U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
DEMONSTRATION PROJECTS PROGRAM

STAMINA 2.0
FHWA TRAFFIC NOISE
PREDICTION PROGRAM

FORM 3 - ROADWAY DATA

NAME SMITH
PAGE 3 OF 16
DATE 15 APR 82
PROJECT N.F.

BLOCK CONTROL LINE

27 NUMBER OF ROADS

NOTES 1. MAXIMUM OF 80 ROADWAYS PERMITTED
2. MAXIMUM OF 15 ENDPOINTS PER ROADWAY
3. USE A SEPARATE SHEET FOR EACH ROADWAY
4. ONLY ENTER BLOCK CONTROL LINE ONCE PER EACH BLOCK OF ROADWAY DATA

ROADWAY TITLE (MAXIMUM OF 80 CHARACTERS. ENTER AS ONE LINE) NO. 1

INDUSTRIAL ROAD

VEHICLE TYPE	VEHICLES PER HOUR	SPEED
'CARS'	200	35
'MT'	200	35
'HT'	300	35
~~'VEH4'~~		
~~'VEH5'~~		
~~'VEH6'~~		
~~'VEH7'~~		
~~'VEH8'~~		

CROSS OUT IF NOT REQUIRED

'L'/

ENDPOINT ID (MAX 8 CHARAC)	EAST COORDINATE (X)	NORTH COORDINATE (Y)	ELEVATION(Z)	GA*	DO NOT CODE
'I1'	-2000	350	0	0	1
'I2'	2000	350	0	0	2
					3
					4
					5
					6
					7
					8
					9
					10
					11
					12
					13
					14
					15

*GA=GRADE ADJUSTMENT FOR HEAVY TRUCKS - 1=YES, 0=NO

'L'/

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FORM 3 - ROADWAY DATA

NAME SMITH
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PROJECT N.F.

BLOCK CONTROL LINE

~~2 2 NUMBER OF ROADS~~

NOTES 1. MAXIMUM OF 30 ROADWAYS PERMITTED
2. MAXIMUM OF 15 ENDPOINTS PER ROADWAY
3. USE A SEPARATE SHEET FOR EACH ROADWAY
4. ONLY ENTER BLOCK CONTROL LINE ONCE PER EACH BLOCK OF ROADWAY DATA

ROADWAY TITLE (MAXIMUM OF 80 CHARACTERS. ENTER AS ONE LINE)
WEST BOUND LANES - W. OF RECEIVER

NO. 2

VEHICLE TYPE	VEHICLES PER HOUR	SPEED
'CARS'	800	55
'MT'	70	55
'HT'	250	55
~~'VEH4'~~		
~~'VEH5'~~		
~~'VEH6'~~		
~~'VEH7'~~		
~~'VEH8'~~		

CROSS OUT IF NOT REQUIRED

'L'/

ENDPOINT ID (MAX 8 CHARAC)	EAST COORDINATE (X)	NORTH COORDINATE (Y)	ELEVATION(Z)	DA*	DO NOT CODE
'W1'	-2000	216	0	0	1
'W2'	-500	216	30	0	2
''					3
''					4
''					5
''					6
''					7
''					8
''					9
''					10
''					11
''					12
''					13
''					14
''					15

'L'/

*DA=GRADE ADJUSTMENT FOR HEAVY TRUCKS - 1=YES, 0=NO

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FORM 3 - ROADWAY DATA

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PROJECT N.E.

BLOCK CONTROL LINE

~~NUMBER OF ROADS~~

NOTES 1. MAXIMUM OF 30 ROADWAYS PERMITTED
2. MAXIMUM OF 15 ENDPOINTS PER ROADWAY
3. USE A SEPARATE SHEET FOR EACH ROADWAY
4. ONLY ENTER BLOCK CONTROL LINE ONCE PER EACH BLOCK OF ROADWAY DATA

ROADWAY TITLE (MAXIMUM OF 60 CHARACTERS. ENTER AS ONE LINE) NO. 3

WEST BOUND LANES - VIADUCT

VEHICLE TYPE	VEHICLES PER HOUR	SPEED
CARS	800	55
MT	70	55
HT	250	55

CROSS OUT IF NOT REQUIRED

ROADWAY ID (MAX 8 CHARAC)	EAST COORDINATE (X)	NORTH COORDINATE (Y)	ELEVATION(Z)	DA*	DO NOT CODE
W2	-500	216	30	0	1
W3	500	216	30	0	2
					3
					4
					5
					6
					7
					8
					9
					10
					11
					12
					13
					14
					15

*DA=GRADE ADJUSTMENT FOR HEAVY TRUCKS - 1=YES, 0=NO

REV/ 3/83

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FEDERAL HIGHWAY ADMINISTRATION
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FHWA TRAFFIC NOISE
PREDICTION PROGRAM

FORM 3 - ROADWAY DATA

NAME
PROG
DATE
PROJECT

BLOCK CONTROL LINE

2 ~~NUMBER OF ROADS~~

NOTES 1. MAXIMUM OF 80 ROADWAYS PERMITTED
2. MAXIMUM OF 15 ENDPOINTS PER ROADWAY
3. USE A SEPARATE SHEET FOR EACH ROADWAY
4. ONLY ENTER BLOCK CONTROL LINE ONCE PER EACH BLOCK OF ROADWAY DATA

ROADWAY TITLE (MAXIMUM OF 80 CHARACTERS. ENTER AS ONE LINE)

WEST BOUND LANES - E. OF RECEIVER

NO. 4

VEHICLE TYPE	VEHICLES PER HOUR	SPEED
'CARS'	800	55
'MT'	70	55
'HT'	250	55
~~'VEH4'~~		
~~'VEH5'~~		
~~'VEH6'~~		
~~'VEH7'~~		
~~'VEH8'~~		

CROSS OUT IF NOT REQUIRED

'L'/

ENDPOINT ID (MAX 8 CHARAC)	EAST COORDINATE (X)	NORTH COORDINATE (Y)	ELEVATION(Z)	OA*
'W3'	500	216	30	0
'W4'	2000	216	0	0
''				
''				
''				
''				
''				
''				
''				
''				
''				
''				
''				
''				
''				

DO NOT MODIFY
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15

'L'/

*OA=GRADE ADJUSTMENT FOR HEAVY TRUCKS - 1=YES, 0=NO

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FORM 3 - ROADWAY DATA

NAME SMITH
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PROJECT N.F.

