



# GEA LIMITED (GEOTECHNICAL & ENV ASSOC)

Rear of 159-163 King's Cross Road, London WC1X 9BN  
Wall Installation only Issue 4

| Job No.   | Sheet No.   | Rev.    |
|-----------|-------------|---------|
| J16180    |             |         |
| Drg. Ref. |             |         |
| Made by   | Date        | Checked |
|           | 07-Mar-2017 |         |

## Problem Type

Problem Type : Tunnelling and Embedded Wall Excavations

## Displacement Data

| Type | Name   | Direction of extrusion | Point/Line/Line for extrusion |          |              |              |          |              | No. of intervals across extrusion/line | Extrusion depth | No. of intervals along extrusion | Calculate | Surface type for tunnels |
|------|--------|------------------------|-------------------------------|----------|--------------|--------------|----------|--------------|----------------------------------------|-----------------|----------------------------------|-----------|--------------------------|
|      |        |                        | First point                   |          |              | Second point |          |              |                                        |                 |                                  |           |                          |
|      |        |                        | X [m]                         | Y [m]    | Z(level) [m] | X [m]        | Y [m]    | Z(level) [m] |                                        |                 |                                  |           |                          |
| Grid | Grid 1 | Global X               | 0.30000                       | 0.00000  | 0.00000      | -            | 80.00000 | 0.00000      | 250                                    | 100.00000       | 250                              | No        | Surface                  |
| Line | A      | -                      | 22.50000                      | 48.10000 | -0.50000     | 25.90000     | 48.10000 | -0.50000     | 4                                      | -               | -                                | Yes       | Surface                  |
| Line | B      | -                      | 25.90000                      | 48.10000 | -0.50000     | 25.90000     | 45.00000 | -0.50000     | 4                                      | -               | -                                | Yes       | Surface                  |
| Line | C      | -                      | 25.90000                      | 45.00000 | -0.50000     | 30.50000     | 44.90000 | -0.50000     | 5                                      | -               | -                                | Yes       | Surface                  |
| Line | D      | -                      | 30.50000                      | 44.90000 | -0.50000     | 30.40000     | 50.30000 | -0.50000     | 6                                      | -               | -                                | Yes       | Surface                  |
| Line | E      | -                      | 30.40000                      | 50.30000 | -0.50000     | 32.90000     | 50.30000 | -0.50000     | 3                                      | -               | -                                | Yes       | Surface                  |
| Line | F      | -                      | 32.90000                      | 50.30000 | -0.50000     | 33.00000     | 59.60000 | -0.50000     | 10                                     | -               | -                                | Yes       | Surface                  |
| Line | G      | -                      | 33.00000                      | 59.60000 | -0.50000     | 28.00000     | 59.60000 | -0.50000     | 5                                      | -               | -                                | Yes       | Surface                  |
| Line | H      | -                      | 28.00000                      | 59.60000 | -0.50000     | 28.10000     | 56.90000 | -0.50000     | 3                                      | -               | -                                | Yes       | Surface                  |
| Line | I      | -                      | 28.10000                      | 56.90000 | -0.50000     | 20.90000     | 57.00000 | -0.50000     | 8                                      | -               | -                                | Yes       | Surface                  |
| Line | J      | -                      | 33.00000                      | 59.50000 | -0.50000     | 52.50000     | 59.50000 | -0.50000     | 10                                     | -               | -                                | Yes       | Surface                  |
| Line | K      | -                      | 33.00000                      | 52.20000 | -0.50000     | 41.90000     | 52.20000 | -0.50000     | 9                                      | -               | -                                | Yes       | Surface                  |
| Line | L      | -                      | 37.70000                      | 59.40000 | -0.50000     | 37.70000     | 52.20000 | -0.50000     | 8                                      | -               | -                                | Yes       | Surface                  |
| Line | M      | -                      | 42.00000                      | 59.50000 | -1.50000     | 41.90000     | 52.20000 | -1.50000     | 8                                      | -               | -                                | Yes       | Surface                  |
| Line | N      | -                      | 45.50000                      | 53.30000 | -4.00000     | 45.50000     | 59.40000 | -4.00000     | 7                                      | -               | -                                | Yes       | Surface                  |
| Line | O      | -                      | 37.70000                      | 52.20000 | -0.68000     | 37.70000     | 47.60000 | -0.68000     | 5                                      | -               | -                                | Yes       | Surface                  |
| Line | P      | -                      | 45.50000                      | 53.30000 | -1.85000     | 45.50000     | 47.60000 | -1.85000     | 6                                      | -               | -                                | Yes       | Surface                  |
| Line | Q      | -                      | 41.90000                      | 52.20000 | -0.65000     | 41.90000     | 47.60000 | -0.65000     | 5                                      | -               | -                                | Yes       | Surface                  |
| Line | R      | -                      | 33.00000                      | 50.30000 | -0.50000     | 32.60000     | 42.90000 | -0.50000     | 8                                      | -               | -                                | Yes       | Surface                  |
| Line | S      | -                      | 54.40000                      | 58.50000 | -0.50000     | 73.00000     | 33.70000 | -0.50000     | 16                                     | -               | -                                | Yes       | Surface                  |
| Line | T      | -                      | 45.50000                      | 53.30000 | -0.50000     | 68.90000     | 23.70000 | -0.50000     | 19                                     | -               | -                                | Yes       | Surface                  |
| Line | U      | -                      | 63.00000                      | 47.00000 | -0.50000     | 55.10000     | 41.10000 | -0.50000     | 10                                     | -               | -                                | Yes       | Surface                  |
| Line | V      | -                      | 55.10000                      | 41.10000 | -0.50000     | 52.20000     | 38.90000 | -0.50000     | 4                                      | -               | -                                | Yes       | Surface                  |
| Line | W      | -                      | 52.20000                      | 38.90000 | -1.70000     | 52.90000     | 38.00000 | -1.70000     | 2                                      | -               | -                                | Yes       | Surface                  |
| Line | X      | -                      | 66.40000                      | 42.50000 | -0.50000     | 58.60000     | 36.70000 | -0.50000     | 10                                     | -               | -                                | Yes       | Surface                  |
| Line | Y      | -                      | 58.60000                      | 36.70000 | -1.40000     | 55.70000     | 34.50000 | -1.40000     | 4                                      | -               | -                                | Yes       | Surface                  |
| Line | Z      | -                      | 69.70000                      | 38.10000 | -0.50000     | 62.00000     | 32.40000 | -0.50000     | 10                                     | -               | -                                | Yes       | Surface                  |
| Line | AA     | -                      | 62.00000                      | 32.40000 | -1.40000     | 59.00000     | 30.30000 | -1.40000     | 4                                      | -               | -                                | Yes       | Surface                  |
| Line | AB     | -                      | 73.00000                      | 33.70000 | -0.50000     | 65.30000     | 28.20000 | -0.50000     | 10                                     | -               | -                                | Yes       | Surface                  |
| Line | AC     | -                      | 65.30000                      | 28.20000 | -0.50000     | 61.20000     | 25.20000 | -0.50000     | 6                                      | -               | -                                | Yes       | Surface                  |
| Line | AD     | -                      | 61.20000                      | 25.20000 | -1.46000     | 53.40000     | 26.20000 | -1.46000     | 8                                      | -               | -                                | Yes       | Surface                  |
| Line | AE     | -                      | 61.20000                      | 25.20000 | -0.50000     | 61.00000     | 21.90000 | -0.50000     | 4                                      | -               | -                                | Yes       | Surface                  |
| Line | AF     | -                      | 50.30000                      | 26.50000 | -1.46000     | 50.00000     | 23.30000 | -1.46000     | 4                                      | -               | -                                | Yes       | Surface                  |
| Line | AG     | -                      | 50.00000                      | 23.30000 | -0.50000     | 67.00000     | 21.10000 | -0.50000     | 9                                      | -               | -                                | Yes       | Surface                  |
| Line | AH     | -                      | 59.00000                      | 20.70000 | -0.50000     | 52.70000     | 21.40000 | -0.50000     | 7                                      | -               | -                                | Yes       | Surface                  |
| Line | AI     | -                      | 52.70000                      | 21.40000 | -0.50000     | 52.00000     | 16.60000 | -0.50000     | 5                                      | -               | -                                | Yes       | Surface                  |
| Line | AJ     | -                      | 52.00000                      | 16.60000 | -0.50000     | 43.10000     | 17.70000 | -0.50000     | 9                                      | -               | -                                | Yes       | Surface                  |
| Line | AK     | -                      | 43.10000                      | 17.70000 | -0.50000     | 43.80000     | 22.60000 | -0.50000     | 5                                      | -               | -                                | Yes       | Surface                  |
| Line | AL     | -                      | 43.80000                      | 22.60000 | -0.50000     | 39.10000     | 23.20000 | -0.50000     | 5                                      | -               | -                                | Yes       | Surface                  |
| Line | AM     | -                      | 39.10000                      | 23.20000 | -0.50000     | 38.90000     | 20.50000 | -0.50000     | 3                                      | -               | -                                | Yes       | Surface                  |
| Line | AN     | -                      | 38.90000                      | 20.50000 | -0.50000     | 35.60000     | 21.00000 | -0.50000     | 4                                      | -               | -                                | Yes       | Surface                  |
| Line | AO     | -                      | 35.60000                      | 21.00000 | -0.50000     | 35.90000     | 23.50000 | -0.50000     | 3                                      | -               | -                                | Yes       | Surface                  |
| Line | AP     | -                      | 35.90000                      | 23.50000 | -0.50000     | 31.50000     | 24.20000 | -0.50000     | 5                                      | -               | -                                | Yes       | Surface                  |
| Line | AQ     | -                      | 31.50000                      | 24.20000 | -0.50000     | 30.80000     | 19.30000 | -0.50000     | 5                                      | -               | -                                | Yes       | Surface                  |
| Line | AR     | -                      | 35.60000                      | 12.40000 | -0.50000     | 36.70000     | 20.80000 | -0.50000     | 9                                      | -               | -                                | Yes       | Surface                  |
| Line | AS     | -                      | 44.70000                      | 9.30000  | -0.50000     | 45.70000     | 17.40000 | -0.50000     | 9                                      | -               | -                                | Yes       | Surface                  |
| Line | AT     | -                      | 54.50000                      | 10.00000 | -0.50000     | 55.80000     | 21.00000 | -0.50000     | 6                                      | -               | -                                | Yes       | Surface                  |
| Line | AU     | -                      | 33.10000                      | 38.00000 | -2.00000     | 26.00000     | 39.00000 | -2.00000     | 8                                      | -               | -                                | Yes       | Surface                  |
| Line | AV     | -                      | 26.00000                      | 39.00000 | -2.00000     | 25.40000     | 29.80000 | -2.00000     | 10                                     | -               | -                                | Yes       | Surface                  |
| Line | AW     | -                      | 25.40000                      | 29.80000 | -2.00000     | 36.70000     | 29.10000 | -2.00000     | 6                                      | -               | -                                | Yes       | Surface                  |

## Vertical Ground Movement Curves

|                          |                                                                                                                                                                            |
|--------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Curve Name:              | No vertical ground movement                                                                                                                                                |
| Coordinates:             | [Distance from wall / wall depth or max. excavation depth (x), Depth / wall depth or max. excavation depth (y), Settlement / wall depth or max. excavation depth (z) (%) ] |
| Curve Fitting Method:    | Polynomial                                                                                                                                                                 |
| x Order:                 | 1                                                                                                                                                                          |
| y Order:                 | 0                                                                                                                                                                          |
| Polynomial: z =          | 0.0x + 0.0                                                                                                                                                                 |
| Coeff. of Determination: | -2147483648.E+2147483647                                                                                                                                                   |
| Curve Name:              | Installation of contiguous bored pile wall in stiff clay (CIRIA 580 Fig. 2.8(b))                                                                                           |
| Coordinates:             | [Distance from wall / wall depth or max. excavation depth (x), Depth / wall depth or max. excavation depth (y), Settlement / wall depth or max. excavation depth (z) (%) ] |
| Curve Fitting Method:    | Polynomial                                                                                                                                                                 |
| x Order:                 | 1                                                                                                                                                                          |
| y Order:                 | 0                                                                                                                                                                          |
| Polynomial: z =          | -2.0E-2x + 4.0E-2                                                                                                                                                          |
| Coeff. of Determination: | 1.0                                                                                                                                                                        |
| Curve Name:              | Installation of planar diaphragm wall in stiff clay (CIRIA 580 Fig. 2.9(b))                                                                                                |
| Coordinates:             | [Distance from wall / wall depth or max. excavation depth (x), Depth / wall depth or max. excavation depth (y), Settlement / wall depth or max. excavation depth (z) (%) ] |
| Curve Fitting Method:    | Polynomial                                                                                                                                                                 |
| x Order:                 | 4                                                                                                                                                                          |
| y Order:                 | 0                                                                                                                                                                          |
| Polynomial: z =          | -1.2355E-2x <sup>4</sup> + 3.4814E-2x <sup>3</sup> - 2.8885E-3x <sup>2</sup> - 6.5161E-2x + 4.9987E-2                                                                      |
| Coeff. of Determination: | 1.0000                                                                                                                                                                     |

## Horizontal Ground Movement Curves

|                       |                                                                                                                                                                                     |
|-----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Curve Name:           | No horizontal ground movement                                                                                                                                                       |
| Coordinates:          | [Distance from wall / wall depth or max. excavation depth (x), Depth / wall depth or max. excavation depth (y), Horizontal movement / wall depth or max. excavation depth (z) (%) ] |
| Curve Fitting Method: | Polynomial                                                                                                                                                                          |
| x Order:              | 0                                                                                                                                                                                   |
| y Order:              | 0                                                                                                                                                                                   |
| Polynomial: z =       | 0.0                                                                                                                                                                                 |



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Wall Installation only Issue 4

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|-----------|---------------------|---------|
| J16180    |                     |         |
| Drg. Ref. |                     |         |
| Made by   | Date<br>07-Mar-2017 | Checked |

| Type                                                                                                                                                                                           | Name               | Direction of extrusion | Point/Line/Line for extrusion                                                    | No. of intervals across extrusion/line | Extrusion depth                | No. of intervals along extrusion | Calculate Surface type for tunnels          |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|------------------------|----------------------------------------------------------------------------------|----------------------------------------|--------------------------------|----------------------------------|---------------------------------------------|
| Coeff. of Determination: -2147483648.E+2147483647                                                                                                                                              |                    |                        |                                                                                  |                                        |                                |                                  |                                             |
| Curve Name: Installation of contiguous bored pile wall in stiff clay (CIRIA 580 Fig. 2.8(a))                                                                                                   |                    |                        |                                                                                  |                                        |                                |                                  |                                             |
| Coordinates: [Distance from wall / wall depth or max. excavation depth (x), Depth / wall depth or max. excavation depth (y), Horizontal movement / wall depth or max. excavation depth (z)](%) |                    |                        |                                                                                  |                                        |                                |                                  |                                             |
| [0.000,0.000,0.041][0.050,0.000,0.039][0.100,0.000,0.036][0.150,0.000,0.034]                                                                                                                   |                    |                        |                                                                                  |                                        |                                |                                  |                                             |
| [0.200,0.000,0.032][0.250,0.000,0.030][0.300,0.000,0.029][0.350,0.000,0.027]                                                                                                                   |                    |                        |                                                                                  |                                        |                                |                                  |                                             |
| [0.400,0.000,0.025][0.450,0.000,0.023][0.500,0.000,0.022][0.550,0.000,0.020]                                                                                                                   |                    |                        |                                                                                  |                                        |                                |                                  |                                             |
| [0.600,0.000,0.019][0.650,0.000,0.018][0.700,0.000,0.016][0.750,0.000,0.015]                                                                                                                   |                    |                        |                                                                                  |                                        |                                |                                  |                                             |
| [0.800,0.000,0.014][0.850,0.000,0.013][0.900,0.000,0.012][0.950,0.000,0.010]                                                                                                                   |                    |                        |                                                                                  |                                        |                                |                                  |                                             |
| [1.000,0.000,0.009][1.050,0.000,0.008][1.100,0.000,0.007][1.150,0.000,0.006]                                                                                                                   |                    |                        |                                                                                  |                                        |                                |                                  |                                             |
| [1.200,0.000,0.005][1.250,0.000,0.004][1.300,0.000,0.004][1.350,0.000,0.003]                                                                                                                   |                    |                        |                                                                                  |                                        |                                |                                  |                                             |
| [1.400,0.000,0.002][1.450,0.000,0.001][1.500,0.000,0.000]                                                                                                                                      |                    |                        |                                                                                  |                                        |                                |                                  |                                             |
| Curve Fitting Method: Polynomial                                                                                                                                                               |                    |                        |                                                                                  |                                        |                                |                                  |                                             |
| x Order: 3                                                                                                                                                                                     |                    |                        |                                                                                  |                                        |                                |                                  |                                             |
| y Order: 0                                                                                                                                                                                     |                    |                        |                                                                                  |                                        |                                |                                  |                                             |
| Polynomial: z = -4.2486E-3x <sup>3</sup> + 1.9096E-2x <sup>2</sup> - 4.6221E-2x + 4.0729E-2                                                                                                    |                    |                        |                                                                                  |                                        |                                |                                  |                                             |
| Coeff. of Determination: 1.0000                                                                                                                                                                |                    |                        |                                                                                  |                                        |                                |                                  |                                             |
| Curve Name: Installation of planar diaphragm wall in stiff clay (CIRIA 580 Fig. 2.9(a))                                                                                                        |                    |                        |                                                                                  |                                        |                                |                                  |                                             |
| Coordinates: [Distance from wall / wall depth or max. excavation depth (x), Depth / wall depth or max. excavation depth (y), Horizontal movement / wall depth or max. excavation depth (z)](%) |                    |                        |                                                                                  |                                        |                                |                                  |                                             |
| [0.000,0.000,0.050][1.500,0.000,0.000]                                                                                                                                                         |                    |                        |                                                                                  |                                        |                                |                                  |                                             |
| Curve Fitting Method: Polynomial                                                                                                                                                               |                    |                        |                                                                                  |                                        |                                |                                  |                                             |
| x Order: 1                                                                                                                                                                                     |                    |                        |                                                                                  |                                        |                                |                                  |                                             |
| y Order: 0                                                                                                                                                                                     |                    |                        |                                                                                  |                                        |                                |                                  |                                             |
| Polynomial: z = -3.33E-2x + 5.00E-2                                                                                                                                                            |                    |                        |                                                                                  |                                        |                                |                                  |                                             |
| Coeff. of Determination: 1.00                                                                                                                                                                  |                    |                        |                                                                                  |                                        |                                |                                  |                                             |
| Polygonal Excavations                                                                                                                                                                          |                    |                        |                                                                                  |                                        |                                |                                  |                                             |
| Excavation Name: Wall Installation A                                                                                                                                                           |                    |                        |                                                                                  |                                        |                                |                                  |                                             |
| Surface level [m]: 0.0                                                                                                                                                                         |                    |                        |                                                                                  |                                        |                                |                                  |                                             |
| Contribution: Positive                                                                                                                                                                         |                    |                        |                                                                                  |                                        |                                |                                  |                                             |
| Enabled: Yes                                                                                                                                                                                   |                    |                        |                                                                                  |                                        |                                |                                  |                                             |
| Surface movement curves which are selected are applied between surface and [m]: -4.4000                                                                                                        |                    |                        |                                                                                  |                                        |                                |                                  |                                             |
| Corner                                                                                                                                                                                         | x                  | y                      | Base Level                                                                       | Stiffened                              | Previous Side                  | Next Side                        |                                             |
|                                                                                                                                                                                                | [m]                | [m]                    | [m]                                                                              | d                                      | p1 p2*                         | d p1 p2*                         |                                             |
|                                                                                                                                                                                                |                    |                        |                                                                                  | [m]                                    | [%]                            | [m]                              | [%]                                         |
| 1                                                                                                                                                                                              | 32.700             | 32.500                 | -4.4000                                                                          | No                                     | - - -                          | - - -                            | -                                           |
| 2                                                                                                                                                                                              | 36.800             | 32.000                 | -4.4000                                                                          | No                                     | - - -                          | - - -                            | -                                           |
| 3                                                                                                                                                                                              | 37.300             | 42.900                 | -4.4000                                                                          | No                                     | - - -                          | - - -                            | -                                           |
| 4                                                                                                                                                                                              | 33.400             | 42.900                 | -4.4000                                                                          | No                                     | - - -                          | - - -                            | -                                           |
| Side                                                                                                                                                                                           | Corner 1           | Corner 2               | Ground Movement Curve                                                            |                                        |                                |                                  |                                             |
|                                                                                                                                                                                                | x y                | x y                    | Vertical Horizontal                                                              |                                        |                                |                                  |                                             |
|                                                                                                                                                                                                | [m] [m]            | [m] [m]                |                                                                                  |                                        |                                |                                  |                                             |
| 1                                                                                                                                                                                              | 32.700 32.500      | 36.800 32.000          | Installation of planar diaphragm wall in stiff clay (CIRIA 580 Fig. 2.9(b))      |                                        |                                |                                  |                                             |
| 2                                                                                                                                                                                              | 36.800 32.000      | 37.300 42.900          | No vertical ground movement                                                      |                                        |                                |                                  |                                             |
| 3                                                                                                                                                                                              | 37.300 42.900      | 33.400 42.900          | Installation of planar diaphragm wall in stiff clay (CIRIA 580 Fig. 2.9(b))      |                                        |                                |                                  |                                             |
| 4                                                                                                                                                                                              | 33.400 42.900      | 32.700 32.500          | Installation of planar diaphragm wall in stiff clay (CIRIA 580 Fig. 2.9(b))      |                                        |                                |                                  |                                             |
| Excavation Name: Wall Installation B                                                                                                                                                           |                    |                        |                                                                                  |                                        |                                |                                  |                                             |
| Surface level [m]: 0.0                                                                                                                                                                         |                    |                        |                                                                                  |                                        |                                |                                  |                                             |
| Contribution: Positive                                                                                                                                                                         |                    |                        |                                                                                  |                                        |                                |                                  |                                             |
| Enabled: Yes                                                                                                                                                                                   |                    |                        |                                                                                  |                                        |                                |                                  |                                             |
| Surface movement curves which are selected are applied between surface and [m]: -8.5000                                                                                                        |                    |                        |                                                                                  |                                        |                                |                                  |                                             |
| Corner                                                                                                                                                                                         | x                  | y                      | Base Level                                                                       | Stiffened                              | Previous Side                  | Next Side                        |                                             |
|                                                                                                                                                                                                | [m]                | [m]                    | [m]                                                                              | d                                      | p1 p2*                         | d p1 p2*                         |                                             |
|                                                                                                                                                                                                |                    |                        |                                                                                  | [m]                                    | [%]                            | [m]                              | [%]                                         |
| 1                                                                                                                                                                                              | 36.700             | 28.400                 | -8.5000                                                                          | No                                     | - - -                          | - - -                            | -                                           |
| 2                                                                                                                                                                                              | 50.100             | 26.600                 | -8.5000                                                                          | No                                     | - - -                          | - - -                            | -                                           |
| 3                                                                                                                                                                                              | 48.400             | 35.400                 | -8.5000                                                                          | No                                     | - - -                          | - - -                            | -                                           |
| 4                                                                                                                                                                                              | 48.166             | 36.351                 | -4.4000                                                                          | No                                     | - - -                          | - - -                            | -                                           |
| 5                                                                                                                                                                                              | 45.300             | 47.600                 | -4.4000                                                                          | No                                     | - - -                          | - - -                            | -                                           |
| 6                                                                                                                                                                                              | 37.600             | 47.600                 | -4.4000                                                                          | No                                     | - - -                          | - - -                            | -                                           |
| 7                                                                                                                                                                                              | 36.700             | 28.800                 | -4.4000                                                                          | No                                     | - - -                          | - - -                            | -                                           |
| Side                                                                                                                                                                                           | Corner 1           | Corner 2               | Ground Movement Curve                                                            |                                        |                                |                                  |                                             |
|                                                                                                                                                                                                | x y                | x y                    | Vertical Horizontal                                                              |                                        |                                |                                  |                                             |
|                                                                                                                                                                                                | [m] [m]            | [m] [m]                |                                                                                  |                                        |                                |                                  |                                             |
| 1                                                                                                                                                                                              | 36.700 28.400      | 50.100 26.600          | Installation of contiguous bored pile wall in stiff clay (CIRIA 580 Fig. 2.8(b)) |                                        |                                |                                  |                                             |
| 2                                                                                                                                                                                              | 50.100 26.600      | 48.400 35.400          | Installation of contiguous bored pile wall in stiff clay (CIRIA 580 Fig. 2.8(b)) |                                        |                                |                                  |                                             |
| 3                                                                                                                                                                                              | 48.400 35.400      | 48.166 36.351          | Installation of contiguous bored pile wall in stiff clay (CIRIA 580 Fig. 2.8(b)) |                                        |                                |                                  |                                             |
| 4                                                                                                                                                                                              | 48.166 36.351      | 45.300 47.600          | Installation of planar diaphragm wall in stiff clay (CIRIA 580 Fig. 2.9(b))      |                                        |                                |                                  |                                             |
| 5                                                                                                                                                                                              | 45.300 47.600      | 37.600 47.600          | Installation of planar diaphragm wall in stiff clay (CIRIA 580 Fig. 2.9(b))      |                                        |                                |                                  |                                             |
| 6                                                                                                                                                                                              | 37.600 47.600      | 36.700 28.800          | Installation of planar diaphragm wall in stiff clay (CIRIA 580 Fig. 2.9(b))      |                                        |                                |                                  |                                             |
| 7                                                                                                                                                                                              | 36.700 28.800      | 36.700 28.400          | Installation of contiguous bored pile wall in stiff clay (CIRIA 580 Fig. 2.8(b)) |                                        |                                |                                  |                                             |
| Damage Category Strains                                                                                                                                                                        |                    |                        |                                                                                  |                                        |                                |                                  |                                             |
| Name                                                                                                                                                                                           | 0 (Negligible)     | 1 (Very Slight)        | 2 (Slight)                                                                       | 3 (Moderate)                           |                                |                                  |                                             |
|                                                                                                                                                                                                | to                 | to                     | to                                                                               | to                                     |                                |                                  |                                             |
|                                                                                                                                                                                                | 1 (Very Slight)    | 2 (Slight)             | 3 (Moderate)                                                                     | 4 (Severe)                             |                                |                                  |                                             |
| Burland Strain Limits                                                                                                                                                                          | 0.0                | 500.00E-6              | 750.00E-6                                                                        | 0.0015000                              |                                |                                  |                                             |
| Specific Structures - Geometry                                                                                                                                                                 |                    |                        |                                                                                  |                                        |                                |                                  |                                             |
| Structure Name                                                                                                                                                                                 | Sub-Structure Name | Displacement Line      | Start Distance Along                                                             | End Distance Along                     | Vertical Offsets from Line for | Vertical Displacement Limit      | Damage Category Strains Poisson's Ratio E/G |



GEA LIMITED  
(GEOTECHNICAL & ENV ASSOC)

Rear of 159-163 King's Cross Road, London WC1X 9BN  
Wall Installation only Issue 4

| Job No.   | Sheet No.   | Rev.    |
|-----------|-------------|---------|
| J16180    |             |         |
| Drg. Ref. |             |         |
| Made by   | Date        | Checked |
|           | 07-Mar-2017 |         |

|    |       |    | Line    | Line     | Vertical<br>Movement<br>Calculations | Sensitivity |                       |                 |
|----|-------|----|---------|----------|--------------------------------------|-------------|-----------------------|-----------------|
|    |       |    |         |          |                                      |             | [m]                   | [mm]            |
| A  |       | A  | 0.00000 | 3.39900  | 0.0                                  | 0.10000     | Burland Strain Limits | 0.20000 2.60000 |
| B  |       | B  | 0.00000 | 3.09900  | 0.0                                  | 0.10000     | Burland Strain Limits | 0.20000 2.60000 |
| C  |       | C  | 0.00000 | 4.60009  | 0.0                                  | 0.10000     | Burland Strain Limits | 0.20000 2.60000 |
| D  |       | D  | 0.00000 | 5.39993  | 0.0                                  | 0.10000     | Burland Strain Limits | 0.20000 2.60000 |
| E  |       | E  | 0.00000 | 2.49900  | 0.0                                  | 0.10000     | Burland Strain Limits | 0.20000 2.60000 |
| F  |       | F  | 0.00000 | 9.29954  | 0.0                                  | 0.10000     | Burland Strain Limits | 0.20000 2.60000 |
| G  |       | G  | 0.00000 | 4.99900  | 0.0                                  | 0.10000     | Burland Strain Limits | 0.20000 2.60000 |
| H  |       | H  | 0.00000 | 2.70085  | 0.0                                  | 0.10000     | Burland Strain Limits | 0.20000 2.60000 |
| I  |       | I  | 0.00000 | 7.19969  | 0.0                                  | 0.10000     | Burland Strain Limits | 0.20000 2.60000 |
| J  |       | J  | 0.00000 | 19.49900 | 0.0                                  | 0.10000     | Burland Strain Limits | 0.20000 2.60000 |
| K  |       | K  | 0.00000 | 8.89900  | 0.0                                  | 0.10000     | Burland Strain Limits | 0.20000 2.60000 |
| L  |       | L  | 0.00000 | 7.19900  | 0.0                                  | 0.10000     | Burland Strain Limits | 0.20000 2.60000 |
| M  |       | M  | 0.00000 | 7.29968  | 0.0                                  | 0.10000     | Burland Strain Limits | 0.20000 2.60000 |
| N  |       | N  | 0.00000 | 6.09900  | 0.0                                  | 0.10000     | Burland Strain Limits | 0.20000 2.60000 |
| O  |       | O  | 0.00000 | 4.59900  | 0.0                                  | 0.10000     | Burland Strain Limits | 0.20000 2.60000 |
| P  | Sub # | P  | 0.00000 | 5.69900  | 0.0                                  | 0.10000     | Burland Strain Limits | 0.20000 2.60000 |
| Q  |       | Q  | 0.00000 | 4.59900  | 0.0                                  | 0.10000     | Burland Strain Limits | 0.20000 2.60000 |
| R  |       | R  | 0.00000 | 7.40080  | 0.0                                  | 0.10000     | Burland Strain Limits | 0.20000 2.60000 |
| S  |       | S  | 0.00000 | 30.99900 | 0.0                                  | 0.10000     | Burland Strain Limits | 0.20000 2.60000 |
| T  |       | T  | 0.00000 | 37.73121 | 0.0                                  | 0.10000     | Burland Strain Limits | 0.20000 2.60000 |
| U  |       | U  | 0.00000 | 9.85902  | 0.0                                  | 0.10000     | Burland Strain Limits | 0.20000 2.60000 |
| V  |       | V  | 0.00000 | 3.63905  | 0.0                                  | 0.10000     | Burland Strain Limits | 0.20000 2.60000 |
| W  |       | W  | 0.00000 | 1.13918  | 0.0                                  | 0.10000     | Burland Strain Limits | 0.20000 2.60000 |
| X  |       | X  | 0.00000 | 9.71908  | 0.0                                  | 0.10000     | Burland Strain Limits | 0.20000 2.60000 |
| Y  |       | Y  | 0.00000 | 3.63905  | 0.0                                  | 0.10000     | Burland Strain Limits | 0.20000 2.60000 |
| Z  |       | Z  | 0.00000 | 9.57919  | 0.0                                  | 0.10000     | Burland Strain Limits | 0.20000 2.60000 |
| AA |       | AA | 0.00000 | 3.66097  | 0.0                                  | 0.10000     | Burland Strain Limits | 0.20000 2.60000 |
| AB |       | AB | 0.00000 | 9.46156  | 0.0                                  | 0.10000     | Burland Strain Limits | 0.20000 2.60000 |
| AC |       | AC | 0.00000 | 5.07935  | 0.0                                  | 0.10000     | Burland Strain Limits | 0.20000 2.60000 |
| AD |       | AD | 0.00000 | 7.86284  | 0.0                                  | 0.10000     | Burland Strain Limits | 0.20000 2.60000 |
| AE |       | AE | 0.00000 | 3.30506  | 0.0                                  | 0.10000     | Burland Strain Limits | 0.20000 2.60000 |
| AF |       | AF | 0.00000 | 3.21393  | 0.0                                  | 0.10000     | Burland Strain Limits | 0.20000 2.60000 |
| AG |       | AG | 0.00000 | 17.14076 | 0.0                                  | 0.10000     | Burland Strain Limits | 0.20000 2.60000 |
| AH |       | AH | 0.00000 | 6.33777  | 0.0                                  | 0.10000     | Burland Strain Limits | 0.20000 2.60000 |
| AI | Sub # | AI | 0.00000 | 4.84977  | 0.0                                  | 0.10000     | Burland Strain Limits | 0.20000 2.60000 |
| AJ | Sub # | AJ | 0.00000 | 8.96672  | 0.0                                  | 0.10000     | Burland Strain Limits | 0.20000 2.60000 |
| AK | Sub # | AK | 0.00000 | 4.94875  | 0.0                                  | 0.10000     | Burland Strain Limits | 0.20000 2.60000 |
| AL | Sub # | AL | 0.00000 | 4.73714  | 0.0                                  | 0.10000     | Burland Strain Limits | 0.20000 2.60000 |
| AM | Sub # | AM | 0.00000 | 2.70640  | 0.0                                  | 0.10000     | Burland Strain Limits | 0.20000 2.60000 |
| AN | Sub # | AN | 0.00000 | 3.33666  | 0.0                                  | 0.10000     | Burland Strain Limits | 0.20000 2.60000 |
| AO | Sub # | AO | 0.00000 | 2.51694  | 0.0                                  | 0.10000     | Burland Strain Limits | 0.20000 2.60000 |
| AP | Sub # | AP | 0.00000 | 4.45433  | 0.0                                  | 0.10000     | Burland Strain Limits | 0.20000 2.60000 |
| AQ | Sub # | AQ | 0.00000 | 9.94875  | 0.0                                  | 0.10000     | Burland Strain Limits | 0.20000 2.60000 |
| AR | Sub # | AR | 0.00000 | 8.47072  | 0.0                                  | 0.10000     | Burland Strain Limits | 0.20000 2.60000 |
| AS | Sub # | AS | 0.00000 | 8.16049  | 0.0                                  | 0.10000     | Burland Strain Limits | 0.20000 2.60000 |
| AT | Sub # | AT | 0.00000 | 11.07555 | 0.0                                  | 0.10000     | Burland Strain Limits | 0.20000 2.60000 |
| AU |       | AU | 0.00000 | 7.11026  | 0.0                                  | 0.10000     | Burland Strain Limits | 0.20000 2.60000 |
| AV |       | AV | 0.00000 | 9.21854  | 0.0                                  | 0.10000     | Burland Strain Limits | 0.20000 2.60000 |
| AW |       | AW | 0.00000 | 11.32066 | 0.0                                  | 0.10000     | Burland Strain Limits | 0.20000 2.60000 |

Specific Structures - Bending Parameters

| Structure Name | Sub-Structure Name | Height | Default Properties | Hogging                             |                                      |                                               | Sagging                             |                                      |                                               |
|----------------|--------------------|--------|--------------------|-------------------------------------|--------------------------------------|-----------------------------------------------|-------------------------------------|--------------------------------------|-----------------------------------------------|
|                |                    |        |                    | 2nd Moment of Area (per unit width) | Distance of Bending Strain from N.A. | Distance of N.A. from Edge of Beam in Tension | 2nd Moment of Area (per unit width) | Distance of Bending Strain from N.A. | Distance of N.A. from Edge of Beam in Tension |
|                |                    | [m]    |                    | [m <sup>3</sup> ]                   | [m]                                  | [m]                                           | [m <sup>3</sup> ]                   | [m]                                  | [m]                                           |
| A              |                    | 15.500 | Yes                | 1241.3                              | 15.500                               | 15.500                                        | 310.32                              | 7.7500                               | 7.7500                                        |
| B              |                    | 15.500 | Yes                | 1241.3                              | 15.500                               | 15.500                                        | 310.32                              | 7.7500                               | 7.7500                                        |
| C              |                    | 15.500 | Yes                | 1241.3                              | 15.500                               | 15.500                                        | 310.32                              | 7.7500                               | 7.7500                                        |
| D              |                    | 15.500 | Yes                | 1241.3                              | 15.500                               | 15.500                                        | 310.32                              | 7.7500                               | 7.7500                                        |
| E              |                    | 15.500 | Yes                | 1241.3                              | 15.500                               | 15.500                                        | 310.32                              | 7.7500                               | 7.7500                                        |
| F              |                    | 15.500 | Yes                | 1241.3                              | 15.500                               | 15.500                                        | 310.32                              | 7.7500                               | 7.7500                                        |
| G              |                    | 15.500 | Yes                | 1241.3                              | 15.500                               | 15.500                                        | 310.32                              | 7.7500                               | 7.7500                                        |
| H              |                    | 15.500 | Yes                | 1241.3                              | 15.500                               | 15.500                                        | 310.32                              | 7.7500                               | 7.7500                                        |
| I              |                    | 15.500 | Yes                | 1241.3                              | 15.500                               | 15.500                                        | 310.32                              | 7.7500                               | 7.7500                                        |
| J              |                    | 8.5000 | Yes                | 204.71                              | 8.5000                               | 8.5000                                        | 51.177                              | 4.2500                               | 4.2500                                        |
| K              |                    | 8.5000 | Yes                | 204.71                              | 8.5000                               | 8.5000                                        | 51.177                              | 4.2500                               | 4.2500                                        |
| L              |                    | 8.5000 | Yes                | 204.71                              | 8.5000                               | 8.5000                                        | 51.177                              | 4.2500                               | 4.2500                                        |
| M              |                    | 9.5000 | Yes                | 285.79                              | 9.5000                               | 9.5000                                        | 71.448                              | 4.7500                               | 4.7500                                        |
| N              |                    | 12.000 | Yes                | 576.00                              | 12.000                               | 12.000                                        | 144.00                              | 6.0000                               | 6.0000                                        |
| O              |                    | 3.6800 | Yes                | 16.612                              | 3.6800                               | 3.6800                                        | 4.1530                              | 1.8400                               | 1.8400                                        |
| P              | Sub #              | 4.8500 | Yes                | 38.028                              | 4.8500                               | 4.8500                                        | 9.5070                              | 2.4250                               | 2.4250                                        |
| Q              |                    | 3.6500 | Yes                | 16.209                              | 3.6500                               | 3.6500                                        | 4.0523                              | 1.8250                               | 1.8250                                        |
| R              |                    | 3.5000 | Yes                | 14.292                              | 3.5000                               | 3.5000                                        | 3.5729                              | 1.7500                               | 1.7500                                        |
| S              |                    | 8.5000 | Yes                | 204.71                              | 8.5000                               | 8.5000                                        | 51.177                              | 4.2500                               | 4.2500                                        |
| T              |                    | 8.5000 | Yes                | 204.71                              | 8.5000                               | 8.5000                                        | 51.177                              | 4.2500                               | 4.2500                                        |
| U              |                    | 8.5000 | Yes                | 204.71                              | 8.5000                               | 8.5000                                        | 51.177                              | 4.2500                               | 4.2500                                        |
| V              |                    | 6.5000 | Yes                | 91.542                              | 6.5000                               | 6.5000                                        | 22.885                              | 3.2500                               | 3.2500                                        |
| W              |                    | 7.7000 | Yes                | 152.18                              | 7.7000                               | 7.7000                                        | 38.044                              | 3.8500                               | 3.8500                                        |
| X              |                    | 8.5000 | Yes                | 204.71                              | 8.5000                               | 8.5000                                        | 51.177                              | 4.2500                               | 4.2500                                        |
| Y              |                    | 7.4000 | Yes                | 135.07                              | 7.4000                               | 7.4000                                        | 33.769                              | 3.7000                               | 3.7000                                        |
| Z              |                    | 8.5000 | Yes                | 204.71                              | 8.5000                               | 8.5000                                        | 51.177                              | 4.2500                               | 4.2500                                        |
| AA             |                    | 7.4000 | Yes                | 135.07                              | 7.4000                               | 7.4000                                        | 33.769                              | 3.7000                               | 3.7000                                        |
| AB             |                    | 8.5000 | Yes                | 204.71                              | 8.5000                               | 8.5000                                        | 51.177                              | 4.2500                               | 4.2500                                        |
| AC             |                    | 8.5000 | Yes                | 14.292                              | 3.5000                               | 3.5000                                        | 3.5729                              | 1.7500                               | 1.7500                                        |
| AD             |                    | 4.4600 | Yes                | 29.572                              | 4.4600                               | 4.4600                                        | 7.3930                              | 2.2300                               | 2.2300                                        |
| AE             |                    | 3.5000 | Yes                | 14.292                              | 3.5000                               | 3.5000                                        | 3.5729                              | 1.7500                               | 1.7500                                        |
| AF             |                    | 4.4600 | Yes                | 29.572                              | 4.4600                               | 4.4600                                        | 7.3930                              | 2.2300                               | 2.2300                                        |
| AG             |                    | 3.5000 | Yes                | 14.292                              | 3.5000                               | 3.5000                                        | 3.5729                              | 1.7500                               | 1.7500                                        |
| AH             |                    | 18.500 | Yes                | 2110.5                              | 18.500                               | 18.500                                        | 527.64                              | 9.2500                               | 9.2500                                        |
| AI             | Sub #              | 18.500 | Yes                | 2110.5                              | 18.500                               | 18.500                                        | 527.64                              | 9.2500                               | 9.2500                                        |
| AJ             | Sub #              | 18.500 | Yes                | 2110.5                              | 18.500                               | 18.500                                        | 527.64                              | 9.2500                               | 9.2500                                        |
| AK             | Sub #              | 18.500 | Yes                | 2110.5                              | 18.500                               | 18.500                                        | 527.64                              | 9.2500                               | 9.2500                                        |
| AL             | Sub #              | 18.500 | Yes                | 2110.5                              | 18.500                               | 18.500                                        | 527.64                              | 9.2500                               | 9.2500                                        |
| AM             | Sub #              | 18.500 | Yes                | 2110.5                              | 18.500                               | 18.500                                        | 527.64                              | 9.2500                               | 9.2500                                        |
| AN             | Sub #              | 18.500 | Yes                | 2110.5                              | 18.500                               | 18.500                                        | 527.64                              | 9.2500                               | 9.2500                                        |
| AO             | Sub #              | 18.500 | Yes                | 2110.5                              | 18.500                               | 18.500                                        | 527.64                              | 9.2500                               | 9.2500                                        |
| AP             | Sub #              | 18.500 | Yes                | 2110.5                              | 18.500                               | 18.500                                        | 527.64                              | 9.2500                               | 9.2500                                        |
| AQ             | Sub #              | 18.500 | Yes                | 2110.5                              | 18.500                               | 18.500                                        | 527.64                              | 9.2500                               | 9.2500                                        |
| AR             | Sub #              | 18.500 | Yes                | 2110.5                              | 18.500                               | 18.500                                        | 527.64                              | 9.2500                               | 9.2500                                        |
| AS             | Sub #              | 18.500 | Yes                | 2110.5                              | 18.500                               | 18.500                                        | 527.64                              | 9.2500                               | 9.2500                                        |
| AT             | Sub #              | 18.500 | Yes                | 2110.5                              | 18.500                               | 18.500                                        | 527.64                              | 9.2500                               | 9.2500                                        |
| AU             |                    | 4.6000 | Yes                | 32.445                              | 4.6000                               | 4.6000                                        | 8.1113                              | 2.3000                               | 2.3000                                        |
| AV             |                    | 4.6000 | Yes                | 32.445                              | 4.6000                               | 4.6000                                        | 8.1113                              | 2.3000                               | 2.3000                                        |
| AW             |                    | 4.6000 | Yes                | 32.445                              | 4.6000                               | 4.6000                                        | 8.1113                              | 2.3000                               | 2.3000                                        |

Building Segment Combinations

| Structure Name                        | Sub-Structure Name | Vertical Offset from Line for Vertical Movement Calculations | Segment Start | Length | Curvature | Combined Segment |
|---------------------------------------|--------------------|--------------------------------------------------------------|---------------|--------|-----------|------------------|
|                                       |                    | [m]                                                          |               | [m]    | [m]       |                  |
| No structures have segments combined. |                    |                                                              |               |        |           |                  |

Warnings



# GEA LIMITED (GEOTECHNICAL & ENV ASSOC)

Rear of 159-163 King's Cross Road, London WC1X 9BN

Wall Installation only Issue 4

| Job No.   | Sheet No.           | Rev.    |
|-----------|---------------------|---------|
| J16180    |                     |         |
| Drg. Ref. |                     |         |
| Made by   | Date<br>07-Mar-2017 | Checked |

| Structure Name | Sub-Structure Name | Vertical Offset from Line for Vertical | Segment | Start | Length | Curvature | Combined Segment |
|----------------|--------------------|----------------------------------------|---------|-------|--------|-----------|------------------|
|----------------|--------------------|----------------------------------------|---------|-------|--------|-----------|------------------|

1 Multiple excavations have been specified. The displacements resulting from these excavations are calculated by summing the displacements resulting from each individual excavation. No account has been taken of the interactions between excavations (e.g. overlapping zones of influence or 'shielding' of one excavation by another).

## Displacement and Strain Results

| Type/No. |         | Coordinates |          |          | Displacements |            |            | Angle of Line                          |                                               |
|----------|---------|-------------|----------|----------|---------------|------------|------------|----------------------------------------|-----------------------------------------------|
| Name     | Dist.   | x           | y        | z        | x             | y          | z          | Horizontal displacement along the Line | Horizontal displacement perpendicular to Line |
|          | [m]     | [m]         | [m]      | [m]      | [mm]          | [mm]       | [mm]       | [mm]                                   | [mm]                                          |
| A        | Line 1  | 22.50000    | 48.10000 | -0.50000 | 0.0           | 0.0        | 0.0        | 0.0                                    | 0.0                                           |
|          | 0.85000 | 23.35000    | 48.10000 | -0.50000 | 0.0           | 0.0        | 0.0        | 0.0                                    | 0.0                                           |
|          | 1.7000  | 24.20000    | 48.10000 | -0.50000 | 0.0           | 0.0        | 0.0        | 0.0                                    | 0.0                                           |
|          | 2.5500  | 25.05000    | 48.10000 | -0.50000 | 0.0           | 0.0        | 0.0        | 0.0                                    | 0.0                                           |
|          | 3.4000  | 25.90000    | 48.10000 | -0.50000 | 0.0           | 0.0        | 0.0        | 0.0                                    | 0.0                                           |
| B        | Line 2  | 25.90000    | 48.10000 | -0.50000 | 0.0           | 0.0        | 0.0        | 0.0                                    | 270.00                                        |
|          | 0.77500 | 25.90000    | 47.32500 | -0.50000 | 0.0           | 0.0        | 0.0        | 0.0                                    | 270.00                                        |
|          | 1.5500  | 25.90000    | 46.55000 | -0.50000 | 0.0           | 0.0        | 0.0        | 0.0                                    | 270.00                                        |
|          | 2.3250  | 25.90000    | 45.77500 | -0.50000 | 0.0           | 0.0        | 0.0        | 0.0                                    | 270.00                                        |
|          | 3.1000  | 25.90000    | 45.00000 | -0.50000 | 0.0           | 0.0        | 0.0        | 0.0                                    | 270.00                                        |
| C        | Line 3  | 25.90000    | 45.00000 | -0.50000 | 0.0           | 0.0        | 0.0        | 0.0                                    | 358.75                                        |
|          | 0.92022 | 26.82000    | 44.98000 | -0.50000 | 0.0           | 0.0        | 0.0        | 0.0                                    | 358.75                                        |
|          | 1.8404  | 27.74000    | 44.96000 | -0.50000 | 0.18067       | -0.065755  | 0.029441   | 0.18205                                | -0.061812                                     |
|          | 2.7607  | 28.66000    | 44.94000 | -0.50000 | 0.44079       | -0.18971   | 0.081065   | 0.44481                                | -0.180808                                     |
|          | 3.6809  | 29.58000    | 44.92000 | -0.50000 | 0.67150       | -0.35508   | 0.18662    | 0.67905                                | -0.34041                                      |
| D        | Line 4  | 30.50000    | 44.90000 | -0.50000 | 0.84440       | -0.58235   | 0.36915    | 0.85686                                | -0.56386                                      |
|          | 0.90015 | 30.48333    | 45.80000 | -0.50000 | 0.58786       | -0.58450   | 0.22561    | -0.59529                               | -0.57694                                      |
|          | 1.8003  | 30.46667    | 46.70000 | -0.50000 | 0.36054       | -0.47483   | 0.11723    | -0.48154                               | -0.35768                                      |
|          | 2.7005  | 30.45000    | 47.60000 | -0.50000 | 0.18623       | -0.29670   | 0.053505   | -0.30010                               | -0.18070                                      |
|          | 3.6006  | 30.43333    | 48.50000 | -0.50000 | 0.040996      | -0.077385  | 0.014768   | -0.078131                              | -0.039556                                     |
| E        | Line 5  | 30.40000    | 50.30000 | -0.50000 | 0.0           | 0.0        | 0.0        | 0.0                                    | 91.061                                        |
|          | 0.83333 | 31.23333    | 50.30000 | -0.50000 | 0.0           | 0.0        | 0.0        | 0.0                                    | 91.061                                        |
|          | 1.6667  | 32.06667    | 50.30000 | -0.50000 | 0.13273       | -0.064767  | 0.023319   | 0.13273                                | -0.064767                                     |
|          | 2.5000  | 32.90000    | 50.30000 | -0.50000 | 0.34097       | -0.19587   | 0.061567   | 0.34097                                | -0.19587                                      |
|          | 3.3333  | 33.73333    | 50.30000 | -0.50000 | 0.34097       | -0.19587   | 0.061567   | -0.19220                               | -0.34305                                      |
| F        | Line 6  | 32.90000    | 50.30000 | -0.50000 | 0.17643       | -0.13656   | 0.033718   | -0.13465                               | -0.17789                                      |
|          | 0.93005 | 32.91000    | 51.23000 | -0.50000 | 0.015705      | -0.015302  | 0.0043513  | -0.015302                              | -0.015302                                     |
|          | 1.8601  | 32.92000    | 52.16000 | -0.50000 | 0.0           | 0.0        | 0.0        | 0.0                                    | 89.384                                        |
|          | 2.7902  | 32.93000    | 53.09000 | -0.50000 | 0.0           | 0.0        | 0.0        | 0.0                                    | 89.384                                        |
|          | 3.7202  | 32.94000    | 54.02000 | -0.50000 | 0.0           | 0.0        | 0.0        | 0.0                                    | 89.384                                        |
| G        | Line 7  | 33.00000    | 59.60000 | -0.50000 | 0.0           | 0.0        | 0.0        | 0.0                                    | 180.00                                        |
|          | 0.10000 | 32.90000    | 59.60000 | -0.50000 | 0.0           | 0.0        | 0.0        | 0.0                                    | 180.00                                        |
|          | 2.00000 | 31.00000    | 59.60000 | -0.50000 | 0.0           | 0.0        | 0.0        | 0.0                                    | 180.00                                        |
|          | 3.0000  | 30.00000    | 59.60000 | -0.50000 | 0.0           | 0.0        | 0.0        | 0.0                                    | 180.00                                        |
|          | 4.0000  | 29.00000    | 59.60000 | -0.50000 | 0.0           | 0.0        | 0.0        | 0.0                                    | 180.00                                        |
| H        | Line 8  | 28.00000    | 59.60000 | -0.50000 | 0.0           | 0.0        | 0.0        | 0.0                                    | 180.00                                        |
|          | 0.90062 | 28.03333    | 58.70000 | -0.50000 | 0.0           | 0.0        | 0.0        | 0.0                                    | 272.12                                        |
|          | 1.8012  | 28.06667    | 57.80000 | -0.50000 | 0.0           | 0.0        | 0.0        | 0.0                                    | 272.12                                        |
|          | 2.7019  | 28.10000    | 56.90000 | -0.50000 | 0.0           | 0.0        | 0.0        | 0.0                                    | 272.12                                        |
|          | 3.6003  | 28.13333    | 56.00000 | -0.50000 | 0.0           | 0.0        | 0.0        | 0.0                                    | 179.20                                        |
| I        | Line 9  | 27.20000    | 56.90000 | -0.50000 | 0.0           | 0.0        | 0.0        | 0.0                                    | 179.20                                        |
|          | 0.90009 | 27.20000    | 56.91250 | -0.50000 | 0.0           | 0.0        | 0.0        | 0.0                                    | 179.20                                        |
|          | 1.8002  | 26.30000    | 56.92500 | -0.50000 | 0.0           | 0.0        | 0.0        | 0.0                                    | 179.20                                        |
|          | 2.7003  | 25.40000    | 56.93750 | -0.50000 | 0.0           | 0.0        | 0.0        | 0.0                                    | 179.20                                        |
|          | 3.6003  | 24.50000    | 56.95000 | -0.50000 | 0.0           | 0.0        | 0.0        | 0.0                                    | 179.20                                        |
| J        | Line 10 | 23.60000    | 56.96250 | -0.50000 | 0.0           | 0.0        | 0.0        | 0.0                                    | 179.20                                        |
|          | 0.90005 | 22.70000    | 56.97500 | -0.50000 | 0.0           | 0.0        | 0.0        | 0.0                                    | 179.20                                        |
|          | 1.8006  | 21.80000    | 56.98750 | -0.50000 | 0.0           | 0.0        | 0.0        | 0.0                                    | 179.20                                        |
|          | 2.7007  | 20.90000    | 57.00000 | -0.50000 | 0.0           | 0.0        | 0.0        | 0.0                                    | 179.20                                        |
|          | 3.6000  | 20.00000    | 57.00000 | -0.50000 | 0.0           | 0.0        | 0.0        | 0.0                                    | 0.0                                           |
| K        | Line 11 | 33.00000    | 59.50000 | -0.50000 | 0.0           | 0.0        | 0.0        | 0.0                                    | 0.0                                           |
|          | 1.9500  | 34.95000    | 59.50000 | -0.50000 | 0.0           | 0.0        | 0.0        | 0.0                                    | 0.0                                           |
|          | 3.9000  | 36.90000    | 59.50000 | -0.50000 | 0.0           | 0.0        | 0.0        | 0.0                                    | 0.0                                           |
|          | 5.8500  | 38.85000    | 59.50000 | -0.50000 | 0.0           | 0.0        | 0.0        | 0.0                                    | 0.0                                           |
|          | 7.8000  | 40.80000    | 59.50000 | -0.50000 | 0.0           | 0.0        | 0.0        | 0.0                                    | 0.0                                           |
| L        | Line 12 | 42.75000    | 59.50000 | -0.50000 | 0.0           | 0.0        | 0.0        | 0.0                                    | 0.0                                           |
|          | 9.7500  | 42.75000    | 59.50000 | -0.50000 | 0.0           | 0.0        | 0.0        | 0.0                                    | 0.0                                           |
|          | 11.700  | 44.70000    | 59.50000 | -0.50000 | 0.0           | 0.0        | 0.0        | 0.0                                    | 0.0                                           |
|          | 13.650  | 46.65000    | 59.50000 | -0.50000 | 0.0           | 0.0        | 0.0        | 0.0                                    | 0.0                                           |
|          | 15.600  | 48.60000    | 59.50000 | -0.50000 | 0.0           | 0.0        | 0.0        | 0.0                                    | 0.0                                           |
| M        | Line 13 | 52.50000    | 59.50000 | -0.50000 | 0.0           | 0.0        | 0.0        | 0.0                                    | 0.0                                           |
|          | 17.550  | 50.55000    | 59.50000 | -0.50000 | 0.0           | 0.0        | 0.0        | 0.0                                    | 0.0                                           |
|          | 19.500  | 52.50000    | 59.50000 | -0.50000 | 0.0           | 0.0        | 0.0        | 0.0                                    | 0.0                                           |
|          | 0.90009 | 37.70000    | 58.50000 | -0.50000 | 0.0           | 0.0        | 0.0        | 0.0                                    | 270.00                                        |
|          | 1.8000  | 37.70000    | 57.60000 | -0.50000 | 0.0           | 0.0        | 0.0        | 0.0                                    | 270.00                                        |
| N        | Line 14 | 37.70000    | 56.70000 | -0.50000 | 0.0           | 0.0        | 0.0        | 0.0                                    | 270.00                                        |
|          | 2.7000  | 37.70000    | 56.70000 | -0.50000 | 0.0           | 0.0        | 0.0        | 0.0                                    | 270.00                                        |
|          | 3.6000  | 37.70000    | 55.80000 | -0.50000 | 0.0           | 0.0        | 0.0        | 0.0                                    | 270.00                                        |
|          | 4.5000  | 37.70000    | 54.90000 | -0.50000 | 0.0           | 0.0        | 0.0        | 0.0                                    | 270.00                                        |
|          | 5.4000  | 37.70000    | 54.00000 | -0.50000 | 0.0           | 0.0        | 0.0        | 0.0                                    | 270.00                                        |
| O        | Line 15 | 37.70000    | 53.10000 | -0.50000 | 0.0           | 0.0        | 0.0        | 0.0                                    | 270.00                                        |
|          | 6.3000  | 37.70000    | 52.20000 | -0.50000 | 0.0           | 0.0        | 0.0        | 0.0                                    | 270.00                                        |
|          | 7.2000  | 37.70000    | 51.30000 | -0.50000 | 0.0           | 0.0        | 0.0        | 0.0                                    | 270.00                                        |
|          | 8.1000  | 37.70000    | 50.40000 | -0.50000 | 0.0           | 0.0        | 0.0        | 0.0                                    | 270.00                                        |
|          | 9.0000  | 37.70000    | 49.50000 | -0.50000 | 0.0           | 0.0        | 0.0        | 0.0                                    | 270.00                                        |
| P        | Line 16 | 45.50000    | 53.30000 | -1.85000 | -0.010479     | -0.29865   | 0.044906   | -0.29865                               | 0.010479                                      |
|          | 0.87143 | 45.50000    | 54.17143 | -1.85000 | -0.0085056    | -0.0029068 | -0.0085056 | 258.87E-6                              | 90.000                                        |
|          | 1.7429  | 45.50000    | 55.04286 | -1.85000 | 0.0           | 0.0        | 0.0        | 0.0                                    | 90.000                                        |
|          | 2.6143  | 45.50000    | 55.91429 | -1.85000 | 0.0           | 0.0        | 0.0        | 0.0                                    | 90.000                                        |
|          | 3.4857  | 45.50000    | 56.78571 | -1.85000 | 0.0           | 0.0        | 0.0        | 0.0                                    | 90.000                                        |







# GEA LIMITED (GEOTECHNICAL & ENV ASSOC)

Rear of 159-163 King's Cross Road, London WC1X 9BN  
Wall Installation only Issue 4

| Job No.   | Sheet No.           | Rev.    |
|-----------|---------------------|---------|
| J16180    |                     |         |
| Drg. Ref. |                     |         |
| Made by   | Date<br>07-Mar-2017 | Checked |

| Type/No.                                                    |             | Coordinates |          |               | Displacements |          |                                        | Angle of Line to x Axis                       |                         |
|-------------------------------------------------------------|-------------|-------------|----------|---------------|---------------|----------|----------------------------------------|-----------------------------------------------|-------------------------|
| Name                                                        | Dist.       | x           | y        | z             | x             | y        | z                                      | Horizontal displacement                       | Horizontal displacement |
| AW                                                          | 7.3756      | 25.52000    | 31.64000 | -2.00000      | 0.0           | 0.0      | 0.0                                    | 0.0                                           | 0.0                     |
|                                                             | 8.2976      | 25.46000    | 30.72000 | -2.00000      | 0.0           | 0.0      | 0.0                                    | 0.0                                           | 0.0                     |
|                                                             | 9.2195      | 25.40000    | 29.80000 | -2.00000      | 0.0           | 0.0      | 0.0                                    | 0.0                                           | 0.0                     |
|                                                             | Line 49     | 25.40000    | 29.80000 | -2.00000      | 0.0           | 0.0      | 0.0                                    | 0.0                                           | 0.0                     |
|                                                             | 1.8869      | 27.28333    | 29.68333 | -2.00000      | 0.14632       | 0.076087 | 0.025690                               | 0.14134                                       | 0.084988                |
|                                                             | 3.7739      | 29.16667    | 29.56667 | -2.00000      | 0.51492       | 0.42748  | 0.14409                                | 0.48751                                       | 0.45850                 |
|                                                             | 5.6608      | 31.05000    | 29.45000 | -2.00000      | 0.80491       | 0.90358  | 0.43160                                | 0.74750                                       | 0.95162                 |
|                                                             | 7.5478      | 32.93333    | 29.33333 | -2.00000      | 1.0769        | 1.1083   | 0.79708                                | 1.0063                                        | 1.1727                  |
|                                                             | 9.4347      | 34.81667    | 29.21667 | -2.00000      | 1.7097        | 1.1153   | 1.5716                                 | 1.6374                                        | 1.2189                  |
|                                                             | 11.322      | 36.70000    | 29.10000 | -2.00000      | 2.2329        | 1.0620   | 2.7362                                 | 2.1630                                        | 1.1981                  |
|                                                             |             |             |          |               |               |          |                                        |                                               |                         |
| Specific Building Damage Results - Horizontal Displacements |             |             |          |               |               |          |                                        |                                               |                         |
| Structure: A   Sub-structure:                               |             |             |          |               |               |          |                                        |                                               |                         |
| Dist.                                                       | Coordinates |             |          | Displacements |               |          |                                        |                                               |                         |
|                                                             | x           | y           | z        | x             | y             |          | Horizontal displacement along the Line | Horizontal displacement perpendicular to Line |                         |
| [m]                                                         | [m]         | [m]         | [m]      | [mm]          | [mm]          |          | [mm]                                   | [mm]                                          |                         |
| 0.0                                                         | 22.50000    | 48.10000    | -0.50000 | 0.0           | 0.0           |          | 0.0                                    | 0.0                                           |                         |
| 0.85000                                                     | 23.35000    | 48.10000    | -0.50000 | 0.0           | 0.0           |          | 0.0                                    | 0.0                                           |                         |
| 1.7000                                                      | 24.20000    | 48.10000    | -0.50000 | 0.0           | 0.0           |          | 0.0                                    | 0.0                                           |                         |
| 2.5500                                                      | 25.05000    | 48.10000    | -0.50000 | 0.0           | 0.0           |          | 0.0                                    | 0.0                                           |                         |
| 3.4000                                                      | 25.90000    | 48.10000    | -0.50000 | 0.0           | 0.0           |          | 0.0                                    | 0.0                                           |                         |
| Structure: B   Sub-structure:                               |             |             |          |               |               |          |                                        |                                               |                         |
| Dist.                                                       | Coordinates |             |          | Displacements |               |          |                                        |                                               |                         |
|                                                             | x           | y           | z        | x             | y             |          | Horizontal displacement along the Line | Horizontal displacement perpendicular to Line |                         |
| [m]                                                         | [m]         | [m]         | [m]      | [mm]          | [mm]          |          | [mm]                                   | [mm]                                          |                         |
| 0.0                                                         | 25.90000    | 48.10000    | -0.50000 | 0.0           | 0.0           |          | 0.0                                    | 0.0                                           |                         |
| 0.77500                                                     | 25.90000    | 47.32500    | -0.50000 | 0.0           | 0.0           |          | 0.0                                    | 0.0                                           |                         |
| 1.5500                                                      | 25.90000    | 46.55000    | -0.50000 | 0.0           | 0.0           |          | 0.0                                    | 0.0                                           |                         |
| 2.3250                                                      | 25.90000    | 45.77500    | -0.50000 | 0.0           | 0.0           |          | 0.0                                    | 0.0                                           |                         |
| 3.1000                                                      | 25.90000    | 45.00000    | -0.50000 | 0.0           | 0.0           |          | 0.0                                    | 0.0                                           |                         |
| Structure: C   Sub-structure:                               |             |             |          |               |               |          |                                        |                                               |                         |
| Dist.                                                       | Coordinates |             |          | Displacements |               |          |                                        |                                               |                         |
|                                                             | x           | y           | z        | x             | y             |          | Horizontal displacement along the Line | Horizontal displacement perpendicular to Line |                         |
| [m]                                                         | [m]         | [m]         | [m]      | [mm]          | [mm]          |          | [mm]                                   | [mm]                                          |                         |
| 0.0                                                         | 25.90000    | 45.00000    | -0.50000 | 0.0           | 0.0           |          | 0.0                                    | 0.0                                           |                         |
| 0.92022                                                     | 26.82000    | 44.98000    | -0.50000 | 0.0           | 0.0           |          | 0.0                                    | 0.0                                           |                         |
| 1.8404                                                      | 27.74000    | 44.96000    | -0.50000 | 0.18067       | -0.065755     |          | 0.18205                                | -0.061812                                     |                         |
| 2.7607                                                      | 28.66000    | 44.94000    | -0.50000 | 0.44079       | -0.18971      |          | 0.44481                                | -0.18008                                      |                         |
| 3.6809                                                      | 29.58000    | 44.92000    | -0.50000 | 0.67150       | -0.35508      |          | 0.67905                                | -0.34041                                      |                         |
| 4.6011                                                      | 30.50000    | 44.90000    | -0.50000 | 0.84440       | -0.58235      |          | 0.85686                                | -0.56386                                      |                         |
| Structure: D   Sub-structure:                               |             |             |          |               |               |          |                                        |                                               |                         |
| Dist.                                                       | Coordinates |             |          | Displacements |               |          |                                        |                                               |                         |
|                                                             | x           | y           | z        | x             | y             |          | Horizontal displacement along the Line | Horizontal displacement perpendicular to Line |                         |
| [m]                                                         | [m]         | [m]         | [m]      | [mm]          | [mm]          |          | [mm]                                   | [mm]                                          |                         |
| 0.0                                                         | 30.50000    | 44.90000    | -0.50000 | 0.84440       | -0.58235      |          | -0.59788                               | -0.83347                                      |                         |
| 0.90015                                                     | 30.48333    | 45.80000    | -0.50000 | 0.58786       | -0.58450      |          | -0.59529                               | -0.57694                                      |                         |
| 1.8003                                                      | 30.46667    | 46.70000    | -0.50000 | 0.36654       | -0.47483      |          | -0.48154                               | -0.35768                                      |                         |
| 2.7005                                                      | 30.45000    | 47.60000    | -0.50000 | 0.18623       | -0.29670      |          | -0.30010                               | -0.18070                                      |                         |
| 3.6006                                                      | 30.43333    | 48.50000    | -0.50000 | 0.040996      | -0.077385     |          | -0.078131                              | -0.039556                                     |                         |
| 4.5008                                                      | 30.41667    | 49.40000    | -0.50000 | 0.0           | 0.0           |          | 0.0                                    | 0.0                                           |                         |
| 5.4009                                                      | 30.40000    | 50.30000    | -0.50000 | 0.0           | 0.0           |          | 0.0                                    | 0.0                                           |                         |
| Structure: E   Sub-structure:                               |             |             |          |               |               |          |                                        |                                               |                         |
| Dist.                                                       | Coordinates |             |          | Displacements |               |          |                                        |                                               |                         |
|                                                             | x           | y           | z        | x             | y             |          | Horizontal displacement along the Line | Horizontal displacement perpendicular to Line |                         |
| [m]                                                         | [m]         | [m]         | [m]      | [mm]          | [mm]          |          | [mm]                                   | [mm]                                          |                         |
| 0.0                                                         | 30.40000    | 50.30000    | -0.50000 | 0.0           | 0.0           |          | 0.0                                    | 0.0                                           |                         |
| 0.83333                                                     | 31.23333    | 50.30000    | -0.50000 | 0.0           | 0.0           |          | 0.0                                    | 0.0                                           |                         |
| 1.6667                                                      | 32.06667    | 50.30000    | -0.50000 | 0.13273       | -0.064767     |          | 0.13273                                | -0.064767                                     |                         |
| 2.5000                                                      | 32.90000    | 50.30000    | -0.50000 | 0.34097       | -0.19587      |          | 0.34097                                | -0.19587                                      |                         |
| Structure: F   Sub-structure:                               |             |             |          |               |               |          |                                        |                                               |                         |
| Dist.                                                       | Coordinates |             |          | Displacements |               |          |                                        |                                               |                         |
|                                                             | x           | y           | z        | x             | y             |          | Horizontal displacement along the Line | Horizontal displacement perpendicular to Line |                         |
| [m]                                                         | [m]         | [m]         | [m]      | [mm]          | [mm]          |          | [mm]                                   | [mm]                                          |                         |
| 0.0                                                         | 32.90000    | 50.30000    | -0.50000 | 0.34097       | -0.19587      |          | -0.19220                               | -0.34305                                      |                         |
| 0.93085                                                     | 32.91000    | 51.23000    | -0.50000 | 0.17643       | -0.13656      |          | -0.13465                               | -0.17789                                      |                         |
| 1.8611                                                      | 32.92000    | 52.16000    | -0.50000 | 0.015705      | -0.015302     |          | -0.015133                              | -0.015869                                     |                         |
| 2.7902                                                      | 32.93000    | 53.09000    | -0.50000 | 0.0           | 0.0           |          | 0.0                                    | 0.0                                           |                         |
| 3.7202                                                      | 32.94000    | 54.02000    | -0.50000 | 0.0           | 0.0           |          | 0.0                                    | 0.0                                           |                         |
| 4.6503                                                      | 32.95000    | 54.95000    | -0.50000 | 0.0           | 0.0           |          | 0.0                                    | 0.0                                           |                         |
| 5.5803                                                      | 32.96000    | 55.88000    | -0.50000 | 0.0           | 0.0           |          | 0.0                                    | 0.0                                           |                         |
| 6.5104                                                      | 32.97000    | 56.81000    | -0.50000 | 0.0           | 0.0           |          | 0.0                                    | 0.0                                           |                         |
| 7.4404                                                      | 32.98000    | 57.74000    | -0.50000 | 0.0           | 0.0           |          | 0.0                                    | 0.0                                           |                         |
| 8.3705                                                      | 32.99000    | 58.67000    | -0.50000 | 0.0           | 0.0           |          | 0.0                                    | 0.0                                           |                         |
| 9.3005                                                      | 33.00000    | 59.60000    | -0.50000 | 0.0           | 0.0           |          | 0.0                                    | 0.0                                           |                         |
| Structure: G   Sub-structure:                               |             |             |          |               |               |          |                                        |                                               |                         |
| Dist.                                                       | Coordinates |             |          | Displacements |               |          |                                        |                                               |                         |
|                                                             | x           | y           | z        | x             | y             |          | Horizontal displacement along the Line | Horizontal displacement perpendicular to Line |                         |
| [m]                                                         | [m]         | [m]         | [m]      | [mm]          | [mm]          |          | [mm]                                   | [mm]                                          |                         |
| 0.0                                                         | 33.00000    | 59.60000    | -0.50000 | 0.0           | 0.0           |          | 0.0                                    | 0.0                                           |                         |
| 1.0000                                                      | 32.00000    | 59.60000    | -0.50000 | 0.0           | 0.0           |          | 0.0                                    | 0.0                                           |                         |
| 2.0000                                                      | 31.00000    | 59.60000    | -0.50000 | 0.0           | 0.0           |          | 0.0                                    | 0.0                                           |                         |
| 3.0000                                                      | 30.00000    | 59.60000    | -0.50000 | 0.0           | 0.0           |          | 0.0                                    | 0.0                                           |                         |
| 4.0000                                                      | 29.00000    | 59.60000    | -0.50000 | 0.0           | 0.0           |          | 0.0                                    | 0.0                                           |                         |
| 5.0000                                                      | 28.00000    | 59.60000    | -0.50000 | 0.0           | 0.0           |          | 0.0                                    | 0.0                                           |                         |



# GEA LIMITED (GEOTECHNICAL & ENV ASSOC)

Rear of 159-163 King's Cross Road, London WC1X 9BN  
Wall Installation only Issue 4

| Job No.   | Sheet No.           | Rev.    |
|-----------|---------------------|---------|
| J16180    |                     |         |
| Drg. Ref. |                     |         |
| Made by   | Date<br>07-Mar-2017 | Checked |

| Dist.   | Coordinates |          |          | Displacements                     |     |                                       |
|---------|-------------|----------|----------|-----------------------------------|-----|---------------------------------------|
|         | x           | y        | z        | x                                 | y   |                                       |
|         |             |          |          | Horizontal displacement along the |     | Horizontal displacement perpendicular |
|         |             |          |          | Line                              |     | to Line                               |
|         |             |          |          | [mm]                              |     | [mm]                                  |
| 0.0     | 28.00000    | 59.60000 | -0.50000 | 0.0                               | 0.0 | 0.0                                   |
| 0.90062 | 28.03333    | 59.70000 | -0.50000 | 0.0                               | 0.0 | 0.0                                   |
| 1.8012  | 28.06667    | 57.80000 | -0.50000 | 0.0                               | 0.0 | 0.0                                   |
| 2.7019  | 28.10000    | 56.90000 | -0.50000 | 0.0                               | 0.0 | 0.0                                   |

Structure: H | Sub-structure:

| Dist.   | Coordinates |          |          | Displacements                     |     |                                       |
|---------|-------------|----------|----------|-----------------------------------|-----|---------------------------------------|
|         | x           | y        | z        | x                                 | y   |                                       |
|         |             |          |          | Horizontal displacement along the |     | Horizontal displacement perpendicular |
|         |             |          |          | Line                              |     | to Line                               |
|         |             |          |          | [mm]                              |     | [mm]                                  |
| 0.0     | 28.10000    | 56.90000 | -0.50000 | 0.0                               | 0.0 | 0.0                                   |
| 0.90009 | 27.20000    | 56.91250 | -0.50000 | 0.0                               | 0.0 | 0.0                                   |
| 1.8002  | 26.30000    | 56.92500 | -0.50000 | 0.0                               | 0.0 | 0.0                                   |
| 2.7003  | 25.40000    | 56.93750 | -0.50000 | 0.0                               | 0.0 | 0.0                                   |
| 3.6003  | 24.50000    | 56.95000 | -0.50000 | 0.0                               | 0.0 | 0.0                                   |
| 4.5004  | 23.60000    | 56.96250 | -0.50000 | 0.0                               | 0.0 | 0.0                                   |
| 5.4005  | 22.70000    | 56.97500 | -0.50000 | 0.0                               | 0.0 | 0.0                                   |
| 6.3006  | 21.80000    | 56.98750 | -0.50000 | 0.0                               | 0.0 | 0.0                                   |
| 7.2007  | 20.90000    | 57.00000 | -0.50000 | 0.0                               | 0.0 | 0.0                                   |

Structure: I | Sub-structure:

| Dist.   | Coordinates |          |          | Displacements                     |     |                                       |
|---------|-------------|----------|----------|-----------------------------------|-----|---------------------------------------|
|         | x           | y        | z        | x                                 | y   |                                       |
|         |             |          |          | Horizontal displacement along the |     | Horizontal displacement perpendicular |
|         |             |          |          | Line                              |     | to Line                               |
|         |             |          |          | [mm]                              |     | [mm]                                  |
| 0.0     | 28.10000    | 56.90000 | -0.50000 | 0.0                               | 0.0 | 0.0                                   |
| 0.90009 | 27.20000    | 56.91250 | -0.50000 | 0.0                               | 0.0 | 0.0                                   |
| 1.8002  | 26.30000    | 56.92500 | -0.50000 | 0.0                               | 0.0 | 0.0                                   |
| 2.7003  | 25.40000    | 56.93750 | -0.50000 | 0.0                               | 0.0 | 0.0                                   |
| 3.6003  | 24.50000    | 56.95000 | -0.50000 | 0.0                               | 0.0 | 0.0                                   |
| 4.5004  | 23.60000    | 56.96250 | -0.50000 | 0.0                               | 0.0 | 0.0                                   |
| 5.4005  | 22.70000    | 56.97500 | -0.50000 | 0.0                               | 0.0 | 0.0                                   |
| 6.3006  | 21.80000    | 56.98750 | -0.50000 | 0.0                               | 0.0 | 0.0                                   |
| 7.2007  | 20.90000    | 57.00000 | -0.50000 | 0.0                               | 0.0 | 0.0                                   |

Structure: J | Sub-structure:

| Dist.   | Coordinates |          |          | Displacements                     |     |                                       |
|---------|-------------|----------|----------|-----------------------------------|-----|---------------------------------------|
|         | x           | y        | z        | x                                 | y   |                                       |
|         |             |          |          | Horizontal displacement along the |     | Horizontal displacement perpendicular |
|         |             |          |          | Line                              |     | to Line                               |
|         |             |          |          | [mm]                              |     | [mm]                                  |
| 0.0     | 33.00000    | 59.50000 | -0.50000 | 0.0                               | 0.0 | 0.0                                   |
| 1.9500  | 34.95000    | 59.50000 | -0.50000 | 0.0                               | 0.0 | 0.0                                   |
| 3.9000  | 36.90000    | 59.50000 | -0.50000 | 0.0                               | 0.0 | 0.0                                   |
| 5.8500  | 38.85000    | 59.50000 | -0.50000 | 0.0                               | 0.0 | 0.0                                   |
| 7.8000  | 40.80000    | 59.50000 | -0.50000 | 0.0                               | 0.0 | 0.0                                   |
| 9.7500  | 42.75000    | 59.50000 | -0.50000 | 0.0                               | 0.0 | 0.0                                   |
| 11.7000 | 44.70000    | 59.50000 | -0.50000 | 0.0                               | 0.0 | 0.0                                   |
| 13.6500 | 46.65000    | 59.50000 | -0.50000 | 0.0                               | 0.0 | 0.0                                   |
| 15.6000 | 48.60000    | 59.50000 | -0.50000 | 0.0                               | 0.0 | 0.0                                   |
| 17.5500 | 50.55000    | 59.50000 | -0.50000 | 0.0                               | 0.0 | 0.0                                   |
| 19.5000 | 52.50000    | 59.50000 | -0.50000 | 0.0                               | 0.0 | 0.0                                   |

Structure: K | Sub-structure:

| Dist.   | Coordinates |          |          | Displacements                     |          |                                       |
|---------|-------------|----------|----------|-----------------------------------|----------|---------------------------------------|
|         | x           | y        | z        | x                                 | y        |                                       |
|         |             |          |          | Horizontal displacement along the |          | Horizontal displacement perpendicular |
|         |             |          |          | Line                              |          | to Line                               |
|         |             |          |          | [mm]                              |          | [mm]                                  |
| 0.0     | 33.00000    | 52.20000 | -0.50000 | 0.022302                          | 0.022302 | 0.022302                              |
| 0.98889 | 33.98889    | 52.20000 | -0.50000 | 0.15477                           | 0.15477  | -0.19715                              |
| 1.9778  | 34.97778    | 52.20000 | -0.50000 | 0.21544                           | -0.37794 | 0.21544                               |
| 2.9667  | 35.96667    | 52.20000 | -0.50000 | 0.19169                           | -0.53985 | 0.19169                               |
| 3.9556  | 36.95556    | 52.20000 | -0.50000 | 0.090417                          | -0.64539 | 0.090417                              |
| 4.9444  | 37.94444    | 52.20000 | -0.50000 | 0.0                               | -0.66667 | 0.0                                   |
| 5.9333  | 38.93333    | 52.20000 | -0.50000 | 0.0                               | -0.66667 | 0.0                                   |
| 6.9222  | 39.92222    | 52.20000 | -0.50000 | 0.0                               | -0.66667 | 0.0                                   |
| 7.9111  | 40.91111    | 52.20000 | -0.50000 | 0.0                               | -0.66667 | 0.0                                   |
| 8.9000  | 41.90000    | 52.20000 | -0.50000 | 0.0                               | -0.66667 | 0.0                                   |

Structure: L | Sub-structure:

| Dist.   | Coordinates |          |          | Displacements                     |          |                                       |
|---------|-------------|----------|----------|-----------------------------------|----------|---------------------------------------|
|         | x           | y        | z        | x                                 | y        |                                       |
|         |             |          |          | Horizontal displacement along the |          | Horizontal displacement perpendicular |
|         |             |          |          | Line                              |          | to Line                               |
|         |             |          |          | [mm]                              |          | [mm]                                  |
| 0.0     | 37.70000    | 59.40000 | -0.50000 | 0.0                               | 0.0      | 0.0                                   |
| 0.90000 | 37.70000    | 58.50000 | -0.50000 | 0.0                               | 0.0      | 0.0                                   |
| 1.8000  | 37.70000    | 57.60000 | -0.50000 | 0.0                               | 0.0      | 0.0                                   |
| 2.7000  | 37.70000    | 56.70000 | -0.50000 | 0.0                               | 0.0      | 0.0                                   |
| 3.6000  | 37.70000    | 55.80000 | -0.50000 | 0.0                               | 0.0      | 0.0                                   |
| 4.5000  | 37.70000    | 54.90000 | -0.50000 | 0.0                               | 0.0      | 0.0                                   |
| 5.4000  | 37.70000    | 54.00000 | -0.50000 | 0.0                               | -0.66667 | 0.0                                   |
| 6.3000  | 37.70000    | 53.10000 | -0.50000 | 0.0                               | -0.36667 | 0.0                                   |
| 7.2000  | 37.70000    | 52.20000 | -0.50000 | 0.0                               | -0.66667 | 0.0                                   |

Structure: M | Sub-structure:

| Dist.   | Coordinates |          |          | Displacements                     |           |                                       |
|---------|-------------|----------|----------|-----------------------------------|-----------|---------------------------------------|
|         | x           | y        | z        | x                                 | y         |                                       |
|         |             |          |          | Horizontal displacement along the |           | Horizontal displacement perpendicular |
|         |             |          |          | Line                              |           | to Line                               |
|         |             |          |          | [mm]                              |           | [mm]                                  |
| 0.0     | 42.00000    | 59.50000 | -1.50000 | 0.0                               | 0.0       | 0.0                                   |
| 0.91259 | 41.98750    | 58.58750 | -1.50000 | 0.0                               | 0.0       | 0.0                                   |
| 1.8252  | 41.97500    | 57.67500 | -1.50000 | 0.0                               | 0.0       | 0.0                                   |
| 2.7378  | 41.96250    | 56.76250 | -1.50000 | 0.0                               | 0.0       | 0.0                                   |
| 3.6503  | 41.95000    | 55.85000 | -1.50000 | 0.0                               | 0.0       | 0.0                                   |
| 4.5629  | 41.93750    | 54.93750 | -1.50000 | 0.0                               | 0.0       | 0.0                                   |
| 5.4755  | 41.92500    | 54.02500 | -1.50000 | 0.0                               | -0.058333 | 0.058328                              |
| 6.3881  | 41.91250    | 53.11250 | -1.50000 | 0.0                               | -0.36250  | 0.36247                               |
| 7.3007  | 41.90000    | 52.20000 | -1.50000 | 0.0                               | -0.66667  | 0.66660                               |

Structure: N | Sub-structure:

| Dist.   | Coordinates |          |          | Displacements                     |            |                                       |
|---------|-------------|----------|----------|-----------------------------------|------------|---------------------------------------|
|         | x           | y        | z        | x                                 | y          |                                       |
|         |             |          |          | Horizontal displacement along the |            | Horizontal displacement perpendicular |
|         |             |          |          | Line                              |            | to Line                               |
|         |             |          |          | [mm]                              |            | [mm]                                  |
| 0.0     | 45.50000    | 53.30000 | -4.00000 | -0.010479                         | -0.29865   | -0.29865                              |
| 0.87143 | 45.50000    | 54.17143 | -4.00000 | -258.87E-6                        | -0.0085056 | -0.0085056                            |
| 1.7429  | 45.50000    | 55.04286 | -4.00000 | 0.0                               | 0.0        | 0.0                                   |
| 2.6143  | 45.50000    | 55.91429 | -4.00000 | 0.0                               | 0.0        | 0.0                                   |
| 3.4857  | 45.50000    | 56.78571 | -4.00000 | 0.0                               | 0.0        | 0.0                                   |
| 4.3571  | 45.50000    | 57.65714 | -4.00000 | 0.0                               | 0.0        | 0.0                                   |



# GEA LIMITED (GEOTECHNICAL & ENV ASSOC)

Rear of 159-163 King's Cross Road, London WC1X 9BN  
Wall Installation only Issue 4

| Job No.   | Sheet No.           | Rev.    |
|-----------|---------------------|---------|
| J16180    |                     |         |
| Drg. Ref. |                     |         |
| Made by   | Date<br>07-Mar-2017 | Checked |

| Dist.  | Coordinates |          |          | Displacements |                                   |                                       |
|--------|-------------|----------|----------|---------------|-----------------------------------|---------------------------------------|
|        | x           | y        | z        | x             | y                                 |                                       |
|        |             |          |          |               | Horizontal displacement along the | Horizontal displacement perpendicular |
| 5.2286 | 45.50000    | 58.52857 | -4.00000 | 0.0           | 0.0                               | 0.0                                   |
| 6.1000 | 45.50000    | 59.40000 | -4.00000 | 0.0           | 0.0                               | 0.0                                   |

Structure: 0 | Sub-structure:

| Dist.   | Coordinates |          |          | Displacements |                                   |                                       |
|---------|-------------|----------|----------|---------------|-----------------------------------|---------------------------------------|
|         | x           | y        | z        | x             | y                                 |                                       |
|         |             |          |          |               | Horizontal displacement along the | Horizontal displacement perpendicular |
|         | [m]         | [m]      | [m]      | [mm]          | [mm]                              |                                       |
|         | 0.0         | 37.70000 | 52.20000 | -0.68000      | 0.0                               | 0.0                                   |
| 0.92000 | 37.70000    | 51.28000 | -0.68000 | 0.0           | -0.97333                          | 0.97333                               |
| 1.8400  | 37.70000    | 50.36000 | -0.68000 | 0.0           | -1.2800                           | 1.2800                                |
| 2.7600  | 37.70000    | 49.44000 | -0.68000 | -935.53E-6    | -1.6020                           | 1.6020                                |
| 3.6800  | 37.70000    | 48.52000 | -0.68000 | -0.021851     | -2.2003                           | 2.2003                                |
| 4.6000  | 37.70000    | 47.60000 | -0.68000 | -0.050431     | -2.7926                           | 2.7926                                |

Structure: P | Sub-structure: Sub #

| Dist.   | Coordinates |          |          | Displacements |                                   |                                       |
|---------|-------------|----------|----------|---------------|-----------------------------------|---------------------------------------|
|         | x           | y        | z        | x             | y                                 |                                       |
|         |             |          |          |               | Horizontal displacement along the | Horizontal displacement perpendicular |
|         | [m]         | [m]      | [m]      | [mm]          | [mm]                              |                                       |
|         | 0.0         | 45.50000 | 53.30000 | -1.85000      | -0.010479                         | -0.29865                              |
| 0.95000 | 45.50000    | 52.35000 | -1.85000 | -0.025883     | 0.61472                           | 0.61472                               |
| 1.9000  | 45.50000    | 51.40000 | -1.85000 | -0.048963     | 0.93029                           | 0.93029                               |
| 2.8500  | 45.50000    | 50.45000 | -1.85000 | -0.087341     | -1.2446                           | 1.2446                                |
| 3.8000  | 45.50000    | 49.50000 | -1.85000 | -0.16364      | -1.5546                           | 1.5546                                |
| 4.7500  | 45.50000    | 48.55000 | -1.85000 | -0.38656      | -1.8361                           | 1.8361                                |
| 5.7000  | 45.50000    | 47.60000 | -1.85000 | -2.0693       | -0.52721                          | 0.52721                               |

Structure: Q | Sub-structure:

| Dist.   | Coordinates |          |          | Displacements |                                   |                                       |
|---------|-------------|----------|----------|---------------|-----------------------------------|---------------------------------------|
|         | x           | y        | z        | x             | y                                 |                                       |
|         |             |          |          |               | Horizontal displacement along the | Horizontal displacement perpendicular |
|         | [m]         | [m]      | [m]      | [mm]          | [mm]                              |                                       |
|         | 0.0         | 41.90000 | 52.20000 | -0.65000      | 0.0                               | 0.0                                   |
| 0.92000 | 41.90000    | 51.28000 | -0.65000 | 0.0           | -0.97333                          | 0.97333                               |
| 1.8400  | 41.90000    | 50.36000 | -0.65000 | 0.0           | -1.2800                           | 1.2800                                |
| 2.7600  | 41.90000    | 49.44000 | -0.65000 | 0.0           | -1.5867                           | 1.5867                                |
| 3.6800  | 41.90000    | 48.52000 | -0.65000 | 0.0           | -1.8933                           | 1.8933                                |
| 4.6000  | 41.90000    | 47.60000 | -0.65000 | -0.0028569    | -2.2029                           | 2.2029                                |

Structure: R | Sub-structure:

| Dist.   | Coordinates |          |          | Displacements |                                   |                                       |
|---------|-------------|----------|----------|---------------|-----------------------------------|---------------------------------------|
|         | x           | y        | z        | x             | y                                 |                                       |
|         |             |          |          |               | Horizontal displacement along the | Horizontal displacement perpendicular |
|         | [m]         | [m]      | [m]      | [mm]          | [mm]                              |                                       |
|         | 0.0         | 33.00000 | 50.30000 | -0.50000      | 0.36398                           | -0.21364                              |
| 0.92635 | 32.95000    | 49.37500 | -0.50000 | 0.50788       | -0.22927                          | 0.20153                               |
| 1.8527  | 32.90000    | 48.45000 | -0.50000 | 0.62895       | -0.44931                          | 0.41471                               |
| 2.7791  | 32.85000    | 47.52500 | -0.50000 | 0.69542       | -0.67257                          | 0.63406                               |
| 3.7054  | 32.80000    | 46.60000 | -0.50000 | 0.76922       | -0.96784                          | 0.92491                               |
| 4.6318  | 32.75000    | 45.67500 | -0.50000 | 0.90023       | -1.2465                           | 1.1961                                |
| 5.5581  | 32.70000    | 44.75000 | -0.50000 | 1.1585        | -1.4703                           | 1.4056                                |
| 6.4845  | 32.65000    | 43.82500 | -0.50000 | 1.7469        | -1.4298                           | 1.3334                                |
| 7.4108  | 32.60000    | 42.90000 | -0.50000 | 2.5390        | -0.15905                          | 0.021775                              |

Structure: S | Sub-structure:

| Dist.  | Coordinates |          |          | Displacements |                                   |                                       |
|--------|-------------|----------|----------|---------------|-----------------------------------|---------------------------------------|
|        | x           | y        | z        | x             | y                                 |                                       |
|        |             |          |          |               | Horizontal displacement along the | Horizontal displacement perpendicular |
|        | [m]         | [m]      | [m]      | [mm]          | [mm]                              |                                       |
|        | 0.0         | 54.40000 | 58.50000 | -0.50000      | 0.0                               | 0.0                                   |
| 1.9375 | 55.56250    | 56.95000 | -0.50000 | 0.0           | 0.0                               | 0.0                                   |
| 3.8750 | 56.72500    | 55.40000 | -0.50000 | 0.0           | 0.0                               | 0.0                                   |
| 5.8125 | 57.88750    | 53.85000 | -0.50000 | 0.0           | 0.0                               | 0.0                                   |
| 7.7500 | 59.05000    | 52.30000 | -0.50000 | 0.0           | 0.0                               | 0.0                                   |
| 9.6875 | 60.21250    | 50.75000 | -0.50000 | 0.0           | 0.0                               | 0.0                                   |
| 11.625 | 61.37500    | 49.20000 | -0.50000 | 0.0           | 0.0                               | 0.0                                   |
| 13.562 | 62.53750    | 47.65000 | -0.50000 | 0.0           | 0.0                               | 0.0                                   |
| 15.500 | 63.70000    | 46.10000 | -0.50000 | 0.0           | 0.0                               | 0.0                                   |
| 17.438 | 64.86250    | 44.55000 | -0.50000 | 0.0           | 0.0                               | 0.0                                   |
| 19.375 | 66.02500    | 43.00000 | -0.50000 | 0.0           | 0.0                               | 0.0                                   |
| 21.313 | 67.18750    | 41.45000 | -0.50000 | 0.0           | 0.0                               | 0.0                                   |
| 23.250 | 68.35000    | 39.90000 | -0.50000 | 0.0           | 0.0                               | 0.0                                   |
| 25.188 | 69.51250    | 38.35000 | -0.50000 | 0.0           | 0.0                               | 0.0                                   |
| 27.125 | 70.67500    | 36.80000 | -0.50000 | 0.0           | 0.0                               | 0.0                                   |
| 29.063 | 71.83750    | 35.25000 | -0.50000 | 0.0           | 0.0                               | 0.0                                   |
| 31.000 | 73.00000    | 33.70000 | -0.50000 | 0.0           | 0.0                               | 0.0                                   |

Structure: T | Sub-structure:

| Dist.  | Coordinates |          |          | Displacements |                                   |                                       |
|--------|-------------|----------|----------|---------------|-----------------------------------|---------------------------------------|
|        | x           | y        | z        | x             | y                                 |                                       |
|        |             |          |          |               | Horizontal displacement along the | Horizontal displacement perpendicular |
|        | [m]         | [m]      | [m]      | [mm]          | [mm]                              |                                       |
|        | 0.0         | 45.50000 | 53.30000 | -0.50000      | 0.010479                          | -0.29865                              |
| 1.9859 | 46.73158    | 51.74211 | -0.50000 | -0.24145      | -0.69861                          | 0.39831                               |
| 3.9718 | 47.96316    | 50.18421 | -0.50000 | -0.69114      | -0.67065                          | 0.097493                              |
| 5.9577 | 49.19474    | 48.62632 | -0.50000 | -0.82913      | -0.21849                          | -0.34280                              |
| 7.9436 | 50.42632    | 47.06842 | -0.50000 | -0.56968      | -0.14514                          | -0.23943                              |
| 9.9295 | 51.65789    | 45.51053 | -0.50000 | -0.30842      | -0.078578                         | -0.12962                              |
| 11.915 | 52.88947    | 43.95263 | -0.50000 | -0.047155     | -0.012014                         | -0.019819                             |
| 13.901 | 54.12105    | 42.39474 | -0.50000 | 0.0           | 0.0                               | 0.0                                   |
| 15.887 | 55.35263    | 40.83684 | -0.50000 | 0.0           | 0.0                               | 0.0                                   |
| 17.873 | 56.58421    | 39.27895 | -0.50000 | 0.0           | 0.0                               | 0.0                                   |
| 19.859 | 57.81579    | 37.72105 | -0.50000 | -0.53491      | -0.13160                          | -0.22849                              |
| 21.845 | 59.04737    | 36.16316 | -0.50000 | -0.37959      | -0.073330                         | -0.17788                              |
| 23.831 | 60.27895    | 34.60526 | -0.50000 | -0.21702      | -0.041924                         | -0.10170                              |
| 25.817 | 61.51053    | 33.04737 | -0.50000 | -0.057977     | -0.011200                         | -0.027169                             |
| 27.803 | 62.74211    | 31.48947 | -0.50000 | 0.0           | 0.0                               | 0.0                                   |
| 29.789 | 63.97368    | 29.93158 | -0.50000 | 0.0           | 0.0                               | 0.0                                   |
| 31.774 | 65.20526    | 28.37368 | -0.50000 | 0.0           | 0.0                               | 0.0                                   |
| 33.760 | 66.43684    | 26.81579 | -0.50000 | 0.0           | 0.0                               | 0.0                                   |
| 35.746 | 67.66842    | 25.25789 | -0.50000 | 0.0           | 0.0                               | 0.0                                   |
| 37.732 | 68.90000    | 23.70000 | -0.50000 | 0.0           | 0.0                               | 0.0                                   |

|           |             |         |
|-----------|-------------|---------|
| Job No.   | Sheet No.   | Rev.    |
| J16180    |             |         |
| Drg. Ref. |             |         |
| Made by   | Date        | Checked |
|           | 07-Mar-2017 |         |

Dist.

x

y

z

x

y

Displacements

Horizontal displacement along the

Horizontal displacement perpendicular

Structure: U | Sub-structure:

Dist.

x

y

z

x

y

Displacements

Horizontal displacement along the

Horizontal displacement perpendicular

[m]

[m]

[m]

[m]

[mm]

[mm]

[mm]

[mm]

[mm]

0.0

63.90000

47.90000

-0.50000

0.0

0.0

0.0

0.0

0.0

0.98600

62.21000

46.41000

-0.50000

0.0

0.0

0.0

0.0

0.0

1.9720

61.42000

45.82000

-0.50000

0.0

0.0

0.0

0.0

0.0

2.9580

60.63000

45.23000

-0.50000

0.0

0.0

0.0

0.0

0.0

3.9440

59.84000

44.64000

-0.50000

0.0

0.0

0.0

0.0

0.0

4.9300

59.05000

44.05000

-0.50000

0.0

0.0

0.0

0.0

0.0

5.9160

58.26000

43.46000

-0.50000

0.0

0.0

0.0

0.0

0.0

6.9020

57.47000

42.87000

-0.50000

0.0

0.0

0.0

0.0

0.0

7.8880

56.68000

42.28000

-0.50000

0.0

0.0

0.0

0.0

0.0

8.8740

55.89000

41.69000

-0.50000

0.0

0.0

0.0

0.0

0.0

9.8600

55.10000

41.10000

-0.50000

0.0

0.0

0.0

0.0

0.0

Structure: V | Sub-structure:

Dist.

x

y

z

x

y

Displacements

Horizontal displacement along the

Horizontal displacement perpendicular

[m]

[m]

[m]

[m]

[mm]

[mm]

[mm]

[mm]

[mm]

0.0

55.10000

41.10000

-0.50000

0.0

0.0

0.0

0.0

0.0

0.91001

54.37500

40.15500

-0.50000

0.0

0.0

0.0

0.0

0.0

1.8200

53.65000

40.00000

-0.50000

-0.12432

-0.031675

0.11819

-0.049903

0.0

2.7300

52.92500

39.45000

-0.50000

-0.39512

-0.10067

0.37563

-0.15860

0.0

3.6401

52.20000

38.90000

-0.50000

-0.66592

-0.16966

0.63307

-0.26730

0.0

Structure: W | Sub-structure:

Dist.

x

y

z

x

y

Displacements

Horizontal displacement along the

Horizontal displacement perpendicular

[m]

[m]

[m]

[m]

[mm]

[mm]

[mm]

[mm]

[mm]

0.0

52.20000

38.90000

-1.70000

-0.66592

-0.16966

-0.27491

-0.62981

0.0

0.57009

52.55000

38.45000

-1.70000

-0.59225

-0.15089

-0.24450

-0.56013

0.0

1.1402

52.90000

38.00000

-1.70000

-0.51858

-0.13212

-0.21409

-0.49046

0.0

Structure: X | Sub-structure:

Dist.

x

y

z

x

y

Displacements

Horizontal displacement along the

Horizontal displacement perpendicular

[m]

[m]

[m]

[m]

[mm]

[mm]

[mm]

[mm]

[mm]

0.0

66.40000

42.50000

-0.50000

0.0

0.0

0.0

0.0

0.0

0.97201

65.62000

41.92000

-0.50000

0.0

0.0

0.0

0.0

0.0

1.9440

64.84000

41.34000

-0.50000

0.0

0.0

0.0

0.0

0.0

2.9160

64.06000

40.76000

-0.50000

0.0

0.0

0.0

0.0

0.0

3.8880

63.28000

40.18000

-0.50000

0.0

0.0

0.0

0.0

0.0

4.8600

62.50000

39.60000

-0.50000

0.0

0.0

0.0

0.0

0.0

5.8320

61.72000

39.02000

-0.50000

0.0

0.0

0.0

0.0

0.0

6.8041

60.94000

38.44000

-0.50000

0.0

0.0

0.0

0.0

0.0

7.7761

60.16000

37.86000

-0.50000

-0.12898

-0.026980

0.11960

-0.055311

0.0

8.7481

59.38000

37.28000

-0.50000

-0.28321

-0.054712

0.25991

-0.12509

0.0

9.7281

58.60000

36.70000

-0.50000

-0.44105

-0.085202

0.40476

-0.19480

0.0

Structure: Y | Sub-structure:

