

Project: Liftstation_V2.0

Jeremy McLaughlin, Houston Engineering, Inc. January 23, 2014
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Plate Local Forces (Extreme Rows Only)

| Plate | Material | Result Case Name | Location | Mx ft-K/ft | My ft-K/ft | Mxy ft-K/ft | Vx K/ft | Vy K/ft |
|-------|------------------------|-------------------------|----------|--------------------|--------------------|----------------|--------------------|--------------------|
| FL140 | Concrete (F'c = 4 ksi) | COE Liftstation - Empty | N141 | -8.665 | -67.69 7 | 2.368 | 0.146 | -33.85 7 |
| FL140 | Concrete (F'c = 4 ksi) | COE Liftstation - Empty | N172 | -6.398 | -57.26 5 | 2.309 | 0.147 | -33.85 7 |
| FL193 | Concrete (F'c = 4 ksi) | COE Liftstation - full | N196 | 1.194 | 2.340 | 12.123 | 4.075 | -4.605 |
| FL205 | Concrete (F'c = 4 ksi) | COE Liftstation - full | N209 | 2.232 | 2.855 | -9.723 | -2.822 | -8.446 |
| FL320 | Concrete (F'c = 4 ksi) | COE Liftstation - full | N358 | 19.875 | 31.416 | 0.085 | -0.741 | -0.182 |
| FL341 | Concrete (F'c = 4 ksi) | COE Liftstation - Empty | N350 | -33.72 6 | -1.177 | 1.406 | 25.768 | -0.157 |
| FL398 | Concrete (F'c = 4 ksi) | COE Liftstation - Empty | N408 | -43.41 0 | -5.836 | -4.123 | -27.25 6 | 0.621 |
| FL398 | Concrete (F'c = 4 ksi) | COE Liftstation - Empty | N438 | -34.90 4 | -4.399 | -0.596 | -27.37 1 | 0.315 |
| FL514 | Concrete (F'c = 4 ksi) | COE Liftstation - full | N527 | 25.858 | 7.805 | 0.233 | -2.221 | -0.221 |
| FL800 | Concrete (F'c = 4 ksi) | COE Liftstation - Empty | N823 | -7.237 | -51.71 5 | -2.123 | 0.233 | 30.497 |

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|-------|------------------------|-------------------------|----------|--------------------|--------------------|--------------------|--------------------|--------------------|
| | | | | ft-K/ft | ft-K/ft | ft-K/ft | K/ft | K/ft |
| FW109 | Concrete (F'c = 4 ksi) | COE Liftstation - Empty | N1027 | 4.089 | 52.408 | 1.623 | -0.571 | -33.75 4 |
| FW109 | Concrete (F'c = 4 ksi) | COE Liftstation - Empty | N854 | 6.408 | 62.784 | 1.784 | -0.973 | -33.75 4 |
| FW187 | Concrete (F'c = 4 ksi) | COE Liftstation - Empty | N1312 | -3.165 | -0.387 | 18.962 | -5.517 | -6.214 |
| FW198 | Concrete (F'c = 4 ksi) | COE Liftstation - Empty | N1324 | -2.752 | -0.474 | -17.44 0 | 5.097 | -7.413 |
| FW212 | Concrete (F'c = 4 ksi) | COE Liftstation - Empty | N1609 | 38.187 | 6.290 | 4.994 | -21.83 2 | 14.009 |
| FW333 | Concrete (F'c = 4 ksi) | COE Liftstation - Empty | N2218 | -41.56 3 | -28.32 2 | -0.260 | 1.105 | -2.325 |
| FW352 | Concrete (F'c = 4 ksi) | COE Liftstation - Empty | N2360 | 45.854 | 4.154 | 1.166 | -28.67 2 | 3.566 |
| FW369 | Concrete (F'c = 4 ksi) | COE Liftstation - Empty | N2376 | 43.571 | 1.988 | -2.769 | 27.385 | 1.378 |
| FW380 | Concrete (F'c = 4 ksi) | COE Liftstation - Empty | N2509 | 55.027 | 6.134 | -0.390 | -28.32 5 | 3.601 |
| FW417 | Concrete (F'c = 4 ksi) | COE Liftstation - Empty | N2668 | -45.12 0 | -25.20 1 | -0.101 | 1.204 | 1.117 |

