PAVEMENT EVALUATION IN URBAN SETTINGS USING SEISMIC PAVEMENT ANALYZER

(Appendices)

by

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APPENDIX A

RAW DATA MEASURED WITH SPA ALONG LINE A
Line A
Low Frequency Load Cell

Normalized Amplitude

Time, msec
Line A
Geophone 1

Normalized Amplitude

Time, msec

0 2 4 6 8 10 12 14 16

1 2 3 4 5 6 7 8
Line A
Surface Waves (75-mm Rec. Spacing)
Line A
Surface Waves (150-mm Rec. Spacing)
Line A
Surface Waves (300-mm Rec. Spacing)
Line A
Surface Waves (600-mm Rec.Spacing)
Line A
Impacta Echo (Accelerometer 1)
Line A
Impacta Echo (Accelerometer 2)

Normalized Amplitude

Frequency, kHz
Line A
Impact Echo (Accelerometer 3)
APPENDIX B

RAW DATA MEASURED WITH SPA ALONG LINE B
Line B
High Frequency Load Cell (1)
Line B
High Frequency Load Cell (2)
Line B
accelerometer 3 (2)

Normalized Amplitude

Time, msec
Line B
accelerometer 4

Normalized Amplitude

Time, msec
Line B
Low Frequency Load Cell

Normalized Amplitude

Time, msec

0 2 4 6 8 10 12 14 16

1 2 3 4 5 6 7
Line B
Geophone 1

Normalized Amplitude

Time, msec

0  2  4  6  8  10  12  14  16

1  2  3  4  5  6  7
Line B
Geophone 3

Normalized Amplitude

Time, msec
Line B
Impulse Response (Indiv. Normalized)

Normalized Amplitude

Frequency, Hz

1  2  3  4  5  6  7
Line B
Surface Waves (150-mm Rec. Spacing)

Phase of Transfer Function

Frequency, kHz
Line B
Impact Echo (Accelerometer 1)
Line B
Impact Echo (Accelerometer 2)
Line B
Impact Echo (Accelerometer 3)

Normalized Amplitude

Frequency, kHz
APPENDIX C

RAW DATA MEASURED WITH SPA ALONG LINE C
Line C
High Frequency Load Cell (1)

Normalized Amplitude

Time, msec
Line C
accelerometer 1

Normalized Amplitude

Time, msec
Line C
accelerometer 3 (1)
Line C
High Frequency Load Cell (2)
Line C
accelerometer 3 (2)
Line C
accelerometer 4

Normalized Amplitude

Time, msec
Line C
Impulse Response (Indiv. Normalized)

Normalized Amplitude

Frequency, Hz

0  200  400  600  800  1000

1  2  3  4  5  6  7  8
Line C
Surface Waves (75-mm Rec. Spacing)
Line C
Surface Waves (300-mm Rec. Spacing)
Line C
Surface Waves (600-mm Rec. Spacing)
Line C
Surface Waves (1200-mm Rec. Spacing)
Line C
Impact Echo (Accelerometer 1)
Line C
Impact Echo (Accelerometer 2)
Line C
Impact Echo (Accelerometer 3)

Normalized Amplitude

Frequency, kHz
APPENDIX D

RAW DATA MEASURED WITH SPA ALONG LINE D
Line D
High Frequency Load Cell (1)
Line D
accelerometer 1

Normalized Amplitude vs. Time, msec
Line D
accelerometer 3 (1)
Line D
High Frequency Load Cell (2)

Normalized Amplitude

Time, msec
Line D
accelerometer 3 (2)
Line D
accelerometer 5

Normalized Amplitude

Time, msec
Line D
Low Frequency Load Cell

Normalized Amplitude vs. Time, msec
Line D
Geophone 3

Normalized Amplitude

Time, msec

0 2 4 6 8 10 12 14 16

1 2 3 4 5 6 7
Line D
Surface Waves (75-mm Rec. Spacing)
Line D
Surface Waves (150-mm Rec. Spacing)
Line D
Surface Waves (300-mm Rec. Spacing)
Line D
Surface Waves (1200-mm Rec. Spacing)
Phase Velocity, m/sec