Dist.

x

y

z

x

y

Displacements

Horizontal displacement along the

Horizontal displacement perpendicular

[m]

[m]

[m]

[m]

[mm]

[mm]

[mm]

[mm]

[mm]

0.0

58.60000

36.70000

-1.40000

-0.44105

-0.085202

0.40287

-0.19868

0.0

0.91001

57.87500

36.15000

-1.40000

-0.59399

-0.11475

0.54258

-0.26758

0.0

1.8200

57.15000

35.60000

-1.40000

-0.75453

-0.14576

0.68922

-0.33990

0.0

2.7300

56.42500

35.05000

-1.40000

-0.92454

-0.17860

0.84452

-0.41649

0.0

3.6401

55.70000

34.50000

-1.40000

-1.1059

-0.21364

1.0102

-0.49819

0.0

Structure: Z | Sub-structure:

Dist.

x

y

z

x

y

Displacements

Horizontal displacement along the

Horizontal displacement perpendicular

[m]

[m]

[m]

[m]

[mm]

[mm]

[mm]

[mm]

[mm]

0.0

69.70000

38.10000

-0.50000

0.0

0.0

0.0

0.0

0.0

0.95802

68.93000

37.53000

-0.50000

0.0

0.0

0.0

0.0

0.0

1.9160

68.16000

36.96000

-0.50000

0.0

0.0

0.0

0.0

0.0

2.8741

67.39000

36.39000

-0.50000

0.0

0.0

0.0

0.0

0.0

3.8321

66.62000

35.82000

-0.50000

0.0

0.0

0.0

0.0

0.0

4.7901

65.85000

35.25000

-0.50000

0.0

0.0

0.0

0.0

0.0

5.7481

65.08000

34.68000

-0.50000

0.0

0.0

0.0

0.0

0.0

6.7061

64.31000

34.11000

-0.50000

0.0

0.0

0.0

0.0

0.0

7.6642

63.54000

33.54000

-0.50000

0.0

0.0

0.0

0.0

0.0

8.6222

62.77000

32.97000

-0.50000

0.0

0.0

0.0

0.0

0.0

9.5802

62.00000

32.40000

-0.50000

0.0

0.0

0.0

0.0

0.0

Structure: AA | Sub-structure:

Dist.

x

y

z

x

y

Displacements

Horizontal displacement along the

Horizontal displacement perpendicular

[m]

[m]

[m]

[m]

[mm]

[mm]

[mm]

[mm]

[mm]

0.0

62.00000

32.40000

-1.40000

0.0

0.0

0.0

0.0

0.0

0.91549

61.25000

31.87500

-1.40000

-0.14093

-0.027224

0.13106

-0.058513

0.0

1.8310

60.50000

31.35000

-1.40000

-0.28767

-0.055572

0.26753

-0.11944

0.0

2.7465

59.75000

30.82500

-1.40000

-0.43834

-0.084678

0.40766

-0.18200

0.0

3.6620

59.00000

30.30000

-1.40000

-0.59496

-0.11493

0.55332

-0.24703

0.0

Structure: AB | Sub-structure:

Dist.

x

y

z

x

y

Displacements

Horizontal displacement along the

Horizontal displacement perpendicular

[m]

[m]

[m]

[m]

[mm]

[mm]

[mm]

[mm]

[mm]

0.0

62.00000

32.40000

-1.40000

0.0

0.0

0.0

0.0

0.0

0.91549

61.25000

31.87500

-1.40000

-0.14093

-0.027224

0.13106

-0.058513

0.0

1.8310

60.50000

31.35000

-1.40000

-0.28767

-0.055572

0.26753

-0.11944

0.0

2.7465

59.75000

30.82500

-1.40000

-0.43834

-0.084678

0.40766

-0.18200

0.0

3.6620

59.00000

30.30000

-1.40000

-0.59496

-0.11493

0.55332

-0.24703

0.0



# GEA LIMITED (GEOTECHNICAL & ENV ASSOC)

Rear of 159-163 King's Cross Road, London WC1X 9BN  
Wall Installation only Issue 4

| Job No.   | Sheet No.           | Rev.    |
|-----------|---------------------|---------|
| J16180    |                     |         |
| Drg. Ref. |                     |         |
| Made by   | Date<br>07-Mar-2017 | Checked |

| [m]     | [m]      | [m]      | [m]      | [mm] | [mm] | Line<br>[mm] | to Line<br>[mm] |
|---------|----------|----------|----------|------|------|--------------|-----------------|
| 0.0     | 73.00000 | 33.70000 | -0.50000 | 0.0  | 0.0  | 0.0          | 0.0             |
| 0.94626 | 72.23000 | 33.15000 | -0.50000 | 0.0  | 0.0  | 0.0          | 0.0             |
| 1.8925  | 71.46000 | 32.60000 | -0.50000 | 0.0  | 0.0  | 0.0          | 0.0             |
| 2.8388  | 70.69000 | 32.05000 | -0.50000 | 0.0  | 0.0  | 0.0          | 0.0             |
| 3.7850  | 69.92000 | 31.50000 | -0.50000 | 0.0  | 0.0  | 0.0          | 0.0             |
| 4.7313  | 69.15000 | 30.95000 | -0.50000 | 0.0  | 0.0  | 0.0          | 0.0             |
| 5.6775  | 68.38000 | 30.40000 | -0.50000 | 0.0  | 0.0  | 0.0          | 0.0             |
| 6.6238  | 67.61000 | 29.85000 | -0.50000 | 0.0  | 0.0  | 0.0          | 0.0             |
| 7.5700  | 66.84000 | 29.30000 | -0.50000 | 0.0  | 0.0  | 0.0          | 0.0             |
| 8.5163  | 66.07000 | 28.75000 | -0.50000 | 0.0  | 0.0  | 0.0          | 0.0             |
| 9.4626  | 65.30000 | 28.20000 | -0.50000 | 0.0  | 0.0  | 0.0          | 0.0             |

Structure: AC | Sub-structure:

| Dist.   | Coordinates |          |          | Displacements |           |                                        |                                               |
|---------|-------------|----------|----------|---------------|-----------|----------------------------------------|-----------------------------------------------|
|         | x           | y        | z        | x             | y         | Horizontal displacement along the Line | Horizontal displacement perpendicular to Line |
| [m]     | [m]         | [m]      | [m]      | [mm]          | [mm]      | [mm]                                   | [mm]                                          |
| 0.0     | 65.30000    | 28.20000 | -0.50000 | 0.0           | 0.0       | 0.0                                    | 0.0                                           |
| 0.84673 | 64.61667    | 27.70000 | -0.50000 | 0.0           | 0.0       | 0.0                                    | 0.0                                           |
| 1.6935  | 63.93333    | 27.20000 | -0.50000 | 0.0           | 0.0       | 0.0                                    | 0.0                                           |
| 2.5402  | 63.25000    | 26.70000 | -0.50000 | 0.0           | 0.0       | 0.0                                    | 0.0                                           |
| 3.3869  | 62.56667    | 26.20000 | -0.50000 | -0.050776     | 0.0016292 | 0.040016                               | -0.031290                                     |
| 4.2336  | 61.88333    | 25.70000 | -0.50000 | -0.16619      | 0.012694  | 0.12663                                | -0.10838                                      |
| 5.0804  | 61.20000    | 25.20000 | -0.50000 | -0.27711      | 0.034951  | 0.20300                                | -0.19184                                      |

Structure: AD | Sub-structure:

| Dist.   | Coordinates |          |          | Displacements |          |                                        |                                               |
|---------|-------------|----------|----------|---------------|----------|----------------------------------------|-----------------------------------------------|
|         | x           | y        | z        | x             | y        | Horizontal displacement along the Line | Horizontal displacement perpendicular to Line |
| [m]     | [m]         | [m]      | [m]      | [mm]          | [mm]     | [mm]                                   | [mm]                                          |
| 0.0     | 61.20000    | 25.20000 | -1.46000 | -0.27711      | 0.034951 | 0.27930                                | 571.43E-6                                     |
| 0.98298 | 60.22500    | 25.32500 | -1.46000 | -0.45617      | 0.057443 | 0.45977                                | 0.0010313                                     |
| 1.9650  | 59.25000    | 25.45000 | -1.46000 | -0.64379      | 0.080914 | 0.64805                                | 0.0016105                                     |
| 2.9489  | 58.27500    | 25.57500 | -1.46000 | -0.84331      | 0.10574  | 0.84991                                | 0.0023612                                     |
| 3.9319  | 57.30000    | 25.70000 | -1.46000 | -1.0581       | 0.13226  | 1.0663                                 | 0.0033637                                     |
| 4.9149  | 56.32500    | 25.82500 | -1.46000 | -1.2914       | 0.16078  | 1.3014                                 | 0.0047485                                     |
| 5.8979  | 55.35000    | 25.95000 | -1.46000 | -1.5467       | 0.19149  | 1.5585                                 | 0.0067433                                     |
| 6.8809  | 54.37500    | 26.07500 | -1.46000 | -1.8272       | 0.22439  | 1.8409                                 | 0.0097834                                     |
| 7.8638  | 53.40000    | 26.20000 | -1.46000 | -2.1365       | 0.25897  | 2.1521                                 | 0.014819                                      |

Structure: AE | Sub-structure:

| Dist.   | Coordinates |          |          | Displacements |          |                                        |                                               |
|---------|-------------|----------|----------|---------------|----------|----------------------------------------|-----------------------------------------------|
|         | x           | y        | z        | x             | y        | Horizontal displacement along the Line | Horizontal displacement perpendicular to Line |
| [m]     | [m]         | [m]      | [m]      | [mm]          | [mm]     | [mm]                                   | [mm]                                          |
| 0.0     | 61.20000    | 25.20000 | -0.50000 | -0.27711      | 0.034951 | -0.018123                              | -0.27872                                      |
| 0.82651 | 61.15000    | 24.37500 | -0.50000 | -0.25900      | 0.052152 | -0.036388                              | -0.26168                                      |
| 1.6530  | 61.10000    | 23.55000 | -0.50000 | -0.22982      | 0.063722 | -0.049703                              | -0.23325                                      |
| 2.4795  | 61.05000    | 22.72500 | -0.50000 | -0.19105      | 0.067611 | -0.055929                              | -0.19479                                      |
| 3.3061  | 61.00000    | 21.90000 | -0.50000 | -0.14450      | 0.062308 | -0.053452                              | -0.14801                                      |

Structure: AF | Sub-structure:

| Dist.   | Coordinates |          |          | Displacements |        |                                        |                                               |
|---------|-------------|----------|----------|---------------|--------|----------------------------------------|-----------------------------------------------|
|         | x           | y        | z        | x             | y      | Horizontal displacement along the Line | Horizontal displacement perpendicular to Line |
| [m]     | [m]         | [m]      | [m]      | [mm]          | [mm]   | [mm]                                   | [mm]                                          |
| 0.0     | 50.30000    | 26.50000 | -1.46000 | -3.0050       | 1.5025 | -1.2155                                | -3.1321                                       |
| 0.80351 | 50.22500    | 25.70000 | -1.46000 | -0.42097      | 3.0310 | -2.9785                                | -0.70208                                      |
| 1.6070  | 50.15000    | 24.90000 | -1.46000 | -0.080493     | 2.7368 | -2.7173                                | -0.33559                                      |
| 2.4105  | 50.07500    | 24.10000 | -1.46000 | 0.024375      | 2.4375 | -2.4291                                | -0.20325                                      |
| 3.2140  | 50.00000    | 23.30000 | -1.46000 | 0.065415      | 2.1587 | -2.1554                                | -0.13636                                      |

Structure: AG | Sub-structure:

| Dist.  | Coordinates |          |          | Displacements |          |                                        |                                               |
|--------|-------------|----------|----------|---------------|----------|----------------------------------------|-----------------------------------------------|
|        | x           | y        | z        | x             | y        | Horizontal displacement along the Line | Horizontal displacement perpendicular to Line |
| [m]    | [m]         | [m]      | [m]      | [mm]          | [mm]     | [mm]                                   | [mm]                                          |
| 0.0    | 50.00000    | 23.30000 | -0.50000 | 0.065415      | 2.1587   | -0.21217                               | 2.1492                                        |
| 1.9046 | 51.88889    | 23.05556 | -0.50000 | -0.87598      | 1.7356   | -1.0915                                | 1.6089                                        |
| 3.8093 | 53.77778    | 22.81111 | -0.50000 | -1.0873       | 1.1202   | -1.2221                                | 0.97138                                       |
| 5.7139 | 55.66667    | 22.56667 | -0.50000 | -0.93546      | 0.67779  | -1.0147                                | 0.55212                                       |
| 7.6186 | 57.55556    | 22.32222 | -0.50000 | -0.67254      | 0.38588  | -0.71650                               | 0.29638                                       |
| 9.5232 | 59.44444    | 22.07778 | -0.50000 | -0.38425      | 0.18595  | -0.40493                               | 0.13510                                       |
| 11.428 | 61.33333    | 21.83333 | -0.50000 | -0.090654     | 0.038467 | -0.094841                              | 0.026515                                      |
| 13.332 | 63.22222    | 21.58889 | -0.50000 | 0.0           | 0.0      | 0.0                                    | 0.0                                           |
| 15.237 | 65.11111    | 21.34444 | -0.50000 | 0.0           | 0.0      | 0.0                                    | 0.0                                           |
| 17.142 | 67.00000    | 21.10000 | -0.50000 | 0.0           | 0.0      | 0.0                                    | 0.0                                           |

Structure: AH | Sub-structure:

| Dist.   | Coordinates |          |          | Displacements |         |                                        |                                               |
|---------|-------------|----------|----------|---------------|---------|----------------------------------------|-----------------------------------------------|
|         | x           | y        | z        | x             | y       | Horizontal displacement along the Line | Horizontal displacement perpendicular to Line |
| [m]     | [m]         | [m]      | [m]      | [mm]          | [mm]    | [mm]                                   | [mm]                                          |
| 0.0     | 59.00000    | 20.70000 | -0.50000 | -0.31010      | 0.20557 | 0.33090                                | -0.17007                                      |
| 0.90554 | 58.10000    | 20.80000 | -0.50000 | -0.42174      | 0.30576 | 0.45292                                | -0.25732                                      |
| 1.8111  | 57.20000    | 20.90000 | -0.50000 | -0.52410      | 0.42076 | 0.56736                                | -0.36031                                      |
| 2.7166  | 56.30000    | 21.00000 | -0.50000 | -0.61263      | 0.55334 | 0.66999                                | -0.48231                                      |
| 3.6222  | 55.40000    | 21.10000 | -0.50000 | -0.68014      | 0.70580 | 0.75392                                | -0.62638                                      |
| 4.5277  | 54.50000    | 21.20000 | -0.50000 | -0.71610      | 0.87885 | 0.80877                                | -0.79440                                      |
| 5.4332  | 53.60000    | 21.30000 | -0.50000 | -0.70639      | 1.0697  | 0.82020                                | -0.98513                                      |
| 6.3388  | 52.70000    | 21.40000 | -0.50000 | -0.63439      | 1.2688  | 0.77063                                | -1.1910                                       |

Structure: AI | Sub-structure: Sub #

| Dist. | Coordinates |          |          | Displacements |        |                                        |                                               |
|-------|-------------|----------|----------|---------------|--------|----------------------------------------|-----------------------------------------------|
|       | x           | y        | z        | x             | y      | Horizontal displacement along the Line | Horizontal displacement perpendicular to Line |
| [m]   | [m]         | [m]      | [m]      | [mm]          | [mm]   | [mm]                                   | [mm]                                          |
| 0.0   | 52.70000    | 21.40000 | -0.50000 | -0.63439      | 1.2688 | -1.1640                                | -0.81085                                      |



# GEA LIMITED (GEOTECHNICAL & ENV ASSOC)

Rear of 159-163 King's Cross Road, London WC1X 9BN  
Wall Installation only Issue 4

| Job No.   | Sheet No.           | Rev.    |
|-----------|---------------------|---------|
| J16180    |                     |         |
| Drg. Ref. |                     |         |
| Made by   | Date<br>07-Mar-2017 | Checked |

| Dist.   | Coordinates |          |          | Displacements |         |                                                                                         |
|---------|-------------|----------|----------|---------------|---------|-----------------------------------------------------------------------------------------|
|         | x           | y        | z        | x             | y       | Horizontal displacement along the line<br>Horizontal displacement perpendicular to line |
| 0.97015 | 52.56000    | 20.44000 | -0.50000 | -0.44983      | 1.1264  | -0.10497                                                                                |
| 1.9403  | 52.42000    | 19.48000 | -0.50000 | -0.31402      | 0.96371 | -0.90831                                                                                |
| 2.9105  | 52.28000    | 18.52000 | -0.50000 | -0.21426      | 0.79414 | -0.75491                                                                                |
| 3.8806  | 52.14000    | 17.56000 | -0.50000 | -0.14086      | 0.62420 | -0.59734                                                                                |
| 4.8508  | 52.00000    | 16.60000 | -0.50000 | -0.086733     | 0.45649 | -0.43919                                                                                |

Structure: AJ | Sub-structure: Sub #

| Dist.   | Coordinates |          |          | Displacements |         |                                                                                         |
|---------|-------------|----------|----------|---------------|---------|-----------------------------------------------------------------------------------------|
|         | x           | y        | z        | x             | y       | Horizontal displacement along the line<br>Horizontal displacement perpendicular to line |
|         | [m]         | [m]      | [m]      | [mm]          | [mm]    | [mm]                                                                                    |
| 0.0     | 52.00000    | 16.60000 | -0.50000 | -0.086733     | 0.45649 | 0.14207                                                                                 |
| 0.99641 | 51.01111    | 16.72222 | -0.50000 | -0.047174     | 0.51143 | 0.10955                                                                                 |
| 1.9928  | 50.02222    | 16.84444 | -0.50000 | 0.0043440     | 0.54487 | 0.062523                                                                                |
| 2.9892  | 49.03333    | 16.96667 | -0.50000 | 0.061313      | 0.55373 | 0.0070721                                                                               |
| 3.9857  | 48.04444    | 17.08889 | -0.50000 | 0.073968      | 0.55065 | -0.0058654                                                                              |
| 4.9821  | 47.05556    | 17.21111 | -0.50000 | 0.073698      | 0.54864 | -0.0058440                                                                              |
| 5.9785  | 46.06667    | 17.33333 | -0.50000 | 0.073429      | 0.54664 | -0.0058227                                                                              |
| 6.9749  | 45.07778    | 17.45556 | -0.50000 | 0.073160      | 0.54464 | -0.0058014                                                                              |
| 7.9713  | 44.08889    | 17.57778 | -0.50000 | 0.072891      | 0.54264 | -0.0057801                                                                              |
| 8.9677  | 43.10000    | 17.70000 | -0.50000 | 0.072623      | 0.54064 | -0.0057587                                                                              |

Structure: AK | Sub-structure: Sub #

| Dist.   | Coordinates |          |          | Displacements |         |                                                                                         |
|---------|-------------|----------|----------|---------------|---------|-----------------------------------------------------------------------------------------|
|         | x           | y        | z        | x             | y       | Horizontal displacement along the line<br>Horizontal displacement perpendicular to line |
|         | [m]         | [m]      | [m]      | [mm]          | [mm]    | [mm]                                                                                    |
| 0.0     | 43.10000    | 17.70000 | -0.50000 | 0.072623      | 0.54064 | 0.54547                                                                                 |
| 0.98995 | 43.24000    | 18.68000 | -0.50000 | 0.098663      | 0.73449 | 0.74106                                                                                 |
| 1.9799  | 43.38000    | 19.66000 | -0.50000 | 0.12653       | 0.94195 | 0.95038                                                                                 |
| 2.9698  | 43.52000    | 20.64000 | -0.50000 | 0.15688       | 1.1664  | 1.1769                                                                                  |
| 3.9598  | 43.66000    | 21.62000 | -0.50000 | 0.18958       | 1.4113  | 1.4239                                                                                  |
| 4.9497  | 43.80000    | 22.60000 | -0.50000 | 0.22566       | 1.6799  | 1.6950                                                                                  |

Structure: AL | Sub-structure: Sub #

| Dist.   | Coordinates |          |          | Displacements |        |                                                                                         |
|---------|-------------|----------|----------|---------------|--------|-----------------------------------------------------------------------------------------|
|         | x           | y        | z        | x             | y      | Horizontal displacement along the line<br>Horizontal displacement perpendicular to line |
|         | [m]         | [m]      | [m]      | [mm]          | [mm]   | [mm]                                                                                    |
| 0.0     | 43.80000    | 22.60000 | -0.50000 | 0.22566       | 1.6799 | -0.011113                                                                               |
| 0.94763 | 42.86000    | 22.72000 | -0.50000 | 0.22542       | 1.6782 | -0.011101                                                                               |
| 1.8953  | 41.92000    | 22.84000 | -0.50000 | 0.22519       | 1.6764 | -0.011090                                                                               |
| 2.8429  | 40.98000    | 22.96000 | -0.50000 | 0.22495       | 1.6746 | -0.011078                                                                               |
| 3.7905  | 40.04000    | 23.08000 | -0.50000 | 0.22471       | 1.6729 | -0.011066                                                                               |
| 4.7381  | 39.10000    | 23.20000 | -0.50000 | 0.22448       | 1.6711 | -0.011055                                                                               |

Structure: AM | Sub-structure: Sub #

| Dist.   | Coordinates |          |          | Displacements |         |                                                                                         |
|---------|-------------|----------|----------|---------------|---------|-----------------------------------------------------------------------------------------|
|         | x           | y        | z        | x             | y       | Horizontal displacement along the line<br>Horizontal displacement perpendicular to line |
|         | [m]         | [m]      | [m]      | [mm]          | [mm]    | [mm]                                                                                    |
| 0.0     | 39.10000    | 23.20000 | -0.50000 | 0.22448       | 1.6711  | -1.6831                                                                                 |
| 0.90247 | 39.03333    | 22.30000 | -0.50000 | 0.19160       | 1.4263  | -1.4366                                                                                 |
| 1.8049  | 38.96667    | 21.40000 | -0.50000 | 0.16138       | 1.2014  | -1.2101                                                                                 |
| 2.7074  | 38.90000    | 20.50000 | -0.50000 | 0.13350       | 0.99382 | -1.0010                                                                                 |

Structure: AN | Sub-structure: Sub #

| Dist.   | Coordinates |          |          | Displacements |         |                                                                                         |
|---------|-------------|----------|----------|---------------|---------|-----------------------------------------------------------------------------------------|
|         | x           | y        | z        | x             | y       | Horizontal displacement along the line<br>Horizontal displacement perpendicular to line |
|         | [m]         | [m]      | [m]      | [mm]          | [mm]    | [mm]                                                                                    |
| 0.0     | 38.90000    | 20.50000 | -0.50000 | 0.13350       | 0.99382 | 0.016888                                                                                |
| 0.83442 | 38.07500    | 20.62500 | -0.50000 | 0.13392       | 0.99694 | 0.016941                                                                                |
| 1.6688  | 37.25000    | 20.75000 | -0.50000 | 0.13434       | 1.0001  | 0.016994                                                                                |
| 2.5032  | 36.42500    | 20.87500 | -0.50000 | 0.13476       | 1.0032  | 0.017047                                                                                |
| 3.3377  | 35.60000    | 21.00000 | -0.50000 | 0.14927       | 1.0042  | 0.0028459                                                                               |

Structure: AO | Sub-structure: Sub #

| Dist.   | Coordinates |          |          | Displacements |        |                                                                                         |
|---------|-------------|----------|----------|---------------|--------|-----------------------------------------------------------------------------------------|
|         | x           | y        | z        | x             | y      | Horizontal displacement along the line<br>Horizontal displacement perpendicular to line |
|         | [m]         | [m]      | [m]      | [mm]          | [mm]   | [mm]                                                                                    |
| 0.0     | 35.60000    | 21.00000 | -0.50000 | 0.14927       | 1.0042 | 1.0148                                                                                  |
| 0.83931 | 35.70000    | 21.83333 | -0.50000 | 0.18226       | 1.1969 | 1.2100                                                                                  |
| 1.6786  | 35.80000    | 22.66667 | -0.50000 | 0.22040       | 1.4040 | 1.4203                                                                                  |
| 2.5179  | 35.90000    | 23.50000 | -0.50000 | 0.26570       | 1.6274 | 1.6475                                                                                  |

Structure: AP | Sub-structure: Sub #

| Dist.   | Coordinates |          |          | Displacements |         |                                                                                         |
|---------|-------------|----------|----------|---------------|---------|-----------------------------------------------------------------------------------------|
|         | x           | y        | z        | x             | y       | Horizontal displacement along the line<br>Horizontal displacement perpendicular to line |
|         | [m]         | [m]      | [m]      | [mm]          | [mm]    | [mm]                                                                                    |
| 0.0     | 35.90000    | 23.50000 | -0.50000 | 0.26570       | 1.6274  | -0.0067090                                                                              |
| 0.89107 | 35.02000    | 23.64000 | -0.50000 | 0.54104       | 1.5329  | -0.29347                                                                                |
| 1.7821  | 34.14000    | 23.78000 | -0.50000 | 0.75645       | 1.3652  | -0.53257                                                                                |
| 2.6732  | 33.26000    | 23.92000 | -0.50000 | 0.89039       | 1.1596  | -0.69715                                                                                |
| 3.5643  | 32.38000    | 24.06000 | -0.50000 | 0.94460       | 0.94990 | -0.78377                                                                                |
| 4.4553  | 31.50000    | 24.20000 | -0.50000 | 0.93395       | 0.75434 | -0.80383                                                                                |

Structure: AQ | Sub-structure: Sub #

| Dist.   | Coordinates |          |          | Displacements |         |                                                                                         |
|---------|-------------|----------|----------|---------------|---------|-----------------------------------------------------------------------------------------|
|         | x           | y        | z        | x             | y       | Horizontal displacement along the line<br>Horizontal displacement perpendicular to line |
|         | [m]         | [m]      | [m]      | [mm]          | [mm]    | [mm]                                                                                    |
| 0.0     | 31.50000    | 24.20000 | -0.50000 | 0.93395       | 0.75434 | -0.87884                                                                                |
| 0.98995 | 31.36000    | 23.22000 | -0.50000 | 0.73542       | 0.71338 | -0.81022                                                                                |



# GEA LIMITED (GEOTECHNICAL & ENV ASSOC)

Rear of 159-163 King's Cross Road, London WC1X 9BN  
Wall Installation only Issue 4

| Job No.   | Sheet No.           | Rev.    |
|-----------|---------------------|---------|
| J16180    |                     |         |
| Drg. Ref. |                     |         |
| Made by   | Date<br>07-Mar-2017 | Checked |

| Dist.  | Coordinates |          |          | Displacements |         |                                                                            |
|--------|-------------|----------|----------|---------------|---------|----------------------------------------------------------------------------|
|        | x           | y        | z        | x             | y       | Horizontal displacement along the<br>Horizontal displacement perpendicular |
| 1.9799 | 31.22000    | 22.24000 | -0.50000 | 0.56410       | 0.63410 | -0.70750 0.46876                                                           |
| 2.9698 | 31.08000    | 21.26000 | -0.50000 | 0.41797       | 0.53102 | -0.58480 0.33868                                                           |
| 3.9598 | 30.94000    | 20.28000 | -0.50000 | 0.29322       | 0.41337 | -0.45068 0.23182                                                           |
| 4.9497 | 30.80000    | 19.30000 | -0.50000 | 0.18575       | 0.28650 | -0.30989 0.14337                                                           |

Structure: AR | Sub-structure: Sub #

| Dist.   | Coordinates |          |          | Displacements |          |                                                                            |
|---------|-------------|----------|----------|---------------|----------|----------------------------------------------------------------------------|
|         | x           | y        | z        | x             | y        | Horizontal displacement along the<br>Horizontal displacement perpendicular |
| [m]     | [m]         | [m]      | [m]      | [mm]          | [mm]     | Line to Line<br>[mm] [mm]                                                  |
| 0.0     | 35.60000    | 12.40000 | -0.50000 | 0.0           | 0.0      | 0.0 0.0                                                                    |
| 0.94130 | 35.72222    | 13.33333 | -0.50000 | 0.0           | 0.0      | 0.0 0.0                                                                    |
| 1.8026  | 35.84444    | 14.26667 | -0.50000 | 0.0           | 0.0      | 0.0 0.0                                                                    |
| 2.8239  | 35.96667    | 15.20000 | -0.50000 | 0.0           | 0.0      | 0.0 0.0                                                                    |
| 3.7652  | 36.08889    | 16.13333 | -0.50000 | 0.012264      | 0.091299 | 0.092119 -305.62E-6                                                        |
| 4.7065  | 36.21111    | 17.06667 | -0.50000 | 0.034558      | 0.25726  | 0.25957 -861.16E-6                                                         |
| 5.6478  | 36.33333    | 18.00000 | -0.50000 | 0.057449      | 0.42768  | 0.43152 -0.0014316                                                         |
| 6.5891  | 36.45556    | 18.93333 | -0.50000 | 0.081331      | 0.60546  | 0.61090 -0.0020267                                                         |
| 7.5394  | 36.57778    | 19.86667 | -0.50000 | 0.10659       | 0.79353  | 0.80065 -0.0026563                                                         |
| 8.4717  | 36.70000    | 20.80000 | -0.50000 | 0.13363       | 0.99480  | 1.0037 -0.0033300                                                          |

Structure: AS | Sub-structure: Sub #

| Dist.   | Coordinates |          |          | Displacements |          |                                                                            |
|---------|-------------|----------|----------|---------------|----------|----------------------------------------------------------------------------|
|         | x           | y        | z        | x             | y        | Horizontal displacement along the<br>Horizontal displacement perpendicular |
| [m]     | [m]         | [m]      | [m]      | [mm]          | [mm]     | Line to Line<br>[mm] [mm]                                                  |
| 0.0     | 44.70000    | 9.30000  | -0.50000 | 0.0           | 0.0      | 0.0 0.0                                                                    |
| 0.90683 | 44.81111    | 10.20000 | -0.50000 | 0.0           | 0.0      | 0.0 0.0                                                                    |
| 1.8137  | 44.92222    | 11.10000 | -0.50000 | 0.0           | 0.0      | 0.0 0.0                                                                    |
| 2.7205  | 45.03333    | 12.00000 | -0.50000 | 0.0           | 0.0      | 0.0 0.0                                                                    |
| 3.6273  | 45.14444    | 12.90000 | -0.50000 | 0.0           | 0.0      | 0.0 0.0                                                                    |
| 4.5342  | 45.25556    | 13.80000 | -0.50000 | 0.0           | 0.0      | 0.0 0.0                                                                    |
| 5.4410  | 45.36667    | 14.70000 | -0.50000 | 0.0079098     | 0.058884 | 0.059410 -635.34E-6                                                        |
| 6.3478  | 45.47778    | 15.60000 | -0.50000 | 0.029310      | 0.21820  | 0.22014 -0.0023543                                                         |
| 7.2547  | 45.58889    | 16.50000 | -0.50000 | 0.051180      | 0.36101  | 0.38441 -0.0041110                                                         |
| 8.1615  | 45.70000    | 17.40000 | -0.50000 | 0.073871      | 0.54993  | 0.55484 -0.0059335                                                         |

Structure: AT | Sub-structure: Sub #

| Dist.  | Coordinates |          |          | Displacements |          |                                                                            |
|--------|-------------|----------|----------|---------------|----------|----------------------------------------------------------------------------|
|        | x           | y        | z        | x             | y        | Horizontal displacement along the<br>Horizontal displacement perpendicular |
| [m]    | [m]         | [m]      | [m]      | [mm]          | [mm]     | Line to Line<br>[mm] [mm]                                                  |
| 0.0    | 54.50000    | 10.00000 | -0.50000 | 0.0           | 0.0      | 0.0 0.0                                                                    |
| 1.8461 | 54.71667    | 11.83333 | -0.50000 | 0.0           | 0.0      | 0.0 0.0                                                                    |
| 3.6922 | 54.93333    | 13.66667 | -0.50000 | 0.0           | 0.0      | 0.0 0.0                                                                    |
| 5.5383 | 55.15000    | 15.50000 | -0.50000 | -0.041370     | 0.090931 | 0.085447 0.051756                                                          |
| 7.3844 | 55.36667    | 17.33333 | -0.50000 | -0.18559      | 0.32654  | 0.30250 0.22263                                                            |
| 9.2305 | 55.58333    | 19.16667 | -0.50000 | -0.38342      | 0.51978  | 0.47118 0.44178                                                            |
| 11.077 | 55.80000    | 21.00000 | -0.50000 | -0.64416      | 0.63285  | 0.55288 0.71398                                                            |

Structure: AU | Sub-structure:

| Dist.   | Coordinates |          |          | Displacements |            |                                                                            |
|---------|-------------|----------|----------|---------------|------------|----------------------------------------------------------------------------|
|         | x           | y        | z        | x             | y          | Horizontal displacement along the<br>Horizontal displacement perpendicular |
| [m]     | [m]         | [m]      | [m]      | [mm]          | [mm]       | Line to Line<br>[mm] [mm]                                                  |
| 0.0     | 33.10000    | 38.60000 | -2.00000 | 3.0357        | -0.18792   | -3.0415 0.016867                                                           |
| 0.88891 | 32.21250    | 38.65000 | -2.00000 | 2.4442        | -0.15386   | -2.4489 0.016131                                                           |
| 1.7778  | 31.32500    | 38.70000 | -2.00000 | 1.8526        | -0.11979   | -1.8564 0.015394                                                           |
| 2.6667  | 30.43750    | 38.75000 | -2.00000 | 1.3047        | -0.087815  | -1.3075 0.014289                                                           |
| 3.5556  | 29.55000    | 38.80000 | -2.00000 | 1.0091        | -0.067918  | -1.0113 0.013052                                                           |
| 4.4445  | 28.66250    | 38.85000 | -2.00000 | 0.71344       | -0.048020  | -0.71502 0.0078139                                                         |
| 5.3334  | 27.77500    | 38.90000 | -2.00000 | 0.41783       | -0.028123  | -0.41875 0.0045762                                                         |
| 6.2224  | 26.88750    | 38.95000 | -2.00000 | 0.12221       | -0.0082258 | -0.12248 0.0013385                                                         |
| 7.1113  | 26.00000    | 39.00000 | -2.00000 | 0.0           | 0.0        | 0.0 0.0                                                                    |

Structure: AV | Sub-structure:

| Dist.   | Coordinates |          |          | Displacements |      |                                                                            |
|---------|-------------|----------|----------|---------------|------|----------------------------------------------------------------------------|
|         | x           | y        | z        | x             | y    | Horizontal displacement along the<br>Horizontal displacement perpendicular |
| [m]     | [m]         | [m]      | [m]      | [mm]          | [mm] | Line to Line<br>[mm] [mm]                                                  |
| 0.0     | 26.00000    | 39.00000 | -2.00000 | 0.0           | 0.0  | 0.0 0.0                                                                    |
| 0.92195 | 25.94000    | 38.00000 | -2.00000 | 0.0           | 0.0  | 0.0 0.0                                                                    |
| 1.8439  | 25.88000    | 37.16000 | -2.00000 | 0.0           | 0.0  | 0.0 0.0                                                                    |
| 2.7659  | 25.82000    | 36.24000 | -2.00000 | 0.0           | 0.0  | 0.0 0.0                                                                    |
| 3.6878  | 25.76000    | 35.32000 | -2.00000 | 0.0           | 0.0  | 0.0 0.0                                                                    |
| 4.6098  | 25.70000    | 34.40000 | -2.00000 | 0.0           | 0.0  | 0.0 0.0                                                                    |
| 5.5317  | 25.64000    | 33.48000 | -2.00000 | 0.0           | 0.0  | 0.0 0.0                                                                    |
| 6.4537  | 25.58000    | 32.56000 | -2.00000 | 0.0           | 0.0  | 0.0 0.0                                                                    |
| 7.3756  | 25.52000    | 31.64000 | -2.00000 | 0.0           | 0.0  | 0.0 0.0                                                                    |
| 8.2976  | 25.46000    | 30.72000 | -2.00000 | 0.0           | 0.0  | 0.0 0.0                                                                    |
| 9.2195  | 25.40000    | 29.80000 | -2.00000 | 0.0           | 0.0  | 0.0 0.0                                                                    |

Structure: AW | Sub-structure:

| Dist.  | Coordinates |          |          | Displacements |          |                                                                            |
|--------|-------------|----------|----------|---------------|----------|----------------------------------------------------------------------------|
|        | x           | y        | z        | x             | y        | Horizontal displacement along the<br>Horizontal displacement perpendicular |
| [m]    | [m]         | [m]      | [m]      | [mm]          | [mm]     | Line to Line<br>[mm] [mm]                                                  |
| 0.0    | 25.40000    | 29.80000 | -2.00000 | 0.0           | 0.0      | 0.0 0.0                                                                    |
| 1.0869 | 27.28333    | 29.68333 | -2.00000 | 0.14632       | 0.076087 | 0.14134 0.084908                                                           |
| 3.7739 | 29.16667    | 29.56667 | -2.00000 | 0.51492       | 0.42748  | 0.48751 0.45850                                                            |
| 5.6608 | 31.05000    | 29.45000 | -2.00000 | 0.80491       | 0.90358  | 0.74750 0.95162                                                            |
| 7.5478 | 32.93333    | 29.33333 | -2.00000 | 1.0769        | 1.1083   | 1.0063 1.1727                                                              |
| 9.4347 | 34.81667    | 29.21667 | -2.00000 | 1.7097        | 1.1153   | 1.6374 1.2189                                                              |
| 11.322 | 36.70000    | 29.10000 | -2.00000 | 2.2329        | 1.0620   | 2.1630 1.1981                                                              |

## Specific Building Damage Results - Vertical Displacements

Structure: A | Sub-structure:

| Dist. | Coordinates |     |     | Displacements |      |                                                                            |
|-------|-------------|-----|-----|---------------|------|----------------------------------------------------------------------------|
|       | x           | y   | z   | x             | y    | Horizontal displacement along the<br>Horizontal displacement perpendicular |
| [m]   | [m]         | [m] | [m] | [mm]          | [mm] | Line to Line<br>[mm] [mm]                                                  |



# GEA LIMITED (GEOTECHNICAL & ENV ASSOC)

Rear of 159-163 King's Cross Road, London WC1X 9BN  
Wall Installation only Issue 4

| Job No.   | Sheet No.           | Rev.    |
|-----------|---------------------|---------|
| J16180    |                     |         |
| Drg. Ref. |                     |         |
| Made by   | Date<br>07-Mar-2017 | Checked |

Vertical Offset 1  
0.0 22.50000 48.10000 -0.50000 0.0  
0.85000 23.35000 48.10000 -0.50000 0.0  
1.7000 24.20000 48.10000 -0.50000 0.0  
2.5500 25.05000 48.10000 -0.50000 0.0  
3.4000 25.90000 48.10000 -0.50000 0.0

Structure: B | Sub-structure:

| Dist. | Coordinates |     |     | Displacements |
|-------|-------------|-----|-----|---------------|
|       | x           | y   | z   |               |
| [m]   | [m]         | [m] | [m] | [mm]          |

Vertical Offset 1  
0.0 25.90000 48.10000 -0.50000 0.0  
0.77500 25.90000 47.32500 -0.50000 0.0  
1.5500 25.90000 46.55000 -0.50000 0.0  
2.3250 25.90000 45.77500 -0.50000 0.0  
3.1000 25.90000 45.00000 -0.50000 0.0

Structure: C | Sub-structure:

| Dist. | Coordinates |     |     | Displacements |
|-------|-------------|-----|-----|---------------|
|       | x           | y   | z   |               |
| [m]   | [m]         | [m] | [m] | [mm]          |

Vertical Offset 1  
0.0 25.90000 45.00000 -0.50000 0.0  
0.92022 26.82000 44.90000 -0.50000 0.0  
1.8404 27.74000 44.90000 -0.50000 0.029441  
2.7607 28.66000 44.94000 -0.50000 0.081065  
3.6809 29.58000 44.92000 -0.50000 0.18662  
4.6011 30.50000 44.90000 -0.50000 0.36915

Structure: D | Sub-structure:

| Dist. | Coordinates |     |     | Displacements |
|-------|-------------|-----|-----|---------------|
|       | x           | y   | z   |               |
| [m]   | [m]         | [m] | [m] | [mm]          |

Vertical Offset 1  
0.0 30.50000 44.90000 -0.50000 0.36915  
0.90015 30.48333 45.80000 -0.50000 0.22561  
1.8003 30.46667 46.70000 -0.50000 0.11723  
2.7005 30.45000 47.60000 -0.50000 0.053505  
3.6006 30.43333 48.50000 -0.50000 0.014768  
4.5008 30.41667 49.40000 -0.50000 0.0  
5.4009 30.40000 50.30000 -0.50000 0.0

Structure: E | Sub-structure:

| Dist. | Coordinates |     |     | Displacements |
|-------|-------------|-----|-----|---------------|
|       | x           | y   | z   |               |
| [m]   | [m]         | [m] | [m] | [mm]          |

Vertical Offset 1  
0.0 30.40000 50.30000 -0.50000 0.0  
0.83333 31.23333 50.30000 -0.50000 0.0  
1.6667 32.06667 50.30000 -0.50000 0.023319  
2.5000 32.90000 50.30000 -0.50000 0.061567

Structure: F | Sub-structure:

| Dist. | Coordinates |     |     | Displacements |
|-------|-------------|-----|-----|---------------|
|       | x           | y   | z   |               |
| [m]   | [m]         | [m] | [m] | [mm]          |

Vertical Offset 1  
0.0 32.90000 50.30000 -0.50000 0.061567  
0.93005 32.91000 51.23000 -0.50000 0.033718  
1.8601 32.92000 52.16000 -0.50000 0.0043513  
2.7902 32.93000 53.09000 -0.50000 0.0  
3.7202 32.94000 54.02000 -0.50000 0.0  
4.6503 32.95000 54.95000 -0.50000 0.0  
5.5803 32.96000 55.88000 -0.50000 0.0  
6.5104 32.97000 56.81000 -0.50000 0.0  
7.4404 32.98000 57.74000 -0.50000 0.0  
8.3705 32.99000 58.67000 -0.50000 0.0  
9.3005 33.00000 59.60000 -0.50000 0.0

Structure: G | Sub-structure:

| Dist. | Coordinates |     |     | Displacements |
|-------|-------------|-----|-----|---------------|
|       | x           | y   | z   |               |
| [m]   | [m]         | [m] | [m] | [mm]          |

Vertical Offset 1  
0.0 33.00000 59.60000 -0.50000 0.0  
1.0000 32.00000 59.60000 -0.50000 0.0  
2.0000 31.00000 59.60000 -0.50000 0.0  
3.0000 30.00000 59.60000 -0.50000 0.0  
4.0000 29.00000 59.60000 -0.50000 0.0  
5.0000 28.00000 59.60000 -0.50000 0.0

Structure: H | Sub-structure:

| Dist. | Coordinates |     |     | Displacements |
|-------|-------------|-----|-----|---------------|
|       | x           | y   | z   |               |
| [m]   | [m]         | [m] | [m] | [mm]          |

Vertical Offset 1  
0.0 28.00000 59.60000 -0.50000 0.0  
0.90052 28.03333 56.70000 -0.50000 0.0  
1.8012 28.06667 57.80000 -0.50000 0.0  
2.7019 28.10000 56.90000 -0.50000 0.0

Structure: I | Sub-structure:

| Dist. | Coordinates |     |     | Displacements |
|-------|-------------|-----|-----|---------------|
|       | x           | y   | z   |               |
| [m]   | [m]         | [m] | [m] | [mm]          |

Vertical Offset 1  
0.0 28.10000 56.90000 -0.50000 0.0  
0.90009 27.20000 56.91250 -0.50000 0.0  
1.8002 26.30000 56.92500 -0.50000 0.0  
2.7003 25.40000 56.93750 -0.50000 0.0  
3.6003 24.50000 56.95000 -0.50000 0.0  
4.5004 23.60000 56.96250 -0.50000 0.0  
5.4005 22.70000 56.97500 -0.50000 0.0



# GEA LIMITED (GEOTECHNICAL & ENV ASSOC)

Rear of 159-163 King's Cross Road, London WC1X 9BN  
Wall Installation only Issue 4

| Job No.   | Sheet No.           | Rev.    |
|-----------|---------------------|---------|
| J16180    |                     |         |
| Drg. Ref. |                     |         |
| Made by   | Date<br>07-Mar-2017 | Checked |

| Dist.   | Coordinates |          | Displacements |      |
|---------|-------------|----------|---------------|------|
|         | x           | y        | z             | z    |
|         | [m]         | [m]      | [m]           | [mm] |
| 6.39006 | 21.80000    | 56.98750 | -0.50000      | 0.0  |
| 7.2007  | 20.90000    | 57.00000 | -0.50000      | 0.0  |

Structure: J | Sub-structure:

| Dist.             | Coordinates |          | Displacements |      |
|-------------------|-------------|----------|---------------|------|
|                   | x           | y        | z             | z    |
|                   | [m]         | [m]      | [m]           | [mm] |
| Vertical Offset 1 |             |          |               |      |
| 0.0               | 33.00000    | 59.50000 | -0.50000      | 0.0  |
| 1.9500            | 34.95000    | 59.50000 | -0.50000      | 0.0  |
| 3.9000            | 36.90000    | 59.50000 | -0.50000      | 0.0  |
| 5.8500            | 38.85000    | 59.50000 | -0.50000      | 0.0  |
| 7.8000            | 40.80000    | 59.50000 | -0.50000      | 0.0  |
| 9.7500            | 42.75000    | 59.50000 | -0.50000      | 0.0  |
| 11.700            | 44.70000    | 59.50000 | -0.50000      | 0.0  |
| 13.650            | 46.65000    | 59.50000 | -0.50000      | 0.0  |
| 15.600            | 48.60000    | 59.50000 | -0.50000      | 0.0  |
| 17.550            | 50.55000    | 59.50000 | -0.50000      | 0.0  |
| 19.500            | 52.50000    | 59.50000 | -0.50000      | 0.0  |

Structure: K | Sub-structure:

| Dist.             | Coordinates |          | Displacements |           |
|-------------------|-------------|----------|---------------|-----------|
|                   | x           | y        | z             | z         |
|                   | [m]         | [m]      | [m]           | [mm]      |
| Vertical Offset 1 |             |          |               |           |
| 0.0               | 33.00000    | 52.20000 | -0.50000      | 0.0059792 |
| 0.98889           | 33.98889    | 52.20000 | -0.50000      | 0.037639  |
| 1.9778            | 34.97778    | 52.20000 | -0.50000      | 0.070379  |
| 2.9667            | 35.96667    | 52.20000 | -0.50000      | 0.10803   |
| 3.9556            | 36.95556    | 52.20000 | -0.50000      | 0.13685   |
| 4.9444            | 37.94444    | 52.20000 | -0.50000      | 0.14301   |
| 5.9333            | 38.93333    | 52.20000 | -0.50000      | 0.14301   |
| 6.9222            | 39.92222    | 52.20000 | -0.50000      | 0.14301   |
| 7.9111            | 40.91111    | 52.20000 | -0.50000      | 0.14301   |
| 8.9000            | 41.90000    | 52.20000 | -0.50000      | 0.14301   |

Structure: L | Sub-structure:

| Dist.             | Coordinates |          | Displacements |          |
|-------------------|-------------|----------|---------------|----------|
|                   | x           | y        | z             | z        |
|                   | [m]         | [m]      | [m]           | [mm]     |
| Vertical Offset 1 |             |          |               |          |
| 0.0               | 37.70000    | 59.40000 | -0.50000      | 0.0      |
| 0.90000           | 37.70000    | 58.50000 | -0.50000      | 0.0      |
| 1.8000            | 37.70000    | 57.60000 | -0.50000      | 0.0      |
| 2.7000            | 37.70000    | 56.70000 | -0.50000      | 0.0      |
| 3.6000            | 37.70000    | 55.80000 | -0.50000      | 0.0      |
| 4.5000            | 37.70000    | 54.90000 | -0.50000      | 0.0      |
| 5.4000            | 37.70000    | 54.00000 | -0.50000      | 0.011612 |
| 6.3000            | 37.70000    | 53.10000 | -0.50000      | 0.056472 |
| 7.2000            | 37.70000    | 52.20000 | -0.50000      | 0.14301  |

Structure: M | Sub-structure:

| Dist.             | Coordinates |          | Displacements |          |
|-------------------|-------------|----------|---------------|----------|
|                   | x           | y        | z             | z        |
|                   | [m]         | [m]      | [m]           | [mm]     |
| Vertical Offset 1 |             |          |               |          |
| 0.0               | 42.00000    | 59.50000 | -1.50000      | 0.0      |
| 0.91259           | 41.98750    | 58.58750 | -1.50000      | 0.0      |
| 1.8252            | 41.97500    | 57.67500 | -1.50000      | 0.0      |
| 2.7378            | 41.96250    | 56.76250 | -1.50000      | 0.0      |
| 3.6503            | 41.95000    | 55.85000 | -1.50000      | 0.0      |
| 4.5629            | 41.93750    | 54.93750 | -1.50000      | 0.0      |
| 5.4755            | 41.92500    | 54.02500 | -1.50000      | 0.010316 |
| 6.3881            | 41.91250    | 53.11250 | -1.50000      | 0.055705 |
| 7.3007            | 41.90000    | 52.20000 | -1.50000      | 0.14301  |

Structure: N | Sub-structure:

| Dist.             | Coordinates |          | Displacements |           |
|-------------------|-------------|----------|---------------|-----------|
|                   | x           | y        | z             | z         |
|                   | [m]         | [m]      | [m]           | [mm]      |
| Vertical Offset 1 |             |          |               |           |
| 0.0               | 45.50000    | 53.30000 | -4.00000      | 0.044906  |
| 0.87143           | 45.50000    | 54.17143 | -4.00000      | 0.0020068 |
| 1.7429            | 45.50000    | 55.04286 | -4.00000      | 0.0       |
| 2.6143            | 45.50000    | 55.91429 | -4.00000      | 0.0       |
| 3.4857            | 45.50000    | 56.78571 | -4.00000      | 0.0       |
| 4.3571            | 45.50000    | 57.65714 | -4.00000      | 0.0       |
| 5.2286            | 45.50000    | 58.52857 | -4.00000      | 0.0       |
| 6.1000            | 45.50000    | 59.40000 | -4.00000      | 0.0       |

Structure: O | Sub-structure:

| Dist.             | Coordinates |          | Displacements |         |
|-------------------|-------------|----------|---------------|---------|
|                   | x           | y        | z             | z       |
|                   | [m]         | [m]      | [m]           | [mm]    |
| Vertical Offset 1 |             |          |               |         |
| 0.0               | 37.70000    | 52.20000 | -0.68000      | 0.14301 |
| 0.92000           | 37.70000    | 51.28000 | -0.68000      | 0.32595 |
| 1.8400            | 37.70000    | 50.36000 | -0.68000      | 0.63226 |
| 2.7600            | 37.70000    | 49.44000 | -0.68000      | 1.0684  |
| 3.6800            | 37.70000    | 48.52000 | -0.68000      | 1.6496  |
| 4.6000            | 37.70000    | 47.60000 | -0.68000      | 2.3202  |

Structure: P | Sub-structure: Sub #

| Dist.             | Coordinates |          | Displacements |          |
|-------------------|-------------|----------|---------------|----------|
|                   | x           | y        | z             | z        |
|                   | [m]         | [m]      | [m]           | [mm]     |
| Vertical Offset 1 |             |          |               |          |
| 0.0               | 45.50000    | 53.30000 | -1.85000      | 0.044906 |
| 0.95000           | 45.50000    | 52.35000 | -1.85000      | 0.12279  |
| 1.9000            | 45.50000    | 51.40000 | -1.85000      | 0.29415  |
| 2.8500            | 45.50000    | 50.45000 | -1.85000      | 0.59384  |
| 3.8000            | 45.50000    | 49.50000 | -1.85000      | 1.0279   |
| 4.7500            | 45.50000    | 48.55000 | -1.85000      | 1.5714   |
| 5.7000            | 45.50000    | 47.60000 | -1.85000      | 2.0721   |

Structure: Q | Sub-structure:

|           |             |         |
|-----------|-------------|---------|
| Job No.   | Sheet No.   | Rev.    |
| J16180    |             |         |
| Drg. Ref. |             |         |
| Made by   | Date        | Checked |
|           | 07-Mar-2017 |         |

| Dist. | Coordinates |          |          | Displacements |
|-------|-------------|----------|----------|---------------|
| [m]   | x<br>[m]    | y<br>[m] | z<br>[m] | z<br>[mm]     |

Vertical Offset 1

|         |          |          |          |         |
|---------|----------|----------|----------|---------|
| 0.0     | 41.90000 | 52.20000 | -0.65000 | 0.14301 |
| 0.92000 | 41.90000 | 51.28000 | -0.65000 | 0.32595 |
| 1.8400  | 41.90000 | 50.36000 | -0.65000 | 0.63226 |
| 2.7600  | 41.90000 | 49.44000 | -0.65000 | 1.0652  |
| 3.6800  | 41.90000 | 48.52000 | -0.65000 | 1.6031  |
| 4.6000  | 41.90000 | 47.60000 | -0.65000 | 2.2004  |

Structure: R | Sub-structure:

| Dist. | Coordinates |          |          | Displacements |
|-------|-------------|----------|----------|---------------|
| [m]   | x<br>[m]    | y<br>[m] | z<br>[m] | z<br>[mm]     |

Vertical Offset 1

|         |          |          |          |          |
|---------|----------|----------|----------|----------|
| 0.0     | 33.00000 | 50.30000 | -0.50000 | 0.067532 |
| 0.92035 | 32.95000 | 49.37500 | -0.50000 | 0.10476  |
| 1.8527  | 32.90000 | 48.45000 | -0.50000 | 0.17225  |
| 2.7791  | 32.85000 | 47.52500 | -0.50000 | 0.25957  |
| 3.7054  | 32.80000 | 46.60000 | -0.50000 | 0.43204  |
| 4.6318  | 32.75000 | 45.67500 | -0.50000 | 0.71954  |
| 5.5551  | 32.70000 | 44.75000 | -0.50000 | 1.1151   |
| 6.4845  | 32.65000 | 43.82500 | -0.50000 | 1.5573   |
| 7.4108  | 32.60000 | 42.90000 | -0.50000 | 1.8010   |

Structure: S | Sub-structure:

| Dist. | Coordinates |          |          | Displacements |
|-------|-------------|----------|----------|---------------|
| [m]   | x<br>[m]    | y<br>[m] | z<br>[m] | z<br>[mm]     |

Vertical Offset 1

|        |          |          |          |     |
|--------|----------|----------|----------|-----|
| 0.0    | 54.40000 | 58.50000 | -0.50000 | 0.0 |
| 1.9375 | 55.56250 | 56.95000 | -0.50000 | 0.0 |
| 3.8750 | 56.72500 | 55.40000 | -0.50000 | 0.0 |
| 5.8125 | 57.88750 | 53.85000 | -0.50000 | 0.0 |
| 7.7500 | 59.05000 | 52.30000 | -0.50000 | 0.0 |
| 9.6875 | 60.21250 | 50.75000 | -0.50000 | 0.0 |
| 11.625 | 61.37500 | 49.20000 | -0.50000 | 0.0 |
| 13.562 | 62.53750 | 47.65000 | -0.50000 | 0.0 |
| 15.500 | 63.70000 | 46.10000 | -0.50000 | 0.0 |
| 17.438 | 64.86250 | 44.55000 | -0.50000 | 0.0 |
| 19.375 | 66.02500 | 43.00000 | -0.50000 | 0.0 |
| 21.313 | 67.18750 | 41.45000 | -0.50000 | 0.0 |
| 23.250 | 68.35000 | 39.90000 | -0.50000 | 0.0 |
| 25.188 | 69.51250 | 38.35000 | -0.50000 | 0.0 |
| 27.125 | 70.67500 | 36.80000 | -0.50000 | 0.0 |
| 29.063 | 71.83750 | 35.25000 | -0.50000 | 0.0 |
| 31.000 | 73.00000 | 33.70000 | -0.50000 | 0.0 |

Structure: T | Sub-structure:

| Dist. | Coordinates |          |          | Displacements |
|-------|-------------|----------|----------|---------------|
| [m]   | x<br>[m]    | y<br>[m] | z<br>[m] | z<br>[mm]     |

Vertical Offset 1

|        |          |          |          |           |
|--------|----------|----------|----------|-----------|
| 0.0    | 45.50000 | 53.30000 | -0.50000 | 0.044906  |
| 1.9859 | 46.73158 | 51.74211 | -0.50000 | 0.17621   |
| 3.9718 | 47.96316 | 50.18421 | -0.50000 | 0.31790   |
| 5.9577 | 49.19474 | 48.62632 | -0.50000 | 0.24328   |
| 7.9436 | 50.42632 | 47.06842 | -0.50000 | 0.11307   |
| 9.9295 | 51.65789 | 45.51053 | -0.50000 | 0.048035  |
| 11.915 | 52.88947 | 43.95263 | -0.50000 | 0.0087825 |
| 13.901 | 54.12105 | 42.39474 | -0.50000 | 0.0       |
| 15.887 | 55.35263 | 40.83684 | -0.50000 | 0.0       |
| 17.873 | 56.58421 | 39.27895 | -0.50000 | 0.0       |
| 19.859 | 57.81579 | 37.72105 | -0.50000 | 1.4532    |
| 21.845 | 59.04737 | 36.16316 | -0.50000 | 1.2802    |
| 23.831 | 60.27895 | 34.60526 | -0.50000 | 1.0975    |
| 25.817 | 61.51053 | 33.04737 | -0.50000 | 0.91474   |
| 27.803 | 62.74211 | 31.48947 | -0.50000 | 0.73200   |
| 29.789 | 63.97368 | 29.93158 | -0.50000 | 0.54925   |
| 31.774 | 65.20526 | 28.37368 | -0.50000 | 0.35819   |
| 33.760 | 66.43684 | 26.81579 | -0.50000 | 0.13235   |
| 35.746 | 67.66842 | 25.25789 | -0.50000 | 0.0       |
| 37.732 | 68.90000 | 23.70000 | -0.50000 | 0.0       |

Structure: U | Sub-structure:

| Dist. | Coordinates |          |          | Displacements |
|-------|-------------|----------|----------|---------------|
| [m]   | x<br>[m]    | y<br>[m] | z<br>[m] | z<br>[mm]     |

Vertical Offset 1

|         |          |          |          |     |
|---------|----------|----------|----------|-----|
| 0.0     | 63.00000 | 47.00000 | -0.50000 | 0.0 |
| 0.98600 | 62.21000 | 46.41000 | -0.50000 | 0.0 |
| 1.9720  | 61.42000 | 45.82000 | -0.50000 | 0.0 |
| 2.9580  | 60.63000 | 45.23000 | -0.50000 | 0.0 |
| 3.9440  | 59.84000 | 44.64000 | -0.50000 | 0.0 |
| 4.9300  | 59.05000 | 44.05000 | -0.50000 | 0.0 |
| 5.9160  | 58.26000 | 43.46000 | -0.50000 | 0.0 |
| 6.9020  | 57.47000 | 42.87000 | -0.50000 | 0.0 |
| 7.8880  | 56.68000 | 42.28000 | -0.50000 | 0.0 |
| 8.8740  | 55.89000 | 41.69000 | -0.50000 | 0.0 |
| 9.8600  | 55.10000 | 41.10000 | -0.50000 | 0.0 |

Structure: V | Sub-structure:

| Dist. | Coordinates |          |          | Displacements |
|-------|-------------|----------|----------|---------------|
| [m]   | x<br>[m]    | y<br>[m] | z<br>[m] | z<br>[mm]     |

Vertical Offset 1

|         |          |          |          |          |
|---------|----------|----------|----------|----------|
| 0.0     | 55.10000 | 41.10000 | -0.50000 | 0.0      |
| 0.91001 | 54.37500 | 40.55000 | -0.50000 | 0.0      |
| 1.8200  | 53.65000 | 40.00000 | -0.50000 | 0.020621 |
| 2.7300  | 52.92500 | 39.45000 | -0.50000 | 0.064512 |
| 3.6401  | 52.20000 | 38.90000 | -0.50000 | 0.15183  |

Structure: W | Sub-structure:

| Dist. | Coordinates |          |          | Displacements |
|-------|-------------|----------|----------|---------------|
| [m]   | x<br>[m]    | y<br>[m] | z<br>[m] | z<br>[mm]     |

Vertical Offset 1

|         |          |          |          |         |
|---------|----------|----------|----------|---------|
| 0.0     | 52.20000 | 38.90000 | -1.70000 | 0.15183 |
| 0.57009 | 52.55000 | 38.45000 | -1.70000 | 0.12129 |



# GEA LIMITED (GEOTECHNICAL & ENV ASSOC)

Rear of 159-163 King's Cross Road, London WC1X 9BN  
Wall Installation only Issue 4

| Job No.   | Sheet No.           | Rev.    |
|-----------|---------------------|---------|
| J16180    |                     |         |
| Drg. Ref. |                     |         |
| Made by   | Date<br>07-Mar-2017 | Checked |

| Dist.  | Coordinates |          |          | Displacements |
|--------|-------------|----------|----------|---------------|
| [m]    | x<br>[m]    | y<br>[m] | z<br>[m] | z<br>[mm]     |
| 1.1402 | 52.90000    | 38.00000 | -1.70000 | 0.096244      |

Structure: X | Sub-structure:

| Dist.             | Coordinates |          |          | Displacements |
|-------------------|-------------|----------|----------|---------------|
| [m]               | x<br>[m]    | y<br>[m] | z<br>[m] | z<br>[mm]     |
| Vertical Offset 1 |             |          |          |               |
| 0.0               | 60.40000    | 42.50000 | -0.50000 | 0.0           |
| 0.97201           | 65.62000    | 41.92000 | -0.50000 | 0.0           |
| 1.9440            | 64.84000    | 41.34000 | -0.50000 | 0.0           |
| 2.9160            | 64.06000    | 40.76000 | -0.50000 | 0.0           |
| 3.8880            | 63.28000    | 40.18000 | -0.50000 | 0.0           |
| 4.8600            | 62.50000    | 39.60000 | -0.50000 | 0.0           |
| 5.8320            | 61.72000    | 39.02000 | -0.50000 | 0.082433      |
| 6.8041            | 60.94000    | 38.44000 | -0.50000 | 0.81936       |
| 7.7761            | 60.16000    | 37.86000 | -0.50000 | 0.99709       |
| 8.7481            | 59.38000    | 37.28000 | -0.50000 | 1.1725        |
| 9.7201            | 58.60000    | 36.70000 | -0.50000 | 1.3477        |

Structure: Y | Sub-structure:

| Dist.             | Coordinates |          |          | Displacements |
|-------------------|-------------|----------|----------|---------------|
| [m]               | x<br>[m]    | y<br>[m] | z<br>[m] | z<br>[mm]     |
| Vertical Offset 1 |             |          |          |               |
| 0.0               | 58.60000    | 36.70000 | -1.40000 | 1.3477        |
| 0.91061           | 57.87500    | 36.15000 | -1.40000 | 1.5109        |
| 1.8200            | 57.15000    | 35.60000 | -1.40000 | 1.6742        |
| 2.7300            | 56.42500    | 35.05000 | -1.40000 | 1.8374        |
| 3.6401            | 55.70000    | 34.50000 | -1.40000 | 2.0006        |

Structure: Z | Sub-structure:

| Dist.             | Coordinates |          |          | Displacements |
|-------------------|-------------|----------|----------|---------------|
| [m]               | x<br>[m]    | y<br>[m] | z<br>[m] | z<br>[mm]     |
| Vertical Offset 1 |             |          |          |               |
| 0.0               | 69.70000    | 38.10000 | -0.50000 | 0.0           |
| 0.95802           | 68.93000    | 37.53000 | -0.50000 | 0.0           |
| 1.9160            | 68.16000    | 36.96000 | -0.50000 | 0.0           |
| 2.8741            | 67.39000    | 36.39000 | -0.50000 | 0.0           |
| 3.8321            | 66.62000    | 35.82000 | -0.50000 | 0.0           |
| 4.7901            | 65.85000    | 35.25000 | -0.50000 | 0.0           |
| 5.7481            | 65.08000    | 34.68000 | -0.50000 | 0.15187       |
| 6.7061            | 64.31000    | 34.11000 | -0.50000 | 0.32470       |
| 7.6642            | 63.54000    | 33.54000 | -0.50000 | 0.49753       |
| 8.6222            | 62.77000    | 32.97000 | -0.50000 | 0.67035       |
| 9.5802            | 62.00000    | 32.40000 | -0.50000 | 0.84318       |

Structure: AA | Sub-structure:

| Dist.             | Coordinates |          |          | Displacements |
|-------------------|-------------|----------|----------|---------------|
| [m]               | x<br>[m]    | y<br>[m] | z<br>[m] | z<br>[mm]     |
| Vertical Offset 1 |             |          |          |               |
| 0.0               | 62.00000    | 32.40000 | -1.40000 | 0.84318       |
| 0.91549           | 61.25000    | 31.87500 | -1.40000 | 1.0104        |
| 1.8310            | 60.50000    | 31.35000 | -1.40000 | 1.1776        |
| 2.7465            | 59.75000    | 30.82500 | -1.40000 | 1.3448        |
| 3.6620            | 59.00000    | 30.30000 | -1.40000 | 1.5120        |

Structure: AB | Sub-structure:

| Dist.             | Coordinates |          |          | Displacements |
|-------------------|-------------|----------|----------|---------------|
| [m]               | x<br>[m]    | y<br>[m] | z<br>[m] | z<br>[mm]     |
| Vertical Offset 1 |             |          |          |               |
| 0.0               | 73.00000    | 33.70000 | -0.50000 | 0.0           |
| 0.94626           | 72.23000    | 33.15000 | -0.50000 | 0.0           |
| 1.8925            | 71.46000    | 32.60000 | -0.50000 | 0.0           |
| 2.8388            | 70.69000    | 32.05000 | -0.50000 | 0.0           |
| 3.7850            | 69.92000    | 31.50000 | -0.50000 | 0.0           |
| 4.7313            | 69.15000    | 30.95000 | -0.50000 | 0.0           |
| 5.6775            | 68.38000    | 30.40000 | -0.50000 | 0.0           |
| 6.6238            | 67.61000    | 29.85000 | -0.50000 | 0.0           |
| 7.5700            | 66.84000    | 29.30000 | -0.50000 | 0.0087312     |
| 8.5163            | 66.07000    | 28.75000 | -0.50000 | 0.17719       |
| 9.4626            | 65.30000    | 28.20000 | -0.50000 | 0.34320       |

Structure: AC | Sub-structure:

| Dist.             | Coordinates |          |          | Displacements |
|-------------------|-------------|----------|----------|---------------|
| [m]               | x<br>[m]    | y<br>[m] | z<br>[m] | z<br>[mm]     |
| Vertical Offset 1 |             |          |          |               |
| 0.0               | 65.30000    | 28.20000 | -0.50000 | 0.34320       |
| 0.84673           | 64.61667    | 27.70000 | -0.50000 | 0.48034       |
| 1.6935            | 63.93333    | 27.20000 | -0.50000 | 0.63073       |
| 2.5402            | 63.25000    | 26.70000 | -0.50000 | 0.76992       |
| 3.3869            | 62.56667    | 26.20000 | -0.50000 | 0.90538       |
| 4.2336            | 61.88333    | 25.70000 | -0.50000 | 1.0365        |
| 5.0804            | 61.20000    | 25.20000 | -0.50000 | 1.1624        |

Structure: AD | Sub-structure:

| Dist.             | Coordinates |          |          | Displacements |
|-------------------|-------------|----------|----------|---------------|
| [m]               | x<br>[m]    | y<br>[m] | z<br>[m] | z<br>[mm]     |
| Vertical Offset 1 |             |          |          |               |
| 0.0               | 61.20000    | 25.20000 | -1.46000 | 1.1624        |
| 0.98298           | 60.22500    | 25.32500 | -1.46000 | 1.3590        |
| 1.9660            | 59.25000    | 25.45000 | -1.46000 | 1.5556        |
| 2.9489            | 58.27500    | 25.57500 | -1.46000 | 1.7522        |
| 3.9319            | 57.30000    | 25.70000 | -1.46000 | 1.9488        |
| 4.9149            | 56.32500    | 25.82500 | -1.46000 | 2.1454        |
| 5.8979            | 55.35000    | 25.95000 | -1.46000 | 2.3420        |
| 6.8809            | 54.37500    | 26.07500 | -1.46000 | 2.5386        |
| 7.8638            | 53.40000    | 26.20000 | -1.46000 | 2.7352        |

Structure: AE | Sub-structure:

| Dist. | Coordinates |   |   | Displacements |
|-------|-------------|---|---|---------------|
|       | x           | y | z | z             |



# GEA LIMITED (GEOTECHNICAL & ENV ASSOC)

Rear of 159-163 King's Cross Road, London WC1X 9BN  
Wall Installation only Issue 4

| Job No.   | Sheet No.           | Rev.    |
|-----------|---------------------|---------|
| J16180    |                     |         |
| Drg. Ref. |                     |         |
| Made by   | Date<br>07-Mar-2017 | Checked |

[m] [m] [m] [m] [mm]

## Vertical Offset 1

0.0 61.20000 25.20000 -0.50000 1.1624  
0.82651 61.15000 24.37500 -0.50000 1.1456  
1.6530 61.10000 23.55000 -0.50000 1.1170  
2.4795 61.05000 22.72500 -0.50000 1.0769  
3.3061 61.00000 21.90000 -0.50000 1.0260

Structure: AF | Sub-structure:

| Dist. | Coordinates |     |     | Displacements |
|-------|-------------|-----|-----|---------------|
|       | x           | y   | z   | z             |
| [m]   | [m]         | [m] | [m] | [mm]          |

## Vertical Offset 1

0.0 50.30000 26.50000 -1.46000 3.3553  
0.80351 50.22500 25.70000 -1.46000 3.2183  
1.6070 50.15000 24.90000 -1.46000 3.0599  
2.4105 50.07500 24.10000 -1.46000 2.9000  
3.2140 50.00000 23.30000 -1.46000 2.7397

Structure: AG | Sub-structure:

| Dist. | Coordinates |     |     | Displacements |
|-------|-------------|-----|-----|---------------|
|       | x           | y   | z   | z             |
| [m]   | [m]         | [m] | [m] | [mm]          |

## Vertical Offset 1

0.0 50.00000 23.30000 -0.50000 2.7397  
1.9046 51.88889 23.05556 -0.50000 2.6059  
3.8093 53.77778 22.81111 -0.50000 2.3439  
5.7139 55.66667 22.56667 -0.50000 2.0251  
7.6186 57.55556 22.32222 -0.50000 1.6809  
9.5232 59.44444 22.07778 -0.50000 1.3238  
11.428 61.33333 21.83333 -0.50000 0.95944  
13.332 63.22222 21.58889 -0.50000 0.59070  
15.237 65.11111 21.34444 -0.50000 0.21909  
17.142 67.00000 21.10000 -0.50000 0.0

Structure: AH | Sub-structure:

| Dist. | Coordinates |     |     | Displacements |
|-------|-------------|-----|-----|---------------|
|       | x           | y   | z   | z             |
| [m]   | [m]         | [m] | [m] | [mm]          |

## Vertical Offset 1

0.0 59.00000 20.70000 -0.50000 1.2644  
0.90554 58.10000 20.80000 -0.50000 1.4237  
1.8111 57.20000 20.90000 -0.50000 1.5790  
2.7166 56.30000 21.00000 -0.50000 1.7291  
3.6222 55.40000 21.10000 -0.50000 1.8724  
4.5277 54.50000 21.20000 -0.50000 2.0069  
5.4332 53.60000 21.30000 -0.50000 2.1297  
6.3388 52.70000 21.40000 -0.50000 2.2372

Structure: AI | Sub-structure: Sub #

| Dist. | Coordinates |     |     | Displacements |
|-------|-------------|-----|-----|---------------|
|       | x           | y   | z   | z             |
| [m]   | [m]         | [m] | [m] | [mm]          |

## Vertical Offset 1

0.0 52.70000 21.40000 -0.50000 2.2372  
0.97015 52.56000 20.44000 -0.50000 2.0734  
1.9403 52.42000 19.48000 -0.50000 1.9023  
2.9105 52.28000 18.52000 -0.50000 1.7262  
3.8806 52.14000 17.56000 -0.50000 1.5465  
4.8508 52.00000 16.60000 -0.50000 1.3642

Structure: AJ | Sub-structure: Sub #

| Dist. | Coordinates |     |     | Displacements |
|-------|-------------|-----|-----|---------------|
|       | x           | y   | z   | z             |
| [m]   | [m]         | [m] | [m] | [mm]          |

## Vertical Offset 1

0.0 52.00000 16.60000 -0.50000 1.3642  
0.99041 51.01111 16.72222 -0.50000 1.4161  
1.9928 50.02222 16.84444 -0.50000 1.4480  
2.9892 49.03333 16.96667 -0.50000 1.4616  
3.9857 48.04444 17.08889 -0.50000 1.4600  
4.9821 47.05556 17.21111 -0.50000 1.4579  
5.9785 46.06667 17.33333 -0.50000 1.4558  
6.9749 45.07778 17.45556 -0.50000 1.4537  
7.9713 44.08889 17.57778 -0.50000 1.4516  
8.9677 43.10000 17.70000 -0.50000 1.4495

Structure: AK | Sub-structure: Sub #

| Dist. | Coordinates |     |     | Displacements |
|-------|-------------|-----|-----|---------------|
|       | x           | y   | z   | z             |
| [m]   | [m]         | [m] | [m] | [mm]          |

## Vertical Offset 1

0.0 43.10000 17.70000 -0.50000 1.4495  
0.98995 43.24000 18.68000 -0.50000 1.6474  
1.9799 43.38000 19.66000 -0.50000 1.8454  
2.9698 43.52000 20.64000 -0.50000 2.0434  
3.9598 43.66000 21.62000 -0.50000 2.2414  
4.9497 43.80000 22.60000 -0.50000 2.4394

Structure: AL | Sub-structure: Sub #

| Dist. | Coordinates |     |     | Displacements |
|-------|-------------|-----|-----|---------------|
|       | x           | y   | z   | z             |
| [m]   | [m]         | [m] | [m] | [mm]          |

## Vertical Offset 1

0.0 43.80000 22.60000 -0.50000 2.4394  
0.94763 42.86000 22.72000 -0.50000 2.4381  
1.8953 41.92000 22.84000 -0.50000 2.4369  
2.8429 40.98000 22.96000 -0.50000 2.4356  
3.7905 40.04000 23.08000 -0.50000 2.4344  
4.7381 39.10000 23.20000 -0.50000 2.4332

Structure: AM | Sub-structure: Sub #

| Dist. | Coordinates |     |     | Displacements |
|-------|-------------|-----|-----|---------------|
|       | x           | y   | z   | z             |
| [m]   | [m]         | [m] | [m] | [mm]          |



# GEA LIMITED (GEOTECHNICAL & ENV ASSOC)

Rear of 159-163 King's Cross Road, London WC1X 9BN  
Wall Installation only Issue 4

| Job No.   | Sheet No.           | Rev.    |
|-----------|---------------------|---------|
| J16180    |                     |         |
| Drg. Ref. |                     |         |
| Made by   | Date<br>07-Mar-2017 | Checked |

Vertical Offset 1  
0.0 39.10000 23.20000 -0.50000 2.4332  
0.90247 39.03333 22.30000 -0.50000 2.2530  
1.8049 38.96667 21.40000 -0.50000 2.0728  
2.7074 38.90000 20.50000 -0.50000 1.8926

Structure: AN | Sub-structure: Sub #

| Dist. | Coordinates |     |     | Displacements |
|-------|-------------|-----|-----|---------------|
|       | x           | y   | z   | z             |
| [m]   | [m]         | [m] | [m] | [mm]          |

Vertical Offset 1  
0.0 38.90000 20.50000 -0.50000 1.8926  
0.83442 38.07500 20.62500 -0.50000 1.8955  
1.6680 37.25000 20.75000 -0.50000 1.8983  
2.5032 36.42500 20.87500 -0.50000 1.9011  
3.3377 35.60000 21.00000 -0.50000 1.9037

Structure: AO | Sub-structure: Sub #

| Dist. | Coordinates |     |     | Displacements |
|-------|-------------|-----|-----|---------------|
|       | x           | y   | z   | z             |
| [m]   | [m]         | [m] | [m] | [mm]          |

Vertical Offset 1  
0.0 35.60000 21.00000 -0.50000 1.9037  
0.83931 35.70000 21.83333 -0.50000 2.0715  
1.6786 35.80000 22.66667 -0.50000 2.2393  
2.5179 35.90000 23.50000 -0.50000 2.4070

Structure: AP | Sub-structure: Sub #

| Dist. | Coordinates |     |     | Displacements |
|-------|-------------|-----|-----|---------------|
|       | x           | y   | z   | z             |
| [m]   | [m]         | [m] | [m] | [mm]          |

Vertical Offset 1  
0.0 35.90000 23.50000 -0.50000 2.4070  
0.89107 35.02000 23.64000 -0.50000 2.3904  
1.7821 34.14000 23.78000 -0.50000 2.3436  
2.6732 33.26000 23.92000 -0.50000 2.2703  
3.5643 32.38000 24.06000 -0.50000 2.1753  
4.4553 31.50000 24.20000 -0.50000 2.0631

Structure: AQ | Sub-structure: Sub #

| Dist. | Coordinates |     |     | Displacements |
|-------|-------------|-----|-----|---------------|
|       | x           | y   | z   | z             |
| [m]   | [m]         | [m] | [m] | [mm]          |

Vertical Offset 1  
0.0 31.50000 24.20000 -0.50000 2.0631  
0.98995 31.36000 23.22000 -0.50000 1.9121  
1.9799 31.22000 22.24000 -0.50000 1.7510  
2.9698 31.08000 21.26000 -0.50000 1.5827  
3.9598 30.94000 20.28000 -0.50000 1.4089  
4.9497 30.80000 19.30000 -0.50000 1.2309

Structure: AR | Sub-structure: Sub #

| Dist. | Coordinates |     |     | Displacements |
|-------|-------------|-----|-----|---------------|
|       | x           | y   | z   | z             |
| [m]   | [m]         | [m] | [m] | [mm]          |

Vertical Offset 1  
0.0 35.60000 12.40000 -0.50000 0.19920  
0.94130 35.72222 13.33333 -0.50000 0.38746  
1.8826 35.84444 14.26667 -0.50000 0.57572  
2.8239 35.96667 15.20000 -0.50000 0.76397  
3.7652 36.08889 16.13333 -0.50000 0.95223  
4.7065 36.21111 17.06667 -0.50000 1.1405  
5.6478 36.33333 18.00000 -0.50000 1.3288  
6.5891 36.45556 18.93333 -0.50000 1.5170  
7.5304 36.57778 19.86667 -0.50000 1.7053  
8.4717 36.70000 20.80000 -0.50000 1.8935

Structure: AS | Sub-structure: Sub #

| Dist. | Coordinates |     |     | Displacements |
|-------|-------------|-----|-----|---------------|
|       | x           | y   | z   | z             |
| [m]   | [m]         | [m] | [m] | [mm]          |

Vertical Offset 1  
0.0 44.70000 9.30000 -0.50000 0.0  
0.90683 44.81111 10.20000 -0.50000 0.0083731  
1.8137 44.92222 11.10000 -0.50000 0.18973  
2.7295 45.03333 12.00000 -0.50000 0.37109  
3.6273 45.14444 12.90000 -0.50000 0.55244  
4.5342 45.25556 13.80000 -0.50000 0.73380  
5.4410 45.36667 14.70000 -0.50000 0.91515  
6.3478 45.47778 15.60000 -0.50000 1.0965  
7.2547 45.58889 16.50000 -0.50000 1.2779  
8.1615 45.70000 17.40000 -0.50000 1.4592

Structure: AT | Sub-structure: Sub #

| Dist. | Coordinates |     |     | Displacements |
|-------|-------------|-----|-----|---------------|
|       | x           | y   | z   | z             |
| [m]   | [m]         | [m] | [m] | [mm]          |

Vertical Offset 1  
0.0 54.50000 10.00000 -0.50000 0.0  
1.8461 54.71667 11.83333 -0.50000 0.30570  
3.6922 54.93333 13.66667 -0.50000 0.63861  
5.5383 55.15000 15.50000 -0.50000 0.96105  
7.3844 55.36667 17.33333 -0.50000 1.2683  
9.2305 55.58333 19.16667 -0.50000 1.5526  
11.077 55.80000 21.00000 -0.50000 1.8619

Structure: AU | Sub-structure:

| Dist. | Coordinates |     |     | Displacements |
|-------|-------------|-----|-----|---------------|
|       | x           | y   | z   | z             |
| [m]   | [m]         | [m] | [m] | [mm]          |

Vertical Offset 1  
0.0 33.10000 38.60000 -2.00000 2.4280  
0.88891 32.21250 38.65000 -2.00000 1.7165  
1.7778 31.32500 38.70000 -2.00000 1.1309



# GEA LIMITED (GEOTECHNICAL & ENV ASSOC)

Rear of 159-163 King's Cross Road, London WC1X 9BN  
Wall Installation only Issue 4

| Job No.   | Sheet No.           | Rev.    |
|-----------|---------------------|---------|
| J16180    |                     |         |
| Drg. Ref. |                     |         |
| Made by   | Date<br>07-Mar-2017 | Checked |

| Dist.  | Coordinates |          |          | Displacements |
|--------|-------------|----------|----------|---------------|
| [m]    | x<br>[m]    | y<br>[m] | z<br>[m] | z<br>[mm]     |
| 2.6667 | 30.43750    | 38.75000 | -2.00000 | 0.66622       |
| 3.5556 | 29.55000    | 38.80000 | -2.00000 | 0.35691       |
| 4.4445 | 28.66250    | 38.85000 | -2.00000 | 0.16454       |
| 5.3334 | 27.77500    | 38.90000 | -2.00000 | 0.066830      |
| 6.2224 | 26.88750    | 38.95000 | -2.00000 | 0.019805      |
| 7.1113 | 26.00000    | 39.00000 | -2.00000 | 0.0           |

Structure: AV | Sub-structure:

| Dist.             | Coordinates |          |          | Displacements |
|-------------------|-------------|----------|----------|---------------|
| [m]               | x<br>[m]    | y<br>[m] | z<br>[m] | z<br>[mm]     |
| Vertical Offset 1 |             |          |          |               |
| 0.0               | 26.00000    | 39.00000 | -2.00000 | 0.0           |
| 0.92195           | 25.94000    | 38.08000 | -2.00000 | 0.0           |
| 1.8439            | 25.88000    | 37.16000 | -2.00000 | 0.0           |
| 2.7659            | 25.82000    | 36.24000 | -2.00000 | 0.0           |
| 3.6878            | 25.76000    | 35.32000 | -2.00000 | 0.0           |
| 4.6098            | 25.70000    | 34.40000 | -2.00000 | 0.0           |
| 5.5317            | 25.64000    | 33.48000 | -2.00000 | 0.0           |
| 6.4537            | 25.58000    | 32.56000 | -2.00000 | 0.0           |
| 7.3756            | 25.52000    | 31.64000 | -2.00000 | 0.0           |
| 8.2976            | 25.46000    | 30.72000 | -2.00000 | 0.0           |
| 9.2195            | 25.40000    | 29.80000 | -2.00000 | 0.0           |

Structure: AW | Sub-structure:

| Dist.             | Coordinates |          |          | Displacements |
|-------------------|-------------|----------|----------|---------------|
| [m]               | x<br>[m]    | y<br>[m] | z<br>[m] | z<br>[mm]     |
| Vertical Offset 1 |             |          |          |               |
| 0.0               | 25.40000    | 29.80000 | -2.00000 | 0.0           |
| 1.0869            | 27.28333    | 29.68333 | -2.00000 | 0.025690      |
| 3.7739            | 29.16667    | 29.56667 | -2.00000 | 0.14489       |
| 5.6608            | 31.05000    | 29.45000 | -2.00000 | 0.43160       |
| 7.5478            | 32.93333    | 29.33333 | -2.00000 | 0.79708       |
| 9.4347            | 34.81667    | 29.21667 | -2.00000 | 1.5716        |
| 11.322            | 36.70000    | 29.10000 | -2.00000 | 2.7362        |

## Specific Building Damage Results - All Segments

Structure: A | Sub-structure:

| Vertical Offset<br>from Line for<br>Vertical<br>Movement<br>Calculations    | Segment                                                                | Start | Length | Curvature | Deflection<br>Ratio | Average<br>Horizontal<br>Strain | Max.<br>Tensile<br>Strain | Maximum<br>Gradient of<br>Horizontal<br>Displacement<br>Curve | Maximum<br>Gradient of<br>Vertical<br>Displacement<br>Curve | Min.<br>Radius of<br>Curvature | Damage<br>Category |
|-----------------------------------------------------------------------------|------------------------------------------------------------------------|-------|--------|-----------|---------------------|---------------------------------|---------------------------|---------------------------------------------------------------|-------------------------------------------------------------|--------------------------------|--------------------|
| [m]                                                                         |                                                                        | [m]   | [m]    |           | [%]                 | [%]                             | [%]                       |                                                               |                                                             | [m]                            |                    |
| 0.0                                                                         | All settlements are less than the Settlement Trough Limit Sensitivity. |       |        |           |                     |                                 |                           |                                                               |                                                             |                                |                    |
| Tensile horizontal strains are +ve, compressive horizontal strains are -ve. |                                                                        |       |        |           |                     |                                 |                           |                                                               |                                                             |                                |                    |

Structure: B | Sub-structure:

| Vertical Offset<br>From Line for<br>Vertical<br>Movement<br>Calculations    | Segment                                                                | Start | Length | Curvature | Deflection<br>Ratio | Average<br>Horizontal<br>Strain | Max.<br>Tensile<br>Strain | Maximum<br>Gradient of<br>Horizontal<br>Displacement<br>Curve | Maximum<br>Gradient of<br>Vertical<br>Displacement<br>Curve | Min.<br>Radius of<br>Curvature | Damage<br>Category |
|-----------------------------------------------------------------------------|------------------------------------------------------------------------|-------|--------|-----------|---------------------|---------------------------------|---------------------------|---------------------------------------------------------------|-------------------------------------------------------------|--------------------------------|--------------------|
| [m]                                                                         |                                                                        | [m]   | [m]    |           | [%]                 | [%]                             | [%]                       |                                                               |                                                             | [m]                            |                    |
| 0.0                                                                         | All settlements are less than the Settlement Trough Limit Sensitivity. |       |        |           |                     |                                 |                           |                                                               |                                                             |                                |                    |
| Tensile horizontal strains are +ve, compressive horizontal strains are -ve. |                                                                        |       |        |           |                     |                                 |                           |                                                               |                                                             |                                |                    |

Structure: C | Sub-structure:

| Vertical Offset from Line for Vertical Movement Calculations                | Segment | Start  | Length  | Curvature | Deflection Ratio | Average Horizontal Strain | Max. Tensile Strain | Maximum Gradient of Horizontal Displacement Curve | Maximum Gradient of Vertical Displacement Curve | Min. Radius of Curvature | Damage Category |
|-----------------------------------------------------------------------------|---------|--------|---------|-----------|------------------|---------------------------|---------------------|---------------------------------------------------|-------------------------------------------------|--------------------------|-----------------|
| [m]                                                                         |         | [m]    | [m]     |           | [%]              | [%]                       | [%]                 |                                                   |                                                 | [m]                      |                 |
| 0.0                                                                         | 1       | 3.6809 | 0.91922 | Hogging   |                  | 0.0                       | 0.019322            | 0.019322                                          | -254.49E-6                                      | -198.32E-6               | 10232.0         |
| (Negligible)                                                                |         |        |         |           |                  |                           |                     |                                                   |                                                 |                          |                 |
| Tensile horizontal strains are +ve, compressive horizontal strains are -ve. |         |        |         |           |                  |                           |                     |                                                   |                                                 |                          |                 |

Structure: D | Sub-structure:

| Vertical Offset from Line for Vertical Movement Calculations                | Segment | Start | Length | Curvature | Deflection Ratio | Average Horizontal Strain | Max. Tensile Strain | Maximum Gradient of Horizontal Displacement Curve | Maximum Gradient of Vertical Displacement Curve | Min. Radius of Curvature | Damage Category |
|-----------------------------------------------------------------------------|---------|-------|--------|-----------|------------------|---------------------------|---------------------|---------------------------------------------------|-------------------------------------------------|--------------------------|-----------------|
| [m]                                                                         |         | [m]   | [m]    |           | [%]              | [%]                       | [%]                 |                                                   |                                                 | [m]                      |                 |
| 0.0                                                                         | 1       | 0.0   | 1.8003 | Hogging   | 966.79E-6        | 0.0064624                 | 0.0065809           | -201.53E-6                                        | 159.45E-6                                       | 21589.0                  | (Negligible)    |
| Tensile horizontal strains are +ve, compressive horizontal strains are -ve. |         |       |        |           |                  |                           |                     |                                                   |                                                 |                          |                 |

Structure: E | Sub-structure:

| Vertical Offset<br>from Line for<br>Vertical<br>Movement<br>Calculations    | Segment                                                                | Start | Length | Curvature | Deflection<br>Ratio | Average<br>Horizontal<br>Strain | Max.<br>Tensile<br>Strain | Maximum<br>Gradient of<br>Horizontal<br>Displacement<br>Curve | Maximum<br>Gradient of<br>Vertical<br>Displacement<br>Curve | Min.<br>Radius of<br>Curvature | Damage<br>Category |
|-----------------------------------------------------------------------------|------------------------------------------------------------------------|-------|--------|-----------|---------------------|---------------------------------|---------------------------|---------------------------------------------------------------|-------------------------------------------------------------|--------------------------------|--------------------|
| [m]                                                                         |                                                                        | [m]   | [m]    |           | [%]                 | [%]                             | [%]                       |                                                               |                                                             | [m]                            |                    |
| 0.0                                                                         | All settlements are less than the Settlement Trough Limit Sensitivity. |       |        |           |                     |                                 |                           |                                                               |                                                             |                                |                    |
| Tensile horizontal strains are +ve, compressive horizontal strains are -ve. |                                                                        |       |        |           |                     |                                 |                           |                                                               |                                                             |                                |                    |

Structure: F | Sub-structure:

| Vertical Offset<br>From Line for<br>Vertical<br>Movement<br>Calculations    | Segment                                                                | Start | Length | Curvature | Deflection<br>Ratio | Average<br>Horizontal<br>Strain | Max.<br>Tensile<br>Strain | Maximum<br>Gradient of<br>Horizontal<br>Displacement<br>Curve | Maximum<br>Gradient of<br>Vertical<br>Displacement<br>Curve | Min.<br>Radius of<br>Curvature | Damage<br>Category |
|-----------------------------------------------------------------------------|------------------------------------------------------------------------|-------|--------|-----------|---------------------|---------------------------------|---------------------------|---------------------------------------------------------------|-------------------------------------------------------------|--------------------------------|--------------------|
| [m]                                                                         |                                                                        | [m]   | [m]    |           | [%]                 | [%]                             | [%]                       |                                                               |                                                             | [m]                            |                    |
| 0.0                                                                         | All settlements are less than the Settlement Trough Limit Sensitivity. |       |        |           |                     |                                 |                           |                                                               |                                                             |                                |                    |
| Tensile horizontal strains are +ve, compressive horizontal strains are -ve. |                                                                        |       |        |           |                     |                                 |                           |                                                               |                                                             |                                |                    |

Structure: G | Sub-structure:

| Vertical Offset from Line for Vertical Movement Calculations | Segment | Start | Length | Curvature | Deflection Ratio | Average Horizontal Strain | Max. Tensile Strain | Maximum Gradient of Horizontal Displacement Curve | Maximum Gradient of Vertical Displacement Curve | Min. Radius of Curvature | Damage Category |
|--------------------------------------------------------------|---------|-------|--------|-----------|------------------|---------------------------|---------------------|---------------------------------------------------|-------------------------------------------------|--------------------------|-----------------|
| [m]                                                          |         | [m]   | [m]    |           | [%]              | [%]                       | [%]                 |                                                   |                                                 | [m]                      |                 |



# GEA LIMITED (GEOTECHNICAL & ENV ASSOC)

Rear of 159-163 King's Cross Road, London WC1X 9BN  
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| Job No.   | Sheet No.           | Rev.    |
|-----------|---------------------|---------|
| J16180    |                     |         |
| Drg. Ref. |                     |         |
| Made by   | Date<br>07-Mar-2017 | Checked |

[m] [m] [m] [m] [m] [m]  
0.0 All settlements are less than the Settlement Trough Limit Sensitivity.  
Tensile horizontal strains are +ve, compressive horizontal strains are -ve.

