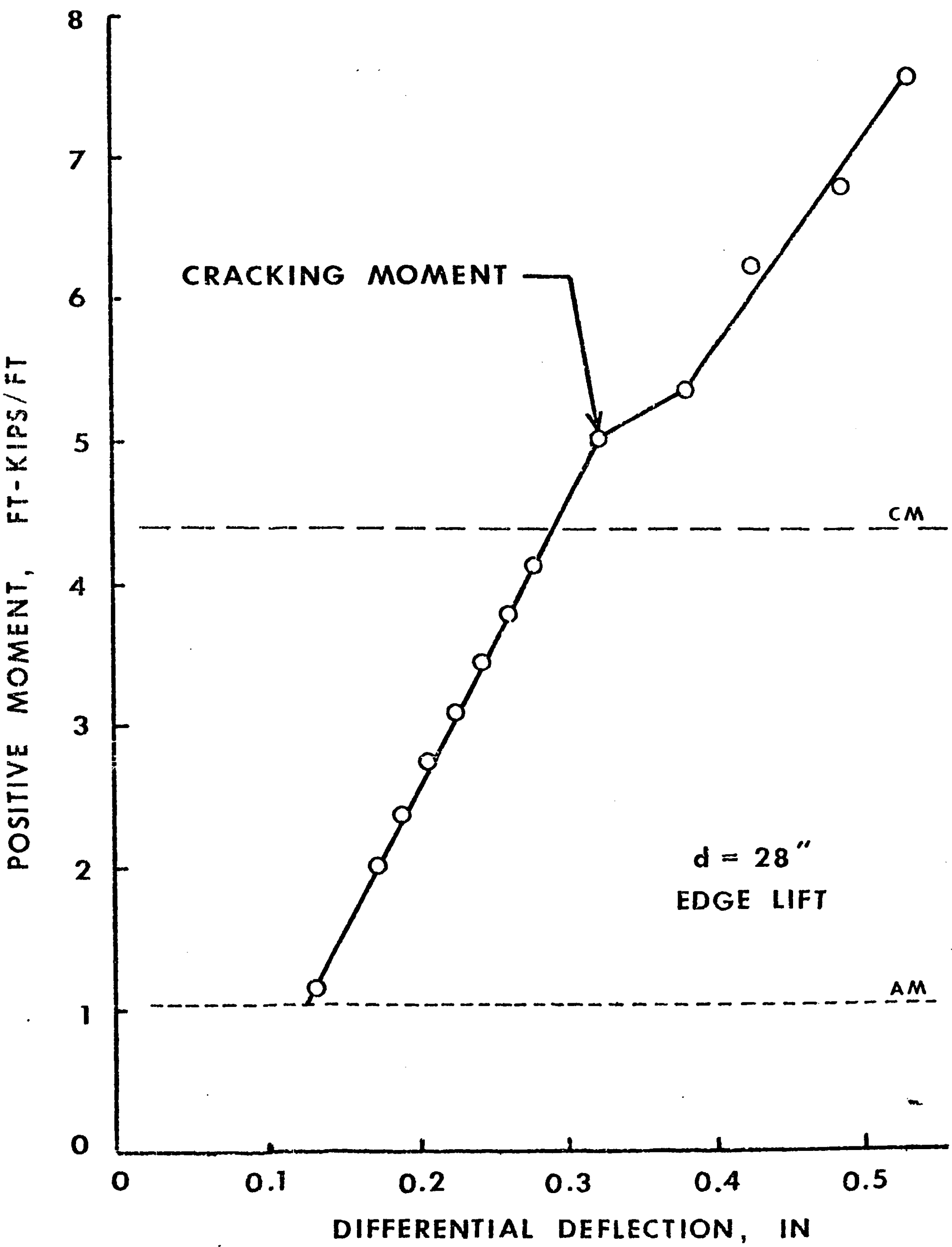
8
7
6
5
4
3
2
1
0
POSITIVE MOMENT, FT-KIPS/FT
CRACKING MOMENT
CM
AM
d = 24"
EDGE LIFT
0
0.1
0.2
0.3
0.4
0.5
0.6
DIFFERENTIAL DEFLECTION, IN

FIG 73c.



8
7
6
5
4
3
2
1
0
POSITIVE MOMENT, FT-KIPS/FT
CRACKING MOMENT
CM
AM
d = 26"
EDGE LIFT
0
0.1
0.2
0.3
0.4
0.5
0.6
DIFFERENTIAL DEFLECTION, IN

FIG 73d.



8
7
6
5
4
3
2
1
0
POSITIVE MOMENT, FT-KIPS/FT
CRACKING MOMENT
CM
AM
d = 28"
EDGE LIFT
0
0.1
0.2
0.3
0.4
0.5
DIFFERENTIAL DEFLECTION, IN

FIG 73e.

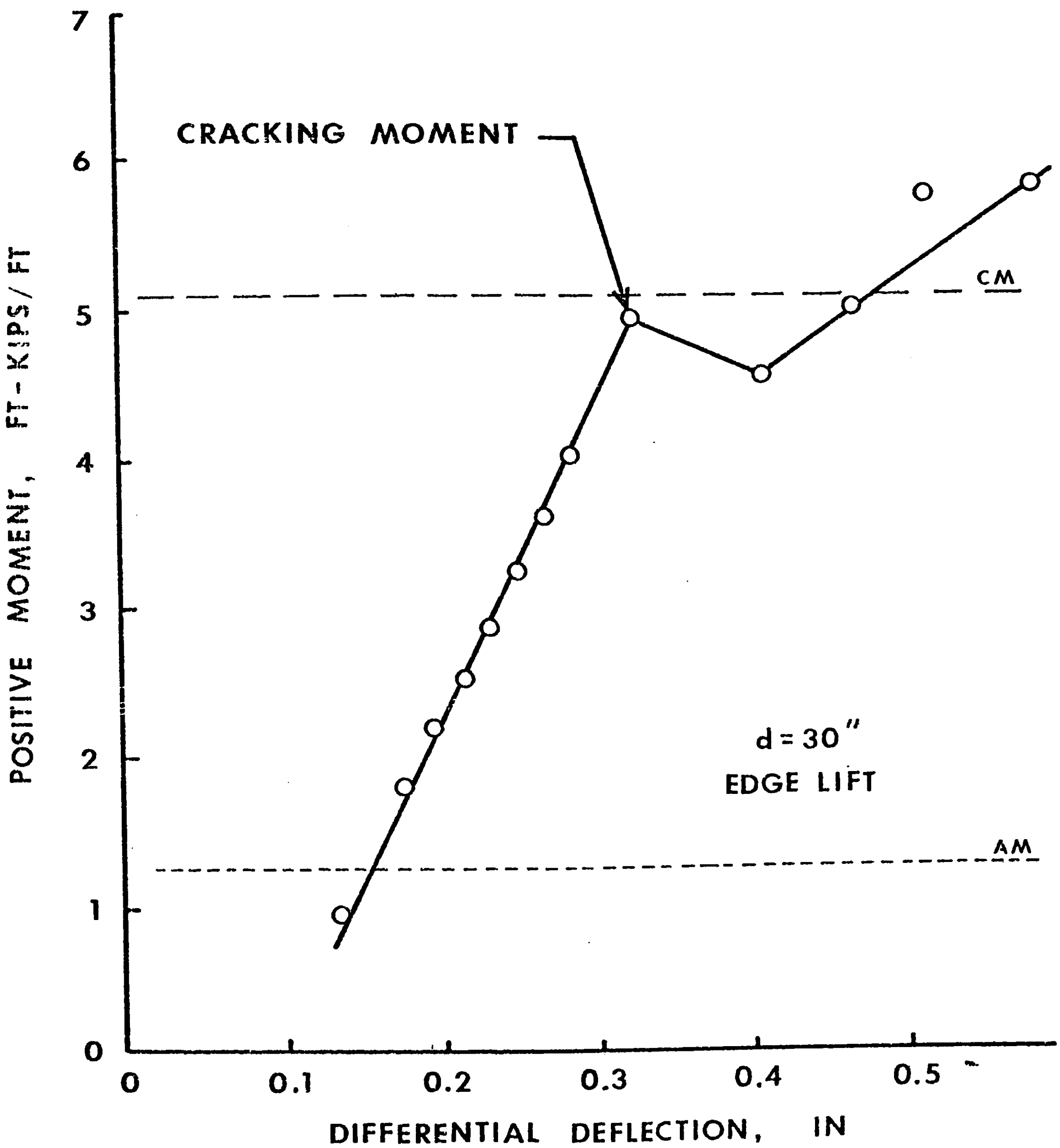

CRACKING MOMENT
CM
AM
d = 30"
EDGE LIFT
POSITIVE MOMENT, FT - KIPS / FT
DIFFERENTIAL DEFLECTION, IN
0
1
2
3
4
5
6
7
0.1
0.2
0.3
0.4
0.5

FIG 73f.

APPENDIX P

SUMMARY OF COEFFICIENT OF FRICTION VALUES FOR PAVEMENTS OR TEST SLABS WITHOUT USE OF FRICTION REDUCING METHODS [FROM MAHONEY (43)]

INVESTIGATOR	REFERENCE	DATE	PAVEMENT OR SLAB PLACED OR CAST AGAINST:	COEFFICIENT OF FRICTION
Goldbeck	26	1917	Sand Layer	1.4
			3/4-Inch Broken Stone	1.1
			3/4-Inch Gravel Subbase	1.3
			3-Inch Broken Stone	3.0
			Clay Subgrade	2.1
Teller and Bosley	87	1930	Dry Subgrade	2.0
			Damp Subgrade	2.5
			Wet Subgrade	1.7
Sparkes	83	1939	Clinker Base	3.1-3.7
Stott	84	1955	Sand Layer	1.2-2.0
Cholnoky	13	1956	Base Course	5.2
				1.1[a]
Stott	85	1961	Sharp Sand	1.0
				0.7[a]
HRB Rpt. No. 78	71	1963	Granular Subbase	1.5
Timms	89	1964	Granular Subbase	1.7
				0.9[a]
Venkatasubramanian	96	1966	Compacted Damp Sand Base	1.28
				1.00[a]

[a] Indicates Kinetic Coefficient of Friction; all other values are Static Coefficient of Friction.

APPENDIX Q

DIFFERENTIAL SWELLING OCCURRING AT THE SLAB PERIMETER FOR CENTER LIFT AND EDGE SWELLING CONDITIONS IN PREDOMINANTLY KAOLINITE, ILLITE, OR MONTMORILLONITE CLAY SOILS

TABLE 31. Differential Swell Occurring at the Perimeter of a Slab for a Center Lift Swelling Condition in Predominantly Koalinite Clay Soil

Percent Clay (%)	Depth to Constant Suction (FT)	Constant Suction (pF)	Velocity of Moisture Flow (inches /month)	DIFFERENTIAL SWELL (IN)							
				EDGE DISTANCE PENETRATION (FT)							
				1 FT	2 FT	3 FT	4 FT	5 FT	6 FT	7 FT	8 FT
20	3	3.2	0.1	0.001	0.001	0.002	0.002	0.003	0.004	0.004	0.005
			0.3	0.002	0.004	0.006	0.007	0.009	0.011	0.013	0.015
			0.5	0.003	0.005	0.008	0.011	0.015	0.018	0.021	0.025
			0.7	0.004	0.008	0.012	0.017	0.021	0.026	0.032	0.038
		3.4	0.1	0.001	0.002	0.003	0.004	0.006	0.007	0.008	0.009
			0.3	0.004	0.008	0.011	0.015	0.020	0.024	0.029	0.034
			0.5	0.006	0.012	0.019	0.026	0.034	0.044	0.054	0.067
			0.7	0.008	0.017	0.027	0.038	0.052	0.069	0.091	0.124
		3.6	0.1	0.003	0.006	0.009	0.012	0.015	0.019	0.022	0.026
			0.3	0.008	0.017	0.027	0.040	0.055	0.073	0.099	0.137
			0.5	0.014	0.030	0.050	0.077	0.117	0.192	0.370	0.881
			0.7	0.018	0.042	0.074	0.125	0.226	0.487	1.252	3.530
	5	3.2	0.1	0.001	0.003	0.004	0.005	0.007	0.008	0.010	0.012
			0.3	0.004	0.008	0.012	0.016	0.020	0.025	0.029	0.034
			0.5	0.007	0.013	0.020	0.028	0.035	0.043	0.051	0.060
			0.7	0.009	0.019	0.029	0.040	0.051	0.062	0.075	0.089
		3.4	0.1	0.003	0.005	0.008	0.011	0.014	0.017	0.020	0.023
			0.3	0.008	0.016	0.025	0.034	0.044	0.055	0.066	0.078
			0.5	0.014	0.028	0.043	0.060	0.079	0.100	0.125	0.153
			0.7	0.018	0.039	0.062	0.088	0.119	0.157	0.207	0.279
		3.6	0.1	0.006	0.013	0.020	0.027	0.034	0.042	0.050	0.059
			0.3	0.019	0.040	0.063	0.091	0.123	0.163	0.217	0.300
			0.5	0.030	0.067	0.112	0.171	0.258	0.413	0.776	1.797
			0.7	0.042	0.095	0.165	0.276	0.485	1.009	2.499	6.879
	7	3.2	0.1	0.002	0.004	0.007	0.009	0.012	0.015	0.017	0.020
			0.3	0.007	0.015	0.022	0.030	0.038	0.046	0.055	0.063
			0.5	0.012	0.025	0.038	0.051	0.065	0.080	0.095	0.111
			0.7	0.017	0.035	0.053	0.073	0.093	0.115	0.139	0.164
		3.4	0.1	0.005	0.010	0.016	0.021	0.026	0.031	0.037	0.042
			0.3	0.015	0.030	0.046	0.063	0.081	0.100	0.121	0.142
			0.5	0.024	0.050	0.079	0.110	0.144	0.184	0.228	0.281
			0.7	0.034	0.071	0.113	0.616	0.218	0.287	0.379	0.514
		3.58	0.1	0.011	0.022	0.033	0.045	0.057	0.069	0.082	0.096
			0.3	0.032	0.066	0.124	0.147	0.197	0.257	0.332	0.436
			0.5	0.051	0.110	0.182	0.272	0.396	0.596	1.006	2.098
			0.7	0.071	0.157	0.269	0.431	0.712	1.346	3.081	8.129

TABLE 31. (Continued)(Center Lift: Predominantly Koalinite Clay)

Percent Clay (%)	Depth to Constant Suction (FT)	Constant Suction (pF)	Velocity of Moisture Flow (inches /month)	DIFFERENTIAL SWELL (INCHES)							
				EDGE DISTANCE PENETRATION (FT)							
				1 FT	2 FT	3 FT	4 FT	5 FT	6 FT	7 FT	8 FT
40	3	3.2	0.1	0.001	0.001	0.002	0.002	0.004	0.005	0.005	0.006
			0.3	0.002	0.004	0.006	0.009	0.011	0.014	0.016	0.019
			0.5	0.004	0.008	0.012	0.016	0.020	0.024	0.029	0.034
			0.7	0.005	0.010	0.016	0.022	0.029	0.035	0.043	0.050
		3.4	0.1	0.002	0.004	0.005	0.007	0.008	0.009	0.011	0.014
			0.3	0.004	0.009	0.014	0.020	0.025	0.032	0.038	0.044
			0.5	0.007	0.016	0.074	0.037	0.046	0.058	0.073	0.090
			0.7	0.011	0.023	0.036	0.051	0.070	0.092	0.122	0.166
		3.6	0.1	0.003	0.007	0.011	0.015	0.020	0.024	0.029	0.034
			0.3	0.010	0.023	0.037	0.053	0.072	0.097	0.131	0.183
			0.5	0.018	0.040	0.066	0.102	0.157	0.256	0.495	1.181
			0.7	0.025	0.056	0.100	0.168	0.303	0.653	1.677	4.728
	5	3.2	0.1	0.002	0.004	0.006	0.007	0.009	0.011	0.013	0.015
			0.3	0.005	0.011	0.016	0.022	0.028	0.033	0.039	0.046
			0.5	0.009	0.018	0.027	0.037	0.047	0.057	0.068	0.080
			0.7	0.012	0.025	0.038	0.053	0.067	0.083	0.100	0.118
		3.4	0.1	0.003	0.007	0.011	0.015	0.019	0.023	0.027	0.031
			0.3	0.011	0.022	0.034	0.046	0.059	0.073	0.088	0.104
			0.5	0.018	0.037	0.148	0.081	0.106	0.134	0.167	0.206
			0.7	0.025	0.052	0.083	0.118	0.159	0.210	0.277	0.374
		3.6	0.1	0.008	0.017	0.027	0.036	0.046	0.057	0.068	0.079
			0.3	0.026	0.054	0.085	0.122	0.165	0.219	0.292	0.401
			0.5	0.041	0.090	0.150	0.229	0.346	0.553	1.040	2.408
			0.7	0.057	0.128	0.224	0.371	0.652	1.353	3.349	9.215
	7	3.2	0.1	0.003	0.006	0.010	0.013	0.017	0.020	0.023	0.027
			0.3	0.010	0.020	0.030	0.040	0.051	0.062	0.073	0.084
			0.5	0.016	0.033	0.051	0.069	0.087	0.107	0.127	0.148
			0.7	0.023	0.046	0.071	0.098	0.125	0.155	0.186	0.220
		3.4	0.1	0.006	0.013	0.020	0.027	0.034	0.041	0.048	0.056
			0.3	0.020	0.041	0.062	0.085	0.109	0.135	0.162	0.191
			0.5	0.033	0.069	0.107	0.148	0.194	0.246	0.306	0.377
			0.7	0.045	0.095	0.152	0.216	0.292	0.385	0.507	0.689
		3.58	0.1	0.014	0.029	0.044	0.060	0.076	0.093	0.110	0.129
			0.3	0.042	0.087	0.133	0.196	0.263	0.343	0.444	0.583
			0.5	0.069	0.148	0.244	0.365	0.531	0.799	1.348	2.791
			0.7	0.095	0.210	0.360	0.577	0.953	1.803	4.126	–

TABLE 31. (Continued)(Center Lift: Predominantly Koalinite Clay)

Percent Clay (%)	Depth to Constant Suction (FT)	Constant Suction (pF)	Velocity of Moisture Flow (inches /month)	DIFFERENTIAL SWELL (INCHES) EDGE DISTANCE PENETRATION (FT) 1 FT	2 FT	3 FT	4 FT	5 FT	6 FT	7 FT	8 FT
50	3	3.2	0.1	0.001	0.002	0.002	0.003	0.004	0.005	0.006	0.007
			0.3	0.003	0.005	0.008	0.011	0.014	0.018	0.021	0.024
			0.5	0.004	0.009	0.014	0.019	0.025	0.030	0.036	0.042
			0.7	0.006	0.013	0.020	0.028	0.036	0.044	0.053	0.063
		3.4	0.1	0.002	0.004	0.006	0.008	0.010	0.012	0.015	0.017
			0.3	0.006	0.012	0.018	0.025	0.032	0.040	0.048	0.057
			0.5	0.009	0.020	0.031	0.043	0.057	0.073	0.091	0.113
			0.7	0.013	0.028	0.044	0.064	0.086	0.115	0.153	0.207
		3.6	0.1	0.005	0.009	0.014	0.020	0.025	0.031	0.037	0.044
			0.3	0.014	0.029	0.046	0 067	0.091	0.123	0.165	0.230
			0.5	0.022	0.049	0.083	0.127	0.196	0.321	0.620	1.480
			0.7	0.031	0.070	0.124	0.210	0.380	0.818	2.103	5.926
	5	3.2	0.1	0.002	0.005	0.007	0.009	0.011	0.014	0.016	0.018
			0.3	0.007	0.014	0.020	0.027	0.035	0.042	0.050	0.057
			0.5	0.011	0.022	0.034	0.046	0.059	0.072	0.086	0.100
			0.7	0.015	0.031	0.048	0.066	0.084	0.104	0.125	0.148
		3.4	0.1	0.005	0.009	0.014	0.019	0.024	0.029	0.034	0.039
			0.3	0.013	0.027	0.042	0.058	0.074	0.092	0.110	0.130
			0.5	0.023	0.047	0.073	0.101	0.133	0.168	0.209	0.258
			0.7	0.031	0.066	0.105	0.148	0.200	0.264	0.347	0.469
		3.6	0.1	0.011	0.022	0.033	0.045	0.058	0.071	0.085	0.099
			0.3	0.031	0.066	0.106	0.151	0.206	0.274	0.365	0.502
			0.5	0.051	0.113	0.188	0.288	0.434	0.694	1.303	3.018
			0.7	0.071	0.160	0.281	0.465	0.817	1.696	4.196	-
	7	3.2	0.1	0.004	0.008	0.013	0.017	0.021	0.025	0.030	0.034
			0.3	0.012	0.024	0.037	0.050	0.064	0.077	0.091	0.106
			0.5	0.021	0.042	0.064	0.086	0.110	0.134	0.159	0.186
			0.7	0.028	0.058	0.090	0.122	0.157	0.194	0.233	0.276
		3.4	0.1	0.008	0.017	0.025	0.034	0.043	0.052	0.061	0.070
			0.3	0.025	0.051	0.078	0.107	0.137	0.169	0.203	0.240
			0.5	0.041	0.085	0.133	0.185	0.243	0.308	0.383	0.472
			0.7	0.057	0.120	0.191	0.272	0.366	0.483	0.636	0.864
		3.58	0.1	0.018	0.036	0.055	0.074	0.095	0.116	0.138	0.161
			0.3	0.053	0.111	0.174	0.246	0.330	0.430	0.557	0.732
			0.5	0.086	0.186	0.306	0.457	0.666	1.001	1.690	3.499
			0.7	0.119	0.263	0.452	0.723	1.194	2.260	5.172	-

TABLE 31. (Continued)(Center Lift: Predominantly Koalinite Clay)

Percent Clay (%)	Depth to Constant Suction (FT)	Constant Suction (pF)	Velocity of Moisture Flow (inches /month)	DIFFERENTIAL SWELL (INCHES)							
				EDGE DISTANCE PENETRATION (FT)							
				1 FT	2 FT	3 FT	4 FT	5 FT	6 FT	7 FT	8 FT
60	3	3.2	0.1	0.001	0.003	0.004	0.005	0.006	0.007	0.008	0.010
			0.3	0.003	0.007	0.010	0.014	0.018	0.021	0.025	0.029
			0.5	0.006	0.012	0.018	0.024	0.030	0.037	0.044	0.052
			0.7	0.008	0.017	0.025	0.034	0.044	0.054	0.065	0.077
		3.4	0.1	0.002	0.005	0.007	0.010	0.012	0.015	0.017	0.020
			0.3	0.007	0.014	0.022	0.030	0.038	0.047	0.057	0.068
			0.5	0.012	0.024	0.038	0.053	0.069	0.088	0.110	0.136
			0.7	0.016	0.033	0.053	0.077	0.104	0.138	0.184	0.249
		3.6	0.1	0.006	0.012	0.018	0.024	0.031	0.038	0.045	0.053
			0.3	0.017	0.035	0.056	0.081	0.110	0.148	0.199	0.278
			0.5	0.026	0.059	0.099	0.154	0.236	0.386	0.745	1.779
			0.7	0.036	0.083	0.149	0.252	0.455	0.983	2.527	7.124
	5	3.2	0.1	0.003	0.005	0.008	0.011	0.014	0.016	0.019	0.022
			0.3	0.008	0.016	0.025	0.033	0.042	0.051	0.060	0.069
			0.5	0.013	0.027	0.041	0.056	0.071	0.087	0.103	0.120
			0.7	0.019	0.038	0.058	0.080	0.102	0.126	0.151	0.178
		3.4	0.1	0.006	0.011	0.017	0.023	0.029	0.034	0.041	0.047
			0.3	0.016	0.033	0.051	0.069	0.089	0.110	0.132	0.156
			0.5	0.028	0.056	0.087	0.122	0.160	0.202	0.252	0.310
			0.7	0.037	0.078	0.125	0.177	0.240	0.316	0.417	0.564
		3.6	0.1	0.013	0.027	0.040	0.055	0.070	0.086	0.102	0.120
			0.3	0.038	0.080	0.077	0.182	0.248	0.329	0.439	0.604
			0.5	0.062	0.135	0.226	0.345	0.521	0.834	1.566	3.628
			0.7	0.086	0.193	0.337	0.559	0.982	2.039	5.049	-
	7	3.2	0.1	0.005	0.010	0.016	0.021	0.026	0.031	0.036	0.041
			0.3	0.015	0.030	0.046	0.061	0.078	0.094	0.111	0.128
			0.5	0.025	0.050	0.077	0.104	0.132	0.161	0.192	0.224
			0.7	0.034	0.070	0.108	0.147	0.189	0.233	0.281	0.332
		3.4	0.1	0.010	0.020	0.030	0.041	0.052	0.062	0.073	0.085
			0.3	0.030	0.061	0.093	0.128	0.164	0.202	0.243	0.287
			0.5	0.050	0.103	0.160	0.223	0.292	0.371	0.461	0.568
			0.7	0.069	0.144	0.229	0.326	0.440	0.580	0.765	1.038
		3.58	0.1	0.021	0.043	0.066	0.089	0.114	0.139	0.166	0.194
			0.3	0.063	0.131	0.208	0.295	0.396	0.516	0.669	0.879
			0.5	0.103	0.223	0.367	0.549	0.800	1.203	2.031	4.205
			0.7	0.142	0.316	0.543	0.870	1.436	2.717	6.217	-

