A  Austin Community Landfill Testing Results
A.1 Austin Community Landfill Location 1

A.1.1 Downhole Seismic Testing

![Diagram of downhole seismic testing](image)

Figure A-1. Austin Community Landfill #1 (east hole): Downhole seismic testing at vertical load of 0 kN: (a) $V_p-Z$, (b) $V_s-ZX$, and (c) $V_s-ZY$. 

447
Figure A-2. Austin Community Landfill #1 (east hole): Downhole seismic testing at vertical load of 4 kN: (a) $V_p-Z$, (b) $V_s-ZX$, and (c) $V_s-ZY$. 

ACL Location 1: East Hole Array
Downhole seismic testing; Vertical static load ~ 4 kN

(a) 
- Spacing 14 in., $\Delta t_1 = 1.113\text{ msec}$
- $V_p-Z = 1047\text{ ft/s} = 319\text{ m/s}$

(b) 
- Spacing 8.7 in., $\Delta t_2 = 0.898\text{ msec}$
- $V_p-Z = 806\text{ ft/s} = 245\text{ m/s}$

(c) 
- Spacing 12.8 in., $\Delta t_3 = 1.250\text{ msec}$
- $V_p-Z = 853\text{ ft/s} = 260\text{ m/s}$

ACL Location 1: East Hole Array
Downhole seismic testing; Vertical static load ~ 4 kN

(a) 
- Spacing 14 in., $\Delta t_1 = 2.754\text{ msec}$
- $V_s-ZX = 423\text{ ft/s} = 129\text{ m/s}$

(b) 
- Spacing 8.7 in., $\Delta t_2 = 1.465\text{ msec}$
- $V_s-ZX = 494\text{ ft/s} = 150\text{ m/s}$

(c) 
- Spacing 12.8 in., $\Delta t_3 = 1.934\text{ msec}$
- $V_s-ZX = 551\text{ ft/s} = 168\text{ m/s}$

ACL Location 1: East Hole Array
Downhole seismic testing; Vertical static load ~ 4 kN

(a) 
- Spacing 14 in., $\Delta t_1 = 2.578\text{ msec}$
- $V_s-ZY = 452\text{ ft/s} = 137\text{ m/s}$

(b) 
- Spacing 8.7 in., $\Delta t_2 = 1.680\text{ msec}$
- $V_s-ZY = 431\text{ ft/s} = 131\text{ m/s}$

(c) 
- Spacing 12.8 in., $\Delta t_3 = 1.855\text{ msec}$
- $V_s-ZY = 574\text{ ft/s} = 175\text{ m/s}$
Figure A-3. Austin Community Landfill #1 (east hole): Downhole seismic testing at vertical load of 9 kN: (a) $V_p-Z$, (b) $V_s-ZX$, and (c) $V_s-ZY$. 
Figure A-4. Austin Community Landfill #1 (east hole): Downhole seismic testing at vertical load of 18 kN: (a) $V_p-Z$, (b) $V_s-ZX$, and (c) $V_s-ZY$. 
Figure A-5. Austin Community Landfill #1 (east hole): Downhole seismic testing at vertical load of 67 kN: (a) $V_{P-Z}$, (b) $V_{s-ZX}$, and (c) $V_{s-ZY}$. 
Figure A-6. Austin Community Landfill #1 (east hole): Downhole seismic testing at vertical load of 133 kN: (a) $V_p-Z$, (b) $V_s-ZX$, and (c) $V_s-ZY$. 

ACL Location 1: East Hole Array
Downhole seismic testing; Vertical static load ~ 133 kN

(a) $V_p-Z$
Spacing 8.7 in., $\Delta t = 0.742$ msec
$V_p-Z = 976$ ft/s = 297 m/s

(b) $V_s-ZX$
Spacing 14 in., $\Delta t = 2.031$ msec
$V_s-ZX = 574$ ft/s = 175 m/s
Spacing 8.7 in., $\Delta t = 1.328$ msec
$V_s-ZX = 545$ ft/s = 166 m/s
Spacing 12.8 in., $\Delta t = 1.797$ msec
$V_s-ZX = 593$ ft/s = 180 m/s

(c) $V_s-ZY$
Spacing 14 in., $\Delta t = 1.992$ msec
$V_s-ZY = 585$ ft/s = 178 m/s
Spacing 8.7 in., $\Delta t = 1.484$ msec
$V_s-ZY = 488$ ft/s = 148 m/s
Spacing 12.8 in., $\Delta t = 1.699$ msec
$V_s-ZY = 627$ ft/s = 191 m/s
Figure A-7. Austin Community Landfill #1 (west hole): Downhole seismic testing at vertical load of 0 kN: (a) $V_p-Z$, (b) $V_s-ZX$, and (c) $V_s-ZY$. 
Figure A-8. Austin Community Landfill #1 (west hole): Downhole seismic testing at vertical load of 4 kN: (a) $V_p-Z$, (b) $V_s-ZX$, and (c) $V_s-ZY$. 
Figure A-9. Austin Community Landfill #1 (west hole): Downhole seismic testing at vertical load of 9 kN: (a) $V_p - Z$, (b) $V_s - ZX$, and (c) $V_s - ZY$. 
Figure A-10. Austin Community Landfill #1 (west hole): Downhole seismic testing at vertical load of 18 kN: (a) $V_p-Z$, (b) $V_s-Z_X$, and (c) $V_s-Z_Y$.
Figure A-11. Austin Community Landfill #1 (west hole): Downhole seismic testing at vertical load of 67 kN: (a) $V_p-Z$, (b) $V_s-ZX$, and (c) $V_s-ZY$. 
Figure A-12. Austin Community Landfill #1 (west hole): Downhole seismic testing at vertical load of 133 kN: (a) $V_p-Z$, (b) $V_s-ZX$, and (c) $V_s-ZY$. 
A.1.2 Crosshole Seismic Testing

Figure A-13. Austin Community Landfill #1 (rod A): Crosshole seismic testing at vertical load of 0 kN: (a) $V_p-X$ and (b) $V_s-XZ$.

Figure A-14. Austin Community Landfill #1 (rod A): Crosshole seismic testing at vertical load of 4 kN: (a) $V_p-X$ and (b) $V_s-XZ$. 
Figure A-15. Austin Community Landfill #1 (rod A): Crosshole seismic testing at vertical load of 9 kN: (a) $V_p$ and (b) $V_s$. 

Figure A-16. Austin Community Landfill #1 (rod A): Crosshole seismic testing at vertical load of 18 kN: (a) $V_p$ and (b) $V_s$. 

ACL Location 1: G2X-G1X
Crosshole seismic testing; Vertical static load ~ 9 kN
Hit on rod A
Spacing = 17.6 in.
$\Delta t = 1.543$ msec
$V_p = 951$ ft/s = 290 m/s

ACL Location 1: G2Z-G1Z
Crosshole seismic testing; Vertical static load ~ 9 kN
Hit on rod A
Spacing = 17.6 in.
$\Delta t = 3.047$ msec
$V_s = 482$ ft/s = 146 m/s

ACL Location 1: G2X-G1X
Crosshole seismic testing; Vertical static load ~ 18 kN
Hit on rod A
Spacing = 17.6 in.
$\Delta t = 1.543$ msec
$V_p = 951$ ft/s = 290 m/s

ACL Location 1: G2Z-G1Z
Crosshole seismic testing; Vertical static load ~ 18 kN
Hit on rod A
Spacing = 17.6 in.
$\Delta t = 3.027$ msec
$V_s = 485$ ft/s = 147 m/s
Figure A-17. Austin Community Landfill #1 (rod A): Crosshole seismic testing at vertical load of 67 kN: (a) $V_{p-X}$ and (b) $V_{s-XZ}$.

Figure A-18. Austin Community Landfill #1 (rod A): Crosshole seismic testing at vertical load of 133 kN: (a) $V_{p-X}$ and (b) $V_{s-XZ}$. 
Figure A-19. Austin Community Landfill #1 (rod B): Crosshole seismic testing at vertical load of 0 kN: (a) $V_{p-X}$ and (b) $V_{s-XZ}$.

Figure A-20. Austin Community Landfill #1 (rod B): Crosshole seismic testing at vertical load of 4 kN: (a) $V_{p-X}$ and (b) $V_{s-XZ}$. 

ACL Location 1: G5X-G3X
Crosshole seismic testing; Vertical static load ~ 0 kN
Hit on rod B
Spacing = 18 in.
$\Delta t = 1.348$ msec
$V_{p-X} = 1113$ ft/s = 339 m/s

ACL Location 1: G5Z-G3Z
Crosshole seismic testing; Vertical static load ~ 0 kN
Hit on rod B
Spacing = 18 in.
$\Delta t = 4.219$ msec
$V_{s-XZ} = 355$ ft/s = 108 m/s

ACL Location 1: G5X-G3X
Crosshole seismic testing; Vertical static load ~ 4 kN
Hit on rod B
Spacing = 18 in.
$\Delta t = 1.328$ msec
$V_{p-X} = 1129$ ft/s = 344 m/s

ACL Location 1: G5Z-G3Z
Crosshole seismic testing; Vertical static load ~ 4 kN
Hit on rod B
Spacing = 18 in.
$\Delta t = 4.199$ msec
$V_{s-XZ} = 357$ ft/s = 108 m/s
Figure A-21. Austin Community Landfill #1 (rod B): Crosshole seismic testing at vertical load of 9 kN: (a) $V_{p,X}$ and (b) $V_{s,XZ}$.

Figure A-22. Austin Community Landfill #1 (rod B): Crosshole seismic testing at vertical load of 18 kN: (a) $V_{p,X}$ and (b) $V_{s,XZ}$.
Figure A-23. Austin Community Landfill #1 (rod B): Crosshole seismic testing at vertical load of 67 kN: (a) $V_{p-X}$ and (b) $V_{s-XZ}$.

Figure A-24. Austin Community Landfill #1 (rod B): Crosshole seismic testing at vertical load of 133 kN: (a) $V_{p-X}$ and (b) $V_{s-XZ}$. 
Figure A-25. Austin Community Landfill #1 (rod C): Crosshole seismic testing at vertical load of 0 kN: (a) $V_{p,X}$ and (b) $V_{s,XZ}$.

Figure A-26. Austin Community Landfill #1 (rod C): Crosshole seismic testing at vertical load of 4 kN: (a) $V_{p,X}$ and (b) $V_{s,XZ}$. 
Figure A-27. Austin Community Landfill #1 (rod C): Crosshole seismic testing at vertical load of 9 kN: (a) $V_{p,X}$ and (b) $V_{s,XZ}$.

ACL Location 1: G8X-G6X
Crosshole seismic testing; Vertical static load ~ 9 kN
Hit on rod C
Spacing = 17.9 in.
$\Delta t = 1.348$ msec
$V_{p,X} = 1109$ ft/s = 338 m/s

ACL Location 1: G8Z-G6Z
Crosshole seismic testing; Vertical static load ~ 9 kN
Hit on rod C
Spacing = 17.9 in.
$\Delta t = 2.754$ msec
$V_{s,XZ} = 542$ ft/s = 165 m/s

Figure A-28. Austin Community Landfill #1 (rod C): Crosshole seismic testing at vertical load of 18 kN: (a) $V_{p,X}$ and (b) $V_{s,XZ}$.

ACL Location 1: G8X-G6X
Crosshole seismic testing; Vertical static load ~ 18 kN
Hit on rod C
Spacing = 17.9 in.
$\Delta t = 1.348$ msec
$V_{p,X} = 1109$ ft/s = 338 m/s

ACL Location 1: G8Z-G6Z
Crosshole seismic testing; Vertical static load ~ 18 kN
Hit on rod C
Spacing = 17.9 in.
$\Delta t = 2.617$ msec
$V_{s,XZ} = 571$ ft/s = 174 m/s
Figure A-29. Austin Community Landfill #1 (rod C): Crosshole seismic testing at vertical load of 67 kN: (a) $V_{p-X}$ and (b) $V_{s-XZ}$.

Figure A-30. Austin Community Landfill #1 (rod C): Crosshole seismic testing at vertical load of 133 kN: $V_{p-X}$. 
A.1.3 Steady-state Dynamic Testing

Figure A-31. Austin Community Landfill #1: Steady-state dynamic testing at vertical load of 18 kN and horizontal dynamic load of 1 kN.

Figure A-32. Austin Community Landfill #1: Steady-state dynamic testing at vertical load of 18 kN and horizontal dynamic load of 2 kN.
Figure A-33. Austin Community Landfill #1: Steady-state dynamic testing at vertical load of 18 kN and horizontal dynamic load of 4 kN.

Figure A-34. Austin Community Landfill #1: Steady-state dynamic testing at vertical load of 18 kN and horizontal dynamic load of 7 kN.
Figure A-35. Austin Community Landfill #1: Steady-state dynamic testing at vertical load of 18 kN and horizontal dynamic load of 10 kN.

Figure A-36. Austin Community Landfill #1: Steady-state dynamic testing at vertical load of 18 kN and horizontal dynamic load of 13 kN.
Figure A-37. Austin Community Landfill #1: Steady-state dynamic testing at vertical load of 67 kN and horizontal dynamic load of 40 kN.

Figure A-38. Austin Community Landfill #1: Steady-state dynamic testing at vertical load of 67 kN and horizontal dynamic load of 49 kN.
Figure A-39. Austin Community Landfill #1: Steady-state dynamic testing at vertical load of 133 kN and horizontal dynamic load of 40 kN.

Figure A-40. Austin Community Landfill #1: Steady-state dynamic testing at vertical load of 133 kN and horizontal dynamic load of 67 kN.
Figure A-41. Austin Community Landfill #1: Steady-state dynamic testing at vertical load of 133 kN and horizontal dynamic load of 98 kN.

Figure A-42. Austin Community Landfill #1: Steady-state dynamic testing at vertical load of 133 kN and horizontal dynamic load of 133 kN.
Figure A-43. Austin Community Landfill #1: Steady-state dynamic testing at vertical load of 165 kN and horizontal dynamic load of 27 kN.

Figure A-44. Austin Community Landfill #1: Steady-state dynamic testing at vertical load of 165 kN and horizontal dynamic load of 40 kN.
Figure A-45. Austin Community Landfill #1: Steady-state dynamic testing at vertical load of 165 kN and horizontal dynamic load of 40 kN.

Figure A-46. Austin Community Landfill #1: Steady-state dynamic testing at vertical load of 165 kN and horizontal dynamic load of 98 kN.
Figure A-47. Austin Community Landfill #1: Steady-state dynamic testing at vertical load of 165 kN and horizontal dynamic load of 133 kN.
A.2 Austin Community Landfill Location 2

A.2.1 Downhole Seismic Testing

Figure A-48. Austin Community Landfill #2 (north hole): Downhole seismic testing at vertical load of 0 kN: (a) $V_p-Z$, (b) $V_s-ZX$, and (c) $V_s-ZY$. 

<table>
<thead>
<tr>
<th>ACL Location 2: North Hole Array</th>
<th>ACL Location 2: North Hole Array</th>
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<tbody>
<tr>
<td>Downhole seismic testing; Vertical static load ~ 0 kN</td>
<td>Downhole seismic testing; Vertical static load ~ 0 kN</td>
</tr>
<tr>
<td>Spacing 6 in., $\Delta t = 0.391$ msec</td>
<td>Spacing 6 in., $\Delta t = 0.391$ msec</td>
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<tr>
<td>$V_p-Z = 1280$ ft/s = 390 m/s</td>
<td>$V_s-ZY = 533$ ft/s = 162 m/s</td>
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<td>Spacing 6 in., $\Delta t = 0.566$ msec</td>
<td>Spacing 6 in., $\Delta t = 0.566$ msec</td>
</tr>
<tr>
<td>$V_p-Z = 882$ ft/s = 269 m/s</td>
<td>$V_s-ZX = 350$ ft/s = 106 m/s</td>
</tr>
<tr>
<td>Spacing 8 in., $\Delta t = 1.035$ msec</td>
<td>Spacing 8 in., $\Delta t = 1.035$ msec</td>
</tr>
<tr>
<td>$V_p-Z = 644$ ft/s = 196 m/s</td>
<td>$V_s-ZY = 371$ ft/s = 113 m/s</td>
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Figure A-49. Austin Community Landfill #2 (north hole): Downhole seismic testing at vertical load of 9 kN: (a) $V_p-Z$, (b) $V_s-ZX$, and (c) $V_s-ZY$. 

ACL Location 2: North Hole Array
Downhole seismic testing, Vertical static load ~ 9 kN

<table>
<thead>
<tr>
<th>Spacing</th>
<th>$\Delta t$ (msec)</th>
<th>$V_p-Z$ (ft/s)</th>
<th>$V_s-ZX$ (ft/s)</th>
<th>$V_s-ZY$ (ft/s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 in.</td>
<td>0.371</td>
<td>1347</td>
<td>568</td>
<td>375</td>
</tr>
<tr>
<td>6 in.</td>
<td>0.566</td>
<td>882</td>
<td>360</td>
<td>375</td>
</tr>
<tr>
<td>8 in.</td>
<td>1.016</td>
<td>656</td>
<td>375</td>
<td>379</td>
</tr>
</tbody>
</table>

ACL Location 2: North Hole Array
Downhole seismic testing, Vertical static load ~ 9 kN

<table>
<thead>
<tr>
<th>Spacing</th>
<th>$\Delta t$ (msec)</th>
<th>$V_s-ZX$ (ft/s)</th>
<th>$V_s-ZY$ (ft/s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 in.</td>
<td>0.879</td>
<td>568</td>
<td>375</td>
</tr>
<tr>
<td>6 in.</td>
<td>1.387</td>
<td>360</td>
<td>375</td>
</tr>
<tr>
<td>8 in.</td>
<td>1.777</td>
<td>375</td>
<td>379</td>
</tr>
</tbody>
</table>
Figure A-50. Austin Community Landfill #2 (north hole): Downhole seismic testing at vertical load of 18 kN: (a) $V_{p-Z}$, (b) $V_{s-ZX}$, and (c) $V_{s-ZY}$. 
ACL Location 2: North Hole Array
ACL Location 2: North Hole Array
ACL Location 2: North Hole Array

Figure A-51. Austin Community Landfill #2 (north hole): Downhole seismic testing at vertical load of 36 kN: (a) $V_{p-Z}$, (b) $V_{s-ZX}$, and (c) $V_{s-ZY}$. 
Figure A-52. Austin Community Landfill #2 (north hole): Downhole seismic testing at vertical load of 67 kN: (a) $V_{p-Z}$, (b) $V_{s-ZX}$, and (c) $V_{s-ZY}$. 
Figure A-53. Austin Community Landfill #2 (north hole): Downhole seismic testing at vertical load of 133 kN: (a) $V_p-Z$, (b) $V_s-ZX$, and (c) $V_s-ZY$. 
Figure A-54. Austin Community Landfill #2 (south hole): Downhole seismic testing at vertical load of 0 kN: (a) $V_{p-Z}$, (b) $V_{s-ZX}$, and (c) $V_{s-ZY}$. 
Figure A-55. Austin Community Landfill #2 (south hole): Downhole seismic testing at vertical load of 9 kN: (a) $V_p-Z$, (b) $V_s-ZX$, and (c) $V_s-ZY$. 
Figure A-56. Austin Community Landfill #2 (south hole): Downhole seismic testing at vertical load of 9 kN: (a) $V_{p-Z}$, (b) $V_{s-ZX}$, and (c) $V_{s-ZY}$. 
Figure A-57. Austin Community Landfill #2 (south hole): Downhole seismic testing at vertical load of 18 kN: (a) $V_{p-Z}$, (b) $V_{s-ZX}$, and (c) $V_{s-ZY}$.
Figure A-58. Austin Community Landfill #2 (south hole): Downhole seismic testing at vertical load of 36 kN: (a) $V_{p-Z}$, (b) $V_{S-ZX}$, and (c) $V_{S-ZY}$. 