Structure: H | Sub-structure:

| Vertical Offset from Line for Vertical Movement Calculations                                                                                          | Segment | Start | Length | Curvature | Deflection Ratio | Average Horizontal Strain | Max. Tensile Strain | Maximum Gradient of Horizontal Displacement Curve | Maximum Gradient of Vertical Displacement Curve | Min. Radius of Curvature | Damage Category |
|-------------------------------------------------------------------------------------------------------------------------------------------------------|---------|-------|--------|-----------|------------------|---------------------------|---------------------|---------------------------------------------------|-------------------------------------------------|--------------------------|-----------------|
| [m]<br>0.0                                                                                                                                            |         |       | [m]    | [m]       | [%]              | [%]                       | [%]                 |                                                   |                                                 | [m]                      |                 |
| All settlements are less than the Settlement Trough Limit Sensitivity.<br>Tensile horizontal strains are +ve, compressive horizontal strains are -ve. |         |       |        |           |                  |                           |                     |                                                   |                                                 |                          |                 |

Structure: I | Sub-structure:

| Vertical Offset from Line for Vertical Movement Calculations                                                                                          | Segment | Start | Length | Curvature | Deflection Ratio | Average Horizontal Strain | Max. Tensile Strain | Maximum Gradient of Horizontal Displacement Curve | Maximum Gradient of Vertical Displacement Curve | Min. Radius of Curvature | Damage Category |
|-------------------------------------------------------------------------------------------------------------------------------------------------------|---------|-------|--------|-----------|------------------|---------------------------|---------------------|---------------------------------------------------|-------------------------------------------------|--------------------------|-----------------|
| [m]<br>0.0                                                                                                                                            |         |       | [m]    | [m]       | [%]              | [%]                       | [%]                 |                                                   |                                                 | [m]                      |                 |
| All settlements are less than the Settlement Trough Limit Sensitivity.<br>Tensile horizontal strains are +ve, compressive horizontal strains are -ve. |         |       |        |           |                  |                           |                     |                                                   |                                                 |                          |                 |

Structure: J | Sub-structure:

| Vertical Offset from Line for Vertical Movement Calculations                                                                                          | Segment | Start | Length | Curvature | Deflection Ratio | Average Horizontal Strain | Max. Tensile Strain | Maximum Gradient of Horizontal Displacement Curve | Maximum Gradient of Vertical Displacement Curve | Min. Radius of Curvature | Damage Category |
|-------------------------------------------------------------------------------------------------------------------------------------------------------|---------|-------|--------|-----------|------------------|---------------------------|---------------------|---------------------------------------------------|-------------------------------------------------|--------------------------|-----------------|
| [m]<br>0.0                                                                                                                                            |         |       | [m]    | [m]       | [%]              | [%]                       | [%]                 |                                                   |                                                 | [m]                      |                 |
| All settlements are less than the Settlement Trough Limit Sensitivity.<br>Tensile horizontal strains are +ve, compressive horizontal strains are -ve. |         |       |        |           |                  |                           |                     |                                                   |                                                 |                          |                 |

Structure: K | Sub-structure:

| Vertical Offset from Line for Vertical Movement Calculations                                     | Segment | Start | Length | Curvature | Deflection Ratio | Average Horizontal Strain | Max. Tensile Strain | Maximum Gradient of Horizontal Displacement Curve | Maximum Gradient of Vertical Displacement Curve | Min. Radius of Curvature | Damage Category |
|--------------------------------------------------------------------------------------------------|---------|-------|--------|-----------|------------------|---------------------------|---------------------|---------------------------------------------------|-------------------------------------------------|--------------------------|-----------------|
| [m]<br>0.0                                                                                       |         |       | [m]    | [m]       | [%]              | [%]                       | [%]                 |                                                   |                                                 | [m]                      |                 |
| 1 2.9667 3.9556 Sagging 506.75E-6 -0.0048460 0.0010085 102.42E-6 -38.078E-6 65133.0 (Negligible) |         |       |        |           |                  |                           |                     |                                                   |                                                 |                          |                 |
| 2 6.9222 1.9768 None 0.0 0.0 0.0 0.0 0.0 - (Negligible)                                          |         |       |        |           |                  |                           |                     |                                                   |                                                 |                          |                 |
| Tensile horizontal strains are +ve, compressive horizontal strains are -ve.                      |         |       |        |           |                  |                           |                     |                                                   |                                                 |                          |                 |

Structure: L | Sub-structure:

| Vertical Offset from Line for Vertical Movement Calculations                | Segment | Start | Length | Curvature | Deflection Ratio | Average Horizontal Strain | Max. Tensile Strain | Maximum Gradient of Horizontal Displacement Curve | Maximum Gradient of Vertical Displacement Curve | Min. Radius of Curvature | Damage Category |
|-----------------------------------------------------------------------------|---------|-------|--------|-----------|------------------|---------------------------|---------------------|---------------------------------------------------|-------------------------------------------------|--------------------------|-----------------|
| [m]<br>0.0                                                                  |         |       | [m]    | [m]       | [%]              | [%]                       | [%]                 |                                                   |                                                 | [m]                      |                 |
| 1 7.1990 0.0 None 0.0 0.0 0.0 -333.22E-6 -96.121E-6 18500.0 (Negligible)    |         |       |        |           |                  |                           |                     |                                                   |                                                 |                          |                 |
| Tensile horizontal strains are +ve, compressive horizontal strains are -ve. |         |       |        |           |                  |                           |                     |                                                   |                                                 |                          |                 |

Structure: M | Sub-structure:

| Vertical Offset from Line for Vertical Movement Calculations                | Segment | Start | Length | Curvature | Deflection Ratio | Average Horizontal Strain | Max. Tensile Strain | Maximum Gradient of Horizontal Displacement Curve | Maximum Gradient of Vertical Displacement Curve | Min. Radius of Curvature | Damage Category |
|-----------------------------------------------------------------------------|---------|-------|--------|-----------|------------------|---------------------------|---------------------|---------------------------------------------------|-------------------------------------------------|--------------------------|-----------------|
| [m]<br>0.0                                                                  |         |       | [m]    | [m]       | [%]              | [%]                       | [%]                 |                                                   |                                                 | [m]                      |                 |
| 1 7.2997 0.0 None 0.0 0.0 0.0 -333.16E-6 -95.636E-6 19090.0 (Negligible)    |         |       |        |           |                  |                           |                     |                                                   |                                                 |                          |                 |
| Tensile horizontal strains are +ve, compressive horizontal strains are -ve. |         |       |        |           |                  |                           |                     |                                                   |                                                 |                          |                 |

Structure: N | Sub-structure:

| Vertical Offset from Line for Vertical Movement Calculations                                                                                          | Segment | Start | Length | Curvature | Deflection Ratio | Average Horizontal Strain | Max. Tensile Strain | Maximum Gradient of Horizontal Displacement Curve | Maximum Gradient of Vertical Displacement Curve | Min. Radius of Curvature | Damage Category |
|-------------------------------------------------------------------------------------------------------------------------------------------------------|---------|-------|--------|-----------|------------------|---------------------------|---------------------|---------------------------------------------------|-------------------------------------------------|--------------------------|-----------------|
| [m]<br>0.0                                                                                                                                            |         |       | [m]    | [m]       | [%]              | [%]                       | [%]                 |                                                   |                                                 | [m]                      |                 |
| All settlements are less than the Settlement Trough Limit Sensitivity.<br>Tensile horizontal strains are +ve, compressive horizontal strains are -ve. |         |       |        |           |                  |                           |                     |                                                   |                                                 |                          |                 |

Structure: O | Sub-structure:

| Vertical Offset from Line for Vertical Movement Calculations                                   | Segment | Start | Length | Curvature | Deflection Ratio | Average Horizontal Strain | Max. Tensile Strain | Maximum Gradient of Horizontal Displacement Curve | Maximum Gradient of Vertical Displacement Curve | Min. Radius of Curvature | Damage Category |
|------------------------------------------------------------------------------------------------|---------|-------|--------|-----------|------------------|---------------------------|---------------------|---------------------------------------------------|-------------------------------------------------|--------------------------|-----------------|
| [m]<br>0.0                                                                                     |         |       | [m]    | [m]       | [%]              | [%]                       | [%]                 |                                                   |                                                 | [m]                      |                 |
| 1 0.0 0.45990 Hogging 0.0082887 0.046211 0.053454 -649.98E-6 -728.35E-6 6422.2 1 (Very Slight) |         |       |        |           |                  |                           |                     |                                                   |                                                 |                          |                 |
| Tensile horizontal strains are +ve, compressive horizontal strains are -ve.                    |         |       |        |           |                  |                           |                     |                                                   |                                                 |                          |                 |

Structure: P | Sub-structure: Sub #

| Vertical Offset from Line for Vertical Movement Calculations                                   | Segment | Start | Length | Curvature | Deflection Ratio | Average Horizontal Strain | Max. Tensile Strain | Maximum Gradient of Horizontal Displacement Curve | Maximum Gradient of Vertical Displacement Curve | Min. Radius of Curvature | Damage Category |
|------------------------------------------------------------------------------------------------|---------|-------|--------|-----------|------------------|---------------------------|---------------------|---------------------------------------------------|-------------------------------------------------|--------------------------|-----------------|
| [m]<br>0.0                                                                                     |         |       | [m]    | [m]       | [%]              | [%]                       | [%]                 |                                                   |                                                 | [m]                      |                 |
| 1 0.05000 3.7521 Hogging 0.0066153 0.032175 0.035966 -332.60E-6 -571.89E-6 7133.8 (Negligible) |         |       |        |           |                  |                           |                     |                                                   |                                                 |                          |                 |
| 2 4.7021 0.09690 Sagging 201.27E-6 -0.12974 0.025948 0.0013797 -571.89E-6 11332.0 (Negligible) |         |       |        |           |                  |                           |                     |                                                   |                                                 |                          |                 |
| Tensile horizontal strains are +ve, compressive horizontal strains are -ve.                    |         |       |        |           |                  |                           |                     |                                                   |                                                 |                          |                 |

Structure: Q | Sub-structure:

| Vertical Offset from Line for Vertical | Segment | Start | Length | Curvature | Deflection Ratio | Average Horizontal Strain | Max. Tensile Strain | Maximum Gradient of Horizontal | Maximum Gradient of Vertical | Min. Radius of Curvature | Damage Category |
|----------------------------------------|---------|-------|--------|-----------|------------------|---------------------------|---------------------|--------------------------------|------------------------------|--------------------------|-----------------|
|----------------------------------------|---------|-------|--------|-----------|------------------|---------------------------|---------------------|--------------------------------|------------------------------|--------------------------|-----------------|



GEA LIMITED  
(GEOTECHNICAL & ENV ASSOC)

Rear of 159-163 King's Cross Road, London WC1X 9BN  
Wall Installation only Issue 4

| Job No.   | Sheet No.           | Rev.    |
|-----------|---------------------|---------|
| J16180    |                     |         |
| Drg. Ref. |                     |         |
| Made by   | Date<br>07-Mar-2017 | Checked |

| Movement Calculations                                                       |                                                                        |         |         |           |                  |                           | Displacement Curve  |                                                   | Displacement Curve                              |                          |                 |              |
|-----------------------------------------------------------------------------|------------------------------------------------------------------------|---------|---------|-----------|------------------|---------------------------|---------------------|---------------------------------------------------|-------------------------------------------------|--------------------------|-----------------|--------------|
| [m]                                                                         |                                                                        | [m]     |         | [%]       |                  | [%]                       |                     |                                                   |                                                 | [m]                      |                 |              |
| 0.0                                                                         | 1                                                                      | 0.0     | 4.5990  | Hogging   | 0.0072426        | 0.033397                  | 0.039768            | -336.39E-6                                        | -648.98E-6                                      | 6821.8                   | 0               | (Negligible) |
| Tensile horizontal strains are +ve, compressive horizontal strains are -ve. |                                                                        |         |         |           |                  |                           |                     |                                                   |                                                 |                          |                 |              |
| Structure: R   Sub-structure:                                               |                                                                        |         |         |           |                  |                           |                     |                                                   |                                                 |                          |                 |              |
| Vertical Offset from Line for Vertical Movement Calculations                | Segment                                                                | Start   | Length  | Curvature | Deflection Ratio | Average Horizontal Strain | Max. Tensile Strain | Maximum Gradient of Horizontal Displacement Curve | Maximum Gradient of Vertical Displacement Curve | Min. Radius of Curvature | Damage Category |              |
| [m]                                                                         |                                                                        | [m]     | [m]     |           | [%]              | [%]                       | [%]                 |                                                   |                                                 | [m]                      |                 |              |
| 0.0                                                                         | 1                                                                      | 0.92635 | 4.6368  | Hogging   | 0.0060199        | 0.025960                  | 0.031474            | -313.88E-6                                        | -477.91E-6                                      | 8142.8                   | 0               | (Negligible) |
|                                                                             | 2                                                                      | 5.5632  | 1.8466  | Sagging   | 0.0053293        | -0.074843                 | 0.015243            | 0.0014179                                         | -477.91E-6                                      | 3287.4                   | 0               | (Negligible) |
| Tensile horizontal strains are +ve, compressive horizontal strains are -ve. |                                                                        |         |         |           |                  |                           |                     |                                                   |                                                 |                          |                 |              |
| Structure: S   Sub-structure:                                               |                                                                        |         |         |           |                  |                           |                     |                                                   |                                                 |                          |                 |              |
| Vertical Offset from Line for Vertical Movement Calculations                | Segment                                                                | Start   | Length  | Curvature | Deflection Ratio | Average Horizontal Strain | Max. Tensile Strain | Maximum Gradient of Horizontal Displacement Curve | Maximum Gradient of Vertical Displacement Curve | Min. Radius of Curvature | Damage Category |              |
| [m]                                                                         |                                                                        | [m]     | [m]     |           | [%]              | [%]                       | [%]                 |                                                   |                                                 | [m]                      |                 |              |
| 0.0                                                                         | All settlements are less than the Settlement Trough Limit Sensitivity. |         |         |           |                  |                           |                     |                                                   |                                                 |                          |                 |              |
| Tensile horizontal strains are +ve, compressive horizontal strains are -ve. |                                                                        |         |         |           |                  |                           |                     |                                                   |                                                 |                          |                 |              |
| Structure: T   Sub-structure:                                               |                                                                        |         |         |           |                  |                           |                     |                                                   |                                                 |                          |                 |              |
| Vertical Offset from Line for Vertical Movement Calculations                | Segment                                                                | Start   | Length  | Curvature | Deflection Ratio | Average Horizontal Strain | Max. Tensile Strain | Maximum Gradient of Horizontal Displacement Curve | Maximum Gradient of Vertical Displacement Curve | Min. Radius of Curvature | Damage Category |              |
| [m]                                                                         |                                                                        | [m]     | [m]     |           | [%]              | [%]                       | [%]                 |                                                   |                                                 | [m]                      |                 |              |
| 0.0                                                                         | 1                                                                      | 1.9859  | 5.4076  | Sagging   | 0.0027832        | -0.012323                 | 0.0028827           | 221.76E-6                                         | -71.359E-6                                      | 33207.                   | 0               | (Negligible) |
|                                                                             | 2                                                                      | 7.3935  | 11.303  | Hogging   | 0.0050045        | 0.0015338                 | 0.0061316           | 115.07E-6                                         | -731.82E-6                                      | 10835.                   | 0               | (Negligible) |
|                                                                             | 3                                                                      | 18.696  | 12.616  | Sagging   | 0.0068274        | 750.65E-6                 | 0.010713            | 115.07E-6                                         | -731.82E-6                                      | 8765.1                   | 0               | (Negligible) |
|                                                                             | 4                                                                      | 31.312  | 2.4485  | Sagging   | 267.42E-6        | 0.0                       | 261.82E-6           | 0.0                                               | 113.72E-6                                       | 55432.                   | 0               | (Negligible) |
| Tensile horizontal strains are +ve, compressive horizontal strains are -ve. |                                                                        |         |         |           |                  |                           |                     |                                                   |                                                 |                          |                 |              |
| Structure: U   Sub-structure:                                               |                                                                        |         |         |           |                  |                           |                     |                                                   |                                                 |                          |                 |              |
| Vertical Offset from Line for Vertical Movement Calculations                | Segment                                                                | Start   | Length  | Curvature | Deflection Ratio | Average Horizontal Strain | Max. Tensile Strain | Maximum Gradient of Horizontal Displacement Curve | Maximum Gradient of Vertical Displacement Curve | Min. Radius of Curvature | Damage Category |              |
| [m]                                                                         |                                                                        | [m]     | [m]     |           | [%]              | [%]                       | [%]                 |                                                   |                                                 | [m]                      |                 |              |
| 0.0                                                                         | All settlements are less than the Settlement Trough Limit Sensitivity. |         |         |           |                  |                           |                     |                                                   |                                                 |                          |                 |              |
| Tensile horizontal strains are +ve, compressive horizontal strains are -ve. |                                                                        |         |         |           |                  |                           |                     |                                                   |                                                 |                          |                 |              |
| Structure: V   Sub-structure:                                               |                                                                        |         |         |           |                  |                           |                     |                                                   |                                                 |                          |                 |              |
| Vertical Offset from Line for Vertical Movement Calculations                | Segment                                                                | Start   | Length  | Curvature | Deflection Ratio | Average Horizontal Strain | Max. Tensile Strain | Maximum Gradient of Horizontal Displacement Curve | Maximum Gradient of Vertical Displacement Curve | Min. Radius of Curvature | Damage Category |              |
| [m]                                                                         |                                                                        | [m]     | [m]     |           | [%]              | [%]                       | [%]                 |                                                   |                                                 | [m]                      |                 |              |
| 0.0                                                                         | 1                                                                      | 3.6391  | 0.0     | None      | 0.0              | 0.0                       | 0.0                 | -282.82E-6                                        | -95.931E-6                                      | 17084.                   | 0               | (Negligible) |
| Tensile horizontal strains are +ve, compressive horizontal strains are -ve. |                                                                        |         |         |           |                  |                           |                     |                                                   |                                                 |                          |                 |              |
| Structure: W   Sub-structure:                                               |                                                                        |         |         |           |                  |                           |                     |                                                   |                                                 |                          |                 |              |
| Vertical Offset from Line for Vertical Movement Calculations                | Segment                                                                | Start   | Length  | Curvature | Deflection Ratio | Average Horizontal Strain | Max. Tensile Strain | Maximum Gradient of Horizontal Displacement Curve | Maximum Gradient of Vertical Displacement Curve | Min. Radius of Curvature | Damage Category |              |
| [m]                                                                         |                                                                        | [m]     | [m]     |           | [%]              | [%]                       | [%]                 |                                                   |                                                 | [m]                      |                 |              |
| 0.0                                                                         | 1                                                                      | 0.0     | 0.57009 | Sagging   | 0.0              | 0.0053346                 | 0.0053346           | -53.344E-6                                        | 53.569E-6                                       | 59139.                   | 0               | (Negligible) |
| Tensile horizontal strains are +ve, compressive horizontal strains are -ve. |                                                                        |         |         |           |                  |                           |                     |                                                   |                                                 |                          |                 |              |
| Structure: X   Sub-structure:                                               |                                                                        |         |         |           |                  |                           |                     |                                                   |                                                 |                          |                 |              |
| Vertical Offset from Line for Vertical Movement Calculations                | Segment                                                                | Start   | Length  | Curvature | Deflection Ratio | Average Horizontal Strain | Max. Tensile Strain | Maximum Gradient of Horizontal Displacement Curve | Maximum Gradient of Vertical Displacement Curve | Min. Radius of Curvature | Damage Category |              |
| [m]                                                                         |                                                                        | [m]     | [m]     |           | [%]              | [%]                       | [%]                 |                                                   |                                                 | [m]                      |                 |              |
| 0.0                                                                         | 1                                                                      | 6.8041  | 2.7064  | Sagging   | 56.742E-6        | 0.013802                  | 0.013829            | -149.00E-6                                        | -758.14E-6                                      | 6718.5                   | 0               | (Negligible) |
|                                                                             | 2                                                                      | 9.5105  | 0.20859 | None      | 0.0              | 0.014902                  | 0.014902            | -149.00E-6                                        | -180.19E-6                                      | 4.4001E+6                | 0               | (Negligible) |
| Tensile horizontal strains are +ve, compressive horizontal strains are -ve. |                                                                        |         |         |           |                  |                           |                     |                                                   |                                                 |                          |                 |              |
| Structure: Y   Sub-structure:                                               |                                                                        |         |         |           |                  |                           |                     |                                                   |                                                 |                          |                 |              |
| Vertical Offset from Line for Vertical Movement Calculations                | Segment                                                                | Start   | Length  | Curvature | Deflection Ratio | Average Horizontal Strain | Max. Tensile Strain | Maximum Gradient of Horizontal Displacement Curve | Maximum Gradient of Vertical Displacement Curve | Min. Radius of Curvature | Damage Category |              |
| [m]                                                                         |                                                                        | [m]     | [m]     |           | [%]              | [%]                       | [%]                 |                                                   |                                                 | [m]                      |                 |              |
| 0.0                                                                         | 1                                                                      | 0.0     | 3.6391  | Sagging   | 0.0              | 0.016684                  | 0.016684            | -182.02E-6                                        | -179.35E-6                                      | 427.94E+6                | 0               | (Negligible) |
| Tensile horizontal strains are +ve, compressive horizontal strains are -ve. |                                                                        |         |         |           |                  |                           |                     |                                                   |                                                 |                          |                 |              |
| Structure: Z   Sub-structure:                                               |                                                                        |         |         |           |                  |                           |                     |                                                   |                                                 |                          |                 |              |
| Vertical Offset from Line for Vertical Movement Calculations                | Segment                                                                | Start   | Length  | Curvature | Deflection Ratio | Average Horizontal Strain | Max. Tensile Strain | Maximum Gradient of Horizontal Displacement Curve | Maximum Gradient of Vertical Displacement Curve | Min. Radius of Curvature | Damage Category |              |
| [m]                                                                         |                                                                        | [m]     | [m]     |           | [%]              | [%]                       | [%]                 |                                                   |                                                 | [m]                      |                 |              |



# GEA LIMITED (GEOTECHNICAL & ENV ASSOC)

Rear of 159-163 King's Cross Road, London WC1X 9BN  
Wall Installation only Issue 4

| Job No.   | Sheet No.           | Rev.    |
|-----------|---------------------|---------|
| J16180    |                     |         |
| Drg. Ref. |                     |         |
| Made by   | Date<br>07-Mar-2017 | Checked |

|            |   |               |               |         |            |            |            |     |            |                  |              |
|------------|---|---------------|---------------|---------|------------|------------|------------|-----|------------|------------------|--------------|
| [m]<br>0.0 | 1 | [m]<br>5.7481 | [m]<br>1.9160 | Hogging | [%]<br>0.0 | [%]<br>0.0 | [%]<br>0.0 | 0.0 | -180.40E-6 | [m]<br>18945.0   | 0            |
|            | 2 | [m]<br>7.6641 | [m]<br>1.9150 | Sagging | 0.0        | 0.0        | 0.0        | 0.0 | -180.40E-6 | [m]<br>169.34E+9 | 0            |
|            |   |               |               |         |            |            |            |     |            |                  | (Negligible) |

Tensile horizontal strains are +ve, compressive horizontal strains are -ve.

Structure: AA | Sub-structure:

| Vertical Offset<br>from Line for<br>Vertical<br>Movement<br>Calculations | Segment | Start      | Length        | Curvature | Deflection<br>Ratio | Average<br>Horizontal<br>Strain | Max.<br>Tensile<br>Strain | Maximum<br>Gradient of<br>Horizontal<br>Displacement<br>Curve | Maximum<br>Gradient of<br>Vertical<br>Displacement<br>Curve | Min.<br>Radius of<br>Curvature | Damage<br>Category |
|--------------------------------------------------------------------------|---------|------------|---------------|-----------|---------------------|---------------------------------|---------------------------|---------------------------------------------------------------|-------------------------------------------------------------|--------------------------------|--------------------|
| [m]<br>0.0                                                               | 1       | [m]<br>0.0 | [m]<br>3.6610 | Sagging   | [%]<br>0.0          | [%]<br>0.015110                 | [%]<br>0.015110           | -159.08E-6                                                    | -182.60E-6                                                  | [m]<br>761.45E+6               | 0                  |
|                                                                          |         |            |               |           |                     |                                 |                           |                                                               |                                                             |                                | (Negligible)       |

Tensile horizontal strains are +ve, compressive horizontal strains are -ve.

Structure: AB | Sub-structure:

| Vertical Offset<br>from Line for<br>Vertical<br>Movement<br>Calculations | Segment | Start         | Length         | Curvature | Deflection<br>Ratio | Average<br>Horizontal<br>Strain | Max.<br>Tensile<br>Strain | Maximum<br>Gradient of<br>Horizontal<br>Displacement<br>Curve | Maximum<br>Gradient of<br>Vertical<br>Displacement<br>Curve | Min.<br>Radius of<br>Curvature | Damage<br>Category |
|--------------------------------------------------------------------------|---------|---------------|----------------|-----------|---------------------|---------------------------------|---------------------------|---------------------------------------------------------------|-------------------------------------------------------------|--------------------------------|--------------------|
| [m]<br>0.0                                                               | 1       | [m]<br>8.5163 | [m]<br>0.44421 | Sagging   | [%]<br>0.0          | [%]<br>0.0                      | [%]<br>0.0                | 0.0                                                           | -178.02E-6                                                  | [m]<br>23512.0                 | 0                  |
|                                                                          | 2       | [m]<br>8.9605 | [m]<br>0.50104 | Sagging   | 0.0                 | 0.0                             | 0.0                       | 0.0                                                           | -175.45E-6                                                  | [m]<br>20845.0                 | 0                  |
|                                                                          |         |               |                |           |                     |                                 |                           |                                                               |                                                             |                                | (Negligible)       |

Tensile horizontal strains are +ve, compressive horizontal strains are -ve.

Structure: AC | Sub-structure:

| Vertical Offset<br>from Line for<br>Vertical<br>Movement<br>Calculations | Segment | Start      | Length        | Curvature | Deflection<br>Ratio | Average<br>Horizontal<br>Strain | Max.<br>Tensile<br>Strain | Maximum<br>Gradient of<br>Horizontal<br>Displacement<br>Curve | Maximum<br>Gradient of<br>Vertical<br>Displacement<br>Curve | Min.<br>Radius of<br>Curvature | Damage<br>Category |
|--------------------------------------------------------------------------|---------|------------|---------------|-----------|---------------------|---------------------------------|---------------------------|---------------------------------------------------------------|-------------------------------------------------------------|--------------------------------|--------------------|
| [m]<br>0.0                                                               | 1       | [m]<br>0.0 | [m]<br>5.0794 | Sagging   | [%]<br>336.52E-6    | [%]<br>0.0039947                | [%]<br>0.0044826          | -102.28E-6                                                    | -171.41E-6                                                  | [m]<br>134410.0                | 0                  |
|                                                                          |         |            |               |           |                     |                                 |                           |                                                               |                                                             |                                | (Negligible)       |

Tensile horizontal strains are +ve, compressive horizontal strains are -ve.

Structure: AD | Sub-structure:

| Vertical Offset<br>from Line for<br>Vertical<br>Movement<br>Calculations | Segment | Start      | Length        | Curvature | Deflection<br>Ratio | Average<br>Horizontal<br>Strain | Max.<br>Tensile<br>Strain | Maximum<br>Gradient of<br>Horizontal<br>Displacement<br>Curve | Maximum<br>Gradient of<br>Vertical<br>Displacement<br>Curve | Min.<br>Radius of<br>Curvature | Damage<br>Category |
|--------------------------------------------------------------------------|---------|------------|---------------|-----------|---------------------|---------------------------------|---------------------------|---------------------------------------------------------------|-------------------------------------------------------------|--------------------------------|--------------------|
| [m]<br>0.0                                                               | 1       | [m]<br>0.0 | [m]<br>7.8628 | Sagging   | [%]<br>0.0          | [%]<br>0.023814                 | [%]<br>0.023815           | -316.46E-6                                                    | -199.96E-6                                                  | [m]<br>130.44E+6               | 0                  |
|                                                                          |         |            |               |           |                     |                                 |                           |                                                               |                                                             |                                | (Negligible)       |

Tensile horizontal strains are +ve, compressive horizontal strains are -ve.

Structure: AE | Sub-structure:

| Vertical Offset<br>from Line for<br>Vertical<br>Movement<br>Calculations | Segment | Start      | Length        | Curvature | Deflection<br>Ratio | Average<br>Horizontal<br>Strain | Max.<br>Tensile<br>Strain | Maximum<br>Gradient of<br>Horizontal<br>Displacement<br>Curve | Maximum<br>Gradient of<br>Vertical<br>Displacement<br>Curve | Min.<br>Radius of<br>Curvature | Damage<br>Category |
|--------------------------------------------------------------------------|---------|------------|---------------|-----------|---------------------|---------------------------------|---------------------------|---------------------------------------------------------------|-------------------------------------------------------------|--------------------------------|--------------------|
| [m]<br>0.0                                                               | 1       | [m]<br>0.0 | [m]<br>3.3051 | Sagging   | [%]<br>686.24E-6    | [%]<br>-0.0010690               | [%]<br>422.89E-6          | 22.100E-6                                                     | 61.633E-6                                                   | [m]<br>56990.0                 | 0                  |
|                                                                          |         |            |               |           |                     |                                 |                           |                                                               |                                                             |                                | (Negligible)       |

Tensile horizontal strains are +ve, compressive horizontal strains are -ve.

Structure: AF | Sub-structure:

| Vertical Offset<br>from Line for<br>Vertical<br>Movement<br>Calculations | Segment | Start      | Length        | Curvature | Deflection<br>Ratio | Average<br>Horizontal<br>Strain | Max.<br>Tensile<br>Strain | Maximum<br>Gradient of<br>Horizontal<br>Displacement<br>Curve | Maximum<br>Gradient of<br>Vertical<br>Displacement<br>Curve | Min.<br>Radius of<br>Curvature | Damage<br>Category |
|--------------------------------------------------------------------------|---------|------------|---------------|-----------|---------------------|---------------------------------|---------------------------|---------------------------------------------------------------|-------------------------------------------------------------|--------------------------------|--------------------|
| [m]<br>0.0                                                               | 1       | [m]<br>0.0 | [m]<br>3.2130 | Sagging   | [%]<br>515.01E-6    | [%]<br>-0.029263                | [%]<br>0.0050586          | 0.0021989                                                     | 199.40E-6                                                   | [m]<br>24051.0                 | 0                  |
|                                                                          |         |            |               |           |                     |                                 |                           |                                                               |                                                             |                                | (Negligible)       |

Tensile horizontal strains are +ve, compressive horizontal strains are -ve.

Structure: AG | Sub-structure:

| Vertical Offset<br>from Line for<br>Vertical<br>Movement<br>Calculations | Segment | Start         | Length        | Curvature | Deflection<br>Ratio | Average<br>Horizontal<br>Strain | Max.<br>Tensile<br>Strain | Maximum<br>Gradient of<br>Horizontal<br>Displacement<br>Curve | Maximum<br>Gradient of<br>Vertical<br>Displacement<br>Curve | Min.<br>Radius of<br>Curvature | Damage<br>Category |
|--------------------------------------------------------------------------|---------|---------------|---------------|-----------|---------------------|---------------------------------|---------------------------|---------------------------------------------------------------|-------------------------------------------------------------|--------------------------------|--------------------|
| [m]<br>0.0                                                               | 1       | [m]<br>0.0    | [m]<br>11.652 | Sagging   | [%]<br>0.0017119    | [%]<br>0.0011028                | [%]<br>0.0033851          | 461.88E-6                                                     | 193.59E-6                                                   | [m]<br>24828.0                 | 0                  |
|                                                                          | 2       | [m]<br>11.652 | [m]<br>3.5850 | Sagging   | [%]<br>37.502E-6    | [%]<br>0.0023340                | [%]<br>0.0023805          | -49.792E-6                                                    | 195.11E-6                                                   | [m]<br>31904.0                 | 0                  |
|                                                                          |         |               |               |           |                     |                                 |                           |                                                               |                                                             |                                | (Negligible)       |

Tensile horizontal strains are +ve, compressive horizontal strains are -ve.

Structure: AH | Sub-structure:

| Vertical Offset<br>from Line for<br>Vertical<br>Movement<br>Calculations | Segment | Start      | Length        | Curvature | Deflection<br>Ratio | Average<br>Horizontal<br>Strain | Max.<br>Tensile<br>Strain | Maximum<br>Gradient of<br>Horizontal<br>Displacement<br>Curve | Maximum<br>Gradient of<br>Vertical<br>Displacement<br>Curve | Min.<br>Radius of<br>Curvature | Damage<br>Category |
|--------------------------------------------------------------------------|---------|------------|---------------|-----------|---------------------|---------------------------------|---------------------------|---------------------------------------------------------------|-------------------------------------------------------------|--------------------------------|--------------------|
| [m]<br>0.0                                                               | 1       | [m]<br>0.0 | [m]<br>6.3378 | Sagging   | [%]<br>818.82E-6    | [%]<br>0.0069390                | [%]<br>0.0073579          | -134.73E-6                                                    | -175.94E-6                                                  | [m]<br>50441.0                 | 0                  |
|                                                                          |         |            |               |           |                     |                                 |                           |                                                               |                                                             |                                | (Negligible)       |

Tensile horizontal strains are +ve, compressive horizontal strains are -ve.

Structure: AI | Sub-structure: Sub #

| Vertical Offset<br>from Line for<br>Vertical<br>Movement<br>Calculations | Segment | Start      | Length        | Curvature | Deflection<br>Ratio | Average<br>Horizontal<br>Strain | Max.<br>Tensile<br>Strain | Maximum<br>Gradient of<br>Horizontal<br>Displacement<br>Curve | Maximum<br>Gradient of<br>Vertical<br>Displacement<br>Curve | Min.<br>Radius of<br>Curvature | Damage<br>Category |
|--------------------------------------------------------------------------|---------|------------|---------------|-----------|---------------------|---------------------------------|---------------------------|---------------------------------------------------------------|-------------------------------------------------------------|--------------------------------|--------------------|
| [m]<br>0.0                                                               | 1       | [m]<br>0.0 | [m]<br>4.8498 | Sagging   | [%]<br>293.53E-6    | [%]<br>0.014941                 | [%]<br>0.015057           | -162.98E-6                                                    | 187.89E-6                                                   | [m]<br>121050.0                | 0                  |
|                                                                          |         |            |               |           |                     |                                 |                           |                                                               |                                                             |                                | (Negligible)       |

Tensile horizontal strains are +ve, compressive horizontal strains are -ve.



# GEA LIMITED (GEOTECHNICAL & ENV ASSOC)

Rear of 159-163 King's Cross Road, London WC1X 9BN  
Wall Installation only Issue 4

| Job No.   | Sheet No.           | Rev.    |
|-----------|---------------------|---------|
| J16180    |                     |         |
| Drg. Ref. |                     |         |
| Made by   | Date<br>07-Mar-2017 | Checked |

| Vertical Offset<br>from Line for<br>Vertical<br>Movement                    | Segment | Start   | Length  | Curvature | Deflection<br>Ratio | Average<br>Horizontal<br>Strain | Max.<br>Tensile<br>Strain | Maximum<br>Gradient of<br>Horizontal<br>Displacement          | Maximum<br>Gradient of<br>Vertical<br>Displacement          | Min.<br>Radius of<br>Curvature | Damage<br>Category |
|-----------------------------------------------------------------------------|---------|---------|---------|-----------|---------------------|---------------------------------|---------------------------|---------------------------------------------------------------|-------------------------------------------------------------|--------------------------------|--------------------|
| Structure: AJ   Sub-structure: Sub #                                        |         |         |         |           |                     |                                 |                           |                                                               |                                                             |                                |                    |
| Vertical Offset<br>from Line for<br>Vertical<br>Movement<br>Calculations    | Segment | Start   | Length  | Curvature | Deflection<br>Ratio | Average<br>Horizontal<br>Strain | Max.<br>Tensile<br>Strain | Maximum<br>Gradient of<br>Horizontal<br>Displacement<br>Curve | Maximum<br>Gradient of<br>Vertical<br>Displacement<br>Curve | Min.<br>Radius of<br>Curvature | Damage<br>Category |
| [m]<br>0.0                                                                  |         | [m]     | [m]     |           | [%]                 | [%]                             | [%]                       |                                                               |                                                             | [m]                            |                    |
|                                                                             | 1       | 0.0     | 5.9785  | Sagging   | 904.77E-6           | -0.0024738                      | 736.61E-6                 | 55.654E-6                                                     | -52.027E-6                                                  | 51448.                         | 0<br>(Negligible)  |
|                                                                             | 2       | 5.9785  | 0.99641 | None      | 0.0                 | 2.1408E-6                       | 2.1100E-6                 | 0.0                                                           | 2.1114E-6                                                   | -                              | 0<br>(Negligible)  |
|                                                                             | 3       | 6.9749  | 1.9918  | Sagging   | 0.0                 | 2.1389E-6                       | 2.1100E-6                 | 0.0                                                           | 2.1114E-6                                                   | 17.599E+12                     | 0<br>(Negligible)  |
| Tensile horizontal strains are +ve, compressive horizontal strains are -ve. |         |         |         |           |                     |                                 |                           |                                                               |                                                             |                                |                    |
| Structure: AK   Sub-structure: Sub #                                        |         |         |         |           |                     |                                 |                           |                                                               |                                                             |                                |                    |
| Vertical Offset<br>from Line for<br>Vertical<br>Movement<br>Calculations    | Segment | Start   | Length  | Curvature | Deflection<br>Ratio | Average<br>Horizontal<br>Strain | Max.<br>Tensile<br>Strain | Maximum<br>Gradient of<br>Horizontal<br>Displacement<br>Curve | Maximum<br>Gradient of<br>Vertical<br>Displacement<br>Curve | Min.<br>Radius of<br>Curvature | Damage<br>Category |
| [m]<br>0.0                                                                  |         | [m]     | [m]     |           | [%]                 | [%]                             | [%]                       |                                                               |                                                             | [m]                            |                    |
|                                                                             | 1       | 0.0     | 4.9487  | Sagging   | 0.0                 | 0.023222                        | 0.023222                  | -273.73E-6                                                    | -199.95E-6                                                  | 196.80E+6                      | 0<br>(Negligible)  |
| Tensile horizontal strains are +ve, compressive horizontal strains are -ve. |         |         |         |           |                     |                                 |                           |                                                               |                                                             |                                |                    |
| Structure: AL   Sub-structure: Sub #                                        |         |         |         |           |                     |                                 |                           |                                                               |                                                             |                                |                    |
| Vertical Offset<br>from Line for<br>Vertical<br>Movement<br>Calculations    | Segment | Start   | Length  | Curvature | Deflection<br>Ratio | Average<br>Horizontal<br>Strain | Max.<br>Tensile<br>Strain | Maximum<br>Gradient of<br>Horizontal<br>Displacement<br>Curve | Maximum<br>Gradient of<br>Vertical<br>Displacement<br>Curve | Min.<br>Radius of<br>Curvature | Damage<br>Category |
| [m]<br>0.0                                                                  |         | [m]     | [m]     |           | [%]                 | [%]                             | [%]                       |                                                               |                                                             | [m]                            |                    |
|                                                                             | 1       | 0.0     | 1.8953  | Sagging   | 0.0                 | 1.2333E-6                       | 1.2517E-6                 | 0.0                                                           | 1.3112E-6                                                   | 14.233E+12                     | 0<br>(Negligible)  |
|                                                                             | 2       | 1.8953  | 0.0     | None      | 0.0                 | 0.0                             | 0.0                       | 0.0                                                           | 1.3112E-6                                                   | -                              | 0<br>(Negligible)  |
|                                                                             | 3       | 1.8953  | 1.3050  | Sagging   | 0.0                 | 1.2320E-6                       | 1.2517E-6                 | 0.0                                                           | 1.3112E-6                                                   | 33.477E+12                     | 0<br>(Negligible)  |
|                                                                             | 4       | 3.2002  | 1.5369  | Sagging   | 0.0                 | 1.2310E-6                       | 1.2517E-6                 | 0.0                                                           | 1.3112E-6                                                   | 3.7263E+12                     | 0<br>(Negligible)  |
| Tensile horizontal strains are +ve, compressive horizontal strains are -ve. |         |         |         |           |                     |                                 |                           |                                                               |                                                             |                                |                    |
| Structure: AM   Sub-structure: Sub #                                        |         |         |         |           |                     |                                 |                           |                                                               |                                                             |                                |                    |
| Vertical Offset<br>from Line for<br>Vertical<br>Movement<br>Calculations    | Segment | Start   | Length  | Curvature | Deflection<br>Ratio | Average<br>Horizontal<br>Strain | Max.<br>Tensile<br>Strain | Maximum<br>Gradient of<br>Horizontal<br>Displacement<br>Curve | Maximum<br>Gradient of<br>Vertical<br>Displacement<br>Curve | Min.<br>Radius of<br>Curvature | Damage<br>Category |
| [m]<br>0.0                                                                  |         | [m]     | [m]     |           | [%]                 | [%]                             | [%]                       |                                                               |                                                             | [m]                            |                    |
|                                                                             | 1       | 0.0     | 2.7064  | Sagging   | 0.0                 | 0.025197                        | 0.025197                  | -273.10E-6                                                    | 199.60E-6                                                   | 196.75E+6                      | 0<br>(Negligible)  |
| Tensile horizontal strains are +ve, compressive horizontal strains are -ve. |         |         |         |           |                     |                                 |                           |                                                               |                                                             |                                |                    |
| Structure: AN   Sub-structure: Sub #                                        |         |         |         |           |                     |                                 |                           |                                                               |                                                             |                                |                    |
| Vertical Offset<br>from Line for<br>Vertical<br>Movement<br>Calculations    | Segment | Start   | Length  | Curvature | Deflection<br>Ratio | Average<br>Horizontal<br>Strain | Max.<br>Tensile<br>Strain | Maximum<br>Gradient of<br>Horizontal<br>Displacement<br>Curve | Maximum<br>Gradient of<br>Vertical<br>Displacement<br>Curve | Min.<br>Radius of<br>Curvature | Damage<br>Category |
| [m]<br>0.0                                                                  |         | [m]     | [m]     |           | [%]                 | [%]                             | [%]                       |                                                               |                                                             | [m]                            |                    |
|                                                                             | 1       | 0.0     | 0.83442 | Hogging   | 0.0                 | 6.3509E-6                       | 6.3300E-6                 | 0.0                                                           | -3.3683E-6                                                  | 18.792E+12                     | 0<br>(Negligible)  |
|                                                                             | 2       | 0.83442 | 2.5022  | Sagging   | 3.9225E-6           | -562.61E-6                      | 112.55E-6                 | 17.019E-6                                                     | -3.3683E-6                                                  | 3.7769E+6                      | 0<br>(Negligible)  |
| Tensile horizontal strains are +ve, compressive horizontal strains are -ve. |         |         |         |           |                     |                                 |                           |                                                               |                                                             |                                |                    |
| Structure: AO   Sub-structure: Sub #                                        |         |         |         |           |                     |                                 |                           |                                                               |                                                             |                                |                    |
| Vertical Offset<br>from Line for<br>Vertical<br>Movement<br>Calculations    | Segment | Start   | Length  | Curvature | Deflection<br>Ratio | Average<br>Horizontal<br>Strain | Max.<br>Tensile<br>Strain | Maximum<br>Gradient of<br>Horizontal<br>Displacement<br>Curve | Maximum<br>Gradient of<br>Vertical<br>Displacement<br>Curve | Min.<br>Radius of<br>Curvature | Damage<br>Category |
| [m]<br>0.0                                                                  |         | [m]     | [m]     |           | [%]                 | [%]                             | [%]                       |                                                               |                                                             | [m]                            |                    |
|                                                                             | 1       | 0.0     | 2.5169  | Sagging   | 1.2784E-6           | 0.025126                        | 0.025126                  | -270.60E-6                                                    | -199.86E-6                                                  | 18.121E+6                      | 0<br>(Negligible)  |
| Tensile horizontal strains are +ve, compressive horizontal strains are -ve. |         |         |         |           |                     |                                 |                           |                                                               |                                                             |                                |                    |
| Structure: AP   Sub-structure: Sub #                                        |         |         |         |           |                     |                                 |                           |                                                               |                                                             |                                |                    |
| Vertical Offset<br>from Line for<br>Vertical<br>Movement<br>Calculations    | Segment | Start   | Length  | Curvature | Deflection<br>Ratio | Average<br>Horizontal<br>Strain | Max.<br>Tensile<br>Strain | Maximum<br>Gradient of<br>Horizontal<br>Displacement<br>Curve | Maximum<br>Gradient of<br>Vertical<br>Displacement<br>Curve | Min.<br>Radius of<br>Curvature | Damage<br>Category |
| [m]<br>0.0                                                                  |         | [m]     | [m]     |           | [%]                 | [%]                             | [%]                       |                                                               |                                                             | [m]                            |                    |
|                                                                             | 1       | 0.0     | 4.4543  | Sagging   | 0.0016623           | -0.017895                       | 0.0037032                 | 321.92E-6                                                     | 125.86E-6                                                   | 25453.                         | 0<br>(Negligible)  |
| Tensile horizontal strains are +ve, compressive horizontal strains are -ve. |         |         |         |           |                     |                                 |                           |                                                               |                                                             |                                |                    |
| Structure: AQ   Sub-structure: Sub #                                        |         |         |         |           |                     |                                 |                           |                                                               |                                                             |                                |                    |
| Vertical Offset<br>from Line for<br>Vertical<br>Movement<br>Calculations    | Segment | Start   | Length  | Curvature | Deflection<br>Ratio | Average<br>Horizontal<br>Strain | Max.<br>Tensile<br>Strain | Maximum<br>Gradient of<br>Horizontal<br>Displacement<br>Curve | Maximum<br>Gradient of<br>Vertical<br>Displacement<br>Curve | Min.<br>Radius of<br>Curvature | Damage<br>Category |
| [m]<br>0.0                                                                  |         | [m]     | [m]     |           | [%]                 | [%]                             | [%]                       |                                                               |                                                             | [m]                            |                    |
|                                                                             | 1       | 0.0     | 4.9487  | Sagging   | 418.97E-6           | 0.011494                        | 0.011663                  | -142.20E-6                                                    | 179.74E-6                                                   | 92298.                         | 0<br>(Negligible)  |
| Tensile horizontal strains are +ve, compressive horizontal strains are -ve. |         |         |         |           |                     |                                 |                           |                                                               |                                                             |                                |                    |
| Structure: AR   Sub-structure: Sub #                                        |         |         |         |           |                     |                                 |                           |                                                               |                                                             |                                |                    |
| Vertical Offset<br>from Line for<br>Vertical<br>Movement<br>Calculations    | Segment | Start   | Length  | Curvature | Deflection<br>Ratio | Average<br>Horizontal<br>Strain | Max.<br>Tensile<br>Strain | Maximum<br>Gradient of<br>Horizontal<br>Displacement<br>Curve | Maximum<br>Gradient of<br>Vertical<br>Displacement<br>Curve | Min.<br>Radius of<br>Curvature | Damage<br>Category |
| [m]<br>0.0                                                                  |         | [m]     | [m]     |           | [%]                 | [%]                             | [%]                       |                                                               |                                                             | [m]                            |                    |
|                                                                             | 1       | 0.0     | 0.94198 | None      | 0.0                 | 0.0                             | 0.0                       | 0.0                                                           | -200.00E-6                                                  | 89.267E+9                      | 0                  |



GEA LIMITED  
(GEOTECHNICAL & ENV ASSOC)

Rear of 159-163 King's Cross Road, London WC1X 9BN  
Wall Installation only Issue 4

| Job No.   | Sheet No.           | Rev.    |
|-----------|---------------------|---------|
| J16180    |                     |         |
| Drg. Ref. |                     |         |
| Made by   | Date<br>07-Mar-2017 | Checked |

| Vertical Offset from Line for Vertical Movement                             | Segment | Start     | Length | Curvature | Deflection Ratio | Average Horizontal Strain | Max. Tensile Strain | Maximum Gradient of Horizontal Displacement | Maximum Gradient of Vertical Displacement | Min. Radius of Curvature | Damage Category   |
|-----------------------------------------------------------------------------|---------|-----------|--------|-----------|------------------|---------------------------|---------------------|---------------------------------------------|-------------------------------------------|--------------------------|-------------------|
| -                                                                           |         | 2 0.94198 | 7.5287 | Sagging   | 0.0              | 0.013329                  | 0.013330            | -215.70E-6                                  | -200.00E-6                                | 68.343E+6                | (Negligible)<br>0 |
| Tensile horizontal strains are +ve, compressive horizontal strains are -ve. |         |           |        |           |                  |                           |                     |                                             |                                           |                          |                   |

Structure: AS | Sub-structure: Sub #

| Vertical Offset from Line for Vertical Movement Calculations                | Segment | Start           | Length         | Curvature | Deflection Ratio | Average Horizontal Strain | Max. Tensile Strain | Maximum Gradient of Horizontal Displacement Curve | Maximum Gradient of Vertical Displacement Curve | Min. Radius of Curvature | Damage Category   |
|-----------------------------------------------------------------------------|---------|-----------------|----------------|-----------|------------------|---------------------------|---------------------|---------------------------------------------------|-------------------------------------------------|--------------------------|-------------------|
| [m]<br>0.0                                                                  |         | [m]<br>1 1.8137 | [m]<br>0.90683 | None      | [%]<br>0.0       | [%]<br>0.0                | [%]<br>0.0          | 0.0                                               | -199.99E-6                                      | [m]<br>19016.            | 0<br>(Negligible) |
|                                                                             |         | 2 2.7205        | 0.0            | None      | 0.0              | 0.0                       | 0.0                 | 0.0                                               | -199.99E-6                                      | -                        | 0<br>(Negligible) |
|                                                                             |         | 3 2.7205        | 5.4400         | Sagging   | 0.0              | 0.010196                  | 0.010196            | -187.90E-6                                        | -199.99E-6                                      | 62.262E+6                | 0<br>(Negligible) |
| Tensile horizontal strains are +ve, compressive horizontal strains are -ve. |         |                 |                |           |                  |                           |                     |                                                   |                                                 |                          |                   |

Structure: AT | Sub-structure: Sub #

| Vertical Offset from Line for Vertical Movement Calculations                | Segment | Start           | Length        | Curvature | Deflection Ratio | Average Horizontal Strain | Max. Tensile Strain | Maximum Gradient of Horizontal Displacement Curve | Maximum Gradient of Vertical Displacement Curve | Min. Radius of Curvature | Damage Category   |
|-----------------------------------------------------------------------------|---------|-----------------|---------------|-----------|------------------|---------------------------|---------------------|---------------------------------------------------|-------------------------------------------------|--------------------------|-------------------|
| [m]<br>0.0                                                                  |         | [m]<br>1 1.8461 | [m]<br>1.6386 | None      | [%]<br>0.0       | [%]<br>0.0                | [%]<br>0.0          | 0.0                                               | -180.33E-6                                      | [m]<br>191570.           | 0<br>(Negligible) |
|                                                                             |         | 2 3.4847        | 7.5909        | Sagging   | 661.94E-6        | 0.0072829                 | 0.0076835           | -117.56E-6                                        | -180.33E-6                                      | 89349.                   | 0<br>(Negligible) |
| Tensile horizontal strains are +ve, compressive horizontal strains are -ve. |         |                 |               |           |                  |                           |                     |                                                   |                                                 |                          |                   |

Structure: AU | Sub-structure:

| Vertical Offset from Line for Vertical Movement Calculations                | Segment | Start        | Length        | Curvature | Deflection Ratio | Average Horizontal Strain | Max. Tensile Strain | Maximum Gradient of Horizontal Displacement Curve | Maximum Gradient of Vertical Displacement Curve | Min. Radius of Curvature | Damage Category |
|-----------------------------------------------------------------------------|---------|--------------|---------------|-----------|------------------|---------------------------|---------------------|---------------------------------------------------|-------------------------------------------------|--------------------------|-----------------|
| [m]<br>0.0                                                                  |         | [m]<br>1 0.4 | [m]<br>0.4445 | Hogging   | [%]<br>0.0090691 | [%]<br>0.052345           | [%]<br>0.058705     | -666.16E-6                                        | 799.97E-6                                       | [m]<br>5775.4            | 1 (Very Slight) |
| Tensile horizontal strains are +ve, compressive horizontal strains are -ve. |         |              |               |           |                  |                           |                     |                                                   |                                                 |                          |                 |

Structure: AV | Sub-structure:

| Vertical Offset from Line for Vertical Movement Calculations                | Segment | Start                                                                         | Length | Curvature | Deflection Ratio | Average Horizontal Strain | Max. Tensile Strain | Maximum Gradient of Horizontal Displacement Curve | Maximum Gradient of Vertical Displacement Curve | Min. Radius of Curvature | Damage Category |
|-----------------------------------------------------------------------------|---------|-------------------------------------------------------------------------------|--------|-----------|------------------|---------------------------|---------------------|---------------------------------------------------|-------------------------------------------------|--------------------------|-----------------|
| [m]<br>0.0                                                                  |         | [m]<br>All settlements are less than the Settlement Trough Limit Sensitivity. | [m]    |           | [%]              | [%]                       | [%]                 |                                                   |                                                 | [m]                      |                 |
| Tensile horizontal strains are +ve, compressive horizontal strains are -ve. |         |                                                                               |        |           |                  |                           |                     |                                                   |                                                 |                          |                 |

Structure: AW | Sub-structure:

| Vertical Offset from Line for Vertical Movement Calculations                | Segment | Start           | Length        | Curvature | Deflection Ratio | Average Horizontal Strain | Max. Tensile Strain | Maximum Gradient of Horizontal Displacement Curve | Maximum Gradient of Vertical Displacement Curve | Min. Radius of Curvature | Damage Category   |
|-----------------------------------------------------------------------------|---------|-----------------|---------------|-----------|------------------|---------------------------|---------------------|---------------------------------------------------|-------------------------------------------------|--------------------------|-------------------|
| [m]<br>0.0                                                                  |         | [m]<br>1 3.7739 | [m]<br>7.5468 | Hogging   | [%]<br>0.0084823 | [%]<br>0.022198           | [%]<br>0.031327     | -334.33E-6                                        | -617.02E-6                                      | [m]<br>9027.7            | 0<br>(Negligible) |
| Tensile horizontal strains are +ve, compressive horizontal strains are -ve. |         |                 |               |           |                  |                           |                     |                                                   |                                                 |                          |                   |

Specific Building Damage Results - Critical Values for All Segments within Each Sub-Structure

Structure: A | Sub-structure:

| Vertical Offset from Line for Vertical Movement Calculations | Deflection Ratio | Average Horizontal Strain | Maximum Slope | Maximum Settlement | Max. Tensile Strain | Maximum Gradient of Horizontal Displacement Curve | Maximum Gradient of Vertical Displacement Curve | Min. Radius of Curvature (Hogging) | Min. Radius of Curvature (Sagging) | Damage Category |
|--------------------------------------------------------------|------------------|---------------------------|---------------|--------------------|---------------------|---------------------------------------------------|-------------------------------------------------|------------------------------------|------------------------------------|-----------------|
| [m]<br>0.0                                                   | [%]              | [%]                       |               | [mm]               | [%]                 |                                                   |                                                 | [m]                                | [m]                                |                 |

Structure: B | Sub-structure:

| Vertical Offset from Line for Vertical Movement Calculations | Deflection Ratio | Average Horizontal Strain | Maximum Slope | Maximum Settlement | Max. Tensile Strain | Maximum Gradient of Horizontal Displacement Curve | Maximum Gradient of Vertical Displacement Curve | Min. Radius of Curvature (Hogging) | Min. Radius of Curvature (Sagging) | Damage Category |
|--------------------------------------------------------------|------------------|---------------------------|---------------|--------------------|---------------------|---------------------------------------------------|-------------------------------------------------|------------------------------------|------------------------------------|-----------------|
| [m]<br>0.0                                                   | [%]              | [%]                       |               | [mm]               | [%]                 |                                                   |                                                 | [m]                                | [m]                                |                 |

Structure: C | Sub-structure:

| Vertical Offset from Line for Vertical Movement Calculations | Deflection Ratio | Average Horizontal Strain | Maximum Slope | Maximum Settlement | Max. Tensile Strain | Maximum Gradient of Horizontal Displacement Curve | Maximum Gradient of Vertical Displacement Curve | Min. Radius of Curvature (Hogging) | Min. Radius of Curvature (Sagging) | Damage Category |
|--------------------------------------------------------------|------------------|---------------------------|---------------|--------------------|---------------------|---------------------------------------------------|-------------------------------------------------|------------------------------------|------------------------------------|-----------------|
| [m]<br>0.0                                                   | [%]<br>0.0       | [%]<br>0.019322           | -198.32E-6    | [mm]<br>0.36895    | [%]<br>0.019322     | -254.49E-6                                        | -198.32E-6                                      | [m]<br>10232.                      | [m]<br>-                           | 0 (Negligible)  |

Structure: D | Sub-structure:

| Vertical Offset from Line for Vertical Movement Calculations | Deflection Ratio | Average Horizontal Strain | Maximum Slope | Maximum Settlement | Max. Tensile Strain | Maximum Gradient of Horizontal Displacement Curve | Maximum Gradient of Vertical Displacement Curve | Min. Radius of Curvature (Hogging) | Min. Radius of Curvature (Sagging) | Damage Category |
|--------------------------------------------------------------|------------------|---------------------------|---------------|--------------------|---------------------|---------------------------------------------------|-------------------------------------------------|------------------------------------|------------------------------------|-----------------|
| [m]<br>0.0                                                   | [%]<br>966.79E-6 | [%]<br>0.0064624          | 159.45E-6     | [mm]<br>0.36915    | [%]<br>0.0065809    | -201.53E-6                                        | 159.45E-6                                       | [m]<br>21589.                      | [m]<br>-                           | 0 (Negligible)  |

Structure: E | Sub-structure:



# GEA LIMITED (GEOTECHNICAL & ENV ASSOC)

Rear of 159-163 King's Cross Road, London WC1X 9BN  
Wall Installation only Issue 4

| Job No.   | Sheet No.           | Rev.    |
|-----------|---------------------|---------|
| J16180    |                     |         |
| Drg. Ref. |                     |         |
| Made by   | Date<br>07-Mar-2017 | Checked |

| Vertical<br>Offset from<br>Line for<br>Vertical<br>Movement<br>Calculations<br>[m] | Deflection<br>Ratio<br>[%] | Average<br>Horizontal<br>Strain<br>[%] | Maximum<br>Slope | Maximum<br>Settlement<br>[mm] | Max.<br>Tensile<br>Strain<br>[%] | Maximum<br>Gradient of<br>Horizontal<br>Displacement<br>Curve<br>[mm] | Maximum<br>Gradient of<br>Vertical<br>Displacement<br>Curve<br>[mm] | Min.<br>Radius of<br>Curvature<br>(Hogging)<br>[m] | Min.<br>Radius of<br>Curvature<br>(Sagging)<br>[m] | Damage Category |
|------------------------------------------------------------------------------------|----------------------------|----------------------------------------|------------------|-------------------------------|----------------------------------|-----------------------------------------------------------------------|---------------------------------------------------------------------|----------------------------------------------------|----------------------------------------------------|-----------------|
| Structure: F   Sub-structure:                                                      |                            |                                        |                  |                               |                                  |                                                                       |                                                                     |                                                    |                                                    |                 |
| Vertical<br>Offset from<br>Line for<br>Vertical<br>Movement<br>Calculations<br>[m] | Deflection<br>Ratio<br>[%] | Average<br>Horizontal<br>Strain<br>[%] | Maximum<br>Slope | Maximum<br>Settlement<br>[mm] | Max.<br>Tensile<br>Strain<br>[%] | Maximum<br>Gradient of<br>Horizontal<br>Displacement<br>Curve<br>[mm] | Maximum<br>Gradient of<br>Vertical<br>Displacement<br>Curve<br>[mm] | Min.<br>Radius of<br>Curvature<br>(Hogging)<br>[m] | Min.<br>Radius of<br>Curvature<br>(Sagging)<br>[m] | Damage Category |
| Structure: F   Sub-structure:                                                      |                            |                                        |                  |                               |                                  |                                                                       |                                                                     |                                                    |                                                    |                 |
| Structure: G   Sub-structure:                                                      |                            |                                        |                  |                               |                                  |                                                                       |                                                                     |                                                    |                                                    |                 |
| Vertical<br>Offset from<br>Line for<br>Vertical<br>Movement<br>Calculations<br>[m] | Deflection<br>Ratio<br>[%] | Average<br>Horizontal<br>Strain<br>[%] | Maximum<br>Slope | Maximum<br>Settlement<br>[mm] | Max.<br>Tensile<br>Strain<br>[%] | Maximum<br>Gradient of<br>Horizontal<br>Displacement<br>Curve<br>[mm] | Maximum<br>Gradient of<br>Vertical<br>Displacement<br>Curve<br>[mm] | Min.<br>Radius of<br>Curvature<br>(Hogging)<br>[m] | Min.<br>Radius of<br>Curvature<br>(Sagging)<br>[m] | Damage Category |
| Structure: G   Sub-structure:                                                      |                            |                                        |                  |                               |                                  |                                                                       |                                                                     |                                                    |                                                    |                 |
| Structure: H   Sub-structure:                                                      |                            |                                        |                  |                               |                                  |                                                                       |                                                                     |                                                    |                                                    |                 |
| Vertical<br>Offset from<br>Line for<br>Vertical<br>Movement<br>Calculations<br>[m] | Deflection<br>Ratio<br>[%] | Average<br>Horizontal<br>Strain<br>[%] | Maximum<br>Slope | Maximum<br>Settlement<br>[mm] | Max.<br>Tensile<br>Strain<br>[%] | Maximum<br>Gradient of<br>Horizontal<br>Displacement<br>Curve<br>[mm] | Maximum<br>Gradient of<br>Vertical<br>Displacement<br>Curve<br>[mm] | Min.<br>Radius of<br>Curvature<br>(Hogging)<br>[m] | Min.<br>Radius of<br>Curvature<br>(Sagging)<br>[m] | Damage Category |
| Structure: H   Sub-structure:                                                      |                            |                                        |                  |                               |                                  |                                                                       |                                                                     |                                                    |                                                    |                 |
| Structure: I   Sub-structure:                                                      |                            |                                        |                  |                               |                                  |                                                                       |                                                                     |                                                    |                                                    |                 |
| Vertical<br>Offset from<br>Line for<br>Vertical<br>Movement<br>Calculations<br>[m] | Deflection<br>Ratio<br>[%] | Average<br>Horizontal<br>Strain<br>[%] | Maximum<br>Slope | Maximum<br>Settlement<br>[mm] | Max.<br>Tensile<br>Strain<br>[%] | Maximum<br>Gradient of<br>Horizontal<br>Displacement<br>Curve<br>[mm] | Maximum<br>Gradient of<br>Vertical<br>Displacement<br>Curve<br>[mm] | Min.<br>Radius of<br>Curvature<br>(Hogging)<br>[m] | Min.<br>Radius of<br>Curvature<br>(Sagging)<br>[m] | Damage Category |
| Structure: I   Sub-structure:                                                      |                            |                                        |                  |                               |                                  |                                                                       |                                                                     |                                                    |                                                    |                 |
| Structure: J   Sub-structure:                                                      |                            |                                        |                  |                               |                                  |                                                                       |                                                                     |                                                    |                                                    |                 |
| Vertical<br>Offset from<br>Line for<br>Vertical<br>Movement<br>Calculations<br>[m] | Deflection<br>Ratio<br>[%] | Average<br>Horizontal<br>Strain<br>[%] | Maximum<br>Slope | Maximum<br>Settlement<br>[mm] | Max.<br>Tensile<br>Strain<br>[%] | Maximum<br>Gradient of<br>Horizontal<br>Displacement<br>Curve<br>[mm] | Maximum<br>Gradient of<br>Vertical<br>Displacement<br>Curve<br>[mm] | Min.<br>Radius of<br>Curvature<br>(Hogging)<br>[m] | Min.<br>Radius of<br>Curvature<br>(Sagging)<br>[m] | Damage Category |
| Structure: J   Sub-structure:                                                      |                            |                                        |                  |                               |                                  |                                                                       |                                                                     |                                                    |                                                    |                 |
| Structure: K   Sub-structure:                                                      |                            |                                        |                  |                               |                                  |                                                                       |                                                                     |                                                    |                                                    |                 |
| Vertical<br>Offset from<br>Line for<br>Vertical<br>Movement<br>Calculations<br>[m] | Deflection<br>Ratio<br>[%] | Average<br>Horizontal<br>Strain<br>[%] | Maximum<br>Slope | Maximum<br>Settlement<br>[mm] | Max.<br>Tensile<br>Strain<br>[%] | Maximum<br>Gradient of<br>Horizontal<br>Displacement<br>Curve<br>[mm] | Maximum<br>Gradient of<br>Vertical<br>Displacement<br>Curve<br>[mm] | Min.<br>Radius of<br>Curvature<br>(Hogging)<br>[m] | Min.<br>Radius of<br>Curvature<br>(Sagging)<br>[m] | Damage Category |
| Structure: K   Sub-structure:                                                      |                            |                                        |                  |                               |                                  |                                                                       |                                                                     |                                                    |                                                    |                 |
| Structure: L   Sub-structure:                                                      |                            |                                        |                  |                               |                                  |                                                                       |                                                                     |                                                    |                                                    |                 |
| Vertical<br>Offset from<br>Line for<br>Vertical<br>Movement<br>Calculations<br>[m] | Deflection<br>Ratio<br>[%] | Average<br>Horizontal<br>Strain<br>[%] | Maximum<br>Slope | Maximum<br>Settlement<br>[mm] | Max.<br>Tensile<br>Strain<br>[%] | Maximum<br>Gradient of<br>Horizontal<br>Displacement<br>Curve<br>[mm] | Maximum<br>Gradient of<br>Vertical<br>Displacement<br>Curve<br>[mm] | Min.<br>Radius of<br>Curvature<br>(Hogging)<br>[m] | Min.<br>Radius of<br>Curvature<br>(Sagging)<br>[m] | Damage Category |
| Structure: L   Sub-structure:                                                      |                            |                                        |                  |                               |                                  |                                                                       |                                                                     |                                                    |                                                    |                 |
| Structure: M   Sub-structure:                                                      |                            |                                        |                  |                               |                                  |                                                                       |                                                                     |                                                    |                                                    |                 |
| Vertical<br>Offset from<br>Line for<br>Vertical<br>Movement<br>Calculations<br>[m] | Deflection<br>Ratio<br>[%] | Average<br>Horizontal<br>Strain<br>[%] | Maximum<br>Slope | Maximum<br>Settlement<br>[mm] | Max.<br>Tensile<br>Strain<br>[%] | Maximum<br>Gradient of<br>Horizontal<br>Displacement<br>Curve<br>[mm] | Maximum<br>Gradient of<br>Vertical<br>Displacement<br>Curve<br>[mm] | Min.<br>Radius of<br>Curvature<br>(Hogging)<br>[m] | Min.<br>Radius of<br>Curvature<br>(Sagging)<br>[m] | Damage Category |
| Structure: M   Sub-structure:                                                      |                            |                                        |                  |                               |                                  |                                                                       |                                                                     |                                                    |                                                    |                 |
| Structure: N   Sub-structure:                                                      |                            |                                        |                  |                               |                                  |                                                                       |                                                                     |                                                    |                                                    |                 |
| Vertical<br>Offset from<br>Line for<br>Vertical<br>Movement<br>Calculations<br>[m] | Deflection<br>Ratio<br>[%] | Average<br>Horizontal<br>Strain<br>[%] | Maximum<br>Slope | Maximum<br>Settlement<br>[mm] | Max.<br>Tensile<br>Strain<br>[%] | Maximum<br>Gradient of<br>Horizontal<br>Displacement<br>Curve<br>[mm] | Maximum<br>Gradient of<br>Vertical<br>Displacement<br>Curve<br>[mm] | Min.<br>Radius of<br>Curvature<br>(Hogging)<br>[m] | Min.<br>Radius of<br>Curvature<br>(Sagging)<br>[m] | Damage Category |
| Structure: N   Sub-structure:                                                      |                            |                                        |                  |                               |                                  |                                                                       |                                                                     |                                                    |                                                    |                 |
| Structure: O   Sub-structure:                                                      |                            |                                        |                  |                               |                                  |                                                                       |                                                                     |                                                    |                                                    |                 |
| Vertical<br>Offset from<br>Line for<br>Vertical<br>Movement<br>Calculations<br>[m] | Deflection<br>Ratio<br>[%] | Average<br>Horizontal<br>Strain<br>[%] | Maximum<br>Slope | Maximum<br>Settlement<br>[mm] | Max.<br>Tensile<br>Strain<br>[%] | Maximum<br>Gradient of<br>Horizontal<br>Displacement<br>Curve<br>[mm] | Maximum<br>Gradient of<br>Vertical<br>Displacement<br>Curve<br>[mm] | Min.<br>Radius of<br>Curvature<br>(Hogging)<br>[m] | Min.<br>Radius of<br>Curvature<br>(Sagging)<br>[m] | Damage Category |
| Structure: O   Sub-structure:                                                      |                            |                                        |                  |                               |                                  |                                                                       |                                                                     |                                                    |                                                    |                 |
| Structure: P   Sub-structure:                                                      |                            |                                        |                  |                               |                                  |                                                                       |                                                                     |                                                    |                                                    |                 |
| Vertical<br>Offset from<br>Line for<br>Vertical<br>Movement<br>Calculations<br>[m] | Deflection<br>Ratio<br>[%] | Average<br>Horizontal<br>Strain<br>[%] | Maximum<br>Slope | Maximum<br>Settlement<br>[mm] | Max.<br>Tensile<br>Strain<br>[%] | Maximum<br>Gradient of<br>Horizontal<br>Displacement<br>Curve<br>[mm] | Maximum<br>Gradient of<br>Vertical<br>Displacement<br>Curve<br>[mm] | Min.<br>Radius of<br>Curvature<br>(Hogging)<br>[m] | Min.<br>Radius of<br>Curvature<br>(Sagging)<br>[m] | Damage Category |
| Structure: P   Sub-structure:                                                      |                            |                                        |                  |                               |                                  |                                                                       |                                                                     |                                                    |                                                    |                 |



GEA LIMITED  
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Rear of 159-163 King's Cross Road, London WC1X 9BN  
Wall Installation only Issue 4

| Job No.   | Sheet No.           | Rev.    |
|-----------|---------------------|---------|
| J16180    |                     |         |
| Drg. Ref. |                     |         |
| Made by   | Date<br>07-Mar-2017 | Checked |

| Vertical<br>Offset from<br>Line for<br>Vertical<br>Movement<br>Calculations | Deflection<br>Ratio | Average<br>Horizontal<br>Strain | Maximum<br>Slope | Maximum<br>Settlement | Max.<br>Tensile<br>Strain | Maximum<br>Gradient of<br>Horizontal<br>Displacement<br>Curve | Maximum<br>Gradient of<br>Vertical<br>Displacement<br>Curve | Min.<br>Radius of<br>Curvature<br>(Hogging) | Min.<br>Radius of<br>Curvature<br>(Sagging) | Damage Category |
|-----------------------------------------------------------------------------|---------------------|---------------------------------|------------------|-----------------------|---------------------------|---------------------------------------------------------------|-------------------------------------------------------------|---------------------------------------------|---------------------------------------------|-----------------|
| [m]<br>0.0                                                                  | [%]<br>0.0066153    | [%]<br>-0.12974                 | -571.89E-6       | [mm]<br>2.0716        | [%]<br>0.035966           | 0.0013797                                                     | -571.89E-6                                                  | [m]<br>7133.8                               | [m]<br>11332.0                              | 0 (Negligible)  |
| Structure: Q   Sub-structure:                                               |                     |                                 |                  |                       |                           |                                                               |                                                             |                                             |                                             |                 |
| Vertical<br>Offset from<br>Line for<br>Vertical<br>Movement<br>Calculations | Deflection<br>Ratio | Average<br>Horizontal<br>Strain | Maximum<br>Slope | Maximum<br>Settlement | Max.<br>Tensile<br>Strain | Maximum<br>Gradient of<br>Horizontal<br>Displacement<br>Curve | Maximum<br>Gradient of<br>Vertical<br>Displacement<br>Curve | Min.<br>Radius of<br>Curvature<br>(Hogging) | Min.<br>Radius of<br>Curvature<br>(Sagging) | Damage Category |
| [m]<br>0.0                                                                  | [%]<br>0.0072426    | [%]<br>0.033397                 | -648.98E-6       | [mm]<br>2.1998        | [%]<br>0.039768           | -336.39E-6                                                    | -648.98E-6                                                  | [m]<br>6821.8                               | [m]<br>-                                    | 0 (Negligible)  |
| Structure: R   Sub-structure:                                               |                     |                                 |                  |                       |                           |                                                               |                                                             |                                             |                                             |                 |
| Vertical<br>Offset from<br>Line for<br>Vertical<br>Movement<br>Calculations | Deflection<br>Ratio | Average<br>Horizontal<br>Strain | Maximum<br>Slope | Maximum<br>Settlement | Max.<br>Tensile<br>Strain | Maximum<br>Gradient of<br>Horizontal<br>Displacement<br>Curve | Maximum<br>Gradient of<br>Vertical<br>Displacement<br>Curve | Min.<br>Radius of<br>Curvature<br>(Hogging) | Min.<br>Radius of<br>Curvature<br>(Sagging) | Damage Category |
| [m]<br>0.0                                                                  | [%]<br>0.0060199    | [%]<br>-0.074843                | -477.91E-6       | [mm]<br>1.8007        | [%]<br>0.031474           | 0.0014179                                                     | -477.91E-6                                                  | [m]<br>8142.8                               | [m]<br>3287.4                               | 0 (Negligible)  |
| Structure: S   Sub-structure:                                               |                     |                                 |                  |                       |                           |                                                               |                                                             |                                             |                                             |                 |
| Vertical<br>Offset from<br>Line for<br>Vertical<br>Movement<br>Calculations | Deflection<br>Ratio | Average<br>Horizontal<br>Strain | Maximum<br>Slope | Maximum<br>Settlement | Max.<br>Tensile<br>Strain | Maximum<br>Gradient of<br>Horizontal<br>Displacement<br>Curve | Maximum<br>Gradient of<br>Vertical<br>Displacement<br>Curve | Min.<br>Radius of<br>Curvature<br>(Hogging) | Min.<br>Radius of<br>Curvature<br>(Sagging) | Damage Category |
| [m]<br>0.0                                                                  | [%]<br>0.0068274    | [%]<br>-0.012323                | -731.82E-6       | [mm]<br>1.4434        | [%]<br>0.010713           | 221.76E-6                                                     | -731.82E-6                                                  | [m]<br>10835.                               | [m]<br>8765.1                               | 0 (Negligible)  |
| Structure: T   Sub-structure:                                               |                     |                                 |                  |                       |                           |                                                               |                                                             |                                             |                                             |                 |
| Vertical<br>Offset from<br>Line for<br>Vertical<br>Movement<br>Calculations | Deflection<br>Ratio | Average<br>Horizontal<br>Strain | Maximum<br>Slope | Maximum<br>Settlement | Max.<br>Tensile<br>Strain | Maximum<br>Gradient of<br>Horizontal<br>Displacement<br>Curve | Maximum<br>Gradient of<br>Vertical<br>Displacement<br>Curve | Min.<br>Radius of<br>Curvature<br>(Hogging) | Min.<br>Radius of<br>Curvature<br>(Sagging) | Damage Category |
| [m]<br>0.0                                                                  | [%]<br>0.0068274    | [%]<br>-0.012323                | -731.82E-6       | [mm]<br>1.4434        | [%]<br>0.010713           | 221.76E-6                                                     | -731.82E-6                                                  | [m]<br>10835.                               | [m]<br>8765.1                               | 0 (Negligible)  |
| Structure: U   Sub-structure:                                               |                     |                                 |                  |                       |                           |                                                               |                                                             |                                             |                                             |                 |
| Vertical<br>Offset from<br>Line for<br>Vertical<br>Movement<br>Calculations | Deflection<br>Ratio | Average<br>Horizontal<br>Strain | Maximum<br>Slope | Maximum<br>Settlement | Max.<br>Tensile<br>Strain | Maximum<br>Gradient of<br>Horizontal<br>Displacement<br>Curve | Maximum<br>Gradient of<br>Vertical<br>Displacement<br>Curve | Min.<br>Radius of<br>Curvature<br>(Hogging) | Min.<br>Radius of<br>Curvature<br>(Sagging) | Damage Category |
| [m]<br>0.0                                                                  | [%]<br>0.0068274    | [%]<br>-0.012323                | -731.82E-6       | [mm]<br>1.4434        | [%]<br>0.010713           | 221.76E-6                                                     | -731.82E-6                                                  | [m]<br>10835.                               | [m]<br>8765.1                               | 0 (Negligible)  |
| Structure: V   Sub-structure:                                               |                     |                                 |                  |                       |                           |                                                               |                                                             |                                             |                                             |                 |
| Vertical<br>Offset from<br>Line for<br>Vertical<br>Movement<br>Calculations | Deflection<br>Ratio | Average<br>Horizontal<br>Strain | Maximum<br>Slope | Maximum<br>Settlement | Max.<br>Tensile<br>Strain | Maximum<br>Gradient of<br>Horizontal<br>Displacement<br>Curve | Maximum<br>Gradient of<br>Vertical<br>Displacement<br>Curve | Min.<br>Radius of<br>Curvature<br>(Hogging) | Min.<br>Radius of<br>Curvature<br>(Sagging) | Damage Category |
| [m]<br>0.0                                                                  | [%]<br>0.0          | [%]<br>0.0                      | -95.931E-6       | [mm]<br>0.15174       | [%]<br>0.0                | -282.82E-6                                                    | -95.931E-6                                                  | [m]<br>-                                    | [m]<br>-                                    | 0 (Negligible)  |
| Structure: W   Sub-structure:                                               |                     |                                 |                  |                       |                           |                                                               |                                                             |                                             |                                             |                 |
| Vertical<br>Offset from<br>Line for<br>Vertical<br>Movement<br>Calculations | Deflection<br>Ratio | Average<br>Horizontal<br>Strain | Maximum<br>Slope | Maximum<br>Settlement | Max.<br>Tensile<br>Strain | Maximum<br>Gradient of<br>Horizontal<br>Displacement<br>Curve | Maximum<br>Gradient of<br>Vertical<br>Displacement<br>Curve | Min.<br>Radius of<br>Curvature<br>(Hogging) | Min.<br>Radius of<br>Curvature<br>(Sagging) | Damage Category |
| [m]<br>0.0                                                                  | [%]<br>0.0          | [%]<br>0.0053346                | 53.569E-6        | [mm]<br>0.15183       | [%]<br>0.0053346          | -53.344E-6                                                    | 53.569E-6                                                   | [m]<br>-                                    | [m]<br>59139.                               | 0 (Negligible)  |
| Structure: X   Sub-structure:                                               |                     |                                 |                  |                       |                           |                                                               |                                                             |                                             |                                             |                 |
| Vertical<br>Offset from<br>Line for<br>Vertical<br>Movement<br>Calculations | Deflection<br>Ratio | Average<br>Horizontal<br>Strain | Maximum<br>Slope | Maximum<br>Settlement | Max.<br>Tensile<br>Strain | Maximum<br>Gradient of<br>Horizontal<br>Displacement<br>Curve | Maximum<br>Gradient of<br>Vertical<br>Displacement<br>Curve | Min.<br>Radius of<br>Curvature<br>(Hogging) | Min.<br>Radius of<br>Curvature<br>(Sagging) | Damage Category |
| [m]<br>0.0                                                                  | [%]<br>56.742E-6    | [%]<br>0.014902                 | -758.14E-6       | [mm]<br>1.3475        | [%]<br>0.014902           | -149.00E-6                                                    | -758.14E-6                                                  | [m]<br>-                                    | [m]<br>6718.5                               | 0 (Negligible)  |
| Structure: Y   Sub-structure:                                               |                     |                                 |                  |                       |                           |                                                               |                                                             |                                             |                                             |                 |
| Vertical<br>Offset from<br>Line for<br>Vertical<br>Movement<br>Calculations | Deflection<br>Ratio | Average<br>Horizontal<br>Strain | Maximum<br>Slope | Maximum<br>Settlement | Max.<br>Tensile<br>Strain | Maximum<br>Gradient of<br>Horizontal<br>Displacement<br>Curve | Maximum<br>Gradient of<br>Vertical<br>Displacement<br>Curve | Min.<br>Radius of<br>Curvature<br>(Hogging) | Min.<br>Radius of<br>Curvature<br>(Sagging) | Damage Category |
| [m]<br>0.0                                                                  | [%]<br>0.0          | [%]<br>0.016684                 | -179.35E-6       | [mm]<br>2.0005        | [%]<br>0.016684           | -182.02E-6                                                    | -179.35E-6                                                  | [m]<br>-                                    | [m]<br>427.94E+6                            | 0 (Negligible)  |
| Structure: Z   Sub-structure:                                               |                     |                                 |                  |                       |                           |                                                               |                                                             |                                             |                                             |                 |
| Vertical<br>Offset from<br>Line for<br>Vertical<br>Movement<br>Calculations | Deflection<br>Ratio | Average<br>Horizontal<br>Strain | Maximum<br>Slope | Maximum<br>Settlement | Max.<br>Tensile<br>Strain | Maximum<br>Gradient of<br>Horizontal<br>Displacement<br>Curve | Maximum<br>Gradient of<br>Vertical<br>Displacement<br>Curve | Min.<br>Radius of<br>Curvature<br>(Hogging) | Min.<br>Radius of<br>Curvature<br>(Sagging) | Damage Category |
| [m]<br>0.0                                                                  | [%]<br>0.0          | [%]<br>0.0                      | -180.40E-6       | [mm]<br>0.84300       | [%]<br>0.0                | 0.0                                                           | -180.40E-6                                                  | [m]<br>18945.                               | [m]<br>169.34E+9                            | 0 (Negligible)  |



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| J16180    |                     |         |
| Drg. Ref. |                     |         |
| Made by   | Date<br>07-Mar-2017 | Checked |

| Vertical<br>Offset from<br>Line for<br>Vertical<br>Movement<br>Calculations<br>[m]<br>0.0 | Deflection<br>Ratio<br>[%]<br>0.0       | Average<br>Horizontal<br>Strain<br>[%]<br>0.015110   | Maximum<br>Slope<br>-182.60E-6 | Maximum<br>Settlement<br>[mm]<br>1.5118  | Max.<br>Tensile<br>Strain<br>[%]<br>0.015110  | Maximum<br>Gradient of<br>Horizontal<br>Displacement<br>Curve<br>-159.08E-6 | Maximum<br>Gradient of<br>Vertical<br>Displacement<br>Curve<br>-182.60E-6 | Min.<br>Radius of<br>Curvature<br>(Hogging)<br>[m]<br>- | Min.<br>Radius of<br>Curvature<br>(Sagging)<br>[m]<br>761.45E+6 | Damage Category<br>0 (Negligible) |
|-------------------------------------------------------------------------------------------|-----------------------------------------|------------------------------------------------------|--------------------------------|------------------------------------------|-----------------------------------------------|-----------------------------------------------------------------------------|---------------------------------------------------------------------------|---------------------------------------------------------|-----------------------------------------------------------------|-----------------------------------|
| Structure: AA   Sub-structure:                                                            |                                         |                                                      |                                |                                          |                                               |                                                                             |                                                                           |                                                         |                                                                 |                                   |
| Vertical<br>Offset from<br>Line for<br>Vertical<br>Movement<br>Calculations<br>[m]<br>0.0 | Deflection<br>Ratio<br>[%]<br>0.0       | Average<br>Horizontal<br>Strain<br>[%]<br>0.0        | Maximum<br>Slope<br>-178.02E-6 | Maximum<br>Settlement<br>[mm]<br>0.34303 | Max.<br>Tensile<br>Strain<br>[%]<br>0.0       | Maximum<br>Gradient of<br>Horizontal<br>Displacement<br>Curve<br>0.0        | Maximum<br>Gradient of<br>Vertical<br>Displacement<br>Curve<br>-178.02E-6 | Min.<br>Radius of<br>Curvature<br>(Hogging)<br>[m]<br>- | Min.<br>Radius of<br>Curvature<br>(Sagging)<br>[m]<br>20845.0   | Damage Category<br>0 (Negligible) |
| Structure: AB   Sub-structure:                                                            |                                         |                                                      |                                |                                          |                                               |                                                                             |                                                                           |                                                         |                                                                 |                                   |
| Vertical<br>Offset from<br>Line for<br>Vertical<br>Movement<br>Calculations<br>[m]<br>0.0 | Deflection<br>Ratio<br>[%]<br>336.52E-6 | Average<br>Horizontal<br>Strain<br>[%]<br>0.0039947  | Maximum<br>Slope<br>-171.41E-6 | Maximum<br>Settlement<br>[mm]<br>1.1623  | Max.<br>Tensile<br>Strain<br>[%]<br>0.0044826 | Maximum<br>Gradient of<br>Horizontal<br>Displacement<br>Curve<br>-102.28E-6 | Maximum<br>Gradient of<br>Vertical<br>Displacement<br>Curve<br>-171.41E-6 | Min.<br>Radius of<br>Curvature<br>(Hogging)<br>[m]<br>- | Min.<br>Radius of<br>Curvature<br>(Sagging)<br>[m]<br>134410.0  | Damage Category<br>0 (Negligible) |
| Structure: AD   Sub-structure:                                                            |                                         |                                                      |                                |                                          |                                               |                                                                             |                                                                           |                                                         |                                                                 |                                   |
| Vertical<br>Offset from<br>Line for<br>Vertical<br>Movement<br>Calculations<br>[m]<br>0.0 | Deflection<br>Ratio<br>[%]<br>0.0       | Average<br>Horizontal<br>Strain<br>[%]<br>0.023814   | Maximum<br>Slope<br>-199.96E-6 | Maximum<br>Settlement<br>[mm]<br>2.7350  | Max.<br>Tensile<br>Strain<br>[%]<br>0.023815  | Maximum<br>Gradient of<br>Horizontal<br>Displacement<br>Curve<br>-316.46E-6 | Maximum<br>Gradient of<br>Vertical<br>Displacement<br>Curve<br>-199.96E-6 | Min.<br>Radius of<br>Curvature<br>(Hogging)<br>[m]<br>- | Min.<br>Radius of<br>Curvature<br>(Sagging)<br>[m]<br>130.44E+6 | Damage Category<br>0 (Negligible) |
| Structure: AE   Sub-structure:                                                            |                                         |                                                      |                                |                                          |                                               |                                                                             |                                                                           |                                                         |                                                                 |                                   |
| Vertical<br>Offset from<br>Line for<br>Vertical<br>Movement<br>Calculations<br>[m]<br>0.0 | Deflection<br>Ratio<br>[%]<br>686.24E-6 | Average<br>Horizontal<br>Strain<br>[%]<br>-0.0010690 | Maximum<br>Slope<br>61.633E-6  | Maximum<br>Settlement<br>[mm]<br>1.1624  | Max.<br>Tensile<br>Strain<br>[%]<br>422.89E-6 | Maximum<br>Gradient of<br>Horizontal<br>Displacement<br>Curve<br>22.100E-6  | Maximum<br>Gradient of<br>Vertical<br>Displacement<br>Curve<br>61.633E-6  | Min.<br>Radius of<br>Curvature<br>(Hogging)<br>[m]<br>- | Min.<br>Radius of<br>Curvature<br>(Sagging)<br>[m]<br>56990.0   | Damage Category<br>0 (Negligible) |
| Structure: AF   Sub-structure:                                                            |                                         |                                                      |                                |                                          |                                               |                                                                             |                                                                           |                                                         |                                                                 |                                   |
| Vertical<br>Offset from<br>Line for<br>Vertical<br>Movement<br>Calculations<br>[m]<br>0.0 | Deflection<br>Ratio<br>[%]<br>515.01E-6 | Average<br>Horizontal<br>Strain<br>[%]<br>-0.029263  | Maximum<br>Slope<br>199.40E-6  | Maximum<br>Settlement<br>[mm]<br>3.3553  | Max.<br>Tensile<br>Strain<br>[%]<br>0.0058586 | Maximum<br>Gradient of<br>Horizontal<br>Displacement<br>Curve<br>0.0021989  | Maximum<br>Gradient of<br>Vertical<br>Displacement<br>Curve<br>199.40E-6  | Min.<br>Radius of<br>Curvature<br>(Hogging)<br>[m]<br>- | Min.<br>Radius of<br>Curvature<br>(Sagging)<br>[m]<br>24851.0   | Damage Category<br>0 (Negligible) |
| Structure: AG   Sub-structure:                                                            |                                         |                                                      |                                |                                          |                                               |                                                                             |                                                                           |                                                         |                                                                 |                                   |
| Vertical<br>Offset from<br>Line for<br>Vertical<br>Movement<br>Calculations<br>[m]<br>0.0 | Deflection<br>Ratio<br>[%]<br>0.0017119 | Average<br>Horizontal<br>Strain<br>[%]<br>0.0023340  | Maximum<br>Slope<br>195.11E-6  | Maximum<br>Settlement<br>[mm]<br>2.7397  | Max.<br>Tensile<br>Strain<br>[%]<br>0.0033851 | Maximum<br>Gradient of<br>Horizontal<br>Displacement<br>Curve<br>461.88E-6  | Maximum<br>Gradient of<br>Vertical<br>Displacement<br>Curve<br>195.11E-6  | Min.<br>Radius of<br>Curvature<br>(Hogging)<br>[m]<br>- | Min.<br>Radius of<br>Curvature<br>(Sagging)<br>[m]<br>24828.0   | Damage Category<br>0 (Negligible) |
| Structure: AH   Sub-structure:                                                            |                                         |                                                      |                                |                                          |                                               |                                                                             |                                                                           |                                                         |                                                                 |                                   |
| Vertical<br>Offset from<br>Line for<br>Vertical<br>Movement<br>Calculations<br>[m]<br>0.0 | Deflection<br>Ratio<br>[%]<br>818.82E-6 | Average<br>Horizontal<br>Strain<br>[%]<br>0.0069390  | Maximum<br>Slope<br>-175.94E-6 | Maximum<br>Settlement<br>[mm]<br>2.2371  | Max.<br>Tensile<br>Strain<br>[%]<br>0.0073579 | Maximum<br>Gradient of<br>Horizontal<br>Displacement<br>Curve<br>-134.73E-6 | Maximum<br>Gradient of<br>Vertical<br>Displacement<br>Curve<br>-175.94E-6 | Min.<br>Radius of<br>Curvature<br>(Hogging)<br>[m]<br>- | Min.<br>Radius of<br>Curvature<br>(Sagging)<br>[m]<br>50441.0   | Damage Category<br>0 (Negligible) |
| Structure: AI   Sub-structure: Sub #                                                      |                                         |                                                      |                                |                                          |                                               |                                                                             |                                                                           |                                                         |                                                                 |                                   |
| Vertical<br>Offset from<br>Line for<br>Vertical<br>Movement<br>Calculations<br>[m]<br>0.0 | Deflection<br>Ratio<br>[%]<br>293.53E-6 | Average<br>Horizontal<br>Strain<br>[%]<br>0.014941   | Maximum<br>Slope<br>187.89E-6  | Maximum<br>Settlement<br>[mm]<br>2.2372  | Max.<br>Tensile<br>Strain<br>[%]<br>0.015057  | Maximum<br>Gradient of<br>Horizontal<br>Displacement<br>Curve<br>-162.98E-6 | Maximum<br>Gradient of<br>Vertical<br>Displacement<br>Curve<br>187.89E-6  | Min.<br>Radius of<br>Curvature<br>(Hogging)<br>[m]<br>- | Min.<br>Radius of<br>Curvature<br>(Sagging)<br>[m]<br>121050.0  | Damage Category<br>0 (Negligible) |
| Structure: AJ   Sub-structure: Sub #                                                      |                                         |                                                      |                                |                                          |                                               |                                                                             |                                                                           |                                                         |                                                                 |                                   |
| Vertical<br>Offset from<br>Line for<br>Vertical<br>Movement<br>Calculations<br>[m]<br>0.0 | Deflection<br>Ratio<br>[%]<br>904.77E-6 | Average<br>Horizontal<br>Strain<br>[%]<br>-0.0024738 | Maximum<br>Slope<br>-52.027E-6 | Maximum<br>Settlement<br>[mm]<br>1.4615  | Max.<br>Tensile<br>Strain<br>[%]<br>736.61E-6 | Maximum<br>Gradient of<br>Horizontal<br>Displacement<br>Curve<br>55.654E-6  | Maximum<br>Gradient of<br>Vertical<br>Displacement<br>Curve<br>-52.027E-6 | Min.<br>Radius of<br>Curvature<br>(Hogging)<br>[m]<br>- | Min.<br>Radius of<br>Curvature<br>(Sagging)<br>[m]<br>51448.0   | Damage Category<br>0 (Negligible) |
| Structure: AK   Sub-structure: Sub #                                                      |                                         |                                                      |                                |                                          |                                               |                                                                             |                                                                           |                                                         |                                                                 |                                   |
| Vertical<br>Offset from                                                                   | Deflection<br>Ratio                     | Average<br>Horizontal                                | Maximum<br>Slope               | Maximum<br>Settlement                    | Max.<br>Tensile                               | Maximum<br>Gradient of                                                      | Maximum<br>Gradient of                                                    | Min.<br>Radius of                                       | Min.<br>Radius of                                               | Damage Category                   |



# GEA LIMITED (GEOTECHNICAL & ENV ASSOC)

Rear of 159-163 King's Cross Road, London WC1X 9BN  
Wall Installation only Issue 4

| Job No.   | Sheet No.           | Rev.    |
|-----------|---------------------|---------|
| J16180    |                     |         |
| Drg. Ref. |                     |         |
| Made by   | Date<br>07-Mar-2017 | Checked |

| Line for Vertical Movement Calculations                      | Strain           |                           |               | Strain             |                     | Horizontal Displacement Curve                     | Vertical Displacement Curve                     | Curvature (Hogging)                |                                    | Curvature (Sagging) |
|--------------------------------------------------------------|------------------|---------------------------|---------------|--------------------|---------------------|---------------------------------------------------|-------------------------------------------------|------------------------------------|------------------------------------|---------------------|
| [m]<br>0.0                                                   | [%]<br>0.0       | [%]<br>0.023222           | -199.95E-6    | [mm]<br>2.4392     | [%]<br>0.023222     | -273.73E-6                                        | -199.95E-6                                      | [m]<br>-196.80E+6                  | 0                                  | (Negligible)        |
| Structure: AL   Sub-structure: Sub #                         |                  |                           |               |                    |                     |                                                   |                                                 |                                    |                                    |                     |
| Vertical Offset from Line for Vertical Movement Calculations | Deflection Ratio | Average Horizontal Strain | Maximum Slope | Maximum Settlement | Max. Tensile Strain | Maximum Gradient of Horizontal Displacement Curve | Maximum Gradient of Vertical Displacement Curve | Min. Radius of Curvature (Hogging) | Min. Radius of Curvature (Sagging) | Damage Category     |
| [m]<br>0.0                                                   | [%]<br>0.0       | [%]<br>1.2333E-6          | 1.3112E-6     | [mm]<br>2.4394     | [%]<br>1.2517E-6    | 0.0                                               | 1.3112E-6                                       | [m]<br>-3.7263E+12                 | 0                                  | (Negligible)        |
| Structure: AM   Sub-structure: Sub #                         |                  |                           |               |                    |                     |                                                   |                                                 |                                    |                                    |                     |
| Vertical Offset from Line for Vertical Movement Calculations | Deflection Ratio | Average Horizontal Strain | Maximum Slope | Maximum Settlement | Max. Tensile Strain | Maximum Gradient of Horizontal Displacement Curve | Maximum Gradient of Vertical Displacement Curve | Min. Radius of Curvature (Hogging) | Min. Radius of Curvature (Sagging) | Damage Category     |
| [m]<br>0.0                                                   | [%]<br>0.0       | [%]<br>0.025197           | 199.60E-6     | [mm]<br>2.4332     | [%]<br>0.025197     | -273.10E-6                                        | 199.60E-6                                       | [m]<br>-196.75E+6                  | 0                                  | (Negligible)        |
| Structure: AN   Sub-structure: Sub #                         |                  |                           |               |                    |                     |                                                   |                                                 |                                    |                                    |                     |
| Vertical Offset from Line for Vertical Movement Calculations | Deflection Ratio | Average Horizontal Strain | Maximum Slope | Maximum Settlement | Max. Tensile Strain | Maximum Gradient of Horizontal Displacement Curve | Maximum Gradient of Vertical Displacement Curve | Min. Radius of Curvature (Hogging) | Min. Radius of Curvature (Sagging) | Damage Category     |
| [m]<br>0.0                                                   | [%]<br>3.9225E-6 | [%]<br>-562.61E-6         | -3.3683E-6    | [mm]<br>1.9037     | [%]<br>112.55E-6    | 17.019E-6                                         | -3.3683E-6                                      | [m]<br>18.792E+12                  | 3.7769E+6                          | 0 (Negligible)      |
| Structure: AO   Sub-structure: Sub #                         |                  |                           |               |                    |                     |                                                   |                                                 |                                    |                                    |                     |
| Vertical Offset from Line for Vertical Movement Calculations | Deflection Ratio | Average Horizontal Strain | Maximum Slope | Maximum Settlement | Max. Tensile Strain | Maximum Gradient of Horizontal Displacement Curve | Maximum Gradient of Vertical Displacement Curve | Min. Radius of Curvature (Hogging) | Min. Radius of Curvature (Sagging) | Damage Category     |
| [m]<br>0.0                                                   | [%]<br>1.2784E-6 | [%]<br>0.025126           | -199.86E-6    | [mm]<br>2.4068     | [%]<br>0.025126     | -270.60E-6                                        | -199.86E-6                                      | [m]<br>-18.121E+6                  | 0                                  | (Negligible)        |
| Structure: AP   Sub-structure: Sub #                         |                  |                           |               |                    |                     |                                                   |                                                 |                                    |                                    |                     |
| Vertical Offset from Line for Vertical Movement Calculations | Deflection Ratio | Average Horizontal Strain | Maximum Slope | Maximum Settlement | Max. Tensile Strain | Maximum Gradient of Horizontal Displacement Curve | Maximum Gradient of Vertical Displacement Curve | Min. Radius of Curvature (Hogging) | Min. Radius of Curvature (Sagging) | Damage Category     |
| [m]<br>0.0                                                   | [%]<br>0.0016623 | [%]<br>-0.017895          | 125.86E-6     | [mm]<br>2.4070     | [%]<br>0.0037032    | 321.92E-6                                         | 125.86E-6                                       | [m]<br>-                           | 25453. 0                           | (Negligible)        |
| Structure: AQ   Sub-structure: Sub #                         |                  |                           |               |                    |                     |                                                   |                                                 |                                    |                                    |                     |
| Vertical Offset from Line for Vertical Movement Calculations | Deflection Ratio | Average Horizontal Strain | Maximum Slope | Maximum Settlement | Max. Tensile Strain | Maximum Gradient of Horizontal Displacement Curve | Maximum Gradient of Vertical Displacement Curve | Min. Radius of Curvature (Hogging) | Min. Radius of Curvature (Sagging) | Damage Category     |
| [m]<br>0.0                                                   | [%]<br>418.97E-6 | [%]<br>0.011494           | 179.74E-6     | [mm]<br>2.0631     | [%]<br>0.011663     | -142.20E-6                                        | 179.74E-6                                       | [m]<br>-                           | 92298. 0                           | (Negligible)        |
| Structure: AR   Sub-structure: Sub #                         |                  |                           |               |                    |                     |                                                   |                                                 |                                    |                                    |                     |
| Vertical Offset from Line for Vertical Movement Calculations | Deflection Ratio | Average Horizontal Strain | Maximum Slope | Maximum Settlement | Max. Tensile Strain | Maximum Gradient of Horizontal Displacement Curve | Maximum Gradient of Vertical Displacement Curve | Min. Radius of Curvature (Hogging) | Min. Radius of Curvature (Sagging) | Damage Category     |
| [m]<br>0.0                                                   | [%]<br>0.0       | [%]<br>0.013329           | -200.00E-6    | [mm]<br>1.8933     | [%]<br>0.013330     | -215.70E-6                                        | -200.00E-6                                      | [m]<br>-                           | 68.343E+6                          | 0 (Negligible)      |
| Structure: AS   Sub-structure: Sub #                         |                  |                           |               |                    |                     |                                                   |                                                 |                                    |                                    |                     |
| Vertical Offset from Line for Vertical Movement Calculations | Deflection Ratio | Average Horizontal Strain | Maximum Slope | Maximum Settlement | Max. Tensile Strain | Maximum Gradient of Horizontal Displacement Curve | Maximum Gradient of Vertical Displacement Curve | Min. Radius of Curvature (Hogging) | Min. Radius of Curvature (Sagging) | Damage Category     |
| [m]<br>0.0                                                   | [%]<br>0.0       | [%]<br>0.010196           | -199.99E-6    | [mm]<br>1.4590     | [%]<br>0.010196     | -187.90E-6                                        | -199.99E-6                                      | [m]<br>-                           | 62.262E+6                          | 0 (Negligible)      |
| Structure: AT   Sub-structure: Sub #                         |                  |                           |               |                    |                     |                                                   |                                                 |                                    |                                    |                     |
| Vertical Offset from Line for Vertical Movement Calculations | Deflection Ratio | Average Horizontal Strain | Maximum Slope | Maximum Settlement | Max. Tensile Strain | Maximum Gradient of Horizontal Displacement Curve | Maximum Gradient of Vertical Displacement Curve | Min. Radius of Curvature (Hogging) | Min. Radius of Curvature (Sagging) | Damage Category     |
| [m]<br>0.0                                                   | [%]<br>661.94E-6 | [%]<br>0.0072829          | -180.33E-6    | [mm]<br>1.8017     | [%]<br>0.0076835    | -117.56E-6                                        | -180.33E-6                                      | [m]<br>-                           | 89349. 0                           | (Negligible)        |
| Structure: AU   Sub-structure:                               |                  |                           |               |                    |                     |                                                   |                                                 |                                    |                                    |                     |
| Vertical Offset from Line for Vertical Movement Calculations | Deflection Ratio | Average Horizontal Strain | Maximum Slope | Maximum Settlement | Max. Tensile Strain | Maximum Gradient of Horizontal Displacement Curve | Maximum Gradient of Vertical Displacement Curve | Min. Radius of Curvature (Hogging) | Min. Radius of Curvature (Sagging) | Damage Category     |
| [m]<br>0.0                                                   | [%]<br>0.0090691 | [%]<br>0.052345           | 799.97E-6     | [mm]<br>2.4280     | [%]<br>0.058705     | -666.16E-6                                        | 799.97E-6                                       | [m]<br>5775.4                      | [m]<br>-1                          | (Very Slight)       |