TABLE 31. (Continued)(Center Lift: Predominantly Kaolinite Clay)

Percent Clay (%)	Depth to Constant Suction (FT)	Constant Suction (pF)	Velocity of Moisture Flow (inches /month)	DIFFERENTIAL SWELL (INCHES) EDGE DISTANCE PENETRATION (FT) 1 FT	2 FT	3 FT	4 FT	5 FT	6 FT	7 FT	8 FT
70	3	3.2	0.1	0.001	0.003	0.004	0.005	0.007	0.008	0.010	0.011
			0.3	0.004	0.008	0.012	0.016	0.021	0.025	0.029	0.034
			0.5	0.006	0.013	0.020	0.027	0.035	0.042	0.051	0.060
			0.7	0.010	0.019	0.029	0.040	0.051	0.063	0.076	0.089
		3.4	0.1	0.003	0.005	0.008	0.011	0.014	0.017	0.020	0.023
			0.3	0.008	0.017	0.026	0.035	0.045	0.056	0.067	0.079
			0.5	0.014	0.028	0.044	0.062	0.081	0.103	0.129	0.159
			0.7	0.019	0.039	0.063	0.090	0.122	0.162	0.215	0.292
		3.6	0.1	0.006	0.013	0.020	0.027	0.035	0.043	0.052	0.061
			0.3	0.019	0.041	0.065	0.094	0.128	0.172	0.232	0.324
			0.5	0.032	0.069	0.117	0.180	0.276	0.451	0.871	2.079
			0.7	0.043	0.098	0.174	0.294	0.532	1.148	2.952	8.322
	5	3.2	0.1	0.003	0.006	0.009	0.013	0.016	0.019	0.022	0.026
			0.3	0.010	0.019	0.029	0.039	0.049	0.059	0.070	0.080
			0.5	0.016	0.032	0.048	0.065	0.083	0.101	0.120	0.140
			0.7	0.022	0.044	0.068	0.093	0.119	0.146	0.176	0.208
		3.4	0.1	0.006	0.012	0.019	0.026	0.033	0.039	0.046	0.054
			0.3	0.018	0.038	0.059	0.081	0.104	0.128	0.155	0.183
			0.5	0.031	0.065	0.101	0.141	0.185	0.235	0.293	0.361
			0.7	0.043	0.092	0.146	0.207	0.280	0.370	0.487	0.659
		3.6	0.1	0.015	0.030	0.046	0.063	0.081	0.099	0.119	0.139
			0.3	0.045	0.094	0.149	0.213	0.290	0.385	0.512	0.706
			0.5	0.072	0.158	0.264	0.404	0.609	0.974	1.830	4.239
			0.7	0.100	0.225	0.394	0.653	1.147	2.381	5.893	-
	7	3.2	0.1	0.006	0.011	0.017	0.023	0.029	0.035	0.041	0.047
			0.3	0.018	0.035	0.053	0.072	0.090	0.110	0.129	0.149
			0.5	0.030	0.059	0.090	0.121	0.154	0.188	0.224	0.262
			0.7	0.040	0.082	0.125	0.172	0.221	0.273	0.328	0.388
		3.4	0.1	0.012	0.024	0.036	0.048	0.060	0.073	0.086	0.099
			0.3	0.035	0.071	0.109	0.149	0.192	0.237	0.284	0.336
			0.5	0.057	0.119	0.186	0.260	0.341	0.432	0.538	0.663
			0.7	0.080	0.168	0.267	0.381	0.514	0.678	0.893	1.213
		3.58	0.1	0.025	0.050	0.077	0.104	0.133	0.163	0.194	0.227
			0.3	0.073	0.154	0.244	0.345	0.463	0.604	0.782	1.028
			0.5	0.120	0.260	0.429	0.642	0.935	1.406	2.373	4.913
			0.7	0.166	0.369	0.634	1.016	1.677	3.175	7.263	-

TABLE 32. Differential Swell Occurring at the Perimeter of a Slab for a Center Lift Swelling Condition in Predominantly Illite Clay Soil

Percent Clay (%)	Depth to Constant Suction (FT)	Constant Suction (pF)	Velocity of Moisture Flow (inches /month)	DIFFERENTIAL SWELL (INCHES) EDGE DISTANCE PENETRATION (FT) 1 FT	2 FT	3 FT	4 FT	5 FT	6 FT	7 FT	8 FT
20	3	3.2	0.1	0.002	0.003	0.004	0.005	0.006	0.007	0.008	0.010
			0.3	0.003	0.007	0.010	0.014	0.017	0.021	0.025	0.029
			0.5	0.006	0.012	0.018	0.024	0.030	0.037	0.044	0.051
			0.7	0.008	0.016	0.024	0.033	0.043	0.053	0.064	0.075
		3.4	0.1	0.003	0.005	0.007	0.010	0.012	0.015	0.017	0.020
			0.3	0.007	0.014	0.022	0.030	0.038	0.047	0.057	0.067
			0.5	0.011	0.024	0.037	0.052	0.068	0.087	0.109	0.135
			0.7	0.016	0.034	0.054	0.077	0.104	0.138	0.182	0.248
		3.6	0.1	0.005	0.011	0.017	0.023	0.030	0.037	0.044	0.051
			0.3	0.016	0.035	0.055	0.080	0.109	0.146	0.197	0.274
			0.5	0.027	0.058	0.098	0.152	0.234	0.382	0.737	1.760
			0.7	0.036	0.083	0.147	0.249	0.451	0.973	2.500	7.049
	5	3.2	0.1	0.003	0.006	0.008	0.011	0.014	0.016	0.019	0.022
			0.3	0.008	0.016	0.024	0.032	0.041	0.050	0.059	0.068
			0.5	0.013	0.027	0.041	0.055	0.070	0.086	0.102	0.119
			0.7	0.018	0.037	0.057	0.078	0.100	0.124	0.149	0.176
		3.4	0.1	0.005	0.011	0.016	0.022	0.028	0.034	0.040	0.046
			0.3	0.016	0.033	0.051	0.069	0.089	0.109	0.131	0.155
			0.5	0.027	0.055	0.086	0.120	0.157	0.200	0.248	0.306
			0.7	0.037	0.078	0.124	0.176	0.238	0.319	0.413	0.558
		3.6	0.1	0.012	0.025	0.039	0.053	0.068	0.084	0.100	0.118
			0.3	0.037	0.079	0.126	0.180	0.245	0.326	0.434	0.598
			0.5	0.062	0.134	0.224	0.342	0.516	0.825	1.551	3.591
			0.7	0.084	0.190	0.333	0.553	0.971	2.016	4.991	-
	7	3.2	0.1	0.005	0.010	0.015	0.020	0.025	0.030	0.035	0.041
			0.3	0.015	0.030	0.045	0.061	0.076	0.093	0.109	0.126
			0.5	0.025	0.050	0.076	0.103	0.131	0.160	0.190	0.221
			0.7	0.034	0.070	0.107	0.146	0.187	0.231	0.278	0.329
		3.4	0.1	0.010	0.020	0.030	0.041	0.051	0.062	0.073	0.084
			0.3	0.029	0.060	0.092	0.126	0.162	0.200	0.241	0.284
			0.5	0.048	0.102	0.158	0.221	0.288	0.367	0.456	0.562
			0.7	0.068	0.143	0.227	0.323	0.436	0.574	0.757	1.028
		3.58	0.1	0.021	0.042	0.065	0.088	0.113	0.138	0.164	0.191
			0.3	0.062	0.131	0.207	0.292	0.392	0.511	0.662	0.870
			0.5	0.103	0.221	0.363	0.543	0.792	1.191	2.010	4.162
			0.7	0.141	0.313	0.537	0.861	1.421	2.689	6.153	-

TABLE 32 . (Continued)(Center Lift: Predominantly Illite Clay)

Percent Clay (%)	Depth to Constant Suction (FT)	Constant Suction (pF)	Velocity of Moisture Flow (inches /month)	DIFFERENTIAL SWELL (INCHES)							
				EDGE DISTANCE PENETRATION (FT)							
				1 FT	2 FT	3 FT	4 FT	5 FT	6 FT	7 FT	8 FT
40	3	3.2	0.1	0.002	0.003	0.005	0.007	0.008	0.010	0.012	0.014
			0.3	0.005	0.010	0.015	0.020	0.026	0.031	0.037	0.042
			0.5	0.008	0.016	0.025	0.034	0.043	0.052	0.063	0.073
			0.7	0.011	0.023	0.035	0.048	0.062	0.076	0.092	0.109
		3.4	0.1	0.003	0.006	0.010	0.013	0.017	0.020	0.024	0.028
			0.3	0.010	0.021	0.032	0.043	0.055	0.068	0.082	0.098
			0.5	0.017	0.034	0.054	0.075	0.099	0.126	0.157	0.194
			0.7	0.023	0.048	0.077	0.110	0.149	0.198	0.263	0.357
		3.6	0.1	0.008	0.017	0.025	0.034	0.044	0.054	0.064	0.075
			0.3	0.023	0.050	0.080	0.115	0.157	0.211	0.284	0.396
			0.5	0.039	0.085	0.142	0.220	0.338	0.552	1.065	2.542
			0.7	0.053	0.120	0.213	0.360	0.651	1.405	3.611	-
	5	3.2	0.1	0.004	0.007	0.011	0.015	0.019	0.023	0.027	0.031
			0.3	0.012	0.024	0.035	0.047	0.060	0.072	0.085	0.098
			0.5	0.019	0.039	0.059	0.080	0.101	0.124	0.147	0.172
			0.7	0.026	0.054	0.083	0.113	0.145	0.179	0.215	0.254
		3.4	0.1	0.007	0.015	0.023	0.031	0.040	0.048	0.057	0.065
			0.3	0.023	0.047	0.073	0.099	0.128	0.157	0.189	0.224
			0.5	0.039	0.080	0.124	0.173	0.227	0.288	0.358	0.442
			0.7	0.053	0.112	0.178	0.254	0.343	0.452	0.596	0.805
		3.6	0.1	0.018	0.037	0.057	0.077	0.099	0.121	0.145	0.170
			0.3	0.054	0.114	0.182	0.261	0.354	0.471	0.627	0.863
			0.5	0.089	0.194	0.323	0.494	0.745	1.192	2.239	5.184
			0.7	0.122	0.275	0.482	0.799	1.403	2.912	7.207	-
	7	3.2	0.1	0.007	0.014	0.021	0.029	0.036	0.043	0.051	0.058
			0.3	0.022	0.043	0.065	0.088	0.111	0.134	0.158	0.183
			0.5	0.035	0.072	0.109	0.148	0.188	0.230	0.274	0.320
			0.7	0.049	0.100	0.154	0.210	0.270	0.330	0.401	0.474
		3.4	0.1	0.015	0.030	0.045	0.060	0.075	0.091	0.106	0.122
			0.3	0.042	0.087	0.134	0.183	0.234	0.289	0.348	0.410
			0.5	0.070	0.146	0.223	0.318	0.417	0.528	0.657	0.811
			0.7	0.098	0.207	0.328	0.466	0.629	0.829	1.093	1.484
		3.58	0.1	0.030	0.062	0.094	0.128	0.163	0.199	0.236	0.277
			0.3	0.090	0.188	0.298	0.422	0.566	0.738	0.956	1.256
			0.5	0.147	0.318	0.524	0.784	1.143	1.719	2.902	6.008
			0.7	0.203	0.451	0.775	1.242	2.051	3.883	8.882	-

TABLE 32. (Continued)(Center Lift: Predominantly Illite Clay)

Percent Clay (%)	Depth to Constant Suction (FT)	Constant Suction (pF)	Velocity of Moisture Flow (inches /month)	DIFFERENTIAL SWELL (INCHES) EDGE DISTANCE PENETRATION (FT) 1 FT	2 FT	3 FT	4 FT	5 FT	6 FT	7 FT	8 FT
50	3	3.2	0.1	0.002	0.004	0.006	0.008	0.010	0.013	0.015	0.017
			0.3	0.006	0.013	0.019	0.026	0.033	0.040	0.047	0.055
			0.5	0.010	0.021	0.033	0.042	0.056	0.069	0.082	0.096
			0.7	0.014	0.030	0.046	0.063	0.081	0.099	0.120	0.142
		3.4	0.1	0.004	0.009	0.013	0.018	0.022	0.027	0.032	0.037
			0.3	0.013	0.026	0.041	0.056	0.072	0.089	0.107	0.127
			0.5	0.022	0.045	0.070	0.093	0.129	0.164	0.205	0.254
			0.7	0.030	0.063	0.101	0.144	0.196	0.260	0.344	0.467
		3.6	0.1	0.011	0.021	0.033	0.045	0.057	0.070	0.084	0.098
			0.3	0.031	0.065	0.105	0.150	0.206	0.276	0.372	0.518
			0.5	0.050	0.111	0.185	0.287	0.441	0.721	1.391	3.322
			0.7	0.069	0.156	0.278	0.470	0.851	1.836	4.720	-
	5	3.2	0.1	0.005	0.010	0.015	0.020	0.026	0.031	0.036	0.041
			0.3	0.015	0.030	0.046	0.062	0.078	0.094	0.111	0.128
			0.5	0.025	0.051	0.077	0.104	0.133	0.162	0.193	0.225
			0.7	0.035	0.071	0.110	0.148	0.190	0.235	0.282	0.333
		3.4	0.1	0.010	0.021	0.031	0.042	0.053	0.064	0.075	0.086
			0.3	0.031	0.062	0.096	0.131	0.167	0.207	0.248	0.293
			0.5	0.051	0.104	0.163	0.227	0.298	0.377	0.469	0.579
			0.7	0.070	0.147	0.233	0.332	0.449	0.592	0.779	1.054
		3.6	0.1	0.025	0.049	0.075	0.102	0.130	0.160	0.191	0.224
			0.3	0.071	0.150	0.239	0.341	0.463	0.615	0.820	1.129
			0.5	0.116	0.253	0.423	0.646	0.974	1.558	2.927	6.778
			0.7	0.159	0.359	0.629	1.043	1.834	3.807	9.422	-
	7	3.2	0.1	0.009	0.018	0.028	0.037	0.047	0.056	0.066	0.075
			0.3	0.028	0.056	0.085	0.114	0.144	0.175	0.206	0.238
			0.5	0.046	0.094	0.143	0.193	0.246	0.301	0.358	0.418
			0.7	0.064	0.131	0.201	0.275	0.353	0.436	0.524	0.620
		3.4	0.1	0.019	0.038	0.057	0.077	0.097	0.117	0.138	0.159
			0.3	0.055	0.114	0.175	0.239	0.307	0.378	0.455	0.537
			0.5	0.092	0.192	0.299	0.416	0.546	0.692	0.860	1.061
			0.7	0.129	0.271	0.429	0.610	0.823	1.085	1.429	1.940
		3.58	0.1	0.040	0.081	0.123	0.167	0.213	0.261	0.310	0.362
			0.3	0.117	0.246	0.389	0.551	0.739	0.965	1.250	1.642
			0.5	0.193	0.417	0.685	1.026	1.495	2.248	3.795	7.856
			0.7	0.265	0.590	1.013	1.624	2.682	5.075	-	-

TABLE 32. (Continued)(Center Lift: Predominantly Illite Clay)

Percent Clay (%)	Depth to Constant Suction (FT)	Constant Suction (pF)	Velocity of Moisture Flow (inches /month)	DIFFERENTIAL SWELL (INCHES) EDGE DISTANCE PENETRATION (FT) 1 FT	2 FT	3 FT	4 FT	5 FT	6 FT	7 FT	8 FT
60	3	3.2	0.1	0.003	0.006	0.008	0.011	0.014	0.016	0.019	0.022
			0.3	0.008	0.016	0.024	0.033	0.041	0.050	0.059	0.068
			0.5	0.013	0.027	0.040	0.055	0.070	0.085	0.102	0.119
			0.7	0.018	0.037	0.057	0.078	0.100	0.123	0.148	0.176
		3.4	0.1	0.006	0.011	0.017	0.022	0.028	0.034	0.040	0.046
			0.3	0.016	0.033	0.051	0.069	0.089	0.110	0.133	0.157
			0.5	0.027	0.055	0.087	0.121	0.159	0.203	0.253	0.314
			0.7	0.037	0.078	0.124	0.178	0.241	0.320	0.424	0.576
		3.6	0.1	0.013	0.026	0.040	0.055	0.070	0.086	0.103	0.121
			0.3	0.038	0.080	0.129	0.185	0.254	0.340	0.459	0.639
			0.5	0.062	0.136	0.229	0.355	0.544	0.890	1.659	4.104
			0.7	0.085	0.194	0.344	0.582	1.052	2.268	5.831	-
	5	3.2	0.1	0.006	0.012	0.018	0.025	0.031	0.038	0.044	0.050
			0.3	0.018	0.037	0.056	0.075	0.095	0.116	0.137	0.158
			0.5	0.031	0.062	0.095	0.129	0.164	0.200	0.238	0.277
			0.7	0.043	0.088	0.134	0.183	0.235	0.290	0.348	0.411
		3.4	0.1	0.012	0.025	0.038	0.051	0.065	0.078	0.092	0.106
			0.3	0.038	0.077	0.118	0.161	0.206	0.255	0.306	0.361
			0.5	0.062	0.129	0.201	0.280	0.367	0.466	0.579	0.714
			0.7	0.086	0.181	0.288	0.410	0.554	0.730	0.962	1.301
		3.6	0.1	0.030	0.061	0.093	0.126	0.161	0.197	0.236	0.276
			0.3	0.088	0.185	0.295	0.421	0.572	0.761	1.013	1.394
			0.5	0.144	0.313	0.522	0.797	1.203	1.924	3.615	8.371
			0.7	0.197	0.444	0.778	1.289	2.265	4.702	-	-
	7	3.2	0.1	0.012	0.023	0.035	0.047	0.058	0.070	0.082	0.094
			0.3	0.035	0.069	0.105	0.141	0.178	0.216	0.255	0.294
			0.5	0.057	0.116	0.176	0.239	0.304	0.372	0.442	0.516
			0.7	0.079	0.162	0.249	0.340	0.436	0.538	0.647	0.766
		3.4	0.1	0.023	0.047	0.071	0.095	0.120	0.145	0.170	0.196
			0.3	0.069	0.141	0.216	0.294	0.379	0.467	0.562	0.663
			0.5	0.114	0.237	0.369	0.514	0.674	0.855	1.063	1.310
			0.7	0.158	0.333	0.528	0.752	1.015	1.340	1.764	2.395
		3.58	0.1	0.050	0.100	0.153	0.207	0.263	0.322	0.383	0.447
			0.3	0.145	0.304	0.481	0.681	0.912	1.192	1.543	2.028
			0.5	0.238	0.514	0.846	1.266	1.846	2.776	4.687	9.702
			0.7	0.328	0.730	1.252	2.006	3.312	6.268	-	-

TABLE 32. (Continued)(Center Lift: Predominantly Illite Clay)

Percent Clay (%)	Depth to Constant Suction (FT)	Constant Suction (pF)	Velocity of Moisture Flow (inches /month)	DIFFERENTIAL SWELL (INCHES) EDGE DISTANCE PENETRATION (FT)							
				1 FT	2 FT	3 FT	4 FT	5 FT	6 FT	7 FT	8 FT
70	3	3.2	0.1	0.003	0.006	0.009	0.013	0.016	0.019	0.022	0.026
			0.3	0.009	0.019	0.028	0.038	0.048	0.059	0.069	0.080
			0.5	0.016	0.032	0.048	0.066	0.083	0.102	0.121	0.141
			0.7	0.021	0.044	0.068	0.092	0.119	0.147	0.177	0.209
		3.4	0.1	0.007	0.013	0.020	0.027	0.034	0.041	0.047	0.055
			0.3	0.019	0.039	0.061	0.083	0.106	0.131	0.158	0.187
			0.5	0.032	0.066	0.103	0.144	0.190	0.242	0.302	0.374
			0.7	0.044	0.093	0.148	0.212	0.287	0.381	0.510	0.686
		3.6	0.1	0.016	0.032	0.049	0.066	0.084	0.103	0.124	0.145
			0.3	0.045	0.095	0.153	0.220	0.302	0.405	0.545	0.761
			0.5	0.074	0.162	0.273	0.423	0.648	1.061	2.047	4.885
			0.7	0.101	0.231	0.409	0.692	1.251	2.700	6.940	-
	5	3.2	0.1	0.008	0.015	0.022	0.030	0.037	0.045	0.035	0.060
			0.3	0.022	0.044	0.067	0.090	0.114	0.138	0.163	0.189
			0.5	0.037	0.074	0.113	0.153	0.195	0.238	0.283	0.330
			0.7	0.051	0.104	0.159	0.218	0.279	0.345	0.414	0.489
		3.4	0.1	0.015	0.030	0.046	0.062	0.077	0.094	0.110	0.127
			0.3	0.044	0.091	0.140	0.191	0.245	0.303	0.364	0.430
			0.5	0.073	0.153	0.239	0.330	0.437	0.554	0.689	0.850
			0.7	0.102	0.215	0.342	0.487	0.659	0.869	1.145	1.548
		3.6	0.1	0.035	0.071	0.109	0.149	0.191	0.234	0.279	0.327
			0.3	0.104	0.219	0.350	0.501	0.680	0.904	1.204	1.659
			0.5	0.170	0.372	0.620	0.948	1.431	2.290	4.302	9.964
			0.7	0.234	0.528	0.925	1.534	2.696	5.597	-	-
	7	3.2	0.1	0.014	0.027	0.041	0.055	0.069	0.083	0.097	0.112
			0.3	0.040	0.082	0.124	0.167	0.212	0.257	0.303	0.350
			0.5	0.068	0.138	0.210	0.284	0.362	0.442	0.526	0.614
			0.7	0.094	0.193	0.296	0.404	0.519	0.640	0.771	0.911
		3.4	0.1	0.028	0.056	0.084	0.113	0.142	0.173	0.202	0.233
			0.3	0.082	0.167	0.257	0.352	0.451	0.556	0.669	0.789
			0.5	0.136	0.282	0.439	0.612	0.803	1.018	1.265	1.560
			0.7	0.188	0.396	0.629	0.895	1.209	1.594	2.100	2.851
		3.58	0.1	0.058	0.118	0.181	0.246	0.313	0.383	0.456	0.532
			0.3	0.173	0.362	0.573	0.812	1.088	1.419	1.838	2.415
			0.5	0.283	0.612	1.007	1.507	2.197	3.304	5.579	11.549
			0.7	0.391	0.869	1.490	2.388	3.943	7.462	-	-

