## APPENDIX B:

**DETAILED RESULTS FOR TIME AND AMPLITUDE VARIATIONS OF THE INSTANTANEOUS BUILDING-FOUNDATION-SOIL SYSTEM FREQUENCY**

This appendix documents the results of variations of instantaneous building frequency for the 21 buildings. For each building, 4 plots are shown (parts a,b,c,d of the respective figure). The first two correspond to first horizontal component of motion, and the second two – to the second component of motion. For each component, the first plot is based on results using zero-crossing analysis, and the second plot is based on results using Gabor transform analysis.

<table>
<thead>
<tr>
<th>Figure No.</th>
<th>Station No.</th>
<th>N</th>
<th>Street address</th>
<th>Comp. rec.</th>
<th>Comp. rec.</th>
</tr>
</thead>
<tbody>
<tr>
<td>B.01</td>
<td>0466</td>
<td>13</td>
<td>LOS ANGELES, 15250 VENTURA BLVD.</td>
<td>N00E 3</td>
<td>W00N 3</td>
</tr>
<tr>
<td>B.02</td>
<td>0482</td>
<td>12</td>
<td>ALHAMBRA, 900 S. FREMONT</td>
<td>NS 5</td>
<td>EW 5</td>
</tr>
<tr>
<td>B.03</td>
<td>0663</td>
<td>12</td>
<td>LOS ANGELES, 10751 WILSHIRE Blvd.</td>
<td>S72W 3</td>
<td>S18E 2</td>
</tr>
<tr>
<td>B.04</td>
<td>0742</td>
<td>8</td>
<td>LOS ANGELES, 1526 N.EDGEMONT ST.,</td>
<td>E00S 12</td>
<td>N00E 10</td>
</tr>
<tr>
<td>B.05</td>
<td>0793</td>
<td>11</td>
<td>LOS ANGELES, 4929 WILSHITE BLVD.</td>
<td>S00W 5</td>
<td>E00S 6</td>
</tr>
<tr>
<td>B.06</td>
<td>0804</td>
<td>10</td>
<td>7215 BRIGHT AVE., BASEMENT, WHITTIER, CA</td>
<td>NS 2</td>
<td>EW 2</td>
</tr>
<tr>
<td>B.07</td>
<td>0872</td>
<td>8</td>
<td>LOS ANGELES, 1111 SUNSET Blvd.</td>
<td>N12W 3</td>
<td>S78W 3</td>
</tr>
<tr>
<td>B.08</td>
<td>0892</td>
<td>55</td>
<td>LOS ANGELES, 333 S. HOPE ST.</td>
<td>N83E 2</td>
<td>W83N 2</td>
</tr>
<tr>
<td>B.09</td>
<td>5082</td>
<td>6</td>
<td>LOS ANGELES, WADSWORTH V.A. HOSPITAL</td>
<td>N35W 2</td>
<td>S55W 2</td>
</tr>
<tr>
<td>B.10</td>
<td>5106</td>
<td>11</td>
<td>LONG BEACH VA HOSPITAL</td>
<td>NS 3</td>
<td>EW 3</td>
</tr>
<tr>
<td>B.11</td>
<td>5108</td>
<td>6</td>
<td>SANTA SUSANA, ETEC Bldg 462</td>
<td>E00S 9</td>
<td>N00E 7</td>
</tr>
<tr>
<td>B.12</td>
<td>5233</td>
<td>32</td>
<td>1100 WILSHIRE, LOS ANGELES, CA</td>
<td>N62W 2</td>
<td>S28W 2</td>
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<td>B.13</td>
<td>5239</td>
<td>7</td>
<td>12440 IMPERIAL HWY, NORWALK, CA</td>
<td>N90E 5</td>
<td>S00W 5</td>
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<td>B.14</td>
<td>5259</td>
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<td>LOS ANGELES, 2005 N. HIGHLAND AVE.</td>
<td>N00E 8</td>
<td>W00N 6</td>
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<tr>
<td>B.15</td>
<td>5260</td>
<td>12</td>
<td>LOS ANGELES, 444 S. SAN VINCENTE</td>
<td>W65N 7</td>
<td>S65W 9</td>
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<td>B.16</td>
<td>5263</td>
<td>19</td>
<td>LOS ANGELES, 10660 WILSHIRE BLVD.</td>
<td>E70S 5</td>
<td>N70E 3</td>
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<tr>
<td>B.17</td>
<td>5450</td>
<td>9</td>
<td>BURBANK, 3601 WEST OLIVE AVE.</td>
<td>N00E 5</td>
<td>W00N 5</td>
</tr>
<tr>
<td>B.18</td>
<td>5451</td>
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<td>LOS ANGELES, 6301 OWENSMOUTH AVE.</td>
<td>N00E 3</td>
<td>W00N 3</td>
</tr>
<tr>
<td>B.19</td>
<td>5453</td>
<td>9</td>
<td>LOS ANGELES, 5805 SEPULVEDA BLVD.</td>
<td>N00E 4</td>
<td>W00N 8</td>
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<td>5455</td>
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<td>LOS ANGELES, 16000 VENTURA BLVD.</td>
<td>E30S 5</td>
<td>N30E 5</td>
</tr>
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<td>B.21</td>
<td>5457</td>
<td>10</td>
<td>LOS ANGELES, 8436 WEST 3rd ST.</td>
<td>N00E 8</td>
<td>S00W 7</td>
</tr>
</tbody>
</table>
Figure B.01a
Figure B.01b.
Figure B.01c
Sherman Oaks, 15250 Ventura Blvd.