ACL Location 2: South Hole Array
Downhole seismic testing; Vertical static load = 36 kN

Spacing 6 in., $\Delta t_1 = 0.410$ msec
$V_{p-Z} = 1219$ ft/s = 371 m/s

Spacing 6 in., $\Delta t_2 = 0.352$ msec
$V_{p-Z} = 1422$ ft/s = 433 m/s

Spacing 8 in., $\Delta t_3 = 0.840$ msec
$V_{p-Z} = 793$ ft/s = 241 m/s

ACL Location 2: South Hole Array
Downhole seismic testing; Vertical static load = 36 kN

Spacing 6 in., $\Delta t_1 = 0.723$ msec
$V_{S-ZX} = 691$ ft/s = 210 m/s

Spacing 6 in., $\Delta t_2 = 0.859$ msec
$V_{S-ZX} = 581$ ft/s = 177 m/s

Spacing 8 in., $\Delta t_3 = 1.758$ msec
$V_{S-ZX} = 379$ ft/s = 115 m/s

ACL Location 2: South Hole Array
Downhole seismic testing; Vertical static load = 36 kN

Spacing 6 in., $\Delta t_1 = 0.859$ msec
$V_{S-ZY} = 581$ ft/s = 177 m/s

Spacing 6 in., $\Delta t_2 = 0.879$ msec
$V_{S-ZY} = 568$ ft/s = 173 m/s

Spacing 8 in., $\Delta t_3 = 1.719$ msec
$V_{S-ZY} = 387$ ft/s = 118 m/s
Figure A-59. Austin Community Landfill #2 (south hole): Downhole seismic testing at vertical load of 67 kN: (a) $V_p$-$Z$, (b) $V_s$-$ZX$, and (c) $V_s$-$ZY$. 
Figure A-60. Austin Community Landfill #2 (south hole): Downhole seismic testing at vertical load of 133 kN: (a) $V_p-Z$, (b) $V_s-ZX$, and (c) $V_s-ZY$. 
A.2.2 Crosshole Seismic Testing

Figure A-61. Austin Community Landfill #2 (rod A): Crosshole seismic testing at vertical load of 0 kN: (a) $V_{p,X}$ and (b) $V_{s,XZ}$.

Figure A-62. Austin Community Landfill #2 (rod A): Crosshole seismic testing at vertical load of 9 kN: (a) $V_{p,X}$ and (b) $V_{s,XZ}$. 

Figure A-63. Austin Community Landfill #2 (rod A): Crosshole seismic testing at vertical load of 18 kN: (a) $V_{p,X}$ and (b) $V_{s,XZ}$.

Figure A-64. Austin Community Landfill #2 (rod A): Crosshole seismic testing at vertical load of 36 kN: (a) $V_{p,X}$ and (b) $V_{s,XZ}$. 
Figure A-65. Austin Community Landfill #2 (rod A): Crosshole seismic testing at vertical load of 67 kN: (a) $V_{p,X}$ and (b) $V_{s,XZ}$.

Figure A-66. Austin Community Landfill #2 (rod A): Crosshole seismic testing at vertical load of 133 kN: (a) $V_{p,X}$ and (b) $V_{s,XZ}$. 

ACL Location 2: G2X-G1X
Crosshole seismic testing; Vertical static load ~ 67 kN
Hit on rod A
Spacing = 18 in.
$\Delta t = 1.504$ msec
$V_{p,X} = 997$ ft/s = 304 m/s

ACL Location 2: G2Z-G1Z
Crosshole seismic testing; Vertical static load ~ 67 kN
Hit on rod A
Spacing = 18 in.
$\Delta t = 4.004$ msec
$V_{s,XZ} = 374$ ft/s = 114 m/s

ACL Location 2: G2X-G1X
Crosshole seismic testing; Vertical static load ~ 133 kN
Hit on rod A
Spacing = 18 in.
$\Delta t = 1.484$ msec
$V_{p,X} = 1010$ ft/s = 308 m/s

ACL Location 2: G2Z-G1Z
Crosshole seismic testing; Vertical static load ~ 133 kN
Hit on rod A
Spacing = 18 in.
$\Delta t = 4.004$ msec
$V_{s,XZ} = 374$ ft/s = 114 m/s
Figure A-67. Austin Community Landfill #2 (rod B): Crosshole seismic testing at vertical load of 0 kN: (a) $V_{p-X}$ and (b) $V_{s-XZ}$.

Figure A-68. Austin Community Landfill #2 (rod B): Crosshole seismic testing at vertical load of 9 kN: (a) $V_{p-X}$ and (b) $V_{s-XZ}$. 
Figure A-69. Austin Community Landfill #2 (rod B): Crosshole seismic testing at vertical load of 18 kN: (a) $V_{p-X}$ and (b) $V_{s-XZ}$.

Figure A-70. Austin Community Landfill #2 (rod B): Crosshole seismic testing at vertical load of 36 kN: (a) $V_{p-X}$ and (b) $V_{s-XZ}$.
Figure A-71. Austin Community Landfill #2 (rod B): Crosshole seismic testing at vertical load of 67 kN: (a) $V_p$ and (b) $V_s$.

ACL Location 2: G5X-G3X
Crosshole seismic testing; Vertical static load ~ 67 kN
Hit on rod B
Spacing = 17.7 in.
$\Delta t = 1.133$ msec
$V_{p,A} = 1301$ ft/s $= 396$ m/s

ACL Location 2: G5Z-G3Z
Crosshole seismic testing; Vertical static load ~ 67 kN
Hit on rod B
Spacing = 17.7 in.
$\Delta t = 2.480$ msec
$V_{s,A} = 594$ ft/s $= 181$ m/s

Figure A-72. Austin Community Landfill #2 (rod B): Crosshole seismic testing at vertical load of 133 kN: (a) $V_p$ and (b) $V_s$.

ACL Location 2: G5X-G3X
Crosshole seismic testing; Vertical static load ~ 133 kN
Hit on rod B
Spacing = 17.7 in.
$\Delta t = 1.094$ msec
$V_{p,A} = 1347$ ft/s $= 410$ m/s

ACL Location 2: G5Z-G3Z
Crosshole seismic testing; Vertical static load ~ 133 kN
Hit on rod B
Spacing = 17.7 in.
$\Delta t = 2.441$ msec
$V_{s,A} = 603$ ft/s $= 184$ m/s
Figure A-73. Austin Community Landfill #2 (rod C): Crosshole seismic testing at vertical load of 0 kN: (a) $V_{p-X}$ and (b) $V_{s-XZ}$.

ACL Location 2: G8X-G6X
Crosshole seismic testing; Vertical static load ~ 0 kN
Hit on rod C
Spacing = 17.8 in.
$\Delta t = 1.133$ msec
$V_{p-X} = 1305$ ft/s = 397 m/s

ACL Location 2: G8Z-G6Z
Crosshole seismic testing; Vertical static load ~ 0 kN
Hit on rod C
Spacing = 17.8 in.
$\Delta t = 3.281$ msec
$V_{s-XZ} = 450$ ft/s = 137 m/s

Figure A-74. Austin Community Landfill #2 (rod C): Crosshole seismic testing at vertical load of 9 kN: (a) $V_{p-X}$ and (b) $V_{s-XZ}$.

ACL Location 2: G8X-G6X
Crosshole seismic testing; Vertical static load ~ 9 kN
Hit on rod C
Spacing = 17.8 in.
$\Delta t = 1.133$ msec
$V_{p-X} = 1305$ ft/s = 397 m/s

ACL Location 2: G8Z-G6Z
Crosshole seismic testing; Vertical static load ~ 9 kN
Hit on rod C
Spacing = 17.8 in.
$\Delta t = 3.047$ msec
$V_{s-XZ} = 485$ ft/s = 147 m/s
Figure A-75. Austin Community Landfill #2 (rod C): Crosshole seismic testing at vertical load of 18 kN: (a) $V_p-X$ and (b) $V_s-XZ$.

Figure A-76. Austin Community Landfill #2 (rod C): Crosshole seismic testing at vertical load of 36 kN: (a) $V_p-X$ and (b) $V_s-XZ$. 
Figure A-77. Austin Community Landfill #2 (rod C): Crosshole seismic testing at vertical load of 67 kN: (a) $V_{p-X}$ and (b) $V_{s-XZ}$.

Figure A-78. Austin Community Landfill #2 (rod C): Crosshole seismic testing at vertical load of 133 kN: (a) $V_{p-X}$ and (b) $V_{s-XZ}$. 
A.2.3 Steady-state Dynamic Testing

Figure A-79. Austin Community Landfill #2: Steady-state dynamic testing at vertical load of 18 kN and horizontal dynamic load of 1 kN.

Figure A-80. Austin Community Landfill #2: Steady-state dynamic testing at vertical load of 18 kN and horizontal dynamic load of 2 kN.
Figure A-81. Austin Community Landfill #2: Steady-state dynamic testing at vertical load of 18 kN and horizontal dynamic load of 4 kN.

Figure A-82. Austin Community Landfill #2: Steady-state dynamic testing at vertical load of 18 kN and horizontal dynamic load of 9 kN.
Figure A-83. Austin Community Landfill #2: Steady-state dynamic testing at vertical load of 18 kN and horizontal dynamic load of 18 kN.

Figure A-84. Austin Community Landfill #2: Steady-state dynamic testing at vertical load of 18 kN and horizontal dynamic load of 27 kN.
Figure A-85. Austin Community Landfill #2: Steady-state dynamic testing at vertical load of 36 kN and horizontal dynamic load of 1 kN.

Figure A-86. Austin Community Landfill #2: Steady-state dynamic testing at vertical load of 36 kN and horizontal dynamic load of 2 kN.
Figure A-87. Austin Community Landfill #2: Steady-state dynamic testing at vertical load of 36 kN and horizontal dynamic load of 4 kN.

Figure A-88. Austin Community Landfill #2: Steady-state dynamic testing at vertical load of 36 kN and horizontal dynamic load of 4 kN.
Figure A-89. Austin Community Landfill #2: Steady-state dynamic testing at vertical load of 36 kN and horizontal dynamic load of 9 kN.

Figure A-90. Austin Community Landfill #2: Steady-state dynamic testing at vertical load of 36 kN and horizontal dynamic load of 18 kN.
Figure A-91. Austin Community Landfill #2: Steady-state dynamic testing at vertical load of 36 kN and horizontal dynamic load of 27 kN.

Figure A-92. Austin Community Landfill #2: Steady-state dynamic testing at vertical load of 67 kN and horizontal dynamic load of 27 kN.
Figure A-93. Austin Community Landfill #2: Steady-state dynamic testing at vertical load of 67 kN and horizontal dynamic load of 36 kN.

Figure A-94. Austin Community Landfill #2: Steady-state dynamic testing at vertical load of 67 kN and horizontal dynamic load of 53 kN.
Figure A-95. Austin Community Landfill #2: Steady-state dynamic testing at vertical load of 67 kN and horizontal dynamic load of 133 kN.

Figure A-96. Austin Community Landfill #2: Steady-state dynamic testing at vertical load of 133 kN and horizontal dynamic load of 27 kN.
Figure A-97. Austin Community Landfill #2: Steady-state dynamic testing at vertical load of 133 kN and horizontal dynamic load of 44 kN.

Figure A-98. Austin Community Landfill #2: Steady-state dynamic testing at vertical load of 133 kN and horizontal dynamic load of 67 kN.
Figure A-99. Austin Community Landfill #2: Steady-state dynamic testing at vertical load of 133 kN and horizontal dynamic load of 98 kN.

Figure A-100. Austin Community Landfill #2: Steady-state dynamic testing at vertical load of 133 kN and horizontal dynamic load of 133 kN.
B  Lamb Canyon Sanitary Landfill Testing Results
B.1 Lamb Canyon Sanitary Landfill Location 1

B.1.1 Downhole Seismic Testing

Figure B-1. Lamb Canyon Sanitary Landfill #1 (east hole): Downhole seismic testing at vertical load of 0 kN: (a) $V_p-Z$, (b) $V_s-ZX$, and (c) $V_s-ZY$. 
Figure B-2. Lamb Canyon Sanitary Landfill #1 (east hole): Downhole seismic testing at vertical load of 18 kN: (a) $V_p-Z$, (b) $V_s-ZX$, and (c) $V_s-ZY$. 
Figure B-3. Lamb Canyon Sanitary Landfill #1 (east hole): Downhole seismic testing at vertical load of 36 kN: (a) $V_p$-$Z$, (b) $V_s$-$ZX$, and (c) $V_s$-$ZY$. 
Figure B-4. Lamb Canyon Sanitary Landfill #1 (east hole): Downhole seismic testing at vertical load of 71 kN: (a) $V_p-Z$, (b) $V_s-ZX$, and (c) $V_s-ZY$. 
Figure B-5. Lamb Canyon Sanitary Landfill #1 (east hole): Downhole seismic testing at vertical load of 111 kN: (a) $V_{p-Z}$, (b) $V_{s-ZX}$, and (c) $V_{s-ZY}$. 
Figure B-6. Lamb Canyon Sanitary Landfill #1 (west hole): Downhole seismic testing at vertical load of 0 kN: (a) $V_p-Z$, (b) $V_s-ZX$, and (c) $V_s-ZY$. 

- **LCSL Location 1: West Hole Array**
  - **Downhole seismic testing; Vertical static load ~ 0 kN**
  - **Spacing 6 in., $\Delta t_{-1} = 0.547$ msec**
    - $V_p-Z = 914$ ft/s = 278 m/s
  - **Spacing 8 in., $\Delta t_{-2} = 0.723$ msec**
    - $V_p-Z = 922$ ft/s = 281 m/s
  - **Spacing 10 in., $\Delta t_{-3} = 0.859$ msec**
    - $V_p-Z = 969$ ft/s = 295 m/s

- **Normalized Magnitude**
  - Time (x10^{-3} sec)
  - G23Z
  - G21Z
  - G19Z
  - G17Z

- **LCSL Location 1: West Hole Array**
  - **Downhole seismic testing; Vertical static load ~ 0 kN**
  - **Spacing 6 in., $\Delta t_{-1} = 0.059$ msec**
    - $V_s-ZX = 8533$ ft/s = 2600 m/s (?)
  - **Spacing 8 in., $\Delta t_{-2} = 1.328$ msec**
    - $V_s-ZX = 501$ ft/s = 152 m/s
  - **Spacing 10 in., $\Delta t_{-3} = 1.738$ msec**
    - $V_s-ZX = 479$ ft/s = 146 m/s

- **Normalized Magnitude**
  - Time (x10^{-3} sec)
  - G23X
  - G21X
  - G19X
  - G17X

- **LCSL Location 1: West Hole Array**
  - **Downhole seismic testing; Vertical static load ~ 0 kN**
  - **Spacing 6 in., $\Delta t_{-1} = 0.918$ msec**
    - $V_s-ZY = 544$ ft/s = 166 m/s
  - **Spacing 8 in., $\Delta t_{-2} = 1.113$ msec**
    - $V_s-ZY = 598$ ft/s = 182 m/s
  - **Spacing 10 in., $\Delta t_{-3} = 1.738$ msec**
    - $V_s-ZY = 479$ ft/s = 146 m/s

- **Normalized Magnitude**
  - Time (x10^{-3} sec)
  - G23Y
  - G21Y
  - G19Y
  - G17Y

516
Figure B-7. Lamb Canyon Sanitary Landfill #1 (west hole): Downhole seismic testing at vertical load of 18 kN: (a) $V_{p-Z}$, (b) $V_{s-ZX}$, and (c) $V_{s-ZY}$. 
Figure B-8. Lamb Canyon Sanitary Landfill #1 (west hole): Downhole seismic testing at vertical load of 36 kN: (a) $V_{p-Z}$, (b) $V_{s-ZX}$, and (c) $V_{s-ZY}$. 
Figure B-9. Lamb Canyon Sanitary Landfill #1 (west hole): Downhole seismic testing at vertical load of 36 kN: (a) $V_p-Z$, (b) $V_s-ZX$, and (c) $V_s-ZY$. 
Figure B-10. Lamb Canyon Sanitary Landfill #1 (west hole): Downhole seismic testing at vertical load of 71 kN: (a) $V_{p-Z}$, (b) $V_{s-ZX}$, and (c) $V_{s-ZY}$. 
Figure B-11. Lamb Canyon Sanitary Landfill #1 (west hole): Downhole seismic testing at vertical load of 111 kN: (a) $V_{p-Z}$, (b) $V_{S-ZX}$, and (c) $V_{S-ZY}$. 
B.1.2 Crosshole Seismic Testing

Figure B-12. Lamb Canyon Sanitary Landfill #1 (rod A): Crosshole seismic testing at vertical load of 0 kN: (a) $V_{p-X}$ and (b) $V_{s-XZ}$.

Figure B-13. Lamb Canyon Sanitary Landfill #1 (rod A): Crosshole seismic testing at vertical load of 18 kN: (a) $V_{p-X}$ and (b) $V_{s-XZ}$. 
Figure B-14. Lamb Canyon Sanitary Landfill #1 (rod A): Crosshole seismic testing at vertical load of 36 kN: (a) $V_{p,x}$ and (b) $V_{s,xz}$.

Figure B-15. Lamb Canyon Sanitary Landfill #1 (rod A): Crosshole seismic testing at vertical load of 71 kN: (a) $V_{p,x}$ and (b) $V_{s,xz}$.
Figure B-16. Lamb Canyon Sanitary Landfill #1 (rod A): Crosshole seismic testing at vertical load of 111 kN: (a) $V_{p-X}$ and (b) $V_{s-XZ}$.

Figure B-17. Lamb Canyon Sanitary Landfill #1 (rod B): Crosshole seismic testing at vertical load of 0 kN: (a) $V_{p-X}$ and (b) $V_{s-XZ}$. 
Figure B-18. Lamb Canyon Sanitary Landfill #1 (rod B): Crosshole seismic testing at vertical load of 18 kN: (a) $V_{p-X}$ and (b) $V_{s-XZ}$.

Figure B-19. Lamb Canyon Sanitary Landfill #1 (rod B): Crosshole seismic testing at vertical load of 36 kN: (a) $V_{p-X}$ and (b) $V_{s-XZ}$. 
Figure B-20. Lamb Canyon Sanitary Landfill #1 (rod B): Crosshole seismic testing at vertical load of 71 kN: (a) $V_{P,X}$ and (b) $V_{S,XZ}$.