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|-------|------------------------|-------------------------|----------|----------------|----------------|----------------|---------------|---------------|
| BW109 | Concrete (F'c = 4 ksi) | COE Liftstation - Empty | N141 | -6.475 | -68.995 | -2.014 | 0.537 | 34.098 |
| BW109 | Concrete (F'c = 4 ksi) | COE Liftstation - Empty | N915 | -4.097 | -58.513 | -1.919 | 0.320 | 34.098 |
| BW187 | Concrete (F'c = 4 ksi) | COE Liftstation - Empty | N1191 | 0.736 | -1.220 | -16.99 | 5.394 | 5.971 |
| | | | | | | 1 | | |
| BW199 | Concrete (F'c = 4 ksi) | COE Liftstation - Empty | N1204 | -2.932 | -1.975 | 16.413 | -6.358 | 4.697 |
| BW212 | Concrete (F'c = 4 ksi) | COE Liftstation - Empty | N1488 | -41.910 | -6.715 | -3.644 | 21.522 | -11.53 |
| | | | | | | | | 3 |
| BW333 | Concrete (F'c = 4 ksi) | COE Liftstation - Empty | N2097 | 40.211 | 27.026 | 0.047 | -0.592 | 2.472 |
| BW352 | Concrete (F'c = 4 ksi) | COE Liftstation - Empty | N2239 | -53.352 | -5.574 | -0.612 | 29.439 | -3.201 |
| BW380 | Concrete (F'c = 4 ksi) | COE Liftstation - Empty | N2388 | -63.001 | -7.675 | 0.720 | 29.155 | -3.000 |
| BW397 | Concrete (F'c = 4 ksi) | COE Liftstation - Empty | N2255 | -40.318 | -1.947 | 5.054 | -26.48 | -0.718 |
| | | | | | | | 8 | |
| BW417 | Concrete (F'c = 4 ksi) | COE Liftstation - Empty | N2547 | 43.772 | 24.322 | 0.105 | -0.631 | -1.019 |

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|-------|------------------------|-------------------------|----------|----------------|----------------|---------------|----------------|----------------|
| | | | | ft-K/ft | ft-K/ft | ft-K/ft | K/ft | K/ft |
| LW107 | Concrete (F'c = 4 ksi) | COE Liftstation - Empty | N349 | 4.647 | 41.454 | 1.542 | -0.433 | -24.835 |
| LW107 | Concrete (F'c = 4 ksi) | COE Liftstation - Empty | N953 | 2.730 | 33.878 | 1.435 | -0.268 | -24.835 |
| LW172 | Concrete (F'c = 4 ksi) | COE Liftstation - Empty | N1223 | -0.315 | -1.091 | 7.640 | -5.598 | -3.426 |
| LW180 | Concrete (F'c = 4 ksi) | COE Liftstation - Empty | N1250 | 4.117 | 0.573 | -7.216 | 7.614 | -2.141 |
| LW245 | Concrete (F'c = 4 ksi) | COE Liftstation - Empty | N1835 | -20.804 | -12.755 | 0.466 | 0.624 | -1.847 |
| LW306 | Concrete (F'c = 4 ksi) | COE Liftstation - Empty | N2056 | 46.963 | 7.699 | 0.564 | 22.936 | -0.708 |
| LW307 | Concrete (F'c = 4 ksi) | COE Liftstation - Empty | N2117 | 54.265 | 7.816 | 0.740 | -26.618 | 0.014 |
| LW314 | Concrete (F'c = 4 ksi) | COE Liftstation - Empty | N2285 | -23.234 | -10.341 | 0.551 | 0.332 | 0.906 |
| LW353 | Concrete (F'c = 4 ksi) | COE Liftstation - Empty | N2388 | 63.806 | 10.248 | 0.748 | -25.568 | -2.005 |
| LW797 | Concrete (F'c = 4 ksi) | COE Liftstation - Empty | N5189 | 0.487 | 7.559 | -0.083 | 0.329 | 3.312 |