TABLE 33 . Differential Swelling Occurring at the Perimeter of a Slab for a Center Lift Swelling Condition in a Predominantly Montmorrillinite Clay Soil

Percent Clay (%)	Depth to Constant Suction (FT)	Constant Suction (pF)	Velocity of Moisture Flow (inches /month)	DIFFERENTIAL SWELL (INCHES) EDGE DISTANCE PENETRATION (FT)							
				1 FT	2 FT	3 FT	4 FT	5 FT	6 FT	7 FT	8 FT
30	3	3.2	0.1	0.001	0.003	0.004	0.005	0.007	0.008	0.009	0.011
			0.3	0.004	0.008	0.012	0.016	0.020	0.025	0.030	0.035
			0.5	0.006	0.013	0.020	0.027	0.035	0.043	0.051	0.060
			0.7	0.010	0.019	0.029	0.040	0.051	0.063	0.076	0.089
		3.4	0.1	0.003	0.005	0.008	0.011	0.014	0.017	0.020	0.023
			0.3	0.008	0.017	0.026	0.035	0.045	0.056	0.067	0.079
			0.5	0.014	0.028	0.044	0.062	0.081	0.102	0.128	0.159
			0.7	0.019	0.039	0.063	0.089	0.122	0.162	0.214	0.291
		3.6	0.1	0.006	0.013	0.020	0.027	0.035	0.043	0.052	0.061
			0.3	0.019	0.041	0.065	0.094	0.128	0.172	0.232	0.323
			0.5	0.031	0.069	0.116	0.179	0.275	0.450	0.858	2.073
			0.7	0.043	0.098	0.173	0.294	0.532	1.145	2.945	8.301
	5	3.2	0.1	0.003	0.006	0.010	0.013	0.016	0.019	0.022	0.026
			0.3	0.009	0.018	0.028	0.038	0.048	0.058	0.069	0.079
			0.5	0.016	0.032	0.048	0.065	0.083	0.101	0.120	0.140
			0.7	0.022	0.044	0.068	0.093	0.119	0.147	0.176	0.208
		3.4	0.1	0.006	0.013	0.019	0.026	0.033	0.039	0.046	0.054
			0.3	0.019	0.039	0.060	0.081	0.104	0.129	0.155	0.182
			0.5	0.032	0.065	0.102	0.141	0.186	0.235	0.293	0.361
			0.7	0.043	0.091	0.145	0.207	0.280	0.369	0.486	0.657
		3.6	0.1	0.015	0.030	0.047	0.063	0.081	0.099	0.119	0.139
			0.3	0.045	0.094	0.149	0.213	0.289	0.384	0.512	0.704
			0.5	0.072	0.158	0.264	0.403	0.607	0.972	1.826	2.514
			0.7	0.100	0.224	0.393	0.651	1.144	2.375	5.870	-
	7	3.2	0.1	0.006	0.012	0.017	0.023	0.029	0.035	0.041	0.047
			0.3	0.017	0.035	0.053	0.071	0.090	0.109	0.128	0.148
			0.5	0.029	0.059	0.089	0.121	0.154	0.188	0.223	0.261
			0.7	0.039	0.081	0.125	0.171	0.219	0.271	0.326	0.386
		3.4	0.1	0.012	0.024	0.036	0.048	0.061	0.074	0.086	0.099
			0.3	0.035	0.071	0.109	0.149	0.191	0.236	0.284	0.335
			0.5	0.058	0.120	0.187	0.261	0.342	0.433	0.537	0.662
			0.7	0.081	0.169	0.268	0.381	0.514	0.677	0.892	1.211
		3.58	0.1	0.024	0.050	0.076	0.104	0.132	0.162	0.193	0.225
			0.3	0.073	0.154	0.243	0.344	0.461	0.602	0.780	1.025
			0.5	0.120	0.259	0.427	0.639	0.932	1.402	2.367	4.900
			0.7	0.165	0.368	0.632	1.013	1.672	3.165	7.244	-

TABLE 33. (Continued)(Center Lift: Predominantly Montmorrillonite Clay)

Percent Clay (%)	Depth to Constant Suction (FT)	Constant Suction (pF)	Velocity of Moisture Flow (inches /month)	DIFFERENTIAL SWELL (INCHES) EDGE DISTANCE PENETRATION (FT) 1 FT	2 FT	3 FT	4 FT	5 FT	6 FT	7 FT	8 FT
40	3	3.2	0.1	0.002	0.004	0.006	0.008	0.010	0.012	0.014	0.016
			0.3	0.006	0.012	0.018	0.024	0.030	0.036	0.042	0.049
			0.5	0.009	0.019	0.029	0.040	0.050	0.062	0.074	0.086
			0.7	0.014	0.027	0.042	0.057	0.074	0.091	0.109	0.129
		3.4	0.1	0.004	0.008	0.012	0.016	0.021	0.025	0.029	0.034
			0.3	0.011	0.024	0.037	0.050	0.065	0.080	0.097	0.115
			0.5	0.019	0.040	0.063	0.088	0.116	0.148	0.185	0.229
			0.7	0.027	0.057	0.091	0.130	0.177	0.234	0.311	0.422
		3.6	0.1	0.010	0.019	0.030	0.040	0.051	0.063	0.076	0.089
			0.3	0.028	0.059	0.094	0.136	0.186	0.249	0.335	0.468
			0.5	0.046	0.100	0.168	0.260	0.399	0.652	1.258	3.004
			0.7	0.062	0.142	0.251	0.425	0.769	1.660	4.267	7.762
	5	3.2	0.1	0.004	0.009	0.013	0.018	0.022	0.027	0.032	0.037
			0.3	0.013	0.027	0.041	0.055	0.069	0.085	0.100	0.115
			0.5	0.023	0.046	0.069	0.094	0.120	0.147	0.174	0.203
			0.7	0.032	0.064	0.098	0.134	0.172	0.212	0.255	0.301
		3.4	0.1	0.010	0.019	0.028	0.038	0.048	0.058	0.068	0.079
			0.3	0.027	0.056	0.086	0.118	0.151	0.186	0.224	0.264
			0.5	0.045	0.094	0.147	0.205	0.269	0.341	0.424	0.522
			0.7	0.063	0.133	0.211	0.300	0.405	0.535	0.704	0.952
		3.6	0.1	0.021	0.044	0.067	0.092	0.117	0.144	0.172	0.201
			0.3	0.064	0.135	0.216	0.308	0.419	0.556	0.741	1.020
			0.5	0.105	0.229	0.382	0.584	0.880	1.408	2.645	6.127
			0.7	0.144	0.325	0.569	0.944	1.658	3.441	8.517	-
	7	3.2	0.1	0.009	0.018	0.026	0.035	0.043	0.052	0.061	0.070
			0.3	0.025	0.051	0.077	0.103	0.131	0.158	0.186	0.215
			0.5	0.042	0.085	0.129	0.175	0.223	0.272	0.324	0.373
			0.7	0.059	0.119	0.183	0.249	0.320	0.394	0.475	0.561
		3.4	0.1	0.017	0.035	0.052	0.070	0.088	0.106	0.125	0.144
			0.3	0.050	0.103	0.158	0.216	0.277	0.342	0.411	0.485
			0.5	0.084	0.173	0.270	0.377	0.494	0.626	0.778	0.960
			0.7	0.116	0.244	0.387	0.550	0.743	0.980	1.291	1.753
		3.56	0.1	0.033	0.066	0.101	0.136	0.173	0.211	0.251	0.292
			0.3	0.096	0.201	0.316	0.444	0.590	0.760	0.967	1.231
			0.5	0.158	0.339	0.553	0.815	1.160	1.668	2.583	4.748
			0.7	0.218	0.480	0.813	1.271	2.004	3.504	7.412	-

TABLE 33. (Continued)(Center Lift: Predominantly Montmorrillonite Clay)

Percent Clay (%)	Depth to Constant Suction (FT)	Constant Suction (pF)	Velocity of Moisture Flow (inches /month)	DIFFERENTIAL SWELL (INCHES)							
				EDGE DISTANCE PENETRATION (FT)							
				1 FT	2 FT	3 FT	4 FT	5 FT	6 FT	7 FT	8 FT
50	3	3.2	0.1	0.003	0.005	0.008	0.010	0.013	0.016	0.018	0.021
			0.3	0.007	0.015	0.023	0.031	0.039	0.047	0.055	0.065
			0.5	0.012	0.026	0.038	0.052	0.066	0.081	0.097	0.113
			0.7	0.018	0.036	0.055	0.075	0.096	0.119	0.143	0.169
		3.4	0.1	0.006	0.011	0.016	0.022	0.027	0.033	0.038	0.044
			0.3	0.016	0.032	0.049	0.067	0.086	0.106	0.127	0.151
			0.5	0.026	0.053	0.083	0.116	0.153	0.195	0.243	0.301
			0.7	0.036	0.075	0.119	0.170	0.231	0.307	0.407	0.553
		3.6	0.1	0.012	0.025	0.038	0.052	0.067	0.082	0.099	0.116
			0.3	0.036	0.077	0.123	0.177	0.243	0.326	0.439	0.613
			0.5	0.059	0.131	0.220	0.340	0.522	0.854	1.648	3.935
			0.7	0.082	0.186	0.330	0.558	1.008	2.175	5.590	-
	5	3.2	0.1	0.006	0.012	0.018	0.024	0.030	0.036	0.042	0.048
			0.3	0.017	0.035	0.054	0.073	0.092	0.111	0.131	0.151
			0.5	0.030	0.060	0.091	0.124	0.157	0.192	0.228	0.266
			0.7	0.041	0.083	0.128	0.175	0.224	0.277	0.333	0.394
		3.4	0.1	0.012	0.024	0.037	0.049	0.062	0.075	0.089	0.102
			0.3	0.036	0.074	0.113	0.154	0.198	0.244	0.294	0.344
			0.5	0.059	0.123	0.193	0.268	0.352	0.446	0.555	0.684
			0.7	0.083	0.174	0.276	0.393	0.531	0.700	0.923	1.247
		3.6	0.1	0.029	0.058	0.089	0.121	0.154	0.189	0.226	0.264
			0.3	0.084	0.177	0.282	0.404	0.548	0.728	0.970	1.336
			0.5	0.137	0.299	0.500	0.764	1.152	1.844	3.464	8.025
			0.7	0.189	0.426	0.745	1.236	2.712	4.508	-	-
	7	3.2	0.1	0.011	0.022	0.034	0.044	0.056	0.067	0.078	0.090
			0.3	0.033	0.067	0.101	0.135	0.171	0.208	0.244	0.282
			0.5	0.055	0.111	0.169	0.229	0.291	0.356	0.423	0.495
			0.7	0.076	0.155	0.238	0.326	0.418	0.516	0.621	0.734
		3.4	0.1	0.023	0.045	0.068	0.091	0.115	0.139	0.163	0.188
			0.3	0.066	0.135	0.208	0.284	0.364	0.449	0.539	0.636
			0.5	0.106	0.226	0.354	0.493	0.646	0.819	1.019	1.256
			0.7	0.152	0.320	0.507	0.721	0.973	1.283	1.692	2.256
		3.56	0.1	0.042	0.087	0.131	0.178	0.226	0.276	0.328	0.382
			0.3	0.126	0.263	0.414	0.583	0.773	0.996	1.266	1.613
			0.5	0.207	0.444	0.724	1.068	1.519	2.185	3.382	6.219
			0.7	0.285	0.629	1.065	1.665	2.625	4.590	-	-

TABLE 33. (Continued)(Center Lift: Predominantly Montmorrillonite Clay)

Percent Clay	Depth of Constant Suction	Constant Suction	Velocity of Moisture Flow (inches /month)	DIFFERENTIAL SWELL (INCHES)							
				EDGE DISTANCE PENETRATION (FT)							
(%)	(FT)	(pF)		1 FT	2 FT	3 FT	4 FT	5 FT	6 FT	7 FT	8 FT
60	3	3.2	0.1	0.003	0.006	0.009	0.013	0.016	0.019	0.022	0.026
			0.3	0.009	0.019	0.028	0.038	0.048	0.059	0.069	0.080
			0.5	0.015	0.031	0.048	0.065	0.082	0.101	0.120	0.140
			0.7	0.022	0.044	0.068	0.092	0.119	0.147	0.176	0.209
		3.4	0.1	0.006	0.013	0.019	0.026	0.033	0.040	0.047	0.054
			0.3	0.019	0.039	0.060	0.082	0.105	0.130	0.157	0.186
			0.5	0.031	0.065	0.102	0.143	0.189	0.240	0.300	0.372
			0.7	0.044	0.093	0.147	0.211	0.286	0.380	0.503	0.683
		3.6	0.1	0.015	0.031	0.048	0.065	0.083	0.102	0.122	0.144
			0.3	0.044	0.095	0.152	0.219	0.300	0.403	0.543	0.758
			0.5	0.073	0.161	0.272	0.420	0.645	1.056	2.037	4.865
			0.7	0.101	0.229	0.407	0.689	1.246	2.689	6.912	
	5	3.2	0.1	0.008	0.015	0.023	0.030	0.038	0.045	0.053	0.060
			0.3	0.022	0.044	0.067	0.090	0.113	0.138	0.162	0.187
			0.5	0.037	0.074	0.113	0.153	0.194	0.237	0.282	0.329
			0.7	0.050	0.103	0.158	0.217	0.278	0.343	0.412	0.487
		3.4	0.1	0.015	0.030	0.043	0.061	0.077	0.093	0.109	0.126
			0.3	0.045	0.091	0.140	0.191	0.245	0.302	0.363	0.426
			0.5	0.073	0.152	0.237	0.331	0.435	0.551	0.686	0.846
			0.7	0.102	0.214	0.341	0.485	0.655	0.865	1.140	1.541
		3.6	0.1	0.035	0.071	0.109	0.149	0.190	0.233	0.279	0.326
			0.3	0.103	0.219	0.349	0.499	0.678	0.901	1.200	1.652
			0.5	0.169	0.370	0.618	0.945	1.425	2.280	4.284	9.923
			0.7	0.234	0.526	0.922	1.528	2.686	5.574	-	-
	7	3.2	0.1	0.013	0.027	0.041	0.055	0.069	0.083	0.097	0.111
			0.3	0.041	0.082	0.125	0.168	0.212	0.256	0.302	0.349
			0.5	0.068	0.137	0.209	0.283	0.360	0.441	0.524	0.612
			0.7	0.093	0.191	0.294	0.402	0.516	0.637	0.767	0.907
		3.4	0.1	0.027	0.055	0.083	0.112	0.142	0.171	0.201	0.232
			0.3	0.082	0.167	0.256	0.351	0.449	0.555	0.656	0.786
			0.5	0.135	0.280	0.438	0.609	0.799	1.013	1.260	1.553
			0.7	0.188	0.395	0.627	0.892	1.204	1.587	2.092	2.840
		3.56	0.1	0.053	0.107	0.163	0.221	0.281	0.342	0.407	0.474
			0.3	0.156	0.326	0.512	0.720	0.957	1.232	1.566	1.994
			0.5	0.256	0.549	0.835	1.320	1.879	2.702	4.182	8.216
			0.7	0.354	0.779	1.317	2.059	3.247	5.677	-	-

TABLE 33 . (Continued)(Center Lift: Predominantly Montmorillonite Clay)

Percent Clay (%)	Depth to Constant Suction (FT)	Constant Suction (pF)	Velocity of Moisture Flow (inches /month)	DIFFERENTIAL SWELL (INCHES)							
				EDGE DISTANCE PENETRATION (FT)							
				1 FT	2 FT	3 FT	4 FT	5 FT	6 FT	7 FT	8 FT
70	3	3.2	0.1	0.004	0.007	0.011	0.015	0.019	0.023	0.026	0.030
			0.3	0.011	0.022	0.034	0.046	0.057	0.070	0.082	0.095
			0.5	0.018	0.037	0.057	0.077	0.098	0.120	0.143	0.167
			0.7	0.026	0.052	0.082	0.110	0.141	0.174	0.210	0.248
		3.4	0.1	0.007	0.015	0.023	0.031	0.039	0.048	0.056	0.065
			0.3	0.023	0.047	0.072	0.098	0.126	0.156	0.188	0.222
			0.5	0.038	0.078	0.122	0.171	0.225	0.287	0.358	0.443
			0.7	0.052	0.110	0.170	0.251	0.341	0.452	0.600	0.814
		3.6	0.1	0.018	0.037	0.056	0.077	0.098	0.121	0.145	0.171
			0.3	0.054	0.114	0.182	0.262	0.359	0.481	0.648	0.903
			0.5	0.088	0.192	0.324	0.502	0.769	1.258	2.428	5.796
			0.7	0.120	0.273	0.485	0.821	1.485	3.203	8.234	-
	5	3.2	0.1	0.009	0.017	0.026	0.035	0.044	0.053	0.062	0.071
			0.3	0.026	0.053	0.080	0.107	0.135	0.164	0.193	0.223
			0.5	0.044	0.088	0.134	0.182	0.231	0.283	0.336	0.392
			0.7	0.060	0.123	0.185	0.258	0.331	0.409	0.491	0.580
		3.4	0.1	0.018	0.036	0.055	0.073	0.092	0.111	0.131	0.151
			0.3	0.053	0.109	0.167	0.228	0.292	0.360	0.433	0.511
			0.5	0.088	0.182	0.284	0.395	0.519	0.658	0.818	1.008
			0.7	0.121	0.256	0.406	0.578	0.781	1.031	1.358	1.837
		3.6	0.1	0.042	0.086	0.131	0.178	0.227	0.278	0.332	0.389
			0.3	0.123	0.260	0.415	0.594	0.807	1.073	1.429	1.968
			0.5	0.202	0.441	0.737	1.126	1.698	2.717	5.104	11.822
			0.7	0.278	0.627	1.093	1.820	3.199	6.640	-	-
	7	3.2	0.1	0.016	0.032	0.049	0.065	0.082	0.098	0.115	0.132
			0.3	0.048	0.097	0.148	0.199	0.251	0.305	0.359	0.415
			0.5	0.081	0.163	0.249	0.338	0.429	0.525	0.624	0.729
			0.7	0.112	0.229	0.351	0.480	0.616	0.759	0.915	1.081
		3.4	0.1	0.032	0.066	0.099	0.134	0.168	0.204	0.240	0.276
			0.3	0.098	0.199	0.306	0.418	0.536	0.661	0.794	0.937
			0.5	0.162	0.334	0.522	0.727	0.952	1.207	1.501	1.851
			0.7	0.224	0.470	0.747	1.063	1.435	1.891	2.492	3.383
		3.56	0.1	0.063	0.128	0.194	0.263	0.334	0.407	0.484	0.563
			0.3	0.185	0.387	0.609	0.857	1.139	1.468	1.865	2.376
			0.5	0.305	0.655	1.067	1.573	2.239	3.219	4.983	9.162
			0.7	0.421	0.928	1.569	2.453	3.868	6.763	-	-

TABLE 34. Differential Swelling Occurring at the Perimeter of a Slab for an Edge Lift Swelling Condition in a Predominantly Kaolinite Clay Soil

Percent Clay (%)	Depth to Constant Suction (FT)	Constant Suction (pF)	Velocity of Moisture Flow (inches /month)	DIFFERENTIAL SWELL (INCHES) EDGE DISTANCE PENETRATION (FT) 1 FT	2 FT	3 FT	4 FT	5 FT	6 FT	7 FT	8 FT
30	3	3.2	0.1	0.001	0.001	0.002	0.002	0.003	0.003	0.004	0.004
			0.3	0.002	0.003	0.004	0.006	0.007	0.009	0.010	0.012
			0.5	0.003	0.005	0.007	0.010	0.012	0.014	0.017	0.019
			0.7	0.004	0.007	0.010	0.013	0.017	0.020	0.023	0.026
		3.4	0.1	0.001	0.002	0.003	0.004	0.005	0.006	0.007	0.008
			0.3	0.003	0.006	0.009	0.012	0.015	0.018	0.021	0.024
			0.5	0.005	0.010	0.015	0.020	0.025	0.029	0.033	0.037
			0.7	0.007	0.014	0.021	0.027	0.033	0.039	0.045	0.050
		3.6	0.1	0.003	0.005	0.008	0.010	0.013	0.015	0.017	0.020
			0.3	0.008	0.015	0.022	0.029	0.035	0.041	0.047	0.053
			0.5	0.013	0.025	0.035	0.046	0.055	0.064	0.072	0.080
			0.7	0.018	0.034	0.048	0.061	0.073	0.084	0.094	0.104
		3.8	0.1	0.006	0.013	0.018	0.024	0.030	0.035	0.040	0.045
			0.3	0.019	0.035	0.050	0.064	0.076	0.088	0.099	0.109
			0.5	0.031	0.056	0.078	0.097	0.114	0.129	0.143	0.156
			0.7	0.042	0.075	0.102	0.125	0.145	0.164	0.180	0.195
	5	3.2	0.1	0.001	0.002	0.003	0.004	0.005	0.007	0.008	0.009
			0.3	0.003	0.007	0.010	0.013	0.016	0.019	0.022	0.025
			0.5	0.006	0.011	0.016	0.021	0.027	0.032	0.037	0.041
			0.7	0.008	0.015	0.022	0.030	0.037	0.044	0.050	0.057
		3.4	0.1	0.002	0.005	0.007	0.009	0.012	0.014	0.016	0.018
			0.3	0.007	0.014	0.021	0.027	0.034	0.040	0.046	0.053
			0.5	0.012	0.023	0.034	0.045	0.055	0.065	0.075	0.084
			0.7	0.016	0.032	0.047	0.061	0.075	0.089	0.101	0.114
		3.6	0.1	0.006	0.012	0.017	0.023	0.028	0.034	0.039	0.044
			0.3	0.018	0.034	0.050	0.065	0.080	0.094	0.107	0.120
			0.5	0.029	0.056	0.081	0.104	0.126	0.147	0.167	0.186
			0.7	0.041	0.077	0.110	0.141	0.169	0.195	0.220	0.243
		3.8	0.1	0.014	0.028	0.042	0.055	0.067	0.079	0.091	0.102
			0.3	0.043	0.081	0.116	0.148	0.178	0.205	0.231	0.255
			0.5	0.072	0.131	0.183	0.228	0.270	0.307	0.342	0.374
			0.7	0.100	0.178	0.244	0.300	0.350	0.395	0.436	0.474
	7	3.2	0.1	0.002	0.004	0.006	0.008	0.009	0.011	0.013	0.015
			0.3	0.006	0.011	0.017	0.022	0.028	0.033	0.039	0.044
			0.5	0.010	0.019	0.028	0.037	0.046	0.055	0.064	0.072
			0.7	0.013	0.026	0.039	0.052	0.064	0.076	0.088	0.099
		3.4	0.1	0.004	0.008	0.012	0.016	0.020	0.024	0.028	0.032
			0.3	0.012	0.024	0.036	0.048	0.059	0.071	0.082	0.093
			0.5	0.021	0.041	0.060	0.079	0.097	0.115	0.132	0.149
			0.7	0.029	0.056	0.083	0.108	0.133	0.157	0.180	0.202
		3.6	0.1	0.010	0.020	0.030	0.040	0.050	0.059	0.069	0.078
			0.3	0.031	0.061	0.089	0.116	0.142	0.167	0.192	0.215
			0.5	0.052	0.100	0.145	0.187	0.227	0.264	0.300	0.335
			0.7	0.073	0.138	0.193	0.254	0.305	0.353	0.399	0.441
		3.8	0.1	-	-	-	-	-	-	-	-

TABLE 34. (Continued)(Edge Lift: Predominantly Kaolinite Clay)