Wavelength, m

Line D - 3
Line D
Impact Echo (Accelerometer 1)
Line D
Impact Echo (Accelerometer 2)
Line D
Impact Echo (Accelerometer 3)
APPENDIX E

RAW DATA MEASURED WITH SPA ALONG LINE E
Line E

High Frequency Load Cell (1)

Normalized Amplitude

Time, msec
Line E
accelerometer 5

Normalized Amplitude

Time, msec
Line E
Geophone 1

Normalized Amplitude

Time, msec
Line E
Surface Waves (75-mm Rec. Spacing)
Line E
Surface Waves (150-mm Rec. Spacing)
Line E
Surface Waves (300-mm Rec. Spacing)
Line E
Surface Waves (600-mm Rec. Spacing)
Line E
Surface Waves (1200-mm Rec. Spacing)

Phase of Transfer Function

Frequency, kHz

0.00  0.25  0.50  0.75  1.00

1  2  3  4  5  6  7  8
Line E
Impact Echo (Accelerometer 1)
Line E
Impact Echo (Accelerometer 2)
Line E
Impact Echo (Accelerometer 3)
APPENDIX F

RAW DATA MEASURED WITH SPA ALONG LINE F
line F
High Frequency Load Cell (1)
line F
accelerometer 1
line F
accelerometer 2

Normalized Amplitude

Time, msec

0  0.1  0.2  0.3  0.4  0.5  0.6  0.7  0.8

1  2  3  4  5  6  7  8
line F
High Frequency Load Cell (2)
line F
accelerometer 3 (2)
Line F
accelerometer 5

Normalized Amplitude

Time, msec
Line F
Low Frequency Load Cell

Normalized Amplitude

Time, msec
line F
Impulse Response (Indiv. Normalized)
Ilne F
Surface Waves (150-mm Rec. Spacing)
line F
Surface Waves (300-mm Rec. Spacing)

Frequency, kHz
Phase of Transfer Function

0 2 4 6 8
Line F
Surface Waves (600-mm Rec. Spacing)
line F
Surface Waves (1200-mm Rec. Spacing)
Phase Velocity, m/sec

Wavelength, m

Line F - 2
Line F
Impact Echo (Accelerometer 3)
APPENDIX G

RAW DATA MEASURED WITH SPA ALONG LINE G
Line G
High Frequency Load Cell (1)

Normalized Amplitude

Time, msec

0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8

1 2 3 4 5 6 7 8
line G
accelerometer 1

Normalized Amplitude

Time, msec

0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8
1 2 3 4 5 6 7 8
Line G
High Frequency Load Cell (2)

Normalized Amplitude

Time, msec
line G
accelerometer 3 (2)
Line G
Low Frequency Load Cell

Normalized Amplitude vs. Time, msec
Line G
Geophone 1

Normalized Amplitude

Time, msec
line G
Geophone 3

Normalized Amplitude

Time, msec

0  2  4  6  8  10  12  14  16

1  2  3  4  5  6  7  8
Line G
Impulse Response (Indiv. Normalized)
line G
Surface Waves (75-mm Rec. Spacing)

Phase of Transfer Function

Frequency, kHz
Line G
Surface Waves (300-mm Rec. Spacing)
Line G
Surface Waves (600-mm Rec. Spacing)
line G
Surface Waves (1200-mm Rec. Spacing)

Phase of Transfer Function

Frequency, kHz
Line G
Impact Echo (Accelerometer 2)

Normalized Amplitude vs. Frequency, kHz
Line G
Impact Echo (Accelerometer 3)
APPENDIX H

RAW DATA MEASURED WITH SPA ALONG LINE H
Line H
High Frequency Load Cell (1)
Line H
High Frequency Load Cell (2)
Line H
accelerometer 3 (2)

Normalized Amplitude

Time, msec
Line H
accelerometer 4
Line H
accelerometer 5

Normalized Amplitude

Time, msec
Line H
Low Frequency Load Cell

Normalized Amplitude

Time, msec
Line H
Geophone 3

Normalized Amplitude

Time, msec
Line H
Impulse Response (Indiv. Normalized)