Figure B.01d.
900 S. Fremont Ave., Alhambra

USGS 0482
Ch01/Ch10 (N-S)

Zero-crossing method

Rocking angle (rad)

$\theta_{\text{max}}$

$10^{-3}$

$10^{-4}$

$\theta_{\text{min}}$

remin (1994)

Sierra Madre (1991)

San Fernando (1971)

Hector Mine (1999)

Northridge (1994)

Whittier-Narrows 12th Aft. (1987)

Apparent frequency, $f_p$ (Hz)

$0.3$ $0.4$ $0.5$ $0.6$ $0.7$

$0.3$ $0.4$ $0.5$ $0.6$ $0.7$

Figure B.02a
900 S. Fremont Ave., Alhambra

USGS 0482
Ch01/Ch10 (N-S)

San Fernando (1971)
Hector Mine (1999)
Northridge (1994)
Whittier-Narrows 12th Aft. (1987)
Sierra Madre (1991)

Rocking angle (rad)

Apparent frequency, $f_p$ (Hz)

Figure B.02b
900 S. Fremont Ave., Alhambra

USGS 0482
Ch02/Ch12 (E-W)

Zero-crossing method

Rocking angle (rad)

θ_max

10^3

10^4

San Fernando (1971)

Northridge (1994)

Hector Mine (1999)

Sierra Madre (1991)

Whittier-Narrows 12th Aft. (1987)

Apparent frequency, \( f_p \) (Hz)

Figure B.02c
Figure B.02d
Figure B.03a
Figure B.03b
Figure B.03c
Figure B.03d
1526 N. Edgemont St.

USGS 0742
E00S

Zero-crossing method

Rocking angle (rad)

Apparent frequency, $f_p$ (Hz)

Figure B.04a
Apparent frequency, $f_p$ (Hz)

Figure B.04b
Figure B.04c
1526 N. Edgemont St.

Figure B.04d
4929 Wilshire Blvd.

USGS 0793
S00W

Zero-crossing method

Northridge (1994)

Apparent frequency, $f_p$ (Hz)

Figure B.05a
4929 Wilshire Blvd.

USGS 0793
S00W

Northridge (1994)

Aft. 104
Aft. 8
Aft. 7
Aft. 4

Apparent frequency, $f_p$ (Hz)

Figure B.05b
Figure B.05c
Figure B.05d
Figure B.06a
Figure B.06b
Figure B.06c
Figure B.06d
Figure B.07a
Figure B.07b
Figure B.07c
1111 Sunset Blvd.

Figure B.07d
Figure B.08a
333 S. Hope St.

USGS 0892
N83E

Figure B.08b
Figure B.08c
Figure B.08d
Wadsworth V.A. Hospital

USGS 5082
CH06/07 (N35W)

Zero-crossing method

θ_max

10^{-3}

θ_min

10^{-5}

f_min

f_max

Apparent frequency, \( f_p \) (Hz)

Figure B.09a
Figure B.09b
Figure B.09c
Wadsworth V.A. Hospital

USGS 5082
CH03/08 (S55W)

Rocking angle (rad)

10^{-3}

10^{-4}

10^{-5}

Apparent frequency, $f_p$ (Hz)

0.6

0.8

1.0

1.2

1.4

1.6

Figure B.09d
Figure B.10a
Figure B.10b
Figure B.10c
Long Beach VA Hospital

USGS 5106
E-W

Apparent frequency, $f_p$ (Hz)

Rocking angle (rad)

Figure B.10d
Canoga Park, Santa Susana, ETEC, Bldg. #462

USGS 5108
E-W Comp.

Zero-crossing method

Figure B.11a
Figure B.11b
Canoga Park, Santa Susana, ETEC, Bldg. #462

USGS 5108
N-S Comp.

