```
*****************************************************************************************
*                                                                                       *
*                                                                                       *
*   SOIL DATA                                                                           *
*   LAYER SOIL   THICKNESS   SHEAR        PHI     GAMMA  NO. OF USER'S                  *
*    NO   TYPE      FT      STRENGTH     DEGREE    KCF    P-Y CURVES                     *
*     1    __      ____     _______     _______   _____      __                          *
*     2    __      ____     _______     _______   _____      __                          *
*     3    __      ____     _______     _______   _____      __                          *
*     4    __      ____     _______     _______   _____      __                          *
*     5    __      ____     _______     _______   _____      __                          *
*     6    __      ____     _______     _______   _____      __                          *
*     7    __      ____     _______     _______   _____      __                          *
*     8    __      ____     _______     _______   _____      __                          *
*     9    __      ____     _______     _______   _____      __                          *
*                                                                                       *
*   SOIL TYPE0 USER SUPPLIED P-Y CURVES        5 LOOSE SAND BELOW WATER TABLE           *
*              1 SOFT CLAY                     6 LOOSE SAND ABOVE WATER TABLE           *
*              2 STIFF CLAY BELOW WATER TABLE  7 MEDIUM SAND BELOW WATER TABLE          *
*              3 STIFF CLAY ABOVE WATER TABLE  8 MEDIUM SAND ABOVE WATER TABLE          *
*              4 UNIFIED CLAY                  9 DENSE SAND BELOW WATER TABLE           *
*                                             10 DENSE SAND ABOVE WATER TABLE           *
*                                                                                       *
*                                                                                       *
*   NOTE : IF SOIL TYPE IS 0, USER NEEDS TO INPUT K, THE MODULUS OF                     *
*          SUBGRADE REACTION (KCF) UNDER COLUMN OF SHEAR STRENGTH.                      *
*       PRESS  <ENTER> TO CONTINUE PF3=QUIT                                             *
*                                                                                       *
*                                                                                       *
*****************************************************************************************
```

```
USER'S P-Y CURVE AT SOIL LAYER _ BETWEEN _____ FT TO _____ FT
__ OF __ AT DEPTH _____ FT
 P: _____ _____ _____ _____ _____ _____ _____ _____
 Y: _____ _____ _____ _____ _____ _____ _____ _____
 P: _____ _____ _____ _____ _____ _____ _____ _____
 Y: _____ _____ _____ _____ _____ _____ _____ _____
 P: _____ _____ _____ _____ _____ _____ _____ _____
 Y: _____ _____ _____ _____ _____ _____ _____ _____
__ OF __ AT DEPTH _____ FT
 P: _____ _____ _____ _____ _____ _____ _____ _____
 Y: _____ _____ _____ _____ _____ _____ _____ _____
 P: _____ _____ _____ _____ _____ _____ _____ _____
 Y: _____ _____ _____ _____ _____ _____ _____ _____
 P: _____ _____ _____ _____ _____ _____ _____ _____
 Y: _____ _____ _____ _____ _____ _____ _____ _____
__ OF __ AT DEPTH _____ FT
 P: _____ _____ _____ _____ _____ _____ _____ _____
 Y: _____ _____ _____ _____ _____ _____ _____ _____
 P: _____ _____ _____ _____ _____ _____ _____ _____
 Y: _____ _____ _____ _____ _____ _____ _____ _____
 P: _____ _____ _____ _____ _____ _____ _____ _____
 Y: _____ _____ _____ _____ _____ _____ _____ _____

      <ENTER> TO CONTINUE PF3=QUIT
```

```
*****************************************************************************
*   PILE HEAD TYPE 1                                                        *
*                                                                           *
*   LOAD DATA                                                               *
*                                                                           *
*       LOAD    AXIAL      LATERAL    MOMENT                                *
*       NO      LOAD       LOAD                                             *
*               KIPS       KIPS       FT-KIPS                               *
*        1    ________   ________   ________                                *
*        2    ________   ________   ________                                *
*        3    ________   ________   ________                                *
*        4    ________   ________   ________                                *
*        5    ________   ________   ________                                *
*        6    ________   ________   ________                                *
*        7    ________   ________   ________                                *
*        8    ________   ________   ________                                *
*        9    ________   ________   ________                                *
*       10    ________   ________   ________                                *
*       11    ________   ________   ________                                *
*       12    ________   ________   ________                                *
*       13    ________   ________   ________                                *
*       14    ________   ________   ________                                *
*       15    ________   ________   ________                                *