BLOCK CONTROL LINE

~~2 NUMBER OF ROADS~~

NOTES 1. MAXIMUM OF 30 ROADWAYS PERMITTED
2. MAXIMUM OF 15 ENDPOINTS PER ROADWAY
3. USE A SEPARATE SHEET FOR EACH ROADWAY
4. ONLY ENTER BLOCK CONTROL LINE ONCE PER EACH BLOCK OF ROADWAY DATA

ROADWAY TITLE (MAXIMUM OF 60 CHARACTERS. ENTER AS ONE LINE)

EASTBOUND LANES - W. OF RECEIVER

NO. 5

VEHICLE TYPE	VEHICLES PER HOUR	SPEED
'CARS'	800	55
'MT'	50	55
'HT'	200	55
~~'VEH4'~~		
~~'VEH5'~~		
~~'VEH6'~~		
~~'VEH7'~~		
~~'VEH8'~~		

CROSS OUT IF NOT REQUIRED

'L'/

ENDPOINT ID (MAX 8 CHARAC)	EAST COORDINATE (X)	NORTH COORDINATE (Y)	ELEVATION(Z)	GA=	DO NOT CODE
'E1'	-2000	162	0	0	1
'E2'	-500	162	30	0	2
''					3
''					4
''					5
''					6
''					7
''					8
''					9
''					10
''					11
''					12
''					13
''					14
''					15

'L'/

GA=GRADE ADJUSTMENT FOR HEAVY TRUCKS - 1=YES, 0=NO

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STAMINA 2.0
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FORM 3 - ROADWAY DATA

NAME SMITH
PAGE 8 OF 16
DATE 15 Dec [illegible]
PROJECT [illegible]

BLOCK CONTROL LINE

2 ~~NUMBER OF ROADS~~

NOTES 1. MAXIMUM OF 80 ROADWAYS PERMITTED
2. MAXIMUM OF 15 ENDPOINTS PER ROADWAY
3. USE A SEPARATE SHEET FOR EACH ROADWAY
4. ONLY ENTER BLOCK CONTROL LINE ONCE PER EACH BLOCK OF ROADWAY DATA

ROADWAY TITLE (MAXIMUM OF 80 CHARACTERS. ENTER AS ONE LINE)
EASTBOUND LANES - VIADUCT

NO. 6

VEHICLE TYPE	VEHICLES PER HOUR	SPEED
'CARS'	800	55
'MT'	50	55
'HT'	200	55
~~'VEH4'~~		
~~'VEH5'~~		
~~'VEH6'~~		
~~'VEH7'~~		
~~'VEH8'~~		

CROSS OUT IF NOT REQUIRED

'L'/

ENDPOINT ID (MAX 8 CHARAC)	EAST COORDINATE (X)	NORTH COORDINATE (Y)	ELEVATION(Z)	DA*	DO NOT CODE
'E2'	-500	162	30	0	1
'E3'	500	162	30	0	2
''					3
''					4
''					5
''					6
''					7
''					8
''					9
''					10
''					11
''					12
''					13
''					14
''					15

'L'/

*DA=GRADE ADJUSTMENT FOR HEAVY TRUCKS - 1=YES, 0=NO

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FORM 3 - ROADWAY DATA

NAME SMITH
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PROJECT N.F.

BLOCK CONTROL LINE

2 ~~NUMBER OF ROADS~~

NOTES 1. MAXIMUM OF 80 ROADWAYS PERMITTED
2. MAXIMUM OF 15 ENDPOINTS PER ROADWAY
3. USE A SEPARATE SHEET FOR EACH ROADWAY
4. ONLY ENTER BLOCK CONTROL LINE ONCE PER EACH BLOCK OF ROADWAY DATA

ROADWAY TITLE (MAXIMUM OF 80 CHARACTERS. ENTER AS ONE LINE)

EASTBOUND LANES - E. OF RECEIVER

NO. ____

VEHICLE TYPE	VEHICLES PER HOUR	SPEED
'CARS'	800	55
'MT'	50	55
'HT'	200	55
~~'VEH4'~~		
~~'VEH5'~~		
~~'VEH6'~~		
~~'VEH7'~~		
~~'VEH8'~~		

CROSS OUT IF NOT REQUIRED

'L'/

ENDPOINT ID (MAX 8 CHARAC)	EAST COORDINATE (X)	NORTH COORDINATE (Y)	ELEVATION(Z)	GA*	DO NOT CODE
'E3'	500	162	30	0	1
'E4'	2000	162	0	0	2
''					3
''					4
''					5
''					6
''					7
''					8
''					9
''					10
''					11
''					12
''					13
''					14
''					15

*GA=GRADE ADJUSTMENT FOR HEAVY TRUCKS - 1=YES, 0=NO

'L'/

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FORM 4 - BARRIER DATA

NAME SMITH
PAGE 10 OF 16
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PROJECT N.F.

BLOCK CONTROL LINE

3	5

NUMBER OF BARRIERS

NOTES 1. MAXIMUM OF 20 BARRIERS PERMITTED
2. MAXIMUM OF 10 ENDPOINTS PER BARRIER
3. USE A SEPARATE SHEET FOR EACH BARRIER
4. ONLY ENTER BLOCK CONTROL LINE ONCE FOR BARRIER DATA

BARRIER TITLE (MAXIMUM OF 60 CHARAC.). ENTER AS ONE LINE.

NOISE WALL - W. OF RECEIVER

NO. 1

ENDPOINT ID (MAX 8 CHARAC)	EAST COORDINATE (X)	NORTH COORDINATE (Y)	BARRIER TOP ELEVATION(Z)	BARRIER GROUND ELEVATION(ZO)	DELZ*	P**
B1	-2000	140	12	0	2	3
B2	-500	140	42	30		

*DELZ=BARRIER HEIGHT INCREMENT IN FEET
**P=NUMBER OF HEIGHT CHANGES. MAX=3

R

BARRIER TYPE A=ABSORPTIVE
R=REFLECTIVE
S=STRUCTURE

FOR STRUCTURE BARRIERS ONLY. ENTER THE FOLLOWING LINE:

NO. OF ROADS AFFECTED	AFFECTED ROADWAY NUMBERS (ASSIGNED SEQUENTIALLY BY PROGRAM)											

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FORM 4 - BARRIER DATA

NAME SMITH
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PROJECT N.E.