# GEA LIMITED (GEOTECHNICAL & ENV ASSOC)

Rear of 159-163 King's Cross Road, London WC1X 9BN  
Wall Installation only Issue 4

| Job No.   | Sheet No.   | Rev.    |
|-----------|-------------|---------|
| J16180    |             |         |
| Drg. Ref. |             |         |
| Made by   | Date        | Checked |
|           | 07-Mar-2017 |         |

| Vertical<br>Offset from<br>Line for<br>Vertical<br>Movement<br>Calculations | Deflection<br>Ratio                                                    | Average<br>Horizontal<br>Strain | Maximum<br>Slope    | Maximum<br>Settlement | Max.<br>Tensile<br>Strain | Maximum<br>Gradient of<br>Horizontal<br>Displacement<br>Curve | Maximum<br>Gradient of<br>Vertical<br>Displacement<br>Curve | Min.<br>Radius of<br>Curvature<br>(Hogging) | Min.<br>Radius of<br>Curvature<br>(Sagging) | Damage Category                             |                                             |                 |
|-----------------------------------------------------------------------------|------------------------------------------------------------------------|---------------------------------|---------------------|-----------------------|---------------------------|---------------------------------------------------------------|-------------------------------------------------------------|---------------------------------------------|---------------------------------------------|---------------------------------------------|---------------------------------------------|-----------------|
| [m]                                                                         | [%]                                                                    | [%]                             |                     | [mm]                  | [%]                       |                                                               |                                                             | [m]                                         | [m]                                         |                                             |                                             |                 |
| Structure: AV   Sub-structure:                                              |                                                                        |                                 |                     |                       |                           |                                                               |                                                             |                                             |                                             |                                             |                                             |                 |
| 0.0                                                                         | 0.0084823                                                              | 0.022198                        | -617.02E-6          | 2.7356                | 0.031327                  | -334.33E-6                                                    | -617.02E-6                                                  | 9027.7                                      |                                             | - 0 (Negligible)                            |                                             |                 |
| Structure: AW   Sub-structure:                                              |                                                                        |                                 |                     |                       |                           |                                                               |                                                             |                                             |                                             |                                             |                                             |                 |
| 0.0                                                                         | 0.0084823                                                              | 0.022198                        | -617.02E-6          | 2.7356                | 0.031327                  | -334.33E-6                                                    | -617.02E-6                                                  | 9027.7                                      |                                             | - 0 (Negligible)                            |                                             |                 |
| Specific Building Damage Results - Critical Segments within Each Structure  |                                                                        |                                 |                     |                       |                           |                                                               |                                                             |                                             |                                             |                                             |                                             |                 |
| Structure Name                                                              | Parameter                                                              | Critical<br>Sub-Structure       | Critical<br>Segment | Start                 | End                       | Curvature                                                     | Maximum<br>Slope                                            | Maximum<br>Settlement                       | Max.<br>Tensile<br>Strain                   | Min.<br>Radius of<br>Curvature<br>(Hogging) | Min.<br>Radius of<br>Curvature<br>(Sagging) | Damage Category |
|                                                                             |                                                                        |                                 |                     | [m]                   | [m]                       |                                                               |                                                             | [mm]                                        | [%]                                         | [m]                                         | [m]                                         |                 |
| A                                                                           | All settlements are less than the Settlement Trough Limit Sensitivity. |                                 |                     |                       |                           |                                                               |                                                             |                                             |                                             |                                             |                                             |                 |
|                                                                             | All settlements are less than the Settlement Trough Limit Sensitivity. |                                 |                     |                       |                           |                                                               |                                                             |                                             |                                             |                                             |                                             |                 |
|                                                                             | All settlements are less than the Settlement Trough Limit Sensitivity. |                                 |                     |                       |                           |                                                               |                                                             |                                             |                                             |                                             |                                             |                 |
|                                                                             | All settlements are less than the Settlement Trough Limit Sensitivity. |                                 |                     |                       |                           |                                                               |                                                             |                                             |                                             |                                             |                                             |                 |
| B                                                                           | All settlements are less than the Settlement Trough Limit Sensitivity. |                                 |                     |                       |                           |                                                               |                                                             |                                             |                                             |                                             |                                             |                 |
|                                                                             | All settlements are less than the Settlement Trough Limit Sensitivity. |                                 |                     |                       |                           |                                                               |                                                             |                                             |                                             |                                             |                                             |                 |
|                                                                             | All settlements are less than the Settlement Trough Limit Sensitivity. |                                 |                     |                       |                           |                                                               |                                                             |                                             |                                             |                                             |                                             |                 |
|                                                                             | All settlements are less than the Settlement Trough Limit Sensitivity. |                                 |                     |                       |                           |                                                               |                                                             |                                             |                                             |                                             |                                             |                 |
| C                                                                           | All settlements are less than the Settlement Trough Limit Sensitivity. |                                 |                     |                       |                           |                                                               |                                                             |                                             |                                             |                                             |                                             |                 |
|                                                                             | Maximum Slope                                                          | 1                               | 3.6809              | 4.6001                | Hogging                   | 198.32E-6                                                     | 0.36895                                                     | 0.019322                                    | 10232.                                      |                                             | - 0 (Negligible)                            |                 |
|                                                                             | Maximum Settlement                                                     | 1                               | 3.6809              | 4.6001                | Hogging                   | 198.32E-6                                                     | 0.36895                                                     | 0.019322                                    | 10232.                                      |                                             | - 0 (Negligible)                            |                 |
|                                                                             | Max. Tensile Strain                                                    | 1                               | 3.6809              | 4.6001                | Hogging                   | 198.32E-6                                                     | 0.36895                                                     | 0.019322                                    | 10232.                                      |                                             | - 0 (Negligible)                            |                 |
|                                                                             | Min. Radius of Curvature (Hogging)                                     | 1                               | 3.6809              | 4.6001                | Hogging                   | 198.32E-6                                                     | 0.36895                                                     | 0.019322                                    | 10232.                                      |                                             | - 0 (Negligible)                            |                 |
|                                                                             | Min. Radius of Curvature (Sagging)                                     | -                               | -                   | -                     | -                         | -                                                             | -                                                           | -                                           | -                                           | -                                           | -                                           |                 |
| D                                                                           | Maximum Slope                                                          | 1                               | 0.0                 | 1.8003                | Hogging                   | 159.45E-6                                                     | 0.36915                                                     | 0.0065809                                   | 21589.                                      |                                             | - 0 (Negligible)                            |                 |
|                                                                             | Maximum Settlement                                                     | 1                               | 0.0                 | 1.8003                | Hogging                   | 159.45E-6                                                     | 0.36915                                                     | 0.0065809                                   | 21589.                                      |                                             | - 0 (Negligible)                            |                 |
|                                                                             | Max. Tensile Strain                                                    | 1                               | 0.0                 | 1.8003                | Hogging                   | 159.45E-6                                                     | 0.36915                                                     | 0.0065809                                   | 21589.                                      |                                             | - 0 (Negligible)                            |                 |
|                                                                             | Min. Radius of Curvature (Hogging)                                     | 1                               | 0.0                 | 1.8003                | Hogging                   | 159.45E-6                                                     | 0.36915                                                     | 0.0065809                                   | 21589.                                      |                                             | - 0 (Negligible)                            |                 |
|                                                                             | Min. Radius of Curvature (Sagging)                                     | -                               | -                   | -                     | -                         | -                                                             | -                                                           | -                                           | -                                           | -                                           | -                                           |                 |
|                                                                             | All settlements are less than the Settlement Trough Limit Sensitivity. |                                 |                     |                       |                           |                                                               |                                                             |                                             |                                             |                                             |                                             |                 |
| E                                                                           | All settlements are less than the Settlement Trough Limit Sensitivity. |                                 |                     |                       |                           |                                                               |                                                             |                                             |                                             |                                             |                                             |                 |
|                                                                             | All settlements are less than the Settlement Trough Limit Sensitivity. |                                 |                     |                       |                           |                                                               |                                                             |                                             |                                             |                                             |                                             |                 |
|                                                                             | All settlements are less than the Settlement Trough Limit Sensitivity. |                                 |                     |                       |                           |                                                               |                                                             |                                             |                                             |                                             |                                             |                 |
|                                                                             | All settlements are less than the Settlement Trough Limit Sensitivity. |                                 |                     |                       |                           |                                                               |                                                             |                                             |                                             |                                             |                                             |                 |
| F                                                                           | All settlements are less than the Settlement Trough Limit Sensitivity. |                                 |                     |                       |                           |                                                               |                                                             |                                             |                                             |                                             |                                             |                 |
|                                                                             | All settlements are less than the Settlement Trough Limit Sensitivity. |                                 |                     |                       |                           |                                                               |                                                             |                                             |                                             |                                             |                                             |                 |
|                                                                             | All settlements are less than the Settlement Trough Limit Sensitivity. |                                 |                     |                       |                           |                                                               |                                                             |                                             |                                             |                                             |                                             |                 |
|                                                                             | All settlements are less than the Settlement Trough Limit Sensitivity. |                                 |                     |                       |                           |                                                               |                                                             |                                             |                                             |                                             |                                             |                 |
| G                                                                           | All settlements are less than the Settlement Trough Limit Sensitivity. |                                 |                     |                       |                           |                                                               |                                                             |                                             |                                             |                                             |                                             |                 |
|                                                                             | All settlements are less than the Settlement Trough Limit Sensitivity. |                                 |                     |                       |                           |                                                               |                                                             |                                             |                                             |                                             |                                             |                 |
|                                                                             | All settlements are less than the Settlement Trough Limit Sensitivity. |                                 |                     |                       |                           |                                                               |                                                             |                                             |                                             |                                             |                                             |                 |
|                                                                             | All settlements are less than the Settlement Trough Limit Sensitivity. |                                 |                     |                       |                           |                                                               |                                                             |                                             |                                             |                                             |                                             |                 |
| H                                                                           | All settlements are less than the Settlement Trough Limit Sensitivity. |                                 |                     |                       |                           |                                                               |                                                             |                                             |                                             |                                             |                                             |                 |
|                                                                             | All settlements are less than the Settlement Trough Limit Sensitivity. |                                 |                     |                       |                           |                                                               |                                                             |                                             |                                             |                                             |                                             |                 |
|                                                                             | All settlements are less than the Settlement Trough Limit Sensitivity. |                                 |                     |                       |                           |                                                               |                                                             |                                             |                                             |                                             |                                             |                 |
|                                                                             | All settlements are less than the Settlement Trough Limit Sensitivity. |                                 |                     |                       |                           |                                                               |                                                             |                                             |                                             |                                             |                                             |                 |
| I                                                                           | All settlements are less than the Settlement Trough Limit Sensitivity. |                                 |                     |                       |                           |                                                               |                                                             |                                             |                                             |                                             |                                             |                 |
|                                                                             | All settlements are less than the Settlement Trough Limit Sensitivity. |                                 |                     |                       |                           |                                                               |                                                             |                                             |                                             |                                             |                                             |                 |
|                                                                             | All settlements are less than the Settlement Trough Limit Sensitivity. |                                 |                     |                       |                           |                                                               |                                                             |                                             |                                             |                                             |                                             |                 |
|                                                                             | All settlements are less than the Settlement Trough Limit Sensitivity. |                                 |                     |                       |                           |                                                               |                                                             |                                             |                                             |                                             |                                             |                 |
| J                                                                           | All settlements are less than the Settlement Trough Limit Sensitivity. |                                 |                     |                       |                           |                                                               |                                                             |                                             |                                             |                                             |                                             |                 |
|                                                                             | All settlements are less than the Settlement Trough Limit Sensitivity. |                                 |                     |                       |                           |                                                               |                                                             |                                             |                                             |                                             |                                             |                 |
|                                                                             | All settlements are less than the Settlement Trough Limit Sensitivity. |                                 |                     |                       |                           |                                                               |                                                             |                                             |                                             |                                             |                                             |                 |
|                                                                             | All settlements are less than the Settlement Trough Limit Sensitivity. |                                 |                     |                       |                           |                                                               |                                                             |                                             |                                             |                                             |                                             |                 |
| K                                                                           | All settlements are less than the Settlement Trough Limit Sensitivity. |                                 |                     |                       |                           |                                                               |                                                             |                                             |                                             |                                             |                                             |                 |
|                                                                             | Maximum Slope                                                          | 1                               | 2.9667              | 6.9222                | Sagging                   | 38.078E-6                                                     | 0.14301                                                     | 0.0010085                                   | -                                           | 65133.                                      | 0 (Negligible)                              |                 |
|                                                                             | Maximum Settlement                                                     | 1                               | 2.9667              | 6.9222                | Sagging                   | 38.078E-6                                                     | 0.14301                                                     | 0.0010085                                   | -                                           | 65133.                                      | 0 (Negligible)                              |                 |
|                                                                             | Max. Tensile Strain                                                    | 1                               | 2.9667              | 6.9222                | Sagging                   | 38.078E-6                                                     | 0.14301                                                     | 0.0010085                                   | -                                           | 65133.                                      | 0 (Negligible)                              |                 |
|                                                                             | Min. Radius of Curvature (Hogging)                                     | -                               | -                   | -                     | -                         | -                                                             | -                                                           | -                                           | -                                           | -                                           | -                                           |                 |
|                                                                             | Min. Radius of Curvature (Sagging)                                     | 1                               | 2.9667              | 6.9222                | Sagging                   | 38.078E-6                                                     | 0.14301                                                     | 0.0010085                                   | -                                           | 65133.                                      | 0 (Negligible)                              |                 |
| L                                                                           | Maximum Slope                                                          | 1                               | 7.1990              | 7.1990                | Sagging                   | 96.121E-6                                                     | 0.14291                                                     | 0.0                                         | -                                           | 18500.                                      | 0 (Negligible)                              |                 |
|                                                                             | Maximum Settlement                                                     | 1                               | 7.1990              | 7.1990                | Sagging                   | 96.121E-6                                                     | 0.14291                                                     | 0.0                                         | -                                           | 18500.                                      | 0 (Negligible)                              |                 |
|                                                                             | Max. Tensile Strain                                                    | 1                               | 7.1990              | 7.1990                | Sagging                   | 96.121E-6                                                     | 0.14291                                                     | 0.0                                         | -                                           | 18500.                                      | 0 (Negligible)                              |                 |
|                                                                             | Min. Radius of Curvature (Hogging)                                     | -                               | -                   | -                     | -                         | -                                                             | -                                                           | -                                           | -                                           | -                                           | -                                           |                 |
|                                                                             | Min. Radius of Curvature (Sagging)                                     | -                               | -                   | -                     | -                         | -                                                             | -                                                           | -                                           | -                                           | -                                           | -                                           |                 |
|                                                                             | All settlements are less than the Settlement Trough Limit Sensitivity. |                                 |                     |                       |                           |                                                               |                                                             |                                             |                                             |                                             |                                             |                 |
| M                                                                           | Maximum Slope                                                          | 1                               | 7.2997              | 7.2997                | Sagging                   | 95.636E-6                                                     | 0.14291                                                     | 0.0                                         | -                                           | 19090.                                      | 0 (Negligible)                              |                 |
|                                                                             | Maximum Settlement                                                     | 1                               | 7.2997              | 7.2997                | Sagging                   | 95.636E-6                                                     | 0.14291                                                     | 0.0                                         | -                                           | 19090.                                      | 0 (Negligible)                              |                 |
|                                                                             | Max. Tensile Strain                                                    | 1                               | 7.2997              | 7.2997                | Sagging                   | 95.636E-6                                                     | 0.14291                                                     | 0.0                                         | -                                           | 19090.                                      | 0 (Negligible)                              |                 |
|                                                                             | Min. Radius of Curvature (Hogging)                                     | -                               | -                   | -                     | -                         | -                                                             | -                                                           | -                                           | -                                           | -                                           | -                                           |                 |
|                                                                             | Min. Radius of Curvature (Sagging)                                     | -                               | -                   | -                     | -                         | -                                                             | -                                                           | -                                           | -                                           | -                                           | -                                           |                 |
|                                                                             | All settlements are less than the Settlement Trough Limit Sensitivity. |                                 |                     |                       |                           |                                                               |                                                             |                                             |                                             |                                             |                                             |                 |
| N                                                                           | All settlements are less than the Settlement Trough Limit Sensitivity. |                                 |                     |                       |                           |                                                               |                                                             |                                             |                                             |                                             |                                             |                 |
|                                                                             | All settlements are less than the Settlement Trough Limit Sensitivity. |                                 |                     |                       |                           |                                                               |                                                             |                                             |                                             |                                             |                                             |                 |



GEA LIMITED  
(GEOTECHNICAL & ENV ASSOC)

Rear of 159-163 King's Cross Road, London WC1X 9BN  
Wall Installation only Issue 4

| Job No.   | Sheet No.   | Rev.    |
|-----------|-------------|---------|
| J16180    |             |         |
| Drg. Ref. |             |         |
| Made by   | Date        | Checked |
|           | 07-Mar-2017 |         |

| Structure Name | Parameter                                                              | Critical Sub-Structure | Critical Segment | Start   | End     | Curvature | Maximum Slope | Maximum Settlement | Max. Tensile Strain | Min. Radius of Curvature (Hogging) | Min. Radius of Curvature (Sagging) | Damage Category |
|----------------|------------------------------------------------------------------------|------------------------|------------------|---------|---------|-----------|---------------|--------------------|---------------------|------------------------------------|------------------------------------|-----------------|
| O              | All settlements are less than the Settlement Trough Limit Sensitivity. |                        |                  |         |         |           |               |                    |                     |                                    |                                    |                 |
|                | All settlements are less than the Settlement Trough Limit Sensitivity. |                        |                  |         |         |           |               |                    |                     |                                    |                                    |                 |
|                | All settlements are less than the Settlement Trough Limit Sensitivity. |                        |                  |         |         |           |               |                    |                     |                                    |                                    |                 |
|                | All settlements are less than the Settlement Trough Limit Sensitivity. |                        |                  |         |         |           |               |                    |                     |                                    |                                    |                 |
|                | Maximum Slope                                                          |                        | 1                | 0.0     | 4.5990  | Hogging   | 728.35E-6     | 2.3194             | 0.053454            | 6422.2                             | - 1 (Very Slight)                  |                 |
|                | Maximum Settlement                                                     |                        | 1                | 0.0     | 4.5990  | Hogging   | 728.35E-6     | 2.3194             | 0.053454            | 6422.2                             | - 1 (Very Slight)                  |                 |
| P              | Max. Tensile Strain                                                    |                        | 1                | 0.0     | 4.5990  | Hogging   | 728.35E-6     | 2.3194             | 0.053454            | 6422.2                             | - 1 (Very Slight)                  |                 |
|                | Min. Radius of Curvature (Hogging)                                     |                        | 1                | 0.0     | 4.5990  | Hogging   | 728.35E-6     | 2.3194             | 0.053454            | 6422.2                             | - 1 (Very Slight)                  |                 |
|                | Min. Radius of Curvature (Sagging)                                     |                        | -                | -       | -       | -         | -             | -                  | -                   | -                                  | -                                  |                 |
|                | Maximum Slope                                                          | Sub #                  | 1                | 0.95000 | 4.7021  | Hogging   | 571.89E-6     | 1.5440             | 0.035966            | 7133.8                             | - 0 (Negligible)                   |                 |
|                | Maximum Settlement                                                     | Sub #                  | 2                | 4.7021  | 5.6990  | Sagging   | 571.89E-6     | 2.0716             | 0.025948            | -                                  | 11332.0                            | 0 (Negligible)  |
|                | Max. Tensile Strain                                                    | Sub #                  | 1                | 0.95000 | 4.7021  | Hogging   | 571.89E-6     | 1.5440             | 0.035966            | 7133.8                             | - 0 (Negligible)                   |                 |
| Q              | Min. Radius of Curvature (Hogging)                                     | Sub #                  | 1                | 0.95000 | 4.7021  | Hogging   | 571.89E-6     | 1.5440             | 0.035966            | 7133.8                             | - 0 (Negligible)                   |                 |
|                | Min. Radius of Curvature (Sagging)                                     | Sub #                  | 2                | 4.7021  | 5.6990  | Sagging   | 571.89E-6     | 2.0716             | 0.025948            | -                                  | 11332.0                            | 0 (Negligible)  |
|                | Maximum Slope                                                          |                        | 1                | 0.0     | 4.5990  | Hogging   | 648.98E-6     | 2.1998             | 0.039768            | 6821.8                             | - 0 (Negligible)                   |                 |
|                | Maximum Settlement                                                     |                        | 1                | 0.0     | 4.5990  | Hogging   | 648.98E-6     | 2.1998             | 0.039768            | 6821.8                             | - 0 (Negligible)                   |                 |
|                | Max. Tensile Strain                                                    |                        | 1                | 0.0     | 4.5990  | Hogging   | 648.98E-6     | 2.1998             | 0.039768            | 6821.8                             | - 0 (Negligible)                   |                 |
|                | Min. Radius of Curvature (Hogging)                                     |                        | 1                | 0.0     | 4.5990  | Hogging   | 648.98E-6     | 2.1998             | 0.039768            | 6821.8                             | - 0 (Negligible)                   |                 |
| R              | Min. Radius of Curvature (Sagging)                                     |                        | -                | -       | -       | -         | -             | -                  | -                   | -                                  | -                                  |                 |
|                | Maximum Slope                                                          |                        | 1                | 0.92635 | 5.5632  | Hogging   | 477.91E-6     | 1.1175             | 0.031474            | 8142.8                             | - 0 (Negligible)                   |                 |
|                | Maximum Settlement                                                     |                        | 2                | 5.5632  | 7.4098  | Sagging   | 477.91E-6     | 1.8007             | 0.015243            | -                                  | 3287.4                             | 0 (Negligible)  |
|                | Max. Tensile Strain                                                    |                        | 1                | 0.92635 | 5.5632  | Hogging   | 477.91E-6     | 1.1175             | 0.031474            | 8142.8                             | - 0 (Negligible)                   |                 |
|                | Min. Radius of Curvature (Hogging)                                     |                        | 1                | 0.92635 | 5.5632  | Hogging   | 477.91E-6     | 1.1175             | 0.031474            | 8142.8                             | - 0 (Negligible)                   |                 |
|                | Min. Radius of Curvature (Sagging)                                     |                        | 2                | 5.5632  | 7.4098  | Sagging   | 477.91E-6     | 1.8007             | 0.015243            | -                                  | 3287.4                             | 0 (Negligible)  |
| S              | All settlements are less than the Settlement Trough Limit Sensitivity. |                        |                  |         |         |           |               |                    |                     |                                    |                                    |                 |
|                | All settlements are less than the Settlement Trough Limit Sensitivity. |                        |                  |         |         |           |               |                    |                     |                                    |                                    |                 |
|                | All settlements are less than the Settlement Trough Limit Sensitivity. |                        |                  |         |         |           |               |                    |                     |                                    |                                    |                 |
|                | All settlements are less than the Settlement Trough Limit Sensitivity. |                        |                  |         |         |           |               |                    |                     |                                    |                                    |                 |
|                | All settlements are less than the Settlement Trough Limit Sensitivity. |                        |                  |         |         |           |               |                    |                     |                                    |                                    |                 |
|                | All settlements are less than the Settlement Trough Limit Sensitivity. |                        |                  |         |         |           |               |                    |                     |                                    |                                    |                 |
| T              | Maximum Slope                                                          |                        | 2                | 7.3935  | 18.696  | Hogging   | 731.82E-6     | 0.60227            | 0.0061316           | 10835.                             | - 0 (Negligible)                   |                 |
|                | Maximum Settlement                                                     |                        | 3                | 18.696  | 31.312  | Sagging   | 731.82E-6     | 1.4434             | 0.010713            | -                                  | 8765.1                             | 0 (Negligible)  |
|                | Max. Tensile Strain                                                    |                        | 3                | 18.696  | 31.312  | Sagging   | 731.82E-6     | 1.4434             | 0.010713            | -                                  | 8765.1                             | 0 (Negligible)  |
|                | Min. Radius of Curvature (Hogging)                                     |                        | 2                | 7.3935  | 18.696  | Hogging   | 731.82E-6     | 0.60227            | 0.0061316           | 10835.                             | - 0 (Negligible)                   |                 |
|                | Min. Radius of Curvature (Sagging)                                     |                        | 3                | 18.696  | 31.312  | Sagging   | 731.82E-6     | 1.4434             | 0.010713            | -                                  | 8765.1                             | 0 (Negligible)  |
|                | All settlements are less than the Settlement Trough Limit Sensitivity. |                        |                  |         |         |           |               |                    |                     |                                    |                                    |                 |
| U              | All settlements are less than the Settlement Trough Limit Sensitivity. |                        |                  |         |         |           |               |                    |                     |                                    |                                    |                 |
|                | All settlements are less than the Settlement Trough Limit Sensitivity. |                        |                  |         |         |           |               |                    |                     |                                    |                                    |                 |
|                | All settlements are less than the Settlement Trough Limit Sensitivity. |                        |                  |         |         |           |               |                    |                     |                                    |                                    |                 |
|                | All settlements are less than the Settlement Trough Limit Sensitivity. |                        |                  |         |         |           |               |                    |                     |                                    |                                    |                 |
|                | All settlements are less than the Settlement Trough Limit Sensitivity. |                        |                  |         |         |           |               |                    |                     |                                    |                                    |                 |
|                | All settlements are less than the Settlement Trough Limit Sensitivity. |                        |                  |         |         |           |               |                    |                     |                                    |                                    |                 |
| V              | Maximum Slope                                                          |                        | 1                | 3.6391  | 3.6391  | Sagging   | 95.931E-6     | 0.15174            | 0.0                 | -                                  | 17084.0                            | 0 (Negligible)  |
|                | Maximum Settlement                                                     |                        | 1                | 3.6391  | 3.6391  | Sagging   | 95.931E-6     | 0.15174            | 0.0                 | -                                  | 17084.0                            | 0 (Negligible)  |
|                | Max. Tensile Strain                                                    |                        | 1                | 3.6391  | 3.6391  | Sagging   | 95.931E-6     | 0.15174            | 0.0                 | -                                  | 17084.0                            | 0 (Negligible)  |
|                | Min. Radius of Curvature (Hogging)                                     |                        | -                | -       | -       | -         | -             | -                  | -                   | -                                  | -                                  |                 |
|                | Min. Radius of Curvature (Sagging)                                     |                        | -                | -       | -       | -         | -             | -                  | -                   | -                                  | -                                  |                 |
|                | All settlements are less than the Settlement Trough Limit Sensitivity. |                        |                  |         |         |           |               |                    |                     |                                    |                                    |                 |
| W              | Maximum Slope                                                          |                        | 1                | 0.0     | 0.57009 | Sagging   | 53.569E-6     | 0.15183            | 0.0053346           | -                                  | 59139.0                            | 0 (Negligible)  |
|                | Maximum Settlement                                                     |                        | 1                | 0.0     | 0.57009 | Sagging   | 53.569E-6     | 0.15183            | 0.0053346           | -                                  | 59139.0                            | 0 (Negligible)  |
|                | Max. Tensile Strain                                                    |                        | 1                | 0.0     | 0.57009 | Sagging   | 53.569E-6     | 0.15183            | 0.0053346           | -                                  | 59139.0                            | 0 (Negligible)  |
|                | Min. Radius of Curvature (Hogging)                                     |                        | -                | -       | -       | -         | -             | -                  | -                   | -                                  | -                                  |                 |
|                | Min. Radius of Curvature (Sagging)                                     |                        | 1                | 0.0     | 0.57009 | Sagging   | 53.569E-6     | 0.15183            | 0.0053346           | -                                  | 59139.0                            | 0 (Negligible)  |
|                | All settlements are less than the Settlement Trough Limit Sensitivity. |                        |                  |         |         |           |               |                    |                     |                                    |                                    |                 |
| X              | Maximum Slope                                                          |                        | 1                | 6.8041  | 9.5105  | Sagging   | 758.14E-6     | 1.3099             | 0.013829            | -                                  | 6718.5                             | 0 (Negligible)  |
|                | Maximum Settlement                                                     |                        | 2                | 9.5105  | 9.7191  | Sagging   | 180.19E-6     | 1.3475             | 0.014902            | -                                  | 4.4001E+6                          | 0 (Negligible)  |
|                | Max. Tensile Strain                                                    |                        | 2                | 9.5105  | 9.7191  | Sagging   | 180.19E-6     | 1.3475             | 0.014902            | -                                  | 4.4001E+6                          | 0 (Negligible)  |
|                | Min. Radius of Curvature (Hogging)                                     |                        | -                | -       | -       | -         | -             | -                  | -                   | -                                  | -                                  |                 |
|                | Min. Radius of Curvature (Sagging)                                     |                        | 1                | 6.8041  | 9.5105  | Sagging   | 758.14E-6     | 1.3099             | 0.013829            | -                                  | 6718.5                             | 0 (Negligible)  |
|                | All settlements are less than the Settlement Trough Limit Sensitivity. |                        |                  |         |         |           |               |                    |                     |                                    |                                    |                 |
| Y              | Maximum Slope                                                          |                        | 1                | 0.0     | 3.6391  | Sagging   | 179.35E-6     | 2.0005             | 0.016684            | -                                  | 427.94E+6                          | 0 (Negligible)  |
|                | Maximum Settlement                                                     |                        | 1                | 0.0     | 3.6391  | Sagging   | 179.35E-6     | 2.0005             | 0.016684            | -                                  | 427.94E+6                          | 0 (Negligible)  |
|                | Max. Tensile Strain                                                    |                        | 1                | 0.0     | 3.6391  | Sagging   | 179.35E-6     | 2.0005             | 0.016684            | -                                  | 427.94E+6                          | 0 (Negligible)  |
|                | Min. Radius of Curvature (Hogging)                                     |                        | -                | -       | -       | -         | -             | -                  | -                   | -                                  | -                                  |                 |
|                | Min. Radius of Curvature (Sagging)                                     |                        | 1                | 0.0     | 3.6391  | Sagging   | 179.35E-6     | 2.0005             | 0.016684            | -                                  | 427.94E+6                          | 0 (Negligible)  |
|                | All settlements are less than the Settlement Trough Limit Sensitivity. |                        |                  |         |         |           |               |                    |                     |                                    |                                    |                 |
| Z              | Maximum Slope                                                          |                        | 1                | 5.7481  | 7.6641  | Hogging   | 180.40E-6     | 0.49753            | 0.0                 | 18945.                             | - 0 (Negligible)                   |                 |
|                | Maximum Settlement                                                     |                        | 2                | 7.6641  | 9.5792  | Sagging   | 180.40E-6     | 0.84300            | 0.0                 | -                                  | 169.34E+9                          | 0 (Negligible)  |
|                | Max. Tensile Strain                                                    |                        | 1                | 5.7481  | 7.6641  | Hogging   | 180.40E-6     | 0.49753            | 0.0                 | 18945.                             | - 0 (Negligible)                   |                 |
|                | Min. Radius of Curvature (Hogging)                                     |                        | 1                | 5.7481  | 7.6641  | Hogging   | 180.40E-6     | 0.49753            | 0.0                 | 18945.                             | - 0 (Negligible)                   |                 |
|                | Min. Radius of Curvature (Sagging)                                     |                        | 2                | 7.6641  | 9.5792  | Sagging   | 180.40E-6     | 0.84300            | 0.0                 | -                                  | 169.34E+9                          | 0 (Negligible)  |
|                | All settlements are less than the Settlement Trough Limit Sensitivity. |                        |                  |         |         |           |               |                    |                     |                                    |                                    |                 |
| AA             | Maximum Slope                                                          |                        | 1                | 0.0     | 3.6610  | Sagging   | 182.60E-6     | 1.5118             | 0.015110            | -                                  | 761.45E+6                          | 0 (Negligible)  |
|                | Maximum Settlement                                                     |                        | 1                | 0.0     | 3.6610  | Sagging   | 182.60E-6     | 1.5118             | 0.015110            | -                                  | 761.45E+6                          | 0 (Negligible)  |



# GEA LIMITED (GEOTECHNICAL & ENV ASSOC)

Rear of 159-163 King's Cross Road, London WC1X 9BN  
Wall Installation only Issue 4

| Job No.   | Sheet No.           | Rev.    |
|-----------|---------------------|---------|
| J16180    |                     |         |
| Drg. Ref. |                     |         |
| Made by   | Date<br>07-Mar-2017 | Checked |

| Structure Name | Parameter                          | Critical Sub-Structure | Critical Segment | Start  | End    | Curvature | Maximum Slope | Maximum Settlement | Max. Tensile Strain | Min. Radius of Curvature (Hogging) | Min. Radius of Curvature (Sagging) | Damage Category |
|----------------|------------------------------------|------------------------|------------------|--------|--------|-----------|---------------|--------------------|---------------------|------------------------------------|------------------------------------|-----------------|
| AB             | Max. Tensile Strain                |                        | 1                | 0.0    | 3.6610 | Sagging   | 182.60E-6     | 1.5118             | 0.015110            | -                                  | 761.45E+6                          | 0 (Negligible)  |
|                | Min. Radius of Curvature (Hogging) |                        | -                | -      | -      | -         | -             | -                  | -                   | -                                  | -                                  | -               |
|                | Min. Radius of Curvature (Sagging) |                        | 1                | 0.0    | 3.6610 | Sagging   | 182.60E-6     | 1.5118             | 0.015110            | -                                  | 761.45E+6                          | 0 (Negligible)  |
|                | Maximum Slope                      |                        | 1                | 8.5163 | 8.9605 | Sagging   | 178.02E-6     | 0.25512            | 0.0                 | -                                  | 23512.0                            | 0 (Negligible)  |
|                | Maximum Settlement                 |                        | 2                | 8.9605 | 9.4616 | Sagging   | 175.45E-6     | 0.34303            | 0.0                 | -                                  | 20845.0                            | 0 (Negligible)  |
|                | Max. Tensile Strain                |                        | 1                | 8.5163 | 8.9605 | Sagging   | 178.02E-6     | 0.25512            | 0.0                 | -                                  | 23512.0                            | 0 (Negligible)  |
| AC             | Min. Radius of Curvature (Hogging) |                        | -                | -      | -      | -         | -             | -                  | -                   | -                                  | -                                  | -               |
|                | Min. Radius of Curvature (Sagging) |                        | 2                | 8.9605 | 9.4616 | Sagging   | 175.45E-6     | 0.34303            | 0.0                 | -                                  | 20845.0                            | 0 (Negligible)  |
|                | Maximum Slope                      |                        | 1                | 0.0    | 5.0794 | Sagging   | 171.41E-6     | 1.1623             | 0.0044826           | -                                  | 134410.0                           | 0 (Negligible)  |
|                | Maximum Settlement                 |                        | 1                | 0.0    | 5.0794 | Sagging   | 171.41E-6     | 1.1623             | 0.0044826           | -                                  | 134410.0                           | 0 (Negligible)  |
|                | Max. Tensile Strain                |                        | 1                | 0.0    | 5.0794 | Sagging   | 171.41E-6     | 1.1623             | 0.0044826           | -                                  | 134410.0                           | 0 (Negligible)  |
|                | Min. Radius of Curvature (Hogging) |                        | -                | -      | -      | -         | -             | -                  | -                   | -                                  | -                                  | -               |
| AD             | Min. Radius of Curvature (Sagging) |                        | 1                | 0.0    | 5.0794 | Sagging   | 171.41E-6     | 1.1623             | 0.0044826           | -                                  | 134410.0                           | 0 (Negligible)  |
|                | Maximum Slope                      |                        | 1                | 0.0    | 7.8628 | Sagging   | 199.96E-6     | 2.7350             | 0.023815            | -                                  | 130.44E+6                          | 0 (Negligible)  |
|                | Maximum Settlement                 |                        | 1                | 0.0    | 7.8628 | Sagging   | 199.96E-6     | 2.7350             | 0.023815            | -                                  | 130.44E+6                          | 0 (Negligible)  |
|                | Max. Tensile Strain                |                        | 1                | 0.0    | 7.8628 | Sagging   | 199.96E-6     | 2.7350             | 0.023815            | -                                  | 130.44E+6                          | 0 (Negligible)  |
|                | Min. Radius of Curvature (Hogging) |                        | -                | -      | -      | -         | -             | -                  | -                   | -                                  | -                                  | -               |
|                | Min. Radius of Curvature (Sagging) |                        | 1                | 0.0    | 7.8628 | Sagging   | 199.96E-6     | 2.7350             | 0.023815            | -                                  | 130.44E+6                          | 0 (Negligible)  |
| AE             | Maximum Slope                      |                        | 1                | 0.0    | 3.3051 | Sagging   | 61.633E-6     | 1.1624             | 422.89E-6           | -                                  | 56990.0                            | 0 (Negligible)  |
|                | Maximum Settlement                 |                        | 1                | 0.0    | 3.3051 | Sagging   | 61.633E-6     | 1.1624             | 422.89E-6           | -                                  | 56990.0                            | 0 (Negligible)  |
|                | Max. Tensile Strain                |                        | 1                | 0.0    | 3.3051 | Sagging   | 61.633E-6     | 1.1624             | 422.89E-6           | -                                  | 56990.0                            | 0 (Negligible)  |
|                | Min. Radius of Curvature (Hogging) |                        | -                | -      | -      | -         | -             | -                  | -                   | -                                  | -                                  | -               |
|                | Min. Radius of Curvature (Sagging) |                        | 1                | 0.0    | 3.3051 | Sagging   | 61.633E-6     | 1.1624             | 422.89E-6           | -                                  | 56990.0                            | 0 (Negligible)  |
|                | Maximum Slope                      |                        | 1                | 0.0    | 3.2130 | Sagging   | 199.40E-6     | 3.3553             | 0.0058586           | -                                  | 24851.0                            | 0 (Negligible)  |
| AF             | Maximum Settlement                 |                        | 1                | 0.0    | 3.2130 | Sagging   | 199.40E-6     | 3.3553             | 0.0058586           | -                                  | 24851.0                            | 0 (Negligible)  |
|                | Max. Tensile Strain                |                        | 1                | 0.0    | 3.2130 | Sagging   | 199.40E-6     | 3.3553             | 0.0058586           | -                                  | 24851.0                            | 0 (Negligible)  |
|                | Min. Radius of Curvature (Hogging) |                        | -                | -      | -      | -         | -             | -                  | -                   | -                                  | -                                  | -               |
|                | Min. Radius of Curvature (Sagging) |                        | 1                | 0.0    | 3.2130 | Sagging   | 199.40E-6     | 3.3553             | 0.0058586           | -                                  | 24851.0                            | 0 (Negligible)  |
|                | Maximum Slope                      |                        | 2                | 11.652 | 15.237 | Sagging   | 195.11E-6     | 0.91601            | 0.0023805           | -                                  | 31904.0                            | 0 (Negligible)  |
|                | Maximum Settlement                 |                        | 1                | 0.0    | 11.652 | Sagging   | 193.59E-6     | 2.7397             | 0.0033851           | -                                  | 24828.0                            | 0 (Negligible)  |
| AG             | Max. Tensile Strain                |                        | 1                | 0.0    | 11.652 | Sagging   | 193.59E-6     | 2.7397             | 0.0033851           | -                                  | 24828.0                            | 0 (Negligible)  |
|                | Min. Radius of Curvature (Hogging) |                        | -                | -      | -      | -         | -             | -                  | -                   | -                                  | -                                  | -               |
|                | Min. Radius of Curvature (Sagging) |                        | 1                | 0.0    | 11.652 | Sagging   | 193.59E-6     | 2.7397             | 0.0033851           | -                                  | 24828.0                            | 0 (Negligible)  |
|                | Maximum Slope                      |                        | 1                | 0.0    | 6.3378 | Sagging   | 175.94E-6     | 2.2371             | 0.0073579           | -                                  | 50441.0                            | 0 (Negligible)  |
|                | Maximum Settlement                 |                        | 1                | 0.0    | 6.3378 | Sagging   | 175.94E-6     | 2.2371             | 0.0073579           | -                                  | 50441.0                            | 0 (Negligible)  |
|                | Max. Tensile Strain                |                        | 1                | 0.0    | 6.3378 | Sagging   | 175.94E-6     | 2.2371             | 0.0073579           | -                                  | 50441.0                            | 0 (Negligible)  |
| AH             | Min. Radius of Curvature (Hogging) |                        | -                | -      | -      | -         | -             | -                  | -                   | -                                  | -                                  | -               |
|                | Min. Radius of Curvature (Sagging) |                        | 1                | 0.0    | 6.3378 | Sagging   | 175.94E-6     | 2.2371             | 0.0073579           | -                                  | 50441.0                            | 0 (Negligible)  |
|                | Maximum Slope                      |                        | 1                | 0.0    | 4.8498 | Sagging   | 187.89E-6     | 2.2372             | 0.015057            | -                                  | 121050.0                           | 0 (Negligible)  |
|                | Maximum Settlement                 |                        | 1                | 0.0    | 4.8498 | Sagging   | 187.89E-6     | 2.2372             | 0.015057            | -                                  | 121050.0                           | 0 (Negligible)  |
|                | Max. Tensile Strain                |                        | 1                | 0.0    | 4.8498 | Sagging   | 187.89E-6     | 2.2372             | 0.015057            | -                                  | 121050.0                           | 0 (Negligible)  |
|                | Min. Radius of Curvature (Hogging) |                        | -                | -      | -      | -         | -             | -                  | -                   | -                                  | -                                  | -               |
| AI             | Min. Radius of Curvature (Sagging) |                        | 1                | 0.0    | 4.8498 | Sagging   | 187.89E-6     | 2.2372             | 0.015057            | -                                  | 121050.0                           | 0 (Negligible)  |
|                | Maximum Slope                      | Sub #                  | 1                | 0.0    | 5.9785 | Sagging   | 52.027E-6     | 1.4615             | 736.61E-6           | -                                  | 51448.0                            | 0 (Negligible)  |
|                | Maximum Settlement                 | Sub #                  | 1                | 0.0    | 5.9785 | Sagging   | 52.027E-6     | 1.4615             | 736.61E-6           | -                                  | 51448.0                            | 0 (Negligible)  |
|                | Max. Tensile Strain                | Sub #                  | 1                | 0.0    | 5.9785 | Sagging   | 52.027E-6     | 1.4615             | 736.61E-6           | -                                  | 51448.0                            | 0 (Negligible)  |
|                | Min. Radius of Curvature (Hogging) |                        | -                | -      | -      | -         | -             | -                  | -                   | -                                  | -                                  | -               |
|                | Min. Radius of Curvature (Sagging) | Sub #                  | 1                | 0.0    | 5.9785 | Sagging   | 52.027E-6     | 1.4615             | 736.61E-6           | -                                  | 51448.0                            | 0 (Negligible)  |
| AJ             | Maximum Slope                      | Sub #                  | 1                | 0.0    | 4.9487 | Sagging   | 199.95E-6     | 2.4392             | 0.023222            | -                                  | 196.80E+6                          | 0 (Negligible)  |
|                | Maximum Settlement                 | Sub #                  | 1                | 0.0    | 4.9487 | Sagging   | 199.95E-6     | 2.4392             | 0.023222            | -                                  | 196.80E+6                          | 0 (Negligible)  |
|                | Max. Tensile Strain                | Sub #                  | 1                | 0.0    | 4.9487 | Sagging   | 199.95E-6     | 2.4392             | 0.023222            | -                                  | 196.80E+6                          | 0 (Negligible)  |
|                | Min. Radius of Curvature (Hogging) |                        | -                | -      | -      | -         | -             | -                  | -                   | -                                  | -                                  | -               |
|                | Min. Radius of Curvature (Sagging) | Sub #                  | 1                | 0.0    | 4.9487 | Sagging   | 199.95E-6     | 2.4392             | 0.023222            | -                                  | 196.80E+6                          | 0 (Negligible)  |
|                | Maximum Slope                      | Sub #                  | 4                | 3.2002 | 4.7371 | Sagging   | 1.3112E-6     | 2.4352             | 1.2517E-6           | -                                  | 3.7263E+12                         | 0 (Negligible)  |
| AK             | Maximum Settlement                 | Sub #                  | 1                | 0.0    | 1.8953 | Sagging   | 1.3112E-6     | 2.4394             | 1.2517E-6           | -                                  | 14.233E+12                         | 0 (Negligible)  |
|                | Max. Tensile Strain                | Sub #                  | 1                | 0.0    | 1.8953 | Sagging   | 1.3112E-6     | 2.4394             | 1.2517E-6           | -                                  | 14.233E+12                         | 0 (Negligible)  |
|                | Min. Radius of Curvature (Hogging) |                        | -                | -      | -      | -         | -             | -                  | -                   | -                                  | -                                  | -               |
|                | Min. Radius of Curvature (Sagging) | Sub #                  | 4                | 3.2002 | 4.7371 | Sagging   | 1.3112E-6     | 2.4352             | 1.2517E-6           | -                                  | 3.7263E+12                         | 0 (Negligible)  |
|                | Maximum Slope                      | Sub #                  | 1                | 0.0    | 4.9487 | Sagging   | 199.95E-6     | 2.4392             | 0.023222            | -                                  | 196.80E+6                          | 0 (Negligible)  |
|                | Maximum Settlement                 | Sub #                  | 1                | 0.0    | 4.9487 | Sagging   | 199.95E-6     | 2.4392             | 0.023222            | -                                  | 196.80E+6                          | 0 (Negligible)  |
| AL             | Max. Tensile Strain                | Sub #                  | 1                | 0.0    | 4.9487 | Sagging   | 199.95E-6     | 2.4392             | 0.023222            | -                                  | 196.80E+6                          | 0 (Negligible)  |
|                | Min. Radius of Curvature (Hogging) |                        | -                | -      | -      | -         | -             | -                  | -                   | -                                  | -                                  | -               |
|                | Min. Radius of Curvature (Sagging) | Sub #                  | 1                | 0.0    | 4.9487 | Sagging   | 199.95E-6     | 2.4392             | 0.023222            | -                                  | 196.80E+6                          | 0 (Negligible)  |
|                | Maximum Slope                      | Sub #                  | 4                | 3.2002 | 4.7371 | Sagging   | 1.3112E-6     | 2.4352             | 1.2517E-6           | -                                  | 3.7263E+12                         | 0 (Negligible)  |
|                | Maximum Settlement                 | Sub #                  | 1                | 0.0    | 1.8953 | Sagging   | 1.3112E-6     | 2.4394             | 1.2517E-6           | -                                  | 14.233E+12                         | 0 (Negligible)  |
|                | Max. Tensile Strain                | Sub #                  | 1                | 0.0    | 1.8953 | Sagging   | 1.3112E-6     | 2.4394             | 1.2517E-6           | -                                  | 14.233E+12                         | 0 (Negligible)  |
| AM             | Min. Radius of Curvature (Hogging) |                        | -                | -      | -      | -         | -             | -                  | -                   | -                                  | -                                  | -               |
|                | Min. Radius of Curvature (Sagging) | Sub #                  | 4                | 3.2002 | 4.7371 | Sagging   | 1.3112E-6     | 2.4352             | 1.2517E-6           | -                                  | 3.7263E+12                         | 0 (Negligible)  |
|                | Maximum Slope                      | Sub #                  | 1                | 0.0    | 4.9487 | Sagging   | 199.95E-6     | 2.4392             | 0.023222            | -                                  | 196.80E+6                          | 0 (Negligible)  |
|                | Maximum Settlement                 | Sub #                  | 1                | 0.0    | 4.9487 | Sagging   | 199.95E-6     | 2.4392             | 0.023222            | -                                  | 196.80E+6                          | 0 (Negligible)  |
|                | Max. Tensile Strain                | Sub #                  | 1                | 0.0    | 4.9487 | Sagging   | 199.95E-6     | 2.4392             | 0.023222            | -                                  | 196.80E+6                          | 0 (Negligible)  |
|                | Min. Radius of Curvature (Hogging) |                        | -                | -      | -      | -         | -             | -                  | -                   | -                                  | -                                  | -               |



GEA LIMITED  
(GEOTECHNICAL & ENV ASSOC)

Rear of 159-163 King's Cross Road, London WC1X 9BN  
Wall Installation only Issue 4

| Job No.   | Sheet No.   | Rev.    |
|-----------|-------------|---------|
| J16180    |             |         |
| Drg. Ref. |             |         |
| Made by   | Date        | Checked |
|           | 07-Mar-2017 |         |

| Structure Name | Parameter                                                              | Critical Sub-Structure | Critical Segment | Start   | End     | Curvature | Maximum Slope | Maximum Settlement | Max. Tensile Strain | Min. Radius of Curvature (Hogging) | Min. Radius of Curvature (Sagging) | Damage Category |
|----------------|------------------------------------------------------------------------|------------------------|------------------|---------|---------|-----------|---------------|--------------------|---------------------|------------------------------------|------------------------------------|-----------------|
| AM             | Curvature (Sagging)                                                    |                        |                  | -       | -       | -         | -             | -                  | -                   | -                                  | -                                  |                 |
|                | Maximum Slope                                                          | Sub #                  | 1                | 0.0     | 2.7064  | Sagging   | 199.60E-6     | 2.4332             | 0.025197            | -                                  | 196.75E+6                          | 0 (Negligible)  |
|                | Maximum Settlement                                                     | Sub #                  | 1                | 0.0     | 2.7064  | Sagging   | 199.60E-6     | 2.4332             | 0.025197            | -                                  | 196.75E+6                          | 0 (Negligible)  |
|                | Max. Tensile Strain                                                    | Sub #                  | 1                | 0.0     | 2.7064  | Sagging   | 199.60E-6     | 2.4332             | 0.025197            | -                                  | 196.75E+6                          | 0 (Negligible)  |
|                | Min. Radius of Curvature (Hogging)                                     | Sub #                  | -                | -       | -       | -         | -             | -                  | -                   | -                                  | -                                  |                 |
| AN             | Min. Radius of Curvature (Sagging)                                     | Sub #                  | 1                | 0.0     | 2.7064  | Sagging   | 199.60E-6     | 2.4332             | 0.025197            | -                                  | 196.75E+6                          | 0 (Negligible)  |
|                | Maximum Slope                                                          | Sub #                  | 1                | 0.0     | 0.83442 | Hogging   | 3.3683E-6     | 1.8955             | 6.3300E-6           | 18.792E+12                         | -                                  | 0 (Negligible)  |
|                | Maximum Settlement                                                     | Sub #                  | 2                | 0.83442 | 3.3367  | Sagging   | 3.3683E-6     | 1.9037             | 112.55E-6           | -                                  | 3.7769E+6                          | 0 (Negligible)  |
|                | Max. Tensile Strain                                                    | Sub #                  | 2                | 0.83442 | 3.3367  | Sagging   | 3.3683E-6     | 1.9037             | 112.55E-6           | -                                  | 3.7769E+6                          | 0 (Negligible)  |
|                | Min. Radius of Curvature (Hogging)                                     | Sub #                  | 1                | 0.0     | 0.83442 | Hogging   | 3.3683E-6     | 1.8955             | 6.3300E-6           | 18.792E+12                         | -                                  | 0 (Negligible)  |
| AO             | Min. Radius of Curvature (Sagging)                                     | Sub #                  | 2                | 0.83442 | 3.3367  | Sagging   | 3.3683E-6     | 1.9037             | 112.55E-6           | -                                  | 3.7769E+6                          | 0 (Negligible)  |
|                | Maximum Slope                                                          | Sub #                  | 1                | 0.0     | 2.5169  | Sagging   | 199.86E-6     | 2.4068             | 0.025126            | -                                  | 18.121E+6                          | 0 (Negligible)  |
|                | Maximum Settlement                                                     | Sub #                  | 1                | 0.0     | 2.5169  | Sagging   | 199.86E-6     | 2.4068             | 0.025126            | -                                  | 18.121E+6                          | 0 (Negligible)  |
|                | Max. Tensile Strain                                                    | Sub #                  | 1                | 0.0     | 2.5169  | Sagging   | 199.86E-6     | 2.4068             | 0.025126            | -                                  | 18.121E+6                          | 0 (Negligible)  |
|                | Min. Radius of Curvature (Hogging)                                     | Sub #                  | -                | -       | -       | -         | -             | -                  | -                   | -                                  | -                                  |                 |
| AP             | Min. Radius of Curvature (Sagging)                                     | Sub #                  | 1                | 0.0     | 2.5169  | Sagging   | 199.86E-6     | 2.4068             | 0.025126            | -                                  | 18.121E+6                          | 0 (Negligible)  |
|                | Maximum Slope                                                          | Sub #                  | 1                | 0.0     | 4.4543  | Sagging   | 125.86E-6     | 2.4070             | 0.0037032           | -                                  | 25453.0                            | 0 (Negligible)  |
|                | Maximum Settlement                                                     | Sub #                  | 1                | 0.0     | 4.4543  | Sagging   | 125.86E-6     | 2.4070             | 0.0037032           | -                                  | 25453.0                            | 0 (Negligible)  |
|                | Max. Tensile Strain                                                    | Sub #                  | 1                | 0.0     | 4.4543  | Sagging   | 125.86E-6     | 2.4070             | 0.0037032           | -                                  | 25453.0                            | 0 (Negligible)  |
|                | Min. Radius of Curvature (Hogging)                                     | Sub #                  | -                | -       | -       | -         | -             | -                  | -                   | -                                  | -                                  |                 |
| AQ             | Min. Radius of Curvature (Sagging)                                     | Sub #                  | 1                | 0.0     | 4.4543  | Sagging   | 125.86E-6     | 2.4070             | 0.0037032           | -                                  | 25453.0                            | 0 (Negligible)  |
|                | Maximum Slope                                                          | Sub #                  | 1                | 0.0     | 4.9487  | Sagging   | 179.74E-6     | 2.0631             | 0.011663            | -                                  | 92298.0                            | 0 (Negligible)  |
|                | Maximum Settlement                                                     | Sub #                  | 1                | 0.0     | 4.9487  | Sagging   | 179.74E-6     | 2.0631             | 0.011663            | -                                  | 92298.0                            | 0 (Negligible)  |
|                | Max. Tensile Strain                                                    | Sub #                  | 1                | 0.0     | 4.9487  | Sagging   | 179.74E-6     | 2.0631             | 0.011663            | -                                  | 92298.0                            | 0 (Negligible)  |
|                | Min. Radius of Curvature (Hogging)                                     | Sub #                  | -                | -       | -       | -         | -             | -                  | -                   | -                                  | -                                  |                 |
| AR             | Min. Radius of Curvature (Sagging)                                     | Sub #                  | 1                | 0.0     | 4.9487  | Sagging   | 179.74E-6     | 2.0631             | 0.011663            | -                                  | 92298.0                            | 0 (Negligible)  |
|                | Maximum Slope                                                          | Sub #                  | 1                | 0.0     | 0.94198 | Sagging   | 200.00E-6     | 0.38759            | 0.0                 | -                                  | 89.267E+9                          | 0 (Negligible)  |
|                | Maximum Settlement                                                     | Sub #                  | 2                | 0.94198 | 8.4707  | Sagging   | 200.00E-6     | 1.8933             | 0.013330            | -                                  | 68.343E+6                          | 0 (Negligible)  |
|                | Max. Tensile Strain                                                    | Sub #                  | 2                | 0.94198 | 8.4707  | Sagging   | 200.00E-6     | 1.8933             | 0.013330            | -                                  | 68.343E+6                          | 0 (Negligible)  |
|                | Min. Radius of Curvature (Hogging)                                     | Sub #                  | -                | -       | -       | -         | -             | -                  | -                   | -                                  | -                                  |                 |
| AS             | Min. Radius of Curvature (Sagging)                                     | Sub #                  | 2                | 0.94198 | 8.4707  | Sagging   | 200.00E-6     | 1.8933             | 0.013330            | -                                  | 68.343E+6                          | 0 (Negligible)  |
|                | Maximum Slope                                                          | Sub #                  | 1                | 1.8137  | 2.7205  | Sagging   | 199.99E-6     | 0.37109            | 0.0                 | -                                  | 19016.0                            | 0 (Negligible)  |
|                | Maximum Settlement                                                     | Sub #                  | 3                | 2.7205  | 8.1605  | Sagging   | 199.99E-6     | 1.4590             | 0.010196            | -                                  | 62.262E+6                          | 0 (Negligible)  |
|                | Max. Tensile Strain                                                    | Sub #                  | 3                | 2.7205  | 8.1605  | Sagging   | 199.99E-6     | 1.4590             | 0.010196            | -                                  | 62.262E+6                          | 0 (Negligible)  |
|                | Min. Radius of Curvature (Hogging)                                     | Sub #                  | -                | -       | -       | -         | -             | -                  | -                   | -                                  | -                                  |                 |
| AT             | Min. Radius of Curvature (Sagging)                                     | Sub #                  | 3                | 2.7205  | 8.1605  | Sagging   | 199.99E-6     | 1.4590             | 0.010196            | -                                  | 62.262E+6                          | 0 (Negligible)  |
|                | Maximum Slope                                                          | Sub #                  | 1                | 1.8461  | 3.4847  | Sagging   | 180.33E-6     | 0.60118            | 0.0                 | -                                  | 191570.0                           | 0 (Negligible)  |
|                | Maximum Settlement                                                     | Sub #                  | 2                | 3.4847  | 11.076  | Sagging   | 180.33E-6     | 1.8017             | 0.0076835           | -                                  | 89349.0                            | 0 (Negligible)  |
|                | Max. Tensile Strain                                                    | Sub #                  | 2                | 3.4847  | 11.076  | Sagging   | 180.33E-6     | 1.8017             | 0.0076835           | -                                  | 89349.0                            | 0 (Negligible)  |
|                | Min. Radius of Curvature (Hogging)                                     | Sub #                  | -                | -       | -       | -         | -             | -                  | -                   | -                                  | -                                  |                 |
| AU             | Min. Radius of Curvature (Sagging)                                     | Sub #                  | 2                | 3.4847  | 11.076  | Sagging   | 180.33E-6     | 1.8017             | 0.0076835           | -                                  | 89349.0                            | 0 (Negligible)  |
|                | Maximum Slope                                                          | Sub #                  | 1                | 0.0     | 4.4445  | Hogging   | 799.97E-6     | 2.4280             | 0.058705            | 5775.4                             | -                                  | 1 (Very Slight) |
|                | Maximum Settlement                                                     | Sub #                  | 1                | 0.0     | 4.4445  | Hogging   | 799.97E-6     | 2.4280             | 0.058705            | 5775.4                             | -                                  | 1 (Very Slight) |
|                | Max. Tensile Strain                                                    | Sub #                  | 1                | 0.0     | 4.4445  | Hogging   | 799.97E-6     | 2.4280             | 0.058705            | 5775.4                             | -                                  | 1 (Very Slight) |
|                | Min. Radius of Curvature (Hogging)                                     | Sub #                  | 1                | 0.0     | 4.4445  | Hogging   | 799.97E-6     | 2.4280             | 0.058705            | 5775.4                             | -                                  | 1 (Very Slight) |
| AV             | Min. Radius of Curvature (Sagging)                                     | Sub #                  | -                | -       | -       | -         | -             | -                  | -                   | -                                  | -                                  |                 |
|                | All settlements are less than the Settlement Trough Limit Sensitivity. |                        |                  |         |         |           |               |                    |                     |                                    |                                    |                 |
|                | All settlements are less than the Settlement Trough Limit Sensitivity. |                        |                  |         |         |           |               |                    |                     |                                    |                                    |                 |
|                | All settlements are less than the Settlement Trough Limit Sensitivity. |                        |                  |         |         |           |               |                    |                     |                                    |                                    |                 |
|                | All settlements are less than the Settlement Trough Limit Sensitivity. |                        |                  |         |         |           |               |                    |                     |                                    |                                    |                 |
| AW             | All settlements are less than the Settlement Trough Limit Sensitivity. |                        |                  |         |         |           |               |                    |                     |                                    |                                    |                 |
|                | Maximum Slope                                                          | Sub #                  | 1                | 3.7739  | 11.321  | Hogging   | 617.02E-6     | 2.7356             | 0.031327            | 9027.7                             | -                                  | 0 (Negligible)  |
|                | Maximum Settlement                                                     | Sub #                  | 1                | 3.7739  | 11.321  | Hogging   | 617.02E-6     | 2.7356             | 0.031327            | 9027.7                             | -                                  | 0 (Negligible)  |
|                | Max. Tensile Strain                                                    | Sub #                  | 1                | 3.7739  | 11.321  | Hogging   | 617.02E-6     | 2.7356             | 0.031327            | 9027.7                             | -                                  | 0 (Negligible)  |
|                | Min. Radius of Curvature (Hogging)                                     | Sub #                  | 1                | 3.7739  | 11.321  | Hogging   | 617.02E-6     | 2.7356             | 0.031327            | 9027.7                             | -                                  | 0 (Negligible)  |
|                | Min. Radius of Curvature (Sagging)                                     | Sub #                  | -                | -       | -       | -         | -             | -                  | -                   | -                                  | -                                  |                 |
|                | All settlements are less than the Settlement Trough Limit Sensitivity. |                        |                  |         |         |           |               |                    |                     |                                    |                                    |                 |
|                | All settlements are less than the Settlement Trough Limit Sensitivity. |                        |                  |         |         |           |               |                    |                     |                                    |                                    |                 |
|                | All settlements are less than the Settlement Trough Limit Sensitivity. |                        |                  |         |         |           |               |                    |                     |                                    |                                    |                 |
|                | All settlements are less than the Settlement Trough Limit Sensitivity. |                        |                  |         |         |           |               |                    |                     |                                    |                                    |                 |

Specific Building Damage Results - All Combined Segments

Structure: A | Sub-structure:

| Vertical Offset from Line for | Combined Segment | Start | Length | Curvature | Deflection Ratio | Average Horizontal Strain | Max. Tensile Strain | Damage Category |
|-------------------------------|------------------|-------|--------|-----------|------------------|---------------------------|---------------------|-----------------|
|-------------------------------|------------------|-------|--------|-----------|------------------|---------------------------|---------------------|-----------------|



|           |                     |         |
|-----------|---------------------|---------|
| Job No.   | Sheet No.           | Rev.    |
| J16180    |                     |         |
| Drg. Ref. |                     |         |
| Made by   | Date<br>07-Mar-2017 | Checked |

|                                                              |                  |       |        |           |                  |                           |                     |        |          |
|--------------------------------------------------------------|------------------|-------|--------|-----------|------------------|---------------------------|---------------------|--------|----------|
| Vertical Movement Calculations                               |                  |       |        |           |                  |                           |                     |        |          |
| [m]                                                          | [m]              | [m]   |        |           |                  |                           |                     |        |          |
| No structures have segments combined.                        |                  |       |        |           |                  |                           |                     |        |          |
| Structure: B   Sub-structure:                                |                  |       |        |           |                  |                           |                     |        |          |
| Vertical Offset from Line for Vertical Movement Calculations | Combined Segment | Start | Length | Curvature | Deflection Ratio | Average Horizontal Strain | Max. Tensile Strain | Damage | Category |
| [m]                                                          |                  | [m]   | [m]    |           |                  |                           |                     |        |          |
| No structures have segments combined.                        |                  |       |        |           |                  |                           |                     |        |          |
| Structure: C   Sub-structure:                                |                  |       |        |           |                  |                           |                     |        |          |
| Vertical Offset from Line for Vertical Movement Calculations | Combined Segment | Start | Length | Curvature | Deflection Ratio | Average Horizontal Strain | Max. Tensile Strain | Damage | Category |
| [m]                                                          |                  | [m]   | [m]    |           |                  |                           |                     |        |          |
| No structures have segments combined.                        |                  |       |        |           |                  |                           |                     |        |          |
| Structure: D   Sub-structure:                                |                  |       |        |           |                  |                           |                     |        |          |
| Vertical Offset from Line for Vertical Movement Calculations | Combined Segment | Start | Length | Curvature | Deflection Ratio | Average Horizontal Strain | Max. Tensile Strain | Damage | Category |
| [m]                                                          |                  | [m]   | [m]    |           |                  |                           |                     |        |          |
| No structures have segments combined.                        |                  |       |        |           |                  |                           |                     |        |          |
| Structure: E   Sub-structure:                                |                  |       |        |           |                  |                           |                     |        |          |
| Vertical Offset from Line for Vertical Movement Calculations | Combined Segment | Start | Length | Curvature | Deflection Ratio | Average Horizontal Strain | Max. Tensile Strain | Damage | Category |
| [m]                                                          |                  | [m]   | [m]    |           |                  |                           |                     |        |          |
| No structures have segments combined.                        |                  |       |        |           |                  |                           |                     |        |          |
| Structure: F   Sub-structure:                                |                  |       |        |           |                  |                           |                     |        |          |
| Vertical Offset from Line for Vertical Movement Calculations | Combined Segment | Start | Length | Curvature | Deflection Ratio | Average Horizontal Strain | Max. Tensile Strain | Damage | Category |
| [m]                                                          |                  | [m]   | [m]    |           |                  |                           |                     |        |          |
| No structures have segments combined.                        |                  |       |        |           |                  |                           |                     |        |          |
| Structure: G   Sub-structure:                                |                  |       |        |           |                  |                           |                     |        |          |
| Vertical Offset from Line for Vertical Movement Calculations | Combined Segment | Start | Length | Curvature | Deflection Ratio | Average Horizontal Strain | Max. Tensile Strain | Damage | Category |
| [m]                                                          |                  | [m]   | [m]    |           |                  |                           |                     |        |          |
| No structures have segments combined.                        |                  |       |        |           |                  |                           |                     |        |          |
| Structure: H   Sub-structure:                                |                  |       |        |           |                  |                           |                     |        |          |
| Vertical Offset from Line for Vertical Movement Calculations | Combined Segment | Start | Length | Curvature | Deflection Ratio | Average Horizontal Strain | Max. Tensile Strain | Damage | Category |
| [m]                                                          |                  | [m]   | [m]    |           |                  |                           |                     |        |          |
| No structures have segments combined.                        |                  |       |        |           |                  |                           |                     |        |          |
| Structure: I   Sub-structure:                                |                  |       |        |           |                  |                           |                     |        |          |
| Vertical Offset from Line for Vertical Movement Calculations | Combined Segment | Start | Length | Curvature | Deflection Ratio | Average Horizontal Strain | Max. Tensile Strain | Damage | Category |
| [m]                                                          |                  | [m]   | [m]    |           |                  |                           |                     |        |          |
| No structures have segments combined.                        |                  |       |        |           |                  |                           |                     |        |          |
| Structure: J   Sub-structure:                                |                  |       |        |           |                  |                           |                     |        |          |
| Vertical Offset from Line for Vertical Movement Calculations | Combined Segment | Start | Length | Curvature | Deflection Ratio | Average Horizontal Strain | Max. Tensile Strain | Damage | Category |
| [m]                                                          |                  | [m]   | [m]    |           |                  |                           |                     |        |          |
| No structures have segments combined.                        |                  |       |        |           |                  |                           |                     |        |          |
| Structure: K   Sub-structure:                                |                  |       |        |           |                  |                           |                     |        |          |
| Vertical Offset from Line for Vertical Movement Calculations | Combined Segment | Start | Length | Curvature | Deflection Ratio | Average Horizontal Strain | Max. Tensile Strain | Damage | Category |
| [m]                                                          |                  | [m]   | [m]    |           |                  |                           |                     |        |          |
| No structures have segments combined.                        |                  |       |        |           |                  |                           |                     |        |          |



GEA LIMITED  
(GEOTECHNICAL & ENV ASSOC)

Rear of 159-163 King's Cross Road, London WC1X 9BN  
Wall Installation only Issue 4

| Job No.   | Sheet No.           | Rev.    |
|-----------|---------------------|---------|
| J16180    |                     |         |
| Drg. Ref. |                     |         |
| Made by   | Date<br>07-Mar-2017 | Checked |

| Vertical<br>Offset from<br>Line for<br>Vertical<br>Movement<br>Calculations | Combined<br>Segment | Start | Length | Curvature | Deflection<br>Ratio | Average<br>Horizontal<br>Strain | Max.<br>Tensile<br>Strain | Damage | Category |
|-----------------------------------------------------------------------------|---------------------|-------|--------|-----------|---------------------|---------------------------------|---------------------------|--------|----------|
| Structure: L   Sub-structure:                                               |                     |       |        |           |                     |                                 |                           |        |          |
| [m]                                                                         |                     | [m]   | [m]    |           | [%]                 | [%]                             | [%]                       |        |          |
| No structures have segments combined.                                       |                     |       |        |           |                     |                                 |                           |        |          |
| Structure: M   Sub-structure:                                               |                     |       |        |           |                     |                                 |                           |        |          |
| [m]                                                                         |                     | [m]   | [m]    |           | [%]                 | [%]                             | [%]                       |        |          |
| No structures have segments combined.                                       |                     |       |        |           |                     |                                 |                           |        |          |
| Structure: N   Sub-structure:                                               |                     |       |        |           |                     |                                 |                           |        |          |
| [m]                                                                         |                     | [m]   | [m]    |           | [%]                 | [%]                             | [%]                       |        |          |
| No structures have segments combined.                                       |                     |       |        |           |                     |                                 |                           |        |          |
| Structure: O   Sub-structure:                                               |                     |       |        |           |                     |                                 |                           |        |          |
| [m]                                                                         |                     | [m]   | [m]    |           | [%]                 | [%]                             | [%]                       |        |          |
| No structures have segments combined.                                       |                     |       |        |           |                     |                                 |                           |        |          |
| Structure: P   Sub-structure: Sub #                                         |                     |       |        |           |                     |                                 |                           |        |          |
| [m]                                                                         |                     | [m]   | [m]    |           | [%]                 | [%]                             | [%]                       |        |          |
| No structures have segments combined.                                       |                     |       |        |           |                     |                                 |                           |        |          |
| Structure: Q   Sub-structure:                                               |                     |       |        |           |                     |                                 |                           |        |          |
| [m]                                                                         |                     | [m]   | [m]    |           | [%]                 | [%]                             | [%]                       |        |          |
| No structures have segments combined.                                       |                     |       |        |           |                     |                                 |                           |        |          |
| Structure: R   Sub-structure:                                               |                     |       |        |           |                     |                                 |                           |        |          |
| [m]                                                                         |                     | [m]   | [m]    |           | [%]                 | [%]                             | [%]                       |        |          |
| No structures have segments combined.                                       |                     |       |        |           |                     |                                 |                           |        |          |
| Structure: S   Sub-structure:                                               |                     |       |        |           |                     |                                 |                           |        |          |
| [m]                                                                         |                     | [m]   | [m]    |           | [%]                 | [%]                             | [%]                       |        |          |
| No structures have segments combined.                                       |                     |       |        |           |                     |                                 |                           |        |          |
| Structure: T   Sub-structure:                                               |                     |       |        |           |                     |                                 |                           |        |          |
| [m]                                                                         |                     | [m]   | [m]    |           | [%]                 | [%]                             | [%]                       |        |          |
| No structures have segments combined.                                       |                     |       |        |           |                     |                                 |                           |        |          |
| Structure: U   Sub-structure:                                               |                     |       |        |           |                     |                                 |                           |        |          |
| [m]                                                                         |                     | [m]   | [m]    |           | [%]                 | [%]                             | [%]                       |        |          |
| No structures have segments combined.                                       |                     |       |        |           |                     |                                 |                           |        |          |
| Structure: V   Sub-structure:                                               |                     |       |        |           |                     |                                 |                           |        |          |
| [m]                                                                         |                     | [m]   | [m]    |           | [%]                 | [%]                             | [%]                       |        |          |
| No structures have segments combined.                                       |                     |       |        |           |                     |                                 |                           |        |          |



| Job No.   | Sheet No.           | Rev.    |
|-----------|---------------------|---------|
| J16180    |                     |         |
| Drg. Ref. |                     |         |
| Made by   | Date<br>07-Mar-2017 | Checked |

|                                                              |                  |       |        |           |                  |                           |                     |        |          |
|--------------------------------------------------------------|------------------|-------|--------|-----------|------------------|---------------------------|---------------------|--------|----------|
| Vertical Movement Calculations                               |                  |       |        |           |                  |                           |                     |        |          |
| [m]                                                          | [m]              | [m]   |        |           |                  |                           |                     |        |          |
| No structures have segments combined.                        |                  |       |        |           |                  |                           |                     |        |          |
| Structure: W   Sub-structure:                                |                  |       |        |           |                  |                           |                     |        |          |
| Vertical Offset from Line for Vertical Movement Calculations | Combined Segment | Start | Length | Curvature | Deflection Ratio | Average Horizontal Strain | Max. Tensile Strain | Damage | Category |
| [m]                                                          |                  | [m]   | [m]    |           |                  |                           |                     |        |          |
| No structures have segments combined.                        |                  |       |        |           |                  |                           |                     |        |          |
| Structure: X   Sub-structure:                                |                  |       |        |           |                  |                           |                     |        |          |
| Vertical Offset from Line for Vertical Movement Calculations | Combined Segment | Start | Length | Curvature | Deflection Ratio | Average Horizontal Strain | Max. Tensile Strain | Damage | Category |
| [m]                                                          |                  | [m]   | [m]    |           |                  |                           |                     |        |          |
| No structures have segments combined.                        |                  |       |        |           |                  |                           |                     |        |          |
| Structure: Y   Sub-structure:                                |                  |       |        |           |                  |                           |                     |        |          |
| Vertical Offset from Line for Vertical Movement Calculations | Combined Segment | Start | Length | Curvature | Deflection Ratio | Average Horizontal Strain | Max. Tensile Strain | Damage | Category |
| [m]                                                          |                  | [m]   | [m]    |           |                  |                           |                     |        |          |
| No structures have segments combined.                        |                  |       |        |           |                  |                           |                     |        |          |
| Structure: Z   Sub-structure:                                |                  |       |        |           |                  |                           |                     |        |          |
| Vertical Offset from Line for Vertical Movement Calculations | Combined Segment | Start | Length | Curvature | Deflection Ratio | Average Horizontal Strain | Max. Tensile Strain | Damage | Category |
| [m]                                                          |                  | [m]   | [m]    |           |                  |                           |                     |        |          |
| No structures have segments combined.                        |                  |       |        |           |                  |                           |                     |        |          |
| Structure: AA   Sub-structure:                               |                  |       |        |           |                  |                           |                     |        |          |
| Vertical Offset from Line for Vertical Movement Calculations | Combined Segment | Start | Length | Curvature | Deflection Ratio | Average Horizontal Strain | Max. Tensile Strain | Damage | Category |
| [m]                                                          |                  | [m]   | [m]    |           |                  |                           |                     |        |          |
| No structures have segments combined.                        |                  |       |        |           |                  |                           |                     |        |          |
| Structure: AB   Sub-structure:                               |                  |       |        |           |                  |                           |                     |        |          |
| Vertical Offset from Line for Vertical Movement Calculations | Combined Segment | Start | Length | Curvature | Deflection Ratio | Average Horizontal Strain | Max. Tensile Strain | Damage | Category |
| [m]                                                          |                  | [m]   | [m]    |           |                  |                           |                     |        |          |
| No structures have segments combined.                        |                  |       |        |           |                  |                           |                     |        |          |
| Structure: AC   Sub-structure:                               |                  |       |        |           |                  |                           |                     |        |          |
| Vertical Offset from Line for Vertical Movement Calculations | Combined Segment | Start | Length | Curvature | Deflection Ratio | Average Horizontal Strain | Max. Tensile Strain | Damage | Category |
| [m]                                                          |                  | [m]   | [m]    |           |                  |                           |                     |        |          |
| No structures have segments combined.                        |                  |       |        |           |                  |                           |                     |        |          |
| Structure: AD   Sub-structure:                               |                  |       |        |           |                  |                           |                     |        |          |
| Vertical Offset from Line for Vertical Movement Calculations | Combined Segment | Start | Length | Curvature | Deflection Ratio | Average Horizontal Strain | Max. Tensile Strain | Damage | Category |
| [m]                                                          |                  | [m]   | [m]    |           |                  |                           |                     |        |          |
| No structures have segments combined.                        |                  |       |        |           |                  |                           |                     |        |          |
| Structure: AE   Sub-structure:                               |                  |       |        |           |                  |                           |                     |        |          |
| Vertical Offset from Line for Vertical Movement Calculations | Combined Segment | Start | Length | Curvature | Deflection Ratio | Average Horizontal Strain | Max. Tensile Strain | Damage | Category |
| [m]                                                          |                  | [m]   | [m]    |           |                  |                           |                     |        |          |
| No structures have segments combined.                        |                  |       |        |           |                  |                           |                     |        |          |
| Structure: AF   Sub-structure:                               |                  |       |        |           |                  |                           |                     |        |          |
| Vertical Offset from Line for Vertical Movement Calculations | Combined Segment | Start | Length | Curvature | Deflection Ratio | Average Horizontal Strain | Max. Tensile Strain | Damage | Category |
| [m]                                                          |                  | [m]   | [m]    |           |                  |                           |                     |        |          |
| No structures have segments combined.                        |                  |       |        |           |                  |                           |                     |        |          |



GEA LIMITED  
(GEOTECHNICAL & ENV ASSOC)

Rear of 159-163 King's Cross Road, London WC1X 9BN  
Wall Installation only Issue 4

| Job No.   | Sheet No.           | Rev.    |
|-----------|---------------------|---------|
| J16180    |                     |         |
| Drg. Ref. |                     |         |
| Made by   | Date<br>07-Mar-2017 | Checked |

| Vertical<br>Offset from<br>Line for<br>Vertical<br>Movement<br>Calculations | Combined<br>Segment | Start | Length | Curvature | Deflection<br>Ratio | Average<br>Horizontal<br>Strain | Max.<br>Tensile<br>Strain | Damage | Category |
|-----------------------------------------------------------------------------|---------------------|-------|--------|-----------|---------------------|---------------------------------|---------------------------|--------|----------|
| Structure: AG   Sub-structure:                                              |                     |       |        |           |                     |                                 |                           |        |          |
| [m]                                                                         |                     | [m]   | [m]    |           | [%]                 | [%]                             | [%]                       |        |          |
| No structures have segments combined.                                       |                     |       |        |           |                     |                                 |                           |        |          |
| Structure: AH   Sub-structure:                                              |                     |       |        |           |                     |                                 |                           |        |          |
| [m]                                                                         |                     | [m]   | [m]    |           | [%]                 | [%]                             | [%]                       |        |          |
| No structures have segments combined.                                       |                     |       |        |           |                     |                                 |                           |        |          |
| Structure: AI   Sub-structure: Sub #                                        |                     |       |        |           |                     |                                 |                           |        |          |
| [m]                                                                         |                     | [m]   | [m]    |           | [%]                 | [%]                             | [%]                       |        |          |
| No structures have segments combined.                                       |                     |       |        |           |                     |                                 |                           |        |          |
| Structure: AJ   Sub-structure: Sub #                                        |                     |       |        |           |                     |                                 |                           |        |          |
| [m]                                                                         |                     | [m]   | [m]    |           | [%]                 | [%]                             | [%]                       |        |          |
| No structures have segments combined.                                       |                     |       |        |           |                     |                                 |                           |        |          |
| Structure: AK   Sub-structure: Sub #                                        |                     |       |        |           |                     |                                 |                           |        |          |
| [m]                                                                         |                     | [m]   | [m]    |           | [%]                 | [%]                             | [%]                       |        |          |
| No structures have segments combined.                                       |                     |       |        |           |                     |                                 |                           |        |          |
| Structure: AL   Sub-structure: Sub #                                        |                     |       |        |           |                     |                                 |                           |        |          |
| [m]                                                                         |                     | [m]   | [m]    |           | [%]                 | [%]                             | [%]                       |        |          |
| No structures have segments combined.                                       |                     |       |        |           |                     |                                 |                           |        |          |
| Structure: AM   Sub-structure: Sub #                                        |                     |       |        |           |                     |                                 |                           |        |          |
| [m]                                                                         |                     | [m]   | [m]    |           | [%]                 | [%]                             | [%]                       |        |          |
| No structures have segments combined.                                       |                     |       |        |           |                     |                                 |                           |        |          |
| Structure: AN   Sub-structure: Sub #                                        |                     |       |        |           |                     |                                 |                           |        |          |
| [m]                                                                         |                     | [m]   | [m]    |           | [%]                 | [%]                             | [%]                       |        |          |
| No structures have segments combined.                                       |                     |       |        |           |                     |                                 |                           |        |          |
| Structure: AO   Sub-structure: Sub #                                        |                     |       |        |           |                     |                                 |                           |        |          |
| [m]                                                                         |                     | [m]   | [m]    |           | [%]                 | [%]                             | [%]                       |        |          |
| No structures have segments combined.                                       |                     |       |        |           |                     |                                 |                           |        |          |
| Structure: AP   Sub-structure: Sub #                                        |                     |       |        |           |                     |                                 |                           |        |          |
| [m]                                                                         |                     | [m]   | [m]    |           | [%]                 | [%]                             | [%]                       |        |          |
| No structures have segments combined.                                       |                     |       |        |           |                     |                                 |                           |        |          |
| Structure: AQ   Sub-structure: Sub #                                        |                     |       |        |           |                     |                                 |                           |        |          |
| [m]                                                                         |                     | [m]   | [m]    |           | [%]                 | [%]                             | [%]                       |        |          |
| No structures have segments combined.                                       |                     |       |        |           |                     |                                 |                           |        |          |



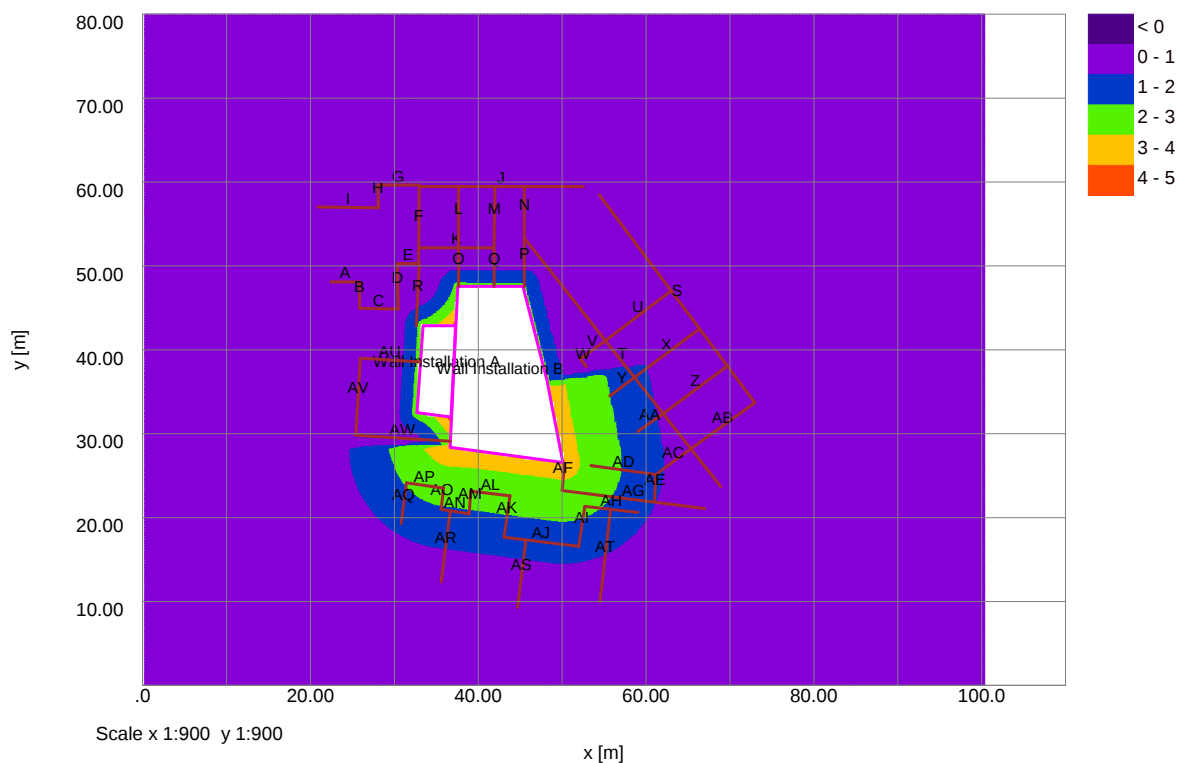
Rear of 159-163 King's Cross Road, London WC1X 9BN  
Wall Installation only Issue 4

| Job No.   | Sheet No.           | Rev.    |
|-----------|---------------------|---------|
| J16180    |                     |         |
| Drg. Ref. |                     |         |
| Made by   | Date<br>07-Mar-2017 | Checked |

|                                                              |                  |       |        |           |                  |                           |                     |        |          |
|--------------------------------------------------------------|------------------|-------|--------|-----------|------------------|---------------------------|---------------------|--------|----------|
| Vertical Movement Calculations                               |                  |       |        |           |                  |                           |                     |        |          |
| [m]                                                          | [m]              | [m]   |        |           |                  |                           |                     |        |          |
| No structures have segments combined.                        |                  |       |        |           |                  |                           |                     |        |          |
| Structure: AR   Sub-structure: Sub #                         |                  |       |        |           |                  |                           |                     |        |          |
| Vertical Offset from Line for Vertical Movement Calculations | Combined Segment | Start | Length | Curvature | Deflection Ratio | Average Horizontal Strain | Max. Tensile Strain | Damage | Category |
| [m]                                                          |                  | [m]   | [m]    |           |                  |                           |                     |        |          |
| No structures have segments combined.                        |                  |       |        |           |                  |                           |                     |        |          |
| Structure: AS   Sub-structure: Sub #                         |                  |       |        |           |                  |                           |                     |        |          |
| Vertical Offset from Line for Vertical Movement Calculations | Combined Segment | Start | Length | Curvature | Deflection Ratio | Average Horizontal Strain | Max. Tensile Strain | Damage | Category |
| [m]                                                          |                  | [m]   | [m]    |           |                  |                           |                     |        |          |
| No structures have segments combined.                        |                  |       |        |           |                  |                           |                     |        |          |
| Structure: AT   Sub-structure: Sub #                         |                  |       |        |           |                  |                           |                     |        |          |
| Vertical Offset from Line for Vertical Movement Calculations | Combined Segment | Start | Length | Curvature | Deflection Ratio | Average Horizontal Strain | Max. Tensile Strain | Damage | Category |
| [m]                                                          |                  | [m]   | [m]    |           |                  |                           |                     |        |          |
| No structures have segments combined.                        |                  |       |        |           |                  |                           |                     |        |          |
| Structure: AU   Sub-structure:                               |                  |       |        |           |                  |                           |                     |        |          |
| Vertical Offset from Line for Vertical Movement Calculations | Combined Segment | Start | Length | Curvature | Deflection Ratio | Average Horizontal Strain | Max. Tensile Strain | Damage | Category |
| [m]                                                          |                  | [m]   | [m]    |           |                  |                           |                     |        |          |
| No structures have segments combined.                        |                  |       |        |           |                  |                           |                     |        |          |
| Structure: AV   Sub-structure:                               |                  |       |        |           |                  |                           |                     |        |          |
| Vertical Offset from Line for Vertical Movement Calculations | Combined Segment | Start | Length | Curvature | Deflection Ratio | Average Horizontal Strain | Max. Tensile Strain | Damage | Category |
| [m]                                                          |                  | [m]   | [m]    |           |                  |                           |                     |        |          |
| No structures have segments combined.                        |                  |       |        |           |                  |                           |                     |        |          |
| Structure: AW   Sub-structure:                               |                  |       |        |           |                  |                           |                     |        |          |
| Vertical Offset from Line for Vertical Movement Calculations | Combined Segment | Start | Length | Curvature | Deflection Ratio | Average Horizontal Strain | Max. Tensile Strain | Damage | Category |
| [m]                                                          |                  | [m]   | [m]    |           |                  |                           |                     |        |          |
| No structures have segments combined.                        |                  |       |        |           |                  |                           |                     |        |          |

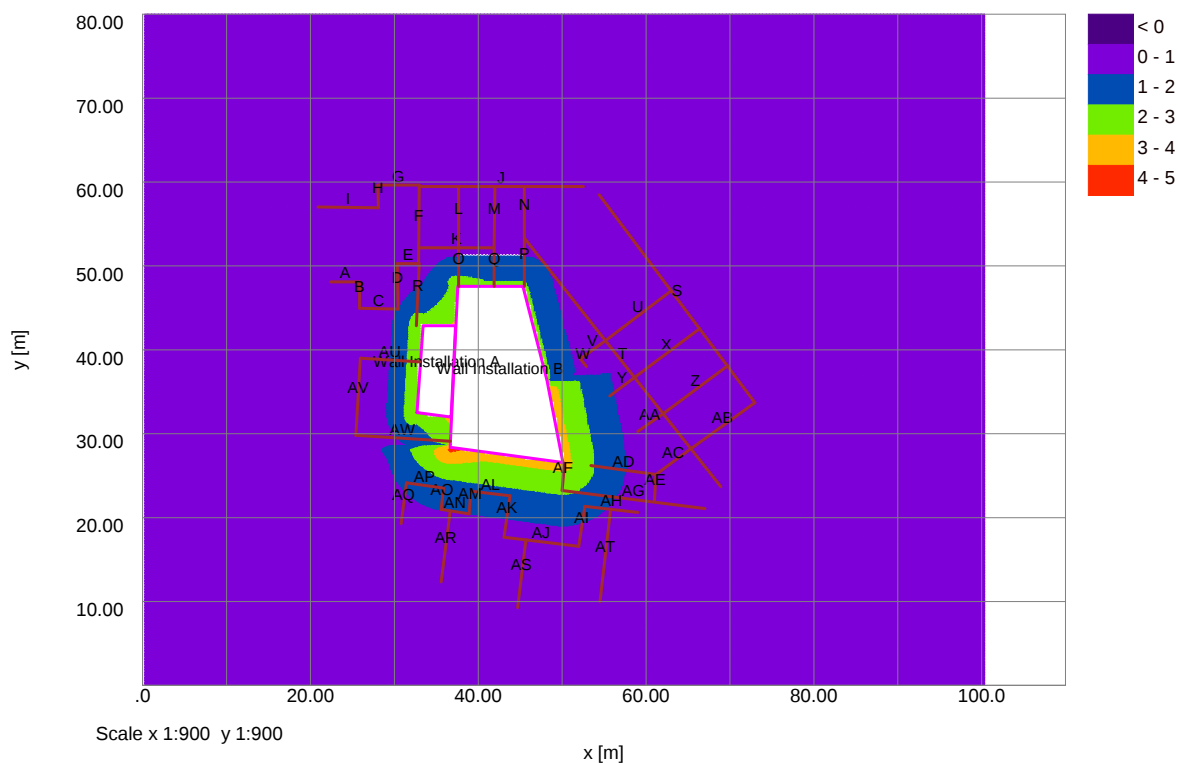
| Job No.   | Sheet No.   | Rev.    |
|-----------|-------------|---------|
| J16180    |             |         |
| Drg. Ref. |             |         |
| Made by   | Date        | Checked |
|           | 07-Mar-2017 |         |

Vertical Settlement Contours: Grid 1 (level 0.000m) (Interval 1mm)



| Job No.   | Sheet No.   | Rev.    |
|-----------|-------------|---------|
| J16180    |             |         |
| Drg. Ref. |             |         |
| Made by   | Date        | Checked |
|           | 07-Mar-2017 |         |

Horizontal Displacement Contours: Grid 1 (level 0.000m) Interval 1mm





# GEA LIMITED (GEOTECHNICAL & ENV ASSOC)

Rear of 159-163 King's Cross Road, London WC1X 9BN  
Wall Installation and Excavation Combined Issue 4

| Job No.   | Sheet No.   | Rev.    |
|-----------|-------------|---------|
| J16180    |             |         |
| Drg. Ref. |             |         |
| Made by   | Date        | Checked |
|           | 07-Mar-2017 |         |

## Problem Type

Problem Type : Tunnelling and Embedded Wall Excavations

## Displacement Data

| Type | Name   | Direction of extrusion | Point/Line/Line for extrusion |          |              | No. of intervals across extrusion/line | Extrusion depth | No. of intervals along extrusion | Calculate | Surface type for tunnels |
|------|--------|------------------------|-------------------------------|----------|--------------|----------------------------------------|-----------------|----------------------------------|-----------|--------------------------|
|      |        |                        | First point                   |          |              | Second point                           |                 |                                  |           |                          |
|      |        |                        | X [m]                         | Y [m]    | Z(level) [m] | X [m]                                  | Y [m]           | Z(level) [m]                     |           |                          |
| Grid | Grid 1 | Global X               | 0.30000                       | 0.00000  | 0.00000      | -                                      | 80.00000        | 0.00000                          | 250       | 100.00000                |
| Line | A      | -                      | 22.50000                      | 48.10000 | -0.50000     | 25.90000                               | 48.10000        | -0.50000                         | 4         | -                        |
| Line | B      | -                      | 25.90000                      | 48.10000 | -0.50000     | 25.90000                               | 45.00000        | -0.50000                         | 4         | -                        |
| Line | C      | -                      | 25.90000                      | 45.00000 | -0.50000     | 30.50000                               | 44.90000        | -0.50000                         | 5         | -                        |
| Line | D      | -                      | 30.50000                      | 44.90000 | -0.50000     | 30.40000                               | 50.30000        | -0.50000                         | 6         | -                        |
| Line | E      | -                      | 30.40000                      | 50.30000 | -0.50000     | 32.90000                               | 50.30000        | -0.50000                         | 3         | -                        |
| Line | F      | -                      | 32.90000                      | 50.30000 | -0.50000     | 33.00000                               | 59.60000        | -0.50000                         | 10        | -                        |
| Line | G      | -                      | 33.00000                      | 59.60000 | -0.50000     | 28.00000                               | 59.60000        | -0.50000                         | 5         | -                        |
| Line | H      | -                      | 28.00000                      | 59.60000 | -0.50000     | 28.10000                               | 56.90000        | -0.50000                         | 3         | -                        |
| Line | I      | -                      | 28.10000                      | 56.90000 | -0.50000     | 20.90000                               | 57.00000        | -0.50000                         | 8         | -                        |
| Line | J      | -                      | 33.00000                      | 59.50000 | -0.50000     | 52.50000                               | 59.50000        | -0.50000                         | 10        | -                        |
| Line | K      | -                      | 33.00000                      | 52.20000 | -0.50000     | 41.90000                               | 52.20000        | -0.50000                         | 9         | -                        |
| Line | L      | -                      | 37.70000                      | 59.40000 | -0.50000     | 37.70000                               | 52.20000        | -0.50000                         | 8         | -                        |
| Line | M      | -                      | 42.00000                      | 59.50000 | -1.50000     | 41.90000                               | 52.20000        | -1.50000                         | 8         | -                        |
| Line | N      | -                      | 45.50000                      | 53.30000 | -4.00000     | 45.50000                               | 59.40000        | -4.00000                         | 7         | -                        |
| Line | O      | -                      | 37.70000                      | 52.20000 | -0.68000     | 37.70000                               | 47.60000        | -0.68000                         | 5         | -                        |
| Line | P      | -                      | 45.50000                      | 53.30000 | -1.85000     | 45.50000                               | 47.60000        | -1.85000                         | 6         | -                        |
| Line | Q      | -                      | 41.90000                      | 52.20000 | -0.65000     | 41.90000                               | 47.60000        | -0.65000                         | 5         | -                        |
| Line | R      | -                      | 33.00000                      | 50.30000 | -0.50000     | 32.60000                               | 42.90000        | -0.50000                         | 8         | -                        |
| Line | S      | -                      | 54.40000                      | 58.50000 | -0.50000     | 73.00000                               | 33.70000        | -0.50000                         | 16        | -                        |
| Line | T      | -                      | 45.50000                      | 53.30000 | -0.50000     | 68.90000                               | 23.70000        | -0.50000                         | 19        | -                        |
| Line | U      | -                      | 63.00000                      | 47.00000 | -0.50000     | 55.10000                               | 41.10000        | -0.50000                         | 10        | -                        |
| Line | V      | -                      | 55.10000                      | 41.10000 | -0.50000     | 52.20000                               | 38.90000        | -0.50000                         | 4         | -                        |
| Line | W      | -                      | 52.20000                      | 38.90000 | -1.70000     | 52.90000                               | 38.00000        | -1.70000                         | 2         | -                        |
| Line | X      | -                      | 66.40000                      | 42.50000 | -0.50000     | 58.60000                               | 36.70000        | -0.50000                         | 10        | -                        |
| Line | Y      | -                      | 58.60000                      | 36.70000 | -1.40000     | 55.70000                               | 34.50000        | -1.40000                         | 4         | -                        |
| Line | Z      | -                      | 69.70000                      | 38.10000 | -0.50000     | 62.00000                               | 32.40000        | -0.50000                         | 10        | -                        |
| Line | AA     | -                      | 62.00000                      | 32.40000 | -1.40000     | 59.00000                               | 30.30000        | -1.40000                         | 4         | -                        |
| Line | AB     | -                      | 73.00000                      | 33.70000 | -0.50000     | 65.30000                               | 28.20000        | -0.50000                         | 10        | -                        |
| Line | AC     | -                      | 65.30000                      | 28.20000 | -0.50000     | 61.20000                               | 25.20000        | -0.50000                         | 6         | -                        |
| Line | AD     | -                      | 61.20000                      | 25.20000 | -1.46000     | 53.40000                               | 26.20000        | -1.46000                         | 8         | -                        |
| Line | AE     | -                      | 61.20000                      | 25.20000 | -0.50000     | 61.00000                               | 21.90000        | -0.50000                         | 4         | -                        |
| Line | AF     | -                      | 50.30000                      | 26.50000 | -1.46000     | 50.00000                               | 23.30000        | -1.46000                         | 4         | -                        |
| Line | AG     | -                      | 50.00000                      | 23.30000 | -0.50000     | 67.00000                               | 21.10000        | -0.50000                         | 9         | -                        |
| Line | AH     | -                      | 59.00000                      | 20.70000 | -0.50000     | 52.70000                               | 21.40000        | -0.50000                         | 7         | -                        |
| Line | AI     | -                      | 52.70000                      | 21.40000 | -0.50000     | 52.00000                               | 16.60000        | -0.50000                         | 5         | -                        |
| Line | AJ     | -                      | 52.00000                      | 16.60000 | -0.50000     | 43.10000                               | 17.70000        | -0.50000                         | 9         | -                        |
| Line | AK     | -                      | 43.10000                      | 17.70000 | -0.50000     | 43.80000                               | 22.60000        | -0.50000                         | 5         | -                        |
| Line | AL     | -                      | 43.80000                      | 22.60000 | -0.50000     | 39.10000                               | 23.20000        | -0.50000                         | 5         | -                        |
| Line | AM     | -                      | 39.10000                      | 23.20000 | -0.50000     | 38.90000                               | 20.50000        | -0.50000                         | 3         | -                        |
| Line | AN     | -                      | 38.90000                      | 20.50000 | -0.50000     | 35.60000                               | 21.00000        | -0.50000                         | 4         | -                        |
| Line | AO     | -                      | 35.60000                      | 21.00000 | -0.50000     | 35.90000                               | 23.50000        | -0.50000                         | 3         | -                        |
| Line | AP     | -                      | 35.90000                      | 23.50000 | -0.50000     | 31.50000                               | 24.20000        | -0.50000                         | 5         | -                        |
| Line | AQ     | -                      | 31.50000                      | 24.20000 | -0.50000     | 30.80000                               | 19.30000        | -0.50000                         | 5         | -                        |
| Line | AR     | -                      | 35.60000                      | 12.40000 | -0.50000     | 36.70000                               | 20.80000        | -0.50000                         | 9         | -                        |
| Line | AS     | -                      | 44.70000                      | 9.30000  | -0.50000     | 45.70000                               | 17.40000        | -0.50000                         | 9         | -                        |
| Line | AT     | -                      | 54.50000                      | 10.00000 | -0.50000     | 55.80000                               | 21.00000        | -0.50000                         | 6         | -                        |
| Line | AU     | -                      | 33.10000                      | 38.60000 | -2.00000     | 26.00000                               | 39.00000        | -2.00000                         | 8         | -                        |
| Line | AV     | -                      | 26.00000                      | 39.00000 | -2.00000     | 25.40000                               | 29.80000        | -2.00000                         | 10        | -                        |
| Line | AW     | -                      | 25.40000                      | 29.80000 | -2.00000     | 36.70000                               | 29.10000        | -2.00000                         | 6         | -                        |

## Vertical Ground Movement Curves

|                          |                                                                                                                                                                          |
|--------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Curve Name:              | No vertical ground movement                                                                                                                                              |
| Coordinates:             | [Distance from wall / wall depth or max. excavation depth (x), Depth / wall depth or max. excavation depth (y), Settlement / wall depth or max. excavation depth (z)(%)] |
| Curve Fitting Method:    | Polynomial                                                                                                                                                               |
| x Order:                 | 1                                                                                                                                                                        |
| y Order:                 | 0                                                                                                                                                                        |
| Polynomial: z =          | 0.0x + 0.0                                                                                                                                                               |
| Coeff. of Determination: | -2147483648.E+2147483647                                                                                                                                                 |
| Curve Name:              | Installation of contiguous bored pile wall in stiff clay (CIRIA 580 Fig. 2.8(b))                                                                                         |
| Coordinates:             | [Distance from wall / wall depth or max. excavation depth (x), Depth / wall depth or max. excavation depth (y), Settlement / wall depth or max. excavation depth (z)(%)] |
| Curve Fitting Method:    | Polynomial                                                                                                                                                               |
| x Order:                 | 1                                                                                                                                                                        |
| y Order:                 | 0                                                                                                                                                                        |
| Polynomial: z =          | -2.0E-2x + 4.0E-2                                                                                                                                                        |
| Coeff. of Determination: | 1.0                                                                                                                                                                      |
| Curve Name:              | Installation of planar diaphragm wall in stiff clay (CIRIA 580 Fig. 2.9(b))                                                                                              |
| Coordinates:             | [Distance from wall / wall depth or max. excavation depth (x), Depth / wall depth or max. excavation depth (y), Settlement / wall depth or max. excavation depth (z)(%)] |
| Curve Fitting Method:    | Polynomial                                                                                                                                                               |
| x Order:                 | 4                                                                                                                                                                        |
| y Order:                 | 0                                                                                                                                                                        |
| Polynomial: z =          | -1.2355E-2x <sup>4</sup> + 3.4814E-2x <sup>3</sup> - 2.8885E-3x <sup>2</sup> - 6.5618E-2x + 4.9987E-2                                                                    |
| Coeff. of Determination: | 1.0000                                                                                                                                                                   |
| Curve Name:              | Excavation in front of high stiffness wall in stiff clay (CIRIA 580 Fig. 2.11(b))                                                                                        |
| Coordinates:             | [Distance from wall / wall depth or max. excavation depth (x), Depth / wall depth or max. excavation depth (y), Settlement / wall depth or max. excavation depth (z)(%)] |