*       16    ________   ________   ________                                *
*       17    ________   ________   ________                                *
*       18    ________   ________   ________                                *
*     PRESS <ENTER> TO CONTINUE PF3=QUIT                                    *
*                                                                           *
*                                                                           *
*****************************************************************************
```

```
*****************************************************************************
*   PILE HEAD TYPE 2                                                        *
*                                                                           *
*   LOAD DATA                                                               *
*                                                                           *
*       LOAD    AXIAL      LATERAL          PILE                            *
*        NO      LOAD       LOAD            HEAD                            *
*               KIPS       KIPS            SLOPE                           *
*        1    ________   ________        ______                            *
*        2    ________   ________        ______                            *
*        3    ________   ________        ______                            *
*        4    ________   ________        ______                            *
*        5    ________   ________        ______                            *
*        6    ________   ________        ______                            *
*        7    ________   ________        ______                            *
*        8    ________   ________        ______                            *
*        9    ________   ________        ______                            *
*       10    ________   ________        ______                            *
*       11    ________   ________        ______                            *
*       12    ________   ________        ______                            *
*       13    ________   ________        ______                            *
*       14    ________   ________        ______                            *
*       15    ________   ________        ______                            *
*       16    ________   ________        ______                            *
*       17    ________   ________        ______                            *
*       18    ________   ________        ______                            *
*   <ENTER>=CONT PF3=QUITPF4=GEOM PF5=GEO2 PF6=SOIL PF7=P-Y PF8=LOAD PF9=FILE *
*                                                                           *
*                                                                           *
*****************************************************************************
```

```
*****************************************************************************************
*    PILE HEAD TYPE 3                                                                   *
*                                                                                       *
*    LOAD DATA                                                                          *
*                                                                                       *
*        LOAD    AXIAL      LATERAL                    ROTATION                         *
*         NO      LOAD       LOAD                       SPRING                          *
*                 KIPS       KIPS                       FT-KIPS                         *
*          1   ________   ________                   ________                           *
*          2   ________   ________                   ________                           *
*          3   ________   ________                   ________                           *
*          4   ________   ________                   ________                           *
*          5   ________   ________                   ________                           *
*          6   ________   ________                   ________                           *
*          7   ________   ________                   ________                           *
*          8   ________   ________                   ________                           *
*          9   ________   ________                   ________                           *
*         10   ________   ________                   ________                           *
*         11   ________   ________                   ________                           *
*         12   ________   ________                   ________                           *
*         13   ________   ________                   ________                           *
*         14   ________   ________                   ________                           *
*         15   ________   ________                   ________                           *
*         16   ________   ________                   ________                           *
*         17   ________   ________                   ________                           *
*         18   ________   ________                   ________                           *
*     <ENTER>=CONT PF3=QUITPF4=GEOM PF5=GEO2 PF6=SOIL PF7=P-Y PF8=LOAD PF9=FILE          *
*                                                                                       *
*                                                                                       *
*****************************************************************************************
```