BLOCK CONTROL LINE

3	~~NUMBER OF BARRIERS~~

NOTES 1. MAXIMUM OF 20 BARRIERS PERMITTED
2. MAXIMUM OF 10 ENDPOINTS PER BARRIER
3. USE A SEPARATE SHEET FOR EACH BARRIER
4. ONLY ENTER BLOCK CONTROL LINE ONCE FOR BARRIER DATA

BARRIER TITLE (MAXIMUM OF 50 CHARAC.). ENTER AS ONE LINE.

NO. 2

NOISE WALL - VIADUCT (STRUCTURE)

ENDPOINT ID (MAX 6 CHARAC)	EAST COORDINATE (X)	NORTH COORDINATE (Y)	BARRIER TOP ELEVATION(Z)	BARRIER GROUND ELEVATION(ZO)	DELZ*	P**
B2	-500	140	42	30	2	3
B3	500	140	42	30		

*DELZ=BARRIER HEIGHT INCREMENT IN FEET
**P=NUMBER OF HEIGHT CHANGES. MAX=9

'S' / BARRIER TYPE A=ABSORPTIVE
R=REFLECTIVE
S=STRUCTURE

FOR STRUCTURE BARRIERS ONLY. ENTER THE FOLLOWING LINE:

NO. OF ROADS AFFECTED	AFFECTED ROADWAY NUMBERS (ASSIGNED SEQUENTIALLY BY PROGRAM)										
2	3	6									

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FORM 4 - BARRIER DATA

NAME SMITH
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DATE 15 APR 82
PROJECT N.F.

BLOCK CONTROL LINE

3 NUMBER OF BARRIERS

NOTES 1. MAXIMUM OF 2[illegible] BARRIE[illegible] PERMITTED
2. M[illegible]IMUM OF [illegible] [illegible]R BARRIER
3. [illegible] EACH BARRIER
4. [illegible] ENTER [illegible] LINE ONCE FOR BARRIER DATA

BARRIER TITLE (MAXIMUM OF 60 CHARAC[illegible]) NO. 3

NOISE WALL - E. OF [illegible]VE

ENDPOINT ID (MAX 8 CHARAC)	EAST COORDINATE (X)	NORTH COORDINATE (Y)	BARRIER TOP HEIGHT (Z)	GROUND HT(Z0)	DELZ*	P**
B3	500	140	[illegible]	30	2	3
B4	2000	140	[illegible]	0		

*DELZ=BARRIER HEIGHT INCREME[illegible]
**P=NUMBER OF HEIGHT CHANGES. [illegible]

R BARRIER TYPE A=ABSORPTIVE
R=REFLECTIVE
S=STRUCTURE

FOR STRUCTURE BARRIERS ONLY. ENTER THE FOLLOWING LINE:

NO. OF ROADS AFFECTED	AFFECTED ROADWAY NUMBERS (ASSIGNED SEQUENTIALLY BY PROGRAM)										

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FHWA TRAFFIC NOISE
PREDICTION PROGRAM

FORM 4 - BARRIER DATA

NAME SMITH
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PROJECT N.F.

BLOCK CONTROL LINE

3 NUMBER OF BARRIERS

NOTES 1. MAXIMUM OF 20 BARRIERS PERMITTED
2. MAXIMUM OF 10 ENDPOINTS PER BARRIER
3. USE A SEPARATE SHEET FOR EACH BARRIER
4. ONLY ENTER BLOCK CONTROL LINE ONCE FOR BARRIER DATA

NO. 4

BARRIER TITLE (MAXIMUM OF 50 CHARAC.). ENTER AS ONE LINE.

FILL ACTING AS A BARRIER, LT OF RECEIVER

ENDPOINT ID (MAX 8 CHARAC)	EAST COORDINATE (X)	NORTH COORDINATE (Y)	BARRIER TOP ELEVATION(Z)	BARRIER GROUND ELEVATION(ZO)	DELZ*	P**
'F1'	-2000	140	0	0	0	0
'F2'	-500	140	30	0		
' '						
' '						
' '						
' '						
' '						
' '						
' '						

*DELZ=BARRIER HEIGHT INCREMENT IN FEET
**P=NUMBER OF HEIGHT CHANGES. MAX=9

'A' BARRIER TYPE A=ABSORPTIVE
R=REFLECTIVE
S=STRUCTURE

FOR STRUCTURE BARRIERS ONLY. ENTER THE FOLLOWING LINE:

NO. OF ROADS AFFECTED	AFFECTED ROADWAY NUMBERS (ASSIGNED SEQUENTIALLY BY PROGRAM)											

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FORM 4 - BARRIER DATA

NAME SMITH
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PROJECT N.E.

BLOCK CONTROL LINE

3	

NUMBER OF BARRIERS

NOTES 1. MAXIMUM OF 20 BARRIERS PERMITTED
2. MAXIMUM OF 10 ENDPOINTS PER BARRIER
3. USE A SEPARATE SHEET FOR EACH BARRIER
4. ONLY ENTER BLOCK CONTROL LINE ONCE FOR BARRIER DATA

BARRIER TITLE (MAXIMUM OF 60 CHARAC.). ENTER AS ONE LINE.

FILL ACTING AS A BARRIER, RT OF RECEIVER

NO. 5

ENDPOINT ID (MAX 8 CHARAC)	EAST COORDINATE (X)	NORTH COORDINATE (Y)	BARRIER TOP ELEVATION(Z)	BARRIER GROUND ELEVATION(ZG)	DELZ*	P**
'F3'	500	140	30	0	0	0
'F4'	2000	140	0	0		
''						
''						
''						
''						
''						
''						
''						
''						

*DELZ=BARRIER HEIGHT INCREMENT IN FEET
**P=NUMBER OF HEIGHT CHANGES, MAX=3

'A' BARRIER TYPE A=ABSORPTIVE
R=REFLECTIVE
S=STRUCTURE

FOR STRUCTURE BARRIERS ONLY, ENTER THE FOLLOWING LINE:

NO. OF ROADS AFFECTED	AFFECTED ROADWAY NUMBERS (ASSIGNED SEQUENTIALLY BY PROGRAM)											

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FORM 5 - RECEIVER DATA

NAME SMITH
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PROJECT N.F.

BLOCK CONTROL LINE

	NUMBER OF RECEIVERS
5	1

NOTE: 1. MAXIMUM OF 40 RECEIVERS;
2. ENTER BLOCK CONTROL LINE ONLY ONCE FOR RECEIVER DATA
3. ENTER RECEIVER DATA TITLE ONLY ONCE.