Percent Clay (%)	Depth to Constant Suction (FT)	Constant Suction (pF)	Velocity of Moisture Flow (inches /month)	DIFFERENTIAL SWELL (INCHES)							
				EDGE DISTANCE PENETRATION (FT)							
				1 FT	2 FT	3 FT	4 FT	5 FT	6 FT	7 FT	8 FT
40	3	3.2	0.1	0.001	0.001	0.002	0.003	0.003	0.004	0.005	0.005
			0.3	0.002	0.004	0.006	0.008	0.010	0.012	0.014	0.015
			0.5	0.003	0.007	0.010	0.013	0.016	0.019	0.022	0.025
			0.7	0.005	0.009	0.014	0.018	0.022	0.026	0.030	0.034
		3.4	0.1	0.001	0.003	0.004	0.006	0.007	0.008	0.010	0.011
			0.3	0.004	0.008	0.012	0.016	0.020	0.024	0.028	0.032
			0.5	0.007	0.014	0.020	0.027	0.033	0.039	0.045	0.050
			0.7	0.010	0.019	0.028	0.037	0.045	0.052	0.060	0.067
		3.6	0.1	0.004	0.007	0.010	0.014	0.017	0.020	0.023	0.026
			0.3	0.010	0.020	0.030	0.039	0.047	0.055	0.063	0.071
			0.5	0.017	0.033	0.047	0.061	0.074	0.086	0.097	0.108
			0.7	0.024	0.045	0.064	0.081	0.098	0.112	0.126	0.139
		3.8	0.1	0.009	0.017	0.025	0.032	0.040	0.046	0.053	0.060
			0.3	0.025	0.047	0.067	0.085	0.102	0.118	0.132	0.145
			0.5	0.041	0.075	0.104	0.129	0.152	0.173	0.192	0.209
			0.7	0.056	0.100	0.136	0.167	0.195	0.219	0.241	0.261
	5	3.2	0.1	0.002	0.003	0.004	0.006	0.007	0.009	0.010	0.012
			0.3	0.004	0.009	0.013	0.017	0.022	0.026	0.030	0.034
			0.5	0.007	0.015	0.022	0.029	0.035	0.042	0.049	0.056
			0.7	0.010	0.020	0.030	0.040	0.049	0.058	0.067	0.076
		3.4	0.1	0.003	0.006	0.009	0.012	0.016	0.019	0.022	0.025
			0.3	0.009	0.019	0.028	0.037	0.045	0.054	0.062	0.071
			0.5	0.016	0.031	0.046	0.060	0.074	0.087	0.100	0.113
			0.7	0.022	0.043	0.063	0.082	0.101	0.119	0.136	0.152
		3.6	0.1	0.008	0.016	0.023	0.031	0.038	0.045	0.052	0.059
			0.3	0.023	0.046	0.067	0.087	0.107	0.126	0.144	0.161
			0.5	0.039	0.075	0.108	0.140	0.169	0.197	0.223	0.249
			0.7	0.054	0.103	0.147	0.188	0.226	0.261	0.295	0.326
		3.8	0.1	0.019	0.038	0.056	0.073	0.090	0.106	0.121	0.136
			0.3	0.058	0.109	0.156	0.198	0.238	0.275	0.309	0.342
			0.5	0.096	0.176	0.245	0.306	0.361	0.411	0.458	0.501
			0.7	0.134	0.239	0.326	0.402	0.469	0.529	0.584	0.634
	7	3.2	0.1	0.003	0.005	0.008	0.010	0.013	0.015	0.018	0.020
			0.3	0.008	0.015	0.023	0.030	0.037	0.045	0.052	0.059
			0.5	0.013	0.025	0.038	0.050	0.062	0.074	0.085	0.097
			0.7	0.018	0.035	0.052	0.069	0.085	0.102	0.117	0.133
		3.4	0.1	0.006	0.011	0.016	0.022	0.027	0.032	0.038	0.043
			0.3	0.017	0.033	0.049	0.064	0.080	0.095	0.109	0.124
			0.5	0.028	0.054	0.080	0.105	0.130	0.154	0.177	0.200
			0.7	0.039	0.076	0.111	0.145	0.178	0.210	0.241	0.271
		3.6	0.1	0.014	0.027	0.041	0.054	0.067	0.080	0.092	0.105
			0.3	0.042	0.081	0.119	0.155	0.190	0.224	0.257	0.238
			0.5	0.069	0.134	0.194	0.250	0.304	0.354	0.402	0.448
			0.7	0.098	0.185	0.266	0.340	0.409	0.473	0.534	0.591
		3.8	0.1	-	-	-	-	-	-	-	-

TABLE 34. (Continued)(Edge Lift: Predominantly Kaolinite Clay)

Percent Clay (%)	Depth to Constant Suction (FT)	Constant Suction (pF)	Velocity of Moisture Flow (inches /month)	DIFFERENTIAL SWELL (INCHES)							
				EDGE DISTANCE PENETRATION (FT)							
				1 FT	2 FT	3 FT	4 FT	5 FT	6 FT	7 FT	8 FT
50	3	3.2	0.1	0.001	0.002	0.003	0.003	0.004	0.005	0.006	0.007
			0.3	0.003	0.005	0.007	0.010	0.012	0.015	0.017	0.019
			0.5	0.004	0.008	0.012	0.016	0.020	0.024	0.028	0.032
			0.7	0.006	0.012	0.017	0.023	0.028	0.033	0.038	0.043
		3.4	0.1	0.002	0.004	0.005	0.007	0.009	0.011	0.012	0.014
			0.3	0.005	0.011	0.016	0.021	0.025	0.030	0.035	0.040
			0.5	0.009	0.017	0.026	0.034	0.041	0.049	0.056	0.063
			0.7	0.012	0.024	0.035	0.046	0.056	0.066	0.075	0.084
		3.6	0.1	0.004	0.009	0.013	0.017	0.021	0.025	0.029	0.033
			0.3	0.013	0.025	0.037	0.048	0.059	0.069	0.079	0.089
			0.5	0.022	0.042	0.059	0.076	0.092	0.107	0.121	0.135
			0.7	0.030	0.056	0.080	0.102	0.122	0.141	0.158	0.175
		3.8	0.1	0.011	0.021	0.031	0.040	0.050	0.058	0.067	0.075
			0.3	0.032	0.059	0.084	0.107	0.128	0.147	0.165	0.182
			0.5	0.052	0.094	0.130	0.162	0.191	0.217	0.240	0.262
			0.7	0.071	0.126	0.171	0.210	0.244	0.275	0.302	0.328
	5	3.2	0.1	0.002	0.004	0.006	0.007	0.009	0.011	0.013	0.015
			0.3	0.006	0.011	0.016	0.022	0.027	0.032	0.037	0.043
			0.5	0.009	0.018	0.027	0.036	0.044	0.053	0.061	0.070
			0.7	0.013	0.025	0.038	0.050	0.062	0.073	0.084	0.096
		3.4	0.1	0.004	0.008	0.012	0.016	0.019	0.023	0.027	0.031
			0.3	0.012	0.023	0.035	0.046	0.057	0.068	0.078	0.088
			0.5	0.020	0.039	0.057	0.075	0.092	0.109	0.126	0.142
			0.7	0.028	0.054	0.079	0.103	0.126	0.149	0.170	0.191
		3.6	0.1	0.010	0.019	0.029	0.038	0.047	0.056	0.065	0.074
			0.3	0.029	0.057	0.084	0.109	0.134	0.158	0.180	0.202
			0.5	0.049	0.094	0.136	0.175	0.212	0.247	0.280	0.312
			0.7	0.068	0.129	0.185	0.236	0.283	0.328	0.369	0.408
		3.8	0.1	0.024	0.048	0.070	0.092	0.112	0.132	0.152	0.171
			0.3	0.072	0.137	0.195	0.249	0.298	0.344	0.387	0.428
			0.5	0.120	0.220	0.307	0.384	0.453	0.516	0.574	0.628
			0.7	0.168	0.299	0.409	0.504	0.588	0.663	0.732	0.795
	7	3.2	0.1	0.003	0.006	0.010	0.013	0.016	0.019	0.022	0.025
			0.3	0.010	0.019	0.028	0.038	0.047	0.056	0.065	0.074
			0.5	0.016	0.032	0.047	0.062	0.077	0.092	0.107	0.121
			0.7	0.022	0.044	0.066	0.087	0.107	0.127	0.147	0.167
		3.4	0.1	0.007	0.014	0.021	0.027	0.034	0.041	0.047	0.054
			0.3	0.021	0.041	0.061	0.080	0.100	0.119	0.137	0.156
			0.5	0.035	0.068	0.100	0.132	0.163	0.193	0.222	0.250
			0.7	0.048	0.095	0.139	0.182	0.223	0.263	0.302	0.339
		3.6	0.1	0.017	0.034	0.051	0.068	0.084	0.100	0.116	0.131
			0.3	0.052	0.102	0.149	0.195	0.239	0.281	0.322	0.361
			0.5	0.087	0.168	0.243	0.314	0.381	0.444	0.504	0.562
			0.7	0.122	0.232	0.333	0.426	0.512	0.593	0.669	0.741
		3.8	0.1	-	-	-	-	-	-	-	-

TABLE 34. (Continued)(Edge Lift: Predominantly Kaolinite Clay)

Percent Clay (%)	Depth to Constant Suction (FT)	Constant Suction (pF)	Velocity of Moisture Flow (inches /month)	DIFFERENTIAL SWELL (INCHES) EDGE DISTANCE PENETRATION (FT) 1 FT	2 FT	3 FT	4 FT	5 FT	6 FT	7 FT	8 FT
60	3	3.2	0.1	0.001	0.002	0.003	0.004	0.005	0.006	0.007	0.008
			0.3	0.003	0.006	0.009	0.012	0.015	0.018	0.021	0.023
			0.5	0.005	0.010	0.015	0.020	0.024	0.029	0.033	0.038
			0.7	0.007	0.014	0.021	0.027	0.033	0.040	0.046	0.052
		3.4	0.1	0.002	0.004	0.006	0.009	0.011	0.013	0.015	0.017
			0.3	0.006	0.013	0.019	0.025	0.031	0.036	0.042	0.048
			0.5	0.011	0.021	0.031	0.040	0.049	0.058	0.067	0.076
			0.7	0.015	0.029	0.042	0.055	0.067	0.079	0.090	0.101
		3.6	0.1	0.005	0.011	0.016	0.021	0.025	0.030	0.035	0.040
			0.3	0.016	0.031	0.045	0.058	0.071	0.083	0.095	0.106
			0.5	0.026	0.050	0.071	0.092	0.111	0.129	0.146	0.162
			0.7	0.036	0.068	0.097	0.123	0.147	0.169	0.190	0.210
		3.8	0.1	0.013	0.025	0.037	0.049	0.059	0.070	0.080	0.090
			0.3	0.038	0.071	0.101	0.129	0.154	0.177	0.199	0.219
			0.5	0.062	0.113	0.157	0.195	0.229	0.260	0.289	0.315
			0.7	0.085	0.151	0.205	0.252	0.293	0.330	0.363	0.394
	5	3.2	0.1	0.002	0.004	0.007	0.009	0.011	0.013	0.015	0.017
			0.3	0.007	0.013	0.020	0.026	0.032	0.039	0.045	0.051
			0.5	0.011	0.022	0.033	0.043	0.053	0.064	0.074	0.084
			0.7	0.015	0.031	0.045	0.060	0.074	0.088	0.101	0.115
		3.4	0.1	0.005	0.009	0.014	0.019	0.023	0.028	0.033	0.037
			0.3	0.014	0.028	0.042	0.055	0.068	0.081	0.094	0.106
			0.5	0.024	0.046	0.069	0.090	0.111	0.131	0.151	0.170
			0.7	0.033	0.065	0.095	0.124	0.152	0.179	0.205	0.230
		3.6	0.1	0.012	0.023	0.035	0.046	0.057	0.068	0.079	0.089
			0.3	0.035	0.069	0.101	0.132	0.161	0.189	0.217	0.243
			0.5	0.059	0.113	0.163	0.210	0.255	0.297	0.337	0.375
			0.7	0.082	0.155	0.222	0.284	0.341	0.394	0.444	0.491
		3.8	0.1	0.029	0.057	0.084	0.110	0.135	0.159	0.183	0.206
			0.3	0.087	0.164	0.235	0.299	0.358	0.414	0.466	0.515
			0.5	0.144	0.265	0.369	0.461	0.544	0.620	0.690	0.754
			0.7	0.201	0.360	0.492	0.606	0.707	0.798	0.880	0.956
	7	3.2	0.1	0.004	0.008	0.011	0.015	0.019	0.023	0.027	0.030
			0.3	0.011	0.023	0.034	0.045	0.056	0.067	0.078	0.089
			0.5	0.019	0.038	0.057	0.075	0.093	0.111	0.128	0.146
			0.7	0.027	0.053	0.079	0.104	0.129	0.153	0.177	0.201
		3.4	0.1	0.008	0.017	0.025	0.033	0.041	0.049	0.057	0.065
			0.3	0.025	0.049	0.073	0.097	0.120	0.143	0.165	0.187
			0.5	0.042	0.082	0.121	0.159	0.196	0.232	0.267	0.301
			0.7	0.058	0.114	0.167	0.219	0.268	0.316	0.363	0.408
		3.6	0.1	0.021	0.041	0.061	0.081	0.101	0.120	0.139	0.158
			0.3	0.063	0.122	0.179	0.234	0.287	0.338	0.387	0.434
			0.5	0.105	0.201	0.292	0.377	0.457	0.534	0.606	0.675
			0.7	0.147	0.279	0.400	0.512	0.616	0.713	0.804	0.891
		3.8	0.1	-	-	-	-	-	-	-	-

TABLE 34. (Continued)(Edge Lift: Predominantly Kaolinite Clay)

Percent Clay (%)	Depth to Constant Suction (FT)	Constant Suction (pF)	Velocity of Moisture Flow (inches /month)	DIFFERENTIAL SWELL (INCHES) EDGE DISTANCE PENETRATION (FT) 1 FT	2 FT	3 FT	4 FT	5 FT	6 FT	7 FT	8 FT
70	3	3.2	0.1	0.001	0.002	0.004	0.005	0.006	0.007	0.008	0.009
			0.3	0.004	0.007	0.011	0.014	0.017	0.021	0.024	0.027
			0.5	0.006	0.012	0.017	0.023	0.028	0.034	0.039	0.044
			0.7	0.008	0.016	0.024	0.032	0.039	0.046	0.054	0.061
		3.4	0.1	0.003	0.005	0.007	0.010	0.012	0.015	0.017	0.020
			0.3	0.008	0.015	0.022	0.029	0.036	0.042	0.049	0.056
			0.5	0.012	0.024	0.036	0.047	0.058	0.068	0.078	0.088
			0.7	0.017	0.034	0.049	0.064	0.079	0.092	0.106	0.118
		3.6	0.1	0.006	0.012	0.018	0.024	0.030	0.035	0.041	0.045
			0.3	0.018	0.036	0.052	0.068	0.083	0.097	0.111	0.124
			0.5	0.030	0.058	0.084	0.107	0.130	0.151	0.170	0.189
			0.7	0.042	0.079	0.113	0.143	0.172	0.198	0.222	0.245
		3.8	0.1	0.015	0.030	0.043	0.057	0.069	0.082	0.094	0.105
			0.3	0.044	0.083	0.119	0.150	0.180	0.207	0.232	0.256
			0.5	0.072	0.132	0.183	0.228	0.268	0.304	0.338	0.369
			0.7	0.099	0.176	0.240	0.295	0.343	0.386	0.425	0.460
	5	3.2	0.1	0.003	0.005	0.008	0.010	0.013	0.015	0.018	0.020
			0.3	0.008	0.015	0.023	0.031	0.038	0.045	0.053	0.060
			0.5	0.013	0.026	0.038	0.050	0.062	0.074	0.086	0.098
			0.7	0.018	0.036	0.053	0.070	0.086	0.103	0.119	0.134
		3.4	0.1	0.006	0.011	0.017	0.022	0.027	0.033	0.038	0.043
			0.3	0.017	0.033	0.049	0.064	0.080	0.095	0.110	0.124
			0.5	0.028	0.054	0.080	0.105	0.130	0.153	0.176	0.199
			0.7	0.039	0.075	0.111	0.145	0.177	0.209	0.239	0.268
		3.6	0.1	0.014	0.027	0.041	0.054	0.067	0.079	0.092	0.104
			0.3	0.041	0.080	0.118	0.154	0.188	0.221	0.253	0.234
			0.5	0.068	0.132	0.191	0.246	0.298	0.347	0.393	0.438
			0.7	0.096	0.181	0.259	0.331	0.398	0.460	0.518	0.574
		3.8	0.1	0.034	0.067	0.098	0.128	0.158	0.186	0.213	0.240
			0.3	0.102	0.192	0.274	0.349	0.419	0.483	0.544	0.601
			0.5	0.169	0.309	0.431	0.539	0.636	0.724	0.806	0.881
			0.7	0.235	0.420	0.575	0.708	0.826	0.932	1.028	1.117
	7	3.2	0.1	0.005	0.009	0.013	0.018	0.022	0.027	0.031	0.035
			0.3	0.013	0.027	0.040	0.053	0.066	0.079	0.091	0.104
			0.5	0.022	0.044	0.066	0.087	0.109	0.129	0.150	0.170
			0.7	0.031	0.062	0.092	0.121	0.150	0.179	0.207	0.234
		3.4	0.1	0.010	0.019	0.029	0.038	0.048	0.057	0.066	0.076
			0.3	0.029	0.058	0.086	0.113	0.140	0.167	0.193	0.218
			0.5	0.048	0.095	0.141	0.185	0.228	0.270	0.311	0.351
			0.7	0.068	0.133	0.195	0.256	0.314	0.370	0.424	0.476
		3.6	0.1	0.024	0.048	0.072	0.095	0.118	0.140	0.162	0.184
			0.3	0.073	0.143	0.209	0.274	0.335	0.395	0.452	0.508
			0.5	0.122	0.235	0.341	0.441	0.534	0.623	0.708	0.789
			0.7	0.172	0.326	0.468	0.598	0.719	0.833	0.940	1.041
		3.8	0.1	-	-	-	-	-	-	-	-

TABLE 35. Differential Swell Occurring at the Perimeter of a Slab for an Edge Lift Swelling Condition in Predominantly Illite Clay Soil

Percent Clay (%)	Depth to Constant Suction (FT)	Constant Suction (pF)	Velocity of Moisture Flow (inches /month)	DIFFERENTIAL SWELL (INCHES) EDGE DISTANCE PENETRATION (FT) 1 FT	2 FT	3 FT	4 FT	5 FT	6 FT	7 FT	8 FT
30	3	3.2	0.1	0.001	0.002	0.003	0.004	0.005	0.006	0.007	0.008
			0.3	0.003	0.006	0.009	0.012	0.015	0.017	0.020	0.023
			0.5	0.005	0.010	0.015	0.019	0.024	0.029	0.033	0.037
			0.7	0.007	0.014	0.020	0.027	0.033	0.039	0.045	0.051
		3.4	0.1	0.002	0.004	0.006	0.008	0.010	0.013	0.015	0.017
			0.3	0.006	0.013	0.019	0.025	0.030	0.036	0.042	0.047
			0.5	0.011	0.021	0.030	0.040	0.049	0.058	0.066	0.075
			0.7	0.015	0.029	0.042	0.054	0.067	0.078	0.089	0.100
		3.6	0.1	0.005	0.010	0.015	0.020	0.025	0.030	0.035	0.039
			0.3	0.016	0.030	0.044	0.057	0.070	0.082	0.094	0.105
			0.5	0.026	0.049	0.071	0.091	0.110	0.128	0.144	0.160
			0.7	0.036	0.067	0.096	0.121	0.145	0.168	0.188	0.208
		3.8	0.1	0.013	0.025	0.037	0.048	0.059	0.069	0.079	0.089
			0.3	0.038	0.071	0.100	0.127	0.152	0.175	0.197	0.217
			0.5	0.061	0.112	0.155	0.193	0.227	0.258	0.286	0.312
			0.7	0.084	0.149	0.203	0.250	0.290	0.327	0.360	0.390
	5	3.2	0.1	0.002	0.004	0.007	0.009	0.011	0.013	0.015	0.017
			0.3	0.007	0.013	0.019	0.026	0.032	0.038	0.045	0.051
			0.5	0.011	0.022	0.032	0.043	0.053	0.063	0.073	0.083
			0.7	0.015	0.030	0.045	0.059	0.073	0.087	0.100	0.114
		3.4	0.1	0.005	0.009	0.014	0.019	0.023	0.028	0.032	0.037
			0.3	0.014	0.028	0.041	0.055	0.068	0.080	0.093	0.105
			0.5	0.023	0.046	0.068	0.089	0.110	0.130	0.149	0.168
			0.7	0.033	0.064	0.094	0.123	0.150	0.177	0.202	0.227
		3.6	0.1	0.012	0.023	0.034	0.046	0.056	0.067	0.078	0.088
			0.3	0.035	0.068	0.100	0.130	0.159	0.187	0.214	0.241
			0.5	0.058	0.112	0.161	0.208	0.252	0.294	0.333	0.371
			0.7	0.081	0.154	0.220	0.281	0.337	0.390	0.439	0.486
		3.8	0.1	0.029	0.057	0.083	0.109	0.134	0.158	0.181	0.203
			0.3	0.086	0.163	0.232	0.296	0.355	0.409	0.461	0.509
			0.5	0.143	0.262	0.365	0.456	0.539	0.613	0.682	0.746
			0.7	0.199	0.356	0.487	0.600	0.699	0.789	0.871	0.946
	7	3.2	0.1	0.004	0.008	0.011	0.015	0.019	0.023	0.026	0.030
			0.3	0.011	0.023	0.034	0.045	0.056	0.067	0.077	0.088
			0.5	0.019	0.038	0.056	0.074	0.092	0.110	0.127	0.144
			0.7	0.027	0.052	0.078	0.103	0.127	0.152	0.175	0.198
		3.4	0.1	0.008	0.016	0.024	0.032	0.040	0.048	0.056	0.064
			0.3	0.025	0.049	0.072	0.096	0.119	0.141	0.163	0.185
			0.5	0.041	0.081	0.119	0.157	0.194	0.229	0.264	0.298
			0.7	0.058	0.113	0.166	0.217	0.266	0.313	0.359	0.404
		3.6	0.1	0.021	0.041	0.061	0.080	0.100	0.119	0.137	0.156
			0.3	0.062	0.121	0.177	0.232	0.284	0.334	0.383	0.430
			0.5	0.103	0.199	0.289	0.373	0.453	0.528	0.600	0.668
			0.7	0.145	0.276	0.395	0.507	0.609	0.706	0.796	0.882
		3.8	0.1	-	-	-	-	-	-	-	-

TABLE 35. (Continued)(Edge Lift: Predominantly Illite Clay)