Figure B-21. Lamb Canyon Sanitary Landfill #1 (rod B): Crosshole seismic testing at vertical load of 111 kN: (a) $V_{P,X}$ and (b) $V_{S,XZ}$.
Figure B-22. Lamb Canyon Sanitary Landfill #1 (rod C): Crosshole seismic testing at vertical load of 0 kN: (a) $V_{p,X}$ and (b) $V_{s,XZ}$.

Figure B-23. Lamb Canyon Sanitary Landfill #1 (rod C): Crosshole seismic testing at vertical load of 18 kN: (a) $V_{p,X}$ and (b) $V_{s,XZ}$.
Figure B-24. Lamb Canyon Sanitary Landfill #1 (rod C): Crosshole seismic testing at vertical load of 36 kN: (a) $V_{p,X}$ and (b) $V_{s,XZ}$.

Figure B-25. Lamb Canyon Sanitary Landfill #1 (rod C): Crosshole seismic testing at vertical load of 71 kN: (a) $V_{p,X}$ and (b) $V_{s,XZ}$. 
B.1.3 Steady-state Dynamic Testing

Figure B-26. Lamb Canyon Sanitary Landfill #1 (rod C): Crosshole seismic testing at vertical load of 111 kN: (a) $V_{p,X}$ and (b) $V_{s,XZ}$.

Figure B-27. Lamb Canyon Sanitary Landfill #1: Steady-state dynamic testing at vertical load of 18 kN and horizontal dynamic load of 1 kN.
Figure B-28. Lamb Canyon Sanitary Landfill #1: Steady-state dynamic testing at vertical load of 18 kN and horizontal dynamic load of 2 kN.

Figure B-29. Lamb Canyon Sanitary Landfill #1: Steady-state dynamic testing at vertical load of 18 kN and horizontal dynamic load of 4 kN.
Figure B-30. Lamb Canyon Sanitary Landfill #1: Steady-state dynamic testing at vertical load of 18 kN and horizontal dynamic load of 9 kN.

Figure B-31. Lamb Canyon Sanitary Landfill #1: Steady-state dynamic testing at vertical load of 18 kN and horizontal dynamic load of 13 kN.
Figure B-32. Lamb Canyon Sanitary Landfill #1: Steady-state dynamic testing at vertical load of 18 kN and horizontal dynamic load of 16 kN.

Figure B-33. Lamb Canyon Sanitary Landfill #1: Steady-state dynamic testing at vertical load of 18 kN and horizontal dynamic load of 18 kN.
Figure B-34. Lamb Canyon Sanitary Landfill #1: Steady-state dynamic testing at vertical load of 36 kN and horizontal dynamic load of 1 kN.

Figure B-35. Lamb Canyon Sanitary Landfill #1: Steady-state dynamic testing at vertical load of 36 kN and horizontal dynamic load of 2 kN.
Figure B-36. Lamb Canyon Sanitary Landfill #1: Steady-state dynamic testing at vertical load of 36 kN and horizontal dynamic load of 7 kN.

Figure B-37. Lamb Canyon Sanitary Landfill #1: Steady-state dynamic testing at vertical load of 36 kN and horizontal dynamic load of 9 kN.
Figure B-38. Lamb Canyon Sanitary Landfill #1: Steady-state dynamic testing at vertical load of 36 kN and horizontal dynamic load of 13 kN.

Figure B-39. Lamb Canyon Sanitary Landfill #1: Steady-state dynamic testing at vertical load of 36 kN and horizontal dynamic load of 18 kN.
Figure B-40. Lamb Canyon Sanitary Landfill #1: Steady-state dynamic testing at vertical load of 36 kN and horizontal dynamic load of 22 kN.

Figure B-41. Lamb Canyon Sanitary Landfill #1: Steady-state dynamic testing at vertical load of 71 kN and horizontal dynamic load of 31 kN.
Figure B-42. Lamb Canyon Sanitary Landfill #1: Steady-state dynamic testing at vertical load of 71 kN and horizontal dynamic load of 36 kN.

Figure B-43. Lamb Canyon Sanitary Landfill #1: Steady-state dynamic testing at vertical load of 71 kN and horizontal dynamic load of 40 kN.
Figure B-44. Lamb Canyon Sanitary Landfill #1: Steady-state dynamic testing at vertical load of 71 kN and horizontal dynamic load of 44 kN.

Figure B-45. Lamb Canyon Sanitary Landfill #1: Steady-state dynamic testing at vertical load of 71 kN and horizontal dynamic load of 53 kN.
Figure B-46. Lamb Canyon Sanitary Landfill #1: Steady-state dynamic testing at vertical load of 71 kN and horizontal dynamic load of 62 kN.

Figure B-47. Lamb Canyon Sanitary Landfill #1: Steady-state dynamic testing at vertical load of 71 kN and horizontal dynamic load of 85 kN.
Figure B-48. Lamb Canyon Sanitary Landfill #1: Steady-state dynamic testing at vertical load of 133 kN and horizontal dynamic load of 27 kN.

Figure B-49. Lamb Canyon Sanitary Landfill #1: Steady-state dynamic testing at vertical load of 133 kN and horizontal dynamic load of 31 kN.
Figure B-50. Lamb Canyon Sanitary Landfill #1: Steady-state dynamic testing at vertical load of 133 kN and horizontal dynamic load of 40 kN.

Figure B-51. Lamb Canyon Sanitary Landfill #1: Steady-state dynamic testing at vertical load of 133 kN and horizontal dynamic load of 53 kN.
Figure B-52. Lamb Canyon Sanitary Landfill #1: Steady-state dynamic testing at vertical load of 133 kN and horizontal dynamic load of 67 kN.

Figure B-53. Lamb Canyon Sanitary Landfill #1: Steady-state dynamic testing at vertical load of 133 kN and horizontal dynamic load of 89 kN.
Figure B-54. Lamb Canyon Sanitary Landfill #1: Steady-state dynamic testing at vertical load of 133 kN and horizontal dynamic load of 133 kN.
B.2 Lamb Canyon Sanitary Landfill Location 2

B.2.1 Downhole Seismic Testing

Figure B-55. Lamb Canyon Sanitary Landfill #2 (east hole): Downhole seismic testing at vertical load of 0 kN: (a) $V_{p,Z}$, (b) $V_{s,ZX}$, and (c) $V_{s,ZY}$. 
Figure B-56. Lamb Canyon Sanitary Landfill #2 (east hole): Downhole seismic testing at vertical load of 18 kN: (a) $V_p-Z$, (b) $V_s-ZX$, and (c) $V_s-ZY$. 
Figure B-57. Lamb Canyon Sanitary Landfill #2 (east hole): Downhole seismic testing at vertical load of 36 kN: (a) $V_p$-$Z$, (b) $V_s$-$ZX$, and (c) $V_s$-$ZY$. 

LCSL Location 2: East Hole Array

Downhole seismic testing; Vertical static load ~ 36 kN

Spacing 6 in., $\Delta t_1 = 0.508$ msec
$V_p$-$Z = 984$ ft/s = 300 m/s

Spacing 8 in., $\Delta t_2 = 0.664$ msec
$V_p$-$Z = 1003$ ft/s = 305 m/s

Spacing 10 in., $\Delta t_3 = 0.898$ msec
$V_p$-$Z = 927$ ft/s = 282 m/s

$LCSL$ Location 2: East Hole Array

Downhole seismic testing; Vertical static load ~ 36 kN

Spacing 6 in., $\Delta t_1 = 1.055$ msec
$V_s$-$ZX = 474$ ft/s = 144 m/s

Spacing 8 in., $\Delta t_2 = 1.289$ msec
$V_s$-$ZX = 517$ ft/s = 157 m/s

Spacing 10 in., $\Delta t_3 = 1.543$ msec
$V_s$-$ZX = 540$ ft/s = 164 m/s

$LCSL$ Location 2: East Hole Array

Downhole seismic testing; Vertical static load ~ 36 kN

Spacing 6 in., $\Delta t_1 = 0.957$ msec
$V_s$-$ZY = 522$ ft/s = 159 m/s

Spacing 8 in., $\Delta t_2 = 1.328$ msec
$V_s$-$ZY = 501$ ft/s = 152 m/s

Spacing 10 in., $\Delta t_3 = 1.543$ msec
$V_s$-$ZY = 540$ ft/s = 164 m/s
Figure B-58. Lamb Canyon Sanitary Landfill #2 (east hole): Downhole seismic testing at vertical load of 71 kN: (a) $V_p-Z$, (b) $V_s-Z_X$, and (c) $V_s-Z_Y$. 

Normalized Magnitude

LCSL Location 2: East Hole Array
Downhole seismic testing; Vertical static load ~ 71 kN

Spacing 6 in., $\Delta t_1 = 0.449$ msec
$V_p-Z = 1113$ ft/s = 339 m/s

Spacing 8 in., $\Delta t_2 = 0.605$ msec
$V_p-Z = 1101$ ft/s = 335 m/s

Spacing 10 in., $\Delta t_3 = 0.859$ msec
$V_p-Z = 969$ ft/s = 295 m/s

LCSL Location 2: East Hole Array
Downhole seismic testing; Vertical static load ~ 71 kN

Spacing 6 in., $\Delta t_1 = 0.312$ msec
$V_s-Z_X = 1600$ ft/s = 487 m/s

Spacing 8 in., $\Delta t_2 = 1.191$ msec
$V_s-Z_X = 559$ ft/s = 170 m/s

Spacing 10 in., $\Delta t_3 = 1.504$ msec
$V_s-Z_X = 554$ ft/s = 168 m/s

LCSL Location 2: East Hole Array
Downhole seismic testing; Vertical static load ~ 71 kN

Spacing 6 in., $\Delta t_1 = 0.957$ msec
$V_s-Z_Y = 522$ ft/s = 159 m/s

Spacing 8 in., $\Delta t_2 = 1.133$ msec
$V_s-Z_Y = 588$ ft/s = 179 m/s

Spacing 10 in., $\Delta t_3 = 1.504$ msec
$V_s-Z_Y = 554$ ft/s = 168 m/s
Figure B-59. Lamb Canyon Sanitary Landfill #2 (east hole): Downhole seismic testing at vertical load of 107 kN: (a) $V_{p-Z}$, (b) $V_{s-ZX}$, and (c) $V_{s-ZY}$. 

- LCSL Location 2: East Hole Array
- Downhole seismic testing; Vertical static load ~ 107 kN
- Spacing 6 in., $\Delta t_{-1} = 0.391$ msec $V_{p-Z} = 1279$ ft/s = 390 m/s
- Spacing 8 in., $\Delta t_{-2} = 0.547$ msec $V_{p-Z} = 1219$ ft/s = 371 m/s
- Spacing 10 in., $\Delta t_{-3} = 0.820$ msec $V_{p-Z} = 1015$ ft/s = 309 m/s
- Spacing 6 in., $\Delta t_{-1} = 0.840$ msec $V_{s-ZX} = 595$ ft/s = 181 m/s
- Spacing 8 in., $\Delta t_{-2} = 1.035$ msec $V_{s-ZX} = 644$ ft/s = 196 m/s
- Spacing 10 in., $\Delta t_{-3} = 1.465$ msec $V_{s-ZX} = 568$ ft/s = 173 m/s
- Spacing 6 in., $\Delta t_{-1} = 0.762$ msec $V_{s-ZY} = 656$ ft/s = 200 m/s
- Spacing 8 in., $\Delta t_{-2} = 1.094$ msec $V_{s-ZY} = 609$ ft/s = 185 m/s
- Spacing 10 in., $\Delta t_{-3} = 1.484$ msec $V_{s-ZY} = 561$ ft/s = 171 m/s
Figure B-60. Lamb Canyon Sanitary Landfill #2 (west hole): Downhole seismic testing at vertical load of 0 kN: (a) $V_p-Z$, (b) $V_s-ZX$, and (c) $V_s-ZY$. 
Figure B-61. Lamb Canyon Sanitary Landfill #2 (west hole): Downhole seismic testing at vertical load of 18 kN: (a) $V_p$-Z, (b) $V_s$-ZX, and (c) $V_s$-ZY.
Figure B-62. Lamb Canyon Sanitary Landfill #2 (west hole): Downhole seismic testing at vertical load of 36 kN: (a) $V_{p-Z}$, (b) $V_{s-ZX}$, and (c) $V_{s-ZY}$. 
Figure B-63. Lamb Canyon Sanitary Landfill #2 (west hole): Downhole seismic testing at vertical load of 71 kN: (a) $V_{p-Z}$, (b) $V_{s-ZX}$, and (c) $V_{s-ZY}$. 
Figure B-64. Lamb Canyon Sanitary Landfill #2 (west hole): Downhole seismic testing at vertical load of 107 kN: (a) $V_p-Z$, (b) $V_s-ZX$, and (c) $V_s-ZY$. 
B.2.2 Crosshole Seismic Testing

Figure B-65. Lamb Canyon Sanitary Landfill #2 (rod A): Crosshole seismic testing at vertical load of 0 kN: (a) $V_{p,X}$ and (b) $V_{s,XZ}$.

Figure B-66. Lamb Canyon Sanitary Landfill #2 (rod A): Crosshole seismic testing at vertical load of 18 kN: (a) $V_{p,X}$ and (b) $V_{s,XZ}$. 
Figure B-67. Lamb Canyon Sanitary Landfill #2 (rod A): Crosshole seismic testing at vertical load of 36 kN: (a) $V_p$ and (b) $V_s$.

Figure B-68. Lamb Canyon Sanitary Landfill #2 (rod A): Crosshole seismic testing at vertical load of 71 kN: (a) $V_p$ and (b) $V_s$. 

LCSL Location 2: G11X-G12X
Crosshole seismic testing; Vertical static load ~ 36 kN
Hit on rod A

Spacing = 18 in.
$\Delta t = 1.211$ msec
$V_{p,X} = 1238$ ft/s = 377 m/s

LCSL Location 2: G11Z-G12Z
Crosshole seismic testing; Vertical static load ~ 36 kN
Hit on rod A

Spacing = 18 in.
$\Delta t = 2.891$ msec
$V_{s,XZ} = 518$ ft/s = 158 m/s

LCSL Location 2: G11X-G12X
Crosshole seismic testing; Vertical static load ~ 71 kN
Hit on rod A

Spacing = 18 in.
$\Delta t = 1.191$ msec
$V_{p,X} = 1259$ ft/s = 383 m/s

LCSL Location 2: G11Z-G12Z
Crosshole seismic testing; Vertical static load ~ 71 kN
Hit on rod A

Spacing = 18 in.
$\Delta t = 2.793$ msec
$V_{s,XZ} = 537$ ft/s = 163 m/s
Figure B-69. Lamb Canyon Sanitary Landfill #2 (rod A): Crosshole seismic testing at vertical load of 107 kN: (a) $V_{p-X}$ and (b) $V_{s-XZ}$.

Figure B-70. Lamb Canyon Sanitary Landfill #2 (rod B): Crosshole seismic testing at vertical load of 0 kN: (a) $V_{p-X}$ and (b) $V_{s-XZ}$. 
Figure B-71. Lamb Canyon Sanitary Landfill #2 (rod B): Crosshole seismic testing at vertical load of 18 kN: (a) $V_p-X$ and (b) $V_s-XZ$.

Figure B-72. Lamb Canyon Sanitary Landfill #2 (rod B): Crosshole seismic testing at vertical load of 36 kN: (a) $V_p-X$ and (b) $V_s-XZ$. 

Normalized Magnitude

Source trigger

Spacing = 18 in.
$\Delta t = 1.289$ msec
$V_{p-X} = 1163$ ft/s = 354 m/s

Normalized Magnitude

Source trigger

Spacing = 18 in.
$\Delta t = 2.988$ msec
$V_{s-XZ} = 501$ ft/s = 152 m/s
Figure B-73. Lamb Canyon Sanitary Landfill #2 (rod B): Crosshole seismic testing at vertical load of (a) 71 kN and (b) 107 kN: $V_{s-XZ}$.

Figure B-74. Lamb Canyon Sanitary Landfill #2 (rod C): Crosshole seismic testing at vertical load of 0 kN: $V_{s-XZ}$. 
Figure B-75. Lamb Canyon Sanitary Landfill #2 (rod C): Crosshole seismic testing at vertical load of 18 kN: (a) $V_p-X$ and (b) $V_s-XZ$.

Figure B-76. Lamb Canyon Sanitary Landfill #2 (rod C): Crosshole seismic testing at vertical load of 36 kN: (a) $V_p-X$ and (b) $V_s-XZ$. 
Figure B-77. Lamb Canyon Sanitary Landfill #2 (rod C): Crosshole seismic testing at vertical load of 71 kN: (a) $V_{p-X}$ and (b) $V_{s-XZ}$.

Figure B-78. Lamb Canyon Sanitary Landfill #2 (rod C): Crosshole seismic testing at vertical load of 107 kN: (a) $V_{p-X}$ and (b) $V_{s-XZ}$. 

LCSL Location 2: G7X-G8X
Crosshole seismic testing; Vertical static load – 71 kN
Hit on rod C

Normalized Magnitude

Source trigger

Spacing = 18 in.
$\Delta t = 1.230$ msec
$V_{p-X} = 1219$ ft/s = 371 m/s

Normalized Magnitude

LCSL Location 2: G7Z-G8Z
Crosshole seismic testing; Vertical static load – 71 kN
Hit on rod C

Normalized Magnitude

Source trigger

Spacing = 18 in.
$\Delta t = 2.461$ msec
$V_{s-XZ} = 609$ ft/s = 185 m/s

Normalized Magnitude

LCSL Location 2: G7X-G8X
Crosshole seismic testing; Vertical static load – 107 kN
Hit on rod C

Normalized Magnitude

Source trigger

Spacing = 18 in.
$\Delta t = 1.094$ msec
$V_{p-X} = 1371$ ft/s = 418 m/s

Normalized Magnitude

LCSL Location 2: G7Z-G8Z
Crosshole seismic testing; Vertical static load – 107 kN
Hit on rod C

Normalized Magnitude

Source trigger

Spacing = 18 in.
$\Delta t = 2.129$ msec
$V_{s-XZ} = 704$ ft/s = 214 m/s
B.2.3 Steady-state Dynamic Testing

Figure B-79. Lamb Canyon Sanitary Landfill #2: Steady-state dynamic testing at vertical load of 18 kN and horizontal dynamic load of 1 kN.

Figure B-80. Lamb Canyon Sanitary Landfill #2: Steady-state dynamic testing at vertical load of 18 kN and horizontal dynamic load of 4 kN.
Figure B-81. Lamb Canyon Sanitary Landfill #2: Steady-state dynamic testing at vertical load of 18 kN and horizontal dynamic load of 9 kN.