RECEIVER DATA TITLE (MAXIMUM OF 80 CHARAC.). ENTER ONCE. ENTER ON 1 LINE

DEERFIELD ESTATES

RECEIVER ID (MAX 8 CHARAC)	EAST COORDINATE (X)	NORTH COORDINATE (Y)	ELEVATION(Z)	DO NOT CODE
R1	0	0	5	1
				2
				3
				4
				5
				6
				7
				8
				9
				0
				1
				2
				3
				4
				5
				6
				7
				8
				9
				0

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FORM 6 - SOUND PROPAGATION DATA

BLOCK CONTROL LINE

	CODE
6	1

NOTES: 1. ENTER CODE ON BLOCK CONTROL LINE: 1=ALPHA VALUES, 2=SHIELDING FACTORS.
2. ENTER BLOCK CONTROL LINE ONCE BEFORE EACH BLOCK OF SOUND PROPAGATION DATA

DATA BLOCK TITLE (ENTER ONCE PER DATA BLOCK. MAX. OF 80 CHARAC.
ALPHA VALUES

ENTER ALPHA VALUES OR SHIELDING FACTORS (IN DBA) FOR ALL RECEIVER-ROADWAY PAIRS

RECEIVER NUMBER	ROADWAY NUMBERS									
1	.5	.5	.5	.5	.5	.5	.5			
2										
3										
4										
5										
6										
7										
8										
9										
10										

7/ 'END OF DATA' LINE. ENTER ONLY ONCE AS LAST LINE IN DATA FILE

```
NORTH FREEWAY
1 3
2 7
INDUSTRIAL ROAD
'CARS' 200 35
'MT' 200 35
'HT' 300 35
'L'/
'I1' -2000 350 0 0
'I2' 2000 350 0 0
'L'/
WESTBOUND LANES - W. OF RECEIVER
'CARS' 800 55
'MT' 70 55
'HT' 250 55
'L'/
'W1' -2000 216 0 0
'W2' -500 216 30 0
'L'/
WESTBOUND LANES - VIADUCT
'CARS' 800 55
'MT' 70 55
'HT' 250 55
'L'/
'W2' -500 216 30 0
'W3' 500 216 30 0
'L'/
WESTBOUND LANES - E. OF RECEIVER
'CARS' 800 55
'MT' 70 55
'HT' 250 55
'L'/
'W3' 500 216 30 0
'W4' 2000 216 0 0
'L'/
EASTBOUND LANES - W. OF RECEIVER
'CARS' 800 55
'MT' 50 55
'HT' 200 55
'L'/
'E1' -2000 162 0 0
'E2' -500 162 30 0
'L'/
```

FIGURE 59. EXAMPLE 3E INPUT DATA

```
EASTBOUND LANES - VIADUCT
'CARS' 800 55
'MT' 50 55
'HT' 200 55
'L'/
'E2' -500 162 30 0
'E3' 500 162 30 0
'L'/
EASTBOUND LANES - E. OF RECEIVER
'CARS' 800 55
'MT' 50 55
'HT' 200 55
'L'/
'E3' 500 162 30 0
'E4' 2000 162 0 0
'L'/
3 5
NOISE WALL - W. OF RECEIVER
'B1' -2000 140 12 0 2 3
'B2' -500 140 42 30
'R'/
NOISE WALL - VIADUCT (STRUCTURE)
'B2' -500 140 42 30 2 3
'B3' 500 140 42 30
'S'/
2 3 6
NOISE WALL - E. OF RECEIVER
'B3' 500 140 42 30 2 3
'B4' 2000 140 12 0
'R'/
FILL ACTING AS A BARRIER, LT OF RECEIVER
'F1' -2000 140 0 0 0 0
'F2' -500 140 30 30
'A'/
FILL ACTING AS A BARRIER, RT OF RECEIVER
'F3' 500 140 30 30 0 0
'F4' 2000 140 0 0
'A'/
5 1
DEERFIELD ESTATES
'R1' 0 0 5
6 1
ALPHA VALUES
.5 .5 .5 .5 .5 .5 .5
7/
```

FIGURE 59. con't

```
              STAMINA 2.0/BCR
          FHWA VERSION (MARCH 1982)
        TRAFFIC NOISE PREDICTION MODEL
       DEVELOPED UNDER CONTRACT BY BBN

  (INPUT UNITS- ENGLISH , OUTPUT UNITS- ENGLISH )


NORTH FREEWAY
PROGRAM INITIALIZATION PARAMETERS

     HEIGHT      CODE          DESCRIPTION
       0.0         1     RECEIVER HEIGHT ADJUSTMENT
       1.00        2     A-WEIGHTED SOUND LEVEL ONLY
       0.0         3     HEIGHT ADJUSTMENT FOR PASSENGER CARS (CARS)
       8.00        4     HEIGHT ADJUSTMENT FOR HEAVY TRUCKS   (HT)
       2.30        5     HEIGHT ADJUSTMENT FOR MEDIUM TRUCKS  (MT)

ROADWAY   1     INDUSTRIAL ROAD

                    VEHICLE TYPE   VEHICLES/HOUR     SPEED
                         CARS            200.         35.
                         HT              300.         35.
                         MT              200.         35.
                      ------------COORDINATES-------------
                            X            Y            Z     GRADE
I1                       -2000.        350.          0.      0
I2                        2000.        350.          0.      0

ROADWAY   2     WESTBOUND LANES - W. OF RECEIVER

                    VEHICLE TYPE   VEHICLES/HOUR     SPEED
                         CARS            800.         55.
                         HT              250.         55.
                         MT               70.         55.
                      ------------COORDINATES-------------
                            X            Y            Z     GRADE
W1                       -2000.        216.          0.      0
W2                        -500.        216.         30.      0

ROADWAY   3     WESTBOUND LANES - VIADUCT

                    VEHICLE TYPE   VEHICLES/HOUR     SPEED
                         CARS            800.         55.
                         HT              250.         55.
                         MT               70.         55.
                      ------------COORDINATES-------------
                            X            Y            Z     GRADE
W2                        -500.        216.         30.      0
W3                         500.        216.         30.      0
```