PILE HEAD TYPE 4

LOAD DATA

LOAD NO	AXIAL LOAD KIPS	LATERAL LOAD KIPS	ROTATION SPRING FT-KIPS	LATERAL SPRING KIPS/FT
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				

<ENTER>=CONT PF3=QUITPF4=GEOM PF5=GEO2 PF6=SOIL PF7=P-Y PF8=LOAD PF9=FILE

DESCRIPTION OF INPUT DATA FORMAT (XEDIT)

TITLE - (18A4)

Columns	Entry	Variable	Units
1 -72	Project Title	TITLE	

UNIT DATA - (4A4)

Columns	Entry	Variable	Units
1 - 4	ENGLish units or METRic units	ISYSTM	LB,IN KT,M
5 -16	Any characters to describe it	IDUM1-3	

INPUT CONTROL DATA - (4I5)

Columns	Entry	Variable	Units
1 - 5	# of increments into which the is divided (Max. is 300)	NI	
6 -10	# of layers of soil (Max. is 9)	NL	
11 -15	# of segments of pile with different section	NDIAM	
16 -20	# of points on plot of distributed lateral load on the pile (Max. is 10, Min. is 0)	NW	

INPUT CONTROL DATA - (3I5)

Columns	Entry	Variable	Units
1 - 5	# of pts. on plot of effective unit weight versus depth (Max. is 10, Min. is 2)	NG1	
6 -10	# of pts. on input curves of strength parameter (c,ϕ,E50) versus depth (Max. is 10, Min. is 2)	NSTR	
11-15	# of input p-y curves (Max. is 30, Min. is 0)	NPY	

GEOMETRY DATA - (3E10.3)

Columns	Entry	Variable	Units
1 -10	Length of pile	LENGTH	L
11 -20	Modulus of elasticity of pile	EPILE	F/L*L
21 -30	Depth below top of pile to GL.	XGS	L

OUTPUT CONTROL DATA - (2I5)

Columns	Entry	Variable	Units
1 - 5	=0 if no p-y curves are to be generated and printed =1 if p-y curves are to be generated and printed	KPYOP	
6 -10	increment used in printing output =1 to print @ every node =2 to print @ second node =3 to print @ third node	INC	

ANALYSIS CONTROL DATA - (3I5, E10.3)

Columns	Entry	Variable	Units
1 - 5	Code to control boundary condition @ top of pile =1 for a free head =2 for a fixed against rotation =3 for a rotational spring =4 for all of the above	KBC	
6 -10	=0 if data are to be printed only to depth where moment first changes sign =1 if data are to be printed for full length of pile =2 for extra output to help for debugging	KOUTPT	
11 -15	=0 for cyclic loading =1 for static loading	KCYCL	
16 -26	# of cycles of loading	RCYCL	

RUN CONTROL DATA - (I5, 2E10.3)

Columns	Entry	Variable	Units
1 - 5	Max. # of iterations for a single run (Default is 100)	MAXIT	
6 -15	Tolerance on solution convergence (Default is 0.00001)	YTOL	
16 -25	Value of deflection of pile head (Default is 10xDiameter)	EXDEFL	

DISTRIBUTED LOADS - (2E10.3)

Columns	Entry	Variable	Units
1 -10	Depth below top of pile to a point where distributed load is specified	XW	L
11 -20	Distributed lateral load on pile	WW	F/L

PILE PROPERTIES DATA - (4E10.3)

Columns	Entry	Variable	Units
1 -10	X-coord.of the top of a segment of pile with uniform cross-section. The 1st input must equal 0	XDIAM(I)	L
11 -20	Diameter of pile corresponding to XDIAM(I)	DIAM(I)	L
21 -30	Moment of inertia of pile	MINERT	L*L*L*L
31 -40	Cross-sectional area of pile	AREA	L*L

SOIL PROFILE CARD - (2I5,5E10.3)

Columns	Entry	Variable	Units
1 - 5	Layer identification number, use 1 for top layer, etc.	LAYER	
6 -10	Code to control the type of p-y curves that will be used =1 for soft clay =2 for stiff clay below water =3 for stiff clay above water =4 for sand =5 for input p-y curves =6 for unified clay	KSOIL(I)	
11 -20	X-coord. of top of layer	XTOP(I)	L
21 -30	X-coord. of bottom of layer	XBOT(I)	L
31 -40	Constant in eq. Es=kx	K(I)	F/L
41 -50	Factor "A" in uniform clay	AE(I)	
51 -60	Factor "F" in uniform clay	FR(I)	

UNIT WEIGHT DATA - (2E10.3)

Columns	Entry	Variable	Units
1 -10	Depth below top of pile to where unit wt. of soil is specified	XG1	F/L
11 -20	Effective unit weight of soil corresponding to XG1	GAM1(I)	F/L

STRENGTH PARAMETER DATA - (4E10.3)

Columns	Entry	Variable	Units
1 -10	X-coord. for which c,ϕ,& E50 are specified	XSTR(I)	L
11 -20	Undrained shear strength of corresponding to XSTR(I)	C1(I)	F/L
21 -30	Angle of internal friction corresponding to XSTR	PHI1(I)	DEG.
31 -40	Strain at 50% stress level corresponding to XSTR	EE50	

CONTROL FOR INPUT OF P-Y CURVES - (I5)

Columns	Entry	Variable	Units
1 - 5	# of pts. on input p-y curves (Max.is 30, Min. is 2)	NPPY	

DEPTH FOR P-Y CURVE - (E10.3)

Columns	Entry	Variable	Units
1 -10	X-coord. to an input p-y curve	XPY(I)	L

P-Y CURVE DATA - (2E10.3)