Percent Clay (%)	Depth to Constant Suction (FT)	Constant Suction (pF)	Velocity of Moisture Flow (inches /month)	DIFFERENTIAL SWELL (INCHES) EDGE DISTANCE PENETRATION (FT)							
				1 FT	2 FT	3 FT	4 FT	5 FT	6 FT	7 FT	8 FT
40	3	3.2	0.1	0.001	0.003	0.004	0.006	0.007	0.009	0.010	0.011
			0.3	0.004	0.009	0.013	0.017	0.021	0.025	0.029	0.033
			0.5	0.007	0.014	0.021	0.028	0.035	0.041	0.048	0.054
			0.7	0.010	0.020	0.029	0.039	0.048	0.057	0.065	0.074
		3.4	0.1	0.003	0.006	0.009	0.012	0.015	0.018	0.021	0.024
			0.3	0.009	0.018	0.027	0.035	0.044	0.052	0.060	0.068
			0.5	0.015	0.030	0.044	0.058	0.071	0.083	0.096	0.108
			0.7	0.021	0.041	0.060	0.079	0.096	0.113	0.129	0.145
		3.6	0.1	0.008	0.015	0.022	0.029	0.036	0.043	0.050	0.057
			0.3	0.022	0.044	0.064	0.083	0.101	0.119	0.136	0.152
			0.5	0.037	0.071	0.102	0.131	0.158	0.184	0.208	0.231
			0.7	0.051	0.097	0.138	0.175	0.210	0.242	0.272	0.300
		3.8	0.1	0.019	0.036	0.053	0.069	0.085	0.100	0.115	0.129
			0.3	0.054	0.102	0.145	0.184	0.220	0.253	0.284	0.313
			0.5	0.088	0.161	0.224	0.278	0.328	0.372	0.413	0.451
			0.7	0.122	0.216	0.294	0.360	0.419	0.472	0.519	0.563
	5	3.2	0.1	0.003	0.006	0.009	0.013	0.016	0.019	0.022	0.025
			0.3	0.009	0.019	0.028	0.037	0.046	0.055	0.064	0.073
			0.5	0.016	0.031	0.047	0.062	0.076	0.091	0.105	0.120
			0.7	0.022	0.044	0.065	0.085	0.106	0.125	0.145	0.164
		3.4	0.1	0.007	0.014	0.020	0.027	0.033	0.040	0.046	0.053
			0.3	0.020	0.040	0.060	0.079	0.097	0.116	0.134	0.152
			0.5	0.034	0.066	0.098	0.129	0.158	0.187	0.216	0.243
			0.7	0.047	0.092	0.135	0.177	0.217	0.255	0.292	0.328
		3.6	0.1	0.017	0.033	0.050	0.066	0.081	0.097	0.112	0.127
			0.3	0.050	0.098	0.144	0.188	0.230	0.271	0.310	0.347
			0.5	0.084	0.161	0.233	0.300	0.364	0.424	0.481	0.535
			0.7	0.117	0.222	0.317	0.405	0.487	0.563	0.634	0.701
		3.8	0.1	0.042	0.082	0.120	0.157	0.193	0.228	0.261	0.294
			0.3	0.124	0.235	0.335	0.427	0.512	0.591	0.665	0.735
			0.5	0.206	0.378	0.527	0.659	0.777	0.886	0.985	1.078
			0.7	0.288	0.514	0.703	0.866	1.010	1.139	1.257	1.366
	7	3.2	0.1	0.005	0.011	0.016	0.022	0.027	0.033	0.038	0.043
			0.3	0.016	0.033	0.049	0.065	0.080	0.096	0.112	0.127
			0.5	0.027	0.054	0.081	0.107	0.133	0.158	0.183	0.208
			0.7	0.038	0.076	0.112	0.149	0.184	0.219	0.253	0.286
		3.4	0.1	0.012	0.024	0.035	0.047	0.058	0.070	0.081	0.093
			0.3	0.036	0.070	0.105	0.138	0.171	0.204	0.236	0.267
			0.5	0.059	0.117	0.172	0.227	0.279	0.331	0.381	0.430
			0.7	0.083	0.163	0.239	0.313	0.384	0.452	0.518	0.583
		3.6	0.1	0.030	0.059	0.088	0.116	0.144	0.171	0.198	0.225
			0.3	0.089	0.175	0.256	0.335	0.410	0.483	0.553	0.621
			0.5	0.149	0.288	0.417	0.539	0.654	0.762	0.866	0.965
			0.7	0.210	0.399	0.572	0.731	0.880	1.019	1.149	1.273
		3.8	0.1	-	-	-	-	-	-	-	-

TABLE 35. (Continued)(Edge Lift: Predominantly Illite Clay)

Percent Clay (%)	Depth to Constant Suction (FT)	Constant Suction (pF)	Velocity of Moisture Flow (inches /month)	DIFFERENTIAL SWELL (INCHES) EDGE DISTANCE PENETRATION (FT) 1 FT	2 FT	3 FT	4 FT	5 FT	6 FT	7 FT	8 FT
50	3	3.2	0.1	0.002	0.004	0.006	0.008	0.009	0.011	0.013	0.015
			0.3	0.006	0.011	0.017	0.022	0.028	0.033	0.038	0.044
			0.5	0.009	0.019	0.028	0.037	0.045	0.054	0.062	0.071
			0.7	0.013	0.026	0.038	0.051	0.062	0.074	0.086	0.097
		3.4	0.1	0.004	0.008	0.012	0.016	0.020	0.024	0.027	0.031
			0.3	0.012	0.024	0.035	0.046	0.057	0.068	0.078	0.089
			0.5	0.020	0.039	0.057	0.075	0.092	0.109	0.125	0.141
			0.7	0.028	0.054	0.079	0.103	0.126	0.148	0.169	0.189
		3.6	0.1	0.010	0.020	0.029	0.038	0.048	0.057	0.065	0.074
			0.3	0.029	0.057	0.083	0.108	0.132	0.155	0.178	0.199
			0.5	0.048	0.093	0.134	0.172	0.207	0.241	0.272	0.303
			0.7	0.067	0.127	0.180	0.229	0.274	0.316	0.356	0.392
		3.8	0.1	0.024	0.047	0.069	0.091	0.111	0.131	0.150	0.168
			0.3	0.071	0.133	0.189	0.240	0.287	0.331	0.371	0.409
			0.5	0.116	0.211	0.292	0.364	0.423	0.486	0.540	0.589
			0.7	0.159	0.282	0.384	0.471	0.548	0.616	0.679	0.736
	5	3.2	0.1	0.004	0.008	0.012	0.016	0.021	0.025	0.029	0.033
			0.3	0.012	0.025	0.037	0.049	0.061	0.072	0.084	0.096
			0.5	0.021	0.041	0.061	0.080	0.100	0.119	0.138	0.156
			0.7	0.029	0.057	0.085	0.112	0.138	0.164	0.190	0.215
		3.4	0.1	0.009	0.018	0.026	0.035	0.044	0.052	0.061	0.069
			0.3	0.027	0.052	0.078	0.103	0.127	0.152	0.175	0.198
			0.5	0.044	0.087	0.128	0.168	0.207	0.245	0.282	0.318
			0.7	0.062	0.121	0.177	0.231	0.283	0.334	0.382	0.429
		3.6	0.1	0.022	0.044	0.065	0.086	0.106	0.127	0.147	0.166
			0.3	0.066	0.129	0.188	0.246	0.301	0.354	0.405	0.454
			0.5	0.109	0.211	0.305	0.393	0.476	0.554	0.629	0.700
			0.7	0.153	0.290	0.415	0.530	0.636	0.736	0.829	0.917
		3.8	0.1	0.054	0.107	0.157	0.205	0.252	0.297	0.341	0.384
			0.3	0.162	0.307	0.438	0.558	0.669	0.773	0.870	0.961
			0.5	0.269	0.494	0.689	0.861	1.016	1.158	1.288	1.409
			0.7	0.376	0.672	0.919	1.132	1.320	1.490	1.644	1.785
	7	3.2	0.1	0.007	0.014	0.021	0.028	0.035	0.042	0.049	0.056
			0.3	0.021	0.043	0.064	0.085	0.105	0.126	0.146	0.166
			0.5	0.036	0.071	0.106	0.140	0.173	0.207	0.240	0.272
			0.7	0.050	0.099	0.147	0.194	0.240	0.286	0.331	0.375
		3.4	0.1	0.015	0.031	0.046	0.061	0.076	0.091	0.106	0.121
			0.3	0.046	0.092	0.137	0.181	0.224	0.266	0.308	0.349
			0.5	0.077	0.153	0.225	0.296	0.365	0.432	0.498	0.562
			0.7	0.109	0.213	0.313	0.409	0.501	0.591	0.678	0.762
		3.6	0.1	0.039	0.077	0.115	0.152	0.188	0.224	0.259	0.294
			0.3	0.117	0.228	0.335	0.437	0.536	0.631	0.723	0.811
			0.5	0.195	0.376	0.545	0.704	0.854	0.997	1.132	1.261
			0.7	0.274	0.522	0.748	0.956	1.150	1.332	1.503	1.664
		3.8	0.1	-	-	-	-	-	-	-	-

TABLE 35. (Continued)(Edge Lift: Predominantly Illite Clay)

Percent Clay (%)	Depth to Constant Suction (FT)	Constant Suction (pF)	Velocity of Moisture Flow (inches /month)	DIFFERENTIAL SWELL (INCHES) EDGE DISTANCE PENETRATION (FT) 1 FT	2 FT	3 FT	4 FT	5 FT	6 FT	7 FT	8 FT
60	3	3.2	0.1	0.002	0.005	0.007	0.009	0.012	0.014	0.016	0.018
			0.3	0.007	0.014	0.021	0.027	0.034	0.041	0.047	0.054
			0.5	0.012	0.023	0.034	0.045	0.056	0.067	0.077	0.087
			0.7	0.016	0.032	0.047	0.062	0.077	0.092	0.106	0.119
		3.4	0.1	0.005	0.010	0.015	0.020	0.024	0.029	0.034	0.039
			0.3	0.015	0.029	0.043	0.057	0.071	0.084	0.097	0.110
			0.5	0.025	0.048	0.071	0.093	0.114	0.135	0.155	0.174
			0.7	0.034	0.067	0.097	0.127	0.155	0.182	0.208	0.234
		3.6	0.1	0.012	0.024	0.036	0.047	0.059	0.070	0.081	0.092
			0.3	0.036	0.070	0.103	0.134	0.164	0.192	0.219	0.245
			0.5	0.060	0.114	0.165	0.212	0.256	0.297	0.337	0.374
			0.7	0.083	0.156	0.223	0.283	0.339	0.391	0.439	0.485
		3.8	0.1	0.030	0.058	0.086	0.112	0.137	0.162	0.185	0.208
			0.3	0.088	0.165	0.234	0.297	0.355	0.409	0.459	0.506
			0.5	0.143	0.260	0.361	0.450	0.529	0.601	0.667	0.728
			0.7	0.196	0.348	0.474	0.582	0.677	0.761	0.838	0.909
	5	3.2	0.1	0.005	0.010	0.015	0.020	0.025	0.030	0.035	0.040
			0.3	0.015	0.030	0.045	0.060	0.075	0.089	0.104	0.118
			0.5	0.025	0.050	0.075	0.099	0.123	0.147	0.170	0.193
			0.7	0.036	0.070	0.104	0.138	0.171	0.203	0.234	0.265
		3.4	0.1	0.011	0.022	0.033	0.043	0.054	0.064	0.075	0.085
			0.3	0.033	0.065	0.096	0.127	0.157	0.187	0.216	0.245
			0.5	0.055	0.107	0.158	0.208	0.256	0.303	0.348	0.393
			0.7	0.076	0.149	0.219	0.286	0.350	0.412	0.472	0.530
		3.6	0.1	0.027	0.054	0.080	0.106	0.132	0.157	0.181	0.206
			0.3	0.081	0.159	0.233	0.303	0.371	0.437	0.500	0.561
			0.5	0.135	0.260	0.376	0.485	0.588	0.685	0.777	0.864
			0.7	0.189	0.358	0.512	0.654	0.786	0.908	1.024	1.133
		3.8	0.1	0.067	0.132	0.194	0.254	0.311	0.367	0.422	0.474
			0.3	0.201	0.379	0.541	0.690	0.827	0.955	1.074	1.187
			0.5	0.333	0.611	0.851	1.064	1.255	1.430	1.591	1.740
			0.7	0.465	0.830	1.135	1.398	1.631	1.840	2.030	2.205
	7	3.2	0.1	0.009	0.018	0.026	0.035	0.044	0.052	0.061	0.070
			0.3	0.026	0.053	0.079	0.104	0.130	0.155	0.180	0.205
			0.5	0.044	0.088	0.130	0.173	0.214	0.255	0.296	0.336
			0.7	0.062	0.122	0.182	0.240	0.297	0.353	0.408	0.463
		3.4	0.1	0.019	0.038	0.057	0.076	0.094	0.113	0.131	0.149
			0.3	0.057	0.114	0.169	0.223	0.276	0.329	0.380	0.431
			0.5	0.096	0.188	0.278	0.366	0.451	0.534	0.615	0.694
			0.7	0.134	0.263	0.386	0.505	0.619	0.730	0.837	0.941
		3.6	0.1	0.048	0.095	0.141	0.187	0.232	0.277	0.320	0.364
			0.3	0.144	0.282	0.414	0.540	0.662	0.779	0.893	1.002
			0.5	0.241	0.465	0.674	0.870	1.055	1.231	1.398	0.558
			0.7	0.339	0.644	0.924	1.181	1.421	1.645	1.856	2.055
		3.8	0.1								

TABLE 35. (Continued)(Edge Lift: Predominantly Illite Clay)

Percent Clay (%)	Depth to Constant Suction (FT)	Constant Suction (pF)	Velocity of Moisture Flow (inches /month)	DIFFERENTIAL SWELL (INCHES) EDGE DISTANCE PENETRATION (FT)							
				1 FT	2 FT	3 FT	4 FT	5 FT	6 FT	7 FT	8 FT
70	3	3.2	0.1	0.003	0.006	0.008	0.011	0.014	0.017	0.019	0.022
			0.3	0.008	0.017	0.025	0.033	0.041	0.048	0.056	0.064
			0.5	0.014	0.027	0.041	0.054	0.067	0.079	0.092	0.104
			0.7	0.019	0.038	0.056	0.074	0.092	0.109	0.126	0.142
		3.4	0.1	0.006	0.012	0.018	0.023	0.029	0.035	0.040	0.046
			0.3	0.018	0.035	0.052	0.068	0.084	0.100	0.115	0.130
			0.5	0.029	0.057	0.084	0.111	0.136	0.160	0.184	0.207
			0.7	0.041	0.079	0.116	0.151	0.185	0.217	0.248	0.278
		3.6	0.1	0.015	0.029	0.043	0.056	0.070	0.083	0.096	0.109
			0.3	0.043	0.084	0.123	0.159	0.195	0.229	0.261	0.292
			0.5	0.071	0.136	0.196	0.252	0.305	0.354	0.401	0.445
			0.7	0.099	0.186	0.265	0.337	0.403	0.465	0.523	0.577
		3.8	0.1	0.036	0.070	0.102	0.133	0.163	0.192	0.220	0.247
			0.3	0.104	0.196	0.279	0.354	0.422	0.486	0.546	0.602
			0.5	0.170	0.310	0.430	0.535	0.630	0.715	0.794	0.866
			0.7	0.234	0.415	0.564	0.692	0.805	0.906	0.998	1.082
	5	3.2	0.1	0.006	0.012	0.018	0.024	0.030	0.036	0.042	0.048
			0.3	0.018	0.036	0.054	0.072	0.089	0.106	0.124	0.141
			0.5	0.030	0.060	0.089	0.118	0.147	0.175	0.202	0.230
			0.7	0.042	0.084	0.124	0.164	0.203	0.241	0.279	0.315
		3.4	0.1	0.013	0.026	0.039	0.052	0.064	0.077	0.089	0.102
			0.3	0.039	0.077	0.115	0.151	0.187	0.223	0.258	0.292
			0.5	0.065	0.128	0.188	0.247	0.305	0.360	0.414	0.467
			0.7	0.091	0.177	0.260	0.340	0.417	0.490	0.562	0.631
		3.6	0.1	0.032	0.064	0.095	0.126	0.157	0.186	0.216	0.245
			0.3	0.097	0.189	0.277	0.361	0.442	0.520	0.595	0.667
			0.5	0.161	0.309	0.448	0.577	0.699	0.815	0.925	1.029
			0.7	0.225	0.426	0.610	0.779	0.935	1.081	1.219	1.348
		3.8	0.1	0.080	0.157	0.231	0.302	0.371	0.437	0.502	0.564
			0.3	0.239	0.452	0.644	0.821	0.984	1.136	1.279	1.413
			0.5	0.396	0.727	1.013	1.266	1.494	1.702	1.894	2.072
			0.7	0.553	0.988	1.351	1.664	1.941	2.190	2.417	2.625
	7	3.2	0.1	0.011	0.021	0.031	0.042	0.052	0.062	0.073	0.083
			0.3	0.031	0.063	0.094	0.124	0.155	0.185	0.215	0.244
			0.5	0.052	0.104	0.155	0.205	0.255	0.304	0.352	0.400
			0.7	0.074	0.146	0.216	0.285	0.354	0.420	0.486	0.551
		3.4	0.1	0.023	0.045	0.068	0.090	0.112	0.134	0.156	0.178
			0.3	0.068	0.135	0.201	0.266	0.329	0.391	0.453	0.513
			0.5	0.114	0.224	0.331	0.436	0.537	0.636	0.732	0.826
			0.7	0.160	0.313	0.459	0.601	0.737	0.869	0.996	1.120
		3.6	0.1	0.057	0.113	0.168	0.223	0.276	0.329	0.381	0.433
			0.3	0.172	0.335	0.492	0.643	0.788	0.928	1.063	1.193
			0.5	0.287	0.553	0.802	1.036	1.256	1.465	1.664	1.854
			0.7	0.403	0.767	1.099	1.406	1.691	1.958	2.209	2.447
		3.8	0.1	-	-	-	-	-	-	-	-

TABLE 36. Differential Swelling Occurring at the Perimeter of a Clay Soil for an Edge Lift Swelling Condition in a Predominantly Montmorillonite Clay Soil

Percent Clay (%)	Depth to Constant Suction (FT)	Constant Suction (pF)	Velocity of Moisture Flow (inches /month)	DIFFERENTIAL SWELL (INCHES) — EDGE DISTANCE PENETRATION (FT)							
				1 FT	2 FT	3 FT	4 FT	5 FT	6 FT	7 FT	8 FT
30	3	3.2	0.1	0.001	0.002	0.004	0.005	0.006	0.007	0.008	0.009
			0.3	0.004	0.007	0.010	0.014	0.017	0.021	0.024	0.027
			0.5	0.006	0.012	0.017	0.023	0.028	0.034	0.039	0.044
			0.7	0.008	0.016	0.024	0.032	0.039	0.046	0.053	0.060
		3.4	0.1	0.003	0.005	0.007	0.010	0.012	0.015	0.017	0.019
			0.3	0.007	0.015	0.022	0.029	0.036	0.042	0.049	0.055
			0.5	0.012	0.024	0.036	0.047	0.058	0.068	0.078	0.088
			0.7	0.017	0.034	0.049	0.064	0.078	0.092	0.105	0.113
		3.6	0.1	0.006	0.012	0.018	0.024	0.030	0.035	0.041	0.046
			0.3	0.018	0.036	0.052	0.068	0.083	0.097	0.111	0.124
			0.5	0.030	0.058	0.083	0.107	0.129	0.150	0.170	0.189
			0.7	0.042	0.079	0.112	0.143	0.171	0.197	0.222	0.245
		3.8	0.1	0.015	0.030	0.043	0.057	0.069	0.082	0.093	0.105
			0.3	0.044	0.083	0.118	0.150	0.179	0.206	0.232	0.255
			0.5	0.072	0.132	0.182	0.227	0.267	0.303	0.337	0.368
			0.7	0.099	0.176	0.239	0.294	0.342	0.385	0.423	0.459
	5	3.2	0.1	0.003	0.005	0.008	0.010	0.013	0.015	0.018	0.020
			0.3	0.008	0.015	0.023	0.030	0.038	0.045	0.053	0.060
			0.5	0.013	0.026	0.038	0.050	0.062	0.074	0.086	0.098
			0.7	0.018	0.036	0.053	0.070	0.086	0.102	0.118	0.134
		3.4	0.1	0.006	0.011	0.016	0.022	0.027	0.033	0.038	0.043
			0.3	0.017	0.033	0.049	0.064	0.080	0.095	0.109	0.124
			0.5	0.028	0.054	0.080	0.105	0.129	0.153	0.176	0.198
			0.7	0.039	0.075	0.110	0.144	0.177	0.208	0.238	0.268
		3.6	0.1	0.014	0.027	0.041	0.054	0.066	0.079	0.092	0.104
			0.3	0.041	0.080	0.118	0.153	0.188	0.221	0.252	0.283
			0.5	0.068	0.131	0.190	0.245	0.297	0.346	0.392	0.437
			0.7	0.095	0.181	0.259	0.330	0.397	0.459	0.517	0.572
		3.8	0.1	0.034	0.067	0.098	0.128	0.157	0.186	0.213	0.239
			0.3	0.101	0.192	0.273	0.348	0.418	0.482	0.543	0.600
			0.5	0.168	0.308	0.430	0.537	0.634	0.722	0.804	0.879
			0.7	0.235	0.419	0.573	0.706	0.824	0.929	1.025	1.114
	7	3.2	0.1	0.004	0.009	0.013	0.018	0.022	0.027	0.031	0.035
			0.3	0.013	0.027	0.040	0.053	0.066	0.078	0.091	0.104
			0.5	0.022	0.044	0.066	0.087	0.108	0.129	0.150	0.170
			0.7	0.031	0.062	0.092	0.121	0.150	0.178	0.206	0.234
		3.4	0.1	0.010	0.019	0.029	0.038	0.048	0.057	0.066	0.075
			0.3	0.029	0.057	0.085	0.113	0.140	0.166	0.192	0.218
			0.5	0.048	0.095	0.141	0.185	0.228	0.270	0.311	0.351
			0.7	0.068	0.133	0.195	0.255	0.313	0.369	0.423	0.475
		3.6	0.1	0.024	0.048	0.071	0.095	0.117	0.140	0.162	0.184
			0.3	0.073	0.142	0.209	0.273	0.334	0.394	0.451	0.506
			0.5	0.122	0.235	0.340	0.439	0.533	0.622	0.706	0.787
			0.7	0.171	0.326	0.466	0.597	0.718	0.831	0.937	1.038
		3.8	0.1	-	-	-	-	-	-	-	-

TABLE 36 . (Continued)(Edge Lift: Predominantly Montmorrillonite Clay)

Percent Clay (%)	Depth to Constant Suction (FT)	Constant Suction (pF)	Velocity of Moisture Flow (inches /month)	DIFFERENTIAL SWELL (INCHES) EDGE DISTANCE PENETRATION (FT) 1 FT	2 FT	3 FT	4 FT	5 FT	6 FT	7 FT	8 FT
40	3	3.2	0.1	0.002	0.003	0.005	0.007	0.008	0.010	0.012	0.013
			0.3	0.005	0.010	0.015	0.020	0.025	0.030	0.035	0.039
			0.5	0.009	0.017	0.025	0.033	0.041	0.049	0.056	0.064
			0.7	0.012	0.023	0.035	0.046	0.056	0.067	0.077	0.087
		3.4	0.1	0.004	0.007	0.011	0.014	0.018	0.021	0.025	0.028
			0.3	0.011	0.021	0.032	0.042	0.052	0.061	0.071	0.080
			0.5	0.018	0.035	0.052	0.068	0.084	0.099	0.113	0.128
			0.7	0.025	0.049	0.071	0.093	0.114	0.133	0.153	0.171
		3.6	0.1	0.009	0.018	0.026	0.035	0.043	0.051	0.059	0.067
			0.3	0.027	0.052	0.075	0.098	0.120	0.141	0.160	0.180
			0.5	0.044	0.084	0.121	0.155	0.187	0.218	0.246	0.274
			0.7	0.061	0.114	0.163	0.207	0.248	0.286	0.321	0.355
		3.8	0.1	0.022	0.043	0.063	0.082	0.100	0.118	0.135	0.152
			0.3	0.064	0.121	0.171	0.217	0.260	0.299	0.336	0.370
			0.5	0.105	0.191	0.264	0.329	0.387	0.440	0.488	0.533
			0.7	0.144	0.255	0.347	0.426	0.495	0.557	0.614	0.665
	5	3.2	0.1	0.004	0.007	0.011	0.015	0.019	0.022	0.026	0.030
			0.3	0.011	0.022	0.033	0.044	0.055	0.065	0.076	0.087
			0.5	0.019	0.037	0.055	0.073	0.090	0.107	0.125	0.141
			0.7	0.026	0.052	0.076	0.101	0.125	0.148	0.171	0.194
		3.4	0.1	0.008	0.016	0.024	0.032	0.039	0.047	0.055	0.062
			0.3	0.024	0.047	0.070	0.093	0.115	0.137	0.158	0.179
			0.5	0.040	0.078	0.116	0.152	0.187	0.221	0.255	0.287
			0.7	0.056	0.109	0.160	0.209	0.256	0.302	0.345	0.388
		3.6	0.1	0.020	0.039	0.059	0.078	0.096	0.115	0.133	0.150
			0.3	0.060	0.116	0.170	0.222	0.272	0.320	0.366	0.410
			0.5	0.099	0.190	0.275	0.355	0.430	0.501	0.568	0.633
			0.7	0.138	0.262	0.375	0.479	0.575	0.665	0.749	0.829
		3.8	0.1	0.049	0.096	0.142	0.186	0.228	0.269	0.309	0.347
			0.3	0.147	0.278	0.396	0.505	0.605	0.699	0.786	0.869
			0.5	0.244	0.447	0.623	0.779	0.919	1.047	1.164	1.274
			0.7	0.340	0.607	0.831	1.023	1.193	1.347	1.486	1.614
	7	3.2	0.1	0.006	0.013	0.019	0.026	0.032	0.038	0.045	0.051
			0.3	0.019	0.039	0.058	0.076	0.095	0.114	0.132	0.150
			0.5	0.032	0.064	0.095	0.126	0.157	0.187	0.217	0.246
			0.7	0.045	0.089	0.133	0.176	0.217	0.258	0.299	0.339
		3.4	0.1	0.014	0.028	0.042	0.055	0.069	0.083	0.096	0.109
			0.3	0.042	0.083	0.124	0.163	0.202	0.241	0.278	0.316
			0.5	0.070	0.138	0.204	0.268	0.330	0.391	0.450	0.508
			0.7	0.098	0.192	0.283	0.369	0.453	0.534	0.613	0.689
		3.6	0.1	0.035	0.070	0.104	0.137	0.170	0.202	0.235	0.266
			0.3	0.106	0.206	0.303	0.395	0.484	0.570	0.653	0.734
			0.5	0.176	0.340	0.493	0.637	0.772	0.901	1.023	1.140
			0.7	0.248	0.472	0.676	0.864	1.040	1.204	1.358	1.504
		3.8	0.1	-	-	-	-	-	-	-	-