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|-------|------------------------|-------------------------|----------|--------------------|----------------|--------------------|--------------------|---------------|
| RW107 | Concrete (F'c = 4 ksi) | COE Liftstation - Empty | N955 | -2.235 | -36.611 | -1.116 | -0.505 | 25.937 |
| RW108 | Concrete (F'c = 4 ksi) | COE Liftstation - Empty | N408 | -5.044 | -45.344 | -0.177 | 1.919 | 25.809 |
| RW169 | Concrete (F'c = 4 ksi) | COE Liftstation - Empty | N1366 | -24.34 8 | -4.428 | -2.914 | 16.324 | -8.032 |
| RW171 | Concrete (F'c = 4 ksi) | COE Liftstation - Empty | N1222 | -0.362 | 0.873 | -10.69 8 | 7.081 | 2.792 |
| RW202 | Concrete (F'c = 4 ksi) | COE Liftstation - Empty | N1399 | 3.194 | 8.134 | 7.565 | -5.970 | 3.238 |
| RW245 | Concrete (F'c = 4 ksi) | COE Liftstation - Empty | N1837 | 23.879 | 15.540 | 0.458 | -2.009 | 2.501 |
| RW284 | Concrete (F'c = 4 ksi) | COE Liftstation - Empty | N2116 | -36.78 9 | -4.176 | 0.091 | 23.196 | -3.600 |
| RW284 | Concrete (F'c = 4 ksi) | COE Liftstation - Empty | N2119 | -29.62 4 | -2.676 | -0.344 | 23.196 | -2.302 |
| RW336 | Concrete (F'c = 4 ksi) | COE Liftstation - Empty | N2437 | 28.866 | 11.165 | -0.189 | 0.581 | -1.188 |
| RW503 | Concrete (F'c = 4 ksi) | COE Liftstation - Empty | N3352 | -16.84 6 | -9.082 | -2.120 | -23.50 6 | 7.069 |

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|-------|------------------------|-------------------------|----------|---------------|-------------------|----------------|----------------|----------------|
| RF109 | Concrete (F'c = 4 ksi) | COE Liftstation - Empty | N5289 | 3.331 | 20.116 | -0.379 | -0.336 | 7.780 |
| RF185 | Concrete (F'c = 4 ksi) | COE Liftstation - full | N5405 | 6.031 | -1.925 | 2.196 | 10.056 | -1.896 |
| RF208 | Concrete (F'c = 4 ksi) | COE Liftstation - full | N5434 | -1.398 | -2.403 | 2.793 | -1.374 | 9.310 |
| RF247 | Concrete (F'c = 4 ksi) | COE Liftstation - full | N5481 | -0.419 | -10.914 | -1.106 | 1.276 | 3.098 |
| RF346 | Concrete (F'c = 4 ksi) | COE Liftstation - Empty | N5572 | 15.427 | 2.813 | 0.305 | 6.382 | 0.118 |
| RF361 | Concrete (F'c = 4 ksi) | COE Liftstation - full | Centroid | -4.742 | -0.576 | -4.488 | -2.628 | -7.749 |
| RF361 | Concrete (F'c = 4 ksi) | COE Liftstation - full | N5619 | -5.943 | 1.193 | -4.119 | -3.755 | -10.898 |
| RF387 | Concrete (F'c = 4 ksi) | COE Liftstation - full | N5618 | 1.703 | -0.101 | 0.443 | -13.816 | 0.406 |
| RF389 | Concrete (F'c = 4 ksi) | COE Liftstation - full | N5649 | -9.227 | 2.046 | -1.310 | -3.018 | -1.608 |
| RF469 | Concrete (F'c = 4 ksi) | COE Liftstation - full | Centroid | -4.307 | -1.780 | 3.656 | -1.898 | 5.405 |