Columns	Entry	Variable	Units
1 -10	Deflection of a pt. on a p-y curve. Data must be in ascending order	YP(I,J)	L
11 -20	Soil resistance correspond-ing to YP(I,J)	PP(I,J)	F/L

CONTROL FOR OUTPUT OF BUILT-IN P-Y CURVES - (I5)

Columns	Entry	Variable	Units
1 - 5	# of depths for p-y curves NN to be printed		

CONTROL FOR DEPTH AT WHICH BUILT-IN P-Y CURVES TO PRINT -(E10.3)

Columns	Entry	Variable	Units
1 -10	X-corred. at which p-y curves are to be printed	XN(I)	L

ESTABLISH LOADS ON PILE HEAD - (I5, 3E10.3)

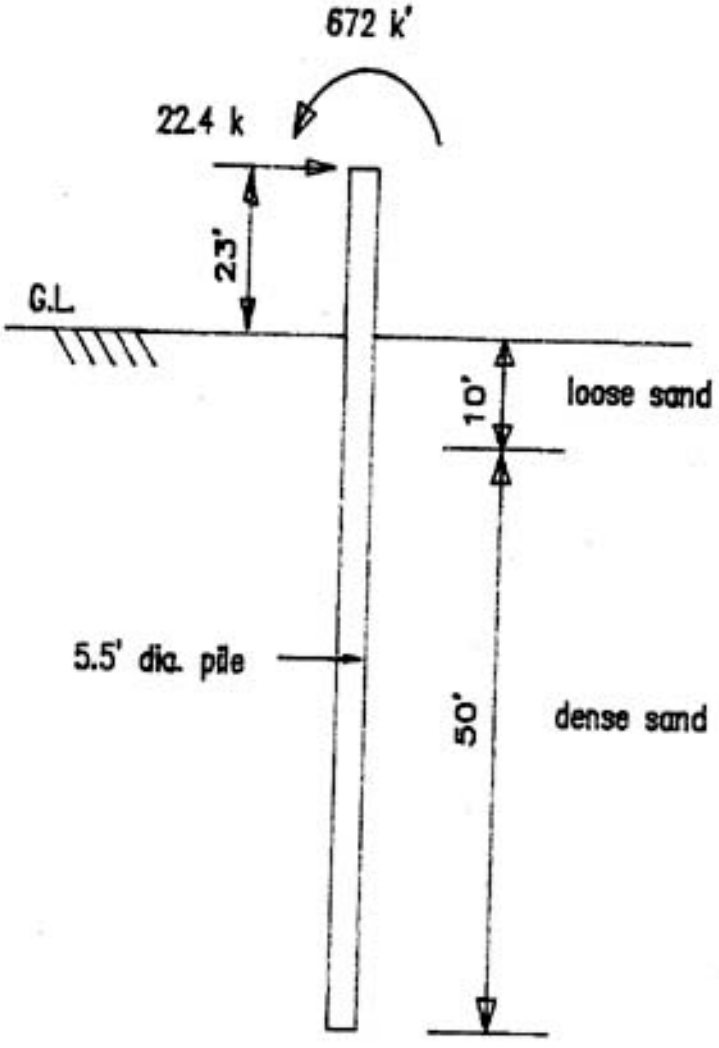
Columns	Entry	Variable	Units
1 - 5	=0 if only the pile head deflection, slope, Max. moment & stress are to be printed =1 if complete output is desired =-1 indicate that all pile head loads have been read & to terminate reading	KOP	
6 -15	Lateral load @ top of pile	PT	F
16 -25	Value of 2nd boundary condition =moment @ top of pile if KBC=1 =slope @ top of pile if KBC=2 =rotational stiffness or moment divided by slope if KBC=3	BC2	F-L
26 -35	Axial load on pile	PX	F

STOP RUN - (18A4)

Columns	Entry	Variable	Units
1 -72	End to stop reading data	TITLE(I)	