Figure B-82. Lamb Canyon Sanitary Landfill #2: Steady-state dynamic testing at vertical load of 18 kN and horizontal dynamic load of 11 kN.
Figure B-83. Lamb Canyon Sanitary Landfill #2: Steady-state dynamic testing at vertical load of 18 kN and horizontal dynamic load of 13 kN.

Figure B-84. Lamb Canyon Sanitary Landfill #2: Steady-state dynamic testing at vertical load of 18 kN and horizontal dynamic load of 18 kN.
Figure B-85. Lamb Canyon Sanitary Landfill #2: Steady-state dynamic testing at vertical load of 36 kN and horizontal dynamic load of 1 kN.

Figure B-86. Lamb Canyon Sanitary Landfill #2: Steady-state dynamic testing at vertical load of 36 kN and horizontal dynamic load of 2 kN.
Figure B-87. Lamb Canyon Sanitary Landfill #2: Steady-state dynamic testing at vertical load of 36 kN and horizontal dynamic load of 4 kN.

Figure B-88. Lamb Canyon Sanitary Landfill #2: Steady-state dynamic testing at vertical load of 36 kN and horizontal dynamic load of 7 kN.
Figure B-89. Lamb Canyon Sanitary Landfill #2: Steady-state dynamic testing at vertical load of 36 kN and horizontal dynamic load of 9 kN.

Figure B-90. Lamb Canyon Sanitary Landfill #2: Steady-state dynamic testing at vertical load of 36 kN and horizontal dynamic load of 11 kN.
Figure B-91. Lamb Canyon Sanitary Landfill #2: Steady-state dynamic testing at vertical load of 36 kN and horizontal dynamic load of 18 kN.

Figure B-92. Lamb Canyon Sanitary Landfill #2: Steady-state dynamic testing at vertical load of 71 kN and horizontal dynamic load of 27 kN.
Figure B-93. Lamb Canyon Sanitary Landfill #2: Steady-state dynamic testing at vertical load of 71 kN and horizontal dynamic load of 36 kN.

Figure B-94. Lamb Canyon Sanitary Landfill #2: Steady-state dynamic testing at vertical load of 71 kN and horizontal dynamic load of 44 kN.
Figure B-95. Lamb Canyon Sanitary Landfill #2: Steady-state dynamic testing at vertical load of 71 kN and horizontal dynamic load of 53 kN.

Figure B-96. Lamb Canyon Sanitary Landfill #2: Steady-state dynamic testing at vertical load of 71 kN and horizontal dynamic load of 71 kN.
Figure B-97. Lamb Canyon Sanitary Landfill #2: Steady-state dynamic testing at vertical load of 71 kN and horizontal dynamic load of 98 kN.

Figure B-98. Lamb Canyon Sanitary Landfill #2: Steady-state dynamic testing at vertical load of 71 kN and horizontal dynamic load of 133 kN.
Figure B-99. Lamb Canyon Sanitary Landfill #2: Steady-state dynamic testing at vertical load of 133 kN and horizontal dynamic load of 31 kN.

Figure B-100. Lamb Canyon Sanitary Landfill #2: Steady-state dynamic testing at vertical load of 133 kN and horizontal dynamic load of 36 kN.
Figure B-101. Lamb Canyon Sanitary Landfill #2: Steady-state dynamic testing at vertical load of 133 kN and horizontal dynamic load of 44 kN.

Figure B-102. Lamb Canyon Sanitary Landfill #2: Steady-state dynamic testing at vertical load of 133 kN and horizontal dynamic load of 53 kN.
Figure B-103. Lamb Canyon Sanitary Landfill #2: Steady-state dynamic testing at vertical load of 133 kN and horizontal dynamic load of 71 kN.

Figure B-104. Lamb Canyon Sanitary Landfill #2: Steady-state dynamic testing at vertical load of 133 kN and horizontal dynamic load of 98 kN.
Figure B-105. Lamb Canyon Sanitary Landfill #2: Steady-state dynamic testing at vertical load of 133 kN and horizontal dynamic load of 133 kN.
B.3 Lamb Canyon Sanitary Landfill Location 3

B.3.1 Downhole Seismic Testing

Figure B-106. Lamb Canyon Sanitary Landfill #3 (east hole): Downhole seismic testing at vertical load of 0 kN: (a) $V_p-Z$, (b) $V_{s-ZX}$, and (c) $V_{s-ZY}$. 

- Spacing 6 in., $\Delta t_1 = 0.605$ msec
  - $V_p-Z = 825$ ft/s = 251 m/s

- Spacing 8 in., $\Delta t_2 = 1.191$ msec
  - $V_p-Z = 559$ ft/s = 170 m/s

- Spacing 10 in., $\Delta t_3 = 1.504$ msec
  - $V_p-Z = 554$ ft/s = 168 m/s

- Spacing 6 in., $\Delta t_1 = 1.211$ msec
  - $V_{s-ZX} = 412$ ft/s = 125 m/s

- Spacing 8 in., $\Delta t_2 = 1.992$ msec
  - $V_{s-ZX} = 334$ ft/s = 101 m/s

- Spacing 10 in., $\Delta t_3 = 2.695$ msec
  - $V_{s-ZX} = 309$ ft/s = 94 m/s

- Spacing 6 in., $\Delta t_1 = 1.230$ msec
  - $V_{s-ZY} = 406$ ft/s = 123 m/s

- Spacing 8 in., $\Delta t_2 = 2.168$ msec
  - $V_{s-ZY} = 307$ ft/s = 93 m/s

- Spacing 10 in., $\Delta t_3 = 2.637$ msec
  - $V_{s-ZY} = 316$ ft/s = 96 m/s
Figure B-107. Lamb Canyon Sanitary Landfill #3 (east hole): Downhole seismic testing at vertical load of 18 kN: (a) $V_p-Z$, (b) $V_s-ZX$, and (c) $V_s-ZY$. 
Figure B-108. Lamb Canyon Sanitary Landfill #3 (east hole): Downhole seismic testing at vertical load of 36 kN: (a) $V_p$-Z, (b) $V_s$-ZX, and (c) $V_s$-ZY.
Figure B-109. Lamb Canyon Sanitary Landfill #3 (east hole): Downhole seismic testing at vertical load of 71 kN: (a) $V_{p-Z}$, (b) $V_{s-ZX}$, and (c) $V_{s-ZY}$. 
Figure B-110. Lamb Canyon Sanitary Landfill #3 (east hole): Downhole seismic testing at vertical load of 98 kN: (a) $V_{p-Z}$, (b) $V_{s-ZX}$, and (c) $V_{s-ZY}$. 
Figure B-111. Lamb Canyon Sanitary Landfill #3 (west hole): Downhole seismic testing at vertical load of 0 kN: (a) $V_{P-Z}$, (b) $V_{S-ZX}$, and (c) $V_{S-ZY}$. 

**LCSL Location 3: West Hole Array**

Downhole seismic testing; Vertical static load ~ 0 kN

(a) $V_{P-Z}$

Spacing 6 in., $\Delta t_{1} = 0.605$ msec

$V_{P-Z} = 825$ ft/s = 251 m/s

Spacing 8 in., $\Delta t_{2} = 1.094$ msec

$V_{P-Z} = 609$ ft/s = 185 m/s

Spacing 10 in., $\Delta t_{3} = 1.309$ msec

$V_{P-Z} = 636$ ft/s = 194 m/s

(b) $V_{S-ZX}$

Spacing 6 in., $\Delta t_{1} = 1.113$ msec

$V_{S-ZX} = 449$ ft/s = 136 m/s

Spacing 8 in., $\Delta t_{2} = 2.168$ msec

$V_{S-ZX} = 307$ ft/s = 93 m/s

Spacing 10 in., $\Delta t_{3} = 2.383$ msec

$V_{S-ZX} = 349$ ft/s = 106 m/s

(c) $V_{S-ZY}$

Spacing 6 in., $\Delta t_{1} = 1.309$ msec

$V_{S-ZY} = 382$ ft/s = 116 m/s

Spacing 8 in., $\Delta t_{2} = 1.934$ msec

$V_{S-ZY} = 344$ ft/s = 105 m/s

Spacing 10 in., $\Delta t_{3} = 2.344$ msec

$V_{S-ZY} = 355$ ft/s = 108 m/s
Figure B-112. Lamb Canyon Sanitary Landfill #3 (west hole): Downhole seismic testing at vertical load of 18 kN: (a) $V_{p-Z}$, (b) $V_{s-ZX}$, and (c) $V_{s-ZY}$. 

(a) Normalized Magnitude

(b) Normalized Magnitude

(c) Normalized Magnitude

<table>
<thead>
<tr>
<th>LCSL Location 3: West Hole Array</th>
<th>LCSL Location 3: West Hole Array</th>
<th>LCSL Location 3: West Hole Array</th>
</tr>
</thead>
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<tr>
<td>Downhole seismic testing; Vertical static load ~ 18 kN</td>
<td>Downhole seismic testing; Vertical static load ~ 18 kN</td>
<td>Downhole seismic testing; Vertical static load ~ 18 kN</td>
</tr>
<tr>
<td>Spacing 6 in., $\Delta_t^{-1} = 0.527$ msec</td>
<td>Spacing 6 in., $\Delta_t^{-1} = 1.016$ msec</td>
<td>Spacing 6 in., $\Delta_t^{-1} = 1.133$ msec</td>
</tr>
<tr>
<td>$V_{p-Z} = 948$ ft/s = 288 m/s</td>
<td>$V_{s-ZX} = 492$ ft/s = 150 m/s</td>
<td>$V_{s-ZY} = 441$ ft/s = 134 m/s</td>
</tr>
<tr>
<td>Spacing 8 in., $\Delta_t^{-2} = 0.996$ msec</td>
<td>Spacing 8 in., $\Delta_t^{-2} = 1.973$ msec</td>
<td>Spacing 8 in., $\Delta_t^{-2} = 1.836$ msec</td>
</tr>
<tr>
<td>$V_{p-Z} = 669$ ft/s = 203 m/s</td>
<td>$V_{s-ZX} = 337$ ft/s = 103 m/s</td>
<td>$V_{s-ZY} = 363$ ft/s = 110 m/s</td>
</tr>
<tr>
<td>Spacing 10 in., $\Delta_t^{-3} = 1.270$ msec</td>
<td>Spacing 10 in., $\Delta_t^{-3} = 2.227$ msec</td>
<td>Spacing 10 in., $\Delta_t^{-3} = 2.188$ msec</td>
</tr>
<tr>
<td>$V_{p-Z} = 656$ ft/s = 200 m/s</td>
<td>$V_{s-ZX} = 374$ ft/s = 114 m/s</td>
<td>$V_{s-ZY} = 380$ ft/s = 116 m/s</td>
</tr>
</tbody>
</table>
Figure B-113. Lamb Canyon Sanitary Landfill #3 (west hole): Downhole seismic testing at vertical load of 36 kN: (a) $V_{p-Z}$, (b) $V_{s-ZX}$, and (c) $V_{s-ZY}$. 
Figure B-114. Lamb Canyon Sanitary Landfill #3 (west hole): Downhole seismic testing at vertical load of 71 kN: (a) $V_{p-Z}$, (b) $V_{s-ZX}$, and (c) $V_{s-ZY}$. 
Figure B-115. Lamb Canyon Sanitary Landfill #3 (west hole): Downhole seismic testing at vertical load of 98 kN: (a) $V_{p-Z}$, (b) $V_{s-ZX}$, and (c) $V_{s-ZY}$. 

(a) 

(b) 

(c)
B.3.2 Crosshole Seismic Testing

Figure B-116. Lamb Canyon Sanitary Landfill #3 (rod A): Crosshole seismic testing at vertical load of 0 kN: (a) $V_{p,X}$ and (b) $V_{s,XZ}$.

Figure B-117. Lamb Canyon Sanitary Landfill #3 (rod A): Crosshole seismic testing at vertical load of 18 kN: (a) $V_{p,X}$ and (b) $V_{s,XZ}$. 

(a) (b)
Figure B-118. Lamb Canyon Sanitary Landfill #3 (rod A): Crosshole seismic testing at vertical load of 36 kN: (a) $V_{p-X}$ and (b) $V_{s-XZ}$.

Figure B-119. Lamb Canyon Sanitary Landfill #3 (rod A): Crosshole seismic testing at vertical load of 71 kN: (a) $V_{p-X}$ and (b) $V_{s-XZ}$. 
Figure B-120. Lamb Canyon Sanitary Landfill #3 (rod A): Crosshole seismic testing at vertical load of 98 kN: (a) $V_p$ and (b) $V_s$.

Figure B-121. Lamb Canyon Sanitary Landfill #3 (rod B): Crosshole seismic testing at vertical load of 0 kN: (a) $V_p$ and (b) $V_s$. 

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LCSL Location 3: G3X-G4X
Crosshole seismic testing; Vertical static load ~ 98 kN
Hit on rod A

LCSL Location 3: G3Z-G4Z
Crosshole seismic testing; Vertical static load ~ 98 kN
Hit on rod A

LCSL Location 3: G1X-G6X
Crosshole seismic testing; Vertical static load ~ 0 kN
Hit on rod B

LCSL Location 3: G1Z-G6Z
Crosshole seismic testing; Vertical static load ~ 0 kN
Hit on rod B

- Source trigger
- Spacing = 18 in.
- $\Delta t = 1.973$ msec
- $V_{p} = 760$ ft/s = 231 m/s
- $V_{s} = 412$ ft/s = 125 m/s
- $V_{s} = 752$ ft/s = 229 m/s
- $V_{s} = 314$ ft/s = 95 m/s
Figure B-122. Lamb Canyon Sanitary Landfill #3 (rod B): Crosshole seismic testing at vertical load of 18 kN: (a) $V_{p-X}$ and (b) $V_{s-XZ}$.

Figure B-123. Lamb Canyon Sanitary Landfill #3 (rod B): Crosshole seismic testing at vertical load of 36 kN: (a) $V_{p-X}$ and (b) $V_{s-XZ}$.
Figure B-124. Lamb Canyon Sanitary Landfill #3 (rod B): Crosshole seismic testing at vertical load of 71 kN: (a) $V_{p-X}$ and (b) $V_{s-XZ}$.

Figure B-125. Lamb Canyon Sanitary Landfill #3 (rod C): Crosshole seismic testing at vertical load of (a) 0 kN and (b) 18 kN: $V_{p-X}$. 
Figure B-126. Lamb Canyon Sanitary Landfill #3 (rod C): Crosshole seismic testing at vertical load of (a) 36 kN and (b) 71 kN: $V_{p-X}$.

Figure B-127. Lamb Canyon Sanitary Landfill #3 (rod C): Crosshole seismic testing at vertical load of 98 kN: $V_{p-X}$. 
B.3.3 Steady-state Dynamic Testing

Figure B-128. Lamb Canyon Sanitary Landfill #3: Steady-state dynamic testing at vertical load of 18 kN and horizontal dynamic load of 1 kN.

Figure B-129. Lamb Canyon Sanitary Landfill #3: Steady-state dynamic testing at vertical load of 18 kN and horizontal dynamic load of 2 kN.
Figure B-130. Lamb Canyon Sanitary Landfill #3: Steady-state dynamic testing at vertical load of 18 kN ton and horizontal dynamic load of 4 kN.

Figure B-131. Lamb Canyon Sanitary Landfill #3: Steady-state dynamic testing at vertical load of 18 kN ton and horizontal dynamic load of 7 kN.
Figure B-132. Lamb Canyon Sanitary Landfill #3: Steady-state dynamic testing at vertical load of 18 kN and horizontal dynamic load of 9 kN.

Figure B-133. Lamb Canyon Sanitary Landfill #3: Steady-state dynamic testing at vertical load of 18 kN and horizontal dynamic load of 11 kN.
Figure B-134. Lamb Canyon Sanitary Landfill #3: Steady-state dynamic testing at vertical load of 36 kN and horizontal dynamic load of 0.6 kN.

Figure B-135. Lamb Canyon Sanitary Landfill #3: Steady-state dynamic testing at vertical load of 36 kN and horizontal dynamic load of 1 kN.
Figure B-136. Lamb Canyon Sanitary Landfill #3: Steady-state dynamic testing at vertical load of 36 kN and horizontal dynamic load of 2 kN.

Figure B-137. Lamb Canyon Sanitary Landfill #3: Steady-state dynamic testing at vertical load of 36 kN and horizontal dynamic load of 4 kN.
Figure B-138. Lamb Canyon Sanitary Landfill #3: Steady-state dynamic testing at vertical load of 36 kN and horizontal dynamic load of 9 kN.

Figure B-139. Lamb Canyon Sanitary Landfill #3: Steady-state dynamic testing at vertical load of 36 kN and horizontal dynamic load of 13 kN.
Figure B-140. Lamb Canyon Sanitary Landfill #3: Steady-state dynamic testing at vertical load of 36 kN and horizontal dynamic load of 18 kN.

Figure B-141. Lamb Canyon Sanitary Landfill #3: Steady-state dynamic testing at vertical load of 71 kN and horizontal dynamic load of 31 kN.
Figure B-142. Lamb Canyon Sanitary Landfill #3: Steady-state dynamic testing at vertical load of 71 kN and horizontal dynamic load of 36 kN.

Figure B-143. Lamb Canyon Sanitary Landfill #3: Steady-state dynamic testing at vertical load of 71 kN and horizontal dynamic load of 40 kN.
Figure B-144. Lamb Canyon Sanitary Landfill #3: Steady-state dynamic testing at vertical load of 71 kN and horizontal dynamic load of 44 kN.

Figure B-145. Lamb Canyon Sanitary Landfill #3: Steady-state dynamic testing at vertical load of 71 kN and horizontal dynamic load of 53 kN.
Figure B-146. Lamb Canyon Sanitary Landfill #3: Steady-state dynamic testing at vertical load of 71 kN and horizontal dynamic load of 71 kN.

Figure B-147. Lamb Canyon Sanitary Landfill #3: Steady-state dynamic testing at vertical load of 71 kN and horizontal dynamic load of 98 kN.
Figure B-148. Lamb Canyon Sanitary Landfill #3: Steady-state dynamic testing at vertical load of 71 kN and horizontal dynamic load of 133 kN.

Figure B-149. Lamb Canyon Sanitary Landfill #3: Steady-state dynamic testing at vertical load of 133 kN and horizontal dynamic load of 31 kN.
Figure B-150. Lamb Canyon Sanitary Landfill #3: Steady-state dynamic testing at vertical load of 133 kN and horizontal dynamic load of 36 kN.

Figure B-151. Lamb Canyon Sanitary Landfill #3: Steady-state dynamic testing at vertical load of 133 kN and horizontal dynamic load of 40 kN.
Figure B-152. Lamb Canyon Sanitary Landfill #3: Steady-state dynamic testing at vertical load of 133 kN and horizontal dynamic load of 44 kN.

Figure B-153. Lamb Canyon Sanitary Landfill #3: Steady-state dynamic testing at vertical load of 133 kN and horizontal dynamic load of 53 kN.
Figure B-154. Lamb Canyon Sanitary Landfill #3: Steady-state dynamic testing at vertical load of 133 kN and horizontal dynamic load of 71 kN.

