```
0101        +     .AND.(MC3.GT.MC4).AND.(MC4.GT.MC5).AND.(MC5.GT.MC6))
0102        +       )   F )
0103              GO TO 200
0104            ELSE
0105              IADD=IADD+1
0106              IF(IADD.GT.3)GOTO 300
0107              L=LMO+LINC(IADD)
0108              GO TO 200
0109            ENDIF
0110      300   CONTINUE
0111            IADD=1
0112            LMIN=LMO
0113            IF(I.EQ.1)LM1=LMO
0114            IF(LM1.NE.0.0)L= LM1
0115            IF(LMIN .EQ. 0.0)LMIN=10.0
0116            GOTO 200
0117          ELSE
0118            IF(STMX.LE.STRLMT)THEN
0119              LM1= L
0120              L=L+LINC(IADD)
0121              GOTO 200
0122            ELSE
0123              IADD=IADD+1
0124              IF(IADD.GT.3)GOTO 400
0125              L=LM1+LINC(IADD)
0126              GO TO 200
0127            ENDIF
0128          ENDIF
0129      400 IF(FILE.EQ.'Y')WRITE(1,14)LMO,LM1
0130            WRITE(6,3)OD
0131            WRITE(6,4)T
0132            WRITE(6,5)EM
0133            WRITE(6,6)GAMMA
0134            WRITE(6,7)SG
0135            WRITE(6,8)SIGINT
0136            WRITE(6,9)STRLMT
0137            WRITE(6,10)H
0138          WRITE(6,14)LMO ,LM1
0139          GOTO 700
0140      500 IADD=IADD+1
0141          IF(IADD.GT.3)GOTO 600
0142          L= LMN - 9.0*LINC(IADD)
0143          IF(LSTX.EQ.0)L= LMN - 4.0*LINC(IADD)
0144          LSTX= 1
0145          L=L+LINC(IADD)
0146          IF(L.LT.0.0)L=LINC(IADD)
0147          GOTO 200
0148      600 IF(FILE.EQ.'Y')WRITE(1,15)STMN,LMN
0149            WRITE(6,3)OD
0150            WRITE(6,4)T
```

```
      WRITE(6,5)EM
      WRITE(6,6)GAMMA
      WRITE(6,7)SG
      WRITE(6,8)SIGINT
      WRITE(6,9)STRLMT
      WRITE(6,10)H
     WRITE(6,15)STMN,LMN
     IF(LMN.EQ.0.0)LMN= 10.0
     LMO=LMN
     LM1=LMN
700  CONTINUE
     STOP
  1  FORMAT(//'0This program calculates the range of distances between'
    &,' supports of a'/' pipeline necessary to keep the maximum stress'
    &,' below a given stress limit.')
  2  FORMAT(///'OENTER THE FOLLOWING DATA: :')
  3  FORMAT(/'$ Outside diameter of pipe                    (inches): '
    &,:,F13.3)
  4  FORMAT('$ Wall thickness of pipe                       (inches): '
    &,:,F13.3)
  5  FORMAT('% Elastic modulus of pipe material                (psi): '
    &,:,F13.3)
  6  FORMAT('$ Specific weight of pipe material          (lb/in**3): '
    &,:,F13.3)
  7  FORMAT('$ Specify gravity of fluid in pipeline                : '
    &,:,F13.3)
  8  FORMAT('$ Existing axial stress in pipeline               (psi): '
    &,:,F13.3)
  9  FORMAT('$ Maximum allowable stress in pipeline            (psi): '
    &,:,F13.3)
 10  FORMAT('$ Height difference between adjacent supports (inches): '
    &,:,F13.3)