EXAMPLE PROBLEM 1

A 5.5 feet diameter CIDH pile, 60 feet long and 23 feet above the ground level, is located in a sandy soil. At the top of the column apply BDS shear(V=22.4k) and moment (M=-672k'). Find the maximum moment and shear in the pile shaft below the ground level. Request plots of moment and shear. (see Bridge Design Aids 12-30 for more details)



```
*****************************************************************************
*                                                                           *
*                                                                           *
*   PILE GEOMETRY                                                           *
*   JOBID: Example Problem #1                                               *
*       E= 486000   KSF            P  |                                     *
*                                   --+-+                                   *
*                            H        | V   M(POSITIVE SIGN)                *
*                            -------> V                                     *
*   - - - - - - - - - - - - - - - -+=====+                                  *
*     | X= 23     FT              |<--->| D1= 5.5        FT                *
*     |                           |     | A1= 44.9       FT**2             *
*     |                           |     | I1= 23.8       FT**4             *
*     V     GROUND LINE           |     | L1= 83         FT                *
*   ------------------------------|     |-----------------------------------*
*                                 |=====|                                   *
*                                 |<--->| D2= _______    FT                *
*                                 |     | A2= ________   FT**2             *
*                                 |     | I2= _________  FT**4             *
*                                 |     | L2= _____      FT                *
*                                 |     |                                   *
*   PILE HEAD TYPE :  1                          CYCLIC LOAD : 0        CYCLES *
*         1 - FREE HEAD                                 0 FOR STATIC LOAD   *
*         2 - HEAD FIXED AGAINST ROTATION               PLOT : Y            *
*         3 - HEAD RESTRAINED W/ A ROTATIONAL SPRING                        *
*             4 - HEAD WITH LATERAL & ROTATIONAL SPRINGS                    *
*                                                                           *
*                                                                           *
*                                                                           *
*****************************************************************************
```

LAYER NO	SOIL TYPE	THICKNESS FT	SHEAR STRENGTH	PHI DEGREE	GAMMA KCF	NO. OF USER'S P-Y CURVES
1	6	10.0	0.000	28.000	0.130	0
2	10	50.0	0.000	40.000	0.140	0
3	—	—	—	—	—	—
4	—	—	—	—	—	—
5	—	—	—	—	—	—
6	—	—	—	—	—	—
7	—	—	—	—	—	—
8	—	—	—	—	—	—
9	—	—	—	—	—	—

SOIL TYPE: 0 USER SUPPLIED P-Y CURVES
1 SOFT CLAY
2 STIFF CLAY BELOW WATER TABLE
3 STIFF CLAY ABOVE WATER TABLE
4 UNIFIED CLAY
5 LOOSE SAND BELOW WATER TABLE
6 LOOSE SAND ABOVE WATER TABLE
7 MEDIUM SAND BELOW WATER TABLE
8 MEDIUM SAND ABOVE WATER TABLE
9 DENSE SAND BELOW WATER TABLE
10 DENSE SAND ABOVE WATER TABLE

NOTE : IF SOIL TYPE IS 0, USER NEEDS TO INPUT K, THE MODULUS OF SUBGRADE REACTION (KCF) UNDER COLUMN OF SHEAR STRENGTH.