Figure B-155. Lamb Canyon Sanitary Landfill #3: Steady-state dynamic testing at vertical load of 133 kN and horizontal dynamic load of 111 kN.
Figure B-156. Lamb Canyon Sanitary Landfill #3: Steady-state dynamic testing at vertical load of 133 kN and horizontal dynamic load of 133 kN.
C Los Reales Landfill Testing Results
C.1 Los Reales Landfill Location 1

C.1.1 Downhole Seismic Testing

Figure C-1. Los Reales Landfill #1 (east hole): Downhole seismic testing at vertical load of 0 kN: (a) $V_{p-Z}$, (b) $V_{s-ZX}$, and (c) $V_{s-ZY}$.
Figure C-2. Los Reales Landfill #1 (east hole): Downhole seismic testing at vertical load of 18 kN: (a) $V_p\text{-}Z$, (b) $V_s\text{-}ZX$, and (c) $V_s\text{-}ZY$. 

Los Reales Location 1: East Hole Array
Downhole seismic testing; Vertical static load ~ 18 kN

Spacing 12 in., $\Delta t_{-2} = 1.328$ msec
$V_p\text{-}Z = 752$ ft/s = 229 m/s

Spacing 16 in., $\Delta t_{-3} = 1.367$ msec
$V_p\text{-}Z = 975$ ft/s = 297 m/s

Spacing 12 in., $\Delta t_{-2} = 2.422$ msec
$V_s\text{-}ZX = 412$ ft/s = 125 m/s

Spacing 16 in., $\Delta t_{-3} = 2.324$ msec
$V_s\text{-}ZX = 573$ ft/s = 174 m/s

Spacing 12 in., $\Delta t_{-2} = 2.734$ msec
$V_s\text{-}ZY = 365$ ft/s = 111 m/s

Spacing 16 in., $\Delta t_{-3} = 2.266$ msec
$V_s\text{-}ZY = 588$ ft/s = 179 m/s
Figure C-3. Los Reales Landfill #1 (east hole): Downhole seismic testing at vertical load of 36 kN: (a) $V_{p-Z}$, (b) $V_{s-ZX}$, and (c) $V_{s-ZY}$. 
Figure C-4. Los Reales Landfill #1 (east hole): Downhole seismic testing at vertical load of 71 kN: (a) $V_p-Z$, (b) $V_s-ZX$, and (c) $V_s-ZY$. 

Los Reales Location 1: East Hole Array
Downhole seismic testing; Vertical static load ~ 71 kN

Spacing 12 in., $\Delta t_{-2} = 1.191$ msec
$V_p-Z = 839$ ft/s = 255 m/s

Spacing 16 in., $\Delta t_{-3} = 1.191$ msec
$V_p-Z = 1119$ ft/s = 341 m/s

Spacing 12 in., $\Delta t_{-2} = 2.266$ msec
$V_s-ZX = 441$ ft/s = 134 m/s

Spacing 16 in., $\Delta t_{-3} = 2.168$ msec
$V_s-ZX = 615$ ft/s = 187 m/s

Spacing 12 in., $\Delta t_{-2} = 2.480$ msec
$V_s-ZY = 403$ ft/s = 122 m/s

Spacing 16 in., $\Delta t_{-3} = 2.168$ msec
$V_s-ZY = 615$ ft/s = 187 m/s
Figure C-5. Los Reales Landfill #1 (east hole): Downhole seismic testing at vertical load of 111 kN: (a) $V_p-Z$, (b) $V_s-ZX$, and (c) $V_s-ZY$. 
Figure C-6. Los Reales Landfill #1 (west hole): Downhole seismic testing at vertical load of 18 kN: (a) $V_{p-Z}$, (b) $V_{s-ZX}$, and (c) $V_{s-ZY}$. 

Los Reales Location 1: West Hole Array
Downhole seismic testing; Vertical static load ~ 18 kN

Spacing 12 in., $\Delta t_{12} = 1.035$ msec
$V_{p-Z} = 966$ ft/s = 294 m/s

Spacing 16 in., $\Delta t_{16} = 1.602$ msec
$V_{p-Z} = 832$ ft/s = 253 m/s

Spacing 6 in., $\Delta t_{6} = 0.840$ msec
$V_{s-ZX} = 595$ ft/s = 181 m/s

Spacing 12 in., $\Delta t_{12} = 2.031$ msec
$V_{s-ZX} = 492$ ft/s = 150 m/s

Spacing 16 in., $\Delta t_{16} = 2.891$ msec
$V_{s-ZX} = 461$ ft/s = 140 m/s

Spacing 6 in., $\Delta t_{6} = 0.957$ msec
$V_{s-ZY} = 522$ ft/s = 159 m/s

Spacing 12 in., $\Delta t_{12} = 1.641$ msec
$V_{s-ZY} = 609$ ft/s = 185 m/s

Spacing 16 in., $\Delta t_{16} = 2.930$ msec
$V_{s-ZY} = 455$ ft/s = 138 m/s
Figure C-7. Los Reales Landfill #1 (west hole): Downhole seismic testing at vertical load of 36 kN: (a) $V_p-Z$, (b) $V_s-ZX$, and (c) $V_s-ZY$. 
Figure C-8. Los Reales Landfill #1 (west hole): Downhole seismic testing at vertical load of 71 kN: (a) $V_{p-Z}$, (b) $V_{s-ZX}$, and (c) $V_{s-ZY}$. 
Figure C-9. Los Reales Landfill #1 (west hole): Downhole seismic testing at vertical load of 111 kN: (a) \( V_p-Z \), (b) \( V_s-ZX \), and (c) \( V_s-ZY \).
C.1.2 Crosshole Seismic Testing

Figure C-10. Los Reales Landfill #1 (rod A): Crosshole seismic testing at vertical loads of (a) 18 kN and (b) 36 kN: $V_{s-XZ}$.

Figure C-11. Los Reales Landfill #1 (rod A): Crosshole seismic testing at vertical loads of (a) 71 kN and (b) 111 kN: $V_{s-XZ}$. 

(a) (b)
Figure C-12. Los Reales Landfill #1 (rod B): Crosshole seismic testing at vertical load of 0 kN:
(a) $V_{p,X}$ and (b) $V_{s,XZ}$.

Figure C-13. Los Reales Landfill #1 (rod B): Crosshole seismic testing at vertical load of 18 kN:
(a) $V_{p,X}$ and (b) $V_{s,XZ}$.
Figure C-14. Los Reales Landfill #1 (rod B): Crosshole seismic testing at vertical load of 36 kN: (a) $V_{p-X}$ and (b) $V_{s-XZ}$.

Figure C-15. Los Reales Landfill #1 (rod B): Crosshole seismic testing at vertical load of 71 kN: (a) $V_{p-X}$ and (b) $V_{s-XZ}$. 
Figure C-16. Los Reales Landfill #1 (rod B): Crosshole seismic testing at vertical load of 111 kN: (a) $V_{p-X}$ and (b) $V_{s-XZ}$.

Figure C-17. Los Reales Landfill #1 (rod C): Crosshole seismic testing at vertical load of 0 kN: (a) $V_{p-X}$ and (b) $V_{s-XZ}$. 
Figure C-18. Los Reales Landfill #1 (rod C): Crosshole seismic testing at vertical load of 18 kN:
(a) $V_{p_X}$ and (b) $V_{s_XZ}$.

Figure C-19. Los Reales Landfill #1 (rod C): Crosshole seismic testing at vertical load of 36 kN:
(a) $V_{p_X}$ and (b) $V_{s_XZ}$.
Figure C-20. Los Reales Landfill #1 (rod C): Crosshole seismic testing at vertical loads of (a) 71 kN and (b) 111 kN: $V_{p-X}$.

C.1.3 Steady-state Dynamic Testing

Figure C-21. Los Reales Landfill #1: Steady-state dynamic testing at vertical load of 18 kN and horizontal dynamic load of 1 kN.
Figure C-22. Los Reales Landfill #1: Steady-state dynamic testing at vertical load of 18 kN and horizontal dynamic load of 2 kN.

Figure C-23. Los Reales Landfill #1: Steady-state dynamic testing at vertical load of 18 kN and horizontal dynamic load of 4 kN.
Figure C-24. Los Reales Landfill #1: Steady-state dynamic testing at vertical load of 18 kN and horizontal dynamic load of 7 kN.

Figure C-25. Los Reales Landfill #1: Steady-state dynamic testing at vertical load of 18 kN and horizontal dynamic load of 9 kN.
Figure C-26. Los Reales Landfill #1: Steady-state dynamic testing at vertical load of 36 kN and horizontal dynamic load of 1 kN.

Figure C-27. Los Reales Landfill #1: Steady-state dynamic testing at vertical load of 36 kN and horizontal dynamic load of 2 kN.
Figure C-28. Los Reales Landfill #1: Steady-state dynamic testing at vertical load of 36 kN and horizontal dynamic load of 4 kN.

Figure C-29. Los Reales Landfill #1: Steady-state dynamic testing at vertical load of 36 kN and horizontal dynamic load of 7 kN.
Figure C-30. Los Reales Landfill #1: Steady-state dynamic testing at vertical load of 36 kN and horizontal dynamic load of 11 kN.

Figure C-31. Los Reales Landfill #1: Steady-state dynamic testing at vertical load of 36 kN and horizontal dynamic load of 18 kN.
Figure C-32. Los Reales Landfill #1: Steady-state dynamic testing at vertical load of 71 kN and horizontal dynamic load of 27 kN.

Figure C-33. Los Reales Landfill #1: Steady-state dynamic testing at vertical load of 71 kN and horizontal dynamic load of 31 kN.
Figure C-34. Los Reales Landfill #1: Steady-state dynamic testing at vertical load of 71 kN and horizontal dynamic load of 36 kN.

Figure C-35. Los Reales Landfill #1: Steady-state dynamic testing at vertical load of 71 kN and horizontal dynamic load of 40 kN.
Figure C-36. Los Reales Landfill #1: Steady-state dynamic testing at vertical load of 71 kN and horizontal dynamic load of 44 kN.

Figure C-37. Los Reales Landfill #1: Steady-state dynamic testing at vertical load of 71 kN and horizontal dynamic load of 53 kN.
Figure C-38. Los Reales Landfill #1: Steady-state dynamic testing at vertical load of 71 kN and horizontal dynamic load of 62 kN.

Figure C-39. Los Reales Landfill #1: Steady-state dynamic testing at vertical load of 71 kN and horizontal dynamic load of 85 kN.
Figure C-40. Los Reales Landfill #1: Steady-state dynamic testing at vertical load of 71 kN and horizontal dynamic load of 133 kN.

Figure C-41. Los Reales Landfill #1: Steady-state dynamic testing at vertical load of 133 kN and horizontal dynamic load of 27 kN.
Figure C-42. Los Reales Landfill #1: Steady-state dynamic testing at vertical load of 133 kN and horizontal dynamic load of 31 kN.

Figure C-43. Los Reales Landfill #1: Steady-state dynamic testing at vertical load of 133 kN and horizontal dynamic load of 36 kN.
Figure C-44. Los Reales Landfill #1: Steady-state dynamic testing at vertical load of 133 kN and horizontal dynamic load of 40 kN.

Figure C-45. Los Reales Landfill #1: Steady-state dynamic testing at vertical load of 133 kN and horizontal dynamic load of 44 kN.
Figure C-46. Los Reales Landfill #1: Steady-state dynamic testing at vertical load of 133 kN and horizontal dynamic load of 53 kN.

Figure C-47. Los Reales Landfill #1: Steady-state dynamic testing at vertical load of 133 kN and horizontal dynamic load of 62 kN.
Figure C-48. Los Reales Landfill #1: Steady-state dynamic testing at vertical load of 133 kN and horizontal dynamic load of 85 kN.

Figure C-49. Los Reales Landfill #1: Steady-state dynamic testing at vertical load of 133 kN and horizontal dynamic load of 133 kN.
C.2 Los Reales Landfill Location 2

C.2.1 Downhole Seismic Testing

Figure C-50. Los Reales Landfill #2 (east hole): Downhole seismic testing at vertical load of 0 kN: (a) $V_{p-Z}$, (b) $V_{s-ZX}$, and (c) $V_{s-ZY}$. 
Figure C-51. Los Reales Landfill #2 (east hole): Downhole seismic testing at vertical load of 18 kN: (a) $V_p-Z$, (b) $V_s-ZX$, and (c) $V_s-ZY$. 
Figure C-52. Los Reales Landfill #2 (east hole): Downhole seismic testing at vertical load of 36 kN: (a) $V_p-Z$, (b) $V_s-ZX$, and (c) $V_s-ZY$. 

Los Reales Location 2: East Hole Array
Downhole seismic testing; Vertical static load ~ 36 kN
Spacing 6 in., $\Delta t_1 = 0.410$ msec
$V_p-Z = 1219$ ft/s = 371 m/s

Spacing 7 in., $\Delta t_2 = 0.547$ msec
$V_p-Z = 1066$ ft/s = 325 m/s

Spacing 8 in., $\Delta t_3 = 0.723$ msec
$V_p-Z = 922$ ft/s = 281 m/s

Los Reales Location 2: East Hole Array
Downhole seismic testing; Vertical static load ~ 36 kN
Spacing 6 in., $\Delta t_1 = 0.859$ msec
$V_s-ZX = 581$ ft/s = 177 m/s

Spacing 7 in., $\Delta t_2 = 1.074$ msec
$V_s-ZX = 543$ ft/s = 165 m/s

Spacing 8 in., $\Delta t_3 = 1.641$ msec
$V_s-ZX = 406$ ft/s = 123 m/s

Los Reales Location 2: East Hole Array
Downhole seismic testing; Vertical static load ~ 36 kN
Spacing 6 in., $\Delta t_1 = 0.879$ msec
$V_s-ZY = 568$ ft/s = 173 m/s

Spacing 7 in., $\Delta t_2 = 1.191$ msec
$V_s-ZY = 489$ ft/s = 149 m/s

Spacing 8 in., $\Delta t_3 = 1.562$ msec
$V_s-ZY = 426$ ft/s = 130 m/s
Figure C-53. Los Reales Landfill #2 (east hole): Downhole seismic testing at vertical load of 67 kN: (a) $V_{p-Z}$, (b) $V_{s-ZX}$, and (c) $V_{s-ZY}$.  

Los Reales Location 2: East Hole Array
Downhole seismic testing; Vertical static load ~ 67 kN

Spacing 6 in., $\Delta t_1 = 0.371$ msec
$V_{p-Z} = 1347$ ft/s = 410 m/s

Spacing 7 in., $\Delta t_2 = 0.508$ msec
$V_{p-Z} = 1148$ ft/s = 350 m/s

Spacing 8 in., $\Delta t_3 = 0.703$ msec
$V_{p-Z} = 948$ ft/s = 288 m/s

Normalized Magnitude
30
25
20
15
10
5
0
Time (x10^{-3} sec)

Los Reales Location 2: East Hole Array
Downhole seismic testing; Vertical static load ~ 67 kN

Spacing 6 in., $\Delta t_1 = 0.742$ msec
$V_{s-ZY} = 673$ ft/s = 205 m/s

Spacing 7 in., $\Delta t_2 = 1.094$ msec
$V_{s-ZY} = 533$ ft/s = 162 m/s

Spacing 8 in., $\Delta t_3 = 1.504$ msec
$V_{s-ZY} = 443$ ft/s = 135 m/s

Normalized Magnitude
30
25
20
15
10
5
0
Time (x10^{-3} sec)
Figure C-54. Los Reales Landfill #2 (east hole): Downhole seismic testing at vertical load of 111 kN: (a) $V_{p-Z}$, (b) $V_{s-ZX}$, and (c) $V_{s-ZY}$. 
Figure C-55. Los Reales Landfill #2 (west hole): Downhole seismic testing at vertical load of 0 kN: (a) $V_{p-Z}$, (b) $V_{s-ZX}$, and (c) $V_{s-ZY}$. 
Figure C-56. Los Reales Landfill #2 (west hole): Downhole seismic testing at vertical load of 18 kN: (a) $V_{p-Z}$, (b) $V_{s-ZX}$, and (c) $V_{s-ZY}$. 
Figure C-57. Los Reales Landfill #2 (west hole): Downhole seismic testing at vertical load of 36 kN: (a) $V_{p-Z}$, (b) $V_{s-ZX}$, and (c) $V_{s-ZY}$. 
Figure C-58. Los Reales Landfill #2 (west hole): Downhole seismic testing at vertical load of 67 kN: (a) $V_{p-Z}$, (b) $V_{s-ZX}$, and (c) $V_{s-ZY}$. 
Figure C-59. Los Reales Landfill #2 (west hole): Downhole seismic testing at vertical load of 111 kN: (a) $V_p-Z$, (b) $V_s-ZX$, and (c) $V_s-ZY$. 
C.2.2 Crosshole Seismic Testing

Figure C-60. Los Reales Landfill #2 (rod A): Crosshole seismic testing at vertical load of 0 kN:
(a) $V_{p,X}$ and (b) $V_{s,XZ}$.

Figure C-61. Los Reales Landfill #2 (rod A): Crosshole seismic testing at vertical load of 18 kN:
(a) $V_{p,X}$ and (b) $V_{s,XZ}$.
Figure C-62. Los Reales Landfill #2 (rod A): Crosshole seismic testing at vertical load of 36 kN:
(a) $V_{p-X}$ and (b) $V_{s-XZ}$.

Figure C-63. Los Reales Landfill #2 (rod A): Crosshole seismic testing at vertical load of 67 kN:
(a) $V_{p-X}$ and (b) $V_{s-XZ}$. 
Figure C-64. Los Reales Landfill #2 (rod A): Crosshole seismic testing at vertical load of 111 kN: (a) $V_p$ and (b) $V_s$.

Figure C-65. Los Reales Landfill #2 (rod B): Crosshole seismic testing at vertical loads of (a) 0 kN and (b) 18 kN: $V_p$. 

Notes:
- Los Reales Location 2: G9X-G10X
  - Crosshole seismic testing; Vertical static load ~ 111 kN
  - Hit on rod A
  - Spacing = 18 in.
  - $\Delta t = 1.543$ msec
  - $V_{p,X} = 972$ ft/s = 296 m/s
- Los Reales Location 2: G9Z-G10Z
  - Crosshole seismic testing; Vertical static load ~ 111 kN
  - Hit on rod A
  - Spacing = 18 in.
  - $\Delta t = 3.379$ msec
  - $V_{s,XZ} = 443$ ft/s = 135 m/s
- Los Reales Location 2: G11X-G12X
  - Crosshole seismic testing; Vertical static load ~ 0 kN
  - Hit on rod B
  - Spacing = 18 in.
  - $\Delta t = 1.406$ msec
  - $V_{p,X} = 1066$ ft/s = 325 m/s
- Los Reales Location 2: G11X-G12X
  - Crosshole seismic testing; Vertical static load ~ 18 kN
  - Hit on rod B
  - Spacing = 18 in.
  - $\Delta t = 1.367$ msec
  - $V_{p,X} = 1097$ ft/s = 334 m/s
**Figure C-66.** Los Reales Landfill #2 (rod B): Crosshole seismic testing at vertical loads of (a) 36 kN and (b) 67 kN: $V_{p-X}$.