# GEA LIMITED (GEOTECHNICAL & ENV ASSOC)

Rear of 159-163 King's Cross Road, London WC1X 9BN  
Wall Installation and Excavation Combined Issue 4

| Job No.   | Sheet No.           | Rev.    |
|-----------|---------------------|---------|
| J16180    |                     |         |
| Drg. Ref. |                     |         |
| Made by   | Date<br>07-Mar-2017 | Checked |

| Type                                                                            | Name                                                                                                                                                                              | Direction of extrusion                                                                                                                                                            | Point/Line/Line for extrusion                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | No. of intervals across extrusion/line | Extrusion depth      | No. of intervals along extrusion | Calculate Surface type for tunnels |
|---------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|----------------------|----------------------------------|------------------------------------|
| Curve Fitting Method:                                                           |                                                                                                                                                                                   |                                                                                                                                                                                   | [3.600,0.000,0.002][3.700,0.000,0.002][3.800,0.000,0.001][3.900,0.000,0.001][4.000,0.000,0.000]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                        |                      |                                  |                                    |
|                                                                                 |                                                                                                                                                                                   |                                                                                                                                                                                   | Polynomial                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                        |                      |                                  |                                    |
|                                                                                 | x Order:                                                                                                                                                                          |                                                                                                                                                                                   | 4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                        |                      |                                  |                                    |
|                                                                                 | y Order:                                                                                                                                                                          |                                                                                                                                                                                   | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                        |                      |                                  |                                    |
|                                                                                 | Polynomial: z =                                                                                                                                                                   |                                                                                                                                                                                   | -2.6455E-3x <sup>4</sup> + 2.8495E-2x <sup>3</sup> - 1.0051E-1x <sup>2</sup> + 1.0569E-1x + 3.8990E-2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                        |                      |                                  |                                    |
|                                                                                 | Coeff. of                                                                                                                                                                         |                                                                                                                                                                                   | 9.9991E-1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                        |                      |                                  |                                    |
|                                                                                 | Determination:                                                                                                                                                                    |                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                        |                      |                                  |                                    |
|                                                                                 | Horizontal Ground Movement Curves                                                                                                                                                 |                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                        |                      |                                  |                                    |
|                                                                                 | Curve Name:                                                                                                                                                                       | No horizontal ground movement                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                        |                      |                                  |                                    |
|                                                                                 | Coordinates:                                                                                                                                                                      | [Distance from wall / wall depth or max. excavation depth (x), Depth / wall depth or max. excavation depth (y), Horizontal movement / wall depth or max. excavation depth (z)(%)] |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                        |                      |                                  |                                    |
| Curve Fitting Method:                                                           |                                                                                                                                                                                   |                                                                                                                                                                                   | [0.000,0.000,0.000][1.000,0.000,0.000][0.000,1.000,0.000][1.000,1.000,0.000]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                        |                      |                                  |                                    |
|                                                                                 |                                                                                                                                                                                   |                                                                                                                                                                                   | Polynomial                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                        |                      |                                  |                                    |
| x Order:                                                                        |                                                                                                                                                                                   |                                                                                                                                                                                   | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                        |                      |                                  |                                    |
| y Order:                                                                        |                                                                                                                                                                                   |                                                                                                                                                                                   | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                        |                      |                                  |                                    |
| Polynomial: z =                                                                 |                                                                                                                                                                                   |                                                                                                                                                                                   | 0.0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                        |                      |                                  |                                    |
| Coeff. of                                                                       |                                                                                                                                                                                   |                                                                                                                                                                                   | -2147483648.E+2147483647                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                        |                      |                                  |                                    |
| Determination:                                                                  |                                                                                                                                                                                   |                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                        |                      |                                  |                                    |
| Curve Name:                                                                     | Installation of contiguous bored pile wall in stiff clay (CIRIA 580 Fig. 2.8(a))                                                                                                  |                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                        |                      |                                  |                                    |
| Coordinates:                                                                    | [Distance from wall / wall depth or max. excavation depth (x), Depth / wall depth or max. excavation depth (y), Horizontal movement / wall depth or max. excavation depth (z)(%)] |                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                        |                      |                                  |                                    |
| Curve Fitting Method:                                                           |                                                                                                                                                                                   |                                                                                                                                                                                   | [0.000,0.000,0.041][0.050,0.000,0.039][0.100,0.000,0.036][0.150,0.000,0.034][0.200,0.000,0.032][0.250,0.000,0.030][0.300,0.000,0.029][0.350,0.000,0.027][0.400,0.000,0.025][0.450,0.000,0.023][0.500,0.000,0.022][0.550,0.000,0.020][0.600,0.000,0.019][0.650,0.000,0.018][0.700,0.000,0.016][0.750,0.000,0.015][0.800,0.000,0.014][0.850,0.000,0.013][0.900,0.000,0.012][0.950,0.000,0.010][1.000,0.000,0.009][1.050,0.000,0.008][1.100,0.000,0.007][1.150,0.000,0.006][1.200,0.000,0.005][1.250,0.000,0.004][1.300,0.000,0.004][1.350,0.000,0.003][1.400,0.000,0.002][1.450,0.000,0.001][1.500,0.000,0.000] |                                        |                      |                                  |                                    |
|                                                                                 |                                                                                                                                                                                   |                                                                                                                                                                                   | Polynomial                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                        |                      |                                  |                                    |
| x Order:                                                                        |                                                                                                                                                                                   |                                                                                                                                                                                   | 3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                        |                      |                                  |                                    |
| y Order:                                                                        |                                                                                                                                                                                   |                                                                                                                                                                                   | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                        |                      |                                  |                                    |
| Polynomial: z =                                                                 |                                                                                                                                                                                   |                                                                                                                                                                                   | -4.2486E-3x <sup>3</sup> + 1.9096E-2x <sup>2</sup> - 4.6221E-2x + 4.0729E-2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                        |                      |                                  |                                    |
| Coeff. of                                                                       |                                                                                                                                                                                   |                                                                                                                                                                                   | 1.0000                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                        |                      |                                  |                                    |
| Determination:                                                                  |                                                                                                                                                                                   |                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                        |                      |                                  |                                    |
| Curve Name:                                                                     | Installation of planar diaphragm wall in stiff clay (CIRIA 580 Fig. 2.9(a))                                                                                                       |                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                        |                      |                                  |                                    |
| Coordinates:                                                                    | [Distance from wall / wall depth or max. excavation depth (x), Depth / wall depth or max. excavation depth (y), Horizontal movement / wall depth or max. excavation depth (z)(%)] |                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                        |                      |                                  |                                    |
| Curve Fitting Method:                                                           |                                                                                                                                                                                   |                                                                                                                                                                                   | [0.000,0.000,0.000][1.500,0.000,0.000]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                        |                      |                                  |                                    |
|                                                                                 |                                                                                                                                                                                   |                                                                                                                                                                                   | Polynomial                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                        |                      |                                  |                                    |
| x Order:                                                                        |                                                                                                                                                                                   |                                                                                                                                                                                   | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                        |                      |                                  |                                    |
| y Order:                                                                        |                                                                                                                                                                                   |                                                                                                                                                                                   | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                        |                      |                                  |                                    |
| Polynomial: z =                                                                 |                                                                                                                                                                                   |                                                                                                                                                                                   | -3.33E-2x + 5.00E-2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                        |                      |                                  |                                    |
| Coeff. of                                                                       |                                                                                                                                                                                   |                                                                                                                                                                                   | 1.00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                        |                      |                                  |                                    |
| Determination:                                                                  |                                                                                                                                                                                   |                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                        |                      |                                  |                                    |
| Curve Name:                                                                     | Excavation in front of high stiffness wall in stiff clay (CIRIA 580 Fig. 2.11(a))                                                                                                 |                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                        |                      |                                  |                                    |
| Coordinates:                                                                    | [Distance from wall / wall depth or max. excavation depth (x), Depth / wall depth or max. excavation depth (y), Horizontal movement / wall depth or max. excavation depth (z)(%)] |                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                        |                      |                                  |                                    |
| Curve Fitting Method:                                                           |                                                                                                                                                                                   |                                                                                                                                                                                   | [0.000,0.000,0.150][4.000,0.000,0.000]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                        |                      |                                  |                                    |
|                                                                                 |                                                                                                                                                                                   |                                                                                                                                                                                   | Polynomial                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                        |                      |                                  |                                    |
| x Order:                                                                        |                                                                                                                                                                                   |                                                                                                                                                                                   | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                        |                      |                                  |                                    |
| y Order:                                                                        |                                                                                                                                                                                   |                                                                                                                                                                                   | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                        |                      |                                  |                                    |
| Polynomial: z =                                                                 |                                                                                                                                                                                   |                                                                                                                                                                                   | -3.75E-2x + 1.50E-1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                        |                      |                                  |                                    |
| Coeff. of                                                                       |                                                                                                                                                                                   |                                                                                                                                                                                   | 1.00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                        |                      |                                  |                                    |
| Determination:                                                                  |                                                                                                                                                                                   |                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                        |                      |                                  |                                    |
| Polygonal Excavations                                                           |                                                                                                                                                                                   |                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                        |                      |                                  |                                    |
| Excavation Name:                                                                |                                                                                                                                                                                   | Wall Installation A                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                        |                      |                                  |                                    |
| Surface level [m]:                                                              |                                                                                                                                                                                   | 0.0                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                        |                      |                                  |                                    |
| Contribution:                                                                   |                                                                                                                                                                                   | Positive                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                        |                      |                                  |                                    |
| Enabled:                                                                        |                                                                                                                                                                                   | Yes                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                        |                      |                                  |                                    |
| Surface movement curves which are selected are applied between surface and [m]: |                                                                                                                                                                                   | -4.4000                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                        |                      |                                  |                                    |
| Corner                                                                          | x                                                                                                                                                                                 | y                                                                                                                                                                                 | Base Level                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Stiffened                              | Previous Side        | Next Side                        |                                    |
|                                                                                 | [m]                                                                                                                                                                               | [m]                                                                                                                                                                               | [m]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                        | d p1 p2* [m] [%] [%] | d p1 p2* [m] [%] [%]             |                                    |
| 1                                                                               | 32.700                                                                                                                                                                            | 32.500                                                                                                                                                                            | -4.4000                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | No                                     | - - -                | - - -                            |                                    |
| 2                                                                               | 36.800                                                                                                                                                                            | 32.000                                                                                                                                                                            | -4.4000                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | No                                     | - - -                | - - -                            |                                    |
| 3                                                                               | 37.300                                                                                                                                                                            | 42.900                                                                                                                                                                            | -4.4000                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | No                                     | - - -                | - - -                            |                                    |
| 4                                                                               | 33.400                                                                                                                                                                            | 42.900                                                                                                                                                                            | -4.4000                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | No                                     | - - -                | - - -                            |                                    |
| Side                                                                            | Corner 1                                                                                                                                                                          | Corner 2                                                                                                                                                                          | Ground Movement Curve                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                        |                      |                                  |                                    |
|                                                                                 | x y                                                                                                                                                                               | x y                                                                                                                                                                               | Vertical Horizontal                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                        |                      |                                  |                                    |
|                                                                                 | [m] [m]                                                                                                                                                                           | [m] [m]                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                        |                      |                                  |                                    |
| 1                                                                               | 32.700 32.500                                                                                                                                                                     | 36.800 32.000                                                                                                                                                                     | Installation of planar diaphragm wall in stiff clay (CIRIA 580 Fig. 2.9(b))                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                        |                      |                                  |                                    |
| 2                                                                               | 36.800 32.000                                                                                                                                                                     | 37.300 42.900                                                                                                                                                                     | No vertical ground movement                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                        |                      |                                  |                                    |
| 3                                                                               | 37.300 42.900                                                                                                                                                                     | 33.400 42.900                                                                                                                                                                     | Installation of planar diaphragm wall in stiff clay (CIRIA 580 Fig. 2.9(b))                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                        |                      |                                  |                                    |
| 4                                                                               | 33.400 42.900                                                                                                                                                                     | 32.700 32.500                                                                                                                                                                     | Installation of planar diaphragm wall in stiff clay (CIRIA 580 Fig. 2.9(b))                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                        |                      |                                  |                                    |
| Excavation Name:                                                                |                                                                                                                                                                                   | Excavation A                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                        |                      |                                  |                                    |
| Surface level [m]:                                                              |                                                                                                                                                                                   | 0.0                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                        |                      |                                  |                                    |
| Contribution:                                                                   |                                                                                                                                                                                   | Positive                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                        |                      |                                  |                                    |
| Enabled:                                                                        |                                                                                                                                                                                   | Yes                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                        |                      |                                  |                                    |
| Surface movement curves which are selected are applied between surface and [m]: |                                                                                                                                                                                   | -4.4000                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                        |                      |                                  |                                    |
| Corner                                                                          | x                                                                                                                                                                                 | y                                                                                                                                                                                 | Base Level                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Stiffened                              | Previous Side        | Next Side                        |                                    |
|                                                                                 | [m]                                                                                                                                                                               | [m]                                                                                                                                                                               | [m]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                        | d p1 p2* [m] [%] [%] | d p1 p2* [m] [%] [%]             |                                    |
| 1                                                                               | 32.700                                                                                                                                                                            | 32.500                                                                                                                                                                            | -4.4000                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Yes                                    | 0.0 67.000 25.000    | 0.0 67.000 25.000                |                                    |
| 2                                                                               | 36.800                                                                                                                                                                            | 32.000                                                                                                                                                                            | -4.4000                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Yes                                    | 0.0 67.000 25.000    | 0.0 67.000 25.000                |                                    |
| 3                                                                               | 37.300                                                                                                                                                                            | 42.900                                                                                                                                                                            | -4.4000                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Yes                                    | 0.0 67.000 25.000    | 0.0 67.000 25.000                |                                    |
| 4                                                                               | 33.400                                                                                                                                                                            | 42.900                                                                                                                                                                            | -4.4000                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Yes                                    | 0.0 67.000 25.000    | 0.0 67.000 25.000                |                                    |
| Side                                                                            | Corner 1                                                                                                                                                                          | Corner 2                                                                                                                                                                          | Ground Movement Curve                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                        |                      |                                  |                                    |
|                                                                                 | x y                                                                                                                                                                               | x y                                                                                                                                                                               | Vertical Horizontal                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                        |                      |                                  |                                    |
|                                                                                 | [m] [m]                                                                                                                                                                           | [m] [m]                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                        |                      |                                  |                                    |
| 1                                                                               | 32.700 32.500                                                                                                                                                                     | 36.800 32.000                                                                                                                                                                     | Excavation in front of high stiffness wall in stiff clay                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                        |                      |                                  |                                    |



# GEA LIMITED (GEOTECHNICAL & ENV ASSOC)

Rear of 159-163 King's Cross Road, London WC1X 9BN  
Wall Installation and Excavation Combined Issue 4

| Job No.   | Sheet No.   | Rev.    |
|-----------|-------------|---------|
| J16180    |             |         |
| Drg. Ref. |             |         |
| Made by   | Date        | Checked |
|           | 07-Mar-2017 |         |

| Side | Corner 1 |          | Corner 2 |          | Ground Movement Curve                                                             |                                                                                   |
|------|----------|----------|----------|----------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
|      | x<br>[m] | y<br>[m] | x<br>[m] | y<br>[m] | Vertical                                                                          | Horizontal                                                                        |
| 2    | 36.800   | 32.000   | 37.300   | 42.900   | (CIRIA 580 Fig. 2.11(b))<br>No vertical ground movement                           | (CIRIA 580 Fig. 2.11(a))<br>No horizontal ground movement                         |
| 3    | 37.300   | 42.900   | 33.400   | 42.900   | Excavation in front of high stiffness wall in stiff clay (CIRIA 580 Fig. 2.11(b)) | Excavation in front of high stiffness wall in stiff clay (CIRIA 580 Fig. 2.11(a)) |
| 4    | 33.400   | 42.900   | 32.700   | 32.500   | Excavation in front of high stiffness wall in stiff clay (CIRIA 580 Fig. 2.11(b)) | Excavation in front of high stiffness wall in stiff clay (CIRIA 580 Fig. 2.11(a)) |

Excavation Name: Wall Installation B  
Surface level [m]: 0.0  
Contribution: Positive  
Enabled: Yes  
Surface movement curves which are selected are applied between surface and [m]: -8.5000

| Corner | x<br>[m] | y<br>[m] | Base Level<br>[m] | Stiffened | Previous Side<br>d<br>[m] | p1<br>[%] | p2*<br>[%] | Next Side<br>d<br>[m] | p1<br>[%] | p2*<br>[%] |
|--------|----------|----------|-------------------|-----------|---------------------------|-----------|------------|-----------------------|-----------|------------|
| 1      | 36.700   | 28.400   | -8.5000           | No        | -                         | -         | -          | -                     | -         | -          |
| 2      | 50.100   | 26.600   | -8.5000           | No        | -                         | -         | -          | -                     | -         | -          |
| 3      | 48.400   | 35.400   | -8.5000           | No        | -                         | -         | -          | -                     | -         | -          |
| 4      | 48.166   | 36.351   | -4.4000           | No        | -                         | -         | -          | -                     | -         | -          |
| 5      | 45.300   | 47.600   | -4.4000           | No        | -                         | -         | -          | -                     | -         | -          |
| 6      | 37.600   | 47.600   | -4.4000           | No        | -                         | -         | -          | -                     | -         | -          |
| 7      | 36.700   | 28.800   | -4.4000           | No        | -                         | -         | -          | -                     | -         | -          |

| Side | Corner 1 |          | Corner 2 |          | Ground Movement Curve                                                            |                                                                                  |
|------|----------|----------|----------|----------|----------------------------------------------------------------------------------|----------------------------------------------------------------------------------|
|      | x<br>[m] | y<br>[m] | x<br>[m] | y<br>[m] | Vertical                                                                         | Horizontal                                                                       |
| 1    | 36.700   | 28.400   | 50.100   | 26.600   | Installation of contiguous bored pile wall in stiff clay (CIRIA 580 Fig. 2.8(b)) | Installation of contiguous bored pile wall in stiff clay (CIRIA 580 Fig. 2.8(a)) |
| 2    | 50.100   | 26.600   | 48.400   | 35.400   | Installation of contiguous bored pile wall in stiff clay (CIRIA 580 Fig. 2.8(b)) | Installation of contiguous bored pile wall in stiff clay (CIRIA 580 Fig. 2.8(a)) |
| 3    | 48.400   | 35.400   | 48.166   | 36.351   | Installation of contiguous bored pile wall in stiff clay (CIRIA 580 Fig. 2.8(b)) | Installation of contiguous bored pile wall in stiff clay (CIRIA 580 Fig. 2.8(a)) |
| 4    | 48.166   | 36.351   | 45.300   | 47.600   | Installation of planar diaphragm wall in stiff clay (CIRIA 580 Fig. 2.9(b))      | Installation of planar diaphragm wall in stiff clay (CIRIA 580 Fig. 2.9(a))      |
| 5    | 45.300   | 47.600   | 37.600   | 47.600   | Installation of planar diaphragm wall in stiff clay (CIRIA 580 Fig. 2.9(b))      | Installation of planar diaphragm wall in stiff clay (CIRIA 580 Fig. 2.9(a))      |
| 6    | 37.600   | 47.600   | 36.700   | 28.800   | Installation of planar diaphragm wall in stiff clay (CIRIA 580 Fig. 2.9(b))      | Installation of planar diaphragm wall in stiff clay (CIRIA 580 Fig. 2.9(a))      |
| 7    | 36.700   | 28.800   | 36.700   | 28.400   | Installation of contiguous bored pile wall in stiff clay (CIRIA 580 Fig. 2.8(b)) | Installation of contiguous bored pile wall in stiff clay (CIRIA 580 Fig. 2.8(a)) |

Excavation Name: Excavation B  
Surface level [m]: 0.0  
Contribution: Positive  
Enabled: Yes  
Surface movement curves which are selected are applied between surface and [m]: -4.4000

| Corner | x<br>[m] | y<br>[m] | Base Level<br>[m] | Stiffened | Previous Side<br>d<br>[m] | p1<br>[%] | p2*<br>[%] | Next Side<br>d<br>[m] | p1<br>[%] | p2*<br>[%] |
|--------|----------|----------|-------------------|-----------|---------------------------|-----------|------------|-----------------------|-----------|------------|
| 1      | 36.700   | 28.400   | -4.4000           | Yes       | 0.0                       | 67.000    | 25.000     | 0.0                   | 67.000    | 25.000     |
| 2      | 50.100   | 26.600   | -4.4000           | Yes       | 0.0                       | 67.000    | 25.000     | 0.0                   | 67.000    | 25.000     |
| 3      | 48.400   | 35.400   | -4.4000           | Yes       | 0.0                       | 67.000    | 25.000     | 0.0                   | 67.000    | 25.000     |
| 4      | 48.166   | 36.351   | -4.4000           | Yes       | 0.0                       | 67.000    | 25.000     | 0.0                   | 67.000    | 25.000     |
| 5      | 45.300   | 47.600   | -4.4000           | Yes       | 0.0                       | 67.000    | 25.000     | 0.0                   | 67.000    | 25.000     |
| 6      | 37.600   | 47.600   | -4.4000           | Yes       | 0.0                       | 67.000    | 25.000     | 0.0                   | 67.000    | 25.000     |
| 7      | 36.700   | 28.800   | -4.4000           | Yes       | 0.0                       | 67.000    | 25.000     | 0.0                   | 67.000    | 25.000     |

| Side | Corner 1 |          | Corner 2 |          | Ground Movement Curve                                                             |                                                                                   |
|------|----------|----------|----------|----------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
|      | x<br>[m] | y<br>[m] | x<br>[m] | y<br>[m] | Vertical                                                                          | Horizontal                                                                        |
| 1    | 36.700   | 28.400   | 50.100   | 26.600   | Excavation in front of high stiffness wall in stiff clay (CIRIA 580 Fig. 2.11(b)) | Excavation in front of high stiffness wall in stiff clay (CIRIA 580 Fig. 2.11(a)) |
| 2    | 50.100   | 26.600   | 48.400   | 35.400   | Excavation in front of high stiffness wall in stiff clay (CIRIA 580 Fig. 2.11(b)) | Excavation in front of high stiffness wall in stiff clay (CIRIA 580 Fig. 2.11(a)) |
| 3    | 48.400   | 35.400   | 48.166   | 36.351   | Excavation in front of high stiffness wall in stiff clay (CIRIA 580 Fig. 2.11(b)) | Excavation in front of high stiffness wall in stiff clay (CIRIA 580 Fig. 2.11(a)) |
| 4    | 48.166   | 36.351   | 45.300   | 47.600   | Excavation in front of high stiffness wall in stiff clay (CIRIA 580 Fig. 2.11(b)) | Excavation in front of high stiffness wall in stiff clay (CIRIA 580 Fig. 2.11(a)) |
| 5    | 45.300   | 47.600   | 37.600   | 47.600   | Excavation in front of high stiffness wall in stiff clay (CIRIA 580 Fig. 2.11(b)) | Excavation in front of high stiffness wall in stiff clay (CIRIA 580 Fig. 2.11(a)) |
| 6    | 37.600   | 47.600   | 36.700   | 28.800   | Excavation in front of high stiffness wall in stiff clay (CIRIA 580 Fig. 2.11(b)) | Excavation in front of high stiffness wall in stiff clay (CIRIA 580 Fig. 2.11(a)) |
| 7    | 36.700   | 28.800   | 36.700   | 28.400   | Excavation in front of high stiffness wall in stiff clay (CIRIA 580 Fig. 2.11(b)) | Excavation in front of high stiffness wall in stiff clay (CIRIA 580 Fig. 2.11(a)) |

## Damage Category Strains

| Name                  | 0 (Negligible)<br>to<br>1 (Very Slight) | 1 (Very Slight)<br>to<br>2 (Slight) | 2 (Slight)<br>to<br>3 (Moderate) | 3 (Moderate)<br>to<br>4 (Severe) |
|-----------------------|-----------------------------------------|-------------------------------------|----------------------------------|----------------------------------|
| Burland Strain Limits | 0.0                                     | 500.00E-6                           | 750.00E-6                        | 0.0015000                        |

## Specific Structures - Geometry

| Structure Name | Sub-Structure Name | Displacement Line | Start Distance Along Line | End Distance Along Line | Vertical Offsets from Line for Vertical Movement Calculations | Vertical Displacement Limit Sensitivity | Damage Category Strains | Poisson's Ratio | E/G    |
|----------------|--------------------|-------------------|---------------------------|-------------------------|---------------------------------------------------------------|-----------------------------------------|-------------------------|-----------------|--------|
|                |                    |                   | [m]                       | [m]                     |                                                               | [mm]                                    |                         |                 |        |
| A              | A                  | A                 | 0.00000                   | 3.39900                 | 0.0                                                           | 0.10000                                 | Burland Strain Limits   | 0.20000         | 2.6000 |
| B              | B                  | B                 | 0.00000                   | 3.09900                 | 0.0                                                           | 0.10000                                 | Burland Strain Limits   | 0.20000         | 2.6000 |
| C              | C                  | C                 | 0.00000                   | 4.60000                 | 0.0                                                           | 0.10000                                 | Burland Strain Limits   | 0.20000         | 2.6000 |
| D              | D                  | D                 | 0.00000                   | 5.39993                 | 0.0                                                           | 0.10000                                 | Burland Strain Limits   | 0.20000         | 2.6000 |
| E              | E                  | E                 | 0.00000                   | 2.49900                 | 0.0                                                           | 0.10000                                 | Burland Strain Limits   | 0.20000         | 2.6000 |
| F              | F                  | F                 | 0.00000                   | 9.29954                 | 0.0                                                           | 0.10000                                 | Burland Strain Limits   | 0.20000         | 2.6000 |
| G              | G                  | G                 | 0.00000                   | 4.99900                 | 0.0                                                           | 0.10000                                 | Burland Strain Limits   | 0.20000         | 2.6000 |
| H              | H                  | H                 | 0.00000                   | 2.70085                 | 0.0                                                           | 0.10000                                 | Burland Strain Limits   | 0.20000         | 2.6000 |
| I              | I                  | I                 | 0.00000                   | 7.19969                 | 0.0                                                           | 0.10000                                 | Burland Strain Limits   | 0.20000         | 2.6000 |
| J              | J                  | J                 | 0.00000                   | 10.40900                | 0.0                                                           | 0.10000                                 | Burland Strain Limits   | 0.20000         | 2.6000 |
| K              | K                  | K                 | 0.00000                   | 8.89900                 | 0.0                                                           | 0.10000                                 | Burland Strain Limits   | 0.20000         | 2.6000 |
| L              | L                  | L                 | 0.00000                   | 7.19900                 | 0.0                                                           | 0.10000                                 | Burland Strain Limits   | 0.20000         | 2.6000 |



# GEA LIMITED (GEOTECHNICAL & ENV ASSOC)

Rear of 159-163 King's Cross Road, London WC1X 9BN  
Wall Installation and Excavation Combined Issue 4

| Job No.   | Sheet No.           | Rev.    |
|-----------|---------------------|---------|
| J16180    |                     |         |
| Drg. Ref. |                     |         |
| Made by   | Date<br>07-Mar-2017 | Checked |

| Structure Name | Sub-Structure Name | Displacement Line | Start Distance Along Line | End Distance Along Line | Vertical Offsets from Line for Vertical | Vertical Displacement Limit Sensitivity | Damage Category Strains | Poisson's Ratio | E/G    |
|----------------|--------------------|-------------------|---------------------------|-------------------------|-----------------------------------------|-----------------------------------------|-------------------------|-----------------|--------|
| M              |                    | M                 | 0.00000                   | 7.29968                 | 0.0                                     | 0.10000                                 | Burland Strain Limits   | 0.20000         | 2.6000 |
| N              |                    | N                 | 0.00000                   | 6.09900                 | 0.0                                     | 0.10000                                 | Burland Strain Limits   | 0.20000         | 2.6000 |
| O              |                    | O                 | 0.00000                   | 4.59900                 | 0.0                                     | 0.10000                                 | Burland Strain Limits   | 0.20000         | 2.6000 |
| P              | Sub #              | P                 | 0.00000                   | 5.69900                 | 0.0                                     | 0.10000                                 | Burland Strain Limits   | 0.20000         | 2.6000 |
| Q              |                    | Q                 | 0.00000                   | 4.59900                 | 0.0                                     | 0.10000                                 | Burland Strain Limits   | 0.20000         | 2.6000 |
| R              |                    | R                 | 0.00000                   | 7.40900                 | 0.0                                     | 0.10000                                 | Burland Strain Limits   | 0.20000         | 2.6000 |
| S              |                    | S                 | 0.00000                   | 30.99900                | 0.0                                     | 0.10000                                 | Burland Strain Limits   | 0.20000         | 2.6000 |
| T              |                    | T                 | 0.00000                   | 37.73121                | 0.0                                     | 0.10000                                 | Burland Strain Limits   | 0.20000         | 2.6000 |
| U              |                    | U                 | 0.00000                   | 9.85902                 | 0.0                                     | 0.10000                                 | Burland Strain Limits   | 0.20000         | 2.6000 |
| V              |                    | V                 | 0.00000                   | 3.63905                 | 0.0                                     | 0.10000                                 | Burland Strain Limits   | 0.20000         | 2.6000 |
| W              |                    | W                 | 0.00000                   | 1.13918                 | 0.0                                     | 0.10000                                 | Burland Strain Limits   | 0.20000         | 2.6000 |
| X              |                    | X                 | 0.00000                   | 9.71908                 | 0.0                                     | 0.10000                                 | Burland Strain Limits   | 0.20000         | 2.6000 |
| Y              |                    | Y                 | 0.00000                   | 3.63905                 | 0.0                                     | 0.10000                                 | Burland Strain Limits   | 0.20000         | 2.6000 |
| Z              |                    | Z                 | 0.00000                   | 9.57919                 | 0.0                                     | 0.10000                                 | Burland Strain Limits   | 0.20000         | 2.6000 |
| AA             |                    | AA                | 0.00000                   | 3.66097                 | 0.0                                     | 0.10000                                 | Burland Strain Limits   | 0.20000         | 2.6000 |
| AB             |                    | AB                | 0.00000                   | 9.46156                 | 0.0                                     | 0.10000                                 | Burland Strain Limits   | 0.20000         | 2.6000 |
| AC             |                    | AC                | 0.00000                   | 5.07935                 | 0.0                                     | 0.10000                                 | Burland Strain Limits   | 0.20000         | 2.6000 |
| AD             |                    | AD                | 0.00000                   | 7.86284                 | 0.0                                     | 0.10000                                 | Burland Strain Limits   | 0.20000         | 2.6000 |
| AE             |                    | AE                | 0.00000                   | 3.30506                 | 0.0                                     | 0.10000                                 | Burland Strain Limits   | 0.20000         | 2.6000 |
| AF             |                    | AF                | 0.00000                   | 3.21393                 | 0.0                                     | 0.10000                                 | Burland Strain Limits   | 0.20000         | 2.6000 |
| AG             |                    | AG                | 0.00000                   | 17.14076                | 0.0                                     | 0.10000                                 | Burland Strain Limits   | 0.20000         | 2.6000 |
| AH             |                    | AH                | 0.00000                   | 6.33777                 | 0.0                                     | 0.10000                                 | Burland Strain Limits   | 0.20000         | 2.6000 |
| AI             | Sub #              | AI                | 0.00000                   | 4.84977                 | 0.0                                     | 0.10000                                 | Burland Strain Limits   | 0.20000         | 2.6000 |
| AJ             | Sub #              | AJ                | 0.00000                   | 8.96672                 | 0.0                                     | 0.10000                                 | Burland Strain Limits   | 0.20000         | 2.6000 |
| AK             | Sub #              | AK                | 0.00000                   | 4.94875                 | 0.0                                     | 0.10000                                 | Burland Strain Limits   | 0.20000         | 2.6000 |
| AL             | Sub #              | AL                | 0.00000                   | 4.73714                 | 0.0                                     | 0.10000                                 | Burland Strain Limits   | 0.20000         | 2.6000 |
| AM             | Sub #              | AM                | 0.00000                   | 2.70640                 | 0.0                                     | 0.10000                                 | Burland Strain Limits   | 0.20000         | 2.6000 |
| AN             | Sub #              | AN                | 0.00000                   | 3.33666                 | 0.0                                     | 0.10000                                 | Burland Strain Limits   | 0.20000         | 2.6000 |
| AO             | Sub #              | AO                | 0.00000                   | 2.51694                 | 0.0                                     | 0.10000                                 | Burland Strain Limits   | 0.20000         | 2.6000 |
| AP             | Sub #              | AP                | 0.00000                   | 4.45433                 | 0.0                                     | 0.10000                                 | Burland Strain Limits   | 0.20000         | 2.6000 |
| AQ             | Sub #              | AQ                | 0.00000                   | 9.94875                 | 0.0                                     | 0.10000                                 | Burland Strain Limits   | 0.20000         | 2.6000 |
| AR             | Sub #              | AR                | 0.00000                   | 8.47072                 | 0.0                                     | 0.10000                                 | Burland Strain Limits   | 0.20000         | 2.6000 |
| AS             | Sub #              | AS                | 0.00000                   | 8.16049                 | 0.0                                     | 0.10000                                 | Burland Strain Limits   | 0.20000         | 2.6000 |
| AT             | Sub #              | AT                | 0.00000                   | 11.07555                | 0.0                                     | 0.10000                                 | Burland Strain Limits   | 0.20000         | 2.6000 |
| AU             | Sub #              | AU                | 0.00000                   | 7.11026                 | 0.0                                     | 0.10000                                 | Burland Strain Limits   | 0.20000         | 2.6000 |
| AV             |                    | AV                | 0.00000                   | 9.22854                 | 0.0                                     | 0.10000                                 | Burland Strain Limits   | 0.20000         | 2.6000 |
| AW             |                    | AW                | 0.00000                   | 11.32066                | 0.0                                     | 0.10000                                 | Burland Strain Limits   | 0.20000         | 2.6000 |

## Specific Structures - Bending Parameters

| Structure Name | Sub-Structure Name | Height | Default Properties | Hogging                             |                                      |                                               | Sagging                             |                                      |                                               |
|----------------|--------------------|--------|--------------------|-------------------------------------|--------------------------------------|-----------------------------------------------|-------------------------------------|--------------------------------------|-----------------------------------------------|
|                |                    |        |                    | 2nd Moment of Area (per unit width) | Distance of Bending Strain from N.A. | Distance of N.A. from Edge of Beam in Tension | 2nd Moment of Area (per unit width) | Distance of Bending Strain from N.A. | Distance of N.A. from Edge of Beam in Tension |
|                |                    |        |                    | [m <sup>3</sup> ]                   | [m]                                  | [m]                                           | [m <sup>3</sup> ]                   | [m]                                  | [m]                                           |
| A              |                    | 15.500 | Yes                | 1241.3                              | 15.500                               | 15.500                                        | 310.32                              | 7.7500                               | 7.7500                                        |
| B              |                    | 15.500 | Yes                | 1241.3                              | 15.500                               | 15.500                                        | 310.32                              | 7.7500                               | 7.7500                                        |
| C              |                    | 15.500 | Yes                | 1241.3                              | 15.500                               | 15.500                                        | 310.32                              | 7.7500                               | 7.7500                                        |
| E              |                    | 15.500 | Yes                | 1241.3                              | 15.500                               | 15.500                                        | 310.32                              | 7.7500                               | 7.7500                                        |
| F              |                    | 15.500 | Yes                | 1241.3                              | 15.500                               | 15.500                                        | 310.32                              | 7.7500                               | 7.7500                                        |
| G              |                    | 15.500 | Yes                | 1241.3                              | 15.500                               | 15.500                                        | 310.32                              | 7.7500                               | 7.7500                                        |
| H              |                    | 15.500 | Yes                | 1241.3                              | 15.500                               | 15.500                                        | 310.32                              | 7.7500                               | 7.7500                                        |
| J              |                    | 8.5000 | Yes                | 204.71                              | 8.5000                               | 8.5000                                        | 51.177                              | 4.2500                               | 4.2500                                        |
| K              |                    | 8.5000 | Yes                | 204.71                              | 8.5000                               | 8.5000                                        | 51.177                              | 4.2500                               | 4.2500                                        |
| L              |                    | 8.5000 | Yes                | 204.71                              | 8.5000                               | 8.5000                                        | 51.177                              | 4.2500                               | 4.2500                                        |
| M              |                    | 9.5000 | Yes                | 285.79                              | 9.5000                               | 9.5000                                        | 71.448                              | 4.7500                               | 4.7500                                        |
| N              |                    | 12.000 | Yes                | 576.00                              | 12.000                               | 12.000                                        | 144.00                              | 6.0000                               | 6.0000                                        |
| O              |                    | 3.6800 | Yes                | 16.612                              | 3.6800                               | 3.6800                                        | 4.1530                              | 1.8400                               | 1.8400                                        |
| P              | Sub #              | 4.8500 | Yes                | 38.028                              | 4.8500                               | 4.8500                                        | 9.5070                              | 2.4250                               | 2.4250                                        |
| Q              |                    | 3.6500 | Yes                | 16.209                              | 3.6500                               | 3.6500                                        | 4.0523                              | 1.8250                               | 1.8250                                        |
| R              |                    | 3.5000 | Yes                | 14.292                              | 3.5000                               | 3.5000                                        | 3.5729                              | 1.7500                               | 1.7500                                        |
| S              |                    | 8.5000 | Yes                | 204.71                              | 8.5000                               | 8.5000                                        | 51.177                              | 4.2500                               | 4.2500                                        |
| T              |                    | 8.5000 | Yes                | 204.71                              | 8.5000                               | 8.5000                                        | 51.177                              | 4.2500                               | 4.2500                                        |
| U              |                    | 8.5000 | Yes                | 204.71                              | 8.5000                               | 8.5000                                        | 51.177                              | 4.2500                               | 4.2500                                        |
| V              |                    | 6.5000 | Yes                | 91.542                              | 6.5000                               | 6.5000                                        | 22.885                              | 3.2500                               | 3.2500                                        |
| W              |                    | 7.7000 | Yes                | 152.18                              | 7.7000                               | 7.7000                                        | 38.044                              | 3.8500                               | 3.8500                                        |
| X              |                    | 8.5000 | Yes                | 204.71                              | 8.5000                               | 8.5000                                        | 51.177                              | 4.2500                               | 4.2500                                        |
| Y              |                    | 7.4000 | Yes                | 135.07                              | 7.4000                               | 7.4000                                        | 33.769                              | 3.7000                               | 3.7000                                        |
| Z              |                    | 8.5000 | Yes                | 204.71                              | 8.5000                               | 8.5000                                        | 51.177                              | 4.2500                               | 4.2500                                        |
| AA             |                    | 7.4000 | Yes                | 135.07                              | 7.4000                               | 7.4000                                        | 33.769                              | 3.7000                               | 3.7000                                        |
| AB             |                    | 8.5000 | Yes                | 204.71                              | 8.5000                               | 8.5000                                        | 51.177                              | 4.2500                               | 4.2500                                        |
| AC             |                    | 3.5000 | Yes                | 14.292                              | 3.5000                               | 3.5000                                        | 3.5729                              | 1.7500                               | 1.7500                                        |
| AD             |                    | 4.4600 | Yes                | 29.572                              | 4.4600                               | 4.4600                                        | 7.3930                              | 2.2300                               | 2.2300                                        |
| AE             |                    | 3.5000 | Yes                | 14.292                              | 3.5000                               | 3.5000                                        | 3.5729                              | 1.7500                               | 1.7500                                        |
| AF             |                    | 4.4600 | Yes                | 29.572                              | 4.4600                               | 4.4600                                        | 7.3930                              | 2.2300                               | 2.2300                                        |
| AG             |                    | 3.5000 | Yes                | 14.292                              | 3.5000                               | 3.5000                                        | 3.5729                              | 1.7500                               | 1.7500                                        |
| AH             |                    | 18.500 | Yes                | 2110.5                              | 18.500                               | 18.500                                        | 527.64                              | 9.2500                               | 9.2500                                        |
| AI             | Sub #              | 18.500 | Yes                | 2110.5                              | 18.500                               | 18.500                                        | 527.64                              | 9.2500                               | 9.2500                                        |
| AJ             | Sub #              | 18.500 | Yes                | 2110.5                              | 18.500                               | 18.500                                        | 527.64                              | 9.2500                               | 9.2500                                        |
| AK             | Sub #              | 18.500 | Yes                | 2110.5                              | 18.500                               | 18.500                                        | 527.64                              | 9.2500                               | 9.2500                                        |
| AL             | Sub #              | 18.500 | Yes                | 2110.5                              | 18.500                               | 18.500                                        | 527.64                              | 9.2500                               | 9.2500                                        |
| AM             | Sub #              | 18.500 | Yes                | 2110.5                              | 18.500                               | 18.500                                        | 527.64                              | 9.2500                               | 9.2500                                        |
| AN             | Sub #              | 18.500 | Yes                | 2110.5                              | 18.500                               | 18.500                                        | 527.64                              | 9.2500                               | 9.2500                                        |
| AO             | Sub #              | 18.500 | Yes                | 2110.5                              | 18.500                               | 18.500                                        | 527.64                              | 9.2500                               | 9.2500                                        |
| AP             | Sub #              | 18.500 | Yes                | 2110.5                              | 18.500                               | 18.500                                        | 527.64                              | 9.2500                               | 9.2500                                        |
| AQ             | Sub #              | 18.500 | Yes                | 2110.5                              | 18.500                               | 18.500                                        | 527.64                              | 9.2500                               | 9.2500                                        |
| AR             | Sub #              | 18.500 | Yes                | 2110.5                              | 18.500                               | 18.500                                        | 527.64                              | 9.2500                               | 9.2500                                        |
| AS             | Sub #              | 18.500 | Yes                | 2110.5                              | 18.500                               | 18.500                                        | 527.64                              | 9.2500                               | 9.2500                                        |
| AT             | Sub #              | 18.500 | Yes                | 2110.5                              | 18.500                               | 18.500                                        | 527.64                              | 9.2500                               | 9.2500                                        |
| AU             |                    | 4.6000 | Yes                | 32.445                              | 4.6000                               | 4.6000                                        | 8.1113                              | 2.3000                               | 2.3000                                        |
| AV             |                    | 4.6000 | Yes                | 32.445                              | 4.6000                               | 4.6000                                        | 8.1113                              | 2.3000                               | 2.3000                                        |
| AW             |                    | 4.6000 | Yes                | 32.445                              | 4.6000                               | 4.6000                                        | 8.1113                              | 2.3000                               | 2.3000                                        |

## Building Segment Combinations

| Structure Name                        | Sub-Structure Name | Vertical Offset from Line for Vertical Movement Calculations | Segment | Start | Length | Curvature | Combined Segment |
|---------------------------------------|--------------------|--------------------------------------------------------------|---------|-------|--------|-----------|------------------|
|                                       |                    | [m]                                                          |         | [m]   | [m]    | [m]       |                  |
| No structures have segments combined. |                    |                                                              |         |       |        |           |                  |

## Warnings

- Multiple excavations have been specified. The displacements resulting from these excavations are calculated by summing the displacements resulting from each individual excavation. No account has been taken of the interactions between excavations (e.g. overlapping zones of influence or 'shielding' of one excavation by another).

## Displacement and Strain Results

| Type/No. | Coordinates |   |   | Displacements           |   |                         | Angle of Line to x Axis |
|----------|-------------|---|---|-------------------------|---|-------------------------|-------------------------|
| Name     | Dist.       | x | y | x                       | y | z                       |                         |
|          |             |   |   | Horizontal displacement |   | Horizontal displacement |                         |









# GEA LIMITED (GEOTECHNICAL & ENV ASSOC)

Rear of 159-163 King's Cross Road, London WC1X 9BN  
Wall Installation and Excavation Combined Issue 4

| Job No.   | Sheet No.           | Rev.    |
|-----------|---------------------|---------|
| J16180    |                     |         |
| Drg. Ref. |                     |         |
| Made by   | Date<br>07-Mar-2017 | Checked |

| Type/No.                      |             | Coordinates |          |               | Displacements |                                        |                                               | Angle of Line to x Axis |                         |
|-------------------------------|-------------|-------------|----------|---------------|---------------|----------------------------------------|-----------------------------------------------|-------------------------|-------------------------|
| Name                          | Dist.       | x           | y        | z             | x             | y                                      | z                                             | Horizontal displacement | Horizontal displacement |
| Structure: A   Sub-structure: |             |             |          |               |               |                                        |                                               |                         |                         |
| Dist.                         | Coordinates |             |          | Displacements |               |                                        |                                               |                         |                         |
|                               | x           | y           | z        | x             | y             | Horizontal displacement along the Line | Horizontal displacement perpendicular to Line |                         |                         |
| [m]                           | [m]         | [m]         | [m]      | [mm]          | [mm]          | [mm]                                   | [mm]                                          |                         |                         |
| 0.0                           | 22.50000    | 48.10000    | -0.50000 | 2.0599        | -0.58186      | 2.0599                                 | -0.58186                                      |                         |                         |
| 0.85000                       | 23.35000    | 48.10000    | -0.50000 | 2.4980        | -0.70465      | 2.4980                                 | -0.70465                                      |                         |                         |
| 1.7000                        | 24.20000    | 48.10000    | -0.50000 | 2.9183        | -0.83724      | 2.9183                                 | -0.83724                                      |                         |                         |
| 2.5500                        | 25.05000    | 48.10000    | -0.50000 | 3.3166        | -0.98006      | 3.3166                                 | -0.98006                                      |                         |                         |
| 3.4000                        | 25.90000    | 48.10000    | -0.50000 | 3.6878        | -1.1330       | 3.6878                                 | -1.1330                                       |                         |                         |
| Structure: B   Sub-structure: |             |             |          |               |               |                                        |                                               |                         |                         |
| Dist.                         | Coordinates |             |          | Displacements |               |                                        |                                               |                         |                         |
|                               | x           | y           | z        | x             | y             | Horizontal displacement along the Line | Horizontal displacement perpendicular to Line |                         |                         |
| [m]                           | [m]         | [m]         | [m]      | [mm]          | [mm]          | [mm]                                   | [mm]                                          |                         |                         |
| 0.0                           | 25.90000    | 48.10000    | -0.50000 | 3.6878        | -1.1330       | 1.1330                                 | 3.6878                                        |                         |                         |
| 0.77500                       | 25.90000    | 47.32500    | -0.50000 | 3.8950        | -1.0946       | 1.0946                                 | 3.8950                                        |                         |                         |
| 1.5500                        | 25.90000    | 46.55000    | -0.50000 | 4.1090        | -1.0195       | 1.0195                                 | 4.1090                                        |                         |                         |
| 2.3250                        | 25.90000    | 45.77500    | -0.50000 | 4.3229        | -0.90311      | 0.90311                                | 4.3229                                        |                         |                         |
| 3.1000                        | 25.90000    | 45.00000    | -0.50000 | 4.5276        | -0.74276      | 0.74276                                | 4.5276                                        |                         |                         |
| Structure: C   Sub-structure: |             |             |          |               |               |                                        |                                               |                         |                         |
| Dist.                         | Coordinates |             |          | Displacements |               |                                        |                                               |                         |                         |
|                               | x           | y           | z        | x             | y             | Horizontal displacement along the Line | Horizontal displacement perpendicular to Line |                         |                         |
| [m]                           | [m]         | [m]         | [m]      | [mm]          | [mm]          | [mm]                                   | [mm]                                          |                         |                         |
| 0.0                           | 25.90000    | 45.00000    | -0.50000 | 4.5276        | -0.74276      | 4.5427                                 | -0.64418                                      |                         |                         |
| 0.92022                       | 26.82000    | 44.98000    | -0.50000 | 5.0254        | -0.88952      | 5.0435                                 | -0.78008                                      |                         |                         |
| 1.8404                        | 27.74000    | 44.96000    | -0.50000 | 5.6733        | -1.1322       | 5.6966                                 | -1.0086                                       |                         |                         |
| 2.7607                        | 28.66000    | 44.94000    | -0.50000 | 6.3528        | -1.4737       | 6.3833                                 | -1.3352                                       |                         |                         |
| 3.6809                        | 29.58000    | 44.92000    | -0.50000 | 6.9234        | -1.9106       | 6.9633                                 | -1.7596                                       |                         |                         |
| 4.6011                        | 30.50000    | 44.90000    | -0.50000 | 7.2971        | -2.4754       | 7.3492                                 | -2.3162                                       |                         |                         |
| Structure: D   Sub-structure: |             |             |          |               |               |                                        |                                               |                         |                         |
| Dist.                         | Coordinates |             |          | Displacements |               |                                        |                                               |                         |                         |
|                               | x           | y           | z        | x             | y             | Horizontal displacement along the Line | Horizontal displacement perpendicular to Line |                         |                         |
| [m]                           | [m]         | [m]         | [m]      | [mm]          | [mm]          | [mm]                                   | [mm]                                          |                         |                         |
| 0.0                           | 30.50000    | 44.90000    | -0.50000 | 7.2971        | -2.4754       | -2.6100                                | -7.2500                                       |                         |                         |
| 0.90015                       | 30.48333    | 45.80000    | -0.50000 | 6.4482        | -2.6616       | -2.7806                                | -6.3978                                       |                         |                         |
| 1.8003                        | 30.46667    | 46.70000    | -0.50000 | 5.8954        | -2.7221       | -2.8308                                | -5.8440                                       |                         |                         |
| 2.7005                        | 30.45000    | 47.60000    | -0.50000 | 5.4556        | -2.6384       | -2.7389                                | -5.4058                                       |                         |                         |
| 3.6006                        | 30.43333    | 48.50000    | -0.50000 | 3.7464        | -2.5587       | -2.6276                                | -3.6984                                       |                         |                         |
| 4.5008                        | 30.41667    | 49.40000    | -0.50000 | 3.3290        | -2.6966       | -2.7577                                | -3.2785                                       |                         |                         |
| 5.4009                        | 30.40000    | 50.30000    | -0.50000 | 2.9460        | -2.8070       | -2.8610                                | -2.8936                                       |                         |                         |
| Structure: E   Sub-structure: |             |             |          |               |               |                                        |                                               |                         |                         |
| Dist.                         | Coordinates |             |          | Displacements |               |                                        |                                               |                         |                         |
|                               | x           | y           | z        | x             | y             | Horizontal displacement along the Line | Horizontal displacement perpendicular to Line |                         |                         |
| [m]                           | [m]         | [m]         | [m]      | [mm]          | [mm]          | [mm]                                   | [mm]                                          |                         |                         |
| 0.0                           | 30.40000    | 50.30000    | -0.50000 | 2.9460        | -2.8070       | 2.9460                                 | -2.8070                                       |                         |                         |
| 0.83333                       | 31.23333    | 50.30000    | -0.50000 | 2.8751        | -3.1596       | 2.8751                                 | -3.1596                                       |                         |                         |
| 1.6667                        | 32.06667    | 50.30000    | -0.50000 | 2.8491        | -3.5807       | 2.8491                                 | -3.5807                                       |                         |                         |
| 2.5000                        | 32.90000    | 50.30000    | -0.50000 | 2.8006        | -4.0607       | 2.8006                                 | -4.0607                                       |                         |                         |
| Structure: F   Sub-structure: |             |             |          |               |               |                                        |                                               |                         |                         |
| Dist.                         | Coordinates |             |          | Displacements |               |                                        |                                               |                         |                         |
|                               | x           | y           | z        | x             | y             | Horizontal displacement along the Line | Horizontal displacement perpendicular to Line |                         |                         |
| [m]                           | [m]         | [m]         | [m]      | [mm]          | [mm]          | [mm]                                   | [mm]                                          |                         |                         |
| 0.0                           | 32.90000    | 50.30000    | -0.50000 | 2.8006        | -4.0607       | -4.0303                                | -2.8441                                       |                         |                         |
| 0.93005                       | 32.91000    | 51.23000    | -0.50000 | 2.2091        | -3.9302       | -3.9062                                | -2.2512                                       |                         |                         |
| 1.8601                        | 32.92000    | 52.16000    | -0.50000 | 1.6795        | -3.6291       | -3.6108                                | -1.7185                                       |                         |                         |
| 2.7902                        | 32.93000    | 53.09000    | -0.50000 | 1.4181        | -3.4344       | -3.4189                                | -1.4550                                       |                         |                         |
| 3.7202                        | 32.94000    | 54.02000    | -0.50000 | 1.2265        | -3.2332       | -3.2199                                | -1.2612                                       |                         |                         |
| 4.6503                        | 32.95000    | 54.95000    | -0.50000 | 1.0483        | -2.9780       | -2.9666                                | -1.0803                                       |                         |                         |
| 5.5803                        | 32.96000    | 55.88000    | -0.50000 | 0.88619       | -2.6806       | -2.6709                                | -0.91496                                      |                         |                         |
| 6.5104                        | 32.97000    | 56.81000    | -0.50000 | 0.74029       | -2.3503       | -2.3422                                | -0.76552                                      |                         |                         |
| 7.4404                        | 32.98000    | 57.74000    | -0.50000 | 0.60964       | -1.9945       | -1.9878                                | -0.63105                                      |                         |                         |
| 8.3705                        | 32.99000    | 58.67000    | -0.50000 | 0.49285       | -1.6186       | -1.6132                                | -0.51023                                      |                         |                         |
| 9.3005                        | 33.00000    | 59.60000    | -0.50000 | 0.38840       | -1.2268       | -1.2226                                | -0.40157                                      |                         |                         |
| Structure: G   Sub-structure: |             |             |          |               |               |                                        |                                               |                         |                         |
| Dist.                         | Coordinates |             |          | Displacements |               |                                        |                                               |                         |                         |
|                               | x           | y           | z        | x             | y             | Horizontal displacement along the Line | Horizontal displacement perpendicular to Line |                         |                         |
| [m]                           | [m]         | [m]         | [m]      | [mm]          | [mm]          | [mm]                                   | [mm]                                          |                         |                         |
| 0.0                           | 33.00000    | 59.60000    | -0.50000 | 0.38840       | -1.2268       | -0.38840                               | 1.2268                                        |                         |                         |
| 1.0000                        | 32.00000    | 59.60000    | -0.50000 | 0.42219       | -1.0765       | -0.42219                               | 1.0765                                        |                         |                         |
| 2.0000                        | 31.00000    | 59.60000    | -0.50000 | 0.42846       | -0.90950      | -0.42846                               | 0.90950                                       |                         |                         |
| 3.0000                        | 30.00000    | 59.60000    | -0.50000 | 0.40680       | -0.73136      | -0.40680                               | 0.73136                                       |                         |                         |
| 4.0000                        | 29.00000    | 59.60000    | -0.50000 | 0.35779       | -0.54681      | -0.35779                               | 0.54681                                       |                         |                         |
| 5.0000                        | 28.00000    | 59.60000    | -0.50000 | 0.28274       | -0.35979      | -0.28274                               | 0.35979                                       |                         |                         |
| Structure: H   Sub-structure: |             |             |          |               |               |                                        |                                               |                         |                         |
| Dist.                         | Coordinates |             |          | Displacements |               |                                        |                                               |                         |                         |
|                               | x           | y           | z        | x             | y             | Horizontal displacement along the Line | Horizontal displacement perpendicular to Line |                         |                         |
| [m]                           | [m]         | [m]         | [m]      | [mm]          | [mm]          | [mm]                                   | [mm]                                          |                         |                         |
| 0.0                           | 28.00000    | 59.60000    | -0.50000 | 0.28274       | -0.35979      | 0.37001                                | 0.26923                                       |                         |                         |
| 0.90062                       | 28.03333    | 58.70000    | -0.50000 | 0.44702       | -0.63919      | 0.65529                                | 0.42306                                       |                         |                         |
| 1.8012                        | 28.06667    | 57.80000    | -0.50000 | 0.61872       | -0.89765      | 0.91994                                | 0.58597                                       |                         |                         |
| 2.7019                        | 28.10000    | 56.90000    | -0.50000 | 0.81465       | -1.1492       | 1.1786                                 | 0.77156                                       |                         |                         |

| Structure: 0   Sub-structure: |             |          |          |               |          |                                        |                                               |
|-------------------------------|-------------|----------|----------|---------------|----------|----------------------------------------|-----------------------------------------------|
| Dist.                         | Coordinates |          |          | Displacements |          |                                        |                                               |
|                               | x           | y        | z        | x             | y        | Horizontal displacement along the line | Horizontal displacement perpendicular to line |
|                               | [m]         | [m]      | [m]      | [mm]          | [mm]     | [mm]                                   | [mm]                                          |
|                               | 0.0         | 37.70000 | 52.20000 | -0.68800      | -0.08400 | -7.4949                                | -0.08400                                      |
|                               | 0.9200      | 37.70000 | 51.20000 | -0.68800      | -0.10315 | -8.3544                                | -0.10315                                      |
|                               | 0.940       | 37.70000 | 50.80000 | -0.68800      | -0.12679 | -9.2087                                | -0.12679                                      |



# GEA LIMITED (GEOTECHNICAL & ENV ASSOC)

Rear of 159-163 King's Cross Road, London WC1X 9BN  
Wall Installation and Excavation Combined Issue 4

| Job No.   | Sheet No.   | Rev.    |
|-----------|-------------|---------|
| J16180    |             |         |
| Drg. Ref. |             |         |
| Made by   | Date        | Checked |
|           | 07-Mar-2017 |         |

| Dist.  | Coordinates |          |          | Displacements |         |                                       |
|--------|-------------|----------|----------|---------------|---------|---------------------------------------|
|        | x           | y        | z        | x             | y       |                                       |
|        |             |          |          |               |         | Horizontal displacement along the     |
|        |             |          |          |               |         | Horizontal displacement perpendicular |
| 2.7600 | 37.70000    | 49.44000 | -0.68000 | -0.15765      | -10.074 | 10.074                                |
| 3.6800 | 37.70000    | 48.52000 | -0.68000 | -0.21764      | -11.206 | 11.206                                |
| 4.6000 | 37.70000    | 47.60000 | -0.68000 | -0.29936      | -12.317 | 12.317                                |

Structure: P | Sub-structure: Sub #

| Dist.   | Coordinates |          |          | Displacements |         |                                       |
|---------|-------------|----------|----------|---------------|---------|---------------------------------------|
|         | x           | y        | z        | x             | y       |                                       |
|         |             |          |          |               |         | Horizontal displacement along the     |
|         |             |          |          |               |         | Horizontal displacement perpendicular |
|         | [m]         | [m]      | [m]      | [mm]          | [mm]    | Line to Line                          |
| 0.0     | 45.50000    | 53.30000 | -1.85000 | -0.43954      | -3.8880 | 3.8880                                |
| 0.95000 | 45.50000    | 52.35000 | -1.85000 | -0.53301      | -4.4656 | 4.4656                                |
| 1.9000  | 45.50000    | 51.40000 | -1.85000 | -0.63920      | -5.0148 | 5.0148                                |
| 2.8500  | 45.50000    | 50.45000 | -1.85000 | -0.78337      | -5.5339 | 5.5339                                |
| 3.8000  | 45.50000    | 49.50000 | -1.85000 | -1.0435       | -6.0101 | 6.0101                                |
| 4.7500  | 45.50000    | 48.55000 | -1.85000 | -1.7169       | -6.2873 | 6.2873                                |
| 5.7000  | 45.50000    | 47.60000 | -1.85000 | -8.8453       | -2.3971 | 2.3971                                |

Structure: Q | Sub-structure:

| Dist.   | Coordinates |          |          | Displacements |         |                                       |
|---------|-------------|----------|----------|---------------|---------|---------------------------------------|
|         | x           | y        | z        | x             | y       |                                       |
|         |             |          |          |               |         | Horizontal displacement along the     |
|         |             |          |          |               |         | Horizontal displacement perpendicular |
|         | [m]         | [m]      | [m]      | [mm]          | [mm]    | Line to Line                          |
| 0.0     | 41.90000    | 52.20000 | -0.65000 | -0.50297      | -6.5585 | 6.5585                                |
| 0.92000 | 41.90000    | 51.28000 | -0.65000 | -0.57631      | -7.2432 | 7.2432                                |
| 1.8400  | 41.90000    | 50.36000 | -0.65000 | -0.64645      | -7.8934 | 7.8934                                |
| 2.7600  | 41.90000    | 49.44000 | -0.65000 | -0.76706      | -8.5819 | 8.5819                                |
| 3.6800  | 41.90000    | 48.52000 | -0.65000 | -0.74752      | -9.0616 | 9.0616                                |
| 4.6000  | 41.90000    | 47.60000 | -0.65000 | -0.75374      | -9.5701 | 9.5701                                |

Structure: R | Sub-structure:

| Dist.   | Coordinates |          |          | Displacements |          |                                       |
|---------|-------------|----------|----------|---------------|----------|---------------------------------------|
|         | x           | y        | z        | x             | y        |                                       |
|         |             |          |          |               |          | Horizontal displacement along the     |
|         |             |          |          |               |          | Horizontal displacement perpendicular |
|         | [m]         | [m]      | [m]      | [mm]          | [mm]     | Line to Line                          |
| 0.0     | 33.00000    | 50.30000 | -0.50000 | 2.7857        | -4.1193  | 3.9629                                |
| 0.92635 | 32.95000    | 49.37500 | -0.50000 | 3.4053        | -4.0423  | 3.8526                                |
| 1.8527  | 32.90000    | 48.45000 | -0.50000 | 3.9818        | -3.9928  | 3.7721                                |
| 2.7791  | 32.85000    | 47.52500 | -0.50000 | 5.8894        | -4.0768  | 3.7529                                |
| 3.7054  | 32.80000    | 46.60000 | -0.50000 | 6.1236        | -4.5276  | 4.1905                                |
| 4.6318  | 32.75000    | 45.67500 | -0.50000 | 6.5127        | -4.8929  | 4.5343                                |
| 5.5581  | 32.70000    | 44.75000 | -0.50000 | 7.2247        | -5.0200  | 4.6227                                |
| 6.4845  | 32.65000    | 43.82500 | -0.50000 | 8.6347        | -4.2250  | 3.7528                                |
| 7.4108  | 32.60000    | 42.90000 | -0.50000 | 13.631        | -0.81225 | 0.075306                              |

Structure: S | Sub-structure:

| Dist.  | Coordinates |          |          | Displacements |           |                                       |
|--------|-------------|----------|----------|---------------|-----------|---------------------------------------|
|        | x           | y        | z        | x             | y         |                                       |
|        |             |          |          |               |           | Horizontal displacement along the     |
|        |             |          |          |               |           | Horizontal displacement perpendicular |
|        | [m]         | [m]      | [m]      | [mm]          | [mm]      | Line to Line                          |
| 0.0    | 54.40000    | 58.50000 | -0.50000 | -0.47973      | -0.57462  | 0.17186                               |
| 1.9375 | 55.56250    | 56.95000 | -0.50000 | -0.83517      | -0.57869  | 0.081852                              |
| 3.8750 | 56.72500    | 55.40000 | -0.50000 | -0.75440      | -0.51504  | -0.040609                             |
| 5.8125 | 57.88750    | 53.85000 | -0.50000 | -0.80597      | -0.40018  | -0.16343                              |
| 7.7500 | 59.05000    | 52.30000 | -0.50000 | -0.76786      | -0.26247  | -0.25974                              |
| 9.6875 | 60.21250    | 50.75000 | -0.50000 | -0.66176      | -0.21956  | -0.34141                              |
| 11.625 | 61.37500    | 49.20000 | -0.50000 | -0.59146      | -0.15069  | -0.23432                              |
| 13.562 | 62.53750    | 47.65000 | -0.50000 | -0.32116      | -0.081825 | -0.12724                              |
| 15.500 | 63.70000    | 46.10000 | -0.50000 | -0.050858     | -0.012958 | -0.020149                             |
| 17.438 | 64.86250    | 44.55000 | -0.50000 | 0.0           | 0.0       | 0.0                                   |
| 19.375 | 66.02500    | 43.00000 | -0.50000 | 0.0           | 0.0       | 0.0                                   |
| 21.313 | 67.18750    | 41.45000 | -0.50000 | 0.0           | 0.0       | 0.0                                   |
| 23.250 | 68.35000    | 39.90000 | -0.50000 | 0.0           | 0.0       | 0.0                                   |
| 25.188 | 69.51250    | 38.35000 | -0.50000 | 0.0           | 0.0       | 0.0                                   |
| 27.125 | 70.67500    | 36.80000 | -0.50000 | 0.0           | 0.0       | 0.0                                   |
| 29.063 | 71.83750    | 35.25000 | -0.50000 | 0.0           | 0.0       | 0.0                                   |
| 31.000 | 73.00000    | 33.70000 | -0.50000 | 0.0           | 0.0       | 0.0                                   |

Structure: T | Sub-structure:

| Dist.  | Coordinates |          |          | Displacements |            |                                       |
|--------|-------------|----------|----------|---------------|------------|---------------------------------------|
|        | x           | y        | z        | x             | y          |                                       |
|        |             |          |          |               |            | Horizontal displacement along the     |
|        |             |          |          |               |            | Horizontal displacement perpendicular |
|        | [m]         | [m]      | [m]      | [mm]          | [mm]       | Line to Line                          |
| 0.0    | 45.50000    | 53.30000 | -0.50000 | -0.43954      | -3.8880    | 2.7774                                |
| 1.9859 | 46.73158    | 51.74211 | -0.50000 | -1.6011       | -4.0329    | 2.1708                                |
| 3.9718 | 47.96316    | 50.18421 | -0.50000 | -3.2511       | -3.0740    | 0.39526                               |
| 5.9577 | 49.19474    | 48.62632 | -0.50000 | -4.5965       | -1.2593    | -1.8627                               |
| 7.9436 | 50.42632    | 47.06842 | -0.50000 | -5.3530       | -1.3730    | -2.2427                               |
| 9.9295 | 51.65789    | 45.51053 | -0.50000 | -4.7279       | -1.1991    | -1.9914                               |
| 11.915 | 52.88947    | 43.95263 | -0.50000 | -4.1226       | -1.0457    | -1.7364                               |
| 13.901 | 54.12105    | 42.39474 | -0.50000 | -3.7578       | -0.95702   | -1.5797                               |
| 15.887 | 55.35263    | 40.83684 | -0.50000 | -3.4625       | -0.88218   | -1.4553                               |
| 17.873 | 56.58421    | 39.27895 | -0.50000 | -3.1686       | -0.80730   | -1.3317                               |
| 19.859 | 57.81579    | 37.72185 | -0.50000 | -3.4125       | -0.83957   | -1.4577                               |
| 21.845 | 59.04737    | 36.16316 | -0.50000 | -2.9574       | -0.57131   | -1.3859                               |
| 23.831 | 60.27895    | 34.60526 | -0.50000 | -2.4584       | -0.47491   | -1.1520                               |
| 25.817 | 61.51053    | 33.04737 | -0.50000 | -1.9629       | -0.37920   | -0.91984                              |
| 27.803 | 62.74211    | 31.48947 | -0.50000 | -1.5685       | -0.30300   | -0.73502                              |
| 29.789 | 63.97368    | 29.93158 | -0.50000 | -1.2321       | -0.23801   | -0.57736                              |
| 31.774 | 65.20526    | 28.37368 | -0.50000 | -0.46406      | -0.054490  | -0.24504                              |
| 33.760 | 66.43684    | 26.81579 | -0.50000 | -0.23956      | -0.0031644 | -0.14609                              |
| 35.746 | 67.66842    | 25.25789 | -0.50000 | 0.0           | 0.0        | 0.0                                   |
| 37.732 | 68.90000    | 23.70000 | -0.50000 | 0.0           | 0.0        | 0.0                                   |

Structure: U | Sub-structure:

| Dist.   | Coordinates |          |          | Displacements |           |                                       |
|---------|-------------|----------|----------|---------------|-----------|---------------------------------------|
|         | x           | y        | z        | x             | y         |                                       |
|         |             |          |          |               |           | Horizontal displacement along the     |
|         |             |          |          |               |           | Horizontal displacement perpendicular |
|         | [m]         | [m]      | [m]      | [mm]          | [mm]      | Line to Line                          |
| 0.0     | 63.00000    | 47.00000 | -0.50000 | -0.21661      | -0.055188 | 0.20657                               |
| 0.98600 | 62.10000    | 46.10000 | -0.50000 | -0.54774      | -0.13955  | 0.52236                               |
| 1.9720  | 61.20000    | 45.20000 | -0.50000 | -0.87886      | -0.22392  | 0.83814                               |
| 2.9580  | 60.30000    | 44.30000 | -0.50000 | -1.2100       | -0.30828  | 1.1539                                |
| 3.9440  | 59.40000    | 43.40000 | -0.50000 | -1.5411       | -0.39265  | 1.4697                                |
| 4.9300  | 58.50000    | 42.50000 | -0.50000 | -1.8722       | -0.47701  | 1.7855                                |



# GEA LIMITED (GEOTECHNICAL & ENV ASSOC)

Rear of 159-163 King's Cross Road, London WC1X 9BN  
Wall Installation and Excavation Combined Issue 4

| Job No.   | Sheet No.           | Rev.    |
|-----------|---------------------|---------|
| J16180    |                     |         |
| Drg. Ref. |                     |         |
| Made by   | Date<br>07-Mar-2017 | Checked |

| Dist.  | Coordinates |          |          | Displacements |          |                                                                                 |
|--------|-------------|----------|----------|---------------|----------|---------------------------------------------------------------------------------|
|        | x           | y        | z        | x             | y        | Horizontal displacement along the line<br>Horizontal displacement perpendicular |
| 5.9160 | 58.26000    | 43.46000 | -0.50000 | -2.2034       | -0.56137 | 2.1013                                                                          |
| 6.9020 | 57.47000    | 42.87000 | -0.50000 | -2.5345       | -0.64574 | 2.4171                                                                          |
| 7.8880 | 56.68000    | 42.28000 | -0.50000 | -2.8656       | -0.73010 | 2.7329                                                                          |
| 8.8740 | 55.89000    | 41.69000 | -0.50000 | -3.1967       | -0.81447 | 3.0486                                                                          |
| 9.8600 | 55.10000    | 41.10000 | -0.50000 | -3.5279       | -0.89883 | 3.3644                                                                          |

Structure: V | Sub-structure:

| Dist.   | Coordinates |          |          | Displacements |          |                                                                                 |
|---------|-------------|----------|----------|---------------|----------|---------------------------------------------------------------------------------|
|         | x           | y        | z        | x             | y        | Horizontal displacement along the line<br>Horizontal displacement perpendicular |
| [m]     | [m]         | [m]      | [m]      | [mm]          | [mm]     | [mm]                                                                            |
| 0.0     | 55.10000    | 41.10000 | -0.50000 | -3.5279       | -0.89883 | 3.3539                                                                          |
| 0.91001 | 54.37500    | 40.55000 | -0.50000 | -3.8325       | -0.97645 | 3.6435                                                                          |
| 1.8200  | 53.65000    | 40.00000 | -0.50000 | -4.2615       | -1.0857  | 4.0513                                                                          |
| 2.7300  | 52.92500    | 39.45000 | -0.50000 | -4.8369       | -1.2324  | 4.5984                                                                          |
| 3.6401  | 52.20000    | 38.90000 | -0.50000 | -5.4124       | -1.3790  | 5.1454                                                                          |

Structure: W | Sub-structure:

| Dist.   | Coordinates |          |          | Displacements |         |                                                                                 |
|---------|-------------|----------|----------|---------------|---------|---------------------------------------------------------------------------------|
|         | x           | y        | z        | x             | y       | Horizontal displacement along the line<br>Horizontal displacement perpendicular |
| [m]     | [m]         | [m]      | [m]      | [mm]          | [mm]    | [mm]                                                                            |
| 0.0     | 52.20000    | 38.90000 | -1.70000 | -5.4124       | -1.3790 | -2.2344                                                                         |
| 0.57009 | 52.55000    | 38.45000 | -1.70000 | -5.2558       | -1.3391 | -2.1698                                                                         |
| 1.1402  | 52.90000    | 38.00000 | -1.70000 | -5.0993       | -1.2992 | -2.1051                                                                         |

Structure: X | Sub-structure:

| Dist.   | Coordinates |          |          | Displacements |           |                                                                                 |
|---------|-------------|----------|----------|---------------|-----------|---------------------------------------------------------------------------------|
|         | x           | y        | z        | x             | y         | Horizontal displacement along the line<br>Horizontal displacement perpendicular |
| [m]     | [m]         | [m]      | [m]      | [mm]          | [mm]      | [mm]                                                                            |
| 0.0     | 66.40000    | 42.50000 | -0.50000 | 0.0           | 0.0       | 0.0                                                                             |
| 0.97201 | 65.62000    | 41.92000 | -0.50000 | 0.0           | 0.0       | 0.0                                                                             |
| 1.9440  | 64.84000    | 41.34000 | -0.50000 | -0.076477     | -0.019485 | 0.072997                                                                        |
| 2.9160  | 64.06000    | 40.76000 | -0.50000 | -0.40318      | -0.10272  | 0.38484                                                                         |
| 3.8880  | 63.28000    | 40.18000 | -0.50000 | -0.72866      | -0.18462  | 0.69488                                                                         |
| 4.8600  | 62.50000    | 39.60000 | -0.50000 | -1.0578       | -0.26825  | 1.0041                                                                          |
| 5.8320  | 61.72000    | 39.02000 | -0.50000 | -1.3841       | -0.34852  | 1.3138                                                                          |
| 6.8041  | 60.94000    | 38.44000 | -0.50000 | -1.6923       | -0.41826  | 1.6028                                                                          |
| 7.7761  | 60.16000    | 37.86000 | -0.50000 | -2.1506       | -0.44987  | 1.9942                                                                          |
| 8.7481  | 59.38000    | 37.28000 | -0.50000 | -2.6627       | -0.51439  | 2.4437                                                                          |
| 9.7201  | 58.60000    | 36.70000 | -0.50000 | -3.1431       | -0.60718  | 2.8845                                                                          |

Structure: Y | Sub-structure:

| Dist.   | Coordinates |          |          | Displacements |          |                                                                                 |
|---------|-------------|----------|----------|---------------|----------|---------------------------------------------------------------------------------|
|         | x           | y        | z        | x             | y        | Horizontal displacement along the line<br>Horizontal displacement perpendicular |
| [m]     | [m]         | [m]      | [m]      | [mm]          | [mm]     | [mm]                                                                            |
| 0.0     | 58.60000    | 36.70000 | -1.40000 | -3.1431       | -0.60718 | 2.8710                                                                          |
| 0.91001 | 57.87500    | 36.15000 | -1.40000 | -3.5965       | -0.69478 | 3.2852                                                                          |
| 1.8200  | 57.15000    | 35.60000 | -1.40000 | -4.0576       | -0.78384 | 3.7064                                                                          |
| 2.7300  | 56.42500    | 35.05000 | -1.40000 | -4.5281       | -0.87474 | 4.1362                                                                          |
| 3.6401  | 55.70000    | 34.50000 | -1.40000 | -5.0099       | -0.96783 | 4.5763                                                                          |

Structure: Z | Sub-structure:

| Dist.   | Coordinates |          |          | Displacements |           |                                                                                 |
|---------|-------------|----------|----------|---------------|-----------|---------------------------------------------------------------------------------|
|         | x           | y        | z        | x             | y         | Horizontal displacement along the line<br>Horizontal displacement perpendicular |
| [m]     | [m]         | [m]      | [m]      | [mm]          | [mm]      | [mm]                                                                            |
| 0.0     | 69.70000    | 38.10000 | -0.50000 | 0.0           | 0.0       | 0.0                                                                             |
| 0.95802 | 68.93000    | 37.53000 | -0.50000 | 0.0           | 0.0       | 0.0                                                                             |
| 1.9160  | 68.16000    | 36.96000 | -0.50000 | 0.0           | 0.0       | 0.0                                                                             |
| 2.8741  | 67.39000    | 36.39000 | -0.50000 | 0.0           | 0.0       | 0.0                                                                             |
| 3.8321  | 66.62000    | 35.82000 | -0.50000 | 0.0           | 0.0       | 0.0                                                                             |
| 4.7901  | 65.85000    | 35.25000 | -0.50000 | -0.18234      | -0.035224 | 0.16751                                                                         |
| 5.7481  | 65.08000    | 34.68000 | -0.50000 | -0.50051      | -0.096689 | 0.45981                                                                         |
| 6.7061  | 64.31000    | 34.11000 | -0.50000 | -0.81867      | -0.15815  | 0.75210                                                                         |
| 7.6642  | 63.54000    | 33.54000 | -0.50000 | -1.1368       | -0.21962  | 1.0444                                                                          |
| 8.6222  | 62.77000    | 32.97000 | -0.50000 | -1.4550       | -0.28198  | 1.3367                                                                          |
| 9.5802  | 62.00000    | 32.40000 | -0.50000 | -1.7732       | -0.34255  | 1.6290                                                                          |

Structure: AA | Sub-structure:

| Dist.   | Coordinates |          |          | Displacements |          |                                                                                 |
|---------|-------------|----------|----------|---------------|----------|---------------------------------------------------------------------------------|
|         | x           | y        | z        | x             | y        | Horizontal displacement along the line<br>Horizontal displacement perpendicular |
| [m]     | [m]         | [m]      | [m]      | [mm]          | [mm]     | [mm]                                                                            |
| 0.0     | 62.00000    | 32.40000 | -1.40000 | -1.7732       | -0.34255 | 1.6491                                                                          |
| 0.91549 | 61.25000    | 31.87500 | -1.40000 | -2.2219       | -0.42923 | 2.0664                                                                          |
| 1.8310  | 60.50000    | 31.35000 | -1.40000 | -2.6764       | -0.51704 | 2.4691                                                                          |
| 2.7455  | 59.75000    | 30.82500 | -1.40000 | -3.1349       | -0.60561 | 2.9155                                                                          |
| 3.6620  | 59.00000    | 30.30000 | -1.40000 | -3.5993       | -0.69532 | 3.3474                                                                          |

Structure: AB | Sub-structure:

| Dist.   | Coordinates |          |          | Displacements |           |                                                                                 |
|---------|-------------|----------|----------|---------------|-----------|---------------------------------------------------------------------------------|
|         | x           | y        | z        | x             | y         | Horizontal displacement along the line<br>Horizontal displacement perpendicular |
| [m]     | [m]         | [m]      | [m]      | [mm]          | [mm]      | [mm]                                                                            |
| 0.0     | 73.00000    | 33.70000 | -0.50000 | 0.0           | 0.0       | 0.0                                                                             |
| 0.94626 | 72.23000    | 33.15000 | -0.50000 | 0.0           | 0.0       | 0.0                                                                             |
| 1.8925  | 71.46000    | 32.60000 | -0.50000 | 0.0           | 0.0       | 0.0                                                                             |
| 2.8388  | 70.69000    | 32.05000 | -0.50000 | 0.0           | 0.0       | 0.0                                                                             |
| 3.7850  | 69.92000    | 31.50000 | -0.50000 | 0.0           | 0.0       | 0.0                                                                             |
| 4.7313  | 69.15000    | 30.95000 | -0.50000 | 0.0           | 0.0       | 0.0                                                                             |
| 5.6775  | 68.38000    | 30.40000 | -0.50000 | 0.0           | 0.0       | 0.0                                                                             |
| 6.6238  | 67.61000    | 29.85000 | -0.50000 | 0.0           | 0.0       | 0.0                                                                             |
| 7.5700  | 66.84000    | 29.30000 | -0.50000 | -0.12564      | -0.020264 | 0.11401                                                                         |
| 8.5163  | 66.07000    | 28.75000 | -0.50000 | -0.28012      | -0.038923 | 0.25789                                                                         |
| 9.4626  | 65.30000    | 28.20000 | -0.50000 | -0.44864      | -0.047225 | 0.39252                                                                         |

**Rear of 159-163 King's Cross Road, London WC1X 9BN**  
Wall Installation and Excavation Combined Issue 4

| Dist.                          | Coordinates |          |          | Displacements |          |                                                                         |
|--------------------------------|-------------|----------|----------|---------------|----------|-------------------------------------------------------------------------|
|                                | x           | y        | z        | x             | y        | Horizontal displacement along the horizontal displacement perpendicular |
| Structure: AC   Sub-structure: |             |          |          |               |          |                                                                         |
| Dist.                          | Coordinates |          |          | Displacements |          |                                                                         |
|                                | x           | y        | z        | x             | y        | Horizontal displacement along the horizontal displacement perpendicular |
|                                |             |          |          |               |          | Line to Line                                                            |
|                                | [m]         |          | [m]      |               | [mm]     | [mm]                                                                    |
|                                | 0. 65       | 30000    | 28.70000 | -0.50000      | -0.44864 | 0.38995                                                                 |
|                                | 0.84673     | 64.61667 | 27.70000 | -0.50000      | -0.58604 | -0.22681                                                                |
|                                | 1.6935      | 63.93333 | 27.20000 | -0.50000      | -0.71813 | -0.31922                                                                |
|                                | 3.5869      | 63.25000 | 26.70000 | -0.50000      | -0.84357 | -0.39893                                                                |
|                                | 3.5869      | 62.56667 | 26.20000 | -0.50000      | -1.01114 | -0.49296                                                                |
|                                | 4.2336      | 61.88333 | 25.70000 | -0.50000      | -1.2335  | -0.62344                                                                |
|                                | 5.0804      | 61.20000 | 25.20000 | -0.50000      | -1.4380  | -0.80401                                                                |
|                                |             |          |          |               |          | 1.0534                                                                  |
|                                |             |          |          |               |          | -0.99553                                                                |

| Structure: AD   Sub-structure: |             |          |          |          |               |         |                                        |                                               |  |
|--------------------------------|-------------|----------|----------|----------|---------------|---------|----------------------------------------|-----------------------------------------------|--|
| Dist.                          | Coordinates |          |          | z        | Displacements |         | Horizontal displacement along the Line | Horizontal displacement perpendicular to Line |  |
|                                | x           | y        |          |          | x             | y       |                                        |                                               |  |
|                                | [m]         | [m]      | [m]      | [mm]     | [mm]          | [mm]    | [mm]                                   | [mm]                                          |  |
| 0                              | 0           | 61.20000 | 25.29000 | -1.46000 | -1.4380       | 0.18137 | 1.4494                                 | 0.0029653                                     |  |
| 0.96298                        | 60.22500    | 25.32500 | -1.46000 | -1.7951  | 0.22665       | 1.8093  | 0.0040583                              |                                               |  |
| 1.2560                         | 59.25000    | 25.45000 | -1.46000 | -2.1609  | 0.27159       | 2.1779  | 0.0054057                              |                                               |  |
| 2.9480                         | 58.27500    | 25.57500 | -1.46000 | -2.5386  | 0.31389       | 2.5645  | 0.0071809                              |                                               |  |
| 3.9319                         | 57.30000    | 25.70000 | -1.46000 | -2.9317  | 0.36646       | 2.9545  | 0.0093202                              |                                               |  |
| 4.9149                         | 56.32500    | 25.82500 | -1.46000 | -3.3435  | 0.41626       | 3.3693  | 0.012294                               |                                               |  |
| 5.8979                         | 55.35000    | 25.95000 | -1.46000 | -3.7775  | 0.46769       | 3.8063  | 0.016469                               |                                               |  |
| 6.8809                         | 54.37500    | 26.07500 | -1.46000 | -4.2372  | 0.52035       | 4.2689  | 0.022687                               |                                               |  |
| 7.8639                         | 53.40000    | 26.20000 | -1.46000 | -4.7268  | 0.57305       | 4.7613  | 0.030279                               |                                               |  |

| Structure: AE   Sub-structure: |             |           |           |               |         |                                        |                                                   |
|--------------------------------|-------------|-----------|-----------|---------------|---------|----------------------------------------|---------------------------------------------------|
| Dist.                          | Coordinates |           | z         | Displacements |         | Horizontal displacement along the Line | Horizontal displacement perpendicular to the Line |
|                                | x           | y         |           | x             | y       |                                        |                                                   |
| [m]                            | [m]         | [m]       | [m]       | [mm]          | [mm]    | [mm]                                   | [mm]                                              |
| 0                              | 61.190800   | 25.190800 | -0.590000 | -1.4380       | 0.18137 | -0.094046                              | -1.4463                                           |
| 0.82651                        | 61.180000   | 24.375000 | -0.590000 | -1.3668       | 0.27522 | -0.19203                               | -1.3810                                           |
| 1.6530                         | 61.180000   | 23.550000 | -0.590000 | -1.2713       | 0.35250 | -0.27494                               | -1.2903                                           |
| 2.4795                         | 61.050000   | 22.725000 | -0.590000 | -1.1559       | 0.40906 | -0.33838                               | -1.1786                                           |
| 3.0961                         | 61.000000   | 22.500000 | -0.590000 | -1.0255       | 0.45800 | -0.39610                               | -1.1263                                           |

| Structure: AF   Sub-structure: |             |          |          |           |        |         |                                        |                                               |
|--------------------------------|-------------|----------|----------|-----------|--------|---------|----------------------------------------|-----------------------------------------------|
| Dist.                          | Coordinates |          |          | z         | y      | x       | Displacements                          |                                               |
|                                | x           | y        |          |           |        |         | Horizontal displacement along the line | Horizontal displacement perpendicular to line |
| [m]                            | [m]         | [m]      | [-m]     | [mm]      | [mm]   | [mm]    | [mm]                                   | [mm]                                          |
| 0.0                            | 50.30800    | 25.50800 | -1.45800 | -5.5641   | 2.8224 | -2.2814 | 5.9028                                 |                                               |
| 0.80351                        | 50.22500    | 25.70800 | -1.46600 | -0.95231  | 6.1375 | -6.8219 | -1.5210                                |                                               |
| 1.6075                         | 50.15000    | 24.90800 | -1.46600 | -0.27474  | 5.8229 | -5.7718 | -0.81705                               |                                               |
| 2.4105                         | 50.07500    | 24.10800 | -1.46800 | -0.044953 | 5.4068 | -5.3798 | -0.54914                               |                                               |
| 3.2140                         | 50.00000    | 23.30800 | -1.46800 | 0.023233  | 5.0066 | -5.0067 | -0.09339                               |                                               |

| Structure: AG   Sub-structure: |             |          |          |               |          |                                        |                                               |  |  |
|--------------------------------|-------------|----------|----------|---------------|----------|----------------------------------------|-----------------------------------------------|--|--|
| Dist.                          | Coordinates |          |          | Displacements |          |                                        |                                               |  |  |
|                                | x           | y        | z        | x             | y        | Horizontal displacement along the Line | Horizontal displacement perpendicular to Line |  |  |
|                                | [m]         | [m]      | [m]      | [mm]          | [mm]     | [mm]                                   | [mm]                                          |  |  |
| 0.0                            | 50.00000    | 23.30000 | -0.50000 | 0.002335      | 4.38666  | -0.57817                               | 4.9534                                        |  |  |
| 1.9046                         | 51.88889    | 23.05556 | -0.50000 | -1.90606      | 3.77728  | -2.3745                                | 3.4969                                        |  |  |
| 3.8093                         | 53.77778    | 22.81111 | -0.50000 | -2.3840       | 2.45668  | -2.6794                                | 2.1297                                        |  |  |
| 5.7139                         | 55.66667    | 22.56667 | -0.50000 | -2.2879       | 1.6577   | -2.4817                                | 1.3503                                        |  |  |
| 7.6186                         | 57.55556    | 22.32222 | -0.50000 | -1.9329       | 1.1098   | -2.0922                                | 0.85179                                       |  |  |
| 9.5232                         | 59.44444    | 22.07778 | -0.50000 | -1.4572       | 0.70519  | -1.5366                                | 0.51235                                       |  |  |
| 11.428                         | 61.33333    | 21.83333 | -0.50000 | -0.92414      | 0.39214  | -0.9663                                | 0.27029                                       |  |  |
| 13.332                         | 63.22222    | 21.58889 | -0.50000 | -0.56337      | 0.21514  | -0.58633                               | 0.14106                                       |  |  |
| 15.237                         | 65.11111    | 21.34444 | -0.50000 | -0.27396      | 0.095917 | -0.28401                               | 0.059633                                      |  |  |
| 17.142                         | 67.00000    | 21.10000 | -0.50000 | 0.0           | 0.0      | 0.0                                    | 0.0                                           |  |  |

| Structure: AH   Sub-structure: |             |          |          |          |               |                                        |                                               |          |  |
|--------------------------------|-------------|----------|----------|----------|---------------|----------------------------------------|-----------------------------------------------|----------|--|
| Dist.                          | Coordinates |          |          |          | Displacements |                                        |                                               |          |  |
|                                | x           | y        | z        | x        | y             | Horizontal displacement along the Line | Horizontal displacement perpendicular to Line |          |  |
|                                | [m]         | [mm]     | [m]      | [m]      | [mm]          | [mm]                                   |                                               |          |  |
|                                | 0.0         | 59.08000 | 20.78000 | -0.50000 | -1.2213       | 0.80960                                | 1.3032                                        | -0.66978 |  |
| 0.90554                        | 58.10800    | 20.80000 | -0.50000 | -1.3947  | 1.0111        | 1.4978                                 | -0.85094                                      |          |  |
| 1.8111                         | 57.20600    | 20.80000 | -0.50000 | -1.5381  | 1.2348        | 1.6650                                 | -1.0574                                       |          |  |
| 2.7166                         | 56.30000    | 21.00000 | -0.50000 | -1.6415  | 1.4827        | 1.7952                                 | -1.2923                                       |          |  |
| 3.6222                         | 55.40800    | 21.10000 | -0.50000 | -1.7269  | 1.7911        | 1.9332                                 | -1.5896                                       |          |  |
| 4.5277                         | 54.50000    | 21.20000 | -0.50000 | -1.7623  | 2.1628        | 1.9969                                 | -1.9593                                       |          |  |
| 5.4332                         | 53.60000    | 21.30000 | -0.50000 | -1.7049  | 2.5817        | 1.9730                                 | -2.3776                                       |          |  |
| 6.3388                         | 52.70000    | 21.40000 | -0.50000 | -1.5172  | 3.0344        | 1.8436                                 | -2.8483                                       |          |  |

| Structure: AI   Sub-structure: Sub # |             |           |           |           |               |                                   |                                          |          |         |
|--------------------------------------|-------------|-----------|-----------|-----------|---------------|-----------------------------------|------------------------------------------|----------|---------|
| Dist.                                | Coordinates |           |           | z         | Displacements |                                   |                                          |          |         |
|                                      | x           | y         | x         |           | y             | Horizontal displacement along the | Horizontal displacement perpendicular to | Line     |         |
|                                      |             |           |           |           |               |                                   |                                          | Line     | to Line |
|                                      | [m]         | [mm]      | [m]       | [mm]      | [mm]          | [mm]                              | [mm]                                     | [mm]     | [mm]    |
| 0                                    | 0           | 52.708000 | 21.408000 | -0.508000 | -1.5172       | 0.0344                            | -2.7837                                  | -1.9392  |         |
| 0.97015                              | 52.560000   | 20.440000 | -0.508000 | -1.1492   | 2.8778        |                                   | -2.6818                                  | -1.5525  |         |
| 1.9493                               | 52.426000   | 19.480000 | -0.508000 | -0.86356  | 2.8582        |                                   | -2.4879                                  | -1.2370  |         |
| 2.9195                               | 52.289000   | 18.520000 | -0.508000 | -0.64269  | 2.8321        |                                   | -2.2985                                  | -0.8781  |         |
| 3.8896                               | 52.149000   | 17.560000 | -0.508000 | -0.47174  | 2.0995        |                                   | -2.0995                                  | -0.76848 |         |
| 4.8598                               | 52.008000   | 16.600000 | -0.508000 | -0.33914  | 1.7850        |                                   | -1.7173                                  | -0.59318 |         |

| <b>Structure:</b> AJ   Sub-structure: Sub # |                    |       |       |        |                      |                                                                     |
|---------------------------------------------|--------------------|-------|-------|--------|----------------------|---------------------------------------------------------------------|
| <b>Dist.</b>                                | <b>Coordinates</b> |       |       |        | <b>Displacements</b> |                                                                     |
|                                             | x                  | y     | z     | x      | y                    |                                                                     |
|                                             |                    |       |       |        |                      | <b>Horizontal displacement along the line perpendicular to Line</b> |
|                                             | [m]                | [m]   | [m]   | [mm]   | [mm]                 | <b>to Line</b>                                                      |
| AJ -> Sub                                   | -0.869             | 0.000 | 0.000 | -0.000 | 0.000                | 0.000                                                               |



# GEA LIMITED (GEOTECHNICAL & ENV ASSOC)

Rear of 159-163 King's Cross Road, London WC1X 9BN  
Wall Installation and Excavation Combined Issue 4

| Job No.   | Sheet No.           | Rev.    |
|-----------|---------------------|---------|
| J16180    |                     |         |
| Drg. Ref. |                     |         |
| Made by   | Date<br>07-Mar-2017 | Checked |

| Dist.   | Coordinates |          |          | Displacements |        |                                       |         |
|---------|-------------|----------|----------|---------------|--------|---------------------------------------|---------|
|         | x           | y        | z        | x             | y      |                                       |         |
|         |             |          |          |               |        | Horizontal displacement along the     |         |
|         |             |          |          |               |        | Horizontal displacement perpendicular |         |
| 0.0     | 52.00000    | 16.60000 | -0.50000 | -0.33914      | 1.7850 | 0.55553                               | -1.7299 |
| 0.99641 | 51.01111    | 16.72222 | -0.50000 | -0.17932      | 1.9441 | 0.41643                               | -1.9074 |
| 1.9928  | 50.02222    | 16.84444 | -0.50000 | 0.016393      | 2.0561 | 0.23594                               | -2.0426 |
| 2.9892  | 49.03333    | 16.96667 | -0.50000 | 0.23374       | 2.1110 | 0.026961                              | -2.1237 |
| 3.9857  | 48.04444    | 17.08889 | -0.50000 | 0.46837       | 3.4867 | -0.037148                             | -3.5179 |
| 4.9821  | 47.05556    | 17.21111 | -0.50000 | 0.46757       | 3.4808 | 0.037077                              | -3.5119 |
| 5.9785  | 46.06667    | 17.33333 | -0.50000 | 0.45143       | 3.4992 | -0.018797                             | -3.5282 |
| 6.9749  | 45.07778    | 17.45556 | -0.50000 | 0.41344       | 3.5613 | 0.026526                              | -3.5851 |
| 7.9713  | 44.08889    | 17.57778 | -0.50000 | 0.37953       | 3.6326 | 0.068919                              | -3.6517 |
| 8.9677  | 43.10000    | 17.70000 | -0.50000 | 0.35181       | 3.7127 | 0.10626                               | -3.7278 |

Structure: AK | Sub-structure: Sub #

| Dist.   | Coordinates |          |          | Displacements |        |                                               |
|---------|-------------|----------|----------|---------------|--------|-----------------------------------------------|
|         | x           | y        | z        | x             | y      |                                               |
|         |             |          |          |               |        | Horizontal displacement along the Line        |
|         |             |          |          |               |        | Horizontal displacement perpendicular to Line |
| [m]     | [m]         | [m]      | [m]      | [mm]          | [mm]   | [mm]                                          |
| 0.0     | 43.10000    | 17.70000 | -0.50000 | 0.35181       | 3.7127 | 3.7252                                        |
| 0.98995 | 43.24000    | 18.60000 | -0.50000 | 0.37498       | 4.3600 | 4.3692                                        |
| 1.9799  | 43.38000    | 19.60000 | -0.50000 | 0.39968       | 5.0022 | 5.0084                                        |
| 2.9698  | 43.52000    | 20.64000 | -0.50000 | 0.42833       | 5.6404 | 5.6443                                        |
| 3.9598  | 43.66000    | 21.62000 | -0.50000 | 0.46421       | 6.2758 | 6.2799                                        |
| 4.9497  | 43.80000    | 22.60000 | -0.50000 | 0.51166       | 6.9099 | 6.9128                                        |

Structure: AL | Sub-structure: Sub #

| Dist.   | Coordinates |          |          | Displacements |        |                                               |
|---------|-------------|----------|----------|---------------|--------|-----------------------------------------------|
|         | x           | y        | z        | x             | y      |                                               |
|         |             |          |          |               |        | Horizontal displacement along the Line        |
|         |             |          |          |               |        | Horizontal displacement perpendicular to line |
|         | [m]         | [m]      | [m]      | [m]           | [mm]   | [mm]                                          |
| 0.0     | 43.80000    | 22.60000 | -0.50000 | 0.51166       | 6.9099 | 0.36748                                       |
| 0.94763 | 42.86000    | 22.72000 | -0.50000 | 0.46600       | 7.0414 | 0.42943                                       |
| 1.8953  | 41.92000    | 22.84000 | -0.50000 | 0.43271       | 7.1985 | 0.48234                                       |
| 2.8429  | 40.98000    | 22.96000 | -0.50000 | 0.41980       | 7.3821 | 0.51839                                       |
| 3.7905  | 40.04000    | 23.08000 | -0.50000 | 0.43705       | 7.5906 | 0.52768                                       |
| 4.7381  | 39.10000    | 23.20000 | -0.50000 | 0.49513       | 7.8186 | 0.49894                                       |

Structure: AM | Sub-structure: Sub #

| Dist.   | Coordinates |          |          | Displacements |        |                                                                                         |
|---------|-------------|----------|----------|---------------|--------|-----------------------------------------------------------------------------------------|
|         | x           | y        | z        | x             | y      |                                                                                         |
|         |             |          |          |               |        | Horizontal displacement along the line<br>Horizontal displacement perpendicular to line |
|         | [m]         | [m]      | [m]      | [mm]          | [mm]   |                                                                                         |
| 0.0     | 39.10000    | 23.20000 | -0.50000 | 0.49513       | 7.8186 | -7.8338<br>-0.083792                                                                    |
| 0.98247 | 39.03333    | 22.30000 | -0.50000 | 0.48226       | 7.1464 | -7.1625<br>-0.046971                                                                    |
| 1.8049  | 38.96667    | 21.40000 | -0.50000 | 0.46387       | 6.4745 | -6.4910<br>0.015682                                                                     |
| 2.7074  | 38.90000    | 20.50000 | -0.50000 | 0.44038       | 5.8046 | -5.8213<br>0.010377                                                                     |

Structure: AN | Sub-structure: Sub #

| Dist.   | Coordinates |          |          | Displacements |        |                                               |
|---------|-------------|----------|----------|---------------|--------|-----------------------------------------------|
|         | x           | y        | z        | x             | y      |                                               |
|         |             |          |          |               |        | Horizontal displacement along the Line        |
|         |             |          |          |               |        | Horizontal displacement perpendicular to Line |
|         | [m]         | [m]      | [m]      | [mm]          | [mm]   | [mm]                                          |
| 0.0     | 38.90000    | 20.50000 | -0.50000 | 0.44038       | 5.8046 | 0.43416                                       |
| 0.83442 | 38.07500    | 20.62500 | -0.50000 | 0.50216       | 5.9454 | 0.39416                                       |
| 1.6688  | 37.25000    | 20.75000 | -0.50000 | 0.58497       | 6.0798 | 0.33242                                       |
| 2.5032  | 36.42500    | 20.87500 | -0.50000 | 0.68791       | 6.2020 | 0.24095                                       |
| 3.3377  | 35.60000    | 21.00000 | -0.50000 | 0.70488       | 5.1514 | 0.074780                                      |