TABLE 36. (Continued)(Edge Lift: Predominantly Montmorrillonite Clay)

Percent Clay (%)	Depth to Constant Suction (FT)	Constant Suction (pF)	Velocity of Moisture Flow (inches /month)	DIFFERENTIAL SWELL (INCHES) EDGE DISTANCE PENETRATION (FT) 1 FT	2 FT	3 FT	4 FT	5 FT	6 FT	7 FT	8 FT
50	3	3.2	0.1	0.002	0.004	0.007	0.009	0.011	0.013	0.015	0.018
			0.3	0.007	0.013	0.020	0.026	0.033	0.039	0.045	0.052
			0.5	0.011	0.022	0.033	0.043	0.054	0.064	0.074	0.084
			0.7	0.016	0.031	0.045	0.060	0.074	0.088	0.101	0.115
		3.4	0.1	0.005	0.009	0.014	0.019	0.023	0.028	0.032	0.037
			0.3	0.014	0.028	0.042	0.055	0.068	0.080	0.093	0.105
			0.5	0.024	0.046	0.068	0.089	0.109	0.129	0.148	0.167
			0.7	0.033	0.064	0.093	0.122	0.149	0.175	0.200	0.224
		3.6	0.1	0.012	0.023	0.034	0.045	0.056	0.067	0.077	0.088
			0.3	0.035	0.068	0.099	0.128	0.157	0.184	0.210	0.235
			0.5	0.057	0.110	0.158	0.203	0.245	0.285	0.323	0.358
			0.7	0.079	0.150	0.213	0.271	0.325	0.375	0.421	0.465
		3.8	0.1	0.029	0.056	0.082	0.107	0.132	0.155	0.177	0.199
			0.3	0.084	0.158	0.224	0.285	0.340	0.392	0.440	0.485
			0.5	0.137	0.250	0.346	0.431	0.507	0.576	0.639	0.698
			0.7	0.188	0.334	0.454	0.558	0.649	0.730	0.804	0.871
	5	3.2	0.1	0.005	0.010	0.015	0.019	0.024	0.029	0.034	0.039
			0.3	0.015	0.029	0.044	0.058	0.072	0.086	0.100	0.133
			0.5	0.024	0.048	0.072	0.095	0.118	0.141	0.163	0.185
			0.7	0.034	0.067	0.100	0.132	0.163	0.194	0.224	0.254
		3.4	0.1	0.011	0.021	0.031	0.041	0.052	0.062	0.072	0.082
			0.3	0.031	0.062	0.092	0.122	0.151	0.179	0.207	0.235
			0.5	0.052	0.103	0.152	0.199	0.245	0.290	0.334	0.376
			0.7	0.073	0.143	0.210	0.274	0.335	0.395	0.452	0.509
		3.6	0.1	0.026	0.052	0.077	0.102	0.126	0.150	0.174	0.197
			0.3	0.078	0.152	0.223	0.291	0.356	0.419	0.479	0.538
			0.5	0.130	0.249	0.361	0.465	0.563	0.656	0.745	0.829
			0.7	0.181	0.343	0.491	0.627	0.753	0.871	0.981	1.086
		3.8	0.1	0.064	0.126	0.186	0.243	0.299	0.352	0.404	0.454
			0.3	0.192	0.364	0.519	0.661	0.793	0.915	1.030	1.138
			0.5	0.319	0.585	0.816	1.020	1.204	1.371	1.525	1.668
			0.7	0.445	0.796	1.088	1.340	1.563	1.764	1.946	2.114
	7	3.2	0.1	0.008	0.017	0.025	0.034	0.042	0.050	0.059	0.067
			0.3	0.025	0.050	0.075	0.100	0.125	0.149	0.173	0.197
			0.5	0.042	0.084	0.125	0.165	0.205	0.245	0.284	0.322
			0.7	0.059	0.117	0.174	0.230	0.285	0.339	0.391	0.443
		3.4	0.1	0.018	0.037	0.055	0.073	0.090	0.108	0.126	0.143
			0.3	0.055	0.109	0.162	0.214	0.265	0.315	0.365	0.413
			0.5	0.092	0.181	0.267	0.351	0.433	0.512	0.590	0.665
			0.7	0.129	0.252	0.370	0.484	0.594	0.700	0.802	0.902
		3.6	0.1	0.046	0.091	0.136	0.179	0.223	0.265	0.307	0.349
			0.3	0.138	0.270	0.397	0.518	0.635	0.747	0.856	0.961
			0.5	0.231	0.446	0.646	0.834	1.012	1.180	1.341	1.494
			0.7	0.325	0.618	0.885	1.132	1.362	1.577	1.779	1.970
		3.8	0.1	-	-	-	-	-	-	-	-

TABLE 36. (Continued)(Edge Lift: Predominantly Montmorrillonite Clay)

Percent Clay (%)	Depth to Constant Suction (FT)	Constant Suction (pF)	Velocity of Moisture Flow (inches /month)	DIFFERENTIAL SWELL (INCHES) EDGE DISTANCE PENETRATION (FT) 1 FT	2 FT	3 FT	4 FT	5 FT	6 FT	7 FT	8 FT
60	3	3.2	0.1	0.003	0.006	0.008	0.011	0.014	0.016	0.019	0.022
			0.3	0.008	0.016	0.025	0.033	0.040	0.048	0.056	0.064
			0.5	0.014	0.027	0.041	0.054	0.066	0.079	0.091	0.104
			0.7	0.019	0.038	0.056	0.074	0.091	0.109	0.125	0.142
		3.4	0.1	0.006	0.012	0.017	0.023	0.029	0.035	0.040	0.046
			0.3	0.018	0.035	0.051	0.068	0.084	0.099	0.115	0.130
			0.5	0.029	0.057	0.084	0.110	0.135	0.160	0.183	0.205
			0.7	0.041	0.079	0.116	0.151	0.184	0.216	0.247	0.277
		3.6	0.1	0.014	0.029	0.043	0.056	0.070	0.083	0.096	0.109
			0.3	0.043	0.083	0.122	0.159	0.194	0.228	0.260	0.291
			0.5	0.071	0.136	0.195	0.251	0.303	0.352	0.399	0.433
			0.7	0.098	0.185	0.264	0.336	0.402	0.463	0.521	0.575
		3.8	0.1	0.035	0.069	0.102	0.133	0.163	0.191	0.219	0.246
			0.3	0.104	0.195	0.277	0.352	0.421	0.484	0.544	0.599
			0.5	0.169	0.309	0.428	0.533	0.627	0.712	0.790	0.863
			0.7	0.233	0.413	0.562	0.690	0.802	0.903	0.994	1.077
	5	3.2	0.1	0.006	0.012	0.018	0.024	0.030	0.036	0.042	0.048
			0.3	0.018	0.036	0.054	0.071	0.089	0.106	0.123	0.140
			0.5	0.030	0.060	0.090	0.118	0.146	0.174	0.202	0.229
			0.7	0.042	0.083	0.124	0.163	0.202	0.240	0.278	0.314
		3.4	0.1	0.013	0.026	0.039	0.051	0.064	0.076	0.089	0.101
			0.3	0.039	0.077	0.114	0.151	0.187	0.222	0.256	0.291
			0.5	0.065	0.127	0.188	0.246	0.303	0.359	0.413	0.465
			0.7	0.090	0.177	0.259	0.339	0.415	0.488	0.559	0.628
		3.6	0.1	0.032	0.064	0.095	0.126	0.156	0.186	0.215	0.244
			0.3	0.096	0.188	0.276	0.360	0.440	0.518	0.593	0.665
			0.5	0.160	0.308	0.446	0.575	0.697	0.812	0.921	1.025
			0.7	0.224	0.425	0.607	0.775	0.931	1.077	1.214	1.343
		3.8	0.1	0.080	0.156	0.230	0.301	0.369	0.436	0.500	0.562
			0.3	0.238	0.450	0.642	0.817	0.980	1.132	1.274	1.407
			0.5	0.395	0.724	1.009	1.261	1.488	1.695	1.886	2.063
			0.7	0.551	0.984	1.345	1.657	1.933	2.181	2.407	2.614
	7	3.2	0.1	0.010	0.021	0.031	0.042	0.052	0.062	0.072	0.083
			0.3	0.031	0.062	0.093	0.124	0.154	0.184	0.214	0.243
			0.5	0.052	0.104	0.155	0.205	0.254	0.303	0.351	0.398
			0.7	0.073	0.145	0.215	0.284	0.352	0.419	0.484	0.548
		3.4	0.1	0.023	0.045	0.067	0.090	0.112	0.134	0.155	0.177
			0.3	0.068	0.135	0.200	0.264	0.328	0.390	0.451	0.511
			0.5	0.113	0.223	0.330	0.434	0.535	0.633	0.729	0.823
			0.7	0.159	0.311	0.458	0.598	0.734	0.865	0.992	1.115
		3.6	0.1	0.057	0.113	0.168	0.222	0.275	0.328	0.380	0.431
			0.3	0.171	0.334	0.490	0.640	0.785	0.924	1.058	1.188
			0.5	0.286	0.551	0.799	1.031	1.251	1.459	1.658	1.847
			0.7	0.402	0.764	1.095	1.400	1.684	1.950	2.200	2.437
		3.8	0.1	-	-	-	-	-	-	-	-

TABLE 36. (Continued)(Edge Lift: Predominantly Montmorrillonite Clay)

Percent Clay (%)	Depth to Constant Suction (FT)	Constant Suction (pF)	Velocity of Moisture Flow (inches /month)	DIFFERENTIAL SWELL (INCHES) EDGE DISTANCE PENETRATION (FT) 1 FT	2 FT	3 FT	4 FT	5 FT	6 FT	7 FT	8 FT
70	3	3.2	0.1	0.003	0.007	0.010	0.013	0.016	0.020	0.023	0.026
			0.3	0.010	0.020	0.029	0.039	0.048	0.058	0.067	0.076
			0.5	0.016	0.032	0.048	0.064	0.079	0.094	0.109	0.123
			0.7	0.023	0.045	0.067	0.088	0.109	0.129	0.149	0.169
		3.4	0.1	0.007	0.014	0.021	0.028	0.034	0.041	0.048	0.054
			0.3	0.021	0.041	0.061	0.081	0.100	0.118	0.137	0.155
			0.5	0.035	0.068	0.100	0.131	0.161	0.190	0.219	0.246
			0.7	0.048	0.094	0.138	0.179	0.219	0.258	0.294	0.330
		3.6	0.1	0.017	0.034	0.051	0.067	0.083	0.099	0.114	0.129
			0.3	0.051	0.099	0.145	0.189	0.231	0.271	0.310	0.347
			0.5	0.084	0.162	0.233	0.299	0.361	0.420	0.475	0.528
			0.7	0.117	0.221	0.314	0.400	0.479	0.552	0.620	0.684
		3.8	0.1	0.042	0.082	0.121	0.158	0.194	0.228	0.261	0.293
			0.3	0.124	0.233	0.330	0.419	0.501	0.577	0.648	0.714
			0.5	0.202	0.368	0.510	0.635	0.747	0.849	0.942	1.028
			0.7	0.277	0.492	0.669	0.822	0.955	1.075	1.184	1.284
	5	3.2	0.1	0.007	0.014	0.022	0.029	0.036	0.043	0.050	0.057
			0.3	0.022	0.043	0.064	0.085	0.106	0.126	0.147	0.167
			0.5	0.036	0.071	0.105	0.140	0.174	0.207	0.240	0.273
			0.7	0.050	0.099	0.147	0.195	0.241	0.286	0.331	0.374
		3.4	0.1	0.015	0.031	0.046	0.061	0.076	0.091	0.106	0.121
			0.3	0.046	0.092	0.136	0.179	0.222	0.264	0.306	0.346
			0.5	0.077	0.151	0.223	0.293	0.361	0.427	0.492	0.554
			0.7	0.108	0.210	0.309	0.403	0.494	0.582	0.666	0.748
		3.6	0.1	0.038	0.076	0.113	0.150	0.186	0.221	0.256	0.290
			0.3	0.115	0.224	0.329	0.429	0.525	0.617	0.706	0.792
			0.5	0.191	0.367	0.531	0.685	0.830	0.967	1.097	1.221
			0.7	0.267	0.506	0.724	0.924	1.110	1.283	1.446	1.600
		3.8	0.1	0.095	0.186	0.274	0.358	0.440	0.519	0.595	0.669
			0.3	0.283	0.536	0.764	0.974	1.168	1.348	1.517	1.677
			0.5	0.470	0.862	1.262	1.502	1.773	2.020	2.247	2.458
			0.7	0.656	1.172	1.603	1.974	2.303	2.598	2.867	3.114
	7	3.2	0.1	0.012	0.025	0.037	0.050	0.062	0.074	0.086	0.098
			0.3	0.037	0.074	0.111	0.147	0.183	0.219	0.255	0.290
			0.5	0.062	0.124	0.184	0.244	0.303	0.361	0.418	0.475
			0.7	0.087	0.173	0.256	0.339	0.419	0.499	0.577	0.653
		3.4	0.1	0.027	0.054	0.080	0.107	0.133	0.159	0.185	0.211
			0.3	0.081	0.160	0.238	0.315	0.390	0.464	0.537	0.609
			0.5	0.135	0.266	0.393	0.517	0.637	0.754	0.869	0.980
			0.7	0.189	0.371	0.545	0.713	0.875	1.031	1.182	1.329
		3.6	0.1	0.068	0.134	0.200	0.264	0.328	0.391	0.453	0.514
			0.3	0.204	0.398	0.584	0.763	0.935	1.101	1.261	1.415
			0.5	0.341	0.656	0.951	1.229	1.490	1.739	1.975	2.200
			0.7	0.479	0.910	1.304	1.668	2.006	2.323	2.621	2.903
		3.8	0.1	-	-	-	-	-	-	-	-
			0.3								
			0.5								

APPENDIX R

SIMPLIFIED PROCEDURE FOR DETERMINING CATION EXCHANGE CAPACITY USING A SPECTROPHOTOMETER [AFTER PEECH (66)]

The cation exchange capacity of soil samples may be determined by comparative means in the standard spectrophotometer device. This simplified procedure is:

1. Place 10 grams of clay soil in a beaker and 100 ml of neutral 1 N ammonium acetate (NH_4Ac) is added. This solution is allowed to stand overnight.

2. Filter the solution of Step 1 by washing through filter paper with 50 ml of NH_4Ac.

3. Wash the material retained on the filter paper of Step 2 with two 150 ml washings of isopropyl alcohol, using suction. The isopropyl alcohol wash fuild should be added in increments of approximately 25 ml and the sample allowed to drain well between additions.

4. Transfer the soil and filter paper to a 800-ml flask. Add 50 ml $MgCl_2$ solution and allow to set at least 30 minutes but preferably 24 hours.

5. Under suction, filter the fluid resulting from Step 4.

6. Prepare a Standard Curve by using 10 μg of NH_4-N/ml Standard Solution in a 50 ml volumetric flask. Adjust the volume to approximately 25 ml, add 1 ml of 10% tartrate solution, and shake. Add 2 ml of Nessler's aliquot with rapid mixing. Add sufficient distilled water to bring the total volume to 50 ml. Allow color to develop for 30 minutes.

7. Repeat Step 6 for 1.0, 2.0, 4.0, and 8.0 ml aliquots of

Standard Solution.

8. Insert the Standard Solution resulting from Steps 6 and 7 into the spectrophotometer. Record readings and plot the results to construct a Standard Curve. (The spectrophotometer is calibrated beforehand with distilled water.)

9. Extract 2.0 ml of sample aliquot and add 25 ml of distilled water in a 50 ml volumetric flask. Add 1 ml of 10% tartrate and shake. Add 2 ml of Nessler's aliquot with rapid mixing. Add sufficient distilled water to bring the total volume to 50 ml. Let the solution stand for 30 minutes and then insert into the spectrophotometer and record the transparency reading.

10. Typical calculations:

Weight of Dry Soil = 10.64 grams

Spectrophotometer = 81%

= 24.5 μg/g from Standard Curve

Conversion:

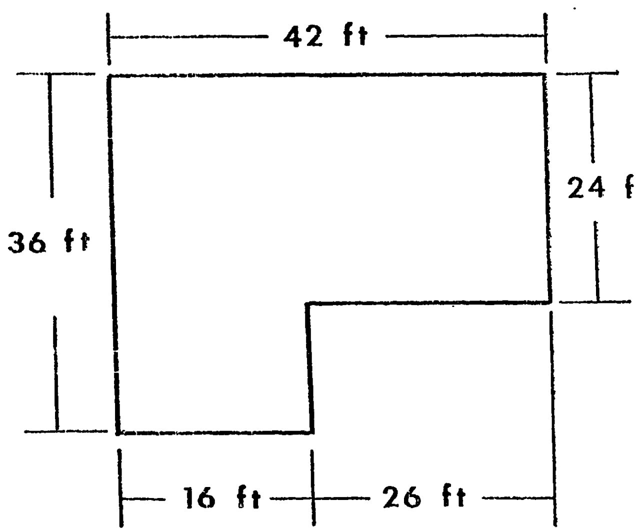
$$\frac{24.5\ \mu g}{2\ ml/aliquot} \times \frac{200\ ml}{1\ ml} \times \frac{50\ ml}{10.64\ \mu g} \times \frac{1}{1000\ \mu g/mg} \times$$

$$\frac{1}{14\ mg/meg} \times 100\ g = 82.2\ meg/100\ g$$

APPENDIX S

DESIGN EXAMPLE: RESIDENTIAL SLAB ON EXPANSIVE SOIL

GIVEN: A single story residence in San Antonio, Texas, with dimensions as shown. Construction is brick veneer with sheetrock interior.



1. DESIGN DATA

A. LOADING.

(1) No interior load bearing partitions.

(2) Perimeter loading is 1040 lb/ft.

B. MATERIALS.

(1) Concrete: f'_c = 2500 psi

(2) Prestressing steel: 270k ½" Ø 7-wire strand.

(3) Mild steel reinforcement: Grade 40 (f_y = 40 ksi)

C. SOILS INVESTIGATION.

(1) Soil Type: CH to depth of 15 ft.

(2) Atterberg Limits: PL = 32

LL = 86

PI = 54

(3) Cation Exchange Capacity: 82.6

(4) Percent Clay: 58%

(5) Allowable Soil Bearing Pressure, q_{allow} = 2700 psf

(6) Depth to Constant Suction: 7 ft.

D. DETERMINE DESIGN SOIL VALUES.

(1) Thornthwaite Moisture Index: From Figure 4, I_m = -16.

(2) Edge Moisture Variation Distance: From Figure 6,

e_m = 4.3 ft (Center Lift)

e_m = 2.3 ft (Edge Lift)

(3) Cation Exchange Activity: $CEAc = \frac{C.E.C.}{\%\ Clay} = \frac{82.6}{58} = 1{,}42$

(4) Clay Activity Ratio:

$$Ac = \frac{PI}{\%\ Clay} = \frac{54}{58} = 0.93$$

(5) Principal Clay Mineral: From Figure 7, principal clay mineral is montmorillonite.

(6) Constant Suction Value: From Figure 8, pF = 3.55

(7) Estimated Velocity of Moisture Flow:

$$v \approx 0.5\ I_m$$

$$v = 0.5\ (16\ \frac{inches}{year} \times \frac{1}{12} \frac{years}{month}) = 0.67\ \frac{inches}{month}$$

(8) Estimated Differential Swell

(a) Center Lift: From Table 3d for 60% Clay, $z = 7$ ft, $pF = 3.56$, $v = 0.7$ in/mo, interpolate between $e_m = 4.0$ ft and $e_m = 5.0$ ft.

$$y_m = 2.415 \text{ in.}$$

(b) Edge Lift: From Table 6d, $y_m = 0.863$ in (by interpolation between $e_m = 4.0$ ft and $e_m = 5.0$ ft; $pf = 3.4$ and $pf = 3.6$)

E. SEPARATE FLOOR PLAN INTO OVERLAPPING RECTANGLES (as shown in Figure A1).

F. ASSUME SPACING OF STIFFENING BEAMS (as shown in Figure A1).

CENTER LIFT DESIGN

2. ASSUME TRIAL SECTIONS

A. DEVELOP DESIGN FOR TWO SLABS:

(1) SLAB (A): 42 ft x 24 ft

(2) SLAB (B): 36 ft x 16 ft

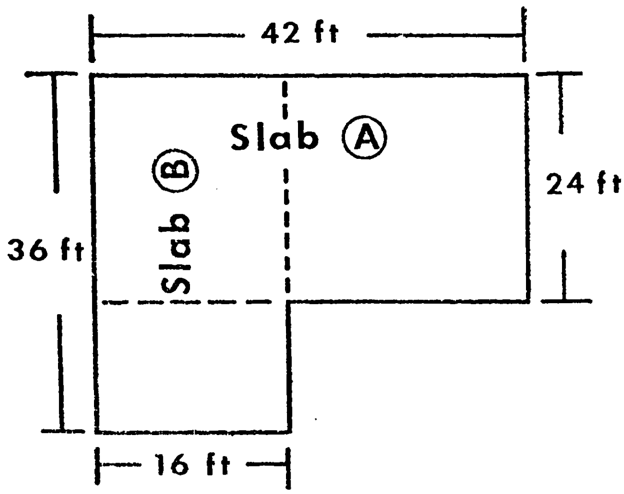
B. DESIGN ONLY SLAB A FOR ILLUSTRATIVE PURPOSES. DESIGN FOR CENTER LIFT CONDITION FIRST.