- **Los Reales Location 2: G11X-G12X**
  - Crosshole seismic testing; Vertical static load ~ 36 kN
  - Hit on rod B
  - Spacing = 18 in.
  - $\Delta t = 1.328$ msec
  - $V_{p-X} = 1129$ ft/s = 344 m/s

- **Los Reales Location 2: G11X-G12X**
  - Crosshole seismic testing; Vertical static load ~ 67 kN
  - Hit on rod B
  - Spacing = 18 in.
  - $\Delta t = 1.289$ msec
  - $V_{p-X} = 1163$ ft/s = 354 m/s

**Figure C-67.** Los Reales Landfill #2 (rod C): Crosshole seismic testing at vertical load of 0 kN:
(a) $V_{p-X}$ and (b) $V_{s-XZ}$.

- **Los Reales Location 2: G22X-G23X**
  - Crosshole seismic testing; Vertical static load ~ 0 kN
  - Hit on rod C
  - Spacing = 18 in.
  - $\Delta t = 1.328$ msec
  - $V_{p-X} = 1129$ ft/s = 344 m/s

- **Los Reales Location 2: G22Z-G23Z**
  - Crosshole seismic testing; Vertical static load ~ 0 kN
  - Hit on rod C
  - Spacing = 18 in.
  - $\Delta t = 3.027$ msec
  - $V_{s-XZ} = 495$ ft/s = 151 m/s
Figure C-68. Los Reales Landfill #2 (rod C): Crosshole seismic testing at vertical load of 18 kN:
(a) $V_p-X$ and (b) $V_s-XZ$.

Figure C-69. Los Reales Landfill #2 (rod C): Crosshole seismic testing at vertical load of 36 kN:
(a) $V_p-X$ and (b) $V_s-XZ$. 
Figure C-70. Los Reales Landfill #2 (rod C): Crosshole seismic testing at vertical load of 67 kN:
(a) $V_p \cdot X$ and (b) $V_s \cdot XZ$.

Figure C-71. Los Reales Landfill #2 (rod C): Crosshole seismic testing at vertical load of 111 kN: $V_p \cdot X$. 
C.2.3 Steady-state Dynamic Testing

Figure C-72. Los Reales Landfill #2: Steady-state dynamic testing at vertical load of 18 kN and horizontal dynamic load of 1 kN.

Figure C-73. Los Reales Landfill #2: Steady-state dynamic testing at vertical load of 18 kN and horizontal dynamic load of 2 kN.
Figure C-74. Los Reales Landfill #2: Steady-state dynamic testing at vertical load of 18 kN and horizontal dynamic load of 4 kN.

Figure C-75. Los Reales Landfill #2: Steady-state dynamic testing at vertical load of 18 kN and horizontal dynamic load of 7 kN.
Figure C-76. Los Reales Landfill #2: Steady-state dynamic testing at vertical load of 18 kN and horizontal dynamic load of 9 kN.

Figure C-77. Los Reales Landfill #2: Steady-state dynamic testing at vertical load of 18 kN and horizontal dynamic load of 13 kN.
Figure C-78. Los Reales Landfill #2: Steady-state dynamic testing at vertical load of 36 kN and horizontal dynamic load of 1 kN.

Figure C-79. Los Reales Landfill #2: Steady-state dynamic testing at vertical load of 36 kN and horizontal dynamic load of 2 kN.
Figure C-80. Los Reales Landfill #2: Steady-state dynamic testing at vertical load of 36 kN and horizontal dynamic load of 4 kN.

Figure C-81. Los Reales Landfill #2: Steady-state dynamic testing at vertical load of 36 kN and horizontal dynamic load of 7 kN.
Figure C-82. Los Reales Landfill #2: Steady-state dynamic testing at vertical load of 36 kN and horizontal dynamic load of 9 kN.

Figure C-83. Los Reales Landfill #2: Steady-state dynamic testing at vertical load of 36 kN and horizontal dynamic load of 13 kN.
Figure C-84. Los Reales Landfill #2: Steady-state dynamic testing at vertical load of 36 kN and horizontal dynamic load of 18 kN.

Figure C-85. Los Reales Landfill #2: Steady-state dynamic testing at vertical load of 36 kN and horizontal dynamic load of 27 kN.
Figure C-86. Los Reales Landfill #2: Steady-state dynamic testing at vertical load of 133 kN and horizontal dynamic load of 27 kN.

Figure C-87. Los Reales Landfill #2: Steady-state dynamic testing at vertical load of 133 kN and horizontal dynamic load of 31 kN.
Figure C-88. Los Reales Landfill #2: Steady-state dynamic testing at vertical load of 133 kN and horizontal dynamic load of 36 kN.

Figure C-89. Los Reales Landfill #2: Steady-state dynamic testing at vertical load of 133 kN and horizontal dynamic load of 44 kN.
Figure C-90. Los Reales Landfill #2: Steady-state dynamic testing at vertical load of 133 kN and horizontal dynamic load of 62 kN.

Figure C-91. Los Reales Landfill #2: Steady-state dynamic testing at vertical load of 133 kN and horizontal dynamic load of 71 kN.
Figure C-92. Los Reales Landfill #2: Steady-state dynamic testing at vertical load of 133 kN and horizontal dynamic load of 133 kN.
C.3 Los Reales Landfill Location 3

C.3.1 Downhole Seismic Testing

Figure C-93. Los Reales Landfill #3 (east hole): Downhole seismic testing at vertical load of 0 kN: (a) $V_{p-Z}$, (b) $V_{s-ZX}$, and (c) $V_{s-ZY}$. 
Figure C-94. Los Reales Landfill #3 (east hole): Downhole seismic testing at vertical load of 18 kN: (a) $V_{p-Z}$, (b) $V_{s-ZX}$, and (c) $V_{s-ZY}$. 
Figure C-95. Los Reales Landfill #3 (east hole): Downhole seismic testing at vertical load of 36 kN: (a) $V_p.Z$, (b) $V_s.ZX$, and (c) $V_s.ZY$. 

Los Reales Location 3: East Hole Array
Downhole seismic testing; Vertical static load ~ 36 kN

Spacing 5.94 in., $\Delta t_1 = 0.586$ msec
$V_p.Z = 844$ ft/s = 257 m/s

Spacing 11.88 in., $\Delta t_2 = 1.484$ msec
$V_p.Z = 666$ ft/s = 203 m/s

Spacing 15.84 in., $\Delta t_3 = 1.738$ msec
$V_p.Z = 759$ ft/s = 231 m/s

Normalized Magnitude

Time (x10^{-3} sec)

G22Z
G14Z
G12Z
G8Z

Los Reales Location 3: East Hole Array
Downhole seismic testing; Vertical static load ~ 36 kN

Spacing 5.94 in., $\Delta t_1 = 1.035$ msec
$V_s.ZX = 478$ ft/s = 145 m/s

Spacing 11.88 in., $\Delta t_2 = 2.988$ msec
$V_s.ZX = 331$ ft/s = 100 m/s

Spacing 15.84 in., $\Delta t_3 = 2.754$ msec
$V_s.ZX = 479$ ft/s = 146 m/s

Normalized Magnitude

Time (x10^{-3} sec)

G22X
G14X
G12X
G8X

Los Reales Location 3: East Hole Array
Downhole seismic testing; Vertical static load ~ 36 kN

Spacing 5.94 in., $\Delta t_1 = 1.035$ msec
$V_s.ZY = 478$ ft/s = 145 m/s

Spacing 11.88 in., $\Delta t_2 = 2.930$ msec
$V_s.ZY = 337$ ft/s = 102 m/s

Spacing 15.84 in., $\Delta t_3 = 3.340$ msec
$V_s.ZY = 395$ ft/s = 120 m/s

Normalized Magnitude

Time (x10^{-3} sec)

G22Y
G14Y
G12Y
G8Y
Figure C-96. Los Reales Landfill #3 (east hole): Downhole seismic testing at vertical load of 67 kN: (a) $V_p$, (b) $V_S$, and (c) $V_S$. 

Los Reales Location 3: East Hole Array
Downhole seismic testing; Vertical static load ~ 67 kN

Spacing 5.82 in., $\Delta t_1 = 0.508$ msec
$V_p = 955$ ft/s = 291 m/s

Spacing 11.76 in., $\Delta t_2 = 1.367$ msec
$V_p = 716$ ft/s = 218 m/s

Spacing 15.84 in., $\Delta t_3 = 1.680$ msec
$V_p = 785$ ft/s = 239 m/s

Normalized Magnitude

Time (x10^-3 sec)

Los Reales Location 3: East Hole Array
Downhole seismic testing; Vertical static load ~ 67 kN

Spacing 5.82 in., $\Delta t_1 = 0.898$ msec
$V_S = 539$ ft/s = 164 m/s

Spacing 11.76 in., $\Delta t_2 = 2.734$ msec
$V_S = 358$ ft/s = 109 m/s

Spacing 15.84 in., $\Delta t_3 = 2.598$ msec
$V_S = 508$ ft/s = 154 m/s

Normalized Magnitude

Time (x10^-3 sec)
Figure C-97. Los Reales Landfill #3 (east hole): Downhole seismic testing at vertical load of 102 kN: (a) $V_p-Z$, (b) $V_s-ZX$, and (c) $V_s-ZY$. 
Figure C-98. Los Reales Landfill #3 (west hole): Downhole seismic testing at vertical load of 0 kN: (a) $V_{p-Z}$, (b) $V_{s-ZX}$, and (c) $V_{s-ZY}$. 
Figure C-99. Los Reales Landfill #3 (west hole): Downhole seismic testing at vertical load of 18 kN: (a) $V_{p-Z}$, (b) $V_{s-ZX}$, and (c) $V_{s-ZY}$. 

Los Reales Location 3: West Hole Array
Downhole seismic testing; Vertical static load ~ 18 kN

Spacing 5.94 in., $\Delta t_1 = 0.820$ msec
$V_{p-Z} = 603$ ft/s = 183 m/s

Spacing 11.88 in., $\Delta t_2 = 1.621$ msec
$V_{p-Z} = 610$ ft/s = 186 m/s

Spacing 15.84 in., $\Delta t_3 = 2.012$ msec
$V_{p-Z} = 656$ ft/s = 199 m/s

Spacing 5.94 in., $\Delta t_1 = 1.738$ msec
$V_{s-ZX} = 284$ ft/s = 86 m/s

Spacing 11.88 in., $\Delta t_2 = 2.793$ msec
$V_{s-ZX} = 354$ ft/s = 108 m/s

Spacing 15.84 in., $\Delta t_3 = 3.945$ msec
$V_{s-ZX} = 334$ ft/s = 101 m/s

Spacing 5.94 in., $\Delta t_1 = 1.406$ msec
$V_{s-ZY} = 352$ ft/s = 107 m/s

Spacing 11.88 in., $\Delta t_2 = 2.676$ msec
$V_{s-ZY} = 369$ ft/s = 112 m/s

Spacing 15.84 in., $\Delta t_3 = 3.633$ msec
$V_{s-ZY} = 363$ ft/s = 110 m/s
Figure C-100. Los Reales Landfill #3 (west hole): Downhole seismic testing at vertical load of 36 kN: (a) $V_p-Z$, (b) $V_s-Z_X$, and (c) $V_s-Z_Y$. 
Figure C-101. Los Reales Landfill #3 (west hole): Downhole seismic testing at vertical load of 67 kN: (a) $V_p-Z$, (b) $V_s-ZX$, and (c) $V_s-ZY$. 
Figure C-102. Los Reales Landfill #3 (west hole): Downhole seismic testing at vertical load of 102 kN: (a) $V_p$-$Z$, (b) $V_s$-$ZX$, and (c) $V_s$-$ZY$. 
C.3.2 Crosshole Seismic Testing

Figure C-103. Los Reales Landfill #2 (rod A): Crosshole seismic testing at vertical load of 0 kN: (a) $V_{p,X}$ and (b) $V_{s,XZ}$.

Figure C-104. Los Reales Landfill #2 (rod A): Crosshole seismic testing at vertical load of 18 kN: (a) $V_{p,X}$ and (b) $V_{s,XZ}$. 
Figure C-105. Los Reales Landfill #2 (rod A): Crosshole seismic testing at vertical load of 36 kN: (a) $V_{p,X}$ and (b) $V_{S,XZ}$.

Figure C-106. Los Reales Landfill #2 (rod A): Crosshole seismic testing at vertical load of 67 kN: (a) $V_{p,X}$ and (b) $V_{S,XZ}$. 
Figure C-107. Los Reales Landfill #2 (rod A): Crosshole seismic testing at vertical load of 102 kN: (a) $V_{p-X}$ and (b) $V_{s-XZ}$.

Figure C-108. Los Reales Landfill #2 (rod B): Crosshole seismic testing at vertical loads of (a) 0 kN and (b) 18 kN: $V_{p-X}$. 
Figure C-109. Los Reales Landfill #2 (rod B): Crosshole seismic testing at vertical loads of (a) 36 kN and (b) 67 kN: $V_p$. 

Figure C-110. Los Reales Landfill #2 (rod B): Crosshole seismic testing at vertical load of 102 kN: $V_p$. 

Los Reales Location 3: G12X-G13X
Crosshole seismic testing; Vertical static load ~ 36 kN
Hit on rod B
Spacing = 18 in.
$\Delta t = 1.719$ msec
$V_p = 872$ ft/s = 266 m/s

Los Reales Location 3: G12X-G13X
Crosshole seismic testing; Vertical static load ~ 67 kN
Hit on rod B
Spacing = 18 in.
$\Delta t = 1.699$ msec
$V_p = 882$ ft/s = 269 m/s

Los Reales Location 3: G12X-G13X
Crosshole seismic testing; Vertical static load ~ 102 kN
Hit on rod B
Spacing = 18 in.
$\Delta t = 1.680$ msec
$V_p = 893$ ft/s = 272 m/s

Source trigger
G12X
G13X

Normalized Magnitude
Time (x10^-3 sec)
Source trigger
G12X
G13X

Normalized Magnitude
Time (x10^-3 sec)
Los Reales Location 3: G14X-G15X
Crosshole seismic testing; Vertical static load ~ 0 kN
Hit on rod C

Source trigger

Spacing = 18 in.
$\Delta t = 2.422$ msec
$V_{p,X} = 619$ ft/s ~ 188 m/s

G14X
G15X

(a)

Normalized Magnitude

Time (x10^{-3} sec)

Los Reales Location 3: G14Z-G15Z
Crosshole seismic testing; Vertical static load ~ 0 kN
Hit on rod C

Source trigger

Spacing = 18 in.
$\Delta t = 5.254$ msec
$V_{s,XZ} = 285$ ft/s ~ 87 m/s

G14Z
G15Z

(b)

Normalized Magnitude

Time (x10^{-3} sec)

Figure C-111. Los Reales Landfill #2 (rod C): Crosshole seismic testing at vertical load of 0 kN:
(a) $V_{p,X}$ and (b) $V_{s,XZ}$.

Los Reales Location 3: G14X-G15X
Crosshole seismic testing; Vertical static load ~ 18 kN
Hit on rod C

Source trigger

Spacing = 18 in.
$\Delta t = 2.285$ msec
$V_{p,X} = 656$ ft/s ~ 200 m/s

G14X
G15X

(a)

Normalized Magnitude

Time (x10^{-3} sec)

Los Reales Location 3: G14Z-G15Z
Crosshole seismic testing; Vertical static load ~ 18 kN
Hit on rod C

Source trigger

Spacing = 18 in.
$\Delta t = 4.707$ msec
$V_{s,XZ} = 318$ ft/s ~ 97 m/s

G14Z
G15Z

(b)

Normalized Magnitude

Time (x10^{-3} sec)

Figure C-112. Los Reales Landfill #2 (rod C): Crosshole seismic testing at vertical load of 18 kN: (a) $V_{p,X}$ and (b) $V_{s,XZ}$. 
Figure C-113. Los Reales Landfill #2 (rod C): Crosshole seismic testing at vertical load of 36 kN: (a) $V_{p-X}$ and (b) $V_{s-XZ}$.

Figure C-114. Los Reales Landfill #2 (rod C): Crosshole seismic testing at vertical load of 67 kN: (a) $V_{p-X}$ and (b) $V_{s-XZ}$. 
C.3.3 Steady-state Dynamic Testing

Figure C-116. Los Reales Landfill #3: Steady-state dynamic testing at vertical load of 18 kN and horizontal dynamic load of 0.7 kN.
Figure C-117. Los Reales Landfill #3: Steady-state dynamic testing at vertical load of 18 kN and horizontal dynamic load of 1 kN.

Figure C-118. Los Reales Landfill #3: Steady-state dynamic testing at vertical load of 18 kN and horizontal dynamic load of 2 kN.
Figure C-119. Los Reales Landfill #3: Steady-state dynamic testing at vertical load of 18 kN and horizontal dynamic load of 4 kN.

Figure C-120. Los Reales Landfill #3: Steady-state dynamic testing at vertical load of 18 kN and horizontal dynamic load of 7 kN.
Figure C-121. Los Reales Landfill #3: Steady-state dynamic testing at vertical load of 18 kN and horizontal dynamic load of 9 kN.

Figure C-122. Los Reales Landfill #3: Steady-state dynamic testing at vertical load of 18 kN and horizontal dynamic load of 11 kN.
Figure C-123. Los Reales Landfill #3: Steady-state dynamic testing at vertical load of 18 kN and horizontal dynamic load of 18 kN.

Figure C-124. Los Reales Landfill #3: Steady-state dynamic testing at vertical load of 36 kN and horizontal dynamic load of 2 kN.
Figure C-125. Los Reales Landfill #3: Steady-state dynamic testing at vertical load of 36 kN and horizontal dynamic load of 4 kN.

Figure C-126. Los Reales Landfill #3: Steady-state dynamic testing at vertical load of 36 kN and horizontal dynamic load of 7 kN.
Figure C-127. Los Reales Landfill #3: Steady-state dynamic testing at vertical load of 36 kN and horizontal dynamic load of 9 kN.

Figure C-128. Los Reales Landfill #3: Steady-state dynamic testing at vertical load of 36 kN and horizontal dynamic load of 11 kN.
Figure C-129. Los Reales Landfill #3: Steady-state dynamic testing at vertical load of 36 kN and horizontal dynamic load of 13 kN.

Figure C-130. Los Reales Landfill #3: Steady-state dynamic testing at vertical load of 36 kN and horizontal dynamic load of 18 kN.
Figure C-131. Los Reales Landfill #3: Steady-state dynamic testing at vertical load of 36 kN and horizontal dynamic load of 27 kN.

Figure C-132. Los Reales Landfill #3: Steady-state dynamic testing at vertical load of 71 kN and horizontal dynamic load of 31 kN.
Figure C-133. Los Reales Landfill #3: Steady-state dynamic testing at vertical load of 71 kN and horizontal dynamic load of 36 kN.