 11  FORMAT('0 Output will be displayed on the terminal screen.')
 12  FORMAT('$ Do you want an additional copy on file FOR001? (Y/N): ')
 13  FORMAT(A1)
 14  FORMAT('0 Supports must be spaced between',F6.0,' and',F6.0,
    & ' feet.'//)
 15  FORMAT('0 Minimum possible stress =',f9.0,' @ for a support '
    &, 'spacing of',f6.0,' feet.'//)
     END
```

```
      SUBROUTINE MOMENT(MXC,STL)
      IMPLICIT REAL*8 (A-Z)
      PARAMETER (PI=3.141592654)
      COMMON/     /LM,L1,QN,SIGMA,QEI ,H,EI
      COMMON/CONST/C1,C2,C3,C4
C
      LM2= LM*LM
      IF(SIGMA)100,200,300
  100 LL=LM*L1
      CLL= COS(LL)
      SLL= SIN(LL)
      C3= SLL*(H+QN/2.*L1*L1)+QN*L1*(CLL-1)/LM
      C3= C3/(2.*(1.-CLL)-SLL*LL)
      C4= -(QN*L1/LM+C3*(1.-CLL))/SLL
      C1= -C4
      C2= -LM*C3
C
      MX= 0.0
      XLM= ATAN2(C3,C4)
  101 CONTINUE
      IF(XLM/LM.LT.L1)THEN
        MXI= 0.0
        IF(XLM.GT.0.0)MXI= ABS((C3*SIN(XLM)+C4*COS(XLM))*LM2+QN)
        MX= MAX(MX,MXI)
        XLM= XLM+PI
        GOTO 101
      ENDIF
      MO= ABS(C4*LM2+QN)
      ML= ABS((C3*SLL+C4*CLL)*LM2+QN)
      MXC= MAX(MO,MX,ML)
      MXC= MXC*EI
      GOTO 500
C
  200 LS= L1*L1
      C1=0.0
      C2=0.0
      C3= QEI*LS/24. + 3.*H/LS
      C4= -(QEI*L1/12.+2.*H/LS/L1)
      MO= ABS(2.*C3)
      ML= ABS(2.*C3+6.*C4*L1+QEI*LS/2.)
      X= 12.*H/QEI/LS/L1 +L1/2.
      MX= 0
      IF((X.GT.0.0).AND.(X.LT.L1))MX= ABS(2.*C3+6.*C4*X+QEI/2.*X*X)
      MXC= MAX(MO,MX,ML)
      MXC= MXC*EI
      GOTO 500
C
  300 LL=LM*L1
      CLL= COSH(LL)
      SLL= SINH(LL)
```

```
      C3= -SLL*(H+QN/2.*L1*L1)+QN*L1*(CLL-1.)/LM
      C3= C3/(2.*(1.-CLL)+SLL*LL)
      C4= (QN*L1/LM+C3*(1.-CLL))/SLL
      C1= -c4
      C2= -LM*C3
C
      ATX=0.0
      IF(C4+C3.NE.0.0)ATX= (C4-C3)/(C4+C3)
      X=0.0
      IF(ATX.GT.0.0)X= (LOG(ATX))/2./LM
C
      MO= ABS(C4*LM2-QN)
      MX= 0.0
      IF((X.GT.0.0).AND.(X.LT.L1))MX= ABS((C3*SINH(LM*X)+C4*COSH(LM*X))
     &    *LM2-QN)
      ML= ABS((C3*SLL + C4*CLL)*LM2-QN)
      MXC= MAX(MO,MX,ML)
      MXC= MXC*EI
      GOTO 500
C
  500 CALL STRESS(STL)
      END
```

```
      SUBROUTINE STRESS(STL)
      IMPLICIT REAL*8 (A-Z)
      INTEGER*4 I,IMAX
      COMMON/    /LM,L1,QN,SIGMA,QEI,H,EI
      COMMON/CONST/C1,C2,C3,C4
C
      SLEN=0.0
      IMAX= NINT(L1/6.0) + 1
      DX= L1/FLOAT(IMAX)
      DX2= DX*DX
      IF(SIGMA)100,200,300
  100 DO 101 I=0,IMAX
      X= DX*FLOAT(I)
      LX=LM*X
      W= C1+C2*X+C3*SIN(LX)+C4*COS(LX)-QN*X*X/2.
      IF( X. NE. 0.0)THEN
        DW=W-WOLD
        DS= SQRT(DX2+DW*DW)
        SLEN= SLEN+DS
      EN IF
  101 WOLD=W
      GOTO 500
  200 DO 201 I=0,IMAX
      X= DX*FLOAT(I)
      X2=X*X
      X3=X2*X
      x4=X2*X2
      W=C3*X2+C4*X3+QEI*X4/24.0
      IF(X.NE.0.0)THEN
        DW=W-WOLD
        DS= SQRT(DX2+DW*DW)
        SLEN= SLEN+DS
      ENDIF
  201 WOLD=W
      GOTO 500
  300 DO 301 I=0,IMAX
      X= DX*FLOAT(I)
      LX=LM*X
      W= C1+C2*X+C3*SINH(LX)+C4*COSH(LX)-QN*X*X/2.
      IF(X.NE.0.0)THEN
        DW=W-WOLD
        DS= SQRT(DX2+DW*DW)
        SLEN= SLEN+DS
      ENDIF
  301 WOLD=W
      GOTO 500
  500 STL= (SLEN/L1-1.0)
      RETURN
      END
```

Battelle
Columbus Laboratories
505 King Avenue
Columbus, Ohio 43201
Telephone (614) 424-6424