C. APPROXIMATE DEPTH OF STIFFENING BEAM.

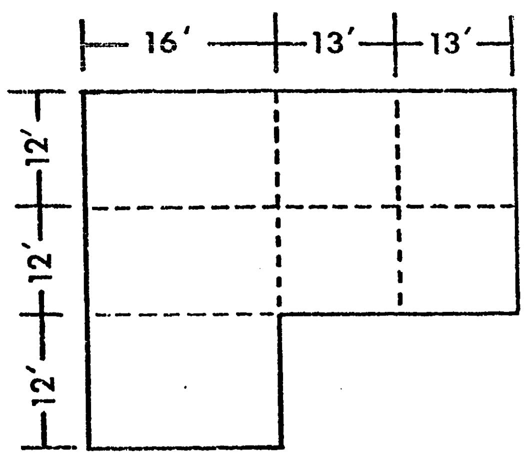
(1) Long Direction

$$L = 42 \text{ ft} < 6\beta = 6(8) = 48 \text{ ft}$$

$$\Delta/L = 1/480$$



a. Divide Plan Area Into Two Overlapping Rectangles.



b. Slab Geometry Suggests Stiffening Beam Locations as Shown; Take Average Beam Spacing as 14 ft For Short Dimension of Slab (A).

FIGURE A1. ASSUMED OVERLAPPING DESIGN RECTANGLES AND STIFFENING BEAM SPACING.

$$\Delta_{allow} = \frac{12 \times 42}{480} = 1.050 \text{ inches}$$

$$X = \frac{(y_m L)^{0.205} (S)^{1.059} (P)^{0.523} (e_m)^{1.296}}{380 \Delta}$$

$$X = \frac{(2.415 \times 42)^{0.205} (12)^{1.059} (1040)^{0.523} (4.3)^{1.296}}{380 (1.050)}$$

$$X = 22.492$$

$$d_\ell = 10^{\frac{1}{1.214} \log_{10}(22.492)} = 13.0 \text{ in}$$

SAY $d_\ell = 14$ in

(2) Short Direction

$L = 24$ ft $< 6\beta = 48$ ft

$$\Delta_{allow} = \frac{12 \times 24}{480} = 0.600 \text{ in}$$

$$X = \frac{(2.415 \times 24)^{0.205} (14)^{1.059} (1040)^{0.523} (4.3)^{1.296}}{380 (0.600)}$$

$$X = 41.318$$

$$d_s = 10^{\frac{1}{1.214} \log_{10}(41.318)} = 21.4 \text{ in}$$

SAY $d_s = 22$ in

14 < 22   <u>22 in GOVERNS</u>

D. CHECK SOIL BEARING

(1) Allowable Soil Pressure

$$q_{allow} = 2700 \text{ psf}$$

(2) Applied Loading

Total Loading = (Slab Weight + Beam Weight + Superstructure Loading + Sustained Live Loads) ÷ Total Bearing Area of Stiffening Beams

= (41,567 + 48,583 + 136,282 +40,300) lbs/176.67 ft^2

= 1510 psf

1510 psf < 2700 psf   <u>OK</u>

E. SECTION PROPERTIES

	Long Direction	Short Direction
Beam Depth, d (in)	22"	22"
Individual Beam Width, b_i (in)	10"	10"
Number of Beams, n	3	4
Total Beam Width, b = 3 b_i (in)	30"	40"
Slab Thickness, t (in)	4"	4"
Moment of Inertia, (in^4), (Figure A2)	60,603	86,322
Section Moduli, (in^3), (Figure A2)		
S_T	10,999	17,653
S_B	3,675	5,045

(LONG DIRECTION CROSS-SECTION)

SECTION		AREA	y	A_y	A_y^2	I_o
Slab :	24'x12"x 4 "	1,152	- 2.00	-2,304	4,608	1,536
Beams:	3 x10"x18"	540	-13.00	-7,020	91,260	14,580
		1,692		-9,324	95,868	16,116
					+ 16,116	
					111,984	

$$y_t = \frac{A_y}{A} = \frac{-9.320}{1,692} = -5.51 \text{ in}$$

$$-Ay_t^2 = -(1692)(-5.51) = -\ 51,381$$

$$I = 60,603 \text{ in}^4$$

$$S_T = \frac{I}{c_t} = \frac{60,603}{5.51} = 10,999 \text{ in}^3$$

$$S_B = \frac{I}{c_b} = \frac{60,603}{16.49} = 3,675 \text{ in}^3$$

Figure A2. Typical Calculations for Determining Moment of Inertia and Section Moduli in the Long and Short Direction.

	Long Direction	Short Direction
Cross-Sectional Area, A (in^2)	1,692	2,736
Centroid of Strands, $\bar{c}$ (inches from top fiber)	-2.00	-2.00
Depth to Neutral Axis, kd (inches from top fiber)	-5.51	-4.89
Prestressing Eccentricity, e (inches from neutral axis)	3.51	2.89
Allowable Concrete Tensile Stress, ksi	0.100	0.100
$f_t = 2\sqrt{2,500} = 100$ psi $= 0.100$ ksi		
Allowable Concrete Compressive Stress, ksi	1.145	1.145
$f_c = 0.45(2,500) = 1145$ psi $= 1.145$ ksi		
Tensile Cracking Stress, ksi	0.300	0.300
$f_{cr} = 6\sqrt{2,500} = 0.300$ ksi		

F. PRESTRESSING STEEL

(1) Number of tendons required for Minimum Average Prestress

(a) Stress in tendons immediately after anchoring

$$f_{ps} = 0.7\, f_{pu} = (0.7)(270) = 189 \text{ ksi}$$

(b) Stress in tendons after losses

$$f_{ps} = 189 - 30 = 159 \text{ ksi}$$

$$N_T \text{ (long)} = \frac{(50 \text{ psi})(1692 \text{ in}^2) / (1000 \text{ lb/kip})}{(159 \text{ ksi})(0.153 \text{ in}^2)} = 3.48$$

$$N_T \text{ (short)} = 5.62$$

(2) Number of tendons necessary to overcome slab-subgrade friction on polyethylene sheeting.

$$\text{Weight of Beams and Slab} = \frac{1,038,528 \text{ in}^3}{1728 \text{ in}^3/\text{ft}^3} (0.150 \text{ k/ft}^3) = 90.15 \text{ kips}$$

$$N_T = 0.50 \frac{(0.75)(90.15)}{(159)(0.153)} = 1.39 \qquad \text{(each direction)}$$

(3) Total number of tendons

N_T (long) = 3.48 + 1.39 = 4.87 → 5 tendons

N_T (short) = 5.62 + 1.39 = 7.01 → 7 tendons

(4) Check Minimum Average Prestress

$$\text{Short Direction: } \frac{(7-1.39) \times 159 \times 0.153}{2736} = 50 \text{ psi} = 50 \text{ psi} \qquad \underline{\underline{\text{OK}}}$$

$$\text{Long Direction: } \frac{(5-1.39) \times 159 \times 0.153}{1692} = 52 \text{ psi} > 50 \text{ psi} \qquad \underline{\underline{\text{OK}}}$$

(5) Design Prestress Force

$$\text{Long : } (5 \times 24.3) - 0.75 \left(\frac{90.15}{2}\right) \approx 87.7 \text{ kips}$$

$$\text{Short : } (7 \times 24.3) - 0.75 \left(\frac{90.15}{2}\right) \approx 136.3 \text{ kips}$$

3. EXPECTED SERVICE MOMENT

A. LONG DIRECTION

$$M_\ell = A_o \left[B(e_m)^{1.238} + C \right]$$

$$A_o = \frac{1}{727} \left[(42)^{0.013} (12)^{0.306} (22)^{0.688} (1040)^{0.534} (2.415)^{0.193} \right]$$

A_o = 1.254

B = 1.0

$$C = 0$$

$$M_\ell = 1.254\,(e_m)^{1.238} = 1.254\,(4.3)^{1.238}$$

$$M_\ell = 7.630 \text{ ft·kips/ft}$$

B. SHORT DIRECTION

$$M_s = \left(\frac{58 + e}{60}\right) M_\ell$$

$$\left(\frac{58 + 43}{60}\right) 7.630$$

$$M_s = 7.922 \text{ ft·kips/ft}$$

4. DETERMINE MAXIMUM ALLOWABLE SERVICE AND CRACKING MOMENTS.

A. SHORT DIRECTION

(1) Tension in Top Fiber

$${}_nM_t = S_T\left(\frac{P_r}{A} + f_t\right) + P_r e$$

$$= (17{,}653)\left(\frac{136.3}{2736} + 0.100\right) + (136.3)(2.89)$$

$$= 3039 \text{ in·kips} = \frac{3039 \text{ in·kips}}{(12 \text{ in/ft})(42 \text{ ft})} = 6.029\ \frac{\text{ft·k}}{\text{ft}}$$

$$6.029 < 7.922$$ NG

INCREASE BEAM DEPTH FROM 22 INCHES TO 24 INCHES

AND ADD 3 TENDONS IN SHORT DIRECTION

2. ASSUME NEW TRIAL SECTIONS

E. SECTION PROPERTIES

	Long Direction	Short Direction
Beam Depth, d (in)	24"	24"
Beam Width, b_i (in)	10"	10"
Number of Beams, n	3	4
Total Beam Width, b (in)	30"	40"
Slab Thickness, t (in)	4"	4"
Moment of Inertia, I (in)	78,347	111,828
Section Moduli (in)		
S_T	12,823	20,671
S_B	4,379	6,015
Cross-Sectional Area, A (in)	1,752	2,816
Centroid of Strands, $\overline{c}$ (in)	- 2.00	- 2.00
Depth to Neutral Axis, kd (in)	-6.11	-5.41
Prestressing Eccentricity, e (in)	+4.11	+3.41

F. PRESTRESSING STEEL

(1) Number of tendons required for Minimum Average Prestress.

$$N_T \text{ (long)} = \frac{(50)(1752) / (1000)}{(159)(0.153)} = 3.60$$

$$N_T \text{ (short)} = \frac{(50)(2816) / (1000)}{(159)(0.153)} = 5.79$$

(2) Number of tendons necessary to overcome slab-subgrade friction

$$\text{Weight of Slab} = \frac{1{,}089{,}408}{1728}(0.150) = 94.57 \text{ k}$$

$$N_T = (0.50)\frac{(0.75)(94.57)}{(159)(0.153)} = 1.46 \text{ (each direction)}$$

(3) Total number of tendons

N_T (long) = 3.60 + 1.46 = 5.06 → 5 tendons

N_T (short) = 5.79 + 1.46 + 2 = 9.25 → 10 tendons

(4) Check Minimum Average Prestress

$$\text{Short Direction: } \frac{8.54 \times 159 \times 0.153}{2816} = 74 \text{ psi} > 50 \text{ psi} \quad \underline{\underline{\text{OK}}}$$

$$\text{Long Direction: } \frac{3.54 \times 159 \times 0.153}{1752} = 49 \text{ psi} \simeq 50 \text{ psi} \quad \underline{\underline{\text{OK}}}$$

(5) Spacing of Tendons

Short Direction: Use 4'-4" O.C. < 8'-6" (Fig. 22) OK

Long Direction: Use 5'-3" O.C. < 7'-8" (Fig. 22) OK

(6) Design prestress forces

Short Direction: 8.54 x 159 x 0.153 = 207.8 k

Long Direction: 3.54 x 159 x 0.153 = 86.1 k

3. EXPECTED SERVICE MOMENT

A. LONG DIRECTION

$$M_{\ell} = 7.630\left(\frac{24}{22}\right)^{0.688} = 8.100 \ \frac{ft\cdot k}{ft}$$

B. SHORT DIRECTION

$$M_s = \left[\frac{58 + 4.3}{60}\right] 8.100 = 8.411 \ \frac{ft\cdot k}{ft}$$

4. DETERMINE MAXIMUM ALLOWABLE SERVICE AND CRACKING MOMENTS

A. SHORT DIMENSION

(1) Tension in Top Fiber

$$_nM_t = (20{,}671)\left(\frac{207.8}{2816} + 0.100\right) + (207.8)(3.41)$$

$$= 8.534 \ \frac{ft\cdot k}{ft}$$

$$8.534 > 8.411$$ **OK**

(2) Compression in Bottom Fiber

$$_nM_c = S_B\left(f_c - \frac{P_r}{A}\right) + P_r e$$

$$= (6{,}015)\left(1.125 - \frac{207.8}{2816}\right) + (207.8)(3.41)$$

$$_nM_c = 13.952 \ \frac{ft\cdot k}{ft}$$

$$13.952 > 8.411$$ **OK**

(3) Tensile Cracking Moment

$$_nM_{cr} = S_T\left(\frac{P_r}{A} + f_{cr}\right) + P_r e$$

$$= (20{,}671)\left(\frac{207.8}{2816} + 0.300\right) + (207.8)(3.41)$$

$$_nM_{cr} = 16.737 \ \frac{ft \cdot k}{ft}$$

$$16.737 > 8.411$$ OK

B. LONG DIRECTION

(1) Tension in Top Fiber

$$_nM_t = (12{,}823)\left(\frac{86.1}{1752} + 0.100\right) + (86.1)(4.11)$$

$$= 7.869 \ \frac{ft \cdot k}{ft}$$

$$7.869 \approx 8.100$$ OK

(2) Compression in Bottom Fiber

$$_nM_c = (4.379)\left(1.125 - \frac{86.1}{1752}\right) + (86.1)(4.11)$$

$$= 16.774 \ \frac{ft \cdot k}{ft}$$

$$16.774 > 8.100$$ OK

(3) Tensile Cracking Moment

$$_nM_{cr} = (12.823)\left(\frac{86.1}{1752} + 0.300\right) + (86.1)(4.11)$$

$${}_{n}M_{cr} = 16.774 \ \frac{ft \cdot k}{ft}$$

$$16.774 > 8.100$$ OK

5. DIFFERENTIAL DEFLECTION

A. SHORT DIRECTION

(1) Calculate Relative Stiffness Length

$$\beta = \frac{1}{12} \sqrt[4]{\frac{E_c I}{E_s}}$$

$$= \frac{1}{12} \sqrt[4]{\frac{(1.5 \times 10^6)(111{,}828)}{1000}}$$

$$\beta = 9.48 \text{ ft}$$

$$L = 24 \text{ ft}$$

$$6\beta = 56.88 \text{ ft}$$

$$24 < 56.88$$ 24 ft GOVERNS

(2) Allowable Differential Deflection

$$\Delta_{allow} = \frac{24}{40} = 0.600 \text{ in}$$

(3) Expected Differential Deflection

$$\Delta_o = \frac{(2.415 \times 24)^{0.205} (14)^{1.059} (1040)^{0.523} (4.3)^{1.296}}{380 (24)^{1.214}}$$

$$\Delta_o = 0.524 \text{ in}$$

$$\Delta_c = (3.41)\sqrt{\frac{6400}{9\ (24)}} = 18.56\%$$

$$\Delta = 0.524\ \left(\frac{100-18.56}{100}\right)$$

$$\Delta = 0.427 \text{ in}$$

$$0.427 < 0.600$$ <u>OK</u>

B. LONG DIRECTION

(1) Relative Stiffness Length

$$\beta = \frac{1}{12}\sqrt[4]{\frac{(1.5 \times 10\ )(78{,}347)}{1000}}$$

$$\beta = 8.68 \text{ ft}$$

$$6\beta = 52.06 \text{ ft}$$

$$L = 42 \text{ ft}$$

$$42 < 52.06$$ <u>42 ft GOVERNS</u>

(2) Allowable Differential Deflection

$$\Delta_{allow} = \frac{42}{40} = 1.050 \text{ in}$$

(3) Expected Differential Deflection

$$\Delta_o = \frac{(2.415 \times 42)^{0.205} (12)^{1.059} (1040)^{0.523} (4.3)^{1.296}}{380 (24)^{1.214}}$$

$$\Delta_o = 0.502 \text{ in}$$

$$\Delta_c = \sqrt{\frac{6400 (4.11)^2}{9 (42)}} = 16.91\%$$

$$\Delta = 0.502 \left(\frac{100-16.91}{100} \right)$$

$$\Delta = 0.418 \text{ in}$$

$$0.418 < 1.050$$ OK

DEFLECTIONS OKAY

6. SHEAR CAPACITY

A. LONG DIRECTION

(1) Expected Service Shear

$$V_\ell = \frac{1}{1940} \left[(L)^{0.09} (S)^{0.71} (d)^{0.43} (P)^{0.44} (y_m)^{0.16} (e_m)^{0.93} \right]$$

$$= \frac{1}{1940} \left[(42)^{0.09} (12)^{0.71} (24)^{0.43} (1040)^{0.44} (2.415)^{0.16} (4.3)^{0.93} \right]$$

$$V_\ell = 1.570 \text{ kips/ft}$$

(2) Permissible Shear Stress

$$v_c = 1.5\sqrt{f'_c} = 1.5\sqrt{2500}$$

$$v_c = 75 \text{ psi}$$

(3) Design Shear Stress

$$v_u = \frac{VW}{n\,b\,d}$$

$$= \frac{(1.570)(24)(1000)}{(3)(10)(24)}$$

$$v_u = 52.3 \text{ psi}$$

$$52.3 < 75.0$$ OK

B. SHORT DIRECTION

(1) Expected Service Shear

$$v_s = \frac{1}{1350}\left[(L)^{0.19}(S)^{0.45}(d)^{0.20}(P)^{0.54}(y_m)^{0.04}(e_m)^{0.97}\right]$$

$$= \frac{1}{1350}\left[(24)^{0.19}(14)^{0.45}(24)^{0.20}(1040)^{0.54}(2.415)^{0.004}(4.3)^{0.97}\right]$$

$$v_s = 1.523 \text{ kips/ft}$$

(2) Permissible Shear Stress

$$v_c = 1.5 \sqrt{f'_c} = 75.0 \text{ psi}$$

(3) Design Shear Stress

$$v_u = \frac{(42)(1.523)(1000)}{(4)(10)(24)}$$

$$v_u = 66.6 \text{ psi}$$

$$66.6 < 75.0 \text{ psi}$$ OK

SHEAR OKAY

EDGE LIFT DESIGN

7. EXPECTED SERVICE MOMENTS

A. LONG DIRECTION

$$M_\ell = \left[\frac{(S)^{0.10} \; (d\, e_m)^{0.78} \; (y_m)^{0.66}}{6.6 \; (L)^{0.0065} \; (P)^{0.04}} \right]$$

$$= \left[\frac{(12)^{0.10} \; (24 \times 2.3)^{0.78} \; (0.736)^{0.66}}{6.6 \; (42)^{0.0065} \; (1040)^{0.04}} \right]$$

$$M_\ell = 2.679 \; \frac{ft \cdot k}{ft}$$

B. SHORT DIRECTION

$$M_s = (d)^{0.35} \left(\frac{19 + e_m}{57.75} \right) M_\ell$$

$$= (24)^{0.35} \left(\frac{19 + 2.3}{57.75} \right) 2.679$$

$$M_s = 3.005 \; \frac{ft \cdot k}{ft}$$

8. DETERMINE MAXIMUM ALLOWABLE SERVICE AND CRACKING MOMENTS.

A. LONG DIRECTION

(1) Tension in Bottom Fiber

$${}_pM_t = S_B \left(\frac{P_r}{A} + f_t \right) - P_r e$$

$$_pM_t = (4{,}379)\left(\frac{86.1}{1752} + 0.300\right) - (86.1)(4.11)$$

$$_pM_t = 4.080 \ \frac{ft \cdot k}{ft}$$

$$4.080 > 2.679$$ **OK**

(2) Compression in Top Fiber

$$_pM_c = S_T\left(f_c - \frac{P_r}{A}\right) + P_r e$$

$$= (12{,}823)\left(1.125 - \frac{86.1}{1752}\right) - (86.1)(4.11)$$

$$_pM_c = 46.673 \ \frac{ft \cdot k}{ft}$$

$$46.673 > 2.679$$ **OK**

B. SHORT DIRECTION

(1) Tension in Bottom Fiber

$$_pM_t = (6{,}015)\left(\frac{207.8}{2816} + 0.300\right) - (207.8)(3.41)$$

$$_pM_t = 3.055 \ \frac{ft \cdot k}{ft}$$

$$3.055 > 3.005$$ **OK**

(2) Compression in Top Fiber

$${}_{p}M_{c} = (20{,}671)(1.125 - \frac{207.8}{2816}) - (207.8)(3.41)$$

$${}_{p}M_{c} = 41.708 \ \frac{ft \cdot k}{ft}$$

$$41.708 > 3.005$$ OK

9. DIFFERENTIAL DEFLECTION

A. LONG DIRECTION

(1) Allowable Differential Deflection

$$\Delta_{allow} = \frac{12 \times 42}{800} = 0.630 \text{ in}$$

(2) Expected Differential Deflection

$$\Delta = \left[\frac{(L)^{0.35} (S)^{0.88} (e_m)^{0.74} (y_m)^{0.76}}{15.90 (d)^{0.85} (P)^{0.01}} \right]$$

$$= \left[\frac{(42)^{0.35} (12)^{0.88} (2.3)^{0.74} (0.736)^{0.76}}{15.90 (24)^{0.85} (1040)^{0.01}} \right]$$

$$\Delta = 0.190 \text{ in}$$

$$0.190 < 0.630$$ OK

B. SHORT DIRECTION

(1) Allowable Differential Deflection

$$\Delta_{allow} = \frac{12 \times 24}{800} = 0.360$$

(2) Expected Differential Deflection

$$\Delta = \left[\frac{(24)^{0.35} (14)^{0.88} (2.3)^{0.74} (0.763)^{0.76}}{15.90 (24)^{0.85} (1040)^{0.01}} \right]$$

$$\Delta = 0.184 \text{ in}$$

0.184 > 0.360 <u>OK</u>

DEFLECTION OK

<u>10. SHEAR CAPACITY</u>

A. EXPECTED SERVICE SHEAR

(1) Long Direction

$$V = \left[\frac{(L)^{0.07} (d)^{0.40} (P)^{0.03} (e_m)^{0.16} (y_m)^{0.67}}{3.0 (S)^{0.015}} \right]$$

$$V = \left[\frac{(42)^{0.07} (24)^{0.40} (1040)^{0.03} (2.3)^{0.16} (0.736)^{0.67}}{3.0 (12)^{0.015}} \right]$$

$$V = 1.705 \text{ kips/ft}$$

(2) Short Direction

$$V = \left[\frac{(24)^{0.07}\ (24)^{0.40}\ (1040)^{0.03}\ (2.3)^{0.16}\ (0.736)^{0.67}}{3.0\ (14)^{0.15}} \right]$$

$V = 1.635$ kips/ft

B. SHEAR STRESSES

(1) Long Direction

(a) Nominal permissible shear stress

$$v_c = 1.5\ \sqrt{f_c'} = 75.0 \text{ psi}$$

(b) Nominal design shear stress

$$v_u = \frac{VW}{nbd} = \frac{(24)(1000)}{(3)(10)(24)}$$

$$v_u = 56.8 \text{ psi}$$

$$56.8 < 75 \text{ psi}$$ OK

(2) Short Direction

(a) Permissible shear stress

$$v_c = 75.0 \text{ psi}$$

(b) Design shear stress

$$v_u = \frac{(1.635)(42)(1000)}{(4)(10)(24)}$$

$$v_u = 71.5 \text{ psi}$$

$71.5 < 75$ psi <u>OK</u>

SHEAR OK

<u>11. DESIGN SUMMARY</u>

A. LONG DIRECTION

Use 24-inch beams, 10-inches wide spaced 12'-0" on center. Use five ½" Ø 270k 7-wire strands in slab with centroids 2-inches below top of slab and at 5'-9" on center, beginning 6" from each edge; total of three beams and five strands.

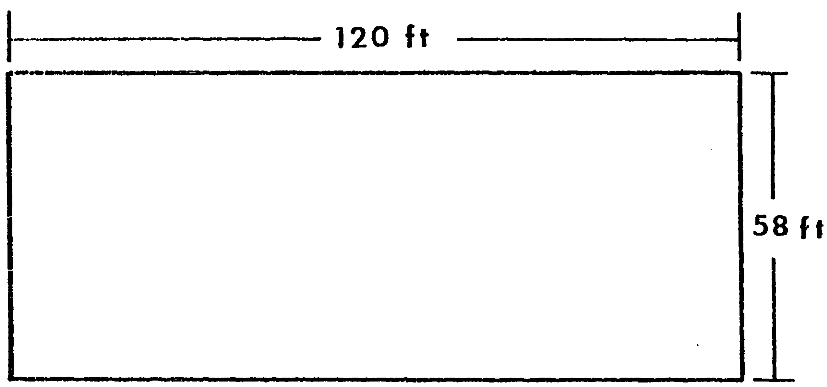
<u>B. SHORT DIRECTION</u>

Use 24-inch beams, 10-inches wide spaced either 13'-0" or 16'-0", as shown, on center. Use ten ½" Ø 270k 7-wire strands in slab with centroids 2-inches below top of slab and at 4'-6" on center, beginning 9" from each edge; total of four beams and ten strands.