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|------------|------------------------|------------------------|----------|----------------|----------------|----------------|----------------|---------------|
| MW110 6 | Concrete (F'c = 4 ksi) | COE Liftstation - full | N367 | -3.751 | -27.360 | 0.756 | -0.743 | 18.645 |
| MW110 6 | Concrete (F'c = 4 ksi) | COE Liftstation - full | N954 | -2.225 | -21.736 | 0.595 | -0.503 | 18.645 |
| MW114 9 | Concrete (F'c = 4 ksi) | COE Liftstation - full | N1083 | 1.020 | -1.028 | -6.530 | 1.585 | 4.493 |
| MW117 9 | Concrete (F'c = 4 ksi) | COE Liftstation - full | N1248 | 1.048 | 2.884 | 6.129 | -4.080 | 1.631 |
| MW118 1 | Concrete (F'c = 4 ksi) | COE Liftstation - full | N1421 | -13.489 | 0.593 | 2.218 | -9.517 | -5.371 |
| MW122 1 | Concrete (F'c = 4 ksi) | COE Liftstation - full | N1686 | 14.681 | 9.342 | -0.425 | 0.803 | 2.211 |
| MW127 3 | Concrete (F'c = 4 ksi) | COE Liftstation - full | N1851 | -19.273 | -2.196 | 2.386 | -16.880 | -0.848 |
| MW128 4 | Concrete (F'c = 4 ksi) | COE Liftstation - full | N1968 | -32.526 | -5.099 | -1.005 | 19.242 | -0.586 |
| MW130 7 | Concrete (F'c = 4 ksi) | COE Liftstation - full | N2256 | -39.300 | -6.382 | 1.717 | 18.644 | 0.732 |
| MW131 3 | Concrete (F'c = 4 ksi) | COE Liftstation - full | N2286 | 17.906 | 6.748 | -0.234 | 1.107 | -0.785 |

Project: Liftstation_V2.2

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| Plate | Material | Result Case Name | Location | Mx ft-K/ft | My ft-K/ft | Mxy ft-K/ft | Vx K/ft | Vy K/ft |
|--------|------------------------|------------------------|----------|----------------|---------------|----------------|----------------|----------------|
| MW1106 | Concrete (F'c = 4 ksi) | COE Liftstation - full | N336 | 2.498 | 22.522 | 0.716 | -0.590 | -17.047 |
| MW1106 | Concrete (F'c = 4 ksi) | COE Liftstation - full | N951 | 0.972 | 17.404 | 0.630 | -0.250 | -17.047 |
| MW1148 | Concrete (F'c = 4 ksi) | COE Liftstation - full | N1080 | -0.188 | 0.169 | 6.443 | -2.967 | -2.474 |
| MW1156 | Concrete (F'c = 4 ksi) | COE Liftstation - full | N1107 | 2.141 | 0.736 | -6.521 | 3.643 | -1.383 |
| MW1158 | Concrete (F'c = 4 ksi) | COE Liftstation - full | N1271 | 17.500 | 3.648 | -0.262 | 11.333 | 9.082 |
| MW1221 | Concrete (F'c = 4 ksi) | COE Liftstation - full | N1683 | -15.211 | -8.975 | -0.303 | 0.679 | -1.850 |
| MW1261 | Concrete (F'c = 4 ksi) | COE Liftstation - full | N1968 | 21.226 | 2.908 | -0.242 | -17.096 | 1.039 |
| MW1296 | Concrete (F'c = 4 ksi) | COE Liftstation - full | N2001 | 32.536 | 4.960 | -0.515 | 19.044 | 1.077 |
| MW1313 | Concrete (F'c = 4 ksi) | COE Liftstation - full | N2133 | -17.828 | -6.563 | -0.440 | 0.983 | 0.841 |
| MW1319 | Concrete (F'c = 4 ksi) | COE Liftstation - full | N2321 | 39.333 | 6.514 | 2.229 | 18.633 | 0.394 |