FIGURE 60. EXAMPLE 3E OUTPUT

```
ROADWAY    4      WESTBOUND LANES - E. OF RECEIVER

                  VEHICLE TYPE    VEHICLES/HOUR      SPEED
                       CARS             800.          55.
                       HT               250.          55.
                       MT                70.          55.
                  ------------COORDINATES-------------
                        X               Y             Z        GRADE
W3                     500.           216.          30.         0
W4                    2000.           216.           0.         0

ROADWAY    5      EASTBOUND LANES - W. OF RECEIVER

                  VEHICLE TYPE    VEHICLES/HOUR      SPEED
                       CARS             800.          55.
                       HT               200.          55.
                       MT                50.          55.
                  ------------COORDINATES-------------
                        X               Y             Z        GRADE
E1                    -2000.           162.           0.         0
E2                     -500.           162.          30.         0

ROADWAY    6      EASTBOUND LANES - VIADUCT

                  VEHICLE TYPE    VEHICLES/HOUR      SPEED
                       CARS             800.          55.
                       HT               200.          55.
                       MT                50.          55.
                  ------------COORDINATES-------------
                        X               Y             Z        GRADE
E2                     -500.           162.          30.         0
E3                      500.           162.          30.         0

ROADWAY    7      EASTBOUND LANES - E. OF RECEIVER

                  VEHICLE TYPE    VEHICLES/HOUR      SPEED
                       CARS             800.          55.
                       HT               200.          55.
                       MT                50.          55.
                  ------------COORDINATES-------------
                        X               Y             Z        GRADE
E3                     500.           162.          30.         0
E4                    2000.           162.           0.         0
BARRIER    1   TYPE(R)      NOISE WALL - W. OF RECEIVER
            ---------COORDINATES----------
                X          Y          Z          ZO        DELZ          P
B1           -2000.      140.       12.          0.         2.          3
B2            -500.      140.       42.         30.
BARRIER    2   TYPE(S)      NOISE WALL - VIADUCT (STRUCTURE)
            ---------COORDINATES----------
                X          Y          Z          ZO        DELZ          P
B2            -500.      140.       42.         30.         2.          3
B3             500.      140.       42.         30.

THE PREVIOUS STRUCTURE APPLIES ONLY TO ROADWAY NUMBERS
      3    6
```

FIGURE 60. con't

```
BARRIER   3   TYPE(R)     NOISE WALL - E. OF RECEIVER
            ---------COORDINATES----------
                X          Y          Z         ZO       DELZ          P
B3             500.       140.       42.        30.        2.           3
B4            2000.       140.       12.         0.
BARRIER   4   TYPE(A)     FILL ACTING AS A BARRIER, LT OF RECEIVER
            ---------COORDINATES----------
                X          Y          Z         ZO       DELZ          P
F1           -2000.       140.        0.         0.        0.           0
F2            -500.       140.       30.        30.
BARRIER   5   TYPE(A)     FILL ACTING AS A BARRIER, RT OF RECEIVER
            ---------COORDINATES----------
                X          Y          Z         ZO       DELZ          P
F3             500.       140.       30.        30.        0.           0
F4            2000.       140.        0.         0.
DEERFIELD ESTATES
                        ------------COORDINATES-------------
                              X            Y            Z
R1                            0.           0.           5.
  ALPHA FACTORS - ROADWAY ACROSS,RECEIVER DOWN

 1 * 0.5 0.5 0.5 0.5 0.5 0.5 0.5
  SHIELDING FACTORS - ROADWAY ACROSS,RECEIVER DOWN

 1 * 0.0 0.0 0.0 0.0 0.0 0.0 0.0
NORTH FREEWAY
RECEIVER     LEQ(H)    SIG    L10    L50    L90

R1            65.0     2.1    67.1   64.5   61.8
```

FIGURE 60. con't

4.3 OPTIMA SAMPLE PROBLEM

The following sample problem illustrates how to use OPTIMA for noise barrier design. Optima is an interactive computer program that must be run on a time-sharing computer system. OPTIMA uses the data from the "acoustics" output of STAMINA 2.0 and additional user supplied information to guide the user to a cost-efficient noise barrier design. The program allows quick evaluation of many alternative designs, which show the predicted noise level at each receiver and the estimated total cost of the barrier for each design.