Structure: AO | Sub-structure: Sub #

| Dist.   | Coordinates |          |          | Displacements |        |                                                   |                                                          |
|---------|-------------|----------|----------|---------------|--------|---------------------------------------------------|----------------------------------------------------------|
|         | x           | y        | z        | x             | y      |                                                   |                                                          |
|         |             |          |          |               |        | Horizontal displacement along the<br>Line<br>[mm] | Horizontal displacement perpendicular to<br>Line<br>[mm] |
|         | [m]         | [m]      | [m]      | [mm]          | [mm]   |                                                   |                                                          |
| 0.0     | 35.60000    | 21.00000 | -0.50000 | 0.70488       | 5.1514 | 5.1987                                            | -0.086096                                                |
| 0.83931 | 35.70000    | 21.83333 | -0.50000 | 0.79949       | 5.7524 | 5.8066                                            | -0.10843                                                 |
| 1.6786  | 35.80000    | 22.66667 | -0.50000 | 0.90292       | 6.3651 | 6.4273                                            | -0.13812                                                 |
| 2.5179  | 35.90000    | 23.50000 | -0.50000 | 1.0192        | 6.9901 | 7.0617                                            | -0.17909                                                 |

Structure: AP | Sub-structure: Sub #

| Dist.   | Coordinates |          |          | Displacements |        |                                               |         |
|---------|-------------|----------|----------|---------------|--------|-----------------------------------------------|---------|
|         | x           | y        | z        | x             | y      |                                               |         |
|         |             |          |          |               |        | Horizontal displacement along the Line        |         |
|         |             |          |          |               |        | Horizontal displacement perpendicular to Line |         |
|         | [m]         | [m]      | [m]      | [m]           | [mm]   | [mm]                                          |         |
| 0.0     | 35.90000    | 23.50000 | -0.50000 | 1.0192        | 6.9901 | 0.091724                                      | -7.0634 |
| 0.89107 | 35.02000    | 23.64000 | -0.50000 | 1.9773        | 7.8159 | -0.72475                                      | -8.0295 |
| 1.7821  | 34.14000    | 23.78000 | -0.50000 | 2.5527        | 7.2541 | -1.3813                                       | -7.5651 |
| 2.6732  | 33.26000    | 23.92000 | -0.50000 | 2.9032        | 6.6463 | -1.8229                                       | -7.0198 |
| 3.5643  | 32.38000    | 24.06000 | -0.50000 | 3.0540        | 6.0677 | -2.0627                                       | -6.4722 |
| 4.4553  | 31.50000    | 24.20000 | -0.50000 | 3.0230        | 4.4851 | -2.2808                                       | -4.9043 |

Structure: AQ | Sub-structure: Sub #

| Dist.   | Coordinates |          |          | Displacements |        |                                               |
|---------|-------------|----------|----------|---------------|--------|-----------------------------------------------|
|         | x           | y        | z        | x             | y      |                                               |
|         |             |          |          |               |        | Horizontal displacement along the Line        |
|         |             |          |          |               |        | Horizontal displacement perpendicular to Line |
| [m]     | [m]         | [m]      | [m]      | [mm]          | [mm]   | [mm]                                          |
| 0.0     | 31.50000    | 24.20000 | -0.50000 | 3.0230        | 4.4851 | -4.8675                                       |
| 0.98995 | 31.36000    | 23.22000 | -0.50000 | 2.5478        | 4.2473 | -4.5650                                       |
| 1.9799  | 31.22000    | 22.24000 | -0.50000 | 2.1543        | 3.9437 | -4.2088                                       |
| 2.9698  | 31.08000    | 21.26000 | -0.50000 | 1.7944        | 3.5608 | -3.7788                                       |
| 3.9598  | 30.94000    | 20.28000 | -0.50000 | 1.4675        | 3.1204 | -3.2966                                       |
| 4.9497  | 30.80000    | 19.30000 | -0.50000 | 1.1701        | 2.6379 | -2.7769                                       |
|         |             |          |          |               |        | 0.78527                                       |

Structure: AR | Sub-structure: Sub #

| Dist. | Coordinates |          |          | Displacements |         |                                        |                                               |
|-------|-------------|----------|----------|---------------|---------|----------------------------------------|-----------------------------------------------|
|       | x           | y        | z        | x             | y       | Horizontal displacement along the line | Horizontal displacement perpendicular to line |
|       | [m]         | [m]      | [m]      | [m]           | [mm]    | [mm]                                   | [mm]                                          |
| 0.0   | 35.60000    | 12.40000 | -0.50000 | 0.079679      | 0.59317 | 0.59849                                | -0.0019856                                    |



# GEA LIMITED (GEOTECHNICAL & ENV ASSOC)

Rear of 159-163 King's Cross Road, London WC1X 9BN  
Wall Installation and Excavation Combined Issue 4

| Job No.   | Sheet No.           | Rev.    |
|-----------|---------------------|---------|
| J16180    |                     |         |
| Drg. Ref. |                     |         |
| Made by   | Date<br>07-Mar-2017 | Checked |

| Dist.   | Coordinates |          |          | Displacements |         |                                                                                         |
|---------|-------------|----------|----------|---------------|---------|-----------------------------------------------------------------------------------------|
|         | x           | y        | z        | x             | y       | Horizontal displacement along the line<br>Horizontal displacement perpendicular to line |
| 0.94130 | 35.72222    | 13.33333 | -0.50000 | 0.12667       | 0.94301 | 0.95147<br>-0.0031566                                                                   |
| 1.8826  | 35.84444    | 14.26667 | -0.50000 | 0.17367       | 1.2929  | 1.3045<br>-0.0043277                                                                    |
| 2.8239  | 35.96667    | 15.20000 | -0.50000 | 0.22939       | 1.8187  | 1.8331<br>0.0086967                                                                     |
| 3.7652  | 36.08889    | 16.13333 | -0.50000 | 0.29724       | 2.4703  | 2.4879<br>0.026027                                                                      |
| 4.7065  | 36.21111    | 17.06667 | -0.50000 | 0.37267       | 3.1946  | 3.2159<br>0.045284                                                                      |
| 5.6478  | 36.33333    | 18.00000 | -0.50000 | 0.44580       | 3.9210  | 3.9457<br>0.067099                                                                      |
| 6.5891  | 36.45556    | 18.93333 | -0.50000 | 0.51645       | 4.6520  | 4.6797<br>0.091958                                                                      |
| 7.5304  | 36.57778    | 19.86667 | -0.50000 | 0.58428       | 5.3897  | 5.4199<br>0.12048                                                                       |
| 8.4717  | 36.70000    | 20.80000 | -0.50000 | 0.64875       | 6.1361  | 6.1683<br>0.15347                                                                       |

Structure: AS | Sub-structure: Sub #

| Dist.   | Coordinates |          |          | Displacements |         |                                                                                         |
|---------|-------------|----------|----------|---------------|---------|-----------------------------------------------------------------------------------------|
|         | x           | y        | z        | x             | y       | Horizontal displacement along the line<br>Horizontal displacement perpendicular to line |
| [m]     | [m]         | [m]      | [m]      | [mm]          | [mm]    | [mm]                                                                                    |
| 0.0     | 44.70000    | 9.30000  | -0.50000 | 0.0           | 0.0     | 0.0                                                                                     |
| 0.96683 | 44.81111    | 10.20000 | -0.50000 | 0.032045      | 0.23856 | 0.24069<br>-0.0025739                                                                   |
| 1.8137  | 44.92222    | 11.10000 | -0.50000 | 0.077316      | 0.57557 | 0.58071<br>-0.0062102                                                                   |
| 2.7205  | 45.03333    | 12.00000 | -0.50000 | 0.12259       | 0.91259 | 0.92073<br>-0.0098465                                                                   |
| 3.6273  | 45.14444    | 12.90000 | -0.50000 | 0.16786       | 1.2496  | 1.2608<br>-0.013483                                                                     |
| 4.5342  | 45.25556    | 13.80000 | -0.50000 | 0.21313       | 1.5866  | 1.6008<br>-0.017119                                                                     |
| 5.4410  | 45.36667    | 14.70000 | -0.50000 | 0.26631       | 1.9825  | 2.0002<br>-0.021391                                                                     |
| 6.3478  | 45.47778    | 15.60000 | -0.50000 | 0.33298       | 2.4788  | 2.5010<br>-0.026746                                                                     |
| 7.2547  | 45.58889    | 16.50000 | -0.50000 | 0.40012       | 2.9787  | 3.0053<br>-0.032139                                                                     |
| 8.1615  | 45.70000    | 17.40000 | -0.50000 | 0.43747       | 3.5348  | 3.5618<br>-0.0010608                                                                    |

Structure: AT | Sub-structure: Sub #

| Dist.  | Coordinates |          |          | Displacements |          |                                                                                         |
|--------|-------------|----------|----------|---------------|----------|-----------------------------------------------------------------------------------------|
|        | x           | y        | z        | x             | y        | Horizontal displacement along the line<br>Horizontal displacement perpendicular to line |
| [m]    | [m]         | [m]      | [m]      | [mm]          | [mm]     | [mm]                                                                                    |
| 0.0    | 54.50000    | 10.00000 | -0.50000 | -0.019508     | 0.073597 | 0.070799<br>0.028010                                                                    |
| 1.8461 | 54.71667    | 11.83333 | -0.50000 | -0.11182      | 0.35767  | 0.34208<br>0.15303                                                                      |
| 3.6922 | 54.93333    | 13.66667 | -0.50000 | -0.22991      | 0.61520  | 0.58396<br>0.30052                                                                      |
| 5.5383 | 55.15000    | 15.50000 | -0.50000 | -0.42065      | 0.92460  | 0.86884<br>0.52626                                                                      |
| 7.3844 | 55.36667    | 17.33333 | -0.50000 | -0.75030      | 1.3201   | 1.2230<br>0.90005                                                                       |
| 9.2305 | 55.58333    | 19.16667 | -0.50000 | -1.1694       | 1.5852   | 1.4370<br>1.3473                                                                        |
| 11.077 | 55.80000    | 21.00000 | -0.50000 | -1.6713       | 1.6419   | 1.4344<br>1.8524                                                                        |

Structure: AU | Sub-structure:

| Dist.   | Coordinates |          |          | Displacements |          |                                                                                         |
|---------|-------------|----------|----------|---------------|----------|-----------------------------------------------------------------------------------------|
|         | x           | y        | z        | x             | y        | Horizontal displacement along the line<br>Horizontal displacement perpendicular to line |
| [m]     | [m]         | [m]      | [m]      | [mm]          | [mm]     | [mm]                                                                                    |
| 0.0     | 33.10000    | 38.60000 | -2.00000 | 14.687        | -0.87360 | -14.713<br>0.046092                                                                     |
| 0.88891 | 32.21250    | 38.65000 | -2.00000 | 13.430        | -0.80121 | -13.454<br>0.044528                                                                     |
| 1.7778  | 31.32500    | 38.70000 | -2.00000 | 12.173        | -0.72882 | -12.194<br>0.042964                                                                     |
| 2.6667  | 30.43750    | 38.75000 | -2.00000 | 10.959        | -0.65852 | -10.979<br>0.041830                                                                     |
| 3.5556  | 29.55000    | 38.80000 | -2.00000 | 9.9982        | -0.60030 | -10.016<br>0.036964                                                                     |
| 4.4445  | 28.66250    | 38.85000 | -2.00000 | 9.0370        | -0.54208 | -9.0532<br>0.032898                                                                     |
| 5.3334  | 27.77500    | 38.90000 | -2.00000 | 8.0759        | -0.48386 | -8.0903<br>0.028832                                                                     |
| 6.2224  | 26.88750    | 38.95000 | -2.00000 | 7.1148        | -0.42564 | -7.1274<br>0.024767                                                                     |
| 7.1113  | 26.00000    | 39.00000 | -2.00000 | 6.3270        | -0.37909 | -6.3383<br>0.022600                                                                     |

Structure: AV | Sub-structure:

| Dist.   | Coordinates |          |          | Displacements |          |                                                                                         |
|---------|-------------|----------|----------|---------------|----------|-----------------------------------------------------------------------------------------|
|         | x           | y        | z        | x             | y        | Horizontal displacement along the line<br>Horizontal displacement perpendicular to line |
| [m]     | [m]         | [m]      | [m]      | [mm]          | [mm]     | [mm]                                                                                    |
| 0.0     | 26.00000    | 39.00000 | -2.00000 | 6.3270        | -0.37909 | -0.033473<br>6.3383                                                                     |
| 0.92195 | 25.94000    | 38.08000 | -2.00000 | 6.3218        | -0.37885 | -0.033368<br>6.3330                                                                     |
| 1.8439  | 25.88000    | 37.16000 | -2.00000 | 6.3165        | -0.37861 | -0.033264<br>6.3278                                                                     |
| 2.7659  | 25.82000    | 36.24000 | -2.00000 | 6.3113        | -0.37838 | -0.033159<br>6.3225                                                                     |
| 3.6878  | 25.76000    | 35.32000 | -2.00000 | 6.3060        | -0.37814 | -0.033054<br>6.3173                                                                     |
| 4.6098  | 25.70000    | 34.40000 | -2.00000 | 6.3008        | -0.37790 | -0.032949<br>6.3120                                                                     |
| 5.5317  | 25.64000    | 33.48000 | -2.00000 | 6.2955        | -0.37766 | -0.032844<br>6.3068                                                                     |
| 6.4537  | 25.58000    | 32.56000 | -2.00000 | 4.9923        | -0.13534 | -0.18984<br>4.9905                                                                      |
| 7.3756  | 25.52000    | 31.64000 | -2.00000 | 4.8334        | 0.18351  | -0.49767<br>4.8113                                                                      |
| 8.2976  | 25.46000    | 30.72000 | -2.00000 | 4.6233        | 0.44561  | -0.74555<br>4.5845                                                                      |
| 9.2195  | 25.40000    | 29.80000 | -2.00000 | 4.3843        | 0.64128  | -0.92525<br>4.3333                                                                      |

Structure: AW | Sub-structure:

| Dist.  | Coordinates |          |          | Displacements |         |                                                                                         |
|--------|-------------|----------|----------|---------------|---------|-----------------------------------------------------------------------------------------|
|        | x           | y        | z        | x             | y       | Horizontal displacement along the line<br>Horizontal displacement perpendicular to line |
| [m]    | [m]         | [m]      | [m]      | [mm]          | [mm]    | [mm]                                                                                    |
| 0.0    | 25.40000    | 29.80000 | -2.00000 | 4.3843        | 0.64128 | 4.3363<br>0.91113                                                                       |
| 1.8869 | 27.28333    | 29.68333 | -2.00000 | 5.3530        | 1.0496  | 5.2779<br>1.3786                                                                        |
| 3.7739 | 29.16667    | 29.56667 | -2.00000 | 6.2178        | 1.8603  | 6.0909<br>2.2411                                                                        |
| 5.6608 | 31.05000    | 29.45000 | -2.00000 | 6.7856        | 3.4879  | 6.5569<br>3.9008                                                                        |
| 7.5478 | 32.93333    | 29.33333 | -2.00000 | 6.9081        | 6.2525  | 6.5083<br>6.6676                                                                        |
| 9.4347 | 34.81667    | 29.21667 | -2.00000 | 8.2526        | 6.2674  | 7.8493<br>6.7057                                                                        |
| 11.322 | 36.70000    | 29.10000 | -2.00000 | 8.9332        | 4.0276  | 8.6671<br>4.5722                                                                        |

## Specific Building Damage Results - Vertical Displacements

Structure: A | Sub-structure:

| Dist.             | Coordinates |          |          | Displacements |      |
|-------------------|-------------|----------|----------|---------------|------|
|                   | x           | y        | z        | x             | z    |
| [m]               | [m]         | [m]      | [m]      | [mm]          | [mm] |
| Vertical Offset 1 |             |          |          |               |      |
| 0.0               | 22.50000    | 48.10000 | -0.50000 | 0.41210       |      |
| 0.85000           | 23.35000    | 48.10000 | -0.50000 | 0.56935       |      |
| 1.7000            | 24.20000    | 48.10000 | -0.50000 | 0.77482       |      |
| 2.5500            | 25.05000    | 48.10000 | -0.50000 | 1.0325        |      |
| 3.4000            | 25.90000    | 48.10000 | -0.50000 | 1.3410        |      |

Structure: B | Sub-structure:

| Dist. | Coordinates |     |     | Displacements |      |
|-------|-------------|-----|-----|---------------|------|
|       | x           | y   | z   | x             | z    |
| [m]   | [m]         | [m] | [m] | [mm]          | [mm] |



# GEA LIMITED (GEOTECHNICAL & ENV ASSOC)

Rear of 159-163 King's Cross Road, London WC1X 9BN  
Wall Installation and Excavation Combined Issue 4

| Job No.   | Sheet No.           | Rev.    |
|-----------|---------------------|---------|
| J16180    |                     |         |
| Drg. Ref. |                     |         |
| Made by   | Date<br>07-Mar-2017 | Checked |

| Dist. | Coordinates |     |     | Displacements |
|-------|-------------|-----|-----|---------------|
|       | x           | y   | z   |               |
| [m]   | [m]         | [m] | [m] | [mm]          |

Vertical Offset 1

|         |          |          |          |        |
|---------|----------|----------|----------|--------|
| 0.0     | 25.90000 | 48.10000 | -0.50000 | 1.3410 |
| 0.77500 | 25.90000 | 47.32500 | -0.50000 | 1.4657 |
| 1.5500  | 25.90000 | 46.55000 | -0.50000 | 1.5888 |
| 2.3250  | 25.90000 | 45.77500 | -0.50000 | 1.7067 |
| 3.1000  | 25.90000 | 45.00000 | -0.50000 | 1.8157 |

Structure: C | Sub-structure:

| Dist. | Coordinates |     |     | Displacements |
|-------|-------------|-----|-----|---------------|
|       | x           | y   | z   |               |
| [m]   | [m]         | [m] | [m] | [mm]          |

Vertical Offset 1

|         |          |          |          |        |
|---------|----------|----------|----------|--------|
| 0.0     | 25.90000 | 45.00000 | -0.50000 | 1.8157 |
| 0.92022 | 26.82000 | 44.90000 | -0.50000 | 2.2813 |
| 1.8404  | 27.74000 | 44.96000 | -0.50000 | 2.8020 |
| 2.7607  | 28.66000 | 44.94000 | -0.50000 | 3.3397 |
| 3.6809  | 29.58000 | 44.92000 | -0.50000 | 3.8877 |
| 4.6011  | 30.50000 | 44.90000 | -0.50000 | 4.4256 |

Structure: D | Sub-structure:

| Dist. | Coordinates |     |     | Displacements |
|-------|-------------|-----|-----|---------------|
|       | x           | y   | z   |               |
| [m]   | [m]         | [m] | [m] | [mm]          |

Vertical Offset 1

|         |          |          |          |        |
|---------|----------|----------|----------|--------|
| 0.0     | 30.50000 | 44.90000 | -0.50000 | 4.4256 |
| 0.90015 | 30.48333 | 45.60000 | -0.50000 | 4.0992 |
| 1.8003  | 30.46667 | 46.70000 | -0.50000 | 3.9274 |
| 2.7005  | 30.45000 | 47.60000 | -0.50000 | 3.7775 |
| 3.6006  | 30.43333 | 48.50000 | -0.50000 | 2.8681 |
| 4.5008  | 30.41667 | 49.40000 | -0.50000 | 2.5902 |
| 5.4009  | 30.40000 | 50.30000 | -0.50000 | 2.2848 |

Structure: E | Sub-structure:

| Dist. | Coordinates |     |     | Displacements |
|-------|-------------|-----|-----|---------------|
|       | x           | y   | z   |               |
| [m]   | [m]         | [m] | [m] | [mm]          |

Vertical Offset 1

|         |          |          |          |        |
|---------|----------|----------|----------|--------|
| 0.0     | 30.40000 | 50.30000 | -0.50000 | 2.2848 |
| 0.83333 | 31.23333 | 50.30000 | -0.50000 | 2.5668 |
| 1.6667  | 32.06667 | 50.30000 | -0.50000 | 2.8341 |
| 2.5000  | 32.90000 | 50.30000 | -0.50000 | 3.0594 |

Structure: F | Sub-structure:

| Dist. | Coordinates |     |     | Displacements |
|-------|-------------|-----|-----|---------------|
|       | x           | y   | z   |               |
| [m]   | [m]         | [m] | [m] | [mm]          |

Vertical Offset 1

|         |          |          |          |         |
|---------|----------|----------|----------|---------|
| 0.0     | 32.90000 | 50.30000 | -0.50000 | 3.0594  |
| 0.93005 | 32.91000 | 51.23000 | -0.50000 | 2.6028  |
| 1.8601  | 32.92000 | 52.16000 | -0.50000 | 2.1494  |
| 2.7902  | 32.93000 | 53.09000 | -0.50000 | 1.7951  |
| 3.7202  | 32.94000 | 54.02000 | -0.50000 | 1.4824  |
| 4.6503  | 32.95000 | 54.95000 | -0.50000 | 1.1859  |
| 5.5803  | 32.96000 | 55.88000 | -0.50000 | 0.91948 |
| 6.5104  | 32.97000 | 56.81000 | -0.50000 | 0.69208 |
| 7.4404  | 32.98000 | 57.74000 | -0.50000 | 0.50681 |
| 8.3705  | 32.99000 | 58.67000 | -0.50000 | 0.36048 |
| 9.3005  | 33.00000 | 59.60000 | -0.50000 | 0.24315 |

Structure: G | Sub-structure:

| Dist. | Coordinates |     |     | Displacements |
|-------|-------------|-----|-----|---------------|
|       | x           | y   | z   |               |
| [m]   | [m]         | [m] | [m] | [mm]          |

Vertical Offset 1

|        |          |          |          |          |
|--------|----------|----------|----------|----------|
| 0.0    | 33.00000 | 59.60000 | -0.50000 | 0.24315  |
| 1.0000 | 32.00000 | 59.60000 | -0.50000 | 0.20215  |
| 2.0000 | 31.00000 | 59.60000 | -0.50000 | 0.16254  |
| 3.0000 | 30.00000 | 59.60000 | -0.50000 | 0.12613  |
| 4.0000 | 29.00000 | 59.60000 | -0.50000 | 0.093314 |
| 5.0000 | 28.00000 | 59.60000 | -0.50000 | 0.062742 |

Structure: H | Sub-structure:

| Dist. | Coordinates |     |     | Displacements |
|-------|-------------|-----|-----|---------------|
|       | x           | y   | z   |               |
| [m]   | [m]         | [m] | [m] | [mm]          |

Vertical Offset 1

|         |          |          |          |          |
|---------|----------|----------|----------|----------|
| 0.0     | 28.00000 | 59.60000 | -0.50000 | 0.062742 |
| 0.90062 | 28.03333 | 58.70000 | -0.50000 | 0.11228  |
| 1.8012  | 28.06667 | 57.80000 | -0.50000 | 0.15947  |
| 2.7019  | 28.10000 | 56.90000 | -0.50000 | 0.22261  |

Structure: I | Sub-structure:

| Dist. | Coordinates |     |     | Displacements |
|-------|-------------|-----|-----|---------------|
|       | x           | y   | z   |               |
| [m]   | [m]         | [m] | [m] | [mm]          |

Vertical Offset 1

|         |          |          |          |          |
|---------|----------|----------|----------|----------|
| 0.0     | 28.10000 | 56.90000 | -0.50000 | 0.22261  |
| 0.90009 | 27.20000 | 56.91250 | -0.50000 | 0.17339  |
| 1.8002  | 26.30000 | 56.92500 | -0.50000 | 0.13460  |
| 2.7003  | 25.40000 | 56.93750 | -0.50000 | 0.10436  |
| 3.6003  | 24.50000 | 56.95000 | -0.50000 | 0.077905 |
| 4.5004  | 23.60000 | 56.96250 | -0.50000 | 0.047151 |
| 5.4005  | 22.70000 | 56.97500 | -0.50000 | 0.0      |
| 6.3006  | 21.80000 | 56.98750 | -0.50000 | 0.0      |
| 7.2007  | 20.90000 | 57.00000 | -0.50000 | 0.0      |

Structure: J | Sub-structure:

| Dist. | Coordinates |     |     | Displacements |
|-------|-------------|-----|-----|---------------|
|       | x           | y   | z   |               |
| [m]   | [m]         | [m] | [m] | [mm]          |

Vertical Offset 1

|        |          |          |          |         |
|--------|----------|----------|----------|---------|
| 0.0    | 33.00000 | 59.50000 | -0.50000 | 0.25487 |
| 1.9500 | 34.95000 | 59.50000 | -0.50000 | 0.35139 |
| 3.9000 | 36.90000 | 59.50000 | -0.50000 | 0.40527 |
| 5.8500 | 38.85000 | 59.50000 | -0.50000 | 0.55572 |



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Rear of 159-163 King's Cross Road, London WC1X 9BN  
Wall Installation and Excavation Combined Issue 4

| Job No.   | Sheet No.           | Rev.    |
|-----------|---------------------|---------|
| J16180    |                     |         |
| Drg. Ref. |                     |         |
| Made by   | Date<br>07-Mar-2017 | Checked |

| Dist.  | Coordinates |          | Displacements |         |
|--------|-------------|----------|---------------|---------|
|        | x           | y        | z             | z       |
| [m]    | [m]         | [m]      | [m]           | [mm]    |
| 7.8000 | 40.80000    | 59.50000 | -0.50000      | 0.54495 |
| 9.7500 | 42.75000    | 59.50000 | -0.50000      | 0.52756 |
| 11.700 | 44.70000    | 59.50000 | -0.50000      | 0.52099 |
| 13.650 | 46.65000    | 59.50000 | -0.50000      | 0.35204 |
| 15.600 | 48.60000    | 59.50000 | -0.50000      | 0.28467 |
| 17.550 | 50.55000    | 59.50000 | -0.50000      | 0.20078 |
| 19.500 | 52.50000    | 59.50000 | -0.50000      | 0.12519 |

Structure: K | Sub-structure:

| Dist.             | Coordinates |          | Displacements |        |
|-------------------|-------------|----------|---------------|--------|
|                   | x           | y        | z             | z      |
| [m]               | [m]         | [m]      | [m]           | [mm]   |
| Vertical Offset 1 |             |          |               |        |
| 0.0               | 33.00000    | 52.20000 | -0.50000      | 2.1435 |
| 0.98889           | 33.98889    | 52.20000 | -0.50000      | 2.7704 |
| 1.9778            | 34.97778    | 52.20000 | -0.50000      | 2.9924 |
| 2.9667            | 35.96667    | 52.20000 | -0.50000      | 3.2113 |
| 3.9556            | 36.95556    | 52.20000 | -0.50000      | 3.4085 |
| 4.9444            | 37.94444    | 52.20000 | -0.50000      | 3.9783 |
| 5.9333            | 38.93333    | 52.20000 | -0.50000      | 3.8850 |
| 6.9222            | 39.92222    | 52.20000 | -0.50000      | 3.7806 |
| 7.9111            | 40.91111    | 52.20000 | -0.50000      | 3.6735 |
| 8.9000            | 41.90000    | 52.20000 | -0.50000      | 3.5709 |

Structure: L | Sub-structure:

| Dist.             | Coordinates |          | Displacements |         |
|-------------------|-------------|----------|---------------|---------|
|                   | x           | y        | z             | z       |
| [m]               | [m]         | [m]      | [m]           | [mm]    |
| Vertical Offset 1 |             |          |               |         |
| 0.0               | 37.70000    | 59.40000 | -0.50000      | 0.58450 |
| 0.90000           | 37.70000    | 58.50000 | -0.50000      | 0.83698 |
| 1.8000            | 37.70000    | 57.60000 | -0.50000      | 1.1468  |
| 2.7000            | 37.70000    | 56.70000 | -0.50000      | 1.5177  |
| 3.6000            | 37.70000    | 55.80000 | -0.50000      | 1.9455  |
| 4.5000            | 37.70000    | 54.90000 | -0.50000      | 2.4177  |
| 5.4000            | 37.70000    | 54.00000 | -0.50000      | 2.9254  |
| 6.3000            | 37.70000    | 53.10000 | -0.50000      | 3.4618  |
| 7.2000            | 37.70000    | 52.20000 | -0.50000      | 3.9987  |

Structure: M | Sub-structure:

| Dist.             | Coordinates |          | Displacements |         |
|-------------------|-------------|----------|---------------|---------|
|                   | x           | y        | z             | z       |
| [m]               | [m]         | [m]      | [m]           | [mm]    |
| Vertical Offset 1 |             |          |               |         |
| 0.0               | 42.00000    | 59.50000 | -1.50000      | 0.53526 |
| 0.91259           | 41.98750    | 58.58750 | -1.50000      | 0.78440 |
| 1.8252            | 41.97500    | 57.67500 | -1.50000      | 1.0812  |
| 2.7378            | 41.96250    | 56.76250 | -1.50000      | 1.4283  |
| 3.6503            | 41.95000    | 55.85000 | -1.50000      | 1.8200  |
| 4.5629            | 41.93750    | 54.93750 | -1.50000      | 2.2420  |
| 5.4755            | 41.92500    | 54.02500 | -1.50000      | 2.6826  |
| 6.3881            | 41.91250    | 53.11250 | -1.50000      | 3.1361  |
| 7.3007            | 41.90000    | 52.20000 | -1.50000      | 3.5709  |

Structure: N | Sub-structure:

| Dist.             | Coordinates |          | Displacements |         |
|-------------------|-------------|----------|---------------|---------|
|                   | x           | y        | z             | z       |
| [m]               | [m]         | [m]      | [m]           | [mm]    |
| Vertical Offset 1 |             |          |               |         |
| 0.0               | 45.50000    | 53.30000 | -4.00000      | 2.0749  |
| 0.87143           | 45.50000    | 54.17143 | -4.00000      | 1.7632  |
| 1.7429            | 45.50000    | 55.04286 | -4.00000      | 1.5154  |
| 2.6143            | 45.50000    | 55.91429 | -4.00000      | 1.2497  |
| 3.4857            | 45.50000    | 56.78571 | -4.00000      | 0.99634 |
| 4.3571            | 45.50000    | 57.65714 | -4.00000      | 0.76244 |
| 5.2286            | 45.50000    | 58.52857 | -4.00000      | 0.54987 |
| 6.1000            | 45.50000    | 59.40000 | -4.00000      | 0.39024 |

Structure: O | Sub-structure:

| Dist.             | Coordinates |          | Displacements |        |
|-------------------|-------------|----------|---------------|--------|
|                   | x           | y        | z             | z      |
| [m]               | [m]         | [m]      | [m]           | [mm]   |
| Vertical Offset 1 |             |          |               |        |
| 0.0               | 37.70000    | 52.20000 | -0.68000      | 3.9987 |
| 0.92000           | 37.70000    | 51.28000 | -0.68000      | 4.5526 |
| 1.8400            | 37.70000    | 50.36000 | -0.68000      | 5.0834 |
| 2.7600            | 37.70000    | 49.44000 | -0.68000      | 5.5319 |
| 3.6800            | 37.70000    | 48.52000 | -0.68000      | 5.8388 |
| 4.6000            | 37.70000    | 47.60000 | -0.68000      | 5.8644 |

Structure: P | Sub-structure: Sub #

| Dist.             | Coordinates |          | Displacements |        |
|-------------------|-------------|----------|---------------|--------|
|                   | x           | y        | z             | z      |
| [m]               | [m]         | [m]      | [m]           | [mm]   |
| Vertical Offset 1 |             |          |               |        |
| 0.0               | 45.50000    | 53.30000 | -1.85000      | 2.0749 |
| 0.95000           | 45.50000    | 52.35000 | -1.85000      | 2.3786 |
| 1.9000            | 45.50000    | 51.40000 | -1.85000      | 2.6946 |
| 2.8500            | 45.50000    | 50.45000 | -1.85000      | 3.0196 |
| 3.8000            | 45.50000    | 49.50000 | -1.85000      | 3.3190 |
| 4.7500            | 45.50000    | 48.55000 | -1.85000      | 3.5804 |
| 5.7000            | 45.50000    | 47.60000 | -1.85000      | 4.1963 |

Structure: Q | Sub-structure:

| Dist.             | Coordinates |          | Displacements |        |
|-------------------|-------------|----------|---------------|--------|
|                   | x           | y        | z             | z      |
| [m]               | [m]         | [m]      | [m]           | [mm]   |
| Vertical Offset 1 |             |          |               |        |
| 0.0               | 41.90000    | 52.20000 | -0.65000      | 3.5709 |
| 0.92000           | 41.90000    | 51.28000 | -0.65000      | 3.9945 |
| 1.8400            | 41.90000    | 50.36000 | -0.65000      | 4.3773 |
| 2.7600            | 41.90000    | 49.44000 | -0.65000      | 4.6605 |
| 3.6800            | 41.90000    | 48.52000 | -0.65000      | 4.7536 |
| 4.6000            | 41.90000    | 47.60000 | -0.65000      | 4.5373 |

Structure: R | Sub-structure:



# GEA LIMITED (GEOTECHNICAL & ENV ASSOC)

Rear of 159-163 King's Cross Road, London WC1X 9BN  
Wall Installation and Excavation Combined Issue 4

| Job No.   | Sheet No.           | Rev.    |
|-----------|---------------------|---------|
| J16180    |                     |         |
| Drg. Ref. |                     |         |
| Made by   | Date<br>07-Mar-2017 | Checked |

| Dist. | Coordinates |          |          | Displacements |
|-------|-------------|----------|----------|---------------|
| [m]   | x<br>[m]    | y<br>[m] | z<br>[m] | z<br>[mm]     |

Vertical Offset 1

|         |          |          |          |        |
|---------|----------|----------|----------|--------|
| 0.0     | 33.00000 | 50.30000 | -0.50000 | 3.0031 |
| 0.92635 | 32.95000 | 49.37500 | -0.50000 | 3.5267 |
| 1.8527  | 32.90000 | 48.45000 | -0.50000 | 3.9581 |
| 2.7791  | 32.85000 | 47.52500 | -0.50000 | 5.2546 |
| 3.7054  | 32.80000 | 46.60000 | -0.50000 | 5.5003 |
| 4.6318  | 32.75000 | 45.67500 | -0.50000 | 5.7456 |
| 5.5581  | 32.70000 | 44.75000 | -0.50000 | 5.9451 |
| 6.4845  | 32.65000 | 43.82500 | -0.50000 | 5.9910 |
| 7.4108  | 32.60000 | 42.90000 | -0.50000 | 7.2185 |

Structure: S | Sub-structure:

| Dist. | Coordinates |          |          | Displacements |
|-------|-------------|----------|----------|---------------|
| [m]   | x<br>[m]    | y<br>[m] | z<br>[m] | z<br>[mm]     |

Vertical Offset 1

|        |          |          |          |          |
|--------|----------|----------|----------|----------|
| 0.0    | 54.40000 | 58.50000 | -0.50000 | 0.10607  |
| 1.9375 | 55.56250 | 56.95000 | -0.50000 | 0.12919  |
| 3.8750 | 56.72500 | 55.40000 | -0.50000 | 0.13874  |
| 5.8125 | 57.88750 | 53.85000 | -0.50000 | 0.13066  |
| 7.7500 | 59.05000 | 52.30000 | -0.50000 | 0.10952  |
| 9.6875 | 60.21250 | 50.75000 | -0.50000 | 0.11516  |
| 11.625 | 61.37500 | 49.20000 | -0.50000 | 0.084683 |
| 13.562 | 62.53750 | 47.65000 | -0.50000 | 0.055634 |
| 15.500 | 63.70000 | 46.10000 | -0.50000 | 0.014224 |
| 17.438 | 64.86250 | 44.55000 | -0.50000 | 0.0      |
| 19.375 | 66.02500 | 43.00000 | -0.50000 | 0.0      |
| 21.313 | 67.18750 | 41.45000 | -0.50000 | 0.0      |
| 23.250 | 68.35000 | 39.90000 | -0.50000 | 0.0      |
| 25.188 | 69.51250 | 38.35000 | -0.50000 | 0.0      |
| 27.125 | 70.67500 | 36.80000 | -0.50000 | 0.0      |
| 29.063 | 71.83750 | 35.25000 | -0.50000 | 0.0      |
| 31.000 | 73.00000 | 33.70000 | -0.50000 | 0.0      |

Structure: T | Sub-structure:

| Dist. | Coordinates |          |          | Displacements |
|-------|-------------|----------|----------|---------------|
| [m]   | x<br>[m]    | y<br>[m] | z<br>[m] | z<br>[mm]     |

Vertical Offset 1

|        |          |          |          |         |
|--------|----------|----------|----------|---------|
| 0.0    | 45.50000 | 53.30000 | -0.50000 | 2.0749  |
| 1.9859 | 46.73158 | 51.74211 | -0.50000 | 2.2614  |
| 3.9718 | 47.96316 | 50.18421 | -0.50000 | 2.3241  |
| 5.9577 | 49.19474 | 48.62632 | -0.50000 | 2.5541  |
| 7.9436 | 50.42632 | 47.06842 | -0.50000 | 3.1159  |
| 9.9295 | 51.65789 | 45.51053 | -0.50000 | 2.7934  |
| 11.915 | 52.88947 | 43.95263 | -0.50000 | 2.4523  |
| 13.901 | 54.12105 | 42.39474 | -0.50000 | 2.1176  |
| 15.887 | 55.35263 | 40.83684 | -0.50000 | 1.7864  |
| 17.873 | 56.58421 | 39.27895 | -0.50000 | 1.4638  |
| 19.859 | 57.81579 | 37.72105 | -0.50000 | 2.6131  |
| 21.845 | 59.04737 | 36.16316 | -0.50000 | 2.1430  |
| 23.831 | 60.27895 | 34.60526 | -0.50000 | 1.7087  |
| 25.817 | 61.51053 | 33.04737 | -0.50000 | 1.3290  |
| 27.803 | 62.74211 | 31.48947 | -0.50000 | 1.0032  |
| 29.789 | 63.97368 | 29.93158 | -0.50000 | 0.72546 |
| 31.774 | 65.20526 | 28.37368 | -0.50000 | 0.41869 |
| 33.760 | 66.43684 | 26.81579 | -0.50000 | 0.16831 |
| 35.746 | 67.66842 | 25.25789 | -0.50000 | 0.0     |
| 37.732 | 68.90000 | 23.70000 | -0.50000 | 0.0     |

Structure: U | Sub-structure:

| Dist. | Coordinates |          |          | Displacements |
|-------|-------------|----------|----------|---------------|
| [m]   | x<br>[m]    | y<br>[m] | z<br>[m] | z<br>[mm]     |

Vertical Offset 1

|         |          |          |          |          |
|---------|----------|----------|----------|----------|
| 0.0     | 63.00000 | 47.00000 | -0.50000 | 0.041913 |
| 0.98600 | 62.21000 | 46.41000 | -0.50000 | 0.080222 |
| 1.9720  | 61.42000 | 45.82000 | -0.50000 | 0.11742  |
| 2.9580  | 60.63000 | 45.23000 | -0.50000 | 0.17487  |
| 3.9440  | 59.84000 | 44.64000 | -0.50000 | 0.26081  |
| 4.9300  | 59.05000 | 44.05000 | -0.50000 | 0.41031  |
| 5.9160  | 58.26000 | 43.46000 | -0.50000 | 0.60534  |
| 6.9020  | 57.47000 | 42.87000 | -0.50000 | 0.85470  |
| 7.8880  | 56.68000 | 42.28000 | -0.50000 | 1.1541   |
| 8.8740  | 55.89000 | 41.69000 | -0.50000 | 1.4940   |
| 9.8600  | 55.10000 | 41.10000 | -0.50000 | 1.8598   |

Structure: V | Sub-structure:

| Dist. | Coordinates |          |          | Displacements |
|-------|-------------|----------|----------|---------------|
| [m]   | x<br>[m]    | y<br>[m] | z<br>[m] | z<br>[mm]     |

Vertical Offset 1

|         |          |          |          |        |
|---------|----------|----------|----------|--------|
| 0.0     | 55.10000 | 41.10000 | -0.50000 | 1.8598 |
| 0.91001 | 54.37500 | 40.55000 | -0.50000 | 2.2024 |
| 1.8200  | 53.65000 | 40.00000 | -0.50000 | 2.5518 |
| 2.7300  | 52.92500 | 39.45000 | -0.50000 | 2.8876 |
| 3.6401  | 52.20000 | 38.90000 | -0.50000 | 3.2034 |

Structure: W | Sub-structure:

| Dist. | Coordinates |          |          | Displacements |
|-------|-------------|----------|----------|---------------|
| [m]   | x<br>[m]    | y<br>[m] | z<br>[m] | z<br>[mm]     |

Vertical Offset 1

|         |          |          |          |        |
|---------|----------|----------|----------|--------|
| 0.0     | 52.20000 | 38.90000 | -1.70000 | 3.2034 |
| 0.57009 | 52.55000 | 38.45000 | -1.70000 | 3.1186 |
| 1.1402  | 52.90000 | 38.00000 | -1.70000 | 3.0331 |

Structure: X | Sub-structure:

| Dist. | Coordinates |          |          | Displacements |
|-------|-------------|----------|----------|---------------|
| [m]   | x<br>[m]    | y<br>[m] | z<br>[m] | z<br>[mm]     |

Vertical Offset 1

|         |          |          |          |          |
|---------|----------|----------|----------|----------|
| 0.0     | 66.40000 | 42.50000 | -0.50000 | 0.0      |
| 0.97201 | 65.62000 | 41.92000 | -0.50000 | 0.0      |
| 1.9440  | 64.84000 | 41.34000 | -0.50000 | 0.019100 |
| 2.9160  | 64.06000 | 40.76000 | -0.50000 | 0.065078 |
| 3.8880  | 63.28000 | 40.18000 | -0.50000 | 0.099136 |



# GEA LIMITED (GEOTECHNICAL & ENV ASSOC)

Rear of 159-163 King's Cross Road, London WC1X 9BN  
Wall Installation and Excavation Combined Issue 4

| Job No.   | Sheet No.           | Rev.    |
|-----------|---------------------|---------|
| J16180    |                     |         |
| Drg. Ref. |                     |         |
| Made by   | Date<br>07-Mar-2017 | Checked |

| Dist.  | Coordinates |          |          | Displacements |
|--------|-------------|----------|----------|---------------|
|        | x           | y        | z        | z             |
| [m]    | [m]         | [m]      | [m]      | [mm]          |
| 4.8600 | 62.50000    | 39.60000 | -0.50000 | 0.14441       |
| 5.8320 | 61.72000    | 39.02000 | -0.50000 | 0.30050       |
| 6.8041 | 60.94000    | 38.44000 | -0.50000 | 1.1487        |
| 7.7761 | 60.16000    | 37.86000 | -0.50000 | 1.4864        |
| 8.7481 | 59.38000    | 37.28000 | -0.50000 | 1.8806        |
| 9.7201 | 58.60000    | 36.70000 | -0.50000 | 2.3164        |

Structure: Y | Sub-structure:

| Dist.             | Coordinates |          |          | Displacements |
|-------------------|-------------|----------|----------|---------------|
|                   | x           | y        | z        | z             |
| [m]               | [m]         | [m]      | [m]      | [mm]          |
| Vertical Offset 1 |             |          |          |               |
| 0.0               | 58.60000    | 36.70000 | -1.40000 | 2.3164        |
| 0.91001           | 57.87500    | 36.15000 | -1.40000 | 2.7617        |
| 1.8200            | 57.15000    | 35.60000 | -1.40000 | 3.2365        |
| 2.7300            | 56.42500    | 35.05000 | -1.40000 | 3.7295        |
| 3.6401            | 55.70000    | 34.50000 | -1.40000 | 4.2260        |

Structure: Z | Sub-structure:

| Dist.             | Coordinates |          |          | Displacements |
|-------------------|-------------|----------|----------|---------------|
|                   | x           | y        | z        | z             |
| [m]               | [m]         | [m]      | [m]      | [mm]          |
| Vertical Offset 1 |             |          |          |               |
| 0.0               | 69.70000    | 38.10000 | -0.50000 | 0.0           |
| 0.95802           | 68.93000    | 37.53000 | -0.50000 | 0.0           |
| 1.9160            | 68.16000    | 36.96000 | -0.50000 | 0.0           |
| 2.8741            | 67.39000    | 36.39000 | -0.50000 | 0.0           |
| 3.8321            | 66.62000    | 35.82000 | -0.50000 | 0.0           |
| 4.7901            | 65.85000    | 35.25000 | -0.50000 | 0.036508      |
| 5.7481            | 65.08000    | 34.68000 | -0.50000 | 0.22659       |
| 6.7061            | 64.31000    | 34.11000 | -0.50000 | 0.43310       |
| 7.6642            | 63.54000    | 33.54000 | -0.50000 | 0.65415       |
| 8.6222            | 62.77000    | 32.97000 | -0.50000 | 0.90462       |
| 9.5802            | 62.00000    | 32.40000 | -0.50000 | 1.1953        |

Structure: AA | Sub-structure:

| Dist.             | Coordinates |          |          | Displacements |
|-------------------|-------------|----------|----------|---------------|
|                   | x           | y        | z        | z             |
| [m]               | [m]         | [m]      | [m]      | [mm]          |
| Vertical Offset 1 |             |          |          |               |
| 0.0               | 62.00000    | 32.40000 | -1.40000 | 1.1953        |
| 0.91549           | 61.25000    | 31.87500 | -1.40000 | 1.5208        |
| 1.8310            | 60.50000    | 31.35000 | -1.40000 | 1.8925        |
| 2.7465            | 59.75000    | 30.82500 | -1.40000 | 2.3087        |
| 3.6620            | 59.00000    | 30.30000 | -1.40000 | 2.7645        |

Structure: AB | Sub-structure:

| Dist.             | Coordinates |          |          | Displacements |
|-------------------|-------------|----------|----------|---------------|
|                   | x           | y        | z        | z             |
| [m]               | [m]         | [m]      | [m]      | [mm]          |
| Vertical Offset 1 |             |          |          |               |
| 0.0               | 73.00000    | 33.70000 | -0.50000 | 0.0           |
| 0.94626           | 72.23000    | 33.15000 | -0.50000 | 0.0           |
| 1.8925            | 71.46000    | 32.60000 | -0.50000 | 0.0           |
| 2.8388            | 70.69000    | 32.05000 | -0.50000 | 0.0           |
| 3.7850            | 69.92000    | 31.50000 | -0.50000 | 0.0           |
| 4.7313            | 69.15000    | 30.95000 | -0.50000 | 0.0           |
| 5.6775            | 68.38000    | 30.40000 | -0.50000 | 0.0           |
| 6.6238            | 67.61000    | 29.85000 | -0.50000 | 0.0           |
| 7.5700            | 66.84000    | 29.30000 | -0.50000 | 0.032112      |
| 8.5163            | 66.07000    | 28.75000 | -0.50000 | 0.21877       |
| 9.4626            | 65.30000    | 28.20000 | -0.50000 | 0.40168       |

Structure: AC | Sub-structure:

| Dist.             | Coordinates |          |          | Displacements |
|-------------------|-------------|----------|----------|---------------|
|                   | x           | y        | z        | z             |
| [m]               | [m]         | [m]      | [m]      | [mm]          |
| Vertical Offset 1 |             |          |          |               |
| 0.0               | 65.30000    | 26.20000 | -0.50000 | 0.40168       |
| 0.84673           | 64.61667    | 27.70000 | -0.50000 | 0.56740       |
| 1.6935            | 63.93333    | 27.20000 | -0.50000 | 0.73963       |
| 2.5402            | 63.25000    | 26.70000 | -0.50000 | 0.91993       |
| 3.3869            | 62.56667    | 26.20000 | -0.50000 | 1.1082        |
| 4.2336            | 61.88333    | 25.70000 | -0.50000 | 1.3027        |
| 5.0804            | 61.20000    | 25.20000 | -0.50000 | 1.5004        |

Structure: AD | Sub-structure:

| Dist.             | Coordinates |          |          | Displacements |
|-------------------|-------------|----------|----------|---------------|
|                   | x           | y        | z        | z             |
| [m]               | [m]         | [m]      | [m]      | [mm]          |
| Vertical Offset 1 |             |          |          |               |
| 0.0               | 61.20000    | 25.20000 | -1.46000 | 1.5004        |
| 0.98298           | 60.22500    | 25.32500 | -1.46000 | 1.8394        |
| 1.9660            | 59.25000    | 25.45000 | -1.46000 | 2.2046        |
| 2.9489            | 58.27500    | 25.57500 | -1.46000 | 2.5886        |
| 3.9319            | 57.30000    | 25.70000 | -1.46000 | 2.9808        |
| 4.9149            | 56.32500    | 25.82500 | -1.46000 | 3.3671        |
| 5.8979            | 55.35000    | 25.95000 | -1.46000 | 3.7298        |
| 6.8809            | 54.37500    | 26.07500 | -1.46000 | 4.0483        |
| 7.8638            | 53.40000    | 26.20000 | -1.46000 | 4.2987        |

Structure: AE | Sub-structure:

| Dist.             | Coordinates |          |          | Displacements |
|-------------------|-------------|----------|----------|---------------|
|                   | x           | y        | z        | z             |
| [m]               | [m]         | [m]      | [m]      | [mm]          |
| Vertical Offset 1 |             |          |          |               |
| 0.0               | 61.20000    | 25.20000 | -0.50000 | 1.5004        |
| 0.82651           | 61.15000    | 24.37500 | -0.50000 | 1.4658        |
| 1.6530            | 61.10000    | 23.55000 | -0.50000 | 1.4131        |
| 2.4795            | 61.05000    | 22.72500 | -0.50000 | 1.3443        |
| 3.3061            | 61.00000    | 21.90000 | -0.50000 | 1.2616        |

Structure: AF | Sub-structure:

| Dist. | Coordinates |     |     | Displacements |
|-------|-------------|-----|-----|---------------|
|       | x           | y   | z   | z             |
| [m]   | [m]         | [m] | [m] | [mm]          |



# GEA LIMITED (GEOTECHNICAL & ENV ASSOC)

Rear of 159-163 King's Cross Road, London WC1X 9BN  
Wall Installation and Excavation Combined Issue 4

| Job No.   | Sheet No.           | Rev.    |
|-----------|---------------------|---------|
| J16180    |                     |         |
| Drg. Ref. |                     |         |
| Made by   | Date<br>07-Mar-2017 | Checked |

Vertical Offset 1  
0.0 50.30000 26.50000 -1.46000 4.2212  
0.80351 50.22500 25.70000 -1.46000 4.4653  
1.6070 50.15000 24.90000 -1.46000 4.5611  
2.4185 50.07500 24.10000 -1.46000 4.5332  
3.2140 50.00000 23.30000 -1.46000 4.4122

Structure: AG | Sub-structure:

| Dist. | Coordinates |     |     | Displacements |
|-------|-------------|-----|-----|---------------|
|       | x           | y   | z   | z             |
| [m]   | [m]         | [m] | [m] | [mm]          |

Vertical Offset 1  
0.0 50.00000 23.30000 -0.50000 4.4122  
1.9046 51.88889 23.05556 -0.50000 4.0146  
3.8093 53.77778 22.81111 -0.50000 3.4936  
5.7139 55.66667 22.56667 -0.50000 2.9696  
7.6186 57.55556 22.32222 -0.50000 2.3589  
9.5232 59.44444 22.07778 -0.50000 1.7334  
11.428 61.33333 21.83333 -0.50000 1.1640  
13.332 63.22222 21.58889 -0.50000 0.67852  
15.237 65.11111 21.34444 -0.50000 0.25891  
17.142 67.00000 21.10000 -0.50000 0.0

Structure: AH | Sub-structure:

| Dist. | Coordinates |     |     | Displacements |
|-------|-------------|-----|-----|---------------|
|       | x           | y   | z   | z             |
| [m]   | [m]         | [m] | [m] | [mm]          |

Vertical Offset 1  
0.0 59.00000 20.70000 -0.50000 1.6177  
0.90554 58.10000 20.80000 -0.50000 1.8787  
1.8111 57.20000 20.90000 -0.50000 2.1413  
2.7166 56.30000 21.00000 -0.50000 2.3977  
3.6222 55.40000 21.10000 -0.50000 2.6647  
4.5277 54.50000 21.20000 -0.50000 2.9363  
5.4332 53.60000 21.30000 -0.50000 3.1948  
6.3388 52.70000 21.40000 -0.50000 3.4329

Structure: AI | Sub-structure: Sub #

| Dist. | Coordinates |     |     | Displacements |
|-------|-------------|-----|-----|---------------|
|       | x           | y   | z   | z             |
| [m]   | [m]         | [m] | [m] | [mm]          |

Vertical Offset 1  
0.0 52.70000 21.40000 -0.50000 3.4329  
0.97015 52.56000 20.44000 -0.50000 3.1603  
1.9403 52.42000 19.48000 -0.50000 2.8497  
2.9105 52.28000 18.52000 -0.50000 2.5178  
3.8806 52.14000 17.56000 -0.50000 2.1798  
4.8508 52.00000 16.60000 -0.50000 1.8480

Structure: AJ | Sub-structure: Sub #

| Dist. | Coordinates |     |     | Displacements |
|-------|-------------|-----|-----|---------------|
|       | x           | y   | z   | z             |
| [m]   | [m]         | [m] | [m] | [mm]          |

Vertical Offset 1  
0.0 52.00000 16.60000 -0.50000 1.8480  
0.99641 51.01111 16.72222 -0.50000 1.9569  
1.9928 50.02222 16.84444 -0.50000 2.0342  
2.9892 49.03333 16.96667 -0.50000 2.0754  
3.9857 48.04444 17.08889 -0.50000 2.6190  
4.9821 47.05556 17.21111 -0.50000 2.6132  
5.9785 46.06667 17.33333 -0.50000 2.6141  
6.9749 45.07778 17.45556 -0.50000 2.6195  
7.9713 44.08889 17.57778 -0.50000 2.6231  
8.9677 43.10000 17.70000 -0.50000 2.6269

Structure: AK | Sub-structure: Sub #

| Dist. | Coordinates |     |     | Displacements |
|-------|-------------|-----|-----|---------------|
|       | x           | y   | z   | z             |
| [m]   | [m]         | [m] | [m] | [mm]          |

Vertical Offset 1  
0.0 43.10000 17.70000 -0.50000 2.6269  
0.98995 43.24000 18.68000 -0.50000 3.2069  
1.9799 43.38000 19.66000 -0.50000 3.8228  
2.9698 43.52000 20.64000 -0.50000 4.4471  
3.9598 43.66000 21.62000 -0.50000 5.0471  
4.9497 43.80000 22.60000 -0.50000 5.5779

Structure: AL | Sub-structure: Sub #

| Dist. | Coordinates |     |     | Displacements |
|-------|-------------|-----|-----|---------------|
|       | x           | y   | z   | z             |
| [m]   | [m]         | [m] | [m] | [mm]          |

Vertical Offset 1  
0.0 43.80000 22.60000 -0.50000 5.5779  
0.94763 42.86000 22.72000 -0.50000 5.6398  
1.8953 41.92000 22.84000 -0.50000 5.7182  
2.8429 40.98000 22.96000 -0.50000 5.8128  
3.7905 40.04000 23.08000 -0.50000 5.9216  
4.7381 39.10000 23.20000 -0.50000 6.0411

Structure: AM | Sub-structure: Sub #

| Dist. | Coordinates |     |     | Displacements |
|-------|-------------|-----|-----|---------------|
|       | x           | y   | z   | z             |
| [m]   | [m]         | [m] | [m] | [mm]          |

Vertical Offset 1  
0.0 39.10000 23.20000 -0.50000 6.0411  
0.90247 39.03333 22.30000 -0.50000 5.4596  
1.8049 38.96667 21.40000 -0.50000 4.8255  
2.7074 38.90000 20.50000 -0.50000 4.1772

Structure: AN | Sub-structure: Sub #

| Dist. | Coordinates |     |     | Displacements |
|-------|-------------|-----|-----|---------------|
|       | x           | y   | z   | z             |
| [m]   | [m]         | [m] | [m] | [mm]          |

Vertical Offset 1



# GEA LIMITED (GEOTECHNICAL & ENV ASSOC)

Rear of 159-163 King's Cross Road, London WC1X 9BN  
Wall Installation and Excavation Combined Issue 4

| Job No.   | Sheet No.           | Rev.    |
|-----------|---------------------|---------|
| J16180    |                     |         |
| Drg. Ref. |                     |         |
| Made by   | Date<br>07-Mar-2017 | Checked |

| Dist.   | Coordinates |          |          | Displacements |
|---------|-------------|----------|----------|---------------|
|         | x           | y        | z        |               |
| [m]     | [m]         | [m]      | [m]      | [mm]          |
| 0.0     | 38.90000    | 20.50000 | -0.50000 | 4.1772        |
| 0.83442 | 38.07500    | 20.62500 | -0.50000 | 4.2358        |
| 1.6688  | 37.25000    | 20.75000 | -0.50000 | 4.2931        |
| 2.5032  | 36.42500    | 20.87500 | -0.50000 | 4.3461        |
| 3.3377  | 35.60000    | 21.00000 | -0.50000 | 3.7729        |

Structure: AO | Sub-structure: Sub #

| Dist.             | Coordinates |          |          | Displacements |
|-------------------|-------------|----------|----------|---------------|
|                   | x           | y        | z        |               |
| [m]               | [m]         | [m]      | [m]      | [mm]          |
| Vertical Offset 1 |             |          |          |               |
| 0.0               | 35.60000    | 21.00000 | -0.50000 | 3.7729        |
| 0.83931           | 35.70000    | 21.83333 | -0.50000 | 4.3333        |
| 1.6786            | 35.80000    | 22.66667 | -0.50000 | 4.9000        |
| 2.5179            | 35.90000    | 23.50000 | -0.50000 | 5.4496        |

Structure: AP | Sub-structure: Sub #

| Dist.             | Coordinates |          |          | Displacements |
|-------------------|-------------|----------|----------|---------------|
|                   | x           | y        | z        |               |
| [m]               | [m]         | [m]      | [m]      | [mm]          |
| Vertical Offset 1 |             |          |          |               |
| 0.0               | 35.90000    | 23.50000 | -0.50000 | 5.4496        |
| 0.89107           | 35.02000    | 23.64000 | -0.50000 | 5.9080        |
| 1.7821            | 34.14000    | 23.78000 | -0.50000 | 5.7259        |
| 2.6732            | 33.26000    | 23.92000 | -0.50000 | 5.5043        |
| 3.5643            | 32.38000    | 24.06000 | -0.50000 | 5.2523        |
| 4.4553            | 31.50000    | 24.20000 | -0.50000 | 4.4806        |

Structure: AQ | Sub-structure: Sub #

| Dist.             | Coordinates |          |          | Displacements |
|-------------------|-------------|----------|----------|---------------|
|                   | x           | y        | z        |               |
| [m]               | [m]         | [m]      | [m]      | [mm]          |
| Vertical Offset 1 |             |          |          |               |
| 0.0               | 31.50000    | 24.20000 | -0.50000 | 4.4806        |
| 0.98995           | 31.36000    | 23.22000 | -0.50000 | 3.9078        |
| 1.9799            | 31.22000    | 22.24000 | -0.50000 | 3.3613        |
| 2.9698            | 31.08000    | 21.26000 | -0.50000 | 2.8296        |
| 3.9598            | 30.94000    | 20.28000 | -0.50000 | 2.3346        |
| 4.9497            | 30.80000    | 19.30000 | -0.50000 | 1.8906        |

Structure: AR | Sub-structure: Sub #

| Dist.             | Coordinates |          |          | Displacements |
|-------------------|-------------|----------|----------|---------------|
|                   | x           | y        | z        |               |
| [m]               | [m]         | [m]      | [m]      | [mm]          |
| Vertical Offset 1 |             |          |          |               |
| 0.0               | 35.60000    | 12.40000 | -0.50000 | 0.28271       |
| 0.94130           | 35.72222    | 13.33333 | -0.50000 | 0.51082       |
| 1.8826            | 35.84444    | 14.26667 | -0.50000 | 0.76308       |
| 2.8239            | 35.96667    | 15.20000 | -0.50000 | 1.0873        |
| 3.7652            | 36.08889    | 16.13333 | -0.50000 | 1.4553        |
| 4.7065            | 36.21111    | 17.06667 | -0.50000 | 1.8836        |
| 5.6478            | 36.33333    | 18.00000 | -0.50000 | 2.3846        |
| 6.5891            | 36.45556    | 18.93333 | -0.50000 | 2.9611        |
| 7.5304            | 36.57778    | 19.86667 | -0.50000 | 3.6063        |
| 8.4717            | 36.70000    | 20.80000 | -0.50000 | 4.3037        |

Structure: AS | Sub-structure: Sub #

| Dist.             | Coordinates |          |          | Displacements |
|-------------------|-------------|----------|----------|---------------|
|                   | x           | y        | z        |               |
| [m]               | [m]         | [m]      | [m]      | [mm]          |
| Vertical Offset 1 |             |          |          |               |
| 0.0               | 44.70000    | 9.30000  | -0.50000 | 0.0           |
| 0.90683           | 44.81111    | 10.20000 | -0.50000 | 0.052628      |
| 1.8137            | 44.92222    | 11.10000 | -0.50000 | 0.27148       |
| 2.7205            | 45.03333    | 12.00000 | -0.50000 | 0.49031       |
| 3.6273            | 45.14444    | 12.90000 | -0.50000 | 0.72996       |
| 4.5342            | 45.25556    | 13.80000 | -0.50000 | 1.0062        |
| 5.4410            | 45.36667    | 14.70000 | -0.50000 | 1.3298        |
| 6.3478            | 45.47778    | 15.60000 | -0.50000 | 1.7066        |
| 7.2547            | 45.58889    | 16.50000 | -0.50000 | 2.1370        |
| 8.1615            | 45.70000    | 17.40000 | -0.50000 | 2.6285        |

Structure: AT | Sub-structure: Sub #

| Dist.             | Coordinates |          |          | Displacements |
|-------------------|-------------|----------|----------|---------------|
|                   | x           | y        | z        |               |
| [m]               | [m]         | [m]      | [m]      | [mm]          |
| Vertical Offset 1 |             |          |          |               |
| 0.0               | 54.50000    | 10.00000 | -0.50000 | 0.015524      |
| 1.8461            | 54.71667    | 11.83333 | -0.50000 | 0.35466       |
| 3.6922            | 54.93333    | 13.66667 | -0.50000 | 0.73892       |
| 5.5383            | 55.15000    | 15.50000 | -0.50000 | 1.1684        |
| 7.3844            | 55.36667    | 17.33333 | -0.50000 | 1.6391        |
| 9.2305            | 55.58333    | 19.16667 | -0.50000 | 2.1132        |
| 11.077            | 55.80000    | 21.00000 | -0.50000 | 2.5289        |

Structure: AU | Sub-structure:

| Dist.             | Coordinates |          |          | Displacements |
|-------------------|-------------|----------|----------|---------------|
|                   | x           | y        | z        |               |
| [m]               | [m]         | [m]      | [m]      | [mm]          |
| Vertical Offset 1 |             |          |          |               |
| 0.0               | 33.10000    | 38.60000 | -2.00000 | 7.2961        |
| 0.88891           | 32.21250    | 38.65000 | -2.00000 | 7.1565        |
| 1.7778            | 31.32500    | 38.70000 | -2.00000 | 6.7541        |
| 2.6667            | 30.43750    | 38.75000 | -2.00000 | 6.1723        |
| 3.5556            | 29.55000    | 38.80000 | -2.00000 | 5.5251        |
| 4.4445            | 28.66250    | 38.85000 | -2.00000 | 4.8443        |
| 5.3334            | 27.77500    | 38.90000 | -2.00000 | 4.1684        |
| 6.2224            | 26.88750    | 38.95000 | -2.00000 | 3.5050        |
| 7.1113            | 26.00000    | 39.00000 | -2.00000 | 2.8727        |

Structure: AV | Sub-structure:

| Dist.             | Coordinates |     |     | Displacements |
|-------------------|-------------|-----|-----|---------------|
|                   | x           | y   | z   |               |
| [m]               | [m]         | [m] | [m] | [mm]          |
| Vertical Offset 1 |             |     |     |               |

Oasys

GEA LIMITED

(GEOTECHNICAL & ENV ASSOC)

Rear of 159-163 King's Cross Road, London WC1X 9BN

Wall Installation and Excavation Combined Issue 4

Job No.

Sheet No.

Rev.

J16180

Drg. Ref.

Made by

Date

Checked

07-Mar-2017

| Dist.   | Coordinates |          |          | Displacements |  |
|---------|-------------|----------|----------|---------------|--|
| [m]     | x           | y        | z        | z             |  |
|         | [m]         | [m]      | [m]      | [mm]          |  |
| 0.0     | 26.00000    | 39.00000 | -2.00000 | 2.8727        |  |
| 0.92195 | 25.94000    | 38.08000 | -2.00000 | 2.8692        |  |
| 1.8439  | 25.88000    | 37.16000 | -2.00000 | 2.8658        |  |
| 2.7659  | 25.82000    | 36.24000 | -2.00000 | 2.8623        |  |
| 3.6878  | 25.76000    | 35.32000 | -2.00000 | 2.8589        |  |
| 4.6098  | 25.70000    | 34.40000 | -2.00000 | 2.8555        |  |
| 5.5317  | 25.64000    | 33.48000 | -2.00000 | 2.8521        |  |
| 6.4537  | 25.58000    | 32.56000 | -2.00000 | 2.1229        |  |
| 7.3756  | 25.52000    | 31.64000 | -2.00000 | 2.0297        |  |
| 8.2976  | 25.46000    | 30.72000 | -2.00000 | 1.9131        |  |
| 9.2195  | 25.40000    | 29.80000 | -2.00000 | 1.7797        |  |

Structure: AW | Sub-structure:

| Dist.             | Coordinates |          |          | Displacements |  |
|-------------------|-------------|----------|----------|---------------|--|
| [m]               | x           | y        | z        | z             |  |
|                   | [m]         | [m]      | [m]      | [mm]          |  |
| Vertical Offset 1 |             |          |          |               |  |
| 0.0               | 25.40000    | 29.80000 | -2.00000 | 1.7797        |  |
| 1.8869            | 27.28333    | 29.68333 | -2.00000 | 2.7235        |  |
| 3.7739            | 29.16667    | 29.56667 | -2.00000 | 3.7125        |  |
| 5.6608            | 31.05000    | 29.45000 | -2.00000 | 5.0793        |  |
| 7.5478            | 32.93333    | 29.33333 | -2.00000 | 7.1818        |  |
| 9.4347            | 34.81667    | 29.21667 | -2.00000 | 7.7789        |  |
| 11.322            | 36.70000    | 29.10000 | -2.00000 | 6.3708        |  |

Specific Building Damage Results - All Segments

Structure: A | Sub-structure:

| Vertical Offset from Line for Vertical Movement Calculations | Segment | Start      | Length        | Curvature | Deflection Ratio | Average Horizontal Strain | Max. Tensile Strain | Maximum Gradient of Horizontal Displacement Curve | Maximum Gradient of Vertical Displacement Curve | Min. Radius of Curvature | Damage Category   |
|--------------------------------------------------------------|---------|------------|---------------|-----------|------------------|---------------------------|---------------------|---------------------------------------------------|-------------------------------------------------|--------------------------|-------------------|
| [m]<br>0.0                                                   | 1       | [m]<br>0.0 | [m]<br>3.3990 | Hogging   | [%]<br>0.0029763 | [%]<br>0.047882           | [%]<br>0.048383     | -515.16E-6                                        | -362.76E-6                                      | [m]<br>14135.            | 0<br>(Negligible) |

Tensile horizontal strains are +ve, compressive horizontal strains are -ve.

Structure: B | Sub-structure:

| Vertical Offset from Line for Vertical Movement Calculations | Segment | Start      | Length        | Curvature | Deflection Ratio | Average Horizontal Strain | Max. Tensile Strain | Maximum Gradient of Horizontal Displacement Curve | Maximum Gradient of Vertical Displacement Curve | Min. Radius of Curvature | Damage Category   |
|--------------------------------------------------------------|---------|------------|---------------|-----------|------------------|---------------------------|---------------------|---------------------------------------------------|-------------------------------------------------|--------------------------|-------------------|
| [m]<br>0.0                                                   | 1       | [m]<br>0.0 | [m]<br>3.0990 | Sagging   | [%]<br>335.83E-6 | [%]<br>-0.012586          | [%]<br>0.0025245    | 206.95E-6                                         | -160.85E-6                                      | [m]<br>69575.            | 0<br>(Negligible) |

Tensile horizontal strains are +ve, compressive horizontal strains are -ve.

Structure: C | Sub-structure:

| Vertical Offset from Line for Vertical Movement Calculations | Segment | Start         | Length        | Curvature | Deflection Ratio | Average Horizontal Strain | Max. Tensile Strain | Maximum Gradient of Horizontal Displacement Curve | Maximum Gradient of Vertical Displacement Curve | Min. Radius of Curvature | Damage Category    |
|--------------------------------------------------------------|---------|---------------|---------------|-----------|------------------|---------------------------|---------------------|---------------------------------------------------|-------------------------------------------------|--------------------------|--------------------|
| [m]<br>0.0                                                   | 1       | [m]<br>0.0    | [m]<br>3.2976 | Hogging   | [%]<br>0.0014779 | [%]<br>0.066080           | [%]<br>0.066321     | -745.72E-6                                        | -595.22E-6                                      | [m]<br>13131.            | 1<br>(Very Slight) |
|                                                              | 2       | [m]<br>3.2976 | [m]<br>1.3025 | Sagging   | [%]<br>226.41E-6 | [%]<br>0.048140           | [%]<br>0.048169     | -629.81E-6                                        | -595.22E-6                                      | [m]<br>55670.            | 0<br>(Negligible)  |

Tensile horizontal strains are +ve, compressive horizontal strains are -ve.

Structure: D | Sub-structure:

| Vertical Offset from Line for Vertical Movement Calculations | Segment | Start         | Length         | Curvature | Deflection Ratio | Average Horizontal Strain | Max. Tensile Strain | Maximum Gradient of Horizontal Displacement Curve | Maximum Gradient of Vertical Displacement Curve | Min. Radius of Curvature | Damage Category   |
|--------------------------------------------------------------|---------|---------------|----------------|-----------|------------------|---------------------------|---------------------|---------------------------------------------------|-------------------------------------------------|--------------------------|-------------------|
| [m]<br>0.0                                                   | 1       | [m]<br>0.0    | [m]<br>1.3181  | Hogging   | [%]<br>0.0036865 | [%]<br>-0.014706          | [%]<br>0.0036797    | 189.46E-6                                         | 362.66E-6                                       | [m]<br>4314.1            | 0<br>(Negligible) |
|                                                              | 2       | [m]<br>1.3181 | [m]<br>1.9632  | Sagging   | [%]<br>0.017228  | [%]<br>0.0069651          | [%]<br>0.020445     | -123.63E-6                                        | 0.0010102                                       | [m]<br>3765.8            | 0<br>(Negligible) |
|                                                              | 3       | [m]<br>3.2812 | [m]<br>1.5940  | Hogging   | [%]<br>0.011073  | [%]<br>-0.0083800         | [%]<br>0.0088019    | 144.55E-6                                         | 0.0010102                                       | [m]<br>5919.8            | 0<br>(Negligible) |
|                                                              | 4       | [m]<br>4.8752 | [m]<br>0.52473 | Hogging   | [%]<br>0.0       | [%]<br>-0.011476          | [%]<br>0.0022951    | 114.77E-6                                         | 339.34E-6                                       | [m]<br>4216.7            | 0<br>(Negligible) |

Tensile horizontal strains are +ve, compressive horizontal strains are -ve.

Structure: E | Sub-structure:

| Vertical Offset from Line for Vertical Movement Calculations | Segment | Start      | Length        | Curvature | Deflection Ratio | Average Horizontal Strain | Max. Tensile Strain | Maximum Gradient of Horizontal Displacement Curve | Maximum Gradient of Vertical Displacement Curve | Min. Radius of Curvature | Damage Category   |
|--------------------------------------------------------------|---------|------------|---------------|-----------|------------------|---------------------------|---------------------|---------------------------------------------------|-------------------------------------------------|--------------------------|-------------------|
| [m]<br>0.0                                                   | 1       | [m]<br>0.0 | [m]<br>2.4990 | Sagging   | [%]<br>0.0013159 | [%]<br>-0.0058172         | [%]<br>0.0014001    | 85.129E-6                                         | -338.44E-6                                      | [m]<br>14198.            | 0<br>(Negligible) |

Tensile horizontal strains are +ve, compressive horizontal strains are -ve.

Structure: F | Sub-structure:

| Vertical Offset from Line for Vertical Movement Calculations | Segment | Start          | Length         | Curvature | Deflection Ratio | Average Horizontal Strain | Max. Tensile Strain | Maximum Gradient of Horizontal Displacement Curve | Maximum Gradient of Vertical Displacement Curve | Min. Radius of Curvature | Damage Category   |
|--------------------------------------------------------------|---------|----------------|----------------|-----------|------------------|---------------------------|---------------------|---------------------------------------------------|-------------------------------------------------|--------------------------|-------------------|
| [m]<br>0.0                                                   | 1       | [m]<br>0.0     | [m]<br>0.40113 | Sagging   | [%]<br>0.0       | [%]<br>0.013347           | [%]<br>0.013347     | -133.45E-6                                        | 490.90E-6                                       | [m]<br>41903.            | 0<br>(Negligible) |
|                                                              | 2       | [m]<br>0.40113 | [m]<br>8.8984  | Hogging   | [%]<br>0.0047801 | [%]<br>0.030947           | [%]<br>0.033014     | -419.83E-6                                        | 490.90E-6                                       | [m]<br>14423.            | 0<br>(Negligible) |

Tensile horizontal strains are +ve, compressive horizontal strains are -ve.

Structure: G | Sub-structure:

| Vertical Offset from Line for Vertical Movement Calculations | Segment | Start | Length | Curvature | Deflection Ratio | Average Horizontal Strain | Max. Tensile Strain | Maximum Gradient of Horizontal Displacement Curve | Maximum Gradient of Vertical Displacement Curve | Min. Radius of Curvature | Damage Category |
|--------------------------------------------------------------|---------|-------|--------|-----------|------------------|---------------------------|---------------------|---------------------------------------------------|-------------------------------------------------|--------------------------|-----------------|
| [m]                                                          |         | [m]   | [m]    |           | [%]              | [%]                       | [%]                 |                                                   |                                                 | [m]                      |                 |

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C:\Users\caroline\Desktop\06...\Xdisp1 wall installation and excavation combined.xdd

Page 21

Printed 07-Mar-2017 Time 13:27



GEA LIMITED  
(GEOTECHNICAL & ENV ASSOC)

Rear of 159-163 King's Cross Road, London WC1X 9BN  
Wall Installation and Excavation Combined Issue 4

| Job No.   | Sheet No.           | Rev.    |
|-----------|---------------------|---------|
| J16180    |                     |         |
| Drg. Ref. |                     |         |
| Made by   | Date<br>07-Mar-2017 | Checked |

| Vertical Offset from Line for Vertical Movement                             | Segment | Start   | Length  | Curvature | Deflection Ratio | Average Horizontal Strain | Max. Tensile Strain | Maximum Gradient of Horizontal Displacement | Maximum Gradient of Vertical Displacement | Min. Radius of Curvature | Damage Category   |
|-----------------------------------------------------------------------------|---------|---------|---------|-----------|------------------|---------------------------|---------------------|---------------------------------------------|-------------------------------------------|--------------------------|-------------------|
| 0.0                                                                         | 1       | 0.0     | 3.0000  | Hogging   | 86.371E-6        | -613.24E-6                | 132.57E-6           | -49.005E-6                                  | 41.003E-6                                 | 316360.                  | 0<br>(Negligible) |
| Tensile horizontal strains are +ve, compressive horizontal strains are -ve. |         |         |         |           |                  |                           |                     |                                             |                                           |                          |                   |
| Structure: H   Sub-structure:                                               |         |         |         |           |                  |                           |                     |                                             |                                           |                          |                   |
| Vertical Offset from Line for Vertical Movement                             | Segment | Start   | Length  | Curvature | Deflection Ratio | Average Horizontal Strain | Max. Tensile Strain | Maximum Gradient of Horizontal Displacement | Maximum Gradient of Vertical Displacement | Min. Radius of Curvature | Damage Category   |
| Calculations<br>[m]<br>0.0                                                  | 1       | 0.90662 | 1.8002  | Hogging   | 438.44E-6        | 0.029052                  | 0.029092            | -316.66E-6                                  | -70.084E-6                                | 39519.                   | 0<br>(Negligible) |
| Tensile horizontal strains are +ve, compressive horizontal strains are -ve. |         |         |         |           |                  |                           |                     |                                             |                                           |                          |                   |
| Structure: I   Sub-structure:                                               |         |         |         |           |                  |                           |                     |                                             |                                           |                          |                   |
| Vertical Offset from Line for Vertical Movement                             | Segment | Start   | Length  | Curvature | Deflection Ratio | Average Horizontal Strain | Max. Tensile Strain | Maximum Gradient of Horizontal Displacement | Maximum Gradient of Vertical Displacement | Min. Radius of Curvature | Damage Category   |
| Calculations<br>[m]<br>0.0                                                  | 1       | 0.0     | 2.7003  | Hogging   | 362.83E-6        | 0.011259                  | 0.011308            | -174.20E-6                                  | 54.672E-6                                 | 74444.                   | 0<br>(Negligible) |
| Tensile horizontal strains are +ve, compressive horizontal strains are -ve. |         |         |         |           |                  |                           |                     |                                             |                                           |                          |                   |
| Structure: J   Sub-structure:                                               |         |         |         |           |                  |                           |                     |                                             |                                           |                          |                   |
| Vertical Offset from Line for Vertical Movement                             | Segment | Start   | Length  | Curvature | Deflection Ratio | Average Horizontal Strain | Max. Tensile Strain | Maximum Gradient of Horizontal Displacement | Maximum Gradient of Vertical Displacement | Min. Radius of Curvature | Damage Category   |
| Calculations<br>[m]<br>0.0                                                  | 1       | 0.0     | 13.450  | Sagging   | 0.0018626        | -0.0040738                | 0.0010651           | 100.23E-6                                   | 86.649E-6                                 | 49099.                   | 0<br>(Negligible) |
|                                                                             | 2       | 13.450  | 6.0491  | Hogging   | 148.82E-6        | -0.0047012                | 943.96E-6           | 94.060E-6                                   | 86.649E-6                                 | 198650.                  | 0<br>(Negligible) |
| Tensile horizontal strains are +ve, compressive horizontal strains are -ve. |         |         |         |           |                  |                           |                     |                                             |                                           |                          |                   |
| Structure: K   Sub-structure:                                               |         |         |         |           |                  |                           |                     |                                             |                                           |                          |                   |
| Vertical Offset from Line for Vertical Movement                             | Segment | Start   | Length  | Curvature | Deflection Ratio | Average Horizontal Strain | Max. Tensile Strain | Maximum Gradient of Horizontal Displacement | Maximum Gradient of Vertical Displacement | Min. Radius of Curvature | Damage Category   |
| Calculations<br>[m]<br>0.0                                                  | 1       | 0.0     | 2.5412  | Sagging   | 0.0096821        | -0.013063                 | 0.0070639           | 358.22E-6                                   | -633.90E-6                                | 1935.7                   | 0<br>(Negligible) |
|                                                                             | 2       | 2.5412  | 1.4730  | Hogging   | 0.0014133        | -0.055815                 | 0.011193            | 668.44E-6                                   | -576.62E-6                                | 12029.                   | 0<br>(Negligible) |
|                                                                             | 3       | 4.0141  | 3.4266  | Sagging   | 0.013390         | -0.027361                 | 0.0099058           | 668.44E-6                                   | -576.62E-6                                | 4056.7                   | 0<br>(Negligible) |
|                                                                             | 4       | 7.4408  | 1.4582  | Hogging   | 99.152E-6        | -0.0037539                | 752.99E-6           | 67.070E-6                                   | 108.30E-6                                 | 155660.                  | 0<br>(Negligible) |
| Tensile horizontal strains are +ve, compressive horizontal strains are -ve. |         |         |         |           |                  |                           |                     |                                             |                                           |                          |                   |
| Structure: L   Sub-structure:                                               |         |         |         |           |                  |                           |                     |                                             |                                           |                          |                   |
| Vertical Offset from Line for Vertical Movement                             | Segment | Start   | Length  | Curvature | Deflection Ratio | Average Horizontal Strain | Max. Tensile Strain | Maximum Gradient of Horizontal Displacement | Maximum Gradient of Vertical Displacement | Min. Radius of Curvature | Damage Category   |
| Calculations<br>[m]<br>0.0                                                  | 1       | 0.0     | 6.7766  | Hogging   | 0.0048074        | 0.068779                  | 0.071612            | -939.07E-6                                  | -595.91E-6                                | 13727.                   | 1 (Very Slight)   |
|                                                                             | 2       | 6.7766  | 0.42240 | Sagging   | 0.0              | 0.093752                  | 0.093752            | -936.64E-6                                  | -595.91E-6                                | 123000.                  | 2 (Slight)        |
| Tensile horizontal strains are +ve, compressive horizontal strains are -ve. |         |         |         |           |                  |                           |                     |                                             |                                           |                          |                   |
| Structure: M   Sub-structure:                                               |         |         |         |           |                  |                           |                     |                                             |                                           |                          |                   |
| Vertical Offset from Line for Vertical Movement                             | Segment | Start   | Length  | Curvature | Deflection Ratio | Average Horizontal Strain | Max. Tensile Strain | Maximum Gradient of Horizontal Displacement | Maximum Gradient of Vertical Displacement | Min. Radius of Curvature | Damage Category   |
| Calculations<br>[m]<br>0.0                                                  | 1       | 0.0     | 5.8138  | Hogging   | 0.0033799        | 0.054899                  | 0.056453            | -802.16E-6                                  | -496.50E-6                                | 17248.                   | 1 (Very Slight)   |
|                                                                             | 2       | 5.8138  | 1.4859  | Sagging   | 480.27E-6        | 0.078785                  | 0.078899            | -802.16E-6                                  | -496.50E-6                                | 31493.                   | 2 (Slight)        |
| Tensile horizontal strains are +ve, compressive horizontal strains are -ve. |         |         |         |           |                  |                           |                     |                                             |                                           |                          |                   |
| Structure: N   Sub-structure:                                               |         |         |         |           |                  |                           |                     |                                             |                                           |                          |                   |
| Vertical Offset from Line for Vertical Movement                             | Segment | Start   | Length  | Curvature | Deflection Ratio | Average Horizontal Strain | Max. Tensile Strain | Maximum Gradient of Horizontal Displacement | Maximum Gradient of Vertical Displacement | Min. Radius of Curvature | Damage Category   |
| Calculations<br>[m]<br>0.0                                                  | 1       | 0.0     | 6.0990  | Hogging   | 0.0018946        | 0.038123                  | 0.038852            | -632.21E-6                                  | 334.46E-6                                 | 12489.                   | 0<br>(Negligible) |
| Tensile horizontal strains are +ve, compressive horizontal strains are -ve. |         |         |         |           |                  |                           |                     |                                             |                                           |                          |                   |
| Structure: O   Sub-structure:                                               |         |         |         |           |                  |                           |                     |                                             |                                           |                          |                   |
| Vertical Offset from Line for Vertical Movement                             | Segment | Start   | Length  | Curvature | Deflection Ratio | Average Horizontal Strain | Max. Tensile Strain | Maximum Gradient of Horizontal Displacement | Maximum Gradient of Vertical Displacement | Min. Radius of Curvature | Damage Category   |
| Calculations<br>[m]<br>0.0                                                  | 1       | 0.0     | 4.5990  | Sagging   | 0.0089511        | 0.10484                   | 0.11712             | -0.0012289                                  | -601.53E-6                                | 2682.4                   | 2 (Slight)        |
| Tensile horizontal strains are +ve, compressive horizontal strains are -ve. |         |         |         |           |                  |                           |                     |                                             |                                           |                          |                   |
| Structure: P   Sub-structure: Sub #                                         |         |         |         |           |                  |                           |                     |                                             |                                           |                          |                   |
| Vertical Offset from Line for Vertical Movement                             | Segment | Start   | Length  | Curvature | Deflection Ratio | Average Horizontal Strain | Max. Tensile Strain | Maximum Gradient of Horizontal Displacement | Maximum Gradient of Vertical Displacement | Min. Radius of Curvature | Damage Category   |



GEA LIMITED  
(GEOTECHNICAL & ENV ASSOC)

Rear of 159-163 King's Cross Road, London WC1X 9BN  
Wall Installation and Excavation Combined Issue 4

| Job No.   | Sheet No.           | Rev.    |
|-----------|---------------------|---------|
| J16180    |                     |         |
| Drg. Ref. |                     |         |
| Made by   | Date<br>07-Mar-2017 | Checked |

| Calculations |   |        |                |           | Curve    |          | Curve      |            |                       |
|--------------|---|--------|----------------|-----------|----------|----------|------------|------------|-----------------------|
| [m]          |   | [m]    | [m]            | [%]       | [%]      | [%]      |            | [m]        |                       |
| 0.0          | 1 | 0.0    | 1.9268 Hogging | 330.43E-6 | 0.059243 | 0.059343 | -607.68E-6 | -341.91E-6 | 68339.1 (Very Slight) |
|              | 2 | 1.9268 | 1.2874 Sagging | 546.31E-6 | 0.053365 | 0.053584 | -546.14E-6 | -341.91E-6 | 22553.1 (Very Slight) |
|              | 3 | 3.2141 | 2.4849 Hogging | 0.011659  | -0.13342 | 0.027500 | 0.0041117  | -735.62E-6 | 1332.1 (Negligible)   |
|              |   |        |                |           |          |          |            |            | 0                     |

Tensile horizontal strains are +ve, compressive horizontal strains are -ve.

Structure: Q | Sub-structure:

| Vertical Offset from Line for Vertical Movement Calculations | Segment | Start      | Length        | Curvature | Deflection Ratio | Average Horizontal Strain | Max. Tensile Strain | Maximum Gradient of Horizontal Displacement Curve | Maximum Gradient of Vertical Displacement Curve | Min. Radius of Curvature | Damage Category |
|--------------------------------------------------------------|---------|------------|---------------|-----------|------------------|---------------------------|---------------------|---------------------------------------------------|-------------------------------------------------|--------------------------|-----------------|
| [m]<br>0.0                                                   | 1       | [m]<br>0.0 | [m]<br>4.5990 | Sagging   | [%]<br>0.011029  | [%]<br>0.065472           | [%]<br>0.080665     | -743.67E-6                                        | -460.07E-6                                      | [m]<br>2495.2            | 2 (Slight)      |

Tensile horizontal strains are +ve, compressive horizontal strains are -ve.

Structure: R | Sub-structure:

| Vertical Offset from Line for Vertical Movement Calculations | Segment | Start      | Length         | Curvature | Deflection Ratio | Average Horizontal Strain | Max. Tensile Strain | Maximum Gradient of Horizontal Displacement Curve | Maximum Gradient of Vertical Displacement Curve | Min. Radius of Curvature | Damage Category |
|--------------------------------------------------------------|---------|------------|----------------|-----------|------------------|---------------------------|---------------------|---------------------------------------------------|-------------------------------------------------|--------------------------|-----------------|
| [m]<br>0.0                                                   | 1       | [m]<br>0.0 | [m]<br>0.48898 | None      | [%]<br>0.0       | [%]<br>-0.011910          | [%]<br>0.0023819    | 119.11E-6                                         | -478.92E-6                                      | [m]<br>3705.9            | 0 (Negligible)  |
|                                                              | 2       | 0.48898    | 1.6884         | Hogging   | 0.014410         | -0.0082501                | 0.011736            | 119.11E-6                                         | -0.0013996                                      | 4148.5                   | 0 (Negligible)  |
|                                                              | 3       | 2.1774     | 2.6641         | Sagging   | 0.019756         | 0.029613                  | 0.049756            | -472.17E-6                                        | -0.0013996                                      | 2782.0                   | 0 (Negligible)  |
|                                                              | 4       | 4.8416     | 2.5682         | Hogging   | 0.027615         | -0.17424                  | 0.038203            | 0.0039857                                         | -0.0013304                                      | 562.66                   | 0 (Negligible)  |

Tensile horizontal strains are +ve, compressive horizontal strains are -ve.

Structure: S | Sub-structure:

| Vertical Offset from Line for Vertical Movement Calculations | Segment | Start      | Length        | Curvature | Deflection Ratio | Average Horizontal Strain | Max. Tensile Strain | Maximum Gradient of Horizontal Displacement Curve | Maximum Gradient of Vertical Displacement Curve | Min. Radius of Curvature | Damage Category |
|--------------------------------------------------------------|---------|------------|---------------|-----------|------------------|---------------------------|---------------------|---------------------------------------------------|-------------------------------------------------|--------------------------|-----------------|
| [m]<br>0.0                                                   | 1       | [m]<br>0.0 | [m]<br>7.3583 | Sagging   | [%]<br>388.00E-6 | [%]<br>-0.0055033         | [%]<br>0.0011167    | 63.398E-6                                         | -11.934E-6                                      | [m]<br>242620.           | 0 (Negligible)  |
|                                                              | 2       | 7.3583     | 0.56855       | Hogging   | 297.58E-6        | -0.0045601                | 928.15E-6           | 46.798E-6                                         | 11.016E-6                                       | 3.4224E+6                | 0 (Negligible)  |
|                                                              | 3       | 7.9268     | 1.7607        | None      | 0.0              | -0.0046796                | 935.95E-6           | -55.267E-6                                        | 15.731E-6                                       | 342600.                  | 0 (Negligible)  |

Tensile horizontal strains are +ve, compressive horizontal strains are -ve.

Structure: T | Sub-structure:

| Vertical Offset from Line for Vertical Movement Calculations | Segment | Start      | Length        | Curvature | Deflection Ratio | Average Horizontal Strain | Max. Tensile Strain | Maximum Gradient of Horizontal Displacement Curve | Maximum Gradient of Vertical Displacement Curve | Min. Radius of Curvature | Damage Category |
|--------------------------------------------------------------|---------|------------|---------------|-----------|------------------|---------------------------|---------------------|---------------------------------------------------|-------------------------------------------------|--------------------------|-----------------|
| [m]<br>0.0                                                   | 1       | [m]<br>0.0 | [m]<br>2.5281 | Sagging   | [%]<br>0.0010397 | [%]<br>-0.043172          | [%]<br>0.0086543    | 894.85E-6                                         | -93.966E-6                                      | [m]<br>20038.            | 0 (Negligible)  |
|                                                              | 2       | 2.5281     | 3.2548        | Hogging   | 0.0020700        | -0.10292                  | 0.020619            | 0.0011383                                         | -115.92E-6                                      | 29079.                   | 0 (Negligible)  |
|                                                              | 3       | 5.7829     | 6.3168        | Sagging   | 0.0090031        | -0.17.11E-6               | 0.0089006           | 0.0011383                                         | -282.96E-6                                      | 10857.                   | 0 (Negligible)  |
|                                                              | 4       | 12.100     | 6.6373        | Hogging   | 0.0084180        | 0.0050523                 | 0.010671            | -78.910E-6                                        | -578.74E-6                                      | 10589.                   | 0 (Negligible)  |
|                                                              | 5       | 18.737     | 4.8604        | Sagging   | 0.014298         | 0.0042591                 | 0.015864            | -117.74E-6                                        | -578.74E-6                                      | 9117.9                   | 0 (Negligible)  |
|                                                              | 6       | 23.597     | 10.163        | Hogging   | 963.65E-6        | 0.010169                  | 0.010980            | -167.31E-6                                        | 218.65E-6                                       | 40573.                   | 0 (Negligible)  |

Tensile horizontal strains are +ve, compressive horizontal strains are -ve.

Structure: U | Sub-structure:

| Vertical Offset from Line for Vertical Movement Calculations | Segment | Start         | Length        | Curvature | Deflection Ratio | Average Horizontal Strain | Max. Tensile Strain | Maximum Gradient of Horizontal Displacement Curve | Maximum Gradient of Vertical Displacement Curve | Min. Radius of Curvature | Damage Category |
|--------------------------------------------------------------|---------|---------------|---------------|-----------|------------------|---------------------------|---------------------|---------------------------------------------------|-------------------------------------------------|--------------------------|-----------------|
| [m]<br>0.0                                                   | 1       | [m]<br>1.9720 | [m]<br>7.8870 | Hogging   | [%]<br>0.0048454 | [%]<br>0.032027           | [%]<br>0.035304     | -320.17E-6                                        | -370.92E-6                                      | [m]<br>10350.            | 0 (Negligible)  |

Tensile horizontal strains are +ve, compressive horizontal strains are -ve.

Structure: V | Sub-structure:

| Vertical Offset from Line for Vertical Movement Calculations | Segment | Start      | Length        | Curvature | Deflection Ratio | Average Horizontal Strain | Max. Tensile Strain | Maximum Gradient of Horizontal Displacement Curve | Maximum Gradient of Vertical Displacement Curve | Min. Radius of Curvature | Damage Category |
|--------------------------------------------------------------|---------|------------|---------------|-----------|------------------|---------------------------|---------------------|---------------------------------------------------|-------------------------------------------------|--------------------------|-----------------|
| [m]<br>0.0                                                   | 1       | [m]<br>0.0 | [m]<br>1.0341 | Hogging   | [%]<br>77.181E-6 | [%]<br>0.033385           | [%]<br>0.033394     | -447.94E-6                                        | -383.70E-6                                      | [m]<br>70690.            | 0 (Negligible)  |
|                                                              | 2       | 1.0341     | 2.6049        | Sagging   | 653.78E-6        | 0.055499                  | 0.055886            | -600.80E-6                                        | -383.70E-6                                      | 38449.1 (Very Slight)    | 1               |

Tensile horizontal strains are +ve, compressive horizontal strains are -ve.

Structure: W | Sub-structure:

| Vertical Offset from Line for Vertical Movement Calculations | Segment | Start      | Length        | Curvature | Deflection Ratio | Average Horizontal Strain | Max. Tensile Strain | Maximum Gradient of Horizontal Displacement Curve | Maximum Gradient of Vertical Displacement Curve | Min. Radius of Curvature | Damage Category |
|--------------------------------------------------------------|---------|------------|---------------|-----------|------------------|---------------------------|---------------------|---------------------------------------------------|-------------------------------------------------|--------------------------|-----------------|
| [m]<br>0.0                                                   | 1       | [m]<br>0.0 | [m]<br>1.1392 | Sagging   | [%]<br>33.906E-6 | [%]<br>0.011336           | [%]<br>0.011344     | -113.35E-6                                        | 150.04E-6                                       | [m]<br>415160.           | 0 (Negligible)  |

Tensile horizontal strains are +ve, compressive horizontal strains are -ve.

Structure: X | Sub-structure:

| Vertical Offset from Line for | Segment | Start | Length | Curvature | Deflection Ratio | Average Horizontal Strain | Max. Tensile Strain | Maximum Gradient of | Maximum Gradient of | Min. Radius of | Damage Category |
|-------------------------------|---------|-------|--------|-----------|------------------|---------------------------|---------------------|---------------------|---------------------|----------------|-----------------|
|-------------------------------|---------|-------|--------|-----------|------------------|---------------------------|---------------------|---------------------|---------------------|----------------|-----------------|



# GEA LIMITED (GEOTECHNICAL & ENV ASSOC)

Rear of 159-163 King's Cross Road, London WC1X 9BN  
Wall Installation and Excavation Combined Issue 4

| Job No.   | Sheet No.           | Rev.    |
|-----------|---------------------|---------|
| J16180    |                     |         |
| Drg. Ref. |                     |         |
| Made by   | Date<br>07-Mar-2017 | Checked |

| Vertical Movement Calculations |        |        |         | Strain    | Strain    | Horizontal Displacement Curve | Vertical Displacement Curve | Curvature  |            |              |
|--------------------------------|--------|--------|---------|-----------|-----------|-------------------------------|-----------------------------|------------|------------|--------------|
|                                | [m]    | [m]    |         | [%]       | [%]       |                               |                             | [m]        |            |              |
|                                | 0.0    |        |         |           |           |                               |                             |            |            |              |
|                                | 1      | 4.8600 | 1.7333  | Hogging   | 0.017371  | 0.030927                      | 0.037757                    | -318.53E-6 | -872.41E-6 | 3843.1       |
|                                | 2      | 6.5934 | 1.8267  | Sagging   | 0.0050739 | 0.041158                      | 0.042816                    | -462.19E-6 | -872.41E-6 | 16628.       |
| 3                              | 8.4201 | 1.2990 | Hogging | 806.80E-6 | 0.045575  | 0.045669                      | -462.19E-6                  | -448.15E-6 | 20861.     |              |
|                                |        |        |         |           |           |                               |                             |            |            | (Negligible) |
|                                |        |        |         |           |           |                               |                             |            |            | (Negligible) |
|                                |        |        |         |           |           |                               |                             |            |            | (Negligible) |

Tensile horizontal strains are +ve, compressive horizontal strains are -ve.

Structure: Y | Sub-structure:

| Vertical Offset from Line for Vertical Movement Calculations | Segment | Start  | Length   | Curvature | Deflection Ratio | Average Horizontal Strain | Max. Tensile Strain | Maximum Gradient of Horizontal Displacement Curve | Maximum Gradient of Vertical Displacement Curve | Min. Radius of Curvature | Damage Category |
|--------------------------------------------------------------|---------|--------|----------|-----------|------------------|---------------------------|---------------------|---------------------------------------------------|-------------------------------------------------|--------------------------|-----------------|
| [m]<br>0.0                                                   |         | [m]    | [m]      |           | [%]              | [%]                       | [%]                 |                                                   |                                                 | [m]                      |                 |
|                                                              | 1       | 0.0    | 3.6141   | Hogging   | 949.33E-6        | 0.046837                  | 0.047188            | -483.46E-6                                        | -545.30E-6                                      | 25577.                   | 0               |
|                                                              | 2       | 3.6141 | 0.024928 | None      | 0.0              | 0.048369                  | 0.048369            | -483.46E-6                                        | -545.30E-6                                      | 4.1155E+6                | (Negligible)    |
|                                                              |         |        |          |           |                  |                           |                     |                                                   |                                                 |                          | 0               |
|                                                              |         |        |          |           |                  |                           |                     |                                                   |                                                 |                          | (Negligible)    |

Tensile horizontal strains are +ve, compressive horizontal strains are -ve.

Structure: Z | Sub-structure:

| Vertical Offset from Line for Vertical Movement Calculations | Segment | Start  | Length | Curvature | Deflection Ratio | Average Horizontal Strain | Max. Tensile Strain | Maximum Gradient of Horizontal Displacement Curve | Maximum Gradient of Vertical Displacement Curve | Min. Radius of Curvature | Damage Category |
|--------------------------------------------------------------|---------|--------|--------|-----------|------------------|---------------------------|---------------------|---------------------------------------------------|-------------------------------------------------|--------------------------|-----------------|
| [m]<br>0.0                                                   |         | [m]    | [m]    |           | [%]              | [%]                       | [%]                 |                                                   |                                                 | [m]                      |                 |
|                                                              | 1       | 5.7481 | 3.8311 | Hogging   | 0.0014764        | 0.030510                  | 0.031016            | -305.01E-6                                        | -303.27E-6                                      | 18277.                   | 0               |
|                                                              |         |        |        |           |                  |                           |                     |                                                   |                                                 |                          | (Negligible)    |

Tensile horizontal strains are +ve, compressive horizontal strains are -ve.