Normalized Amplitude

Frequency, Hz

0 200 400 600 800 1000

1 2 3 4 5 6 7
Line H
Surface Waves (75-mm Rec. Spacing)
Line H
Surface Waves (150-mm Rec. Spacing)
Line H
Surface Waves (600-mm Rec. Spacing)
Line H
Surface Waves (1200-mm Rec. Spacing)

Phase of Transfer Function

Frequency, kHz
Phase Velocity, m/sec

Wavelength, m

Line H - 8
Line H
Impact Echo (Accelerometer 2)
APPENDIX I

RAW DATA MEASURED WITH SPA ALONG LINE I
Line 1
High Frequency Load Cell (1)
Line I
accelerometer 1

Normalized Amplitude

Time, msec
Line 1
High Frequency Load Cell (2)

Normalized Amplitude

Time, msec

0 0.5 1 1.5 2 2.5 3 3.5 4

8 7 6 5 4 3 2 1
Line 1
accelerometer 3 (2)
Line 1
accelerometer 5

Normalized Amplitude

Time, msec
Line 1
Low Frequency Load Cell
Line L
Surface Waves (75-mm Rec. Spacing)
Line I
Surface Waves (150-mm Rec. Spacing)
Line 1
Surface Waves (300-mm Rec. Spacing)
Line I
Surface Waves (600-mm Rec. Spacing)
Line I
Surface Waves (1200-mm Rec. Spacing)
Line 1
Impact Echo (Accelerometer 1)
Line 1
Impact Echo (Accelerometer 3)

Normalized Amplitude

Frequency, kHz
APPENDIX J

RAW DATA MEASURED WITH SPA ALONG LINE J
Line J
accelerometer 3 (1)
Line J
High Frequency Load Cell (2)
Line J
accelerometer 3 (2)

Normalized Amplitude

Time, msec
Line J
Impact Echo (Accelerometer 3)

Normalized Amplitude

Frequency, kHz

0  4  8  12  16  20  24
Line J
accelerometer 4

Normalized Amplitude

Time, msec

0 0.5 1 1.5 2 2.5 3 3.5 4
Line J
Low Frequency Load Cell

Normalized Amplitude

Time, msec

0 2 4 6 8 10 12 14 16

7
6
5
4
3
2
1
Line J
Impulse Response (Indiv. Normalized)
Line J
Surface Waves (75-mm Rec. Spacing)
Line J
Surface Waves (150-mm Rec. Spacing)
Line J
Surface Waves (300-mm Rec. Spacing)
Line J
Surface Waves (600-mm Rec. Spacing)
Line J
Surface Waves (1200-mm Rec. Spacing)
Line J
Impact Echo (Accelerometer 1)
APPENDIX K

RAW DATA MEASURED WITH SPA ALONG LINE K
Line K
High Frequency Load Cell (1)

Normalized Amplitude

Time, msec
Line K
High Frequency Load Cell (2)
Line K
accelerometer 3 (2)

Normalized Amplitude

Time, msec

0 0.5 1 1.5 2 2.5 3 3.5 4
Line K
accelerometer 4
Line K
Low Frequency Load Cell

Normalized Amplitude

Time, msec
Line K
Impulse Response (Indiv. Normalized)
Line K
Surface Waves (75-mm Rec. Spacing)

Phase of Transfer Function

Frequency, kHz
Line K
Surface Waves (150-mm Rec. Spacing)
Line K
Surface Waves (300-mm Rec. Spacing)

Phase of Transfer Function

Frequency, kHz
Line K
Surface Waves (600-mm Rec. Spacing)

Phase of Transfer Function

Frequency, kHz
Line K
Surface Waves (1200-mm Rec. Spacing)
Line K
Impact Echo (Accelerometer 1)

Normalized Amplitude

Frequency, kHz

0  4  8  12  16  20  24
Line K
Impact Echo (Accelerometer 2)
Line K
Impact Echo  (Accelerometer 3)