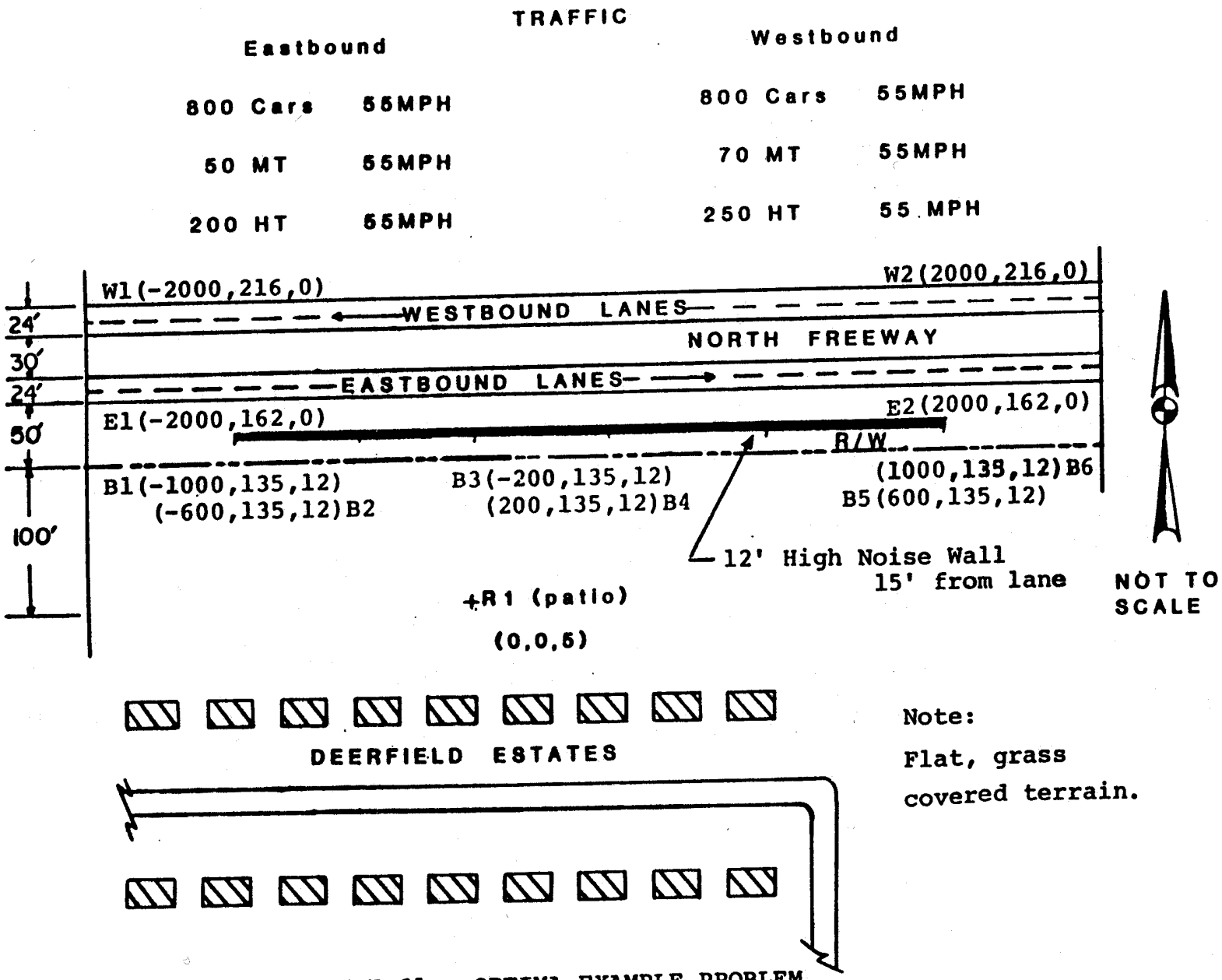
4.3.1 OPTIMA – RUN 1

Figure 61 illustrates a simple OPTIMA problem. The problem has one receiver and a five-section barrier along a straight, level roadway. STAMINA 2.0 input and output files are shown in Figures 62 and 63.

OPTIMA first prints a heading and the problem title and receiver and barrier identifiers from the STAMINA 2.0 acoustics file. The user should note that OPTIMA identifies barriers by sections based on the ID for the endpoint that precedes the section (STAMINA identifies barriers by endpoints). Figure 64 shows a printout for the sample problem to this point.

OPTIMA next prints five barrier material type codes and requests the user to supply a code (1-5) for each barrier section. User entries in OPTIMA follow a question mark (?) and are underlined for easy identification. OPTIMA then requests the user to supply the number of people to be represented by each receiver (0 – 1000), and the Design Noise Level. (DNL) (greater than 40 dBA) in Leg (h) for each receiver. User entries may be made in the list-directed format described in Section 2.3.8. OPTIMA next prints the problem title again and a summary of barrier and receiver data to be used in the design analysis. Figure 65 shows the barrier type selection, receiver specifications, and summary of barrier and receiver data for the sample problem.

OPTIMA then calculates and prints a matrix of Effectiveness/Cost ratios (see Sections 3.2 and 3.3). These ratios are used to guide the user in selecting a cost efficient barrier design. A matrix of barrier heights is also printed.



Note:
Flat, grass covered terrain.

FIGURE 61. OPTIMA EXAMPLE PROBLEM

```
NORTH FREEWAY
1 3
2 2
EASTBOUND LANES
'CARS' 800 55
'MT' 50 55
'HT' 200 55
'L'/
'E1' -2000 162 0 0
'E2' 2000 162 0 0
'L'/
WESTBOUND LANES
'CARS' 800 55
'MT' 70 55
'HT' 250 55
'L'/
'W1' -2000 216 0 0
'W2' 2000 216 0 0
'L'/
3 1
NOISE WALL
'B1' -1000 135 12 0 2 3
'B2' -600 135 12 0
'B3' -200 135 12 0
'B4' 200 135 12 0
'B5' 600 135 12 0
'B6' 1000 135 12 0
'R'/
5 1
DEERFIELD ESTATES
'R1' 0 0 5
6 1
ALPHA VALUES
.5 .5
7/
```

FIGURE 62. OPTIMA EXAMPLE PROBLEM INPUT DATA

```
              STAMINA 2.0/BCR
          FHWA VERSION (MARCH 1982)
        TRAFFIC NOISE PREDICTION MODEL
       DEVELOPED UNDER CONTRACT BY BBN

  (INPUT UNITS- ENGLISH , OUTPUT UNITS- ENGLISH )


NORTH FREEWAY
PROGRAM INITIALIZATION PARAMETERS

     HEIGHT       CODE          DESCRIPTION
       0.0          1      RECEIVER HEIGHT ADJUSTMENT
       1.00         2      A-WEIGHTED SOUND LEVEL ONLY
       0.0          3      HEIGHT ADJUSTMENT FOR PASSENGER CARS (CARS)
       8.00         4      HEIGHT ADJUSTMENT FOR HEAVY TRUCKS   (HT)
       2.30         5      HEIGHT ADJUSTMENT FOR MEDIUM TRUCKS  (MT)


ROADWAY   1      EASTBOUND LANES

                      VEHICLE TYPE   VEHICLES/HOUR      SPEED
                           CARS            800.          55.
                           HT              200.          55.
                           MT               50.          55.
                        ------------COORDINATES-------------
                              X            Y            Z      GRADE
E1                         -2000.       162.          0.       0
E2                          2000.       162.          0.       0


ROADWAY   2      WESTBOUND LANES

                      VEHICLE TYPE   VEHICLES/HOUR      SPEED
                           CARS            800.          55.
                           HT              250.          55.
                           MT               70.          55.
                        ------------COORDINATES-------------
                              X            Y            Z      GRADE
W1                         -2000.       216.          0.       0
W2                          2000.       216.          0.       0
BARRIER   1   TYPE(R)     NOISE WALL
              ---------COORDINATES----------
                X          Y          Z         ZO       DELZ          P
B1            -1000.     135.       12.         0.         2.          3
B2             -600.     135.       12.         0.
B3             -200.     135.       12.         0.
B4              200.     135.       12.         0.
B5              600.     135.       12.         0.
B6             1000.     135.       12.         0.
DEERFIELD ESTATES
                        ------------COORDINATES-------------
                              X            Y            Z
R1                            0.           0.           5.
  ALPHA FACTORS - ROADWAY ACROSS,RECEIVER DOWN

 1 * 0.5 0.5
  SHIELDING FACTORS - ROADWAY ACROSS,RECEIVER DOWN

 1 * 0.0 0.0
NORTH FREEWAY
RECEIVER     LEQ(H)   SIG   L10    L50    L90

R1            66.4    3.1   69.2   65.3   61.3
```