Structure: AA | Sub-structure:

| Vertical Offset from Line for Vertical Movement Calculations | Segment | Start | Length | Curvature | Deflection Ratio | Average Horizontal Strain | Max. Tensile Strain | Maximum Gradient of Horizontal Displacement Curve | Maximum Gradient of Vertical Displacement Curve | Min. Radius of Curvature | Damage Category |
|--------------------------------------------------------------|---------|-------|--------|-----------|------------------|---------------------------|---------------------|---------------------------------------------------|-------------------------------------------------|--------------------------|-----------------|
| [m]<br>0.0                                                   |         | [m]   | [m]    |           | [%]              | [%]                       | [%]                 |                                                   |                                                 | [m]                      |                 |
|                                                              | 1       | 0.0   | 3.6610 | Hogging   | 0.0023745        | 0.046377                  | 0.047267            | -471.56E-6                                        | -497.68E-6                                      | 18096.                   | 0               |
|                                                              |         |       |        |           |                  |                           |                     |                                                   |                                                 |                          | (Negligible)    |

Tensile horizontal strains are +ve, compressive horizontal strains are -ve.

Structure: AB | Sub-structure:

| Vertical Offset from Line for Vertical Movement Calculations | Segment | Start  | Length  | Curvature | Deflection Ratio | Average Horizontal Strain | Max. Tensile Strain | Maximum Gradient of Horizontal Displacement Curve | Maximum Gradient of Vertical Displacement Curve | Min. Radius of Curvature | Damage Category |
|--------------------------------------------------------------|---------|--------|---------|-----------|------------------|---------------------------|---------------------|---------------------------------------------------|-------------------------------------------------|--------------------------|-----------------|
| [m]<br>0.0                                                   |         | [m]    | [m]     |           | [%]              | [%]                       | [%]                 |                                                   |                                                 | [m]                      |                 |
|                                                              | 1       | 8.5163 | 0.42783 | Sagging   | 0.0              | 0.014228                  | 0.014228            | -152.02E-6                                        | -197.23E-6                                      | 25016.                   | 0               |
|                                                              | 2       | 8.9441 | 0.51743 | Sagging   | 0.0              | 0.014228                  | 0.014228            | -142.26E-6                                        | -193.27E-6                                      | 20684.                   | (Negligible)    |
|                                                              |         |        |         |           |                  |                           |                     |                                                   |                                                 |                          | 0               |
|                                                              |         |        |         |           |                  |                           |                     |                                                   |                                                 |                          | (Negligible)    |

Tensile horizontal strains are +ve, compressive horizontal strains are -ve.

Structure: AC | Sub-structure:

| Vertical Offset from Line for Vertical Movement Calculations | Segment | Start | Length | Curvature | Deflection Ratio | Average Horizontal Strain | Max. Tensile Strain | Maximum Gradient of Horizontal Displacement Curve | Maximum Gradient of Vertical Displacement Curve | Min. Radius of Curvature | Damage Category |
|--------------------------------------------------------------|---------|-------|--------|-----------|------------------|---------------------------|---------------------|---------------------------------------------------|-------------------------------------------------|--------------------------|-----------------|
| [m]<br>0.0                                                   |         | [m]   | [m]    |           | [%]              | [%]                       | [%]                 |                                                   |                                                 | [m]                      |                 |
|                                                              | 1       | 0.0   | 5.0794 | Hogging   | 609.84E-6        | 0.013059                  | 0.013659            | -168.54E-6                                        | -233.40E-6                                      | 93673.                   | 0               |
|                                                              |         |       |        |           |                  |                           |                     |                                                   |                                                 |                          | (Negligible)    |

Tensile horizontal strains are +ve, compressive horizontal strains are -ve.

Structure: AD | Sub-structure:

| Vertical Offset from Line for Vertical Movement Calculations | Segment | Start  | Length | Curvature | Deflection Ratio | Average Horizontal Strain | Max. Tensile Strain | Maximum Gradient of Horizontal Displacement Curve | Maximum Gradient of Vertical Displacement Curve | Min. Radius of Curvature | Damage Category |
|--------------------------------------------------------------|---------|--------|--------|-----------|------------------|---------------------------|---------------------|---------------------------------------------------|-------------------------------------------------|--------------------------|-----------------|
| [m]<br>0.0                                                   |         | [m]    | [m]    |           | [%]              | [%]                       | [%]                 |                                                   |                                                 | [m]                      |                 |
|                                                              | 1       | 0.0    | 3.4564 | Hogging   | 865.17E-6        | 0.038003                  | 0.038500            | -402.70E-6                                        | -398.82E-6                                      | 34502.                   | 0               |
|                                                              | 2       | 3.4564 | 4.4065 | Sagging   | 0.0023469        | 0.045340                  | 0.048193            | -500.66E-6                                        | -398.82E-6                                      | 13958.                   | (Negligible)    |
|                                                              |         |        |        |           |                  |                           |                     |                                                   |                                                 |                          | 0               |
|                                                              |         |        |        |           |                  |                           |                     |                                                   |                                                 |                          | (Negligible)    |

Tensile horizontal strains are +ve, compressive horizontal strains are -ve.

Structure: AE | Sub-structure:

| Vertical Offset from Line for Vertical Movement Calculations | Segment | Start | Length | Curvature | Deflection Ratio | Average Horizontal Strain | Max. Tensile Strain | Maximum Gradient of Horizontal Displacement Curve | Maximum Gradient of Vertical Displacement Curve | Min. Radius of Curvature | Damage Category |
|--------------------------------------------------------------|---------|-------|--------|-----------|------------------|---------------------------|---------------------|---------------------------------------------------|-------------------------------------------------|--------------------------|-----------------|
| [m]<br>0.0                                                   |         | [m]   | [m]    |           | [%]              | [%]                       | [%]                 |                                                   |                                                 | [m]                      |                 |
|                                                              | 1       | 0.0   | 3.3051 | Sagging   | 968.85E-6        | -0.0066310                | 0.0017859           | 118.56E-6                                         | 100.12E-6                                       | 36760.                   | 0               |
|                                                              |         |       |        |           |                  |                           |                     |                                                   |                                                 |                          | (Negligible)    |

Tensile horizontal strains are +ve, compressive horizontal strains are -ve.

Structure: AF | Sub-structure:

| Vertical Offset from Line for Vertical Movement Calculations | Segment | Start | Length | Curvature | Deflection Ratio | Average Horizontal Strain | Max. Tensile Strain | Maximum Gradient of Horizontal Displacement Curve | Maximum Gradient of Vertical Displacement Curve | Min. Radius of Curvature | Damage Category |
|--------------------------------------------------------------|---------|-------|--------|-----------|------------------|---------------------------|---------------------|---------------------------------------------------|-------------------------------------------------|--------------------------|-----------------|
| [m]<br>0.0                                                   |         | [m]   | [m]    |           | [%]              | [%]                       | [%]                 |                                                   |                                                 | [m]                      |                 |
|                                                              | 1       | 0.0   | 3.2130 | Sagging   | 0.0075864        | -0.003714                 | 0.017187            | 0.0046769                                         | -305.23E-6                                      | 4127.4                   | 0               |
|                                                              |         |       |        |           |                  |                           |                     |                                                   |                                                 |                          | (Negligible)    |

Tensile horizontal strains are +ve, compressive horizontal strains are -ve.

Structure: AG | Sub-structure:

| Vertical Offset from Line for | Segment | Start | Length | Curvature | Deflection Ratio | Average Horizontal Strain | Max. Tensile Strain | Maximum Gradient of | Maximum Gradient of | Min. Radius of | Damage Category |
|-------------------------------|---------|-------|--------|-----------|------------------|---------------------------|---------------------|---------------------|---------------------|----------------|-----------------|
|-------------------------------|---------|-------|--------|-----------|------------------|---------------------------|---------------------|---------------------|---------------------|----------------|-----------------|

**Rear of 159-163 King's Cross Road, London WC1X 9BN**  
Wall Installation and Excavation Combined Issue 4

| Vertical<br>Movement<br>Calculations |     |        |        |         |           |           | Strain    | Strain     | Horizontal<br>Displacement<br>Curve | Vertical<br>Displacement<br>Curve | Curvature    |
|--------------------------------------|-----|--------|--------|---------|-----------|-----------|-----------|------------|-------------------------------------|-----------------------------------|--------------|
|                                      | [m] | [m]    | [m]    | [%]     | [%]       | [%]       |           |            |                                     |                                   | [m]          |
|                                      | 0.0 |        |        |         |           |           |           |            |                                     |                                   |              |
|                                      | 1   | 0.0    | 8.0923 | Sagging | 0.0015069 | -0.016692 | 0.0033587 | 944.00E-6  | 328.31E-6                           | 23647.                            | 0            |
|                                      | 2   | 8.0923 | 7.1448 | Hogging | 0.0018338 | 0.023023  | 0.025296  | -298.55E-6 | 328.31E-6                           | 26481.                            | 0            |
|                                      |     |        |        |         |           |           |           |            |                                     | (Negligible)                      | (Negligible) |

Tensile horizontal strains are +ve, compressive horizontal strains are -ve.

Structure: AH | Sub-structure:

| Vertical Offset<br>from Line for<br>Vertical<br>Movement<br>Calculations | Segment | Start      | Length         | Curvature | Deflection<br>Ratio | Average<br>Horizontal<br>Strain | Max.<br>Tensile<br>Strain | Maximum<br>Gradient of<br>Horizontal<br>Displacement<br>Curve | Maximum<br>Gradient of<br>Vertical<br>Displacement<br>Curve | Min.<br>Radius of<br>Curvature | Damage<br>Category |
|--------------------------------------------------------------------------|---------|------------|----------------|-----------|---------------------|---------------------------------|---------------------------|---------------------------------------------------------------|-------------------------------------------------------------|--------------------------------|--------------------|
| [m]<br>0.0                                                               |         | [m]<br>0.0 | [m]<br>0.82876 | Sagging   | [%]<br>0.0          | [%]<br>0.021492                 | [%]<br>0.021492           | -214.88E-6                                                    | -288.17E-6                                                  | 224530.                        | 0<br>(Negligible)  |
|                                                                          | 1       | 0.82876    | 0.99413        | Hogging   | 12.322E-6           | 0.018653                        | 0.018653                  | -214.88E-6                                                    | -290.00E-6                                                  | 2.4312E+6                      | 0<br>(Negligible)  |
|                                                                          | 3       | 1.8229     | 1.9259         | Hogging   | 309.79E-6           | 0.013359                        | 0.013384                  | -143.75E-6                                                    | -299.89E-6                                                  | 166750.                        | 0<br>(Negligible)  |
|                                                                          | 4       | 3.7488     | 2.5890         | Sagging   | 662.90E-6           | -0.0031223                      | 737.18E-6                 | 150.80E-6                                                     | -299.89E-6                                                  | 36727.                         | 0<br>(Negligible)  |

Tensile horizontal strains are +ve, compressive horizontal strains are -ve.

Structure: AI | Sub-structure: Sub #

|                                                                     | Segment | Start  | Length | Curvature | Deflection Ratio | Average Horizontal Strain | Max. Tensile Strain | Maximum Gradient of Horizontal Displacement Curve | Maximum Gradient of Vertical Displacement Curve | Min. Radius of Curvature | Damage Category   |
|---------------------------------------------------------------------|---------|--------|--------|-----------|------------------|---------------------------|---------------------|---------------------------------------------------|-------------------------------------------------|--------------------------|-------------------|
| Vertical Offset from Line for Vertical Movement Calculations<br>[m] |         | [m]    | [m]    |           | [mm]             | [%]                       | [%]                 |                                                   |                                                 | [m]                      |                   |
| 0.0                                                                 | 1       | 0.0    | 3.5776 | Sagging   | 0.0810914        | 0.019588                  | 0.019910            | -271.93E-6                                        | 348.31E-6                                       | 22247.                   | 0<br>(Negligible) |
|                                                                     | 2       | 3.5776 | 1.2722 | Hogging   | 114.96E-6        | 0.028715                  | 0.028721            | -291.80E-6                                        | 348.31E-6                                       | 101550.                  | 0<br>(Negligible) |

Tensile horizontal strains are +ve, compressive horizontal strains are -ve.

Structure: AJ | Sub-structure: Sub #

[illegible]

Tensile horizontal strains are +ve, compressive horizontal strains are -ve.

Structure: AK | Sub-structure: Sub #

| Vertical Offset from Line for Vertical Movement Calculations | Segment | Start | Length | Curvature      | Deflection Ratio | Average Horizontal Strain | Max. Tensile Strain | Maximum Gradient of Horizontal Displacement Curve | Maximum Gradient of Vertical Displacement Curve | Min. Radius of Curvature | Damage Category |
|--------------------------------------------------------------|---------|-------|--------|----------------|------------------|---------------------------|---------------------|---------------------------------------------------|-------------------------------------------------|--------------------------|-----------------|
| [m]<br>0.0                                                   |         | 1     | 0.0    | 2.1928 Hogging | 917.62E-6        | 0.064757                  | 0.064841            | -650.11E-6                                        | -630.99E-6                                      | [m]<br>23704.1           | 1 (Very Slight) |
|                                                              |         | 2     | 2.1928 | 2.7559 Sagging | 0.0018558        | 0.064117                  | 0.064540            | -641.93E-6                                        | -630.99E-6                                      | 12210.1                  | 1 (Very Slight) |

Tensile horizontal strains are +ve, compressive horizontal strains are -ve.

Structure: AL | Sub-structure: Sub #

|                                                                                        | Segment | Start           | Length        | Curvature | Deflection Ratio | Average Horizontal Strain | Max. Tensile Strain | Maximum Gradient of Horizontal Displacement Curve | Maximum Gradient of Vertical Displacement Curve | Min. Radius of Curvature | Damage Category   |
|----------------------------------------------------------------------------------------|---------|-----------------|---------------|-----------|------------------|---------------------------|---------------------|---------------------------------------------------|-------------------------------------------------|--------------------------|-------------------|
| Vertical Offset from Line for Vertical Movement Calculations<br><div>(m)<br/>0.0</div> |         | [m]<br>1    0.0 | [m]<br>4.7371 | Hogging   | [%]<br>948.54E-6 | [%]<br>0.0027757          | [%]<br>0.0030249    | -65.367E-6                                        | -126.14E-6                                      | [m]<br>54363.            | Ø<br>(Negligible) |

Tensile horizontal strains are +ve, compressive horizontal strains are -ve.

Structure: AM | Sub-structure: Sub #

| Vertical Offset<br>from Line for<br>Vertical<br>Movement<br>Calculations | Segment | Start | Length | Curvature | Deflection<br>Ratio | Average<br>Horizontal<br>Strain | Max.<br>Tensile<br>Strain | Maximum<br>Gradient of<br>Horizontal<br>Displacement<br>Curve | Maximum<br>Gradient of<br>Vertical<br>Displacement<br>Curve | Min.<br>Radius of<br>Curvature | Damage<br>Category |
|--------------------------------------------------------------------------|---------|-------|--------|-----------|---------------------|---------------------------------|---------------------------|---------------------------------------------------------------|-------------------------------------------------------------|--------------------------------|--------------------|
| [m]                                                                      |         | [m]   | [m]    |           | [%]                 | [%]                             | [%]                       |                                                               |                                                             | [m]                            |                    |
| 0.0                                                                      | 1       | 0.0   | 2.7064 | Sagging   | 0.0014679           | 0.074333                        | 0.074662                  | -743.46E-6                                                    | 717.80E-6                                                   | 13108.                         | 1 (Very Slight)    |

Tensile horizontal strains are +ve, compressive horizontal strains are -ve.

Structure: AN | Sub-structure: Sub #

| Vertical Offset<br>from Line for<br>Vertical<br>Movement<br>Calculations | Segment | Start | Length | Curvature | Deflection<br>Ratio | Average<br>Horizontal<br>Strain | Max.<br>Tensile<br>Strain | Maximum<br>Gradient of<br>Horizontal<br>Displacement<br>Curve | Maximum<br>Gradient of<br>Vertical<br>Displacement<br>Curve | Min.<br>Radius of<br>Curvature | Damage<br>Category |
|--------------------------------------------------------------------------|---------|-------|--------|-----------|---------------------|---------------------------------|---------------------------|---------------------------------------------------------------|-------------------------------------------------------------|--------------------------------|--------------------|
| [m]                                                                      |         | [m]   | [m]    |           | [%]                 | [%]                             | [%]                       |                                                               |                                                             | [m]                            |                    |
| 0.0                                                                      | 1       | 0.0   | 3.3367 | Sagging   | 0.014087            | -0.010764                       | 0.011085                  | 208.78E-6                                                     | 687.07E-6                                                   | 889.99                         | 0                  |

Tensile horizontal strains are +ve, compressive horizontal strains are -ve.

Structure: A0 | Sub-structure: Sub #

| Vertical Offset<br>from Line for<br>Vertical<br>Movement | Segment | Start | Length | Curvature | Deflection<br>Ratio | Average<br>Horizontal<br>Strain | Max.<br>Tensile<br>Strain | Maximum<br>Gradient of<br>Horizontal<br>Displacement | Maximum<br>Gradient of<br>Vertical<br>Displacement | Min.<br>Radius of<br>Curvature | Damage<br>Category |
|----------------------------------------------------------|---------|-------|--------|-----------|---------------------|---------------------------------|---------------------------|------------------------------------------------------|----------------------------------------------------|--------------------------------|--------------------|
|----------------------------------------------------------|---------|-------|--------|-----------|---------------------|---------------------------------|---------------------------|------------------------------------------------------|----------------------------------------------------|--------------------------------|--------------------|



# GEA LIMITED (GEOTECHNICAL & ENV ASSOC)

Rear of 159-163 King's Cross Road, London WC1X 9BN  
Wall Installation and Excavation Combined Issue 4

| Job No.   | Sheet No.   | Rev.    |
|-----------|-------------|---------|
| J16180    |             |         |
| Drg. Ref. |             |         |
| Made by   | Date        | Checked |
|           | 07-Mar-2017 |         |

| Calculations |   |            |                |         |                  | Curve           | Curve           |                              |
|--------------|---|------------|----------------|---------|------------------|-----------------|-----------------|------------------------------|
| [m]<br>0.0   | 1 | [m]<br>0.0 | [m]<br>0.86915 | Hogging | [%]<br>24.626E-6 | [%]<br>0.072485 | [%]<br>0.072485 | [m]<br>58107.1 (Very Slight) |
|              | 2 | 0.86915    | 1.6478         | Sagging | 506.87E-6        | 0.074782        | 0.074851        | 30636.1 (Very Slight)        |

Tensile horizontal strains are +ve, compressive horizontal strains are -ve.

Structure: AP | Sub-structure: Sub #

| Vertical Offset from Line for Vertical Movement Calculations | Segment | Start      | Length        | Curvature | Deflection Ratio | Average Horizontal Strain | Max. Tensile Strain | Maximum Gradient of Horizontal Displacement Curve | Maximum Gradient of Vertical Displacement Curve | Min. Radius of Curvature | Damage Category |
|--------------------------------------------------------------|---------|------------|---------------|-----------|------------------|---------------------------|---------------------|---------------------------------------------------|-------------------------------------------------|--------------------------|-----------------|
| [m]<br>0.0                                                   | 1       | [m]<br>0.0 | [m]<br>4.4543 | Sagging   | [%]<br>0.014898  | [%]<br>-0.053258          | [%]<br>0.013862     | 917.13E-6                                         | 866.23E-6                                       | [m]<br>1002.5            | 0 (Negligible)  |

Tensile horizontal strains are +ve, compressive horizontal strains are -ve.

Structure: AQ | Sub-structure: Sub #

| Vertical Offset from Line for Vertical Movement Calculations | Segment | Start      | Length        | Curvature | Deflection Ratio | Average Horizontal Strain | Max. Tensile Strain | Maximum Gradient of Horizontal Displacement Curve | Maximum Gradient of Vertical Displacement Curve | Min. Radius of Curvature | Damage Category |
|--------------------------------------------------------------|---------|------------|---------------|-----------|------------------|---------------------------|---------------------|---------------------------------------------------|-------------------------------------------------|--------------------------|-----------------|
| [m]<br>0.0                                                   | 1       | [m]<br>0.0 | [m]<br>4.9487 | Hogging   | [%]<br>0.0019544 | [%]<br>0.042235           | [%]<br>0.042635     | -524.72E-6                                        | 578.44E-6                                       | [m]<br>17977.            | 0 (Negligible)  |

Tensile horizontal strains are +ve, compressive horizontal strains are -ve.

Structure: AR | Sub-structure: Sub #

| Vertical Offset from Line for Vertical Movement Calculations | Segment | Start      | Length        | Curvature | Deflection Ratio | Average Horizontal Strain | Max. Tensile Strain | Maximum Gradient of Horizontal Displacement Curve | Maximum Gradient of Vertical Displacement Curve | Min. Radius of Curvature | Damage Category |
|--------------------------------------------------------------|---------|------------|---------------|-----------|------------------|---------------------------|---------------------|---------------------------------------------------|-------------------------------------------------|--------------------------|-----------------|
| [m]<br>0.0                                                   | 1       | [m]<br>0.0 | [m]<br>8.4707 | Hogging   | [%]<br>0.0074632 | [%]<br>0.065745           | [%]<br>0.068339     | -794.48E-6                                        | -740.36E-6                                      | [m]<br>12142.            | 1 (Very Slight) |

Tensile horizontal strains are +ve, compressive horizontal strains are -ve.

Structure: AS | Sub-structure: Sub #

| Vertical Offset from Line for Vertical Movement Calculations | Segment | Start         | Length        | Curvature | Deflection Ratio | Average Horizontal Strain | Max. Tensile Strain | Maximum Gradient of Horizontal Displacement Curve | Maximum Gradient of Vertical Displacement Curve | Min. Radius of Curvature | Damage Category |
|--------------------------------------------------------------|---------|---------------|---------------|-----------|------------------|---------------------------|---------------------|---------------------------------------------------|-------------------------------------------------|--------------------------|-----------------|
| [m]<br>0.0                                                   | 1       | [m]<br>1.8137 | [m]<br>6.3468 | Hogging   | [%]<br>0.0045319 | [%]<br>0.046960           | [%]<br>0.048147     | -613.34E-6                                        | -541.59E-6                                      | [m]<br>13122.            | 0 (Negligible)  |

Tensile horizontal strains are +ve, compressive horizontal strains are -ve.

Structure: AT | Sub-structure: Sub #

| Vertical Offset from Line for Vertical Movement Calculations | Segment | Start         | Length        | Curvature | Deflection Ratio | Average Horizontal Strain | Max. Tensile Strain | Maximum Gradient of Horizontal Displacement Curve | Maximum Gradient of Vertical Displacement Curve | Min. Radius of Curvature | Damage Category |
|--------------------------------------------------------------|---------|---------------|---------------|-----------|------------------|---------------------------|---------------------|---------------------------------------------------|-------------------------------------------------|--------------------------|-----------------|
| [m]<br>0.0                                                   | 1       | [m]<br>1.8461 | [m]<br>5.4030 | Hogging   | [%]<br>792.08E-6 | [%]<br>0.015823           | [%]<br>0.016000     | -191.78E-6                                        | -254.91E-6                                      | [m]<br>75494.            | 0 (Negligible)  |
|                                                              | 2       | 7.2491        | 3.8264        | Sagging   | 781.32E-6        | 0.0062049                 | 0.0064509           | -191.78E-6                                        | -256.76E-6                                      | 46211.                   | 0 (Negligible)  |

Tensile horizontal strains are +ve, compressive horizontal strains are -ve.

Structure: AU | Sub-structure:

| Vertical Offset from Line for Vertical Movement Calculations | Segment | Start      | Length         | Curvature | Deflection Ratio | Average Horizontal Strain | Max. Tensile Strain | Maximum Gradient of Horizontal Displacement Curve | Maximum Gradient of Vertical Displacement Curve | Min. Radius of Curvature | Damage Category |
|--------------------------------------------------------------|---------|------------|----------------|-----------|------------------|---------------------------|---------------------|---------------------------------------------------|-------------------------------------------------|--------------------------|-----------------|
| [m]<br>0.0                                                   | 1       | [m]<br>0.0 | [m]<br>4.43049 | Sagging   | [%]<br>0.0097649 | [%]<br>0.12676            | [%]<br>0.13869      | -0.0014145                                        | 765.06E-6                                       | [m]<br>2792.5            | 2 (Slight)      |
|                                                              | 2       | 4.5849     | 2.5253         | Hogging   | 940.14E-6        | 0.10145                   | 0.10184             | -0.0010820                                        | 759.55E-6                                       | 22146.                   | 2 (Slight)      |

Tensile horizontal strains are +ve, compressive horizontal strains are -ve.

Structure: AV | Sub-structure:

| Vertical Offset from Line for Vertical Movement Calculations | Segment | Start      | Length        | Curvature | Deflection Ratio | Average Horizontal Strain | Max. Tensile Strain | Maximum Gradient of Horizontal Displacement Curve | Maximum Gradient of Vertical Displacement Curve | Min. Radius of Curvature | Damage Category |
|--------------------------------------------------------------|---------|------------|---------------|-----------|------------------|---------------------------|---------------------|---------------------------------------------------|-------------------------------------------------|--------------------------|-----------------|
| [m]<br>0.0                                                   | 1       | [m]<br>0.0 | [m]<br>3.6879 | Hogging   | [%]<br>0.0       | [%]<br>11.371E-6          | [%]<br>11.909E-6    | 0.0                                               | 3.7760E-6                                       | [m]<br>51.727E+6         | 0 (Negligible)  |
|                                                              | 2       | 3.6879     | 2.4055        | Sagging   | 0.014021         | -0.0039675                | 0.011730            | 170.31E-6                                         | 791.04E-6                                       | 4179.3                   | 0 (Negligible)  |
|                                                              | 3       | 6.0934     | 2.0993        | Hogging   | 0.0096375        | -0.028050                 | 0.0081113           | 334.01E-6                                         | 791.04E-6                                       | 5942.8                   | 0 (Negligible)  |
|                                                              | 4       | 8.1927     | 1.0258        | Sagging   | 164.30E-6        | -0.020248                 | 0.0040506           | 268.93E-6                                         | 144.64E-6                                       | 46339.                   | 0 (Negligible)  |

Tensile horizontal strains are +ve, compressive horizontal strains are -ve.

Structure: AW | Sub-structure:

| Vertical Offset from Line for Vertical Movement Calculations | Segment | Start      | Length         | Curvature | Deflection Ratio | Average Horizontal Strain | Max. Tensile Strain | Maximum Gradient of Horizontal Displacement Curve | Maximum Gradient of Vertical Displacement Curve | Min. Radius of Curvature | Damage Category |
|--------------------------------------------------------------|---------|------------|----------------|-----------|------------------|---------------------------|---------------------|---------------------------------------------------|-------------------------------------------------|--------------------------|-----------------|
| [m]<br>0.0                                                   | 1       | [m]<br>0.0 | [m]<br>0.43048 | None      | [%]<br>0.0       | [%]<br>0.049902           | [%]<br>0.049902     | -498.77E-6                                        | -499.93E-6                                      | [m]<br>93852.            | 0 (Negligible)  |
|                                                              | 2       | 0.43048    | 5.3678         | Hogging   | 0.0055312        | 0.037302                  | 0.041868            | -498.77E-6                                        | -0.0011142                                      | 9337.1                   | 0 (Negligible)  |
|                                                              | 3       | 5.7983     | 5.5224         | Sagging   | 0.032351         | 0.038267                  | 0.081895            | -710.19E-6                                        | -0.0011142                                      | 1690.6                   | 2 (Slight)      |

Tensile horizontal strains are +ve, compressive horizontal strains are -ve.

Specific Building Damage Results - Critical Values for All Segments within Each Sub-Structure



# GEA LIMITED (GEOTECHNICAL & ENV ASSOC)

Rear of 159-163 King's Cross Road, London WC1X 9BN  
Wall Installation and Excavation Combined Issue 4

|           |                     |         |
|-----------|---------------------|---------|
| Job No.   | Sheet No.           | Rev.    |
| J16180    |                     |         |
| Drg. Ref. |                     |         |
| Made by   | Date<br>07-Mar-2017 | Checked |

| Vertical Offset from Line for Vertical Movement              | Segment          | Start                     | Length        | Curvature          | Deflection Ratio    | Average Horizontal Strain                         | Max. Tensile Strain                             | Maximum Gradient of Horizontal Displacement | Maximum Gradient of Vertical Displacement | Min. Radius of Curvature | Damage Category |
|--------------------------------------------------------------|------------------|---------------------------|---------------|--------------------|---------------------|---------------------------------------------------|-------------------------------------------------|---------------------------------------------|-------------------------------------------|--------------------------|-----------------|
| Structure: A   Sub-structure:                                |                  |                           |               |                    |                     |                                                   |                                                 |                                             |                                           |                          |                 |
| Vertical Offset from Line for Vertical Movement Calculations | Deflection Ratio | Average Horizontal Strain | Maximum Slope | Maximum Settlement | Max. Tensile Strain | Maximum Gradient of Horizontal Displacement Curve | Maximum Gradient of Vertical Displacement Curve | Min. Radius of Curvature (Hogging)          | Min. Radius of Curvature (Sagging)        | Damage Category          |                 |
| [m]<br>0.0                                                   | [%]<br>0.0029763 | [%]<br>0.047882           | -362.76E-6    | [mm]<br>1.3407     | [%]<br>0.048383     | -515.16E-6                                        | -362.76E-6                                      | [m]<br>14135.                               | [m]<br>-                                  | 0 (Negligible)           |                 |
| Structure: B   Sub-structure:                                |                  |                           |               |                    |                     |                                                   |                                                 |                                             |                                           |                          |                 |
| Vertical Offset from Line for Vertical Movement Calculations | Deflection Ratio | Average Horizontal Strain | Maximum Slope | Maximum Settlement | Max. Tensile Strain | Maximum Gradient of Horizontal Displacement Curve | Maximum Gradient of Vertical Displacement Curve | Min. Radius of Curvature (Hogging)          | Min. Radius of Curvature (Sagging)        | Damage Category          |                 |
| [m]<br>0.0                                                   | [%]<br>335.83E-6 | [%]<br>-0.012586          | -160.85E-6    | [mm]<br>1.8155     | [%]<br>0.0025245    | 206.95E-6                                         | -160.85E-6                                      | [m]<br>-                                    | [m]<br>60575.                             | 0 (Negligible)           |                 |
| Structure: C   Sub-structure:                                |                  |                           |               |                    |                     |                                                   |                                                 |                                             |                                           |                          |                 |
| Vertical Offset from Line for Vertical Movement Calculations | Deflection Ratio | Average Horizontal Strain | Maximum Slope | Maximum Settlement | Max. Tensile Strain | Maximum Gradient of Horizontal Displacement Curve | Maximum Gradient of Vertical Displacement Curve | Min. Radius of Curvature (Hogging)          | Min. Radius of Curvature (Sagging)        | Damage Category          |                 |
| [m]<br>0.0                                                   | [%]<br>0.0014779 | [%]<br>0.066080           | -595.22E-6    | [mm]<br>4.4250     | [%]<br>0.066321     | -745.72E-6                                        | -595.22E-6                                      | [m]<br>13131.                               | [m]<br>55670.                             | 1 (Very Slight)          |                 |
| Structure: D   Sub-structure:                                |                  |                           |               |                    |                     |                                                   |                                                 |                                             |                                           |                          |                 |
| Vertical Offset from Line for Vertical Movement Calculations | Deflection Ratio | Average Horizontal Strain | Maximum Slope | Maximum Settlement | Max. Tensile Strain | Maximum Gradient of Horizontal Displacement Curve | Maximum Gradient of Vertical Displacement Curve | Min. Radius of Curvature (Hogging)          | Min. Radius of Curvature (Sagging)        | Damage Category          |                 |
| [m]<br>0.0                                                   | [%]<br>0.017228  | [%]<br>-0.014706          | 0.0010102     | [mm]<br>4.4256     | [%]<br>0.020445     | 189.46E-6                                         | 0.0010102                                       | [m]<br>4216.7                               | [m]<br>3765.8                             | 0 (Negligible)           |                 |
| Structure: E   Sub-structure:                                |                  |                           |               |                    |                     |                                                   |                                                 |                                             |                                           |                          |                 |
| Vertical Offset from Line for Vertical Movement Calculations | Deflection Ratio | Average Horizontal Strain | Maximum Slope | Maximum Settlement | Max. Tensile Strain | Maximum Gradient of Horizontal Displacement Curve | Maximum Gradient of Vertical Displacement Curve | Min. Radius of Curvature (Hogging)          | Min. Radius of Curvature (Sagging)        | Damage Category          |                 |
| [m]<br>0.0                                                   | [%]<br>0.0013159 | [%]<br>-0.0058172         | -338.44E-6    | [mm]<br>3.0592     | [%]<br>0.0014001    | 85.129E-6                                         | -338.44E-6                                      | [m]<br>-                                    | [m]<br>14198.                             | 0 (Negligible)           |                 |
| Structure: F   Sub-structure:                                |                  |                           |               |                    |                     |                                                   |                                                 |                                             |                                           |                          |                 |
| Vertical Offset from Line for Vertical Movement Calculations | Deflection Ratio | Average Horizontal Strain | Maximum Slope | Maximum Settlement | Max. Tensile Strain | Maximum Gradient of Horizontal Displacement Curve | Maximum Gradient of Vertical Displacement Curve | Min. Radius of Curvature (Hogging)          | Min. Radius of Curvature (Sagging)        | Damage Category          |                 |
| [m]<br>0.0                                                   | [%]<br>0.0047801 | [%]<br>0.030947           | 490.90E-6     | [mm]<br>3.0594     | [%]<br>0.033014     | -419.83E-6                                        | 490.90E-6                                       | [m]<br>14423.                               | [m]<br>41903.                             | 0 (Negligible)           |                 |
| Structure: G   Sub-structure:                                |                  |                           |               |                    |                     |                                                   |                                                 |                                             |                                           |                          |                 |
| Vertical Offset from Line for Vertical Movement Calculations | Deflection Ratio | Average Horizontal Strain | Maximum Slope | Maximum Settlement | Max. Tensile Strain | Maximum Gradient of Horizontal Displacement Curve | Maximum Gradient of Vertical Displacement Curve | Min. Radius of Curvature (Hogging)          | Min. Radius of Curvature (Sagging)        | Damage Category          |                 |
| [m]<br>0.0                                                   | [%]<br>86.371E-6 | [%]<br>-613.24E-6         | 41.003E-6     | [mm]<br>0.24315    | [%]<br>132.57E-6    | -49.005E-6                                        | 41.003E-6                                       | [m]<br>316360.                              | [m]<br>-                                  | 0 (Negligible)           |                 |
| Structure: H   Sub-structure:                                |                  |                           |               |                    |                     |                                                   |                                                 |                                             |                                           |                          |                 |
| Vertical Offset from Line for Vertical Movement Calculations | Deflection Ratio | Average Horizontal Strain | Maximum Slope | Maximum Settlement | Max. Tensile Strain | Maximum Gradient of Horizontal Displacement Curve | Maximum Gradient of Vertical Displacement Curve | Min. Radius of Curvature (Hogging)          | Min. Radius of Curvature (Sagging)        | Damage Category          |                 |
| [m]<br>0.0                                                   | [%]<br>438.44E-6 | [%]<br>0.029052           | -70.084E-6    | [mm]<br>0.22254    | [%]<br>0.029092     | -316.66E-6                                        | -70.084E-6                                      | [m]<br>39519.                               | [m]<br>-                                  | 0 (Negligible)           |                 |
| Structure: I   Sub-structure:                                |                  |                           |               |                    |                     |                                                   |                                                 |                                             |                                           |                          |                 |
| Vertical Offset from Line for Vertical Movement Calculations | Deflection Ratio | Average Horizontal Strain | Maximum Slope | Maximum Settlement | Max. Tensile Strain | Maximum Gradient of Horizontal Displacement Curve | Maximum Gradient of Vertical Displacement Curve | Min. Radius of Curvature (Hogging)          | Min. Radius of Curvature (Sagging)        | Damage Category          |                 |
| [m]<br>0.0                                                   | [%]<br>362.83E-6 | [%]<br>0.011259           | 54.672E-6     | [mm]<br>0.22261    | [%]<br>0.011308     | -174.20E-6                                        | 54.672E-6                                       | [m]<br>74444.                               | [m]<br>-                                  | 0 (Negligible)           |                 |
| Structure: J   Sub-structure:                                |                  |                           |               |                    |                     |                                                   |                                                 |                                             |                                           |                          |                 |
| Vertical Offset from Line for Vertical Movement Calculations | Deflection Ratio | Average Horizontal Strain | Maximum Slope | Maximum Settlement | Max. Tensile Strain | Maximum Gradient of Horizontal Displacement Curve | Maximum Gradient of Vertical Displacement Curve | Min. Radius of Curvature (Hogging)          | Min. Radius of Curvature (Sagging)        | Damage Category          |                 |
| [m]<br>0.0                                                   | [%]<br>0.0018626 | [%]<br>-0.0047012         | 86.649E-6     | [mm]<br>0.55511    | [%]<br>0.0010651    | 100.23E-6                                         | 86.649E-6                                       | [m]<br>198650.                              | [m]<br>49099.                             | 0 (Negligible)           |                 |
| Structure: K   Sub-structure:                                |                  |                           |               |                    |                     |                                                   |                                                 |                                             |                                           |                          |                 |
| Vertical Offset from                                         | Deflection Ratio | Average Horizontal        | Maximum Slope | Maximum Settlement | Max. Tensile        | Maximum Gradient of                               | Maximum Gradient of                             | Min. Radius of                              | Min. Radius of                            | Damage Category          |                 |



# GEA LIMITED (GEOTECHNICAL & ENV ASSOC)

Rear of 159-163 King's Cross Road, London WC1X 9BN  
Wall Installation and Excavation Combined Issue 4

| Job No.   | Sheet No.           | Rev.    |
|-----------|---------------------|---------|
| J16180    |                     |         |
| Drg. Ref. |                     |         |
| Made by   | Date<br>07-Mar-2017 | Checked |

| Line for Vertical Movement Calculations                      | Strain           |                           |                    | Strain             |                     | Horizontal Displacement Curve                     | Vertical Displacement Curve                     | Curvature (Hogging)                |                                    | Curvature (Sagging) |  |
|--------------------------------------------------------------|------------------|---------------------------|--------------------|--------------------|---------------------|---------------------------------------------------|-------------------------------------------------|------------------------------------|------------------------------------|---------------------|--|
| [m]<br>0.0                                                   | [%]<br>0.013390  | [%]<br>-0.055815          | [mm]<br>-633.90E-6 | [mm]<br>3.9779     | [%]<br>0.011193     | 668.44E-6                                         | -633.90E-6                                      | [m]<br>12029.                      | [m]<br>1935.7                      | 0 (Negligible)      |  |
| Structure: L   Sub-structure:                                |                  |                           |                    |                    |                     |                                                   |                                                 |                                    |                                    |                     |  |
| Vertical Offset from Line for Vertical Movement Calculations | Deflection Ratio | Average Horizontal Strain | Maximum Slope      | Maximum Settlement | Max. Tensile Strain | Maximum Gradient of Horizontal Displacement Curve | Maximum Gradient of Vertical Displacement Curve | Min. Radius of Curvature (Hogging) | Min. Radius of Curvature (Sagging) | Damage Category     |  |
| [m]<br>0.0                                                   | [%]<br>0.0048074 | [%]<br>0.093752           | [mm]<br>-595.91E-6 | [mm]<br>3.9981     | [%]<br>0.093752     | -939.07E-6                                        | -595.91E-6                                      | [m]<br>13727.                      | [m]<br>123000.                     | 2 (Slight)          |  |
| Structure: M   Sub-structure:                                |                  |                           |                    |                    |                     |                                                   |                                                 |                                    |                                    |                     |  |
| Vertical Offset from Line for Vertical Movement Calculations | Deflection Ratio | Average Horizontal Strain | Maximum Slope      | Maximum Settlement | Max. Tensile Strain | Maximum Gradient of Horizontal Displacement Curve | Maximum Gradient of Vertical Displacement Curve | Min. Radius of Curvature (Hogging) | Min. Radius of Curvature (Sagging) | Damage Category     |  |
| [m]<br>0.0                                                   | [%]<br>0.0033799 | [%]<br>0.078785           | [mm]<br>-496.50E-6 | [mm]<br>3.5704     | [%]<br>0.078899     | -802.16E-6                                        | -496.50E-6                                      | [m]<br>17248.                      | [m]<br>31493.                      | 2 (Slight)          |  |
| Structure: N   Sub-structure:                                |                  |                           |                    |                    |                     |                                                   |                                                 |                                    |                                    |                     |  |
| Vertical Offset from Line for Vertical Movement Calculations | Deflection Ratio | Average Horizontal Strain | Maximum Slope      | Maximum Settlement | Max. Tensile Strain | Maximum Gradient of Horizontal Displacement Curve | Maximum Gradient of Vertical Displacement Curve | Min. Radius of Curvature (Hogging) | Min. Radius of Curvature (Sagging) | Damage Category     |  |
| [m]<br>0.0                                                   | [%]<br>0.0018946 | [%]<br>0.038123           | [mm]<br>334.46E-6  | [mm]<br>2.0749     | [%]<br>0.038852     | -632.21E-6                                        | 334.46E-6                                       | [m]<br>12489.                      | [m]<br>-                           | 0 (Negligible)      |  |
| Structure: O   Sub-structure:                                |                  |                           |                    |                    |                     |                                                   |                                                 |                                    |                                    |                     |  |
| Vertical Offset from Line for Vertical Movement Calculations | Deflection Ratio | Average Horizontal Strain | Maximum Slope      | Maximum Settlement | Max. Tensile Strain | Maximum Gradient of Horizontal Displacement Curve | Maximum Gradient of Vertical Displacement Curve | Min. Radius of Curvature (Hogging) | Min. Radius of Curvature (Sagging) | Damage Category     |  |
| [m]<br>0.0                                                   | [%]<br>0.0089511 | [%]<br>0.10484            | [mm]<br>-601.53E-6 | [mm]<br>5.8644     | [%]<br>0.11712      | -0.0012289                                        | -601.53E-6                                      | [m]<br>-                           | [m]<br>2682.4                      | 2 (Slight)          |  |
| Structure: P   Sub-structure: Sub #                          |                  |                           |                    |                    |                     |                                                   |                                                 |                                    |                                    |                     |  |
| Vertical Offset from Line for Vertical Movement Calculations | Deflection Ratio | Average Horizontal Strain | Maximum Slope      | Maximum Settlement | Max. Tensile Strain | Maximum Gradient of Horizontal Displacement Curve | Maximum Gradient of Vertical Displacement Curve | Min. Radius of Curvature (Hogging) | Min. Radius of Curvature (Sagging) | Damage Category     |  |
| [m]<br>0.0                                                   | [%]<br>0.011659  | [%]<br>-0.13342           | [mm]<br>-735.62E-6 | [mm]<br>4.1956     | [%]<br>0.059343     | 0.0041117                                         | -735.62E-6                                      | [m]<br>1332.1                      | [m]<br>22553.                      | 1 (Very Slight)     |  |
| Structure: Q   Sub-structure:                                |                  |                           |                    |                    |                     |                                                   |                                                 |                                    |                                    |                     |  |
| Vertical Offset from Line for Vertical Movement Calculations | Deflection Ratio | Average Horizontal Strain | Maximum Slope      | Maximum Settlement | Max. Tensile Strain | Maximum Gradient of Horizontal Displacement Curve | Maximum Gradient of Vertical Displacement Curve | Min. Radius of Curvature (Hogging) | Min. Radius of Curvature (Sagging) | Damage Category     |  |
| [m]<br>0.0                                                   | [%]<br>0.011029  | [%]<br>0.065472           | [mm]<br>-460.07E-6 | [mm]<br>4.7526     | [%]<br>0.080665     | -743.67E-6                                        | -460.07E-6                                      | [m]<br>-                           | [m]<br>2495.2                      | 2 (Slight)          |  |
| Structure: R   Sub-structure:                                |                  |                           |                    |                    |                     |                                                   |                                                 |                                    |                                    |                     |  |
| Vertical Offset from Line for Vertical Movement Calculations | Deflection Ratio | Average Horizontal Strain | Maximum Slope      | Maximum Settlement | Max. Tensile Strain | Maximum Gradient of Horizontal Displacement Curve | Maximum Gradient of Vertical Displacement Curve | Min. Radius of Curvature (Hogging) | Min. Radius of Curvature (Sagging) | Damage Category     |  |
| [m]<br>0.0                                                   | [%]<br>0.027615  | [%]<br>-0.17424           | [mm]<br>-0.0013996 | [mm]<br>7.2172     | [%]<br>0.049756     | 0.0039857                                         | -0.0013996                                      | [m]<br>562.66                      | [m]<br>2782.0                      | 0 (Negligible)      |  |
| Structure: S   Sub-structure:                                |                  |                           |                    |                    |                     |                                                   |                                                 |                                    |                                    |                     |  |
| Vertical Offset from Line for Vertical Movement Calculations | Deflection Ratio | Average Horizontal Strain | Maximum Slope      | Maximum Settlement | Max. Tensile Strain | Maximum Gradient of Horizontal Displacement Curve | Maximum Gradient of Vertical Displacement Curve | Min. Radius of Curvature (Hogging) | Min. Radius of Curvature (Sagging) | Damage Category     |  |
| [m]<br>0.0                                                   | [%]<br>388.00E-6 | [%]<br>-0.005033          | [mm]<br>15.731E-6  | [mm]<br>0.13870    | [%]<br>0.001167     | 63.398E-6                                         | 15.731E-6                                       | [m]<br>3.4224E+6                   | [m]<br>242620.                     | 0 (Negligible)      |  |
| Structure: T   Sub-structure:                                |                  |                           |                    |                    |                     |                                                   |                                                 |                                    |                                    |                     |  |
| Vertical Offset from Line for Vertical Movement Calculations | Deflection Ratio | Average Horizontal Strain | Maximum Slope      | Maximum Settlement | Max. Tensile Strain | Maximum Gradient of Horizontal Displacement Curve | Maximum Gradient of Vertical Displacement Curve | Min. Radius of Curvature (Hogging) | Min. Radius of Curvature (Sagging) | Damage Category     |  |
| [m]<br>0.0                                                   | [%]<br>0.014298  | [%]<br>-0.10292           | [mm]<br>-578.74E-6 | [mm]<br>3.1144     | [%]<br>0.020619     | 0.0011383                                         | -578.74E-6                                      | [m]<br>10589.                      | [m]<br>9117.9                      | 0 (Negligible)      |  |
| Structure: U   Sub-structure:                                |                  |                           |                    |                    |                     |                                                   |                                                 |                                    |                                    |                     |  |
| Vertical Offset from Line for Vertical Movement Calculations | Deflection Ratio | Average Horizontal Strain | Maximum Slope      | Maximum Settlement | Max. Tensile Strain | Maximum Gradient of Horizontal Displacement Curve | Maximum Gradient of Vertical Displacement Curve | Min. Radius of Curvature (Hogging) | Min. Radius of Curvature (Sagging) | Damage Category     |  |
| [m]<br>0.0                                                   | [%]<br>0.0048454 | [%]<br>0.032027           | [mm]<br>-370.92E-6 | [mm]<br>1.8595     | [%]<br>0.035304     | -320.17E-6                                        | -370.92E-6                                      | [m]<br>18350.                      | [m]<br>-                           | 0 (Negligible)      |  |



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Rear of 159-163 King's Cross Road, London WC1X 9BN  
Wall Installation and Excavation Combined Issue 4

| Job No.   | Sheet No.           | Rev.    |
|-----------|---------------------|---------|
| J16180    |                     |         |
| Drg. Ref. |                     |         |
| Made by   | Date<br>07-Mar-2017 | Checked |

| Vertical<br>Offset from<br>Line for<br>Vertical<br>Movement<br>Calculations<br>[m]<br>0.0 | Deflection<br>Ratio<br>[%]<br>653.78E-6 | Average<br>Horizontal<br>Strain<br>[%]<br>0.055499   | Maximum<br>Slope<br>-383.70E-6 | Maximum<br>Settlement<br>[mm]<br>3.2030  | Max.<br>Tensile<br>Strain<br>[%]<br>0.055886  | Maximum<br>Gradient of<br>Horizontal<br>Displacement<br>Curve<br>-600.80E-6 | Maximum<br>Gradient of<br>Vertical<br>Displacement<br>Curve<br>-383.70E-6 | Min.<br>Radius of<br>Curvature<br>(Hogging)<br>[m]<br>70690. | Min.<br>Radius of<br>Curvature<br>(Sagging)<br>[m]<br>38449.  | Damage Category<br>1 (Very Slight) |
|-------------------------------------------------------------------------------------------|-----------------------------------------|------------------------------------------------------|--------------------------------|------------------------------------------|-----------------------------------------------|-----------------------------------------------------------------------------|---------------------------------------------------------------------------|--------------------------------------------------------------|---------------------------------------------------------------|------------------------------------|
| Structure: V   Sub-structure:                                                             |                                         |                                                      |                                |                                          |                                               |                                                                             |                                                                           |                                                              |                                                               |                                    |
| Vertical<br>Offset from<br>Line for<br>Vertical<br>Movement<br>Calculations<br>[m]<br>0.0 | Deflection<br>Ratio<br>[%]<br>33.986E-6 | Average<br>Horizontal<br>Strain<br>[%]<br>0.011336   | Maximum<br>Slope<br>150.04E-6  | Maximum<br>Settlement<br>[mm]<br>3.2034  | Max.<br>Tensile<br>Strain<br>[%]<br>0.011344  | Maximum<br>Gradient of<br>Horizontal<br>Displacement<br>Curve<br>-113.35E-6 | Maximum<br>Gradient of<br>Vertical<br>Displacement<br>Curve<br>150.04E-6  | Min.<br>Radius of<br>Curvature<br>(Hogging)<br>[m]<br>-      | Min.<br>Radius of<br>Curvature<br>(Sagging)<br>[m]<br>415160. | Damage Category<br>0 (Negligible)  |
| Structure: W   Sub-structure:                                                             |                                         |                                                      |                                |                                          |                                               |                                                                             |                                                                           |                                                              |                                                               |                                    |
| Vertical<br>Offset from<br>Line for<br>Vertical<br>Movement<br>Calculations<br>[m]<br>0.0 | Deflection<br>Ratio<br>[%]<br>0.017371  | Average<br>Horizontal<br>Strain<br>[%]<br>0.045575   | Maximum<br>Slope<br>-872.41E-6 | Maximum<br>Settlement<br>[mm]<br>2.3160  | Max.<br>Tensile<br>Strain<br>[%]<br>0.045669  | Maximum<br>Gradient of<br>Horizontal<br>Displacement<br>Curve<br>-462.19E-6 | Maximum<br>Gradient of<br>Vertical<br>Displacement<br>Curve<br>-872.41E-6 | Min.<br>Radius of<br>Curvature<br>(Hogging)<br>[m]<br>3843.1 | Min.<br>Radius of<br>Curvature<br>(Sagging)<br>[m]<br>10628.  | Damage Category<br>0 (Negligible)  |
| Structure: X   Sub-structure:                                                             |                                         |                                                      |                                |                                          |                                               |                                                                             |                                                                           |                                                              |                                                               |                                    |
| Vertical<br>Offset from<br>Line for<br>Vertical<br>Movement<br>Calculations<br>[m]<br>0.0 | Deflection<br>Ratio<br>[%]<br>949.33E-6 | Average<br>Horizontal<br>Strain<br>[%]<br>0.048369   | Maximum<br>Slope<br>-545.30E-6 | Maximum<br>Settlement<br>[mm]<br>4.2254  | Max.<br>Tensile<br>Strain<br>[%]<br>0.048369  | Maximum<br>Gradient of<br>Horizontal<br>Displacement<br>Curve<br>-483.46E-6 | Maximum<br>Gradient of<br>Vertical<br>Displacement<br>Curve<br>-545.30E-6 | Min.<br>Radius of<br>Curvature<br>(Hogging)<br>[m]<br>25577. | Min.<br>Radius of<br>Curvature<br>(Sagging)<br>[m]<br>-       | Damage Category<br>0 (Negligible)  |
| Structure: Y   Sub-structure:                                                             |                                         |                                                      |                                |                                          |                                               |                                                                             |                                                                           |                                                              |                                                               |                                    |
| Vertical<br>Offset from<br>Line for<br>Vertical<br>Movement<br>Calculations<br>[m]<br>0.0 | Deflection<br>Ratio<br>[%]<br>0.0014764 | Average<br>Horizontal<br>Strain<br>[%]<br>0.030510   | Maximum<br>Slope<br>-303.27E-6 | Maximum<br>Settlement<br>[mm]<br>1.1949  | Max.<br>Tensile<br>Strain<br>[%]<br>0.031016  | Maximum<br>Gradient of<br>Horizontal<br>Displacement<br>Curve<br>-305.01E-6 | Maximum<br>Gradient of<br>Vertical<br>Displacement<br>Curve<br>-303.27E-6 | Min.<br>Radius of<br>Curvature<br>(Hogging)<br>[m]<br>18277. | Min.<br>Radius of<br>Curvature<br>(Sagging)<br>[m]<br>-       | Damage Category<br>0 (Negligible)  |
| Structure: Z   Sub-structure:                                                             |                                         |                                                      |                                |                                          |                                               |                                                                             |                                                                           |                                                              |                                                               |                                    |
| Vertical<br>Offset from<br>Line for<br>Vertical<br>Movement<br>Calculations<br>[m]<br>0.0 | Deflection<br>Ratio<br>[%]<br>0.0023745 | Average<br>Horizontal<br>Strain<br>[%]<br>0.046377   | Maximum<br>Slope<br>-497.68E-6 | Maximum<br>Settlement<br>[mm]<br>2.7640  | Max.<br>Tensile<br>Strain<br>[%]<br>0.047267  | Maximum<br>Gradient of<br>Horizontal<br>Displacement<br>Curve<br>-471.56E-6 | Maximum<br>Gradient of<br>Vertical<br>Displacement<br>Curve<br>-497.68E-6 | Min.<br>Radius of<br>Curvature<br>(Hogging)<br>[m]<br>18096. | Min.<br>Radius of<br>Curvature<br>(Sagging)<br>[m]<br>-       | Damage Category<br>0 (Negligible)  |
| Structure: AA   Sub-structure:                                                            |                                         |                                                      |                                |                                          |                                               |                                                                             |                                                                           |                                                              |                                                               |                                    |
| Vertical<br>Offset from<br>Line for<br>Vertical<br>Movement<br>Calculations<br>[m]<br>0.0 | Deflection<br>Ratio<br>[%]<br>0.0       | Average<br>Horizontal<br>Strain<br>[%]<br>0.014228   | Maximum<br>Slope<br>-197.23E-6 | Maximum<br>Settlement<br>[mm]<br>0.40148 | Max.<br>Tensile<br>Strain<br>[%]<br>0.014228  | Maximum<br>Gradient of<br>Horizontal<br>Displacement<br>Curve<br>-152.02E-6 | Maximum<br>Gradient of<br>Vertical<br>Displacement<br>Curve<br>-197.23E-6 | Min.<br>Radius of<br>Curvature<br>(Hogging)<br>[m]<br>-      | Min.<br>Radius of<br>Curvature<br>(Sagging)<br>[m]<br>20684.  | Damage Category<br>0 (Negligible)  |
| Structure: AB   Sub-structure:                                                            |                                         |                                                      |                                |                                          |                                               |                                                                             |                                                                           |                                                              |                                                               |                                    |
| Vertical<br>Offset from<br>Line for<br>Vertical<br>Movement<br>Calculations<br>[m]<br>0.0 | Deflection<br>Ratio<br>[%]<br>609.84E-6 | Average<br>Horizontal<br>Strain<br>[%]<br>0.013059   | Maximum<br>Slope<br>-233.40E-6 | Maximum<br>Settlement<br>[mm]<br>1.5001  | Max.<br>Tensile<br>Strain<br>[%]<br>0.013659  | Maximum<br>Gradient of<br>Horizontal<br>Displacement<br>Curve<br>-168.54E-6 | Maximum<br>Gradient of<br>Vertical<br>Displacement<br>Curve<br>-233.40E-6 | Min.<br>Radius of<br>Curvature<br>(Hogging)<br>[m]<br>93673. | Min.<br>Radius of<br>Curvature<br>(Sagging)<br>[m]<br>-       | Damage Category<br>0 (Negligible)  |
| Structure: AC   Sub-structure:                                                            |                                         |                                                      |                                |                                          |                                               |                                                                             |                                                                           |                                                              |                                                               |                                    |
| Vertical<br>Offset from<br>Line for<br>Vertical<br>Movement<br>Calculations<br>[m]<br>0.0 | Deflection<br>Ratio<br>[%]<br>0.0023469 | Average<br>Horizontal<br>Strain<br>[%]<br>0.045340   | Maximum<br>Slope<br>-398.82E-6 | Maximum<br>Settlement<br>[mm]<br>4.2984  | Max.<br>Tensile<br>Strain<br>[%]<br>0.048193  | Maximum<br>Gradient of<br>Horizontal<br>Displacement<br>Curve<br>-500.66E-6 | Maximum<br>Gradient of<br>Vertical<br>Displacement<br>Curve<br>-398.82E-6 | Min.<br>Radius of<br>Curvature<br>(Hogging)<br>[m]<br>34502. | Min.<br>Radius of<br>Curvature<br>(Sagging)<br>[m]<br>13058.  | Damage Category<br>0 (Negligible)  |
| Structure: AD   Sub-structure:                                                            |                                         |                                                      |                                |                                          |                                               |                                                                             |                                                                           |                                                              |                                                               |                                    |
| Vertical<br>Offset from<br>Line for<br>Vertical<br>Movement<br>Calculations<br>[m]<br>0.0 | Deflection<br>Ratio<br>[%]<br>968.85E-6 | Average<br>Horizontal<br>Strain<br>[%]<br>-0.0086310 | Maximum<br>Slope<br>100.12E-6  | Maximum<br>Settlement<br>[mm]<br>1.5004  | Max.<br>Tensile<br>Strain<br>[%]<br>0.0017859 | Maximum<br>Gradient of<br>Horizontal<br>Displacement<br>Curve<br>118.56E-6  | Maximum<br>Gradient of<br>Vertical<br>Displacement<br>Curve<br>100.12E-6  | Min.<br>Radius of<br>Curvature<br>(Hogging)<br>[m]<br>-      | Min.<br>Radius of<br>Curvature<br>(Sagging)<br>[m]<br>36760.  | Damage Category<br>0 (Negligible)  |
| Structure: AE   Sub-structure:                                                            |                                         |                                                      |                                |                                          |                                               |                                                                             |                                                                           |                                                              |                                                               |                                    |
| Vertical<br>Offset from<br>Line for<br>Vertical<br>Movement<br>Calculations<br>[m]<br>0.0 | Deflection<br>Ratio<br>[%]              | Average<br>Horizontal<br>Strain<br>[%]               | Maximum<br>Slope               | Maximum<br>Settlement<br>[mm]            | Max.<br>Tensile<br>Strain<br>[%]              | Maximum<br>Gradient of<br>Horizontal<br>Displacement<br>Curve               | Maximum<br>Gradient of<br>Vertical<br>Displacement<br>Curve               | Min.<br>Radius of<br>Curvature<br>(Hogging)<br>[m]           | Min.<br>Radius of<br>Curvature<br>(Sagging)<br>[m]            | Damage Category                    |
| Structure: AF   Sub-structure:                                                            |                                         |                                                      |                                |                                          |                                               |                                                                             |                                                                           |                                                              |                                                               |                                    |
| Vertical<br>Offset from<br>Line for<br>Vertical<br>Movement<br>Calculations<br>[m]<br>0.0 | Deflection<br>Ratio<br>[%]              | Average<br>Horizontal<br>Strain<br>[%]               | Maximum<br>Slope               | Maximum<br>Settlement<br>[mm]            | Max.<br>Tensile<br>Strain<br>[%]              | Maximum<br>Gradient of<br>Horizontal<br>Displacement<br>Curve               | Maximum<br>Gradient of<br>Vertical<br>Displacement<br>Curve               | Min.<br>Radius of<br>Curvature<br>(Hogging)<br>[m]           | Min.<br>Radius of<br>Curvature<br>(Sagging)<br>[m]            | Damage Category                    |



# GEA LIMITED (GEOTECHNICAL & ENV ASSOC)

Rear of 159-163 King's Cross Road, London WC1X 9BN  
Wall Installation and Excavation Combined Issue 4

| Job No.   | Sheet No.           | Rev.    |
|-----------|---------------------|---------|
| J16180    |                     |         |
| Drg. Ref. |                     |         |
| Made by   | Date<br>07-Mar-2017 | Checked |

| Line for Vertical Movement Calculations                      | Strain           |                           |               | Strain             |                     | Horizontal Displacement Curve                     | Vertical Displacement Curve                     | Curvature (Hogging)                | Curvature (Sagging)                |                 |
|--------------------------------------------------------------|------------------|---------------------------|---------------|--------------------|---------------------|---------------------------------------------------|-------------------------------------------------|------------------------------------|------------------------------------|-----------------|
| [m]<br>0.0                                                   | [%]<br>0.0075864 | [%]<br>-0.083714          | -305.23E-6    | [mm]<br>4.5605     | [%]<br>0.017187     | 0.0046769                                         | -305.23E-6                                      | [m]<br>-                           | [m]<br>4127.4                      | 0 (Negligible)  |
| Structure: AG   Sub-structure:                               |                  |                           |               |                    |                     |                                                   |                                                 |                                    |                                    |                 |
| Vertical Offset from Line for Vertical Movement Calculations | Deflection Ratio | Average Horizontal Strain | Maximum Slope | Maximum Settlement | Max. Tensile Strain | Maximum Gradient of Horizontal Displacement Curve | Maximum Gradient of Vertical Displacement Curve | Min. Radius of Curvature (Hogging) | Min. Radius of Curvature (Sagging) | Damage Category |
| [m]<br>0.0                                                   | [%]<br>0.0018338 | [%]<br>0.023023           | 328.31E-6     | [mm]<br>4.4122     | [%]<br>0.025296     | 944.00E-6                                         | 328.31E-6                                       | [m]<br>26481.                      | [m]<br>23647.                      | 0 (Negligible)  |
| Structure: AH   Sub-structure:                               |                  |                           |               |                    |                     |                                                   |                                                 |                                    |                                    |                 |
| Vertical Offset from Line for Vertical Movement Calculations | Deflection Ratio | Average Horizontal Strain | Maximum Slope | Maximum Settlement | Max. Tensile Strain | Maximum Gradient of Horizontal Displacement Curve | Maximum Gradient of Vertical Displacement Curve | Min. Radius of Curvature (Hogging) | Min. Radius of Curvature (Sagging) | Damage Category |
| [m]<br>0.0                                                   | [%]<br>662.90E-6 | [%]<br>0.021492           | -299.89E-6    | [mm]<br>3.4326     | [%]<br>0.021492     | -214.88E-6                                        | -299.89E-6                                      | [m]<br>166750.                     | [m]<br>36727.                      | 0 (Negligible)  |
| Structure: AI   Sub-structure: Sub #                         |                  |                           |               |                    |                     |                                                   |                                                 |                                    |                                    |                 |
| Vertical Offset from Line for Vertical Movement Calculations | Deflection Ratio | Average Horizontal Strain | Maximum Slope | Maximum Settlement | Max. Tensile Strain | Maximum Gradient of Horizontal Displacement Curve | Maximum Gradient of Vertical Displacement Curve | Min. Radius of Curvature (Hogging) | Min. Radius of Curvature (Sagging) | Damage Category |
| [m]<br>0.0                                                   | [%]<br>0.0010914 | [%]<br>0.028715           | 348.31E-6     | [mm]<br>3.4329     | [%]<br>0.028721     | -291.80E-6                                        | 348.31E-6                                       | [m]<br>101550.                     | [m]<br>22247.                      | 0 (Negligible)  |
| Structure: AJ   Sub-structure: Sub #                         |                  |                           |               |                    |                     |                                                   |                                                 |                                    |                                    |                 |
| Vertical Offset from Line for Vertical Movement Calculations | Deflection Ratio | Average Horizontal Strain | Maximum Slope | Maximum Settlement | Max. Tensile Strain | Maximum Gradient of Horizontal Displacement Curve | Maximum Gradient of Vertical Displacement Curve | Min. Radius of Curvature (Hogging) | Min. Radius of Curvature (Sagging) | Damage Category |
| [m]<br>0.0                                                   | [%]<br>0.0096096 | [%]<br>-0.017194          | -545.62E-6    | [mm]<br>2.6269     | [%]<br>0.0092667    | 209.77E-6                                         | -545.62E-6                                      | [m]<br>9468.9                      | [m]<br>6740.3                      | 0 (Negligible)  |
| Structure: AK   Sub-structure: Sub #                         |                  |                           |               |                    |                     |                                                   |                                                 |                                    |                                    |                 |
| Vertical Offset from Line for Vertical Movement Calculations | Deflection Ratio | Average Horizontal Strain | Maximum Slope | Maximum Settlement | Max. Tensile Strain | Maximum Gradient of Horizontal Displacement Curve | Maximum Gradient of Vertical Displacement Curve | Min. Radius of Curvature (Hogging) | Min. Radius of Curvature (Sagging) | Damage Category |
| [m]<br>0.0                                                   | [%]<br>0.0018558 | [%]<br>0.064757           | -630.99E-6    | [mm]<br>5.5773     | [%]<br>0.064841     | -650.11E-6                                        | -630.99E-6                                      | [m]<br>23704.                      | [m]<br>12210.                      | 1 (Very Slight) |
| Structure: AL   Sub-structure: Sub #                         |                  |                           |               |                    |                     |                                                   |                                                 |                                    |                                    |                 |
| Vertical Offset from Line for Vertical Movement Calculations | Deflection Ratio | Average Horizontal Strain | Maximum Slope | Maximum Settlement | Max. Tensile Strain | Maximum Gradient of Horizontal Displacement Curve | Maximum Gradient of Vertical Displacement Curve | Min. Radius of Curvature (Hogging) | Min. Radius of Curvature (Sagging) | Damage Category |
| [m]<br>0.0                                                   | [%]<br>948.54E-6 | [%]<br>0.0027757          | -126.14E-6    | [mm]<br>6.0410     | [%]<br>0.0030249    | -65.367E-6                                        | -126.14E-6                                      | [m]<br>54363.                      | [m]<br>-                           | 0 (Negligible)  |
| Structure: AM   Sub-structure: Sub #                         |                  |                           |               |                    |                     |                                                   |                                                 |                                    |                                    |                 |
| Vertical Offset from Line for Vertical Movement Calculations | Deflection Ratio | Average Horizontal Strain | Maximum Slope | Maximum Settlement | Max. Tensile Strain | Maximum Gradient of Horizontal Displacement Curve | Maximum Gradient of Vertical Displacement Curve | Min. Radius of Curvature (Hogging) | Min. Radius of Curvature (Sagging) | Damage Category |
| [m]<br>0.0                                                   | [%]<br>0.0014679 | [%]<br>0.074333           | 717.80E-6     | [mm]<br>6.0411     | [%]<br>0.074662     | -743.46E-6                                        | 717.80E-6                                       | [m]<br>-                           | [m]<br>13108.                      | 1 (Very Slight) |
| Structure: AN   Sub-structure: Sub #                         |                  |                           |               |                    |                     |                                                   |                                                 |                                    |                                    |                 |
| Vertical Offset from Line for Vertical Movement Calculations | Deflection Ratio | Average Horizontal Strain | Maximum Slope | Maximum Settlement | Max. Tensile Strain | Maximum Gradient of Horizontal Displacement Curve | Maximum Gradient of Vertical Displacement Curve | Min. Radius of Curvature (Hogging) | Min. Radius of Curvature (Sagging) | Damage Category |
| [m]<br>0.0                                                   | [%]<br>0.014087  | [%]<br>-0.010764          | 687.07E-6     | [mm]<br>4.3455     | [%]<br>0.011085     | 208.78E-6                                         | 687.07E-6                                       | [m]<br>-                           | [m]<br>889.99                      | 0 (Negligible)  |
| Structure: AO   Sub-structure: Sub #                         |                  |                           |               |                    |                     |                                                   |                                                 |                                    |                                    |                 |
| Vertical Offset from Line for Vertical Movement Calculations | Deflection Ratio | Average Horizontal Strain | Maximum Slope | Maximum Settlement | Max. Tensile Strain | Maximum Gradient of Horizontal Displacement Curve | Maximum Gradient of Vertical Displacement Curve | Min. Radius of Curvature (Hogging) | Min. Radius of Curvature (Sagging) | Damage Category |
| [m]<br>0.0                                                   | [%]<br>506.87E-6 | [%]<br>0.074782           | -674.70E-6    | [mm]<br>5.4489     | [%]<br>0.074851     | -755.25E-6                                        | -674.70E-6                                      | [m]<br>58107.                      | [m]<br>30636.                      | 1 (Very Slight) |
| Structure: AP   Sub-structure: Sub #                         |                  |                           |               |                    |                     |                                                   |                                                 |                                    |                                    |                 |
| Vertical Offset from Line for Vertical Movement Calculations | Deflection Ratio | Average Horizontal Strain | Maximum Slope | Maximum Settlement | Max. Tensile Strain | Maximum Gradient of Horizontal Displacement Curve | Maximum Gradient of Vertical Displacement Curve | Min. Radius of Curvature (Hogging) | Min. Radius of Curvature (Sagging) | Damage Category |
| [m]<br>0.0                                                   | [%]<br>0.014898  | [%]<br>-0.053258          | 866.23E-6     | [mm]<br>5.9061     | [%]<br>0.013862     | 917.13E-6                                         | 866.23E-6                                       | [m]<br>-                           | [m]<br>1002.5                      | 0 (Negligible)  |



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Rear of 159-163 King's Cross Road, London WC1X 9BN  
Wall Installation and Excavation Combined Issue 4

| Job No.   | Sheet No.           | Rev.    |
|-----------|---------------------|---------|
| J16180    |                     |         |
| Drg. Ref. |                     |         |
| Made by   | Date<br>07-Mar-2017 | Checked |

| Vertical<br>Offset from<br>Line for<br>Vertical<br>Movement<br>Calculations | Deflection<br>Ratio                | Average<br>Horizontal<br>Strain | Maximum<br>Slope    | Maximum<br>Settlement | Max.<br>Tensile<br>Strain | Maximum<br>Gradient of<br>Horizontal<br>Displacement<br>Curve | Maximum<br>Gradient of<br>Vertical<br>Displacement<br>Curve | Min.<br>Radius of<br>Curvature<br>(Hogging) | Min.<br>Radius of<br>Curvature<br>(Sagging) | Damage Category                             |                                             |                   |
|-----------------------------------------------------------------------------|------------------------------------|---------------------------------|---------------------|-----------------------|---------------------------|---------------------------------------------------------------|-------------------------------------------------------------|---------------------------------------------|---------------------------------------------|---------------------------------------------|---------------------------------------------|-------------------|
| 0.0                                                                         | 0.0019544                          | 0.042235                        | 578.44E-6           | 4.4806                | 0.042635                  | -524.72E-6                                                    | 578.44E-6                                                   | 17977.                                      |                                             | - 0 (Negligible)                            |                                             |                   |
| Structure: AR   Sub-structure: Sub #                                        |                                    |                                 |                     |                       |                           |                                                               |                                                             |                                             |                                             |                                             |                                             |                   |
| Vertical<br>Offset from<br>Line for<br>Vertical<br>Movement<br>Calculations | Deflection<br>Ratio                | Average<br>Horizontal<br>Strain | Maximum<br>Slope    | Maximum<br>Settlement | Max.<br>Tensile<br>Strain | Maximum<br>Gradient of<br>Horizontal<br>Displacement<br>Curve | Maximum<br>Gradient of<br>Vertical<br>Displacement<br>Curve | Min.<br>Radius of<br>Curvature<br>(Hogging) | Min.<br>Radius of<br>Curvature<br>(Sagging) | Damage Category                             |                                             |                   |
| 0.0                                                                         | 0.0074632                          | 0.065745                        | -740.36E-6          | 4.3030                | 0.068339                  | -794.48E-6                                                    | -740.36E-6                                                  | 12142.                                      |                                             | - 1 (Very Slight)                           |                                             |                   |
| Structure: AS   Sub-structure: Sub #                                        |                                    |                                 |                     |                       |                           |                                                               |                                                             |                                             |                                             |                                             |                                             |                   |
| Vertical<br>Offset from<br>Line for<br>Vertical<br>Movement<br>Calculations | Deflection<br>Ratio                | Average<br>Horizontal<br>Strain | Maximum<br>Slope    | Maximum<br>Settlement | Max.<br>Tensile<br>Strain | Maximum<br>Gradient of<br>Horizontal<br>Displacement<br>Curve | Maximum<br>Gradient of<br>Vertical<br>Displacement<br>Curve | Min.<br>Radius of<br>Curvature<br>(Hogging) | Min.<br>Radius of<br>Curvature<br>(Sagging) | Damage Category                             |                                             |                   |
| 0.0                                                                         | 0.0045319                          | 0.046960                        | -541.59E-6          | 2.6279                | 0.048147                  | -613.34E-6                                                    | -541.59E-6                                                  | 13122.                                      |                                             | - 0 (Negligible)                            |                                             |                   |
| Structure: AT   Sub-structure: Sub #                                        |                                    |                                 |                     |                       |                           |                                                               |                                                             |                                             |                                             |                                             |                                             |                   |
| Vertical<br>Offset from<br>Line for<br>Vertical<br>Movement<br>Calculations | Deflection<br>Ratio                | Average<br>Horizontal<br>Strain | Maximum<br>Slope    | Maximum<br>Settlement | Max.<br>Tensile<br>Strain | Maximum<br>Gradient of<br>Horizontal<br>Displacement<br>Curve | Maximum<br>Gradient of<br>Vertical<br>Displacement<br>Curve | Min.<br>Radius of<br>Curvature<br>(Hogging) | Min.<br>Radius of<br>Curvature<br>(Sagging) | Damage Category                             |                                             |                   |
| 0.0                                                                         | 792.08E-6                          | 0.015823                        | -256.76E-6          | 2.5287                | 0.016000                  | -191.78E-6                                                    | -256.76E-6                                                  | 75494.                                      | 46211.0                                     | 0 (Negligible)                              |                                             |                   |
| Structure: AU   Sub-structure:                                              |                                    |                                 |                     |                       |                           |                                                               |                                                             |                                             |                                             |                                             |                                             |                   |
| Vertical<br>Offset from<br>Line for<br>Vertical<br>Movement<br>Calculations | Deflection<br>Ratio                | Average<br>Horizontal<br>Strain | Maximum<br>Slope    | Maximum<br>Settlement | Max.<br>Tensile<br>Strain | Maximum<br>Gradient of<br>Horizontal<br>Displacement<br>Curve | Maximum<br>Gradient of<br>Vertical<br>Displacement<br>Curve | Min.<br>Radius of<br>Curvature<br>(Hogging) | Min.<br>Radius of<br>Curvature<br>(Sagging) | Damage Category                             |                                             |                   |
| 0.0                                                                         | 0.0097649                          | 0.12676                         | 765.06E-6           | 7.2961                | 0.13869                   | -0.0014145                                                    | 765.06E-6                                                   | 22146.                                      | 2792.5                                      | 2 (Slight)                                  |                                             |                   |
| Structure: AV   Sub-structure:                                              |                                    |                                 |                     |                       |                           |                                                               |                                                             |                                             |                                             |                                             |                                             |                   |
| Vertical<br>Offset from<br>Line for<br>Vertical<br>Movement<br>Calculations | Deflection<br>Ratio                | Average<br>Horizontal<br>Strain | Maximum<br>Slope    | Maximum<br>Settlement | Max.<br>Tensile<br>Strain | Maximum<br>Gradient of<br>Horizontal<br>Displacement<br>Curve | Maximum<br>Gradient of<br>Vertical<br>Displacement<br>Curve | Min.<br>Radius of<br>Curvature<br>(Hogging) | Min.<br>Radius of<br>Curvature<br>(Sagging) | Damage Category                             |                                             |                   |
| 0.0                                                                         | 0.014021                           | -0.020850                       | 791.04E-6           | 2.8727                | 0.011730                  | 334.01E-6                                                     | 791.04E-6                                                   | 5942.8                                      | 4179.3                                      | 0 (Negligible)                              |                                             |                   |
| Structure: AW   Sub-structure:                                              |                                    |                                 |                     |                       |                           |                                                               |                                                             |                                             |                                             |                                             |                                             |                   |
| Vertical<br>Offset from<br>Line for<br>Vertical<br>Movement<br>Calculations | Deflection<br>Ratio                | Average<br>Horizontal<br>Strain | Maximum<br>Slope    | Maximum<br>Settlement | Max.<br>Tensile<br>Strain | Maximum<br>Gradient of<br>Horizontal<br>Displacement<br>Curve | Maximum<br>Gradient of<br>Vertical<br>Displacement<br>Curve | Min.<br>Radius of<br>Curvature<br>(Hogging) | Min.<br>Radius of<br>Curvature<br>(Sagging) | Damage Category                             |                                             |                   |
| 0.0                                                                         | 0.032351                           | 0.049902                        | -0.0011142          | 7.7676                | 0.081895                  | -710.19E-6                                                    | -0.0011142                                                  | 9337.1                                      | 1690.6                                      | 2 (Slight)                                  |                                             |                   |
| Specific Building Damage Results - Critical Segments within Each Structure  |                                    |                                 |                     |                       |                           |                                                               |                                                             |                                             |                                             |                                             |                                             |                   |
| Structure Name                                                              | Parameter                          | Critical<br>Sub-Structure       | Critical<br>Segment | Start                 | End                       | Curvature                                                     | Maximum<br>Slope                                            | Maximum<br>Settlement                       | Max.<br>Tensile<br>Strain                   | Min.<br>Radius of<br>Curvature<br>(Hogging) | Min.<br>Radius of<br>Curvature<br>(Sagging) | Damage Category   |
| A                                                                           | Maximum Slope                      |                                 |                     | 1                     | 0.0                       | 3.3990 Hogging                                                | 362.76E-6                                                   | 1.3407                                      | 0.048383                                    | 14135.                                      |                                             | - 0 (Negligible)  |
|                                                                             | Maximum Settlement                 |                                 |                     | 1                     | 0.0                       | 3.3990 Hogging                                                | 362.76E-6                                                   | 1.3407                                      | 0.048383                                    | 14135.                                      |                                             | - 0 (Negligible)  |
|                                                                             | Max. Tensile Strain                |                                 |                     | 1                     | 0.0                       | 3.3990 Hogging                                                | 362.76E-6                                                   | 1.3407                                      | 0.048383                                    | 14135.                                      |                                             | - 0 (Negligible)  |
|                                                                             | Min. Radius of Curvature (Hogging) |                                 |                     | 1                     | 0.0                       | 3.3990 Hogging                                                | 362.76E-6                                                   | 1.3407                                      | 0.048383                                    | 14135.                                      |                                             | - 0 (Negligible)  |
|                                                                             | Min. Radius of Curvature (Sagging) |                                 |                     | -                     | -                         | -                                                             | -                                                           | -                                           | -                                           | -                                           | -                                           |                   |
| B                                                                           | Maximum Slope                      |                                 |                     | 1                     | 0.0                       | 3.0990 Sagging                                                | 160.85E-6                                                   | 1.8155                                      | 0.0025245                                   | -                                           | 60575.0                                     | 0 (Negligible)    |
|                                                                             | Maximum Settlement                 |                                 |                     | 1                     | 0.0                       | 3.0990 Sagging                                                | 160.85E-6                                                   | 1.8155                                      | 0.0025245                                   | -                                           | 60575.0                                     | 0 (Negligible)    |
|                                                                             | Max. Tensile Strain                |                                 |                     | 1                     | 0.0                       | 3.0990 Sagging                                                | 160.85E-6                                                   | 1.8155                                      | 0.0025245                                   | -                                           | 60575.0                                     | 0 (Negligible)    |
|                                                                             | Min. Radius of Curvature (Hogging) |                                 |                     | -                     | -                         | -                                                             | -                                                           | -                                           | -                                           | -                                           | -                                           |                   |
|                                                                             | Min. Radius of Curvature (Sagging) |                                 |                     | 1                     | 0.0                       | 3.0990 Sagging                                                | 160.85E-6                                                   | 1.8155                                      | 0.0025245                                   | -                                           | 60575.0                                     | 0 (Negligible)    |
| C                                                                           | Maximum Slope                      |                                 |                     | 1                     | 0.0                       | 3.2976 Hogging                                                | 595.22E-6                                                   | 3.6595                                      | 0.066321                                    | 13131.                                      |                                             | - 1 (Very Slight) |
|                                                                             | Maximum Settlement                 |                                 |                     | 2                     | 3.2976                    | 4.6001 Sagging                                                | 595.22E-6                                                   | 4.4250                                      | 0.048169                                    | -                                           | 55670.0                                     | 0 (Negligible)    |
|                                                                             | Max. Tensile Strain                |                                 |                     | 1                     | 0.0                       | 3.2976 Hogging                                                | 595.22E-6                                                   | 3.6595                                      | 0.066321                                    | 13131.                                      |                                             | - 1 (Very Slight) |
|                                                                             | Min. Radius of Curvature (Hogging) |                                 |                     | 1                     | 0.0                       | 3.2976 Hogging                                                | 595.22E-6                                                   | 3.6595                                      | 0.066321                                    | 13131.                                      |                                             | - 1 (Very Slight) |
|                                                                             | Min. Radius of Curvature (Sagging) |                                 |                     | 2                     | 3.2976                    | 4.6001 Sagging                                                | 595.22E-6                                                   | 4.4250                                      | 0.048169                                    | -                                           | 55670.0                                     | 0 (Negligible)    |



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| J16180    |                     |         |
| Drg. Ref. |                     |         |
| Made by   | Date<br>07-Mar-2017 | Checked |

| Structure Name | Parameter                          | Critical Sub-Structure | Critical Segment | Start   | End     | Curvature | Maximum Slope | Maximum Settlement | Max. Tensile Strain | Min. Radius of Curvature (Hogging) | Min. Radius of Curvature (Sagging) | Damage Category |
|----------------|------------------------------------|------------------------|------------------|---------|---------|-----------|---------------|--------------------|---------------------|------------------------------------|------------------------------------|-----------------|
| D              | Maximum Slope                      |                        | 2                | 1.3181  | 3.2812  | Sagging   | 0.0010102     | -                  | 4.0195              | 0.020445                           | 4314.1                             | -               |
|                | Maximum Settlement                 |                        | 1                | 0.0     | 1.3181  | Hogging   | 362.66E-6     | 4.4256             | 0.0036797           | -                                  | 3765.8                             | 0 (Negligible)  |
|                | Max. Tensile Strain                |                        | 2                | 1.3181  | 3.2812  | Sagging   | 0.0010102     | 4.0195             | 0.020445            | -                                  | 3765.8                             | 0 (Negligible)  |
|                | Min. Radius of Curvature (Hogging) |                        | 4                | 4.8752  | 5.3999  | Hogging   | 339.34E-6     | 2.4632             | 0.0022951           | 4216.7                             | -                                  | 0 (Negligible)  |
| E              | Min. Radius of Curvature (Sagging) |                        | 2                | 1.3181  | 3.2812  | Sagging   | 0.0010102     | 4.0195             | 0.020445            | -                                  | 3765.8                             | 0 (Negligible)  |
|                | Maximum Slope                      |                        | 1                | 0.0     | 2.4990  | Sagging   | 338.44E-6     | 3.0592             | 0.0014001           | -                                  | 14198.0                            | 0 (Negligible)  |
|                | Maximum Settlement                 |                        | 1                | 0.0     | 2.4990  | Sagging   | 338.44E-6     | 3.0592             | 0.0014001           | -                                  | 14198.0                            | 0 (Negligible)  |
|                | Max. Tensile Strain                |                        | 1                | 0.0     | 2.4990  | Sagging   | 338.44E-6     | 3.0592             | 0.0014001           | -                                  | 14198.0                            | 0 (Negligible)  |
| F              | Min. Radius of Curvature (Hogging) |                        | -                | -       | -       | -         | -             | -                  | -                   | -                                  | -                                  | -               |
|                | Min. Radius of Curvature (Sagging) |                        | 1                | 0.0     | 2.4990  | Sagging   | 338.44E-6     | 3.0592             | 0.0014001           | -                                  | 14198.0                            | 0 (Negligible)  |
|                | Maximum Slope                      |                        | 1                | 0.0     | 0.40113 | Sagging   | 490.90E-6     | 3.0594             | 0.013347            | -                                  | 41903.0                            | 0 (Negligible)  |
|                | Maximum Settlement                 |                        | 1                | 0.0     | 0.40113 | Sagging   | 490.90E-6     | 3.0594             | 0.013347            | -                                  | 41903.0                            | 0 (Negligible)  |
| G              | Max. Tensile Strain                |                        | 2                | 0.40113 | 9.2995  | Hogging   | 490.90E-6     | 2.8625             | 0.033014            | 14423.                             | -                                  | 0 (Negligible)  |
|                | Min. Radius of Curvature (Hogging) |                        | 2                | 0.40113 | 9.2995  | Hogging   | 490.90E-6     | 2.8625             | 0.033014            | 14423.                             | -                                  | 0 (Negligible)  |
|                | Min. Radius of Curvature (Sagging) |                        | 1                | 0.0     | 0.40113 | Sagging   | 490.90E-6     | 3.0594             | 0.013347            | -                                  | 41903.0                            | 0 (Negligible)  |
|                | Maximum Slope                      |                        | 1                | 0.0     | 3.0000  | Hogging   | 41.003E-6     | 0.24315            | 132.57E-6           | 316360.                            | -                                  | 0 (Negligible)  |
| H              | Maximum Settlement                 |                        | 1                | 0.0     | 3.0000  | Hogging   | 41.003E-6     | 0.24315            | 132.57E-6           | 316360.                            | -                                  | 0 (Negligible)  |
|                | Max. Tensile Strain                |                        | 1                | 0.0     | 3.0000  | Hogging   | 41.003E-6     | 0.24315            | 132.57E-6           | 316360.                            | -                                  | 0 (Negligible)  |
|                | Min. Radius of Curvature (Hogging) |                        | 1                | 0.0     | 3.0000  | Hogging   | 41.003E-6     | 0.24315            | 132.57E-6           | 316360.                            | -                                  | 0 (Negligible)  |
|                | Min. Radius of Curvature (Sagging) |                        | -                | -       | -       | -         | -             | -                  | -                   | -                                  | -                                  | -               |
| I              | Maximum Slope                      |                        | 1                | 0.90062 | 2.7009  | Hogging   | 70.084E-6     | 0.22254            | 0.029092            | 39519.                             | -                                  | 0 (Negligible)  |
|                | Maximum Settlement                 |                        | 1                | 0.90062 | 2.7009  | Hogging   | 70.084E-6     | 0.22254            | 0.029092            | 39519.                             | -                                  | 0 (Negligible)  |
|                | Max. Tensile Strain                |                        | 1                | 0.90062 | 2.7009  | Hogging   | 70.084E-6     | 0.22254            | 0.029092            | 39519.                             | -                                  | 0 (Negligible)  |
|                | Min. Radius of Curvature (Hogging) |                        | 1                | 0.90062 | 2.7009  | Hogging   | 70.084E-6     | 0.22254            | 0.029092            | 39519.                             | -                                  | 0 (Negligible)  |
| J              | Min. Radius of Curvature (Sagging) |                        | -                | -       | -       | -         | -             | -                  | -                   | -                                  | -                                  | -               |
|                | Maximum Slope                      |                        | 1                | 0.0     | 2.7003  | Hogging   | 54.672E-6     | 0.22261            | 0.011308            | 74444.                             | -                                  | 0 (Negligible)  |
|                | Maximum Settlement                 |                        | 1                | 0.0     | 2.7003  | Hogging   | 54.672E-6     | 0.22261            | 0.011308            | 74444.                             | -                                  | 0 (Negligible)  |
|                | Max. Tensile Strain                |                        | 1                | 0.0     | 2.7003  | Hogging   | 54.672E-6     | 0.22261            | 0.011308            | 74444.                             | -                                  | 0 (Negligible)  |
| K              | Min. Radius of Curvature (Hogging) |                        | 1                | 0.0     | 2.7003  | Hogging   | 54.672E-6     | 0.22261            | 0.011308            | 74444.                             | -                                  | 0 (Negligible)  |
|                | Min. Radius of Curvature (Sagging) |                        | -                | -       | -       | -         | -             | -                  | -                   | -                                  | -                                  | -               |
|                | Maximum Slope                      |                        | 1                | 0.0     | 13.450  | Sagging   | 86.649E-6     | 0.55511            | 0.0010651           | -                                  | 49099.0                            | 0 (Negligible)  |
|                | Maximum Settlement                 |                        | 1                | 0.0     | 13.450  | Sagging   | 86.649E-6     | 0.55511            | 0.0010651           | -                                  | 49099.0                            | 0 (Negligible)  |
| L              | Max. Tensile Strain                |                        | 1                | 0.0     | 13.450  | Sagging   | 86.649E-6     | 0.55511            | 0.0010651           | -                                  | 49099.0                            | 0 (Negligible)  |
|                | Min. Radius of Curvature (Hogging) |                        | 2                | 13.450  | 19.499  | Hogging   | 86.649E-6     | 0.36937            | 943.96E-6           | 198650.                            | -                                  | 0 (Negligible)  |
|                | Min. Radius of Curvature (Sagging) |                        | 1                | 0.0     | 13.450  | Sagging   | 86.649E-6     | 0.55511            | 0.0010651           | -                                  | 49099.0                            | 0 (Negligible)  |
|                | Maximum Slope                      |                        | 1                | 0.0     | 2.5412  | Sagging   | 633.90E-6     | 3.1171             | 0.0070639           | -                                  | 1935.7                             | 0 (Negligible)  |
| M              | Maximum Settlement                 |                        | 3                | 4.0141  | 7.4408  | Sagging   | 576.62E-6     | 3.9779             | 0.0099058           | -                                  | 4056.7                             | 0 (Negligible)  |
|                | Max. Tensile Strain                |                        | 2                | 2.5412  | 4.0141  | Hogging   | 576.62E-6     | 3.4423             | 0.011193            | 12029.                             | -                                  | 0 (Negligible)  |
|                | Min. Radius of Curvature (Hogging) |                        | 2                | 2.5412  | 4.0141  | Hogging   | 576.62E-6     | 3.4423             | 0.011193            | 12029.                             | -                                  | 0 (Negligible)  |
|                | Min. Radius of Curvature (Sagging) |                        | 1                | 0.0     | 2.5412  | Sagging   | 633.90E-6     | 3.1171             | 0.0070639           | -                                  | 1935.7                             | 0 (Negligible)  |
| N              | Maximum Slope                      |                        | 1                | 0.0     | 6.7766  | Hogging   | 595.91E-6     | 3.7461             | 0.071612            | 13727.                             | -                                  | 1 (Very Slight) |
|                | Maximum Settlement                 |                        | 2                | 6.7766  | 7.1990  | Sagging   | 595.91E-6     | 3.9981             | 0.093752            | -                                  | 123000.2                           | 2 (Slight)      |
|                | Max. Tensile Strain                |                        | 2                | 6.7766  | 7.1990  | Sagging   | 595.91E-6     | 3.9981             | 0.093752            | -                                  | 123000.2                           | 2 (Slight)      |
|                | Min. Radius of Curvature (Hogging) |                        | 1                | 0.0     | 6.7766  | Hogging   | 595.91E-6     | 3.7461             | 0.071612            | 13727.                             | -                                  | 1 (Very Slight) |
| O              | Min. Radius of Curvature (Sagging) |                        | 2                | 6.7766  | 7.1990  | Sagging   | 595.91E-6     | 3.9981             | 0.093752            | -                                  | 123000.2                           | 2 (Slight)      |
|                | Maximum Slope                      |                        | 1                | 0.0     | 5.8138  | Hogging   | 496.50E-6     | 2.8507             | 0.056453            | 17248.                             | -                                  | 1 (Very Slight) |
|                | Maximum Settlement                 |                        | 2                | 5.8138  | 7.2997  | Sagging   | 496.50E-6     | 3.5704             | 0.078899            | -                                  | 31493.2                            | 2 (Slight)      |
|                | Max. Tensile Strain                |                        | 2                | 5.8138  | 7.2997  | Sagging   | 496.50E-6     | 3.5704             | 0.078899            | -                                  | 31493.2                            | 2 (Slight)      |
| P              | Min. Radius of Curvature (Hogging) |                        | 1                | 0.0     | 5.8138  | Hogging   | 496.50E-6     | 2.8507             | 0.056453            | 17248.                             | -                                  | 1 (Very Slight) |
|                | Min. Radius of Curvature (Sagging) |                        | 2                | 5.8138  | 7.2997  | Sagging   | 496.50E-6     | 3.5704             | 0.078899            | -                                  | 31493.2                            | 2 (Slight)      |
|                | Maximum Slope                      |                        | 1                | 0.0     | 6.0990  | Hogging   | 334.46E-6     | 2.0749             | 0.038852            | 12489.                             | -                                  | 0 (Negligible)  |
|                | Maximum Settlement                 |                        | 1                | 0.0     | 6.0990  | Hogging   | 334.46E-6     | 2.0749             | 0.038852            | 12489.                             | -                                  | 0 (Negligible)  |
| Q              | Max. Tensile Strain                |                        | 1                | 0.0     | 6.0990  | Hogging   | 334.46E-6     | 2.0749             | 0.038852            | 12489.                             | -                                  | 0 (Negligible)  |
|                | Min. Radius of Curvature (Hogging) |                        | 1                | 0.0     | 6.0990  | Hogging   | 334.46E-6     | 2.0749             | 0.038852            | 12489.                             | -                                  | 0 (Negligible)  |
|                | Min. Radius of Curvature (Sagging) |                        | -                | -       | -       | -         | -             | -                  | -                   | -                                  | -                                  | -               |
|                | Maximum Slope                      |                        | 1                | 0.0     | 4.5990  | Sagging   | 601.53E-6     | 5.8644             | 0.11712             | -                                  | 2682.4                             | 2 (Slight)      |
| R              | Maximum Settlement                 |                        | 1                | 0.0     | 4.5990  | Sagging   | 601.53E-6     | 5.8644             | 0.11712             | -                                  | 2682.4                             | 2 (Slight)      |
|                | Max. Tensile Strain                |                        | 1                | 0.0     | 4.5990  | Sagging   | 601.53E-6     | 5.8644             | 0.11712             | -                                  | 2682.4                             | 2 (Slight)      |
|                | Min. Radius of Curvature (Hogging) |                        | -                | -       | -       | -         | -             | -                  | -                   | -                                  | -                                  | -               |
|                | Min. Radius of Curvature (Sagging) |                        | -                | -       | -       | -         | -             | -                  | -                   | -                                  | -                                  | -               |



GEA LIMITED  
(GEOTECHNICAL & ENV ASSOC)