PRESS <ENTER> TO CONTINUE PF3=QUIT

```
*****************************************************************************
*                                                                           *
*                                                                           *
*   LOAD DATA                                                               *
*                                                                           *
*       LOAD   VERTICAL    LATERAL   MOMENT                                 *
*        NO      LOAD       LOAD                                           *
*               KIPS       KIPS     FT-KIPS                                 *
*         1    ______0.0  _____22.4  __-672.0                               *
*         2    ________   ________  _______                                 *
*         3    ________   ________  _______                                 *
*         4    ________   ________  _______                                 *
*         5    ________   ________  _______                                 *
*         6    ________   ________  _______                                 *
*         7    ________   ________  _______                                 *
*         8    ________   ________  ________                                *
*         9    ________   ________  ________                                *
*        10    ________   ________  ________                                *
*        11    ________   ________  ________                                *
*        12    ________   ________  ________                                *
*        13    ________   ________  ________                                *
*        14    ________   ________  ________                                *
*        15    ________   ________  ________                                *
*        16    ________   ________  ________                                *
*        17    ________   ________  ________                                *
*        18    ________   ________  ________                                *
* <ENTER>=CONT PF3=QUIT PF4=GEOM PF5=GEO2 PF6=SOIL PF7=P-Y PF8=LOAD PF9=FILE *
*                                                                           *
*                                                                           *
*****************************************************************************
```

```
*********************************
YOUR PILE FILENAME IS: EX1
*********************************
EXAMPLE PROBLEM #1
K-FT
  166    2    1    0
    4    4    0
   83.000  468000.0    23.000
    1    2
    1    1    1              1
  100
     0.000     5.500    44.900    23.800
    1    4   23.000    33.000    43.200     0.000     0.000
    2    4   33.000    83.000   388.800     0.000     0.000
   23.000     0.130
   33.000     0.130
   33.000     0.140
   83.000     0.140
   23.000     0.000    28.000     0.000
   33.000     0.000    28.000     0.000
   33.000     0.000    40.000     0.000
   83.000     0.000    40.000     0.000
   4
   23.500
   32.500
   33.500
   82.500
   1    22.400  -672.000     0.000       0.0     0.000
  -1
END
```

```
DATE        :  07/14/86        TIME :  8:59:25        PAGE :   1
PROJECT     :  EXAMPLE PROBLEM #1


     UNITS--K-FT


                    I N P U T   I N F O R M A T I O N
                    *********************************

  THE LOADING IS STATIC

  PILE GEOMETRY AND PROPERTIES

     PILE LENGTH                          =      83.00 FT
     MODULUS OF ELASTICITY OF PILE        =  0.468D+06KIPS/FT**2
                    1 SECTION(S)

            X            DIAMETER    MOMENT OF        AREA
                                      INERTIA
            FT             FT         FT**4           FT**2
           0.0
                          5.500      0.449D+02       0.238D+02
          83.00


DATE        :  07/14/86        TIME :  8:59:254       PAGE :   2
PROJECT     :  EXAMPLE PROBLEM #1


  SOILS INFORMATION

     X AT THE GROUND SURFACE              =     - 23.00 FT

     2 LAYER(S) OF SOIL

     LAYER  1
     THE SOIL IS A SAND
     X AT THE TOP OF THE LAYER            =      23.00 FT
     X AT THE BOTTOM OF THE LAYER         =      33.00 FT
     MODULUS OF SUBGRADE REACTION         =  0.432D+02KIPS/FT**3

     LAYER  2
     THE SOIL IS A SAND
     X AT THE TOP OF THE LAYER            =      33.00 FT
     X AT THE BOTTOM OF THE LAYER         =      83.00 FT
     MODULUS OF SUBGRADE REACTION         =  0.389D+03KIPS/FT**3
```

DATE : 07/14/86 TIME : 8:59:25 PAGE : 3
PROJECT : EXAMPLE PROBLEM #1

DISTRIBUTION OF EFFECTIVE UNIT WEIGHT WITH DEPTH
4 POINTS

X,FT	WEIGHT,KIP/FT**3
23.00	0.13D+00
33.00	0.13D+00
33.00	0.14D+00
83.00	0.14D+00

DISTRIBUTION OF STRENGTH PARAMETERS WITH DEPTH
4 POINTS

X,FT	C,KIP/FT**2	PHI,DEGREES	E50
23.00	0.0	28.000	*****
33.00	0.0	28.000	*****
33.00	0.0	40.000	*****
83.00	0.0	40.000	*****

DATE : 07/14/86 TIME : 8:59:25 PAGE : 4
PROJECT : EXAMPLE PROBLEM #1

OUTPUT INFORMATION

GENERATED P-Y CURVES

THE NUMBER OF CURVES = 4
THE NUMBER OF POINTS ON EACH CURVE = 17

DEPTH FT	DIAM FT	PHI	GAMMA KIP/FT**3	A	B	PCT	PCD
0.50	5.50	28.0	0.13D+00	2.77	2.08	0.91D+00	0.81D+01

Y FT	P KIP/FT
0.0	0.0
0.008	0.165
0.015	0.330
0.023	0.495
0.031	0.660
0.038	0.825
0.046	0.990
0.053	1.155
0.061	1.320
0.069	1.485
0.076	1.650
0.084	1.815
0.092	1.903
0.206	2.526
5.706	2.526
11.206	2.526
16.706	2.526

DEPTH	DIAM	PHI	GAMMA	A	B	PCT	PCD
FT	FT		KIP/FT**3				
9.50	5.50	28.0	0.13D+00	1.63	1.17	0.35D+02	0.15D+03

Y	P
FT	KIP/FT
0.0	0.0
0.008	3.135
0.015	6.270
0.023	9.405
0.031	12.540
0.038	15.675
0.046	18.810
0.053	21.945
0.061	25.080
0.069	28.215
0.076	31.350
0.084	34.485
0.092	37.620
0.206	57.354
5.706	57.354
11.206	57.354
16.706	57.354