Zero-crossing method

Apparent frequency, $f_p$ (Hz)

Figure B.11c
Canoga Park, Santa Susana, ETEC, Bldg. #462

USGS 5108
N-S Comp.
Gabor transform method

Figure B.11d
USGS 5233
N62W
Zero-crossing method

1100 Wilshire Blvd.

Rocking angle (rad)

Apparent frequency, \( f_p \) (Hz)

Northridge (1994)

Sierra Madre (1991)

\[ \theta_{\text{max}} \]

\[ \theta_{\text{min}} \]

\[ f_{\text{min}} \]

\[ f_{\text{max}} \]

Figure B.12a
Figure B.12b
Figure B.12c
Figure B.12d
Figure B.13a
Figure B.13b
Figure B.13c
Figure B.13d
Figure B.14a
Figure B.14b

2005 N. Highland Ave.

Apparent frequency, $f_p$ (Hz)
2005 N. Highland Ave.

USGS 5259
W00N

Zero-crossing method

Rocking angle (rad)

Apparent frequency, $f_p$ (Hz)

Figure B.14c
Figure B.14d
Apparent frequency, $f_p$ (Hz)

Figure B.15a
Figure B.15b
Figure B.15c
Figure B.15d
Figure B.16b
10660 Wilshire Blvd.

USGS 5263
N70E

Zero-crossing method

Northridge (1994)

Aft. 106

Aft. 108

Apparent frequency, $f_p$ (Hz)

Figure B.16c
Figure B.16d
Figure B.17a
Burbank, 3601 West Olive Ave.

Apparent frequency, $f_p$ (Hz)

Figure B.17b
Zero-crossing method

Burbank, 3601 West Olive Ave.

Figure B.17c
Figure B.17d
Los Angeles, 6301 Owensmouth Ave.

USGS 5451
N00E (Transverse)

Zero-crossing method

Rocking angle (rad)

\[ \theta_{\text{max}} \]

\[ \theta_{\text{min}} \]

Apparent frequency, \( f_p \) (Hz)

\[ f_{\text{min}} \]

\[ f_{\text{max}} \]

Northridge (1994)

Aft. -26

Aft. -115

Figure B.18a
Figure B.18b
Los Angeles, 6301 Owensmouth Ave.

USGS 5451
W00N (Longitudinal)

Zero-crossing method

Apparent frequency, \( f_p \) (Hz)

\[ \begin{align*}
\theta_{\text{max}} & \quad 10^{-2} \\
\theta_{\text{min}} & \quad 10^{-4}
\end{align*} \]

\[ \begin{align*}
Aft. -26 & \quad f_{\text{min}} \\
Aft. -115 & \quad f_{\text{max}}
\end{align*} \]

Figure B.18c
Woodland Hills, 6301 Owensmouth Ave.

USGS 5451
W00N (Longitudinal)

Gabor transform method

Figure B.18d
Van Nuys, 5805 Sepulveda Blvd.

Apparent frequency, $f_p$ (Hz)

Figure B.19a
Rocking angle (rad)

Apparent frequency, $f_p$ (Hz)

Figure B.19b
Figure B.19c
Van Nuys, 5805 Sepulveda Blvd.

USGS 5453
W00N

Gabor transform method

Figure B.19d

Apparent frequency, $f_p$ (Hz)

Rocking angle (rad)

2σ$^f$

Van Nuys, 5805 Sepulveda Blvd.

Northridge
(1994)

Aft. -7
Aft. -24
Aft. -26
Aft. -29
Aft. -115
Aft. -103
Aft. -104
Aft. -7
Los Angeles, 16000 Ventura Blvd.

USGS 5455
E30S

Zero-crossing method

Rocking angle (rad)

Apparent frequency, $f_p$ (Hz)

Figure B.20a
Encino, 16000 Ventura Blvd.

Apparent frequency, $f_p$ (Hz)

Rocking angle (rad)

Northridge (1994)

Aft. -1

Aft. -7

Aft. -25

Aft. -46

Gabor transform method

Figure B.20b
Encino, 16000 Ventura Blvd.

USGS 5455
N30E
Zero-crossing method

Apparent frequency, $f_p$ (Hz)

Figure B.20c
Figure B.20d
Los Angeles, 8436 West 3rd St.

USGS 5457
N00E

Zero-crossing method

Northridge (1994)

Rocking angle (rad)

Apparent frequency, $f_p$ (Hz)

Figure B.21a
Los Angeles, 8436 West 3rd St.

Northridge (1994)

Gabor transform method

Apparent frequency, \( f_p (\text{Hz}) \)

Figure B.21b
Los Angeles, 8436 West 3rd St.

USGS 5457
S90W

Zero-crossing method

Northridge (1994)

Rocking angle (rad)

$\theta_{\text{max}}$

$\theta_{\text{min}}$

Apparent frequency, $f_p$ (Hz)

$f_{\text{min}}$

$f_{\text{max}}$

Figure B.21c
Apparent frequency, \( f_p \) (Hz)

Los Angeles, 8436 West 3rd St.

Northridge (1994)

Gabor transform method

\( 2\sigma_f \)

Figure B.21d