APPENDIX T

DESIGN EXAMPLE: APARTMENT HOUSE CONSTRUCTED ON EXPANSIVE SOIL

GIVEN: A 3-story apartment house in Houston, Texas with plan dimensions as shown. Construction is stucco exterior, sheetrock interior, and gable truss roof. Perimeter wall load is 2280 lb/ft.



1. DESIGN DATA

A. LOADING. GIVEN AS 2280 LB/FT.

B. MATERIALS.

(1) Concrete: f'_c = 3000 psi

(2) Prestressing steel: 270k ½" Ø 7-Wire Strand

(3) Mild steel reinforcement: Grade 40 (f_y = 40 ksi)

C. SOILS INVESTIGATION

(1) Atterberg Limits: PL = 28

LL = 70

$$PI = 42$$

(2) Cation Exchange Capacity: 72.0

(3) Percent Clay: 65%

(4) Unconfined Compressive Strength, q_u = 2500 psf.

(5) Depth to Constant Suction: 5 ft.

D. DETERMINE DESIGN SOIL VALUES

(1) Thornthwaite Moisture Index: From Figure 4, I_m = +18.

(2) Edge Moisture Variation Distance: From Figure 6,

e_m = 3.0 ft (Center Lift)

e_m = 4.5 ft (Edge Lift)

(3) Cation Exchange Activity:

$$\text{CEAc} = \frac{\text{C.E.C.}}{\%\ \text{Clay}} = \frac{72.0}{65.0} = 1.11$$

(4) Clay Activity Ratio:

$$\text{Ac} = \frac{\text{PI}}{\%\ \text{Clay}} = \frac{42}{65} = 0.65$$

(5) Principal Clay Mineral: From Figure 7, principal clay mineral is montmorillonite.

(6) Constant Suction Value: From Figure 8, pF = 3.3.

(7) Estimated Velocity of Moisture Flow:

$$v = 0.5\ (18 \times \frac{1}{12}) = 0.75 \text{ in/month}$$

$0.75 < 0.70$ <u>0.70 in/mo GOVERNS</u>

(8) Estimated Differential Swell: For $z = 5$ ft, $v = 0.7$ in/mo.

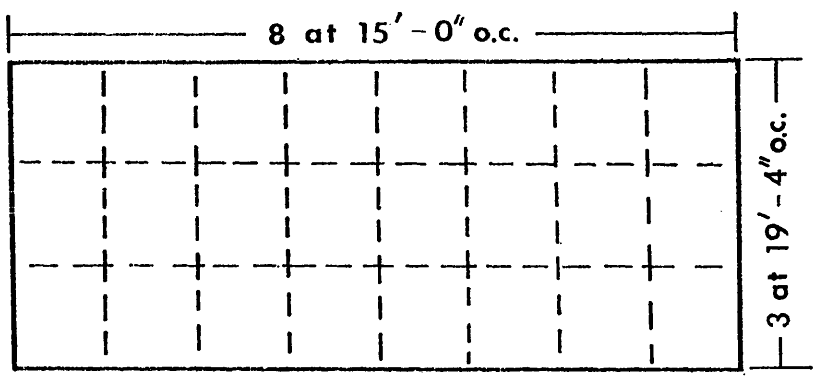
(a) Center Lift: interpolating for 65% clay, pF = 3.3, and $e_m = 3.0$ ft.

$$y_m = 0.274 \text{ in}$$

(b) Edge Lift: interpolating for 65% clay, pF = 3.3, and $e_m = 4.5$ ft.

$$y_m = 0.307 \text{ in}$$

E. ASSUME SPACING OF STIFFENING BEAMS AS SHOWN:



EDGE LIFT DESIGN

2. ASSUME TRIAL SECTION

A. APPROXIMATE DEPTH OF STIFFENING BEAM

(1) Long Direction

Assume $\beta = 10$ ft

$6\beta = 60$ ft — 60 ft GOVERNS

$$\Delta/L = 1/1700$$

$$\Delta_{allow} = \frac{12 \times 60}{1700} = 0.424 \text{ in}$$

$$X = \frac{(L)^{0.35} (S)^{0.88} (e_m)^{0.74} (y_m)^{0.76}}{12\Delta \ (P)^{0.01}}$$

$$X = \frac{(120)^{0.35} (19.33)^{0.88} (4.5)^{0.74} (0.307)^{0.76}}{12 \ (0.424)(2280)^{0.01}}$$

$$X = 16.333$$

$$d_\ell = 10^{\frac{1}{0.85} \log_{10} (16.333)} = 26.7 \text{ in}$$

SAY $d_\ell = 26$ in

(2) Short Direction

Assume $\beta = 10$ ft

$L = 58 \text{ ft} < 6\beta = 60 \text{ ft}$ 58 ft GOVERNS

$$\Delta_{allow} = \frac{12 \times 58}{1700} = 0.409 \text{ in}$$

$$X = \frac{(58)^{0.35} (15)^{0.88} (4.5)^{0.74} (0.307)^{0.76}}{12 \ (0.409)(2280)^{0.01}}$$

$$X = 10.502$$

$$d_s = 10^{\frac{1}{0.85}\log_{10}(10.502)} = 15.9 \text{ in}$$

SAY d_s = 16 in

16 in < 26 in   <u>26 in GOVERNS</u>

D. CHECK SOIL BEARING

(1) Allowable Soil Pressure

$$q_{allow} = 2{,}500 \text{ psf} = 2.50 \text{ ksf}$$

(2) Applied Loading

$$w = (225.9 + 301.6 + 278.4 + 811.7) \text{ kips}/718.9 \text{ ft}^2$$

$$w = 2.25 \text{ ksf}$$

2.25 < 2.50 ksf   <u>OK</u>

E. SECTION PROPERTIES

	Long Direction	Short Direction
Beam Depth, d (in)	26"	26"
Beam Width, b_i (in)	10"	10"
Number of Beams, n	4	9
Total Beam Width, b (in)	40"	90"
Slab Thickness, t (in)	4"	4"
Moment of Inertia, I (in^4)	152,206	336,560

	Long Direction	Short Direction
Section Moduli, (in)		
S_T	29,716	63,192
S_B	7,290	16,279
Cross-Sectional Area, A (in^2)	3,664	7,740
Depth to Neutral Axis, c_g (in)	-5.12	-5.33
Allowable Concrete Tensile Stress, ksi	0.110	0.110
Allowable Concrete Compressive Stress, ksi	1.350	1.350
Tensile Cracking Stress, ksi	0.329	0.329

F. PRESTRESSING STEEL

(1) Number of tendons required for Minimum Average Prestress

(a) Stress in tendons immediately after anchoring

$$f_{ps} = 0.7\ f_{pu} = (0.7)(270) = 189 \text{ ksi}$$

(b) Stress in tendons after losses

$$f_{ps} = 189 - 30 = 159 \text{ ksi}$$

$$N_T \text{ (Long)} = \frac{(50 \text{ psi})(3664 \text{ in}^2)\ /\ (1000 \text{ lb/kip})}{(159 \text{ ksi})(0.153 \text{ in}^2)} = 7.53$$

N_T (Short) = 15.91

(2) Number of tendons required to overcome slab-subgrade friction on polyethylene sheeting

$$\text{Weight of Beams and Slabs} = \frac{6{,}575{,}040}{1728} \quad (0.15)$$

$$= 570.7 \text{ kips}$$

$$N_T = 0.50 \; \frac{(0.75)(570.7)}{(159)(0.153)} = 8.80 \text{ Strands (each direction)}$$

(3) Number of tendons required to overcome wobble and friction losses

$$(K\ell + \mu\alpha)$$

ASSUME $\alpha = 0$ since most strands will be straight;

$K = 0.001$;

$\mu = 0.07$

$$(0.001)\left(\frac{120}{2}\right) + (0.07)(0) = 0.060$$

Since $(K\ell + \mu\alpha) \leq 0.30$, calculate friction loss IAW ACI 318-77, SECT 18.6.2.:

$$P_s = P_x\,(1 + K\ell + \mu\alpha)$$

At center of slab

$$P_x = \frac{P_s}{(1 + K\ell + \mu\alpha)} = \frac{P_s}{(1 + 0.06)}$$

$$P_x = 0.943\ P_s$$

FRICTION LOSS AT MIDDLE OF SLAB CAN BE OVERCOME BY INITIALLY STRESSING TENDONS TO $0.70/0.943 = 0.742\ f_{pu} \leq 0.80\ f_{pu}$. THEREFORE, DO NOT CONSIDER FRICTION LOSS FURTHER IN DESIGN CALCULATIONS IN EITHER DIRECTION.

(4) Total number of tendons

N_T (Long) = 7.53 + 8.80 + 0 = 16.33 → 17 strands

N_T (Short) = 15.91 + 8.80 + 0 = 24.71 → 25 strands

(5) Check Minimum Average Prestress

Short Direction: $\dfrac{(25 - 8.80) \times 159 \times 0.153}{7740} = 0.051$ ksi = 0.050 OK

Long Direction : $\dfrac{(17 - 8.80) \times 159 \times 0.153}{3664} = 0.054$ ksi = 0.050 OK

(6) Design prestress forces

Long Direction : $P_r = (17 - 8.80) \times 24.3$ k = 199.3 kips

Short Direction: $P_r = (25 - 8.80) \times 24.3$ k = 393.7 kips

3. EXPECTED SERVICE MOMENT

A. LONG DIRECTION

$$M_\ell = \frac{(S)^{0.10}\ (de_m)^{0.78}\ (y_m)^{0.66}}{6.6\ (L)^{0.0065}\ (P)^{0.04}}$$

$$= \frac{(19.33)^{0.10}\,(26 \times 4.5)^{0.78}\ (0.307)^{0.66}}{6.6\ (120)^{0.0065}\ (2280)^{0.04}}$$

$$M_\ell = 2.729\ \frac{\text{ft·kips}}{\text{ft}}$$

B. SHORT DIRECTION

$$M_s = (d)^{0.35}\ \left(\frac{19 + e}{57.75}\right)\ M_\ell$$

$$= (26)^{0.35}\ \left(\frac{19 + 4.5}{57.75}\right)\ (2.729)$$

$$M_s = 3.473\ \frac{\text{ft·kips}}{\text{ft}}$$

4. DETERMINE MAXIMUM ALLOWABLE SERVICE AND CRACKING MOMENTS.

A. LONG DIRECTION

(1) Tension in Bottom Fiber

$${}_pM_t = S_B\ \left(\frac{P_r}{A} + f_t\right) - P_r e$$

$$= (7{,}290)\ \left(\frac{199.3}{3664} + 0.329\right) - (199.3)(3.12)$$

$${}_pM_t = 3.122 \ \frac{ft \cdot kips}{ft}$$

$$3.122 > 2.279$$ OK

(2) Compression in Top Fiber

$${}_pM_c = S_T \left(f_c - \frac{P_r}{A}\right) - P_r e$$

$$= (29{,}716)\left(1.350 - \frac{199.3}{3664}\right) - (199.3)(3.12)$$

$${}_pM_c = 54.423 \ \frac{ft \cdot kips}{ft}$$

$$54.423 > 2.279$$ OK

B. SHORT DIRECTION

(1) Tension in Bottom Fiber

$${}_pM_t = (16{,}279)\left(\frac{393.7}{7740} + 0.329\right) - (393.7)(3.33)$$

$$= 3.384 \ \frac{ft \cdot kips}{ft}$$

$$3.384 \simeq 3.473$$

(2) Compression in Top Fiber

$${}_{p}M_{c} = (63{,}192)(1.350 - \frac{393.7}{7740}) - (393.7)(3.33)$$

$$= 56.100 \ \frac{\text{ft}\cdot\text{kips}}{\text{ft}}$$

$$56.100 > 3.473$$

5. DIFFERENTIAL DEFLECTION

A. LONG DIRECTION

(1) Allowable Differential Deflection

$$\beta = \frac{1}{12}\sqrt[4]{\frac{E_c I}{E_c}}$$

$$= \frac{1}{12}\sqrt[4]{\frac{(1.5 \times 10^6)(152{,}206)}{1000}}$$

$$\beta = 10.24 \text{ ft}$$

$$6\beta = 61.46 \text{ ft}$$

$$61.46 \text{ ft} < 120 \text{ ft}$$ <u>6β GOVERNS</u>

$$\Delta_{allow} = \frac{(12)(61.46)}{800} = 0.922 \text{ in}$$

(2) Expected Differential Deflection

$$\Delta = \frac{(L)^{0.35}\ (S)^{0.88}\ (e_m)^{0.74}\ (y_m)^{0.76}}{12\ (d)^{0.85}\ (P)^{0.01}}$$

$$\Delta = \frac{(120)^{0.35}\ (19.33)^{0.88}\ (4.5)^{0.74}\ (0.307)^{0.76}}{12\ (26)^{0.85}\ (2280)^{0.01}}$$

$$\Delta = 0.434 \text{ in}$$

$0.434 < 0.922$ <u>OK</u>

B. SHORT DIRECTION

(1) Allowable Differential Deflection

$$\beta = \frac{1}{12} \sqrt[4]{\frac{(1.5 \times 10^6)(336{,}560)}{1000}}$$

$$\beta = 12.49 \text{ ft}$$

$$6\beta = 74.95$$

74.95 ft > 58 ft <u>58 ft GOVERNS</u>

$$\Delta_{allow} = \frac{(12)(58)}{800} = 0.870 \text{ in}$$

(2) Expected Differential Deflection

$$\Delta = \frac{(58)^{0.35}\,(15)^{0.88}\,(4.5)^{0.74}\,(0.307)^{0.76}}{12\,(26)^{0.85}\,(2280)^{0.01}}$$

Δ = 0.269 in

0.269 < 0.870 in <u>OK</u>

DEFLECTIONS OKAY

B. SHORT DIRECTION

(1) Expected Shear

$$V_s = \frac{(58)^{0.07}\ (26)^{0.40}\ (2280)^{0.03}\ (4.5)^{0.16}\ (0.307)^{0.67}}{3.0\ (15)^{0.015}}$$

$$V_s = 1.138\ \frac{\text{kips}}{\text{ft}}$$

(2) Permissible Shear Stress

$$v_c = 1.5\sqrt{f'_c} = 82.2\ \text{psi}$$

(3) Total Design Shear Stress

$$v_u = \frac{(1.138)(120)(1000)}{(9)(10)(26)} = 58.4\ \text{psi}$$

$$58.4 < 75.0\ \text{psi}$$ OK

CENTER LIFT DESIGN

7. EXPECTED SERVICE MOMENT

A. LONG DIRECTION

$$M_\ell = A \; [B(e_m)^{1.238} + C]$$

$$A = \frac{1}{727}\left[(L)^{0.013}\;(S)^{0.306}\;(d)^{0.688}\;(P)^{0.534}\;(y_m)^{0.193}\right]$$

$$= \frac{1}{727}\left[(120)^{0.013}\;(19.33)^{0.306}\;(26)^{0.688}\;(2280)^{0.534}\;(0.274)^{0.193}\right]$$

$$A = 1.649$$

$e_m \leq 5$: $\quad B = 1.0 \quad C = 0$

$$M_\ell = (1.649)(3.0)^{1.238}$$

$$M_\ell = 6.425 \; \frac{\text{ft}\cdot\text{kips}}{\text{ft}}$$

B. SHORT DIRECTION

$$M_s = \left[\frac{58 + e_m}{60}\right] M_\ell$$

$$= \left[\frac{58 + 3.0}{60}\right] (6.425)$$

$$M_s = 6.532 \; \frac{\text{ft.kips}}{\text{ft}}$$

8. ALLOWABLE SERVICE AND CRACKING MOMENT CAPACITIES IN NEGATIVE BENDING.

A. LONG DIRECTION

(1) Tension in Top Fiber

$${}_nM_t = S_T \left(\frac{P_r}{A} + f_t\right) + P_r e$$

$${}_nM_t = (29{,}716)\left(\frac{199.3}{3664} + 0.110\right) + (199.3)(3.12)$$

$${}_nM_t = 7.912 \ \frac{\text{ft}\cdot\text{kips}}{\text{ft}}$$

$$7.912 > 6.425$$

(2) Compression in Bottom Fiber

$${}_nM_c = S_B \left(f_c - \frac{P_r}{A}\right) + P_r e$$

$$= (7{,}290)\left(1.350 - \frac{199.3}{3664}\right) - (199.3)(3.12)$$

$${}_nM_c = 12.677 \ \frac{\text{ft}\cdot\text{kips}}{\text{ft}}$$

$$12.677 > 6.425$$ <u>OK</u>

(3) Tensile Cracking Moment

$$_nM_{cr} = S_T\left(\frac{P_r}{A} + f_{cr}\right) + P_r e$$

$$= (29{,}716)\left(\frac{199.3}{3664} + 0.329\right) + (199.3)(3.12)$$

$$_nM_{cr} = 17.263 \ \frac{\text{ft}\cdot\text{kips}}{\text{ft}}$$

$$17.263 > 6.425$$ OK

B. SHORT DIRECTION

(1) Tension in Top Fiber

$$_nM_t = (63{,}192)\left(\frac{393.7}{7740} + 0.110\right) + (393.7)(3.33)$$

$$_nM_t = 7.059 \ \frac{\text{ft}\cdot\text{kips}}{\text{ft}}$$

$$7.059 > 6.532 \ \frac{\text{ft}\cdot\text{kips}}{\text{ft}}$$ NG

(2) Compression in Bottom Fiber

$$_nM_c = (16{,}279)\left(1.350 - \frac{393.7}{7740}\right) - (393.7)(3.33)$$

$$_nM_c = 13.776 \ \frac{\text{ft}\cdot\text{kips}}{\text{ft}}$$

$$13.776 > 6.532$$ OK

(3) Tensile Cracking Moment

$$_nM_{cr} = (63,192)\left(\frac{393.7}{7740} + 0.329\right) + (393.7)(3.33)$$

$$_nM_{cr} = 17.580 \ \frac{\text{ft}\cdot\text{kips}}{\text{ft}}$$

$$17.580 > 6.532$$ <u>OK</u>

9. DIFFERENTIAL DEFLECTION

A. LONG DIRECTION

(1) Allowable Differential Deflection

$$\Delta_{allow} = \frac{12(61.46)}{480} = 1.537 \text{ in}$$

(2) Expected Differential Deflection

$$\Delta = \frac{(y_m L)^{0.205} (S)^{1.059} (P)^{0.523} (e_m)^{1.296}}{380 (d)^{1.214}}$$

$$\Delta = \frac{(0.274 \times 120)^{0.205}(19.33)^{1.059}(2280)^{0.523}(3.0)^{1.296}}{380 (26)^{1.214}}$$

$$\Delta = 0.562 \text{ in}$$

$$0.562 < 1.537$$ <u>OK</u>

B. SHORT DIRECTION

(1) Allowable Differential Deflections

$$\Delta_{allow} = \frac{(12)(58)}{480} = 1.450 \text{ in}$$

(2) Expected Differential Deflection

$$\Delta = \frac{(0.274 \times 58)^{0.205}(15)^{1.059}(2280)^{0.523}(3.0)^{1.296}}{380\ (26)^{1.214}}$$

$$\Delta = 0.370 \text{ in}$$

$$0.370 < 1.450 \text{ in}$$ OK

DEFLECTION OKAY

10. SHEAR

A. LONG DIRECTION

(1) Expected Shear Force

$$V_p = \frac{1}{1350}\left[(L)^{0.19}\ (S)^{0.45}\ (d)^{0.20}\ (P)^{0.54}\ (y_m)^{0.04}\ (e_m)^{0.97}\right]$$

$$= \frac{1}{1350}\left[(120)^{0.19}(19.33)^{0.45}(26)^{0.20}(2280)^{0.54}(0.274)^{0.04}(3.0)^{0.97}\right]$$

$$V_p = 2.399\ \frac{\text{kips}}{\text{ft}}$$

(2) Permissible Shear Stress

$$v_c = 1.5\sqrt{f'_c} = 82.2\text{ psi}$$

(3) Total Design Shear Stress

$$v_u = \frac{(2.399)(58)(1000)}{(4)(10)(26)} = 133.8\text{ psi}$$

$$133.8 > 82.2\text{ psi}$$ NG

B. SHORT DIRECTION

(1) Expected Shear Force

$$V_p = \frac{1}{1940}\left[(L)^{0.09}\ (S)^{0.71}\ (d)^{0.43}\ (P)^{0.44}\ (y_m)^{0.16}\ (e_m)^{0.93}\right]$$

$$= \frac{1}{1940}\left[(58)^{0.09}(15)^{0.71}(26)^{0.47}(2280)^{0.44}(0.274)^{0.16}(3.0)^{0.93}\right]$$

$$V_p = 1.593 \text{ kips/ft}$$

(2) Permissible Shear

$$v_c = 1.5 \sqrt{f'_c} = 82.2 \text{ psi}$$

(3) Total Design Shear

$$v_u = \frac{(1.593)(120)(1000)}{(9)(10)(26)} = 81.7 \text{ psi}$$

$$81.7 < 82.2$$ <u>OK</u>

SINCE SHEAR STRESS EXCEEDED IN LONG DIRECTION, MUST EITHER:

A. INCREASE BEAM DEPTH,

B. INCREASE BEAM WIDTH

C. DECREASE BEAM SPACING

D. USE WEB REINFORCEMENT OVER DISTANCE OF 1.5β AT EACH END OF EACH BEAM, OR

E. SOME COMBINATION OF A, B, AND C.

CHOOSE TO ADD ONE BEAM IN LONG DIRECTION AND WIDEN ALL LONG DIRECTION BEAMS TO 12 INCHES

<u>*REVISED*</u> LONG DIRECTION BEAM SPACING = 14.50 ft

<u>*REVISED*</u> LONG DIRECTION PRESTRESS FORCE = 212.1 kips

11. SUMMARY OF REVISED EXPECTED AND ALLOWABLE DESIGN PARAMETERS.

EDGE LIFT DESIGN

	EXPECTED		ALLOWABLE
MOMENT (ft·kips)/ft)			
Long Direction			
Tensile	2.652	<	4.474
Compressive		<	64.133
Short Direction			
Tensile	3.375	<	3.394
Compressive		<	57.959
DIFFERENTIAL DEFLECTION (inches)			
Long Direction	0.337	<	0.997
Short Direction	0.269	<	0.870
SHEAR STRESS (lb/in^2)			
Long Direction	44.5	<	82.2
Short Direction	58.4	<	82.2

CENTER LIFT DESIGN

	EXPECTED		ALLOWABLE
MOMENT (ft·kips/ft)			
Long Direction			
Tensile	5.884	<	9.102
Compressive		<	18.329
Cracking		<	19.705
Short Direction			
Tensile	5.982	<	7.878
Compressive		<	13.819
Cracking		<	17.488
DIFFERENTIAL DEFLECTION (inches)			
Long Direction	0.415	<	1.662
Short Direction	0.370	<	1.450
SHEAR STRESS (lb/in^2)			
Long Direction	78.4	<	82.2
Short Direction	81.7	<	82.2

12. DESIGN SUMMARY

A. LONG DIRECTION

18 -- ½" Ø 270k strands in slab evenly spaced on centers beginning 6" from each edge.

5 -- Beams, 12-inches wide, 26-inches deep evenly spaced 14'-6" on centers

B. SHORT DIRECTION

25 -- ½" Ø 270k strands in slab evenly spaced on centers beginning 6" from each edge.

9 -- Beams, 10-inches wide, 26-inches deep, evenly spaced 15'-0" on centers.