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| MW210 8 | Concrete (F'c = 4 ksi) | COE Liftstation - full | N544 | -6.245 | -45.44 5 | 1.156 | -1.190 | 24.785 |
| MW210 8 | Concrete (F'c = 4 ksi) | COE Liftstation - full | N980 | -4.319 | -37.93 3 | 0.938 | -0.780 | 24.785 |
| MW215 4 | Concrete (F'c = 4 ksi) | COE Liftstation - full | N1403 | -26.25 4 | -4.781 | -2.928 | 13.913 | -8.478 |
| MW215 7 | Concrete (F'c = 4 ksi) | COE Liftstation - full | N1256 | 0.771 | 0.815 | -12.55 2 | 4.047 | 3.216 |
| MW216 8 | Concrete (F'c = 4 ksi) | COE Liftstation - full | N1268 | 0.863 | 1.070 | 12.512 | -4.013 | 3.052 |
| MW223 4 | Concrete (F'c = 4 ksi) | COE Liftstation - full | N2012 | 26.582 | 17.807 | -0.552 | 0.907 | 2.401 |
| MW224 4 | Concrete (F'c = 4 ksi) | COE Liftstation - full | N2154 | -41.71 4 | -6.151 | -0.614 | 22.580 | -2.559 |
| MW227 9 | Concrete (F'c = 4 ksi) | COE Liftstation - full | N2170 | -43.06 9 | -6.265 | 3.136 | -22.59 2 | -1.122 |
| MW229 7 | Concrete (F'c = 4 ksi) | COE Liftstation - full | N2471 | -50.84 0 | -8.237 | -0.680 | -22.17 4 | -0.385 |
| MW230 6 | Concrete (F'c = 4 ksi) | COE Liftstation - full | N2612 | 30.458 | 14.770 | -0.081 | 1.055 | -1.014 |

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|--------|------------------------|------------------------|----------|---------------|---------------|---------------|---------------|---------------|
| | | | | ft-K/ft | ft-K/ft | ft-K/ft | K/ft | K/ft |
| MW3100 | Concrete (F'c = 4 ksi) | COE Liftstation - full | N1271 | -0.720 | 1.008 | 1.852 | -1.283 | -3.665 |
| MW3100 | Concrete (F'c = 4 ksi) | COE Liftstation - full | N1421 | -1.663 | 0.255 | 1.684 | -0.563 | -3.665 |
| MW3110 | Concrete (F'c = 4 ksi) | COE Liftstation - full | N1421 | -2.381 | 0.530 | 1.866 | -0.367 | -3.134 |
| MW3155 | Concrete (F'c = 4 ksi) | COE Liftstation - full | N2027 | -0.106 | 0.054 | -0.480 | 1.222 | -0.025 |
| MW3200 | Concrete (F'c = 4 ksi) | COE Liftstation - full | N2771 | -9.439 | -1.595 | -0.161 | 2.077 | 0.500 |
| MW3209 | Concrete (F'c = 4 ksi) | COE Liftstation - full | N2931 | 6.327 | 1.105 | 0.035 | 1.709 | 0.025 |
| MW3210 | Concrete (F'c = 4 ksi) | COE Liftstation - full | N2921 | -9.405 | -1.596 | -0.326 | 2.072 | 0.779 |
| MW3219 | Concrete (F'c = 4 ksi) | COE Liftstation - full | N3081 | 6.360 | 1.082 | 0.013 | 1.744 | 0.006 |
| MW3240 | Concrete (F'c = 4 ksi) | COE Liftstation - full | N3371 | -8.295 | -1.008 | -0.008 | 1.150 | 1.683 |
| MW3245 | Concrete (F'c = 4 ksi) | COE Liftstation - full | N3526 | -0.803 | 0.001 | -0.132 | 2.178 | -0.026 |