Figure C-134. Los Reales Landfill #3: Steady-state dynamic testing at vertical load of 71 kN and horizontal dynamic load of 40 kN.
Figure C-135. Los Reales Landfill #3: Steady-state dynamic testing at vertical load of 71 kN and horizontal dynamic load of 44 kN.

Figure C-136. Los Reales Landfill #3: Steady-state dynamic testing at vertical load of 133 kN and horizontal dynamic load of 27 kN.
Figure C-137. Los Reales Landfill #3: Steady-state dynamic testing at vertical load of 133 kN and horizontal dynamic load of 31 kN.

Figure C-138. Los Reales Landfill #3: Steady-state dynamic testing at vertical load of 133 kN and horizontal dynamic load of 40 kN.
Figure C-139. Los Reales Landfill #3: Steady-state dynamic testing at vertical load of 133 kN and horizontal dynamic load of 44 kN.

Figure C-140. Los Reales Landfill #3: Steady-state dynamic testing at vertical load of 133 kN and horizontal dynamic load of 53 kN.
Figure C-141. Los Reales Landfill #3: Steady-state dynamic testing at vertical load of 133 kN and horizontal dynamic load of 71 kN.
D  BKK Landfill Testing Results
D.1 BKK Landfill Location 1

D.1.1 Downhole Seismic Testing

Figure D-1. BKK Landfill #1 (north hole): Downhole seismic testing at vertical load of 0 kN: (a) $V_{p-Z}$, (b) $V_{s-ZX}$, and (c) $V_{s-ZY}$. 
Figure D-2. BKK Landfill #1 (north hole): Downhole seismic testing at vertical load of 9 kN: (a) $V_{p-Z}$, (b) $V_{s-ZX}$, and (c) $V_{s-ZY}$. 
Figure D-3. BKK Landfill #1 (north hole): Downhole seismic testing at vertical load of 18 kN:
(a) $V_p-Z$, (b) $V_s-ZX$, and (c) $V_s-ZY$. 
Figure D-4. BKK Landfill #1 (north hole): Downhole seismic testing at vertical load of 36 kN: (a) $V_p-Z$, (b) $V_s-ZX$, and (c) $V_s-ZY$. 

<table>
<thead>
<tr>
<th>Spacing</th>
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<th>$V_p-Z$</th>
<th>$V_s-ZX$</th>
<th>$V_s-ZY$</th>
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<td>624 ft/s</td>
<td>1599 ft/s</td>
<td>1706 ft/s</td>
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<td>10 in.</td>
<td>1.309 msec</td>
<td>1153 ft/s</td>
<td>636 ft/s</td>
<td>618 ft/s</td>
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<td>18 in.</td>
<td>3.672 msec</td>
<td>783 ft/s</td>
<td>408 ft/s</td>
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Figure D-5. BKK Landfill #1 (north hole): Downhole seismic testing at vertical load of 71 kN: (a) $V_{p-Z}$, (b) $V_{s-ZX}$, and (c) $V_{s-ZY}$. 
Figure D-6. BKK Landfill #1 (north hole): Downhole seismic testing at vertical load of 111 kN: (a) $V_p$-$Z$, (b) $V_s$-$ZX$, and (c) $V_s$-$ZY$. 
Figure D-7. BKK Landfill #1 (south hole): Downhole seismic testing at vertical load of 0 kN: (a) $V_{P-Z}$, (b) $V_{S-ZX}$, and (c) $V_{S-ZY}$. 
Figure D-8. BKK Landfill #1 (south hole): Downhole seismic testing at vertical load of 9 kN: (a) $V_{p-Z}$, (b) $V_{s-ZX}$, and (c) $V_{s-ZY}$. 
Figure D-9. BKK Landfill #1 (south hole): Downhole seismic testing at vertical load of 18 kN:
(a) $V_p-Z$, (b) $V_s-ZX$, and (c) $V_s-ZY$. 

**BKK Location 1: South Hole Array**
Downhole seismic testing; Vertical static load ~ 18 kN

- Spacing 6 in., $\Delta t_1 = 0.449$ msec
  - $V_p-Z = 1113$ ft/s = 339 m/s

- Spacing 10 in., $\Delta t_2 = 0.742$ msec
  - $V_p-Z = 1122$ ft/s = 342 m/s

- Spacing 18 in., $\Delta t_3 = 1.699$ msec
  - $V_p-Z = 882$ ft/s = 269 m/s

**BKK Location 1: South Hole Array**
Downhole seismic testing; Vertical static load ~ 18 kN

- Spacing 6 in., $\Delta t_1 = 0.801$ msec
  - $V_s-ZX = 624$ ft/s = 190 m/s

- Spacing 10 in., $\Delta t_2 = 1.250$ msec
  - $V_s-ZX = 666$ ft/s = 203 m/s

- Spacing 18 in., $\Delta t_3 = 2.891$ msec
  - $V_s-ZX = 518$ ft/s = 158 m/s

- Spacing 6 in., $\Delta t_1 = 0.273$ msec
  - $V_s-ZY = 1828$ ft/s = 557 m/s

- Spacing 10 in., $\Delta t_2 = 1.348$ msec
  - $V_s-ZY = 618$ ft/s = 188 m/s

- Spacing 18 in., $\Delta t_3 = 3.398$ msec
  - $V_s-ZY = 441$ ft/s = 134 m/s
Figure D-10. BKK Landfill #1 (south hole): Downhole seismic testing at vertical load of 36 kN:
(a) $V_p$-Z, (b) $V_s$-ZX, and (c) $V_s$-ZY.
Figure D-11. BKK Landfill #1 (south hole): Downhole seismic testing at vertical load of 71 kN: (a) $V_{p-Z}$, (b) $V_{s-ZX}$, and (c) $V_{s-ZY}$. 

BKK Location 1: South Hole Array
Downhole seismic testing; Vertical static load – 71 kN

(a)

Spacing 6 in., $\Delta t_1 = 0.410$ msec
$V_{p-Z} = 1219$ ft/s = 371 m/s

Spacing 10 in., $\Delta t_2 = 0.703$ msec
$V_{p-Z} = 1185$ ft/s = 361 m/s

Spacing 18 in., $\Delta t_3 = 1.602$ msec
$V_{p-Z} = 936$ ft/s = 285 m/s

(b)

Spacing 6 in., $\Delta t_1 = 0.742$ msec
$V_{s-ZX} = 673$ ft/s = 205 m/s

Spacing 10 in., $\Delta t_2 = 1.191$ msec
$V_{s-ZX} = 699$ ft/s = 213 m/s

Spacing 18 in., $\Delta t_3 = 2.754$ msec
$V_{s-ZX} = 544$ ft/s = 166 m/s

(c)

Spacing 6 in., $\Delta t_1 = -0.117$ msec
$V_{s-ZY} = -4266$ ft/s = -1300 m/s (?)

Spacing 10 in., $\Delta t_2 = 1.230$ msec
$V_{s-ZY} = 677$ ft/s = 206 m/s

Spacing 18 in., $\Delta t_3 = 3.281$ msec
$V_{s-ZY} = 457$ ft/s = 139 m/s
Figure D-12. BKK Landfill #1 (south hole): Downhole seismic testing at vertical load of 111 kN:
(a) $V_p-Z$, (b) $V_s-Z_X$, and (c) $V_s-Z_Y$. 

Normalized Magnitude

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Normalized Magnitude

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BKK Location 1: South Hole Array
Downhole seismic testing; Vertical static load ~ 111 kN

Spacing 6 in., $\Delta t_{-1} = 0.410$ msec
$V_p-Z = 1219$ ft/s = 371 m/s

Spacing 10 in., $\Delta t_{-2} = 0.664$ msec
$V_p-Z = 1254$ ft/s = 382 m/s

Spacing 18 in., $\Delta t_{-3} = 1.523$ msec
$V_p-Z = 984$ ft/s = 300 m/s

Spacing 6 in., $\Delta t_{-1} = 0.703$ msec
$V_s-Z_X = 711$ ft/s = 216 m/s

Spacing 10 in., $\Delta t_{-2} = 1.172$ msec
$V_s-Z_X = 711$ ft/s = 216 m/s

Spacing 18 in., $\Delta t_{-3} = 2.715$ msec
$V_s-Z_X = 552$ ft/s = 168 m/s

Spacing 6 in., $\Delta t_{-1} = -0.098$ msec
$V_s-Z_Y = -5119$ ft/s = -1560 m/s

Spacing 10 in., $\Delta t_{-2} = 1.191$ msec
$V_s-Z_Y = 699$ ft/s = 213 m/s

Spacing 18 in., $\Delta t_{-3} = 3.203$ msec
$V_s-Z_Y = 468$ ft/s = 142 m/s
D.1.2 Crosshole Seismic Testing

Figure D-13. BKK Landfill #1 (rod A): Crosshole seismic testing at vertical load of 0 kN: (a) $V_p$ and (b) $V_s$.

Figure D-14. BKK Landfill #1 (rod A): Crosshole seismic testing at vertical load of 9 kN: (a) $V_p$ and (b) $V_s$. 

(a) (b)
BKK Location 1: G16X-G17X
Crosshole seismic testing; Vertical static load ~ 18 kN
Hit on rod A

Spacing = 18 in.
Δt = 1.602 msec
V_p-X = 936 ft/s = 285 m/s

Normalized Magnitude

Time (x10^-3 sec)

Figure D-15. BKK Landfill #1 (rod A): Crosshole seismic testing at vertical load of 18 kN: (a) V_p-X and (b) V_s-XZ.

BKK Location 1: G16Z-G17Z
Crosshole seismic testing; Vertical static load ~ 18 kN
Hit on rod A

Spacing = 18 in.
Δt = 3.066 msec
V_s-XZ = 489 ft/s = 149 m/s

Normalized Magnitude

Time (x10^-3 sec)

(a) (b)

BKK Location 1: G16X-G17X
Crosshole seismic testing; Vertical static load ~ 36 kN
Hit on rod A

Spacing = 18 in.
Δt = 1.582 msec
V_p-X = 948 ft/s = 288 m/s

Normalized Magnitude

Time (x10^-3 sec)

Figure D-16. BKK Landfill #1 (rod A): Crosshole seismic testing at vertical load of 36 kN: (a) V_p-X and (b) V_s-XZ.
Figure D-17. BKK Landfill #1 (rod A): Crosshole seismic testing at vertical load of 71 kN: (a) $V_{p-X}$ and (b) $V_{s-XZ}$.

Figure D-18. BKK Landfill #1 (rod A): Crosshole seismic testing at vertical load of 111 kN: (a) $V_{p-X}$ and (b) $V_{s-XZ}$.
Figure D-19. BKK Landfill #1 (rod B): Crosshole seismic testing at vertical load of 0 kN: (a) $V_p$ and (b) $V_z$.

Figure D-20. BKK Landfill #1 (rod B): Crosshole seismic testing at vertical load of 9 kN: (a) $V_p$ and (b) $V_z$. 
Figure D-21. BKK Landfill #1 (rod B): Crosshole seismic testing at vertical load of 18 kN: (a) $V_{p-X}$ and (b) $V_{s-XZ}$.

Figure D-22. BKK Landfill #1 (rod B): Crosshole seismic testing at vertical load of 36 kN: (a) $V_{p-X}$ and (b) $V_{s-XZ}$.
Figure D-23. BKK Landfill #1 (rod B): Crosshole seismic testing at vertical load of 71 kN: (a) $V_{p,X}$ and (b) $V_{s,XZ}$.

Figure D-24. BKK Landfill #1 (rod B): Crosshole seismic testing at vertical load of 111 kN: (a) $V_{p,X}$ and (b) $V_{s,XZ}$. 
Figure D-25. BKK Landfill #1 (rod C): Crosshole seismic testing at vertical load of 0 kN: (a) $V_p$ and (b) $V_s$.

Figure D-26. BKK Landfill #1 (rod C): Crosshole seismic testing at vertical load of 9 kN: (a) $V_p$ and (b) $V_s$. 
Figure D-27. BKK Landfill #1 (rod C): Crosshole seismic testing at vertical load of 18 kN: (a) $V_{p,X}$ and (b) $V_{s,XZ}$.

Figure D-28. BKK Landfill #1 (rod C): Crosshole seismic testing at vertical load of 36 kN: (a) $V_{p,X}$ and (b) $V_{s,XZ}$.
D.1.3 Steady-state Dynamic Testing

Figure D-29. BKK Landfill #1 (rod C): Crosshole seismic testing at vertical load of 71 kN: (a) $V_{p-X}$ and (b) $V_{s-XZ}$.

Figure D-30. BKK Landfill #1: Steady-state dynamic testing at vertical load of 18 kN and horizontal dynamic load of 1 kN.

714
Figure D-31. BKK Landfill #1: Steady-state dynamic testing at vertical load of 18 kN and horizontal dynamic load of 4 kN.

Figure D-32. BKK Landfill #1: Steady-state dynamic testing at vertical load of 18 kN and horizontal dynamic load of 9 kN.
Figure D-33. BKK Landfill #1: Steady-state dynamic testing at vertical load of 18 kN and horizontal dynamic load of 11 kN.

Figure D-34. BKK Landfill #1: Steady-state dynamic testing at vertical load of 18 kN and horizontal dynamic load of 13 kN.
Figure D-35. BKK Landfill #1: Steady-state dynamic testing at vertical load of 36 kN and horizontal dynamic load of 1 kN.

Figure D-36. BKK Landfill #1: Steady-state dynamic testing at vertical load of 36 kN and horizontal dynamic load of 2 kN.
Figure D-37. BKK Landfill #1: Steady-state dynamic testing at vertical load of 36 kN and horizontal dynamic load of 4 kN.

Figure D-38. BKK Landfill #1: Steady-state dynamic testing at vertical load of 36 kN and horizontal dynamic load of 7 kN.
Figure D-39. BKK Landfill #1: Steady-state dynamic testing at vertical load of 36 kN and horizontal dynamic load of 9 kN.

Figure D-40. BKK Landfill #1: Steady-state dynamic testing at vertical load of 36 kN and horizontal dynamic load of 13 kN.
Figure D-41. BKK Landfill #1: Steady-state dynamic testing at vertical load of 133 kN and horizontal dynamic load of 27 kN.

Figure D-42. BKK Landfill #1: Steady-state dynamic testing at vertical load of 133 kN and horizontal dynamic load of 36 kN.
Figure D-43. BKK Landfill #1: Steady-state dynamic testing at vertical load of 133 kN and horizontal dynamic load of 40 kN.

Figure D-44. BKK Landfill #1: Steady-state dynamic testing at vertical load of 133 kN and horizontal dynamic load of 44 kN.
Figure D-45. BKK Landfill #1: Steady-state dynamic testing at vertical load of 133 kN and horizontal dynamic load of 62 kN.

Figure D-46. BKK Landfill #1: Steady-state dynamic testing at vertical load of 133 kN and horizontal dynamic load of 85 kN.
Figure D-47. BKK Landfill #1: Steady-state dynamic testing at vertical load of 133 kN and horizontal dynamic load of 133 kN.
D.2 BKK Landfill Location 2

D.2.1 Downhole Seismic Testing

Figure D-48. BKK Landfill #2 (north hole): Downhole seismic testing at vertical load of 0 kN: (a) $V_{p-Z}$, (b) $V_{s-ZX}$, and (c) $V_{s-ZY}$. 
Figure D-49. BKK Landfill #2 (north hole): Downhole seismic testing at vertical load of 9 kN:
(a) $V_{p-Z}$, (b) $V_{s-ZX}$, and (c) $V_{s-ZY}$. 
Figure D-50. BKK Landfill #2 (north hole): Downhole seismic testing at vertical load of 18 kN:
(a) $V_p$-$Z$, (b) $V_s$-$ZX$, and (c) $V_s$-$ZY$.
Figure D-51. BKK Landfill #2 (north hole): Downhole seismic testing at vertical load of 36 kN: (a) $V_p-Z$, (b) $V_s-ZX$, and (c) $V_s-ZY$. 
Figure D-52. BKK Landfill #2 (north hole): Downhole seismic testing at vertical load of 71 kN:
(a) \(V_{p-Z}\), (b) \(V_{s-ZX}\), and (c) \(V_{s-ZY}\).
Figure D-53. BKK Landfill #2 (north hole): Downhole seismic testing at vertical load of 111 kN: (a) $V_p-Z$, (b) $V_s-ZX$, and (c) $V_s-ZY$. 
Figure D-54. BKK Landfill #2 (south hole): Downhole seismic testing at vertical load of 0 kN: (a) $V_p-Z$, (b) $V_s-ZX$, and (c) $V_s-ZY$. 
Figure D-55. BKK Landfill #2 (south hole): Downhole seismic testing at vertical load of 9 kN:
(a) $V_{p-Z}$, (b) $V_{s-ZX}$, and (c) $V_{s-ZY}$. 
Figure D-56. BKK Landfill #2 (south hole): Downhole seismic testing at vertical load of 18 kN:
(a) $V_{p-Z}$, (b) $V_{s-ZX}$, and (c) $V_{s-ZY}$.
Figure D-57. BKK Landfill #2 (south hole): Downhole seismic testing at vertical load of 36 kN:
(a) $V_p-Z$, (b) $V_{s-ZX}$, and (c) $V_{s-ZY}$. 

Spacing 5.75 in., $\Delta t_1 = -0.059$ msec
$V_p-Z = -8177$ ft/s = -2492 m/s (?)

Spacing 10 in., $\Delta t_2 = 0.684$ msec
$V_p-Z = 1219$ ft/s = 371 m/s

Spacing 18 in., $\Delta t_3 = 1.055$ msec
$V_p-Z = 1422$ ft/s = 433 m/s

Spacing 5.75 in., $\Delta t_1 = 0.137$ msec
$V_{s-ZX} = 3504$ ft/s = 1068 m/s (?)

Spacing 10 in., $\Delta t_2 = 1.348$ msec
$V_{s-ZX} = 618$ ft/s = 188 m/s

Spacing 18 in., $\Delta t_3 = 1.895$ msec
$V_{s-ZX} = 791$ ft/s = 241 m/s

Spacing 5.75 in., $\Delta t_1 = -0.098$ msec
$V_{s-ZY} = -4906$ ft/s = -1495 m/s (?)

Spacing 10 in., $\Delta t_2 = 1.367$ msec
$V_{s-ZY} = 609$ ft/s = 185 m/s

Spacing 18 in., $\Delta t_3 = 1.816$ msec
$V_{s-ZY} = 825$ ft/s = 251 m/s
Figure D-58. BKK Landfill #2 (south hole): Downhole seismic testing at vertical load of 71 kN:
(a) $V_{p-Z}$, (b) $V_{s-ZX}$, and (c) $V_{s-ZY}$.
Figure D-59. BKK Landfill #2 (south hole): Downhole seismic testing at vertical load of 111 kN: 
(a) $V_p-Z$, (b) $V_s-ZX$, and (c) $V_s-ZY$. 
D.2.2 Crosshole Seismic Testing

Figure D-60. BKK Landfill #2 (rod A): Crosshole seismic testing at vertical load of 0 kN: (a) $V_{p-x}$ and (b) $V_{s-xz}$.