FIGURE 63. OPTIMA EXAMPLE PROBLEM OUTPUT

```
                P R O G R A M   O P T I M A
                ***************************

          BARRIER OPTIMIZATION PROGRAM USING
          PARTIAL SOUND ENERGIES COMPUTED BY THE
          STAMINA/BCR PROGRAM
               BBN VERSION 1 -- 03/01/82

     PROBLEM TITLE
     *************

NORTH FREEWAY


     RECEIVER AND BARRIER IDENTIFIERS
     AS OBTAINED FROM BCR INPUT FILE
     ***********************************

 RECEIVER IDENTIFIERS  (NUMBER IN SYSTEM =    1)

R1

 BARRIER IDENTIFIERS  (NUMBER IN SYSTEM =    5)

B1          B2          B3          B4          B5
```

FIGURE 64. OPTIMA - HEADING, TITLE, RECEIVER AND BARRIER INDENTIFIERS

```
     BARRIER TYPE SELECTION
     **********************

          THE FOLLOWING CODES ARE USED TO DESIGNATE MATERIAL TYPES
          (CONSTRUCTION COSTS -- DATE : 1980)

           1 BERM      2 MASONRY  3 WOOD      4 CONCRETE 5 STEEL

  ENTER TYPE NUMBER (1-5) FOR EACH BARRIER ELEMENT. (LIST DIRECTED
?
3*3 3 3


     RECEIVER SPECIFICATIONS
     ***********************

     NUMBER OF PEOPLE REPRESENTED AND EXTERIOR
     DESIGN NOISE LEVEL FOR EACH RECEIVER

  ENTER NUMBER OF PEOPLE PER RECEIVER (0-1000). (LIST DIRECTED)
?
1

  ENTER DESIGN NOISE LEVEL PER RECEIVER (40<). (LIST DIRECTED)
?
67



NORTH FREEWAY


     SUMMARY OF BARRIER AND RECEIVER DATA
     ************************************

 BARR ELE      ID          TYPE
        1      B1          WOOD
        2      B2          WOOD
        3      B3          WOOD
        4      B4          WOOD
        5      B5          WOOD

  REC NO.      REC ID      PEOPLE        DNL
        1      R1               1.       67.
```

FIGURE 65. OPTIMA - BARRIER AND RECEIVER DATA

Next, OPTIMA requests the user to enter a one-line title or description of the test to be run. After this is entered, the program requests the user to enter the barrier height index for each barrier section (obtained from rows across the top or bottom of the matrix) in a list-directed format.

In an effort to choose an initial balanced design for the sample problem, an E/C matrix, all of the ratios for barrier sections B1 and B5 are substantially lower than 14. This implies that effectiveness is too low and cost is too high to consider constructing a barrier at any height for these two sections. Therefore, the user chooses Height Index 1 – no barrier – for sections B1 and B5. Looking for E/C ratios of 14 for barrier sections B2, B3, and B4, the user chooses height indices 3, 8, and 3 respectively. Figure 66 shows the E/C ratio and barrier height matrices and the barrier height selection for the sample problem.

The program now computes and prints the results which include the problem title, the test run description, the barrier height indices and corresponding barrier heights selected for the test run, the noise level at each receiver (including the "no barrier" condition), the cost of the barrier by material type, and the total cost of the barrier. The results of Run 1 for the sample problem are shown in Figure 67.

4.4.2 OPTIMA – RUN 2 AND RUN 3

At the end of each test run, OPTIMA asks the user if he wishes to select another path of height indices for another test run. If the response is yes, the program prompts the user for another test run description and set of height indices and then calculates and prints the results from that run. If the response is no, the program terminates. Figures 68 and 69 show two additional tests runs for the sample problem.

If the user wishes to change barrier materials for some or all barrier sections or if he wishes to change the population weighting or design noise levels for some or all receivers, he must return OPTIMA from the beginning. The user must rerun STAMINA 2.0 if he wishes to change any of the STAMINA input parameters.

EFFECTIVENESS/COST RATIO AND BARRIER HEIGHT MATRICES
****

BARRIER SECTION NO	IDENT	EFFECTIVENESS/COST RATIO								CORRESPONDING BARRIER HEIGHTS(IN FT)							
HEIGHT INDEX		1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8
1	B1	*	-8.	-2.	-1.	2.	4.	4.	3.	*	6.	8.	10.	12.	14.	16.	18.
2	B2	*	10.	14.	15.	14.	13.	10.	9.	*	6.	8.	10.	12.	14.	16.	18.
3	B3	*	23.	24.	24.	22.	19.	16.	14.	*	6.	8.	10.	12.	14.	16.	18.
4	B4	*	11.	14.	15.	14.	13.	10.	9.	*	6.	8.	10.	12.	14.	16.	18.
5	B5	*	-4.	-0.	2.	4.	5.	4.	3.	*	6.	8.	10.	12.	14.	16.	18.
HEIGHT INDEX		1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8

BARRIER HEIGHT SELECTION FOR NOISE LEVEL AND COST CALCULATION
****

```
 ENTER THIS CALCULATIONS DESCRIPTION FOR OUTPUT FILE (80 CHARS)
?
OPTIMA SAMPLE PROBLEM - RUN 1   EFFECTIVENESS RATIO = 14

 ENTER BARRIER HEIGHT INDEX FOR EACH
 BARRIER SECTION.  (LIST DIRECTED)
?
1 3 8 3 1
```