Figure D-61. BKK Landfill #2 (rod A): Crosshole seismic testing at vertical load of 9 kN: (a) $V_{p-x}$ and (b) $V_{s-xz}$. 

736
Figure D-62. BKK Landfill #2 (rod A): Crosshole seismic testing at vertical load of 18 kN: (a) $V_{p-X}$ and (b) $V_{s-XZ}$.

Figure D-63. BKK Landfill #2 (rod A): Crosshole seismic testing at vertical load of 36 kN: (a) $V_{p-X}$ and (b) $V_{s-XZ}$.
Figure D-64. BKK Landfill #2 (rod A): Crosshole seismic testing at vertical load of 71 kN: (a) $V_p$ and (b) $V_s$.

BKK Location 2: G3X-G4X
Crosshole seismic testing; Vertical static load ~ 71 kN
Hit on rod A

Spacing = 18 in.
$\Delta t = 1.055$ msec
$V_p = 1422$ ft/s = 433 m/s

Normalized Magnitude
Source trigger
G3X
G4X

Time (x10^-3 sec)
Normalized Magnitude
(a)

Figure D-65. BKK Landfill #2 (rod A): Crosshole seismic testing at vertical load of 111 kN: (a) $V_p$ and (b) $V_s$.

BKK Location 2: G3Z-G4Z
Crosshole seismic testing; Vertical static load ~ 111 kN
Hit on rod A

Spacing = 18 in.
$\Delta t = 2.168$ msec
$V_s = 691$ ft/s = 210 m/s

Normalized Magnitude
Source trigger
G3Z
G4Z

Time (x10^-3 sec)
Normalized Magnitude
(a)

738
Figure D-66. BKK Landfill #2 (rod B): Crosshole seismic testing at vertical load of 0 kN: (a) $V_{p,x}$ and (b) $V_{s,xz}$.

Figure D-67. BKK Landfill #2 (rod B): Crosshole seismic testing at vertical load of 9 kN: (a) $V_{p,x}$ and (b) $V_{s,xz}$. 
Figure D-68. BKK Landfill #2 (rod B): Crosshole seismic testing at vertical load of 18 kN: (a) $V_{p-X}$ and (b) $V_{s-XZ}$.

Figure D-69. BKK Landfill #2 (rod B): Crosshole seismic testing at vertical load of 36 kN: (a) $V_{p-X}$ and (b) $V_{s-XZ}$.
Figure D-70. BKK Landfill #2 (rod B): Crosshole seismic testing at vertical load of 71 kN: (a) $V_{p-X}$ and (b) $V_{s-XZ}$.

Figure D-71. BKK Landfill #2 (rod B): Crosshole seismic testing at vertical load of 111 kN: (a) $V_{p-X}$ and (b) $V_{s-XZ}$.
Figure D-72. BKK Landfill #2 (rod C): Crosshole seismic testing at vertical load of 0 kN: (a) \( V_p \) \(_x\) and (b) \( V_s \) \(_{XZ}\).

Figure D-73. BKK Landfill #2 (rod C): Crosshole seismic testing at vertical load of 9 kN: (a) \( V_p \) \(_x\) and (b) \( V_s \) \(_{XZ}\).
Figure D-74. BKK Landfill #2 (rod C): Crosshole seismic testing at vertical load of 18 kN: (a) $V_{p-X}$ and (b) $V_{s-XZ}$.

Figure D-75. BKK Landfill #2 (rod C): Crosshole seismic testing at vertical load of 36 kN: (a) $V_{p-X}$ and (b) $V_{s-XZ}$.
Figure D-76. BKK Landfill #2 (rod C): Crosshole seismic testing at vertical load of 71 kN: (a) $V_{p-X}$ and (b) $V_{s-XZ}$.

Figure D-77. BKK Landfill #2 (rod C): Crosshole seismic testing at vertical load of 111 kN: (a) $V_{p-X}$ and (b) $V_{s-XZ}$. 

(a) (b)
D.2.3 Steady-state Dynamic Testing

Figure D-78. BKK Landfill #2: Steady-state dynamic testing at vertical load of 18 kN and horizontal dynamic load of 1 kN.

Figure D-79. BKK Landfill #2: Steady-state dynamic testing at vertical load of 18 kN and horizontal dynamic load of 2 kN.
Figure D-80. BKK Landfill #2: Steady-state dynamic testing at vertical load of 18 kN and horizontal dynamic load of 4 kN.

Figure D-81. BKK Landfill #2: Steady-state dynamic testing at vertical load of 18 kN and horizontal dynamic load of 7 kN.
Figure D-82. BKK Landfill #2: Steady-state dynamic testing at vertical load of 18 kN and horizontal dynamic load of 11 kN.

Figure D-83. BKK Landfill #2: Steady-state dynamic testing at vertical load of 36 kN and horizontal dynamic load of 0.6 kN.
Figure D-84. BKK Landfill #2: Steady-state dynamic testing at vertical load of 36 kN and horizontal dynamic load of 1.24 kN.

Figure D-85. BKK Landfill #2: Steady-state dynamic testing at vertical load of 36 kN and horizontal dynamic load of 2 kN.
Figure D-86. BKK Landfill #2: Steady-state dynamic testing at vertical load of 36 kN and horizontal dynamic load of 4 kN.

Figure D-87. BKK Landfill #2: Steady-state dynamic testing at vertical load of 36 kN and horizontal dynamic load of 7 kN.
Figure D-88. BKK Landfill #2: Steady-state dynamic testing at vertical load of 36 kN and horizontal dynamic load of 13 kN.

Figure D-89. BKK Landfill #2: Steady-state dynamic testing at vertical load of 71 kN and horizontal dynamic load of 27 kN.
Figure D-90. BKK Landfill #2: Steady-state dynamic testing at vertical load of 71 kN and horizontal dynamic load of 36 kN.

Figure D-91. BKK Landfill #2: Steady-state dynamic testing at vertical load of 71 kN and horizontal dynamic load of 53 kN.
Figure D-92. BKK Landfill #2: Steady-state dynamic testing at vertical load of 71 kN and horizontal dynamic load of 71 kN.

Figure D-93. BKK Landfill #2: Steady-state dynamic testing at vertical load of 71 kN and horizontal dynamic load of 98 kN.
Figure D-94. BKK Landfill #2: Steady-state dynamic testing at vertical load of 71 kN and horizontal dynamic load of 133 kN.

Figure D-95. BKK Landfill #2: Steady-state dynamic testing at vertical load of 133 kN and horizontal dynamic load of 22 kN.
Figure D-96. BKK Landfill #2: Steady-state dynamic testing at vertical load of 133 kN and horizontal dynamic load of 27 kN.

Figure D-97. BKK Landfill #2: Steady-state dynamic testing at vertical load of 133 kN and horizontal dynamic load of 31 kN.
Figure D-98. BKK Landfill #2: Steady-state dynamic testing at vertical load of 133 kN and horizontal dynamic load of 40 kN.

Figure D-99. BKK Landfill #2: Steady-state dynamic testing at vertical load of 133 kN and horizontal dynamic load of 44 kN.
Figure D-100. BKK Landfill #2: Steady-state dynamic testing at vertical load of 133 kN and horizontal dynamic load of 71 kN.

Figure D-101. BKK Landfill #2: Steady-state dynamic testing at vertical load of 133 kN and horizontal dynamic load of 133 kN.
D.3 BKK Landfill Location 3

D.3.1 Downhole Seismic Testing

Figure D-102. BKK Landfill #3 (east hole): Downhole seismic testing at vertical load of 9 kN:
(a) $V_{p-Z}$, (b) $V_{s-ZX}$, and (c) $V_{s-ZY}$. 

757
Figure D-103. BKK Landfill #3 (east hole): Downhole seismic testing at vertical load of 18 kN: (a) $V_p-Z$, (b) $V_s-ZX$, and (c) $V_s-ZY$. 
Figure D-104. BKK Landfill #3 (east hole): Downhole seismic testing at vertical load of 36 kN:
(a) $V_p - Z$, (b) $V_s - ZX$, and (c) $V_s - ZY$. 
Figure D-105. BKK Landfill #3 (east hole): Downhole seismic testing at vertical load of 71 kN:
(a) $V_{p-Z}$, (b) $V_{s-ZX}$, and (c) $V_{s-ZY}$.
Figure D-106. BKK Landfill #3 (east hole): Downhole seismic testing at vertical load of 111 kN:
(a) $V_{p-Z}$, (b) $V_{s-ZX}$, and (c) $V_{s-ZY}$. 
Figure D-107. BKK Landfill #3 (west hole): Downhole seismic testing at vertical load of 0 kN:
(a) $V_{p-Z}$, (b) $V_{s-ZX}$, and (c) $V_{s-ZY}$. 
Figure D-108. BKK Landfill #3 (west hole): Downhole seismic testing at vertical load of 9 kN:
(a) $V_p-Z$, (b) $V_s-ZX$, and (c) $V_s-ZY$.  

- **BKK Location 3: West Hole Array**
  - Downhole seismic testing; Vertical static load ~ 9 kN
  - Spacing 5.75 in., $\Delta t_1 = 0.508$ msec
    - $V_p-Z = 943$ ft/s = 287 m/s
  - Spacing 10 in., $\Delta t_2 = 0.742$ msec
    - $V_p-Z = 1122$ ft/s = 342 m/s
  - Spacing 18 in., $\Delta t_3 = 1.152$ msec
    - $V_p-Z = 1301$ ft/s = 396 m/s

- **BKK Location 3: West Hole Array**
  - Downhole seismic testing; Vertical static load ~ 9 kN
  - Spacing 5.75 in., $\Delta t_1 = 0.918$ msec
    - $V_s-ZX = 521$ ft/s = 159 m/s
  - Spacing 10 in., $\Delta t_2 = 1.348$ msec
    - $V_s-ZX = 618$ ft/s = 188 m/s
  - Spacing 18 in., $\Delta t_3 = 1.895$ msec
    - $V_s-ZX = 791$ ft/s = 241 m/s

- **BKK Location 3: West Hole Array**
  - Downhole seismic testing; Vertical static load ~ 9 kN
  - Spacing 5.75 in., $\Delta t_1 = 0.840$ msec
    - $V_s-ZY = 570$ ft/s = 173 m/s
  - Spacing 10 in., $\Delta t_2 = 1.250$ msec
    - $V_s-ZY = 666$ ft/s = 203 m/s
  - Spacing 18 in., $\Delta t_3 = 2.070$ msec
    - $V_s-ZY = 724$ ft/s = 220 m/s
Figure D-109. BKK Landfill #3 (west hole): Downhole seismic testing at vertical load of 18 kN: (a) $V_{p-Z}$, (b) $V_{s-ZX}$, and (c) $V_{s-ZY}$. 
Figure D-110. BKK Landfill #3 (west hole): Downhole seismic testing at vertical load of 36 kN: (a) $V_pZ$, (b) $V_sZX$, and (c) $V_sZY$. 

Normalized Magnitude

Time (x10^{-3} sec)
Figure D-111. BKK Landfill #3 (west hole): Downhole seismic testing at vertical load of 71 kN: (a) $V_p-Z$, (b) $V_s-ZX$, and (c) $V_s-ZY$. 
Figure D-112. BKK Landfill #3 (west hole): Downhole seismic testing at vertical load of 111 kN: (a) $V_{P-Z}$, (b) $V_{S-ZX}$, and (c) $V_{S-ZY}$. 
D.3.2 Crosshole Seismic Testing

Figure D-113. BKK Landfill #3 (rod A): Crosshole seismic testing at vertical loads of (a) 0 kN and (b) 9 kN: $V_{s,XZ}$.

Figure D-114. BKK Landfill #3 (rod A): Crosshole seismic testing at vertical loads of (a) 18 kN and (b) 36 kN: $V_{s,XZ}$.
Figure D-115. BKK Landfill #3 (rod A): Crosshole seismic testing at vertical loads of (a) 71 kN and (b) 111 kN: $V_{s-XZ}$.

Figure D-116. BKK Landfill #3 (rod B): Crosshole seismic testing at vertical load of 0 kN: (a) $V_{p-X}$ and (b) $V_{s-XZ}$.
Figure D-117. BKK Landfill #3 (rod B): Crosshole seismic testing at vertical load of 9 kN: (a) $V_{p-X}$ and (b) $V_{s-XZ}$.

Figure D-118. BKK Landfill #3 (rod B): Crosshole seismic testing at vertical load of 18 kN: (a) $V_{p-X}$ and (b) $V_{s-XZ}$. 
Figure D-119. BKK Landfill #3 (rod B): Crosshole seismic testing at vertical load of 36 kN: (a) \( V_{p-X} \) and (b) \( V_{s-XZ} \).

Figure D-120. BKK Landfill #3 (rod B): Crosshole seismic testing at vertical load of 71 kN: (a) \( V_{p-X} \) and (b) \( V_{s-XZ} \).
Figure D-121. BKK Landfill #3 (rod B): Crosshole seismic testing at vertical load of 111 kN: (a) $V_{p-X}$ and (b) $V_{s-XZ}$.

Figure D-122. BKK Landfill #3 (rod C): Crosshole seismic testing at vertical load of 0 kN: (a) $V_{p-X}$ and (b) $V_{s-XZ}$. 
Figure D-123. BKK Landfill #3 (rod C): Crosshole seismic testing at vertical load of 9 kN: (a) $V_{p-X}$ and (b) $V_{s-XZ}$.

Figure D-124. BKK Landfill #3 (rod C): Crosshole seismic testing at vertical load of 18 kN: (a) $V_{p-X}$ and (b) $V_{s-XZ}$. 
Figure D-125. BKK Landfill #3 (rod C): Crosshole seismic testing at vertical load of 36 kN: (a) $V_{p-X}$ and (b) $V_{s-XZ}$.

Figure D-126. BKK Landfill #3 (rod C): Crosshole seismic testing at vertical load of 71 kN: (a) $V_{p-X}$ and (b) $V_{s-XZ}$. 

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Normalized Magnitude

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<th>25</th>
<th>20</th>
<th>15</th>
<th>10</th>
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Source trigger

G22X

G23X

Spacing = 18 in.
$\Delta t = 1.309$ msec
$V_{p-X} = 1146$ ft/s = 349 m/s

BKK Location 3: G22X-G23X
Crosshole seismic testing; Vertical static load ~ 36 kN
Hit on rod C

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Normalized Magnitude

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<th>15</th>
<th>10</th>
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Source trigger

G22Z

G23Z

Spacing = 18 in.
$\Delta t = 2.441$ msec
$V_{s-XZ} = 614$ ft/s = 187 m/s

BKK Location 3: G22Z-G23Z
Crosshole seismic testing; Vertical static load ~ 36 kN
Hit on rod C

---

Normalized Magnitude

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<th>10</th>
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Source trigger

G22X

G23X

Spacing = 18 in.
$\Delta t = 1.191$ msec
$V_{p-X} = 1259$ ft/s = 383 m/s

BKK Location 3: G22X-G23X
Crosshole seismic testing; Vertical static load ~ 71 kN
Hit on rod C

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Normalized Magnitude

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Source trigger

G22Z

G23Z

Spacing = 18 in.
$\Delta t = 2.109$ msec
$V_{s-XZ} = 711$ ft/s = 216 m/s

BKK Location 3: G22Z-G23Z
Crosshole seismic testing; Vertical static load ~ 71 kN
Hit on rod C
D.3.3 Steady-state Dynamic Testing

Figure D-128. BKK Landfill #3: Steady-state dynamic testing at vertical load of 18 kN and horizontal dynamic load of 1 kN.
Figure D-129. BKK Landfill #3: Steady-state dynamic testing at vertical load of 18 kN and horizontal dynamic load of 2 kN.

Figure D-130. BKK Landfill #3: Steady-state dynamic testing at vertical load of 18 kN and horizontal dynamic load of 4 kN.
Figure D-131. BKK Landfill #3: Steady-state dynamic testing at vertical load of 18 kN and horizontal dynamic load of 7 kN.

Figure D-132. BKK Landfill #3: Steady-state dynamic testing at vertical load of 36 kN and horizontal dynamic load of 0.56 kN.
Figure D-133. BKK Landfill #3: Steady-state dynamic testing at vertical load of 36 kN and horizontal dynamic load of 1 kN.

Figure D-134. BKK Landfill #3: Steady-state dynamic testing at vertical load of 36 kN and horizontal dynamic load of 2 kN.
Figure D-135. BKK Landfill #3: Steady-state dynamic testing at vertical load of 36 kN and horizontal dynamic load of 4 kN.

Figure D-136. BKK Landfill #3: Steady-state dynamic testing at vertical load of 36 kN and horizontal dynamic load of 9 kN.
Figure D-137. BKK Landfill #3: Steady-state dynamic testing at vertical load of 36 kN and horizontal dynamic load of 13 kN.

Figure D-138. BKK Landfill #3: Steady-state dynamic testing at vertical load of 36 kN and horizontal dynamic load of 18 kN.
Figure D-139. BKK Landfill #3: Steady-state dynamic testing at vertical load of 71 kN and horizontal dynamic load of 27 kN.

Figure D-140. BKK Landfill #3: Steady-state dynamic testing at vertical load of 71 kN and horizontal dynamic load of 36 kN.
Figure D-141. BKK Landfill #3: Steady-state dynamic testing at vertical load of 71 kN and horizontal dynamic load of 36 kN.

Figure D-142. BKK Landfill #3: Steady-state dynamic testing at vertical load of 71 kN and horizontal dynamic load of 44 kN.
Figure D-143. BKK Landfill #3: Steady-state dynamic testing at vertical load of 71 kN and horizontal dynamic load of 62 kN.

Figure D-144. BKK Landfill #3: Steady-state dynamic testing at vertical load of 71 kN and horizontal dynamic load of 71 kN.
Figure D-145. BKK Landfill #3: Steady-state dynamic testing at vertical load of 71 kN and horizontal dynamic load of 85 kN.

Figure D-146. BKK Landfill #3: Steady-state dynamic testing at vertical load of 133 kN and horizontal dynamic load of 27 kN.
Figure D-147. BKK Landfill #3: Steady-state dynamic testing at vertical load of 133 kN and horizontal dynamic load of 31 kN.

Figure D-148. BKK Landfill #3: Steady-state dynamic testing at vertical load of 133 kN and horizontal dynamic load of 36 kN.
Figure D-149. BKK Landfill #3: Steady-state dynamic testing at vertical load of 133 kN and horizontal dynamic load of 44 kN.

Figure D-150. BKK Landfill #3: Steady-state dynamic testing at vertical load of 133 kN and horizontal dynamic load of 62 kN.
Figure D-151. BKK Landfill #3: Steady-state dynamic testing at vertical load of 133 kN and horizontal dynamic load of 71 kN.

Figure D-152. BKK Landfill #3: Steady-state dynamic testing at vertical load of 133 kN and horizontal dynamic load of 85 kN.
Figure D-153. BKK Landfill #3: Steady-state dynamic testing at vertical load of 133 kN and horizontal dynamic load of 133 kN.
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802