FIGURE 66. OPTIMA - E/C RATIOS AND BARRIER HEIGHT MATRICES, AND BARRIER HEIGHT SELECTION

```
                    EFFECTIVENESS/COST RATIO AND BARRIER HEIGHT MATRICES
                    ****************************************************

BARRIER SECTION          EFFECTIVENESS/COST                          CORRESPONDING
   NO  IDENT                    RATIO                          BARRIER HEIGHTS(IN FT)

 HEIGHT INDEX   1    2    3    4    5    6    7    8    1  2  3  4  5  6  7  8

    1  B1      *   -8.  -2.  -1.   2.   4.   4.   3.   *  6.  8.10.12.14.16.18.
    2  B2      *   10.  14.  15.  14.  13.  10.   9.   *  6.  8.10.12.14.16.18.
    3  B3      *   23.  24.  24.  22.  19.  16.  14.   *  6.  8.10.12.14.16.18.
    4  B4      *   11.  14.  15.  14.  13.  10.   9.   *  6.  8.10.12.14.16.18.
    5  B5      *   -4.  -0.   2.   4.   5.   4.   3.   *  6.  8.10.12.14.16.18.

 HEIGHT INDEX   1    2    3    4    5    6    7    8    1  2  3  4  5  6  7  8

     BARRIER HEIGHT SELECTION FOR NOISE LEVEL AND COST CALCULATION
     *************************************************************

  ENTER THIS CALCULATIONS DESCRIPTION FOR OUTPUT FILE (80 CHARS)
 ?
OPTIMA SAMPLE PROBLEM - RUN 1   EFFECTIVENESS RATIO = 14

  ENTER BARRIER HEIGHT INDEX FOR EACH
  BARRIER SECTION.  (LIST DIRECTED)
?
1 3 8 3 1


NORTH FREEWAY

OPTIMA SAMPLE PROBLEM - RUN 1   EFFECTIVENESS RATIO = 14

 BARRIER HEIGHT INDEX FOR EACH BARRIER SECTION
   1  3  8  3  1
 CORRESPONDING BARRIER HEIGHTS FOR EACH SECTION
  0. 8.18. 8. 0.

     R E S U L T S
     *************

 REC     REC ID        LEQ       LEQ(Z(0))
   1     R1            65.2       70.9


 BARRIER TYPE          COST
 BERM                     0.
 MASONRY                  0.
 WOOD                 95304.
 CONCRETE                 0.
 STEEL                    0.
***************************

  BARRIER COST = $    95304.
```

FIGURE 67. OPTIMA - RESULTS, RUN 1

```
                    EFFECTIVENESS/COST RATIO AND BARRIER HEIGHT MATRICES
                    ****************************************************

BARRIER SECTION          EFFECTIVENESS/COST                    CORRESPONDING
  NO  IDENT                     RATIO                   BARRIER HEIGHTS(IN FT)

 HEIGHT INDEX   1   2    3    4    5    6    7    8   1 2  3  4  5  6  7  8

   1  B1       *  -8.  -2.  -1.   2.   4.   4.   3.  * 6. 8.10.12.14.16.18.
   2  B2       *  10.  14.  15.  14.  13.  10.   9.  * 6. 8.10.12.14.16.18.
   3  B3       *  23.  24.  24.  22.  19.  16.  14.  * 6. 8.10.12.14.16.18.
   4  B4       *  11.  14.  15.  14.  13.  10.   9.  * 6. 8.10.12.14.16.18.
   5  B5       *  -4.  -0.   2.   4.   5.   4.   3.  * 6. 8.10.12.14.16.18.

 HEIGHT INDEX   1   2    3    4    5    6    7    8   1 2  3  4  5  6  7  8


     BARRIER HEIGHT SELECTION FOR NOISE LEVEL AND COST CALCULATION
     *************************************************************

  ENTER THIS CALCULATIONS DESCRIPTION FOR OUTPUT FILE (80 CHARS)
 ?
OPTIMA SAMPLE PROBLEM - RUN 2

  ENTER BARRIER HEIGHT INDEX FOR EACH
  BARRIER SECTION.  (LIST DIRECTED)
?
1 3 6 3 1



NORTH FREEWAY

OPTIMA SAMPLE PROBLEM - RUN 2


 BARRIER HEIGHT INDEX FOR EACH BARRIER SECTION
   1  3  6  3  1
 CORRESPONDING BARRIER HEIGHTS FOR EACH SECTION
  0. 8.14. 8. 0.


     R E S U L T S
     *************

 REC     REC ID        LEQ       LEQ(Z(0))
   1     R1            66.2       70.9


 BARRIER TYPE          COST
 BERM                     0.
 MASONRY                  0.
 WOOD                 74088.
 CONCRETE                 0.
 STEEL                    0.
 ***************************

  BARRIER COST = $    74088.
```

FIGURE 68. OPTIMA - RESULTS, RUN 2

```
                    EFFECTIVENESS/COST RATIO AND BARRIER HEIGHT MATRICES
                    ****************************************************

BARRIER SECTION        EFFECTIVENESS/COST                    CORRESPONDING
   NO  IDENT                  RATIO                     BARRIER HEIGHTS(IN FT)

 HEIGHT INDEX   1   2    3    4    5    6    7    8   1 2  3  4  5  6  7  8

    1  B1      *  -8.  -2.  -1.   2.   4.   4.   3.  * 6. 8.10.12.14.16.18.
    2  B2      *  10.  14.  15.  14.  13.  10.   9.  * 6. 8.10.12.14.16.18.
    3  B3      *  23.  24.  24.  22.  19.  16.  14.  * 6. 8.10.12.14.16.18.
    4  B4      *  11.  14.  15.  14.  13.  10.   9.  * 6. 8.10.12.14.16.18.
    5  B5      *  -4.  -0.   2.   4.   5.   4.   3.  * 6. 8.10.12.14.16.18.

 HEIGHT INDEX   1   2    3    4    5    6    7    8   1 2  3  4  5  6  7  8

     BARRIER HEIGHT SELECTION FOR NOISE LEVEL AND COST CALCULATION
     *************************************************************

  ENTER THIS CALCULATIONS DESCRIPTION FOR OUTPUT FILE (80 CHARS)
 ?
OPTIMA SAMPLE PROBLEM - RUN 3

  ENTER BARRIER HEIGHT INDEX FOR EACH
  BARRIER SECTION.  (LIST DIRECTED)
?
1 3 5 3 1


NORTH FREEWAY

OPTIMA SAMPLE PROBLEM - RUN 3

 BARRIER HEIGHT INDEX FOR EACH BARRIER SECTION
   1  3  5  3  1
 CORRESPONDING BARRIER HEIGHTS FOR EACH SECTION
  0. 8.12. 8. 0.


     R E S U L T S
     *************

 REC     REC ID        LEQ       LEQ(Z(0))
   1     R1            67.1       70.9


 BARRIER TYPE          COST
 BERM                     0.
 MASONRY                  0.
 WOOD                 66936.
 CONCRETE                 0.
 STEEL                    0.
****************************

  BARRIER COST = $    66936.
```

FIGURE 69. OPTIMA - RESULTS, RUN 3