Rear of 159-163 King's Cross Road, London WC1X 9BN  
Wall Installation and Excavation Combined Issue 4

| Job No.   | Sheet No.   | Rev.    |
|-----------|-------------|---------|
| J16180    |             |         |
| Drg. Ref. |             |         |
| Made by   | Date        | Checked |
|           | 07-Mar-2017 |         |

| Structure Name | Parameter                          | Critical Sub-Structure | Critical Segment | Start   | End    | Curvature | Maximum Slope | Maximum Settlement | Max. Tensile Strain | Min. Radius of Curvature (Hogging) | Min. Radius of Curvature (Sagging) | Damage Category |
|----------------|------------------------------------|------------------------|------------------|---------|--------|-----------|---------------|--------------------|---------------------|------------------------------------|------------------------------------|-----------------|
| P              | Curvature (Hogging)                |                        |                  | -       | -      | -         |               |                    |                     |                                    |                                    |                 |
|                | Min. Radius of Curvature (Sagging) |                        | 1                | 0.0     | 4.5990 | Sagging   | 601.53E-6     | 5.8644             | 0.11712             | -                                  | 2682.4                             | 2 (Slight)      |
|                | Maximum Slope                      | Sub #                  | 3                | 3.2141  | 5.6990 | Hogging   | 735.62E-6     | 4.1956             | 0.027500            | 1332.1                             | -                                  | 0 (Negligible)  |
|                | Maximum Settlement                 | Sub #                  | 3                | 3.2141  | 5.6990 | Hogging   | 735.62E-6     | 4.1956             | 0.027500            | 1332.1                             | -                                  | 0 (Negligible)  |
|                | Max. Tensile Strain                | Sub #                  | 1                | 0.0     | 1.9268 | Hogging   | 341.91E-6     | 2.7038             | 0.059343            | 68339.                             | -                                  | 1 (Very Slight) |
| Q              | Min. Radius of Curvature (Hogging) | Sub #                  | 3                | 3.2141  | 5.6990 | Hogging   | 735.62E-6     | 4.1956             | 0.027500            | 1332.1                             | -                                  | 0 (Negligible)  |
|                | Min. Radius of Curvature (Sagging) | Sub #                  | 2                | 1.9268  | 3.2141 | Sagging   | 341.91E-6     | 3.1344             | 0.053584            | -                                  | 22553.                             | 1 (Very Slight) |
|                | Maximum Slope                      |                        | 1                | 0.0     | 4.5990 | Sagging   | 460.07E-6     | 4.7526             | 0.080665            | -                                  | 2495.2                             | 2 (Slight)      |
|                | Maximum Settlement                 |                        | 1                | 0.0     | 4.5990 | Sagging   | 460.07E-6     | 4.7526             | 0.080665            | -                                  | 2495.2                             | 2 (Slight)      |
|                | Max. Tensile Strain                |                        | 1                | 0.0     | 4.5990 | Sagging   | 460.07E-6     | 4.7526             | 0.080665            | -                                  | 2495.2                             | 2 (Slight)      |
| R              | Min. Radius of Curvature (Hogging) |                        | -                | -       | -      | -         | -             | -                  | -                   | -                                  | -                                  | -               |
|                | Min. Radius of Curvature (Sagging) |                        | 1                | 0.0     | 4.5990 | Sagging   | 460.07E-6     | 4.7526             | 0.080665            | -                                  | 2495.2                             | 2 (Slight)      |
|                | Maximum Slope                      |                        | 2                | 0.48898 | 2.1774 | Hogging   | 0.0013996     | 4.4126             | 0.011736            | 4140.5                             | -                                  | 0 (Negligible)  |
|                | Maximum Settlement                 |                        | 4                | 4.8416  | 7.4098 | Hogging   | 0.0013304     | 7.2172             | 0.038203            | 562.66                             | -                                  | 0 (Negligible)  |
|                | Max. Tensile Strain                |                        | 3                | 2.1774  | 4.8416 | Sagging   | 0.0013996     | 5.7907             | 0.049756            | -                                  | 2782.0                             | 0 (Negligible)  |
| S              | Min. Radius of Curvature (Hogging) |                        | 4                | 4.8416  | 7.4098 | Hogging   | 0.0013304     | 7.2172             | 0.038203            | 562.66                             | -                                  | 0 (Negligible)  |
|                | Min. Radius of Curvature (Sagging) |                        | 3                | 2.1774  | 4.8416 | Sagging   | 0.0013996     | 5.7907             | 0.049756            | -                                  | 2782.0                             | 0 (Negligible)  |
|                | Maximum Slope                      |                        | 3                | 7.9268  | 9.6875 | Sagging   | 15.731E-6     | 0.11516            | 935.95E-6           | -                                  | 342600.                            | 0 (Negligible)  |
|                | Maximum Settlement                 |                        | 1                | 0.0     | 7.3583 | Sagging   | 11.934E-6     | 0.13870            | 0.0011167           | -                                  | 242620.                            | 0 (Negligible)  |
|                | Max. Tensile Strain                |                        | 1                | 0.0     | 7.3583 | Sagging   | 11.934E-6     | 0.13870            | 0.0011167           | -                                  | 242620.                            | 0 (Negligible)  |
| T              | Min. Radius of Curvature (Hogging) |                        | 2                | 7.3583  | 7.9268 | Hogging   | 11.016E-6     | 0.11383            | 928.15E-6           | 3.4224E+6                          | -                                  | 0 (Negligible)  |
|                | Min. Radius of Curvature (Sagging) |                        | 1                | 0.0     | 7.3583 | Sagging   | 11.934E-6     | 0.13870            | 0.0011167           | -                                  | 242620.                            | 0 (Negligible)  |
|                | Maximum Slope                      |                        | 4                | 12.100  | 18.737 | Hogging   | 578.74E-6     | 2.4212             | 0.010671            | 10589.                             | -                                  | 0 (Negligible)  |
|                | Maximum Settlement                 |                        | 3                | 5.7829  | 12.100 | Sagging   | 282.96E-6     | 3.1144             | 0.0089006           | -                                  | 10857.                             | 0 (Negligible)  |
|                | Max. Tensile Strain                |                        | 2                | 2.5281  | 5.7829 | Hogging   | 115.92E-6     | 2.5338             | 0.020619            | 29079.                             | -                                  | 0 (Negligible)  |
| U              | Min. Radius of Curvature (Hogging) |                        | 4                | 12.100  | 18.737 | Hogging   | 578.74E-6     | 2.4212             | 0.010671            | 10589.                             | -                                  | 0 (Negligible)  |
|                | Min. Radius of Curvature (Sagging) |                        | 5                | 18.737  | 23.597 | Sagging   | 578.74E-6     | 2.6114             | 0.015864            | -                                  | 9117.9                             | 0 (Negligible)  |
|                | Maximum Slope                      |                        | 1                | 1.9720  | 9.8590 | Hogging   | 370.92E-6     | 1.8595             | 0.035304            | 18350.                             | -                                  | 0 (Negligible)  |
|                | Maximum Settlement                 |                        | 1                | 1.9720  | 9.8590 | Hogging   | 370.92E-6     | 1.8595             | 0.035304            | 18350.                             | -                                  | 0 (Negligible)  |
|                | Max. Tensile Strain                |                        | 1                | 1.9720  | 9.8590 | Hogging   | 370.92E-6     | 1.8595             | 0.035304            | 18350.                             | -                                  | 0 (Negligible)  |
| V              | Min. Radius of Curvature (Hogging) |                        | 1                | 1.9720  | 9.8590 | Hogging   | 370.92E-6     | 1.8595             | 0.035304            | 18350.                             | -                                  | 0 (Negligible)  |
|                | Min. Radius of Curvature (Sagging) |                        | -                | -       | -      | -         | -             | -                  | -                   | -                                  | -                                  | -               |
|                | Maximum Slope                      |                        | 1                | 0.0     | 1.0341 | Hogging   | 383.70E-6     | 2.2501             | 0.033394            | 70690.                             | -                                  | 0 (Negligible)  |
|                | Maximum Settlement                 |                        | 2                | 1.0341  | 3.6391 | Sagging   | 383.70E-6     | 3.2030             | 0.055886            | -                                  | 38449.                             | 1 (Very Slight) |
|                | Max. Tensile Strain                |                        | 2                | 1.0341  | 3.6391 | Sagging   | 383.70E-6     | 3.2030             | 0.055886            | -                                  | 38449.                             | 1 (Very Slight) |
| W              | Min. Radius of Curvature (Hogging) |                        | 1                | 0.0     | 1.0341 | Hogging   | 383.70E-6     | 2.2501             | 0.033394            | 70690.                             | -                                  | 0 (Negligible)  |
|                | Min. Radius of Curvature (Sagging) |                        | 2                | 1.0341  | 3.6391 | Sagging   | 383.70E-6     | 3.2030             | 0.055886            | -                                  | 38449.                             | 1 (Very Slight) |
|                | Maximum Slope                      |                        | 1                | 0.0     | 1.1392 | Sagging   | 150.04E-6     | 3.2034             | 0.011344            | -                                  | 415160.                            | 0 (Negligible)  |
|                | Maximum Settlement                 |                        | 1                | 0.0     | 1.1392 | Sagging   | 150.04E-6     | 3.2034             | 0.011344            | -                                  | 415160.                            | 0 (Negligible)  |
|                | Max. Tensile Strain                |                        | 1                | 0.0     | 1.1392 | Sagging   | 150.04E-6     | 3.2034             | 0.011344            | -                                  | 415160.                            | 0 (Negligible)  |
| X              | Min. Radius of Curvature (Hogging) |                        | -                | -       | -      | -         | -             | -                  | -                   | -                                  | -                                  | -               |
|                | Min. Radius of Curvature (Sagging) |                        | 1                | 0.0     | 1.1392 | Sagging   | 150.04E-6     | 3.2034             | 0.011344            | -                                  | 415160.                            | 0 (Negligible)  |
|                | Maximum Slope                      |                        | 1                | 4.8600  | 6.5934 | Hogging   | 872.41E-6     | 0.96487            | 0.037757            | 3843.1                             | -                                  | 0 (Negligible)  |
|                | Maximum Settlement                 |                        | 3                | 8.4201  | 9.7191 | Hogging   | 448.15E-6     | 2.3160             | 0.045669            | 20861.                             | -                                  | 0 (Negligible)  |
|                | Max. Tensile Strain                |                        | 3                | 8.4201  | 9.7191 | Hogging   | 448.15E-6     | 2.3160             | 0.045669            | 20861.                             | -                                  | 0 (Negligible)  |
| Y              | Min. Radius of Curvature (Hogging) |                        | 1                | 4.8600  | 6.5934 | Hogging   | 872.41E-6     | 0.96487            | 0.037757            | 3843.1                             | -                                  | 0 (Negligible)  |
|                | Min. Radius of Curvature (Sagging) |                        | 2                | 6.5934  | 8.4201 | Sagging   | 872.41E-6     | 1.7476             | 0.042816            | -                                  | 10628.                             | 0 (Negligible)  |
|                | Maximum Slope                      |                        | 1                | 0.0     | 3.6141 | Hogging   | 545.30E-6     | 4.2118             | 0.047188            | 25577.                             | -                                  | 0 (Negligible)  |
|                | Maximum Settlement                 |                        | 2                | 3.6141  | 3.6391 | Sagging   | 545.30E-6     | 4.2254             | 0.048369            | -                                  | 4.1155E+6                          | 0 (Negligible)  |
|                | Max. Tensile Strain                |                        | 2                | 3.6141  | 3.6391 | Sagging   | 545.30E-6     | 4.2254             | 0.048369            | -                                  | 4.1155E+6                          | 0 (Negligible)  |
| Z              | Min. Radius of Curvature (Hogging) |                        | 1                | 0.0     | 3.6141 | Hogging   | 545.30E-6     | 4.2118             | 0.047188            | 25577.                             | -                                  | 0 (Negligible)  |
|                | Min. Radius of Curvature (Sagging) |                        | -                | -       | -      | -         | -             | -                  | -                   | -                                  | -                                  | -               |
|                | Maximum Slope                      |                        | 1                | 5.7481  | 9.5792 | Hogging   | 303.27E-6     | 1.1949             | 0.031016            | 18277.                             | -                                  | 0 (Negligible)  |
|                | Maximum Settlement                 |                        | 1                | 5.7481  | 9.5792 | Hogging   | 303.27E-6     | 1.1949             | 0.031016            | 18277.                             | -                                  | 0 (Negligible)  |
|                | Max. Tensile Strain                |                        | 1                | 5.7481  | 9.5792 | Hogging   | 303.27E-6     | 1.1949             | 0.031016            | 18277.                             | -                                  | 0 (Negligible)  |
| AA             | Min. Radius of Curvature (Hogging) |                        | -                | -       | -      | -         | -             | -                  | -                   | -                                  | -                                  | -               |
|                | Min. Radius of Curvature (Sagging) |                        | -                | -       | -      | -         | -             | -                  | -                   | -                                  | -                                  | -               |
|                | Maximum Slope                      |                        | 1                | 0.0     | 3.6610 | Hogging   | 497.68E-6     | 2.7640             | 0.047267            | 18096.                             | -                                  | 0 (Negligible)  |



# GEA LIMITED (GEOTECHNICAL & ENV ASSOC)

Rear of 159-163 King's Cross Road, London WC1X 9BN  
Wall Installation and Excavation Combined Issue 4

| Job No.   | Sheet No.           | Rev.    |
|-----------|---------------------|---------|
| J16180    |                     |         |
| Drg. Ref. |                     |         |
| Made by   | Date<br>07-Mar-2017 | Checked |

| Structure Name                     | Parameter                          | Critical Sub-Structure | Critical Segment | Start  | End     | Curvature | Maximum Slope | Maximum Settlement | Max. Tensile Strain | Min. Radius of Curvature (Hogging) | Min. Radius of Curvature (Sagging) | Damage Category  |
|------------------------------------|------------------------------------|------------------------|------------------|--------|---------|-----------|---------------|--------------------|---------------------|------------------------------------|------------------------------------|------------------|
| AB                                 | Maximum Settlement                 |                        | 1                | 0.0    | 3.6610  | Hogging   | 497.68E-6     | 2.7640             | 0.047267            | 18096.                             | - 0 (Negligible)                   |                  |
|                                    | Max. Tensile Strain                |                        | 1                | 0.0    | 3.6610  | Hogging   | 497.68E-6     | 2.7640             | 0.047267            | 18096.                             | - 0 (Negligible)                   |                  |
|                                    | Min. Radius of Curvature (Hogging) |                        | 1                | 0.0    | 3.6610  | Hogging   | 497.68E-6     | 2.7640             | 0.047267            | 18096.                             | - 0 (Negligible)                   |                  |
|                                    | Min. Radius of Curvature (Sagging) |                        | -                | -      | -       | -         | -             | -                  | -                   | -                                  | -                                  |                  |
|                                    | Maximum Slope                      |                        | 1                | 8.5163 | 8.9441  | Sagging   | 197.23E-6     | 0.30147            | 0.014228            | -                                  | 25016. 0 (Negligible)              |                  |
|                                    | Maximum Settlement                 |                        | 2                | 8.9441 | 9.4616  | Sagging   | 193.27E-6     | 0.40148            | 0.014228            | -                                  | 20684. 0 (Negligible)              |                  |
|                                    | Max. Tensile Strain                |                        | 1                | 8.5163 | 8.9441  | Sagging   | 197.23E-6     | 0.30147            | 0.014228            | -                                  | 25016. 0 (Negligible)              |                  |
|                                    | Min. Radius of Curvature (Hogging) |                        | -                | -      | -       | -         | -             | -                  | -                   | -                                  | -                                  |                  |
|                                    | Min. Radius of Curvature (Sagging) |                        | 2                | 8.9441 | 9.4616  | Sagging   | 193.27E-6     | 0.40148            | 0.014228            | -                                  | 20684. 0 (Negligible)              |                  |
|                                    | AC                                 | Maximum Slope          |                  | 1      | 0.0     | 5.0794    | Hogging       | 233.40E-6          | 1.5001              | 0.013659                           | 93673.                             | - 0 (Negligible) |
| Maximum Settlement                 |                                    |                        | 1                | 0.0    | 5.0794  | Hogging   | 233.40E-6     | 1.5001             | 0.013659            | 93673.                             | - 0 (Negligible)                   |                  |
| Max. Tensile Strain                |                                    |                        | 1                | 0.0    | 5.0794  | Hogging   | 233.40E-6     | 1.5001             | 0.013659            | 93673.                             | - 0 (Negligible)                   |                  |
| Min. Radius of Curvature (Hogging) |                                    |                        | 1                | 0.0    | 5.0794  | Hogging   | 233.40E-6     | 1.5001             | 0.013659            | 93673.                             | - 0 (Negligible)                   |                  |
| Min. Radius of Curvature (Sagging) |                                    |                        | -                | -      | -       | -         | -             | -                  | -                   | -                                  | -                                  |                  |
| AD                                 | Maximum Slope                      |                        | 1                | 0.0    | 3.4564  | Hogging   | 398.82E-6     | 2.7911             | 0.038500            | 34502.                             | - 0 (Negligible)                   |                  |
|                                    | Maximum Settlement                 |                        | 2                | 3.4564 | 7.8628  | Sagging   | 398.82E-6     | 4.2984             | 0.048193            | -                                  | 13058. 0 (Negligible)              |                  |
|                                    | Max. Tensile Strain                |                        | 2                | 3.4564 | 7.8628  | Sagging   | 398.82E-6     | 4.2984             | 0.048193            | -                                  | 13058. 0 (Negligible)              |                  |
|                                    | Min. Radius of Curvature (Hogging) |                        | 1                | 0.0    | 3.4564  | Hogging   | 398.82E-6     | 2.7911             | 0.038500            | 34502.                             | - 0 (Negligible)                   |                  |
|                                    | Min. Radius of Curvature (Sagging) |                        | 2                | 3.4564 | 7.8628  | Sagging   | 398.82E-6     | 4.2984             | 0.048193            | -                                  | 13058. 0 (Negligible)              |                  |
| AE                                 | Maximum Slope                      |                        | 1                | 0.0    | 3.3051  | Sagging   | 100.12E-6     | 1.5004             | 0.0017859           | -                                  | 36760. 0 (Negligible)              |                  |
|                                    | Maximum Settlement                 |                        | 1                | 0.0    | 3.3051  | Sagging   | 100.12E-6     | 1.5004             | 0.0017859           | -                                  | 36760. 0 (Negligible)              |                  |
|                                    | Max. Tensile Strain                |                        | 1                | 0.0    | 3.3051  | Sagging   | 100.12E-6     | 1.5004             | 0.0017859           | -                                  | 36760. 0 (Negligible)              |                  |
|                                    | Min. Radius of Curvature (Hogging) |                        | -                | -      | -       | -         | -             | -                  | -                   | -                                  | -                                  |                  |
| AF                                 | Min. Radius of Curvature (Sagging) |                        | 1                | 0.0    | 3.3051  | Sagging   | 100.12E-6     | 1.5004             | 0.0017859           | -                                  | 36760. 0 (Negligible)              |                  |
|                                    | Maximum Slope                      |                        | 1                | 0.0    | 3.2130  | Sagging   | 305.23E-6     | 4.5605             | 0.017187            | -                                  | 4127.4 0 (Negligible)              |                  |
|                                    | Maximum Settlement                 |                        | 1                | 0.0    | 3.2130  | Sagging   | 305.23E-6     | 4.5605             | 0.017187            | -                                  | 4127.4 0 (Negligible)              |                  |
|                                    | Max. Tensile Strain                |                        | 1                | 0.0    | 3.2130  | Sagging   | 305.23E-6     | 4.5605             | 0.017187            | -                                  | 4127.4 0 (Negligible)              |                  |
|                                    | Min. Radius of Curvature (Hogging) |                        | -                | -      | -       | -         | -             | -                  | -                   | -                                  | -                                  |                  |
| AG                                 | Min. Radius of Curvature (Sagging) |                        | 1                | 0.0    | 3.2130  | Sagging   | 305.23E-6     | 4.5605             | 0.017187            | -                                  | 4127.4 0 (Negligible)              |                  |
|                                    | Maximum Slope                      |                        | 1                | 0.0    | 8.0923  | Sagging   | 328.31E-6     | 4.4122             | 0.0033587           | -                                  | 23647. 0 (Negligible)              |                  |
|                                    | Maximum Settlement                 |                        | 1                | 0.0    | 8.0923  | Sagging   | 328.31E-6     | 4.4122             | 0.0033587           | -                                  | 23647. 0 (Negligible)              |                  |
|                                    | Max. Tensile Strain                |                        | 2                | 8.0923 | 15.237  | Hogging   | 328.31E-6     | 2.2033             | 0.025296            | 26481.                             | - 0 (Negligible)                   |                  |
|                                    | Min. Radius of Curvature (Hogging) |                        | 2                | 8.0923 | 15.237  | Hogging   | 328.31E-6     | 2.2033             | 0.025296            | 26481.                             | - 0 (Negligible)                   |                  |
| AH                                 | Min. Radius of Curvature (Sagging) |                        | 1                | 0.0    | 8.0923  | Sagging   | 328.31E-6     | 4.4122             | 0.0033587           | -                                  | 23647. 0 (Negligible)              |                  |
|                                    | Maximum Slope                      |                        | 3                | 1.8229 | 3.7488  | Hogging   | 299.89E-6     | 2.7027             | 0.013384            | 166750.                            | - 0 (Negligible)                   |                  |
|                                    | Maximum Settlement                 |                        | 4                | 3.7488 | 6.3378  | Sagging   | 299.89E-6     | 3.4326             | 737.18E-6           | -                                  | 36727. 0 (Negligible)              |                  |
|                                    | Max. Tensile Strain                |                        | 1                | 0.0    | 0.82876 | Sagging   | 288.17E-6     | 1.8566             | 0.021492            | -                                  | 224530. 0 (Negligible)             |                  |
|                                    | Min. Radius of Curvature (Hogging) |                        | 3                | 1.8229 | 3.7488  | Hogging   | 299.89E-6     | 2.7027             | 0.013384            | 166750.                            | - 0 (Negligible)                   |                  |
| AI                                 | Min. Radius of Curvature (Sagging) |                        | 4                | 3.7488 | 6.3378  | Sagging   | 299.89E-6     | 3.4326             | 737.18E-6           | -                                  | 36727. 0 (Negligible)              |                  |
|                                    | Maximum Slope                      | Sub #                  | 1                | 0.0    | 3.5776  | Sagging   | 348.31E-6     | 3.4329             | 0.019910            | -                                  | 22247. 0 (Negligible)              |                  |
|                                    | Maximum Settlement                 | Sub #                  | 1                | 0.0    | 3.5776  | Sagging   | 348.31E-6     | 3.4329             | 0.019910            | -                                  | 22247. 0 (Negligible)              |                  |
|                                    | Max. Tensile Strain                | Sub #                  | 2                | 3.5776 | 4.8498  | Hogging   | 348.31E-6     | 2.2854             | 0.028721            | 101550.                            | - 0 (Negligible)                   |                  |
|                                    | Min. Radius of Curvature (Hogging) | Sub #                  | 2                | 3.5776 | 4.8498  | Hogging   | 348.31E-6     | 2.2854             | 0.028721            | 101550.                            | - 0 (Negligible)                   |                  |
| AJ                                 | Min. Radius of Curvature (Sagging) | Sub #                  | 1                | 0.0    | 3.5776  | Sagging   | 348.31E-6     | 3.4329             | 0.019910            | -                                  | 22247. 0 (Negligible)              |                  |
|                                    | Maximum Slope                      | Sub #                  | 2                | 1.2425 | 3.4033  | Hogging   | 545.62E-6     | 2.3013             | 0.0059131           | 9468.9                             | - 0 (Negligible)                   |                  |
|                                    | Maximum Settlement                 | Sub #                  | 6                | 8.2453 | 8.9667  | Sagging   | 3.8327E-6     | 2.6269             | 0.0037474           | -                                  | 1.2764E+6 0 (Negligible)           |                  |
|                                    | Max. Tensile Strain                | Sub #                  | 3                | 3.4033 | 5.9528  | Sagging   | 545.62E-6     | 2.6190             | 0.0092667           | -                                  | 6740.3 0 (Negligible)              |                  |
|                                    | Min. Radius of Curvature (Hogging) | Sub #                  | 2                | 1.2425 | 3.4033  | Hogging   | 545.62E-6     | 2.3013             | 0.0059131           | 9468.9                             | - 0 (Negligible)                   |                  |
| AK                                 | Min. Radius of Curvature (Sagging) | Sub #                  | 3                | 3.4033 | 5.9528  | Sagging   | 545.62E-6     | 2.6190             | 0.0092667           | -                                  | 6740.3 0 (Negligible)              |                  |
|                                    | Maximum Slope                      | Sub #                  | 1                | 0.0    | 2.1928  | Hogging   | 630.99E-6     | 3.9565             | 0.064841            | 23704.                             | - 1 (Very Slight)                  |                  |
|                                    | Maximum Settlement                 | Sub #                  | 2                | 2.1928 | 4.9487  | Sagging   | 630.99E-6     | 5.5773             | 0.064540            | -                                  | 12210. 1 (Very Slight)             |                  |
|                                    | Max. Tensile Strain                | Sub #                  | 1                | 0.0    | 2.1928  | Hogging   | 630.99E-6     | 3.9565             | 0.064841            | 23704.                             | - 1 (Very Slight)                  |                  |
|                                    | Min. Radius of Curvature (Hogging) | Sub #                  | 1                | 0.0    | 2.1928  | Hogging   | 630.99E-6     | 3.9565             | 0.064841            | 23704.                             | - 1 (Very Slight)                  |                  |
| AL                                 | Min. Radius of Curvature (Sagging) | Sub #                  | 2                | 2.1928 | 4.9487  | Sagging   | 630.99E-6     | 5.5773             | 0.064540            | -                                  | 12210. 1 (Very Slight)             |                  |
|                                    | Maximum Slope                      | Sub #                  | 1                | 0.0    | 4.7371  | Hogging   | 126.14E-6     | 6.0410             | 0.0030249           | 54363.                             | - 0 (Negligible)                   |                  |
|                                    | Maximum Settlement                 | Sub #                  | 1                | 0.0    | 4.7371  | Hogging   | 126.14E-6     | 6.0410             | 0.0030249           | 54363.                             | - 0 (Negligible)                   |                  |
|                                    | Max. Tensile Strain                | Sub #                  | 1                | 0.0    | 4.7371  | Hogging   | 126.14E-6     | 6.0410             | 0.0030249           | 54363.                             | - 0 (Negligible)                   |                  |
|                                    | Min. Radius of Curvature (Hogging) | Sub #                  | 1                | 0.0    | 4.7371  | Hogging   | 126.14E-6     | 6.0410             | 0.0030249           | 54363.                             | - 0 (Negligible)                   |                  |



GEA LIMITED  
(GEOTECHNICAL & ENV ASSOC)

Rear of 159-163 King's Cross Road, London WC1X 9BN  
Wall Installation and Excavation Combined Issue 4

| Job No.   | Sheet No.           | Rev.    |
|-----------|---------------------|---------|
| J16180    |                     |         |
| Drg. Ref. |                     |         |
| Made by   | Date<br>07-Mar-2017 | Checked |

| Structure Name | Parameter                          | Critical Sub-Structure | Critical Segment | Start   | End     | Curvature | Maximum Slope | Maximum Settlement | Max. Tensile Strain | Min. Radius of Curvature (Hogging) | Min. Radius of Curvature (Sagging) | Damage Category |
|----------------|------------------------------------|------------------------|------------------|---------|---------|-----------|---------------|--------------------|---------------------|------------------------------------|------------------------------------|-----------------|
| AM             | (Hogging)                          |                        |                  |         |         |           |               |                    |                     |                                    |                                    |                 |
|                | Min. Radius of Curvature (Sagging) |                        |                  |         |         |           |               |                    |                     |                                    |                                    |                 |
|                | Maximum Slope                      | Sub #                  | 1                | 0.0     | 2.7064  | Sagging   | 717.80E-6     | 6.0411             | 0.074662            | -                                  | 13108.1                            | 1 (Very Slight) |
|                | Maximum Settlement                 | Sub #                  | 1                | 0.0     | 2.7064  | Sagging   | 717.80E-6     | 6.0411             | 0.074662            | -                                  | 13108.1                            | 1 (Very Slight) |
|                | Max. Tensile Strain                | Sub #                  | 1                | 0.0     | 2.7064  | Sagging   | 717.80E-6     | 6.0411             | 0.074662            | -                                  | 13108.1                            | 1 (Very Slight) |
| AN             | Min. Radius of Curvature (Hogging) |                        |                  |         |         |           |               |                    |                     |                                    |                                    |                 |
|                | Min. Radius of Curvature (Sagging) | Sub #                  | 1                | 0.0     | 2.7064  | Sagging   | 717.80E-6     | 6.0411             | 0.074662            | -                                  | 13108.1                            | 1 (Very Slight) |
|                | Maximum Slope                      | Sub #                  | 1                | 0.0     | 3.3367  | Sagging   | 687.07E-6     | 4.3455             | 0.011085            | -                                  | 889.99                             | 0 (Negligible)  |
|                | Maximum Settlement                 | Sub #                  | 1                | 0.0     | 3.3367  | Sagging   | 687.07E-6     | 4.3455             | 0.011085            | -                                  | 889.99                             | 0 (Negligible)  |
|                | Max. Tensile Strain                | Sub #                  | 1                | 0.0     | 3.3367  | Sagging   | 687.07E-6     | 4.3455             | 0.011085            | -                                  | 889.99                             | 0 (Negligible)  |
| AO             | Min. Radius of Curvature (Hogging) |                        |                  |         |         |           |               |                    |                     |                                    |                                    |                 |
|                | Min. Radius of Curvature (Sagging) | Sub #                  | 1                | 0.0     | 3.3367  | Sagging   | 687.07E-6     | 4.3455             | 0.011085            | -                                  | 889.99                             | 0 (Negligible)  |
|                | Maximum Slope                      | Sub #                  | 1                | 0.0     | 0.86915 | Hogging   | 674.70E-6     | 4.3534             | 0.072485            | 58107.                             | -                                  | 1 (Very Slight) |
|                | Maximum Settlement                 | Sub #                  | 2                | 0.86915 | 2.5169  | Sagging   | 674.70E-6     | 5.4489             | 0.074851            | -                                  | 30636.1                            | 1 (Very Slight) |
|                | Max. Tensile Strain                | Sub #                  | 2                | 0.86915 | 2.5169  | Sagging   | 674.70E-6     | 5.4489             | 0.074851            | -                                  | 30636.1                            | 1 (Very Slight) |
| AP             | Min. Radius of Curvature (Hogging) |                        |                  |         |         |           |               |                    |                     |                                    |                                    |                 |
|                | Min. Radius of Curvature (Sagging) | Sub #                  | 1                | 0.0     | 0.86915 | Hogging   | 674.70E-6     | 4.3534             | 0.072485            | 58107.                             | -                                  | 1 (Very Slight) |
|                | Maximum Slope                      | Sub #                  | 1                | 0.0     | 4.4543  | Sagging   | 866.23E-6     | 5.9061             | 0.013862            | -                                  | 1002.5                             | 0 (Negligible)  |
|                | Maximum Settlement                 | Sub #                  | 1                | 0.0     | 4.4543  | Sagging   | 866.23E-6     | 5.9061             | 0.013862            | -                                  | 1002.5                             | 0 (Negligible)  |
|                | Max. Tensile Strain                | Sub #                  | 1                | 0.0     | 4.4543  | Sagging   | 866.23E-6     | 5.9061             | 0.013862            | -                                  | 1002.5                             | 0 (Negligible)  |
| AQ             | Min. Radius of Curvature (Hogging) |                        |                  |         |         |           |               |                    |                     |                                    |                                    |                 |
|                | Min. Radius of Curvature (Sagging) | Sub #                  | 1                | 0.0     | 4.4543  | Sagging   | 866.23E-6     | 5.9061             | 0.013862            | -                                  | 1002.5                             | 0 (Negligible)  |
|                | Maximum Slope                      | Sub #                  | 1                | 0.0     | 4.9487  | Hogging   | 578.44E-6     | 4.4806             | 0.042635            | 17977.                             | -                                  | 0 (Negligible)  |
|                | Maximum Settlement                 | Sub #                  | 1                | 0.0     | 4.9487  | Hogging   | 578.44E-6     | 4.4806             | 0.042635            | 17977.                             | -                                  | 0 (Negligible)  |
|                | Max. Tensile Strain                | Sub #                  | 1                | 0.0     | 4.9487  | Hogging   | 578.44E-6     | 4.4806             | 0.042635            | 17977.                             | -                                  | 0 (Negligible)  |
| AR             | Min. Radius of Curvature (Hogging) |                        |                  |         |         |           |               |                    |                     |                                    |                                    |                 |
|                | Min. Radius of Curvature (Sagging) | Sub #                  | 1                | 0.0     | 4.9487  | Hogging   | 578.44E-6     | 4.4806             | 0.042635            | 17977.                             | -                                  | 0 (Negligible)  |
|                | Maximum Slope                      | Sub #                  | 1                | 0.0     | 8.4707  | Hogging   | 740.36E-6     | 4.3030             | 0.068339            | 12142.                             | -                                  | 1 (Very Slight) |
|                | Maximum Settlement                 | Sub #                  | 1                | 0.0     | 8.4707  | Hogging   | 740.36E-6     | 4.3030             | 0.068339            | 12142.                             | -                                  | 1 (Very Slight) |
|                | Max. Tensile Strain                | Sub #                  | 1                | 0.0     | 8.4707  | Hogging   | 740.36E-6     | 4.3030             | 0.068339            | 12142.                             | -                                  | 1 (Very Slight) |
| AS             | Min. Radius of Curvature (Hogging) |                        |                  |         |         |           |               |                    |                     |                                    |                                    |                 |
|                | Min. Radius of Curvature (Sagging) | Sub #                  | 1                | 0.0     | 8.4707  | Hogging   | 740.36E-6     | 4.3030             | 0.068339            | 12142.                             | -                                  | 1 (Very Slight) |
|                | Maximum Slope                      | Sub #                  | 1                | 1.8137  | 8.1605  | Hogging   | 541.59E-6     | 2.6279             | 0.048147            | 13122.                             | -                                  | 0 (Negligible)  |
|                | Maximum Settlement                 | Sub #                  | 1                | 1.8137  | 8.1605  | Hogging   | 541.59E-6     | 2.6279             | 0.048147            | 13122.                             | -                                  | 0 (Negligible)  |
|                | Max. Tensile Strain                | Sub #                  | 1                | 1.8137  | 8.1605  | Hogging   | 541.59E-6     | 2.6279             | 0.048147            | 13122.                             | -                                  | 0 (Negligible)  |
| AT             | Min. Radius of Curvature (Hogging) |                        |                  |         |         |           |               |                    |                     |                                    |                                    |                 |
|                | Min. Radius of Curvature (Sagging) | Sub #                  | 1                | 1.8137  | 8.1605  | Hogging   | 541.59E-6     | 2.6279             | 0.048147            | 13122.                             | -                                  | 0 (Negligible)  |
|                | Maximum Slope                      | Sub #                  | 2                | 7.2491  | 11.076  | Sagging   | 256.76E-6     | 2.5287             | 0.0064509           | -                                  | 46211.0                            | 0 (Negligible)  |
|                | Maximum Settlement                 | Sub #                  | 2                | 7.2491  | 11.076  | Sagging   | 256.76E-6     | 2.5287             | 0.0064509           | -                                  | 46211.0                            | 0 (Negligible)  |
|                | Max. Tensile Strain                | Sub #                  | 1                | 1.8461  | 7.2491  | Hogging   | 254.91E-6     | 1.6046             | 0.016000            | 75494.                             | -                                  | 0 (Negligible)  |
| AU             | Min. Radius of Curvature (Hogging) |                        |                  |         |         |           |               |                    |                     |                                    |                                    |                 |
|                | Min. Radius of Curvature (Sagging) | Sub #                  | 1                | 1.8461  | 7.2491  | Hogging   | 254.91E-6     | 1.6046             | 0.016000            | 75494.                             | -                                  | 0 (Negligible)  |
|                | Maximum Slope                      | Sub #                  | 2                | 7.2491  | 11.076  | Sagging   | 256.76E-6     | 2.5287             | 0.0064509           | -                                  | 46211.0                            | 0 (Negligible)  |
|                | Maximum Settlement                 | Sub #                  | 1                | 0.0     | 4.5849  | Sagging   | 765.06E-6     | 7.2961             | 0.13869             | -                                  | 2792.5                             | 2 (Slight)      |
|                | Max. Tensile Strain                | Sub #                  | 1                | 0.0     | 4.5849  | Sagging   | 765.06E-6     | 7.2961             | 0.13869             | -                                  | 2792.5                             | 2 (Slight)      |
| AV             | Min. Radius of Curvature (Hogging) |                        |                  |         |         |           |               |                    |                     |                                    |                                    |                 |
|                | Min. Radius of Curvature (Sagging) | Sub #                  | 2                | 4.5849  | 7.1103  | Hogging   | 759.55E-6     | 4.7376             | 0.10184             | 22146.                             | -                                  | 2 (Slight)      |
|                | Maximum Slope                      | Sub #                  | 1                | 0.0     | 4.5849  | Sagging   | 765.06E-6     | 7.2961             | 0.13869             | -                                  | 2792.5                             | 2 (Slight)      |
|                | Maximum Settlement                 | Sub #                  | 2                | 3.6879  | 6.0934  | Sagging   | 791.04E-6     | 2.8589             | 0.011730            | -                                  | 4179.3                             | 0 (Negligible)  |
|                | Max. Tensile Strain                | Sub #                  | 1                | 0.0     | 3.6879  | Hogging   | 3.7760E-6     | 2.8727             | 11.909E-6           | 51.727E+6                          | -                                  | 0 (Negligible)  |
| AW             | Min. Radius of Curvature (Hogging) |                        |                  |         |         |           |               |                    |                     |                                    |                                    |                 |
|                | Min. Radius of Curvature (Sagging) | Sub #                  | 3                | 6.0934  | 8.1927  | Hogging   | 791.04E-6     | 2.4078             | 0.0081113           | 5942.8                             | -                                  | 0 (Negligible)  |
|                | Maximum Slope                      | Sub #                  | 2                | 3.6879  | 6.0934  | Sagging   | 791.04E-6     | 2.8589             | 0.011730            | -                                  | 4179.3                             | 0 (Negligible)  |
|                | Maximum Settlement                 | Sub #                  | 2                | 0.43048 | 5.7983  | Hogging   | 0.0011142     | 5.2325             | 0.041868            | 9337.1                             | -                                  | 0 (Negligible)  |
|                | Max. Tensile Strain                | Sub #                  | 3                | 5.7983  | 11.321  | Sagging   | 0.0011142     | 7.7676             | 0.081895            | -                                  | 1690.6                             | 2 (Slight)      |



GEA LIMITED  
(GEOTECHNICAL & ENV ASSOC)

Rear of 159-163 King's Cross Road, London WC1X 9BN  
Wall Installation and Excavation Combined Issue 4

| Job No.   | Sheet No.           | Rev.    |
|-----------|---------------------|---------|
| J16180    |                     |         |
| Drg. Ref. |                     |         |
| Made by   | Date<br>07-Mar-2017 | Checked |

| Structure Name                                               | Parameter        | Critical Sub-Structure | Critical Segment | Start     | End              | Curvature                 | Maximum Slope       | Maximum Settlement | Max. Tensile Strain | Min. Radius of Curvature (Hogging) | Min. Radius of Curvature (Sagging) | Damage Category |
|--------------------------------------------------------------|------------------|------------------------|------------------|-----------|------------------|---------------------------|---------------------|--------------------|---------------------|------------------------------------|------------------------------------|-----------------|
| Specific Building Damage Results - All Combined Segments     |                  |                        |                  |           |                  |                           |                     |                    |                     |                                    |                                    |                 |
| Structure: A   Sub-structure:                                |                  |                        |                  |           |                  |                           |                     |                    |                     |                                    |                                    |                 |
| Vertical Offset from Line for Vertical Movement Calculations | Combined Segment | Start                  | Length           | Curvature | Deflection Ratio | Average Horizontal Strain | Max. Tensile Strain |                    |                     |                                    |                                    | Damage Category |
| [m]                                                          |                  | [m]                    | [m]              |           | [%]              | [%]                       |                     |                    |                     |                                    |                                    |                 |
| No structures have segments combined.                        |                  |                        |                  |           |                  |                           |                     |                    |                     |                                    |                                    |                 |
| Structure: B   Sub-structure:                                |                  |                        |                  |           |                  |                           |                     |                    |                     |                                    |                                    |                 |
| Vertical Offset from Line for Vertical Movement Calculations | Combined Segment | Start                  | Length           | Curvature | Deflection Ratio | Average Horizontal Strain | Max. Tensile Strain |                    |                     |                                    |                                    | Damage Category |
| [m]                                                          |                  | [m]                    | [m]              |           | [%]              | [%]                       |                     |                    |                     |                                    |                                    |                 |
| No structures have segments combined.                        |                  |                        |                  |           |                  |                           |                     |                    |                     |                                    |                                    |                 |
| Structure: C   Sub-structure:                                |                  |                        |                  |           |                  |                           |                     |                    |                     |                                    |                                    |                 |
| Vertical Offset from Line for Vertical Movement Calculations | Combined Segment | Start                  | Length           | Curvature | Deflection Ratio | Average Horizontal Strain | Max. Tensile Strain |                    |                     |                                    |                                    | Damage Category |
| [m]                                                          |                  | [m]                    | [m]              |           | [%]              | [%]                       |                     |                    |                     |                                    |                                    |                 |
| No structures have segments combined.                        |                  |                        |                  |           |                  |                           |                     |                    |                     |                                    |                                    |                 |
| Structure: D   Sub-structure:                                |                  |                        |                  |           |                  |                           |                     |                    |                     |                                    |                                    |                 |
| Vertical Offset from Line for Vertical Movement Calculations | Combined Segment | Start                  | Length           | Curvature | Deflection Ratio | Average Horizontal Strain | Max. Tensile Strain |                    |                     |                                    |                                    | Damage Category |
| [m]                                                          |                  | [m]                    | [m]              |           | [%]              | [%]                       |                     |                    |                     |                                    |                                    |                 |
| No structures have segments combined.                        |                  |                        |                  |           |                  |                           |                     |                    |                     |                                    |                                    |                 |
| Structure: E   Sub-structure:                                |                  |                        |                  |           |                  |                           |                     |                    |                     |                                    |                                    |                 |
| Vertical Offset from Line for Vertical Movement Calculations | Combined Segment | Start                  | Length           | Curvature | Deflection Ratio | Average Horizontal Strain | Max. Tensile Strain |                    |                     |                                    |                                    | Damage Category |
| [m]                                                          |                  | [m]                    | [m]              |           | [%]              | [%]                       |                     |                    |                     |                                    |                                    |                 |
| No structures have segments combined.                        |                  |                        |                  |           |                  |                           |                     |                    |                     |                                    |                                    |                 |
| Structure: F   Sub-structure:                                |                  |                        |                  |           |                  |                           |                     |                    |                     |                                    |                                    |                 |
| Vertical Offset from Line for Vertical Movement Calculations | Combined Segment | Start                  | Length           | Curvature | Deflection Ratio | Average Horizontal Strain | Max. Tensile Strain |                    |                     |                                    |                                    | Damage Category |
| [m]                                                          |                  | [m]                    | [m]              |           | [%]              | [%]                       |                     |                    |                     |                                    |                                    |                 |
| No structures have segments combined.                        |                  |                        |                  |           |                  |                           |                     |                    |                     |                                    |                                    |                 |
| Structure: G   Sub-structure:                                |                  |                        |                  |           |                  |                           |                     |                    |                     |                                    |                                    |                 |
| Vertical Offset from Line for Vertical Movement Calculations | Combined Segment | Start                  | Length           | Curvature | Deflection Ratio | Average Horizontal Strain | Max. Tensile Strain |                    |                     |                                    |                                    | Damage Category |
| [m]                                                          |                  | [m]                    | [m]              |           | [%]              | [%]                       |                     |                    |                     |                                    |                                    |                 |
| No structures have segments combined.                        |                  |                        |                  |           |                  |                           |                     |                    |                     |                                    |                                    |                 |
| Structure: H   Sub-structure:                                |                  |                        |                  |           |                  |                           |                     |                    |                     |                                    |                                    |                 |
| Vertical Offset from Line for Vertical Movement Calculations | Combined Segment | Start                  | Length           | Curvature | Deflection Ratio | Average Horizontal Strain | Max. Tensile Strain |                    |                     |                                    |                                    | Damage Category |
| [m]                                                          |                  | [m]                    | [m]              |           | [%]              | [%]                       |                     |                    |                     |                                    |                                    |                 |
| No structures have segments combined.                        |                  |                        |                  |           |                  |                           |                     |                    |                     |                                    |                                    |                 |
| Structure: I   Sub-structure:                                |                  |                        |                  |           |                  |                           |                     |                    |                     |                                    |                                    |                 |
| Vertical Offset from Line for Vertical Movement Calculations | Combined Segment | Start                  | Length           | Curvature | Deflection Ratio | Average Horizontal Strain | Max. Tensile Strain |                    |                     |                                    |                                    | Damage Category |
| [m]                                                          |                  | [m]                    | [m]              |           | [%]              | [%]                       |                     |                    |                     |                                    |                                    |                 |
| No structures have segments combined.                        |                  |                        |                  |           |                  |                           |                     |                    |                     |                                    |                                    |                 |
| Structure: J   Sub-structure:                                |                  |                        |                  |           |                  |                           |                     |                    |                     |                                    |                                    |                 |
| Vertical Offset from Line for Vertical Movement Calculations | Combined Segment | Start                  | Length           | Curvature | Deflection Ratio | Average Horizontal Strain | Max. Tensile Strain |                    |                     |                                    |                                    | Damage Category |
| [m]                                                          |                  | [m]                    | [m]              |           | [%]              | [%]                       |                     |                    |                     |                                    |                                    |                 |
| No structures have segments combined.                        |                  |                        |                  |           |                  |                           |                     |                    |                     |                                    |                                    |                 |
| Structure: K   Sub-structure:                                |                  |                        |                  |           |                  |                           |                     |                    |                     |                                    |                                    |                 |
| Vertical                                                     | Combined         | Start                  | Length           | Curvature | Deflection       | Average                   | Max.                |                    |                     |                                    |                                    | Damage Category |



# GEA LIMITED (GEOTECHNICAL & ENV ASSOC)

Rear of 159-163 King's Cross Road, London WC1X 9BN  
Wall Installation and Excavation Combined Issue 4

| Job No.   | Sheet No.           | Rev.    |
|-----------|---------------------|---------|
| J16180    |                     |         |
| Drg. Ref. |                     |         |
| Made by   | Date<br>07-Mar-2017 | Checked |

| Offset from<br>Line for<br>Vertical<br>Movement<br>Calculations | Segment |                   |        | Ratio     | Horizontal<br>Strain | Tensile<br>Strain               |                           |                 |
|-----------------------------------------------------------------|---------|-------------------|--------|-----------|----------------------|---------------------------------|---------------------------|-----------------|
| [m]                                                             | [m]     | [m]               |        | [%]       | [%]                  | [%]                             |                           |                 |
| No structures have segments combined.                           |         |                   |        |           |                      |                                 |                           |                 |
| Structure: L   Sub-structure:                                   |         |                   |        |           |                      |                                 |                           |                 |
| Offset from<br>Line for<br>Vertical<br>Movement<br>Calculations | Segment | Combined<br>Start | Length | Curvature | Deflection<br>Ratio  | Average<br>Horizontal<br>Strain | Max.<br>Tensile<br>Strain | Damage Category |
| [m]                                                             |         | [m]               | [m]    |           | [%]                  | [%]                             | [%]                       |                 |
| No structures have segments combined.                           |         |                   |        |           |                      |                                 |                           |                 |
| Structure: M   Sub-structure:                                   |         |                   |        |           |                      |                                 |                           |                 |
| Offset from<br>Line for<br>Vertical<br>Movement<br>Calculations | Segment | Combined<br>Start | Length | Curvature | Deflection<br>Ratio  | Average<br>Horizontal<br>Strain | Max.<br>Tensile<br>Strain | Damage Category |
| [m]                                                             |         | [m]               | [m]    |           | [%]                  | [%]                             | [%]                       |                 |
| No structures have segments combined.                           |         |                   |        |           |                      |                                 |                           |                 |
| Structure: N   Sub-structure:                                   |         |                   |        |           |                      |                                 |                           |                 |
| Offset from<br>Line for<br>Vertical<br>Movement<br>Calculations | Segment | Combined<br>Start | Length | Curvature | Deflection<br>Ratio  | Average<br>Horizontal<br>Strain | Max.<br>Tensile<br>Strain | Damage Category |
| [m]                                                             |         | [m]               | [m]    |           | [%]                  | [%]                             | [%]                       |                 |
| No structures have segments combined.                           |         |                   |        |           |                      |                                 |                           |                 |
| Structure: O   Sub-structure:                                   |         |                   |        |           |                      |                                 |                           |                 |
| Offset from<br>Line for<br>Vertical<br>Movement<br>Calculations | Segment | Combined<br>Start | Length | Curvature | Deflection<br>Ratio  | Average<br>Horizontal<br>Strain | Max.<br>Tensile<br>Strain | Damage Category |
| [m]                                                             |         | [m]               | [m]    |           | [%]                  | [%]                             | [%]                       |                 |
| No structures have segments combined.                           |         |                   |        |           |                      |                                 |                           |                 |
| Structure: P   Sub-structure: Sub #                             |         |                   |        |           |                      |                                 |                           |                 |
| Offset from<br>Line for<br>Vertical<br>Movement<br>Calculations | Segment | Combined<br>Start | Length | Curvature | Deflection<br>Ratio  | Average<br>Horizontal<br>Strain | Max.<br>Tensile<br>Strain | Damage Category |
| [m]                                                             |         | [m]               | [m]    |           | [%]                  | [%]                             | [%]                       |                 |
| No structures have segments combined.                           |         |                   |        |           |                      |                                 |                           |                 |
| Structure: Q   Sub-structure:                                   |         |                   |        |           |                      |                                 |                           |                 |
| Offset from<br>Line for<br>Vertical<br>Movement<br>Calculations | Segment | Combined<br>Start | Length | Curvature | Deflection<br>Ratio  | Average<br>Horizontal<br>Strain | Max.<br>Tensile<br>Strain | Damage Category |
| [m]                                                             |         | [m]               | [m]    |           | [%]                  | [%]                             | [%]                       |                 |
| No structures have segments combined.                           |         |                   |        |           |                      |                                 |                           |                 |
| Structure: R   Sub-structure:                                   |         |                   |        |           |                      |                                 |                           |                 |
| Offset from<br>Line for<br>Vertical<br>Movement<br>Calculations | Segment | Combined<br>Start | Length | Curvature | Deflection<br>Ratio  | Average<br>Horizontal<br>Strain | Max.<br>Tensile<br>Strain | Damage Category |
| [m]                                                             |         | [m]               | [m]    |           | [%]                  | [%]                             | [%]                       |                 |
| No structures have segments combined.                           |         |                   |        |           |                      |                                 |                           |                 |
| Structure: S   Sub-structure:                                   |         |                   |        |           |                      |                                 |                           |                 |
| Offset from<br>Line for<br>Vertical<br>Movement<br>Calculations | Segment | Combined<br>Start | Length | Curvature | Deflection<br>Ratio  | Average<br>Horizontal<br>Strain | Max.<br>Tensile<br>Strain | Damage Category |
| [m]                                                             |         | [m]               | [m]    |           | [%]                  | [%]                             | [%]                       |                 |
| No structures have segments combined.                           |         |                   |        |           |                      |                                 |                           |                 |
| Structure: T   Sub-structure:                                   |         |                   |        |           |                      |                                 |                           |                 |
| Offset from<br>Line for<br>Vertical<br>Movement<br>Calculations | Segment | Combined<br>Start | Length | Curvature | Deflection<br>Ratio  | Average<br>Horizontal<br>Strain | Max.<br>Tensile<br>Strain | Damage Category |
| [m]                                                             |         | [m]               | [m]    |           | [%]                  | [%]                             | [%]                       |                 |
| No structures have segments combined.                           |         |                   |        |           |                      |                                 |                           |                 |
| Structure: U   Sub-structure:                                   |         |                   |        |           |                      |                                 |                           |                 |
| Offset from<br>Line for<br>Vertical<br>Movement<br>Calculations | Segment | Combined<br>Start | Length | Curvature | Deflection<br>Ratio  | Average<br>Horizontal<br>Strain | Max.<br>Tensile<br>Strain | Damage Category |
| [m]                                                             |         | [m]               | [m]    |           | [%]                  | [%]                             | [%]                       |                 |



GEA LIMITED  
(GEOTECHNICAL & ENV ASSOC)

Rear of 159-163 King's Cross Road, London WC1X 9BN  
Wall Installation and Excavation Combined Issue 4

| Job No.   | Sheet No.           | Rev.    |
|-----------|---------------------|---------|
| J16180    |                     |         |
| Drg. Ref. |                     |         |
| Made by   | Date<br>07-Mar-2017 | Checked |

| Vertical<br>Offset from<br>Line for<br>Vertical<br>Movement<br>Calculations | Combined<br>Segment | Start | Length | Curvature | Deflection<br>Ratio | Average<br>Horizontal<br>Strain | Max.<br>Tensile<br>Strain | Damage | Category |
|-----------------------------------------------------------------------------|---------------------|-------|--------|-----------|---------------------|---------------------------------|---------------------------|--------|----------|
| No structures have segments combined.                                       |                     |       |        |           |                     |                                 |                           |        |          |
| Structure: V   Sub-structure:                                               |                     |       |        |           |                     |                                 |                           |        |          |
| Vertical<br>Offset from<br>Line for<br>Vertical<br>Movement<br>Calculations | Combined<br>Segment | Start | Length | Curvature | Deflection<br>Ratio | Average<br>Horizontal<br>Strain | Max.<br>Tensile<br>Strain | Damage | Category |
| [m]                                                                         | [m]                 | [m]   |        |           | [%]                 | [%]                             | [%]                       |        |          |
| No structures have segments combined.                                       |                     |       |        |           |                     |                                 |                           |        |          |
| Structure: W   Sub-structure:                                               |                     |       |        |           |                     |                                 |                           |        |          |
| Vertical<br>Offset from<br>Line for<br>Vertical<br>Movement<br>Calculations | Combined<br>Segment | Start | Length | Curvature | Deflection<br>Ratio | Average<br>Horizontal<br>Strain | Max.<br>Tensile<br>Strain | Damage | Category |
| [m]                                                                         | [m]                 | [m]   |        |           | [%]                 | [%]                             | [%]                       |        |          |
| No structures have segments combined.                                       |                     |       |        |           |                     |                                 |                           |        |          |
| Structure: X   Sub-structure:                                               |                     |       |        |           |                     |                                 |                           |        |          |
| Vertical<br>Offset from<br>Line for<br>Vertical<br>Movement<br>Calculations | Combined<br>Segment | Start | Length | Curvature | Deflection<br>Ratio | Average<br>Horizontal<br>Strain | Max.<br>Tensile<br>Strain | Damage | Category |
| [m]                                                                         | [m]                 | [m]   |        |           | [%]                 | [%]                             | [%]                       |        |          |
| No structures have segments combined.                                       |                     |       |        |           |                     |                                 |                           |        |          |
| Structure: Y   Sub-structure:                                               |                     |       |        |           |                     |                                 |                           |        |          |
| Vertical<br>Offset from<br>Line for<br>Vertical<br>Movement<br>Calculations | Combined<br>Segment | Start | Length | Curvature | Deflection<br>Ratio | Average<br>Horizontal<br>Strain | Max.<br>Tensile<br>Strain | Damage | Category |
| [m]                                                                         | [m]                 | [m]   |        |           | [%]                 | [%]                             | [%]                       |        |          |
| No structures have segments combined.                                       |                     |       |        |           |                     |                                 |                           |        |          |
| Structure: Z   Sub-structure:                                               |                     |       |        |           |                     |                                 |                           |        |          |
| Vertical<br>Offset from<br>Line for<br>Vertical<br>Movement<br>Calculations | Combined<br>Segment | Start | Length | Curvature | Deflection<br>Ratio | Average<br>Horizontal<br>Strain | Max.<br>Tensile<br>Strain | Damage | Category |
| [m]                                                                         | [m]                 | [m]   |        |           | [%]                 | [%]                             | [%]                       |        |          |
| No structures have segments combined.                                       |                     |       |        |           |                     |                                 |                           |        |          |
| Structure: AA   Sub-structure:                                              |                     |       |        |           |                     |                                 |                           |        |          |
| Vertical<br>Offset from<br>Line for<br>Vertical<br>Movement<br>Calculations | Combined<br>Segment | Start | Length | Curvature | Deflection<br>Ratio | Average<br>Horizontal<br>Strain | Max.<br>Tensile<br>Strain | Damage | Category |
| [m]                                                                         | [m]                 | [m]   |        |           | [%]                 | [%]                             | [%]                       |        |          |
| No structures have segments combined.                                       |                     |       |        |           |                     |                                 |                           |        |          |
| Structure: AB   Sub-structure:                                              |                     |       |        |           |                     |                                 |                           |        |          |
| Vertical<br>Offset from<br>Line for<br>Vertical<br>Movement<br>Calculations | Combined<br>Segment | Start | Length | Curvature | Deflection<br>Ratio | Average<br>Horizontal<br>Strain | Max.<br>Tensile<br>Strain | Damage | Category |
| [m]                                                                         | [m]                 | [m]   |        |           | [%]                 | [%]                             | [%]                       |        |          |
| No structures have segments combined.                                       |                     |       |        |           |                     |                                 |                           |        |          |
| Structure: AC   Sub-structure:                                              |                     |       |        |           |                     |                                 |                           |        |          |
| Vertical<br>Offset from<br>Line for<br>Vertical<br>Movement<br>Calculations | Combined<br>Segment | Start | Length | Curvature | Deflection<br>Ratio | Average<br>Horizontal<br>Strain | Max.<br>Tensile<br>Strain | Damage | Category |
| [m]                                                                         | [m]                 | [m]   |        |           | [%]                 | [%]                             | [%]                       |        |          |
| No structures have segments combined.                                       |                     |       |        |           |                     |                                 |                           |        |          |
| Structure: AD   Sub-structure:                                              |                     |       |        |           |                     |                                 |                           |        |          |
| Vertical<br>Offset from<br>Line for<br>Vertical<br>Movement<br>Calculations | Combined<br>Segment | Start | Length | Curvature | Deflection<br>Ratio | Average<br>Horizontal<br>Strain | Max.<br>Tensile<br>Strain | Damage | Category |
| [m]                                                                         | [m]                 | [m]   |        |           | [%]                 | [%]                             | [%]                       |        |          |
| No structures have segments combined.                                       |                     |       |        |           |                     |                                 |                           |        |          |
| Structure: AE   Sub-structure:                                              |                     |       |        |           |                     |                                 |                           |        |          |
| Vertical<br>Offset from<br>Line for<br>Vertical<br>Movement<br>Calculations | Combined<br>Segment | Start | Length | Curvature | Deflection<br>Ratio | Average<br>Horizontal<br>Strain | Max.<br>Tensile<br>Strain | Damage | Category |
| [m]                                                                         | [m]                 | [m]   |        |           | [%]                 | [%]                             | [%]                       |        |          |
| No structures have segments combined.                                       |                     |       |        |           |                     |                                 |                           |        |          |
| Structure: AF   Sub-structure:                                              |                     |       |        |           |                     |                                 |                           |        |          |
| Vertical                                                                    | Combined            | Start | Length | Curvature | Deflection          | Average                         | Max.                      | Damage | Category |



| Job No.   | Sheet No.           | Rev.    |
|-----------|---------------------|---------|
| J16180    |                     |         |
| Drg. Ref. |                     |         |
| Made by   | Date<br>07-Mar-2017 | Checked |

| Offset from<br>Line for<br>Vertical<br>Movement<br>Calculations | Segment |                   |        | Ratio     | Horizontal<br>Strain | Tensile<br>Strain               |                           |                 |
|-----------------------------------------------------------------|---------|-------------------|--------|-----------|----------------------|---------------------------------|---------------------------|-----------------|
| [m]                                                             | [m]     | [m]               |        | [%]       | [%]                  | [%]                             |                           |                 |
| No structures have segments combined.                           |         |                   |        |           |                      |                                 |                           |                 |
| Structure: AG   Sub-structure:                                  |         |                   |        |           |                      |                                 |                           |                 |
| Offset from<br>Line for<br>Vertical<br>Movement<br>Calculations | Segment | Combined<br>Start | Length | Curvature | Deflection<br>Ratio  | Average<br>Horizontal<br>Strain | Max.<br>Tensile<br>Strain | Damage Category |
| [m]                                                             |         | [m]               | [m]    |           | [%]                  | [%]                             | [%]                       |                 |
| No structures have segments combined.                           |         |                   |        |           |                      |                                 |                           |                 |
| Structure: AH   Sub-structure:                                  |         |                   |        |           |                      |                                 |                           |                 |
| Offset from<br>Line for<br>Vertical<br>Movement<br>Calculations | Segment | Combined<br>Start | Length | Curvature | Deflection<br>Ratio  | Average<br>Horizontal<br>Strain | Max.<br>Tensile<br>Strain | Damage Category |
| [m]                                                             |         | [m]               | [m]    |           | [%]                  | [%]                             | [%]                       |                 |
| No structures have segments combined.                           |         |                   |        |           |                      |                                 |                           |                 |
| Structure: AI   Sub-structure: Sub #                            |         |                   |        |           |                      |                                 |                           |                 |
| Offset from<br>Line for<br>Vertical<br>Movement<br>Calculations | Segment | Combined<br>Start | Length | Curvature | Deflection<br>Ratio  | Average<br>Horizontal<br>Strain | Max.<br>Tensile<br>Strain | Damage Category |
| [m]                                                             |         | [m]               | [m]    |           | [%]                  | [%]                             | [%]                       |                 |
| No structures have segments combined.                           |         |                   |        |           |                      |                                 |                           |                 |
| Structure: AJ   Sub-structure: Sub #                            |         |                   |        |           |                      |                                 |                           |                 |
| Offset from<br>Line for<br>Vertical<br>Movement<br>Calculations | Segment | Combined<br>Start | Length | Curvature | Deflection<br>Ratio  | Average<br>Horizontal<br>Strain | Max.<br>Tensile<br>Strain | Damage Category |
| [m]                                                             |         | [m]               | [m]    |           | [%]                  | [%]                             | [%]                       |                 |
| No structures have segments combined.                           |         |                   |        |           |                      |                                 |                           |                 |
| Structure: AK   Sub-structure: Sub #                            |         |                   |        |           |                      |                                 |                           |                 |
| Offset from<br>Line for<br>Vertical<br>Movement<br>Calculations | Segment | Combined<br>Start | Length | Curvature | Deflection<br>Ratio  | Average<br>Horizontal<br>Strain | Max.<br>Tensile<br>Strain | Damage Category |
| [m]                                                             |         | [m]               | [m]    |           | [%]                  | [%]                             | [%]                       |                 |
| No structures have segments combined.                           |         |                   |        |           |                      |                                 |                           |                 |
| Structure: AL   Sub-structure: Sub #                            |         |                   |        |           |                      |                                 |                           |                 |
| Offset from<br>Line for<br>Vertical<br>Movement<br>Calculations | Segment | Combined<br>Start | Length | Curvature | Deflection<br>Ratio  | Average<br>Horizontal<br>Strain | Max.<br>Tensile<br>Strain | Damage Category |
| [m]                                                             |         | [m]               | [m]    |           | [%]                  | [%]                             | [%]                       |                 |
| No structures have segments combined.                           |         |                   |        |           |                      |                                 |                           |                 |
| Structure: AM   Sub-structure: Sub #                            |         |                   |        |           |                      |                                 |                           |                 |
| Offset from<br>Line for<br>Vertical<br>Movement<br>Calculations | Segment | Combined<br>Start | Length | Curvature | Deflection<br>Ratio  | Average<br>Horizontal<br>Strain | Max.<br>Tensile<br>Strain | Damage Category |
| [m]                                                             |         | [m]               | [m]    |           | [%]                  | [%]                             | [%]                       |                 |
| No structures have segments combined.                           |         |                   |        |           |                      |                                 |                           |                 |
| Structure: AN   Sub-structure: Sub #                            |         |                   |        |           |                      |                                 |                           |                 |
| Offset from<br>Line for<br>Vertical<br>Movement<br>Calculations | Segment | Combined<br>Start | Length | Curvature | Deflection<br>Ratio  | Average<br>Horizontal<br>Strain | Max.<br>Tensile<br>Strain | Damage Category |
| [m]                                                             |         | [m]               | [m]    |           | [%]                  | [%]                             | [%]                       |                 |
| No structures have segments combined.                           |         |                   |        |           |                      |                                 |                           |                 |
| Structure: AO   Sub-structure: Sub #                            |         |                   |        |           |                      |                                 |                           |                 |
| Offset from<br>Line for<br>Vertical<br>Movement<br>Calculations | Segment | Combined<br>Start | Length | Curvature | Deflection<br>Ratio  | Average<br>Horizontal<br>Strain | Max.<br>Tensile<br>Strain | Damage Category |
| [m]                                                             |         | [m]               | [m]    |           | [%]                  | [%]                             | [%]                       |                 |
| No structures have segments combined.                           |         |                   |        |           |                      |                                 |                           |                 |
| Structure: AP   Sub-structure: Sub #                            |         |                   |        |           |                      |                                 |                           |                 |
| Offset from<br>Line for<br>Vertical<br>Movement<br>Calculations | Segment | Combined<br>Start | Length | Curvature | Deflection<br>Ratio  | Average<br>Horizontal<br>Strain | Max.<br>Tensile<br>Strain | Damage Category |
| [m]                                                             |         | [m]               | [m]    |           | [%]                  | [%]                             | [%]                       |                 |



**GEA LIMITED**  
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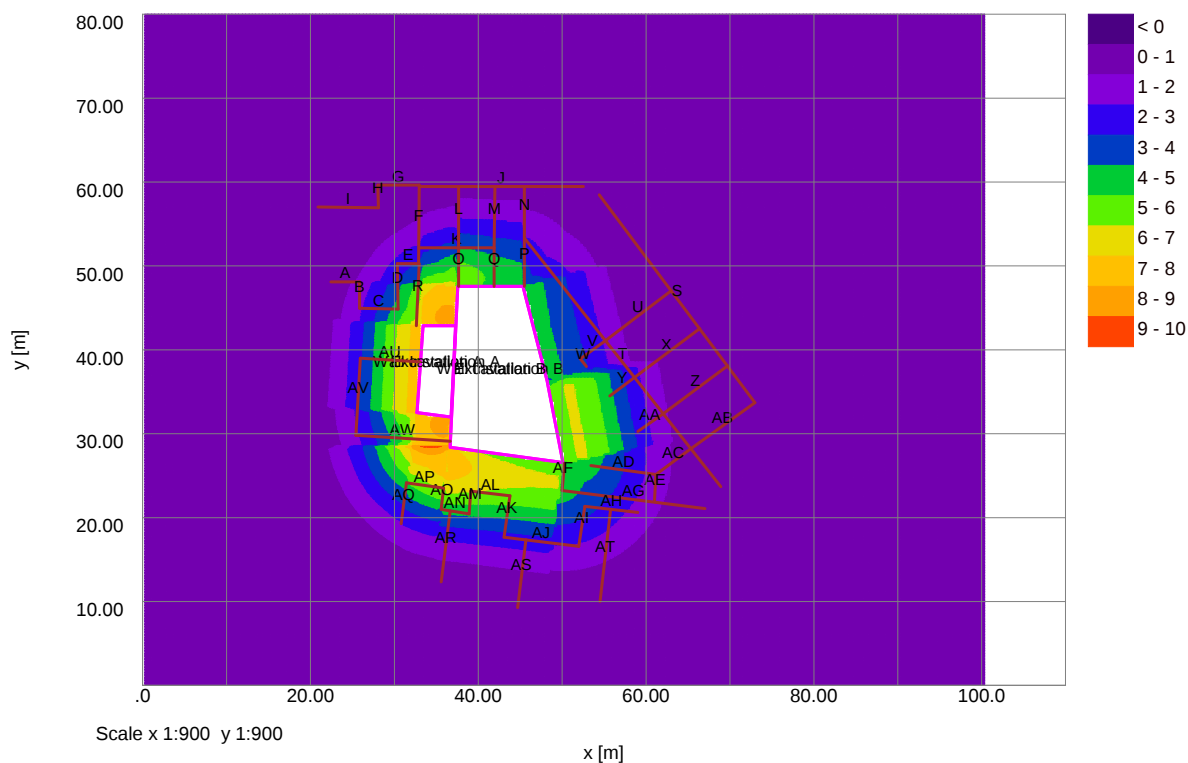
**Rear of 159-163 King's Cross Road, London WC1X 9BN**  
**Wall Installation and Excavation Combined Issue 4**

|           |             |         |
|-----------|-------------|---------|
| Job No.   | Sheet No.   | Rev.    |
| J16180    |             |         |
| Drg. Ref. |             |         |
| Made by   | Date        | Checked |
|           | 07-Mar-2017 |         |

|                                                                             |                     |       |        |           |                     |                                 |                           |        |          |
|-----------------------------------------------------------------------------|---------------------|-------|--------|-----------|---------------------|---------------------------------|---------------------------|--------|----------|
| Vertical<br>Offset from<br>Line for<br>Vertical<br>Movement<br>Calculations | Combined<br>Segment | Start | Length | Curvature | Deflection<br>Ratio | Average<br>Horizontal<br>Strain | Max.<br>Tensile<br>Strain | Damage | Category |
| No structures have segments combined.                                       |                     |       |        |           |                     |                                 |                           |        |          |
| Structure: AQ   Sub-structure: Sub #                                        |                     |       |        |           |                     |                                 |                           |        |          |
| Vertical<br>Offset from<br>Line for<br>Vertical<br>Movement<br>Calculations | Combined<br>Segment | Start | Length | Curvature | Deflection<br>Ratio | Average<br>Horizontal<br>Strain | Max.<br>Tensile<br>Strain | Damage | Category |
| [m]                                                                         |                     | [m]   |        |           |                     |                                 |                           |        |          |
| No structures have segments combined.                                       |                     |       |        |           |                     |                                 |                           |        |          |
| Structure: AR   Sub-structure: Sub #                                        |                     |       |        |           |                     |                                 |                           |        |          |
| Vertical<br>Offset from<br>Line for<br>Vertical<br>Movement<br>Calculations | Combined<br>Segment | Start | Length | Curvature | Deflection<br>Ratio | Average<br>Horizontal<br>Strain | Max.<br>Tensile<br>Strain | Damage | Category |
| [m]                                                                         |                     | [m]   |        |           |                     |                                 |                           |        |          |
| No structures have segments combined.                                       |                     |       |        |           |                     |                                 |                           |        |          |
| Structure: AS   Sub-structure: Sub #                                        |                     |       |        |           |                     |                                 |                           |        |          |
| Vertical<br>Offset from<br>Line for<br>Vertical<br>Movement<br>Calculations | Combined<br>Segment | Start | Length | Curvature | Deflection<br>Ratio | Average<br>Horizontal<br>Strain | Max.<br>Tensile<br>Strain | Damage | Category |
| [m]                                                                         |                     | [m]   |        |           |                     |                                 |                           |        |          |
| No structures have segments combined.                                       |                     |       |        |           |                     |                                 |                           |        |          |
| Structure: AT   Sub-structure: Sub #                                        |                     |       |        |           |                     |                                 |                           |        |          |
| Vertical<br>Offset from<br>Line for<br>Vertical<br>Movement<br>Calculations | Combined<br>Segment | Start | Length | Curvature | Deflection<br>Ratio | Average<br>Horizontal<br>Strain | Max.<br>Tensile<br>Strain | Damage | Category |
| [m]                                                                         |                     | [m]   |        |           |                     |                                 |                           |        |          |
| No structures have segments combined.                                       |                     |       |        |           |                     |                                 |                           |        |          |
| Structure: AU   Sub-structure:                                              |                     |       |        |           |                     |                                 |                           |        |          |
| Vertical<br>Offset from<br>Line for<br>Vertical<br>Movement<br>Calculations | Combined<br>Segment | Start | Length | Curvature | Deflection<br>Ratio | Average<br>Horizontal<br>Strain | Max.<br>Tensile<br>Strain | Damage | Category |
| [m]                                                                         |                     | [m]   |        |           |                     |                                 |                           |        |          |
| No structures have segments combined.                                       |                     |       |        |           |                     |                                 |                           |        |          |
| Structure: AV   Sub-structure:                                              |                     |       |        |           |                     |                                 |                           |        |          |
| Vertical<br>Offset from<br>Line for<br>Vertical<br>Movement<br>Calculations | Combined<br>Segment | Start | Length | Curvature | Deflection<br>Ratio | Average<br>Horizontal<br>Strain | Max.<br>Tensile<br>Strain | Damage | Category |
| [m]                                                                         |                     | [m]   |        |           |                     |                                 |                           |        |          |
| No structures have segments combined.                                       |                     |       |        |           |                     |                                 |                           |        |          |
| Structure: AW   Sub-structure:                                              |                     |       |        |           |                     |                                 |                           |        |          |
| Vertical<br>Offset from<br>Line for<br>Vertical<br>Movement<br>Calculations | Combined<br>Segment | Start | Length | Curvature | Deflection<br>Ratio | Average<br>Horizontal<br>Strain | Max.<br>Tensile<br>Strain | Damage | Category |
| [m]                                                                         |                     | [m]   |        |           |                     |                                 |                           |        |          |
| No structures have segments combined.                                       |                     |       |        |           |                     |                                 |                           |        |          |

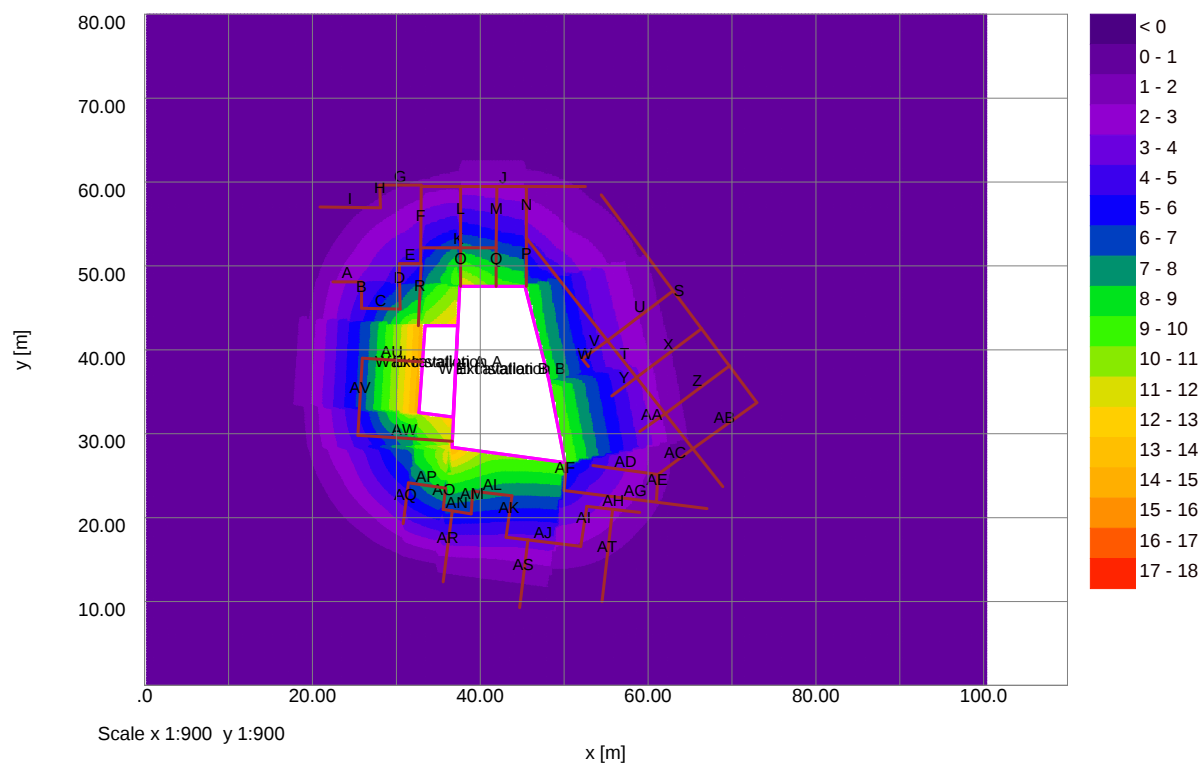
| Job No.   | Sheet No.   | Rev.    |
|-----------|-------------|---------|
| J16180    |             |         |
| Drg. Ref. |             |         |
| Made by   | Date        | Checked |
|           | 07-Mar-2017 |         |

Vertical Settlement Contours: Grid 1 (level 0.000m) (Interval 1mm)

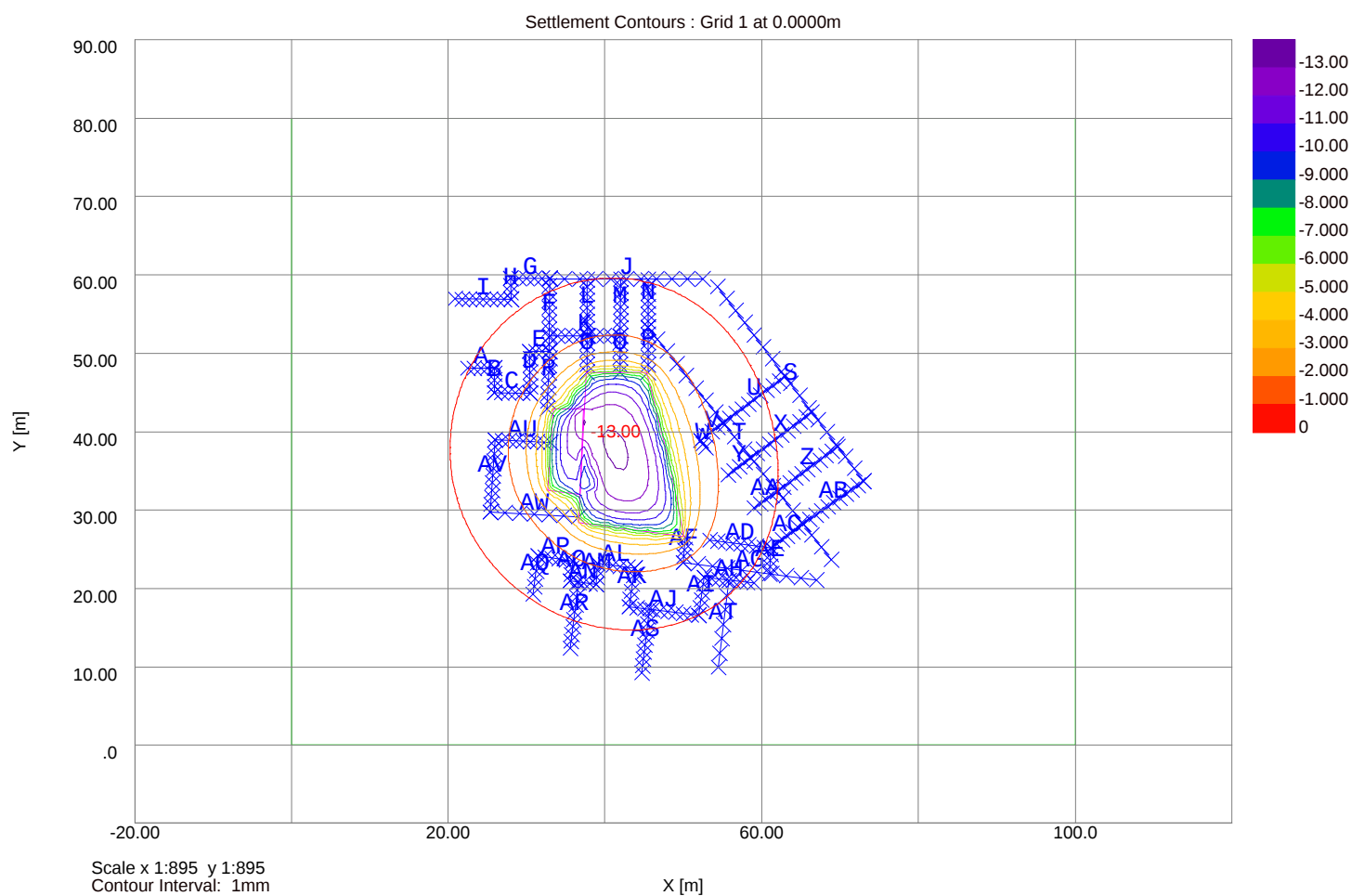


| Job No.   | Sheet No.   | Rev.    |
|-----------|-------------|---------|
| J16180    |             |         |
| Drg. Ref. |             |         |
| Made by   | Date        | Checked |
|           | 07-Mar-2017 |         |

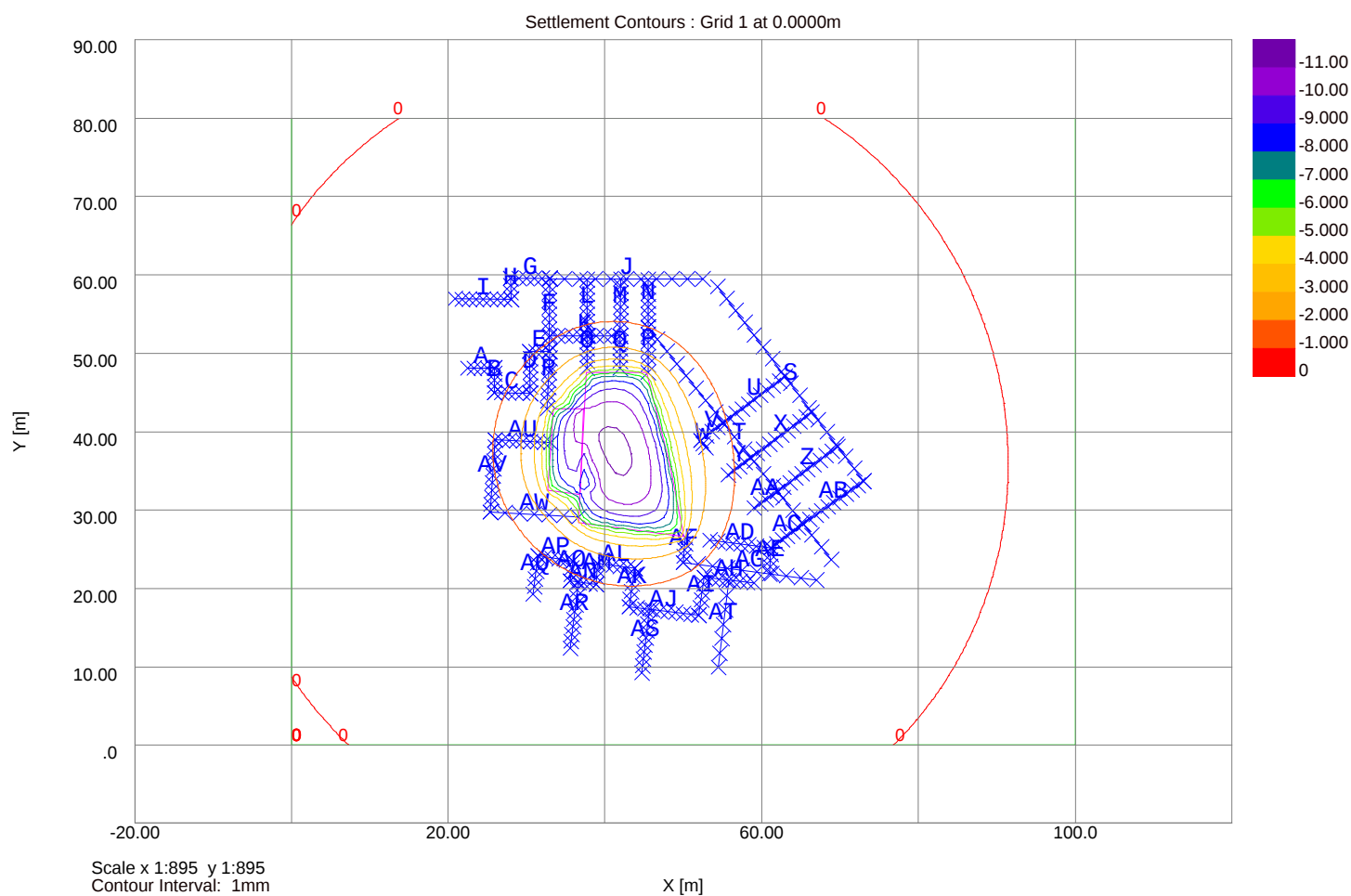
Horizontal Displacement Contours: Grid 1 (level 0.000m) Interval 1mm



| Job No.   | Sheet No. | Rev.    |
|-----------|-----------|---------|
| J16180    |           |         |
| Drg. Ref. |           |         |
| Made by   | Date      | Checked |



| Job No.   | Sheet No. | Rev.    |
|-----------|-----------|---------|
| J16180    |           |         |
| Drg. Ref. |           |         |
| Made by   | Date      | Checked |



## Ground Movement Assessment Summary



|                |        |
|----------------|--------|
| Project Number | J16180 |
| Issue          | 4.0    |
| Wall Reference | Q      |

### Input parameters:

|                  |      |   |
|------------------|------|---|
| Wall Length, L = | 4.60 | m |
| Wall Height, H = | 3.65 | m |

|                           |      |   |
|---------------------------|------|---|
| Proposed basement depth = | 4.40 | m |
|---------------------------|------|---|

|         |      |
|---------|------|
| L / H = | 1.26 |
|---------|------|

### Vertical Displacement Behind Wall Prediction:

|                            |      |    |
|----------------------------|------|----|
| Differential total heave = | 1.70 | mm |
| Predicted from P-Disp      |      |    |

|                    |      |    |
|--------------------|------|----|
| Total settlement = | 0.00 | mm |
|--------------------|------|----|

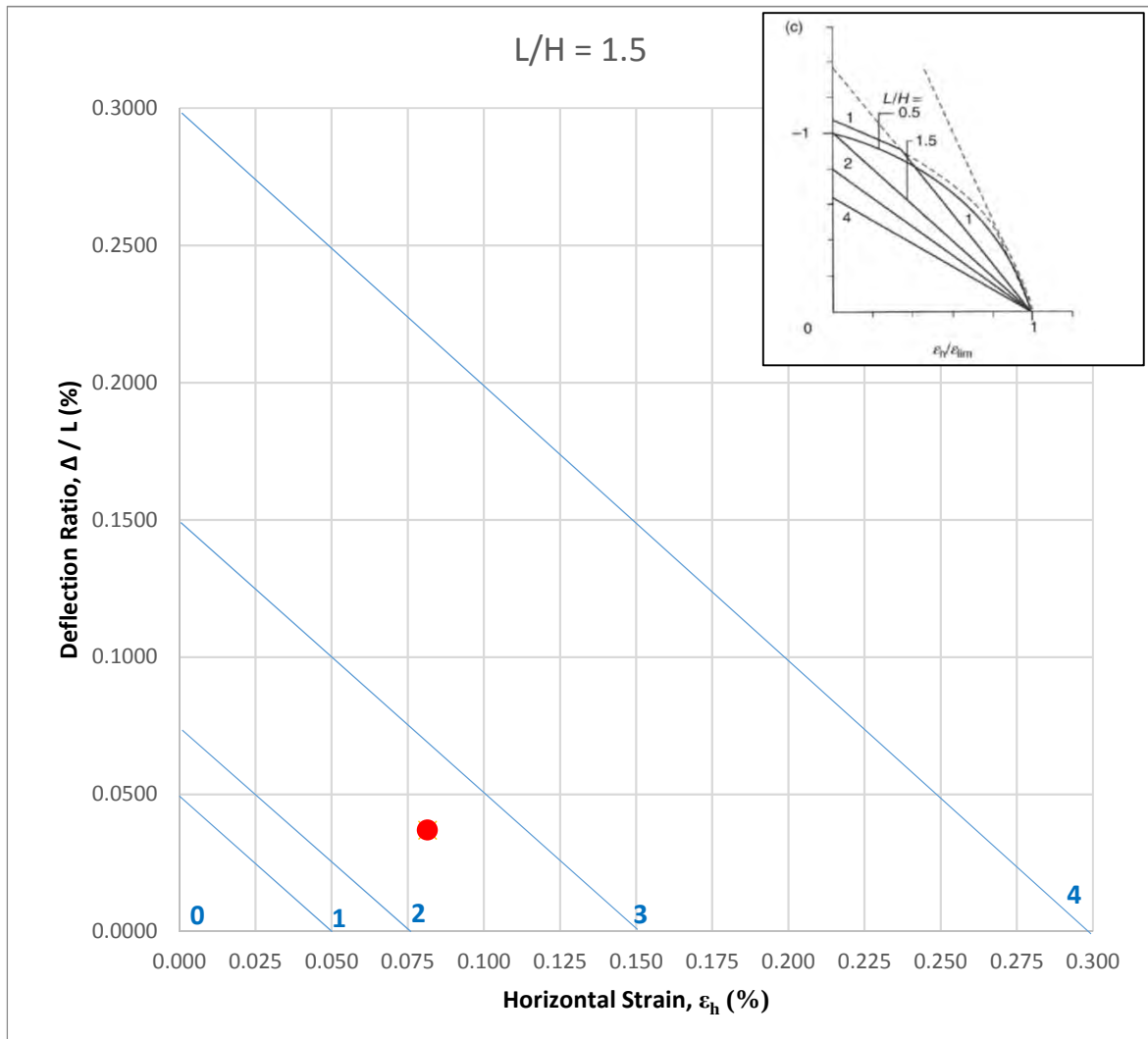
|                                         |      |    |
|-----------------------------------------|------|----|
| Change in vertical movement, $\Delta$ = | 1.70 | mm |
|-----------------------------------------|------|----|

### Horizontal Displacement Behind Wall Prediction:

|                                             |      |    |
|---------------------------------------------|------|----|
| Change in horizontal movement, $\delta_h$ = | 3.75 | mm |
|---------------------------------------------|------|----|

Predicted from CIRIA C580 (Fig 2.11a) assuming excavation in front of a wall in stiff clay and based on 5 mm horizontal movement at wall

|                            |                     |
|----------------------------|---------------------|
| Building Damage Category = | CATEGORY 2 - SLIGHT |
|----------------------------|---------------------|



Wall Length, L = 4.6 m  
Wall Height, H = 3.7 m  
Change in horizontal movement,  $\delta_h$  = 3.75 mm  
Change in vertical movement,  $\Delta$  = 1.70 mm

Horizontal Strain:

$$\text{Horizontal Strain, } \epsilon_h = \frac{\delta_h \times 100}{L \times 1000}$$

$$\epsilon_h = 0.0815$$

Deflection Ratio:

$$\text{Deflection Ratio} = \frac{\Delta \times 100}{L \times 1000}$$

$$= 0.0370$$

## Ground Movement Assessment Summary



|                |        |
|----------------|--------|
| Project Number | J16180 |
| Issue          | 4.0    |
| Wall Reference | O      |

### Input parameters:

|                  |      |   |
|------------------|------|---|
| Wall Length, L = | 4.60 | m |
| Wall Height, H = | 3.68 | m |

|                           |      |   |
|---------------------------|------|---|
| Proposed basement depth = | 4.40 | m |
|---------------------------|------|---|

|         |      |
|---------|------|
| L / H = | 1.25 |
|---------|------|

### Vertical Displacement Behind Wall Prediction:

|                            |      |    |
|----------------------------|------|----|
| Differential total heave = | 1.30 | mm |
| Predicted from P-Disp      |      |    |

|                    |      |    |
|--------------------|------|----|
| Total settlement = | 0.00 | mm |
|--------------------|------|----|

|                                         |      |    |
|-----------------------------------------|------|----|
| Change in vertical movement, $\Delta$ = | 1.30 | mm |
|-----------------------------------------|------|----|

### Horizontal Displacement Behind Wall Prediction:

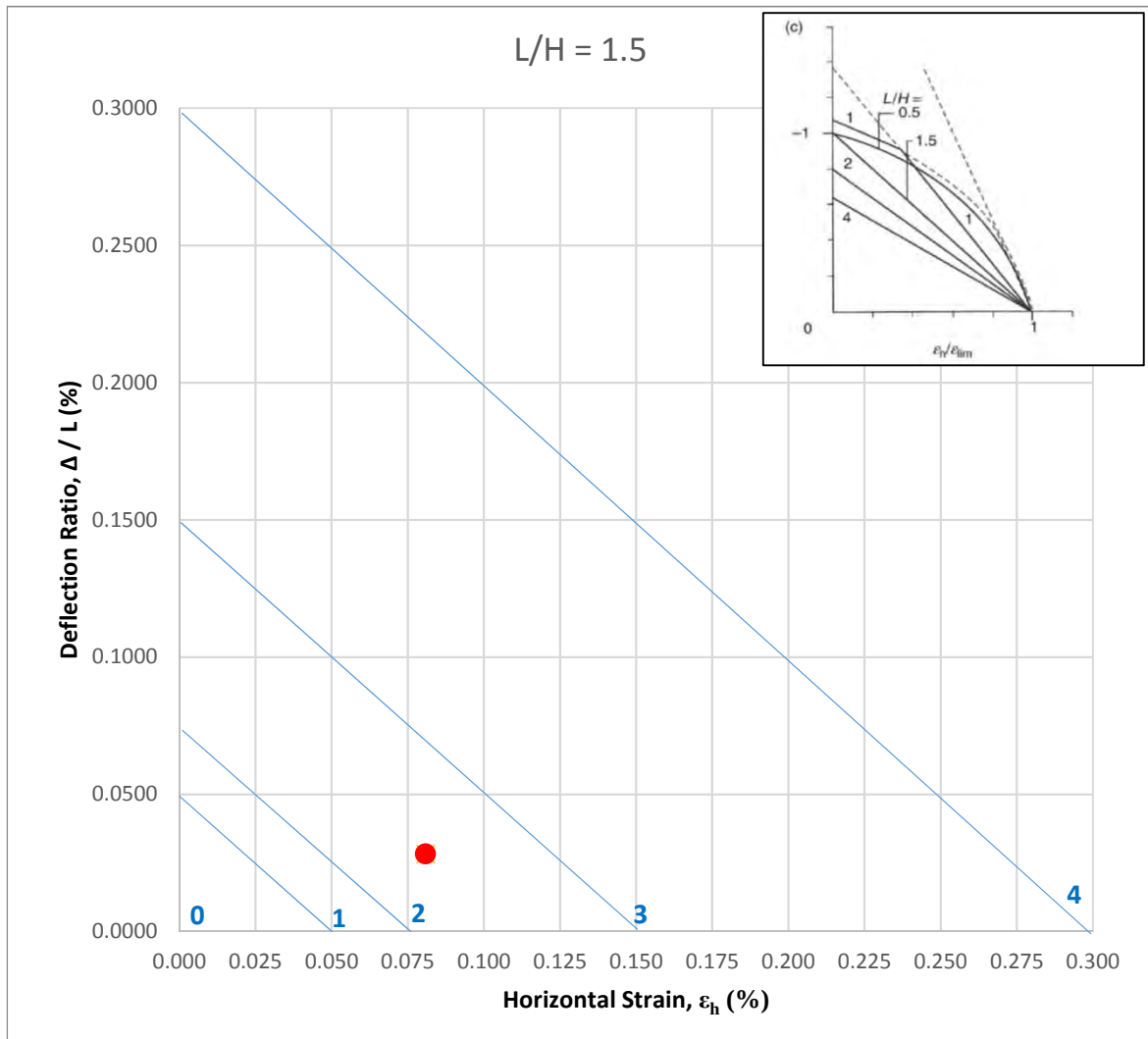
|                                             |      |    |
|---------------------------------------------|------|----|
| Change in horizontal movement, $\delta_h$ = | 3.72 | mm |
|---------------------------------------------|------|----|

Predicted from CIRIA C580 (Fig 2.11a) assuming excavation in front of a wall in stiff clay and based on 5 mm horizontal movement at wall

|                            |                     |
|----------------------------|---------------------|
| Building Damage Category = | CATEGORY 2 - SLIGHT |
|----------------------------|---------------------|

Project Number J16180  
Revision 4.0  
Wall Reference O

L / H = 1.25



Wall Length,  $L = 4.6$  m  
Wall Height,  $H = 3.7$  m  
Change in horizontal movement,  $\delta_h = 3.72$  mm  
Change in vertical movement,  $\Delta = 1.30$  mm

Horizontal Strain:

$$\text{Horizontal Strain, } \epsilon_h = \frac{\delta_h \times 100}{L \times 1000}$$

$\epsilon_h = 0.0809$

Deflection Ratio:

$$\text{Deflection Ratio} = \frac{\Delta \times 100}{L \times 1000}$$

= 0.0283

## Ground Movement Assessment Summary



|                |        |
|----------------|--------|
| Project Number | J16180 |
| Issue          | 4.0    |
| Wall Reference | M      |

### Input parameters:

|                  |      |   |
|------------------|------|---|
| Wall Length, L = | 7.30 | m |
| Wall Height, H = | 9.50 | m |

|                           |      |   |
|---------------------------|------|---|
| Proposed basement depth = | 4.40 | m |
|---------------------------|------|---|

|         |      |
|---------|------|
| L / H = | 0.77 |
|---------|------|

### Vertical Displacement Behind Wall Prediction:

|                            |      |    |
|----------------------------|------|----|
| Differential total heave = | 0.26 | mm |
| Predicted from P-Disp      |      |    |

|                    |      |    |
|--------------------|------|----|
| Total settlement = | 0.00 | mm |
|--------------------|------|----|

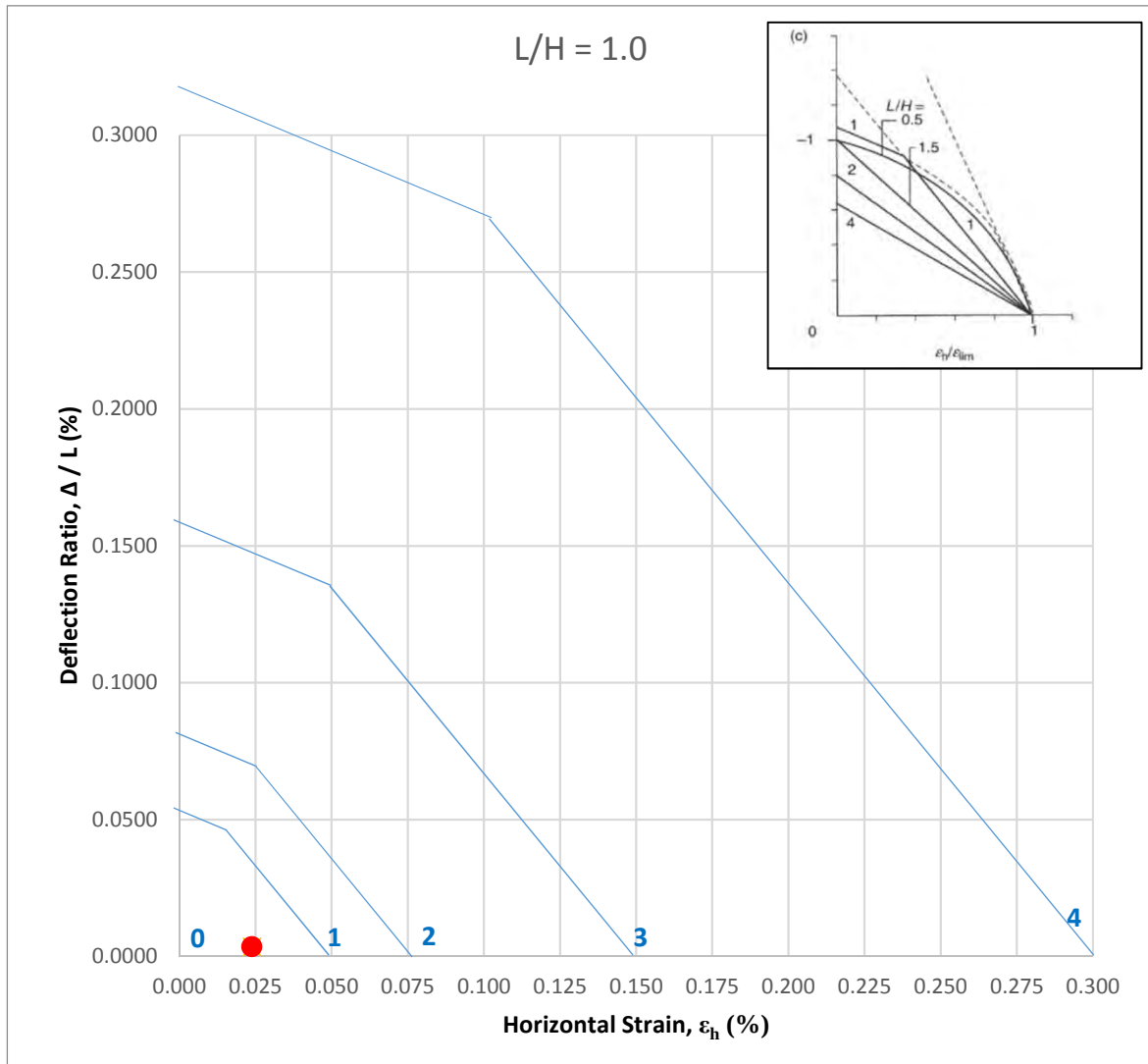
|                                         |      |    |
|-----------------------------------------|------|----|
| Change in vertical movement, $\Delta$ = | 0.26 | mm |
|-----------------------------------------|------|----|

### Horizontal Displacement Behind Wall Prediction:

|                                             |      |    |
|---------------------------------------------|------|----|
| Change in horizontal movement, $\delta_h$ = | 1.74 | mm |
|---------------------------------------------|------|----|

Predicted from CIRIA C580 (Fig 2.11a) assuming excavation in front of a wall in stiff clay and based on 5 mm horizontal movement at wall

|                            |                         |
|----------------------------|-------------------------|
| Building Damage Category = | CATEGORY 0 - NEGLIGIBLE |
|----------------------------|-------------------------|



Wall Length, L = 7.3 m  
Wall Height, H = 9.5 m  
Change in horizontal movement,  $\delta_h$  = 1.74 mm  
Change in vertical movement,  $\Delta$  = 0.26 mm

Horizontal Strain:

$$\text{Horizontal Strain, } \epsilon_h = \frac{\delta_h \times 100}{L \times 1000}$$

$$\epsilon_h = 0.0238$$

Deflection Ratio:

$$\text{Deflection Ratio} = \frac{\Delta \times 100}{L \times 1000}$$

$$= 0.0036$$

## Ground Movement Assessment Summary



|                |        |
|----------------|--------|
| Project Number | J16180 |
| Issue          | 4.0    |
| Wall Reference | L      |

### Input parameters:

|                  |      |   |
|------------------|------|---|
| Wall Length, L = | 7.20 | m |
| Wall Height, H = | 8.50 | m |

|                           |      |   |
|---------------------------|------|---|
| Proposed basement depth = | 4.40 | m |
|---------------------------|------|---|

|         |      |
|---------|------|
| L / H = | 0.85 |
|---------|------|

### Vertical Displacement Behind Wall Prediction:

|                            |      |    |
|----------------------------|------|----|
| Differential total heave = | 0.20 | mm |
| Predicted from P-Disp      |      |    |

|                    |      |    |
|--------------------|------|----|
| Total settlement = | 0.00 | mm |
|--------------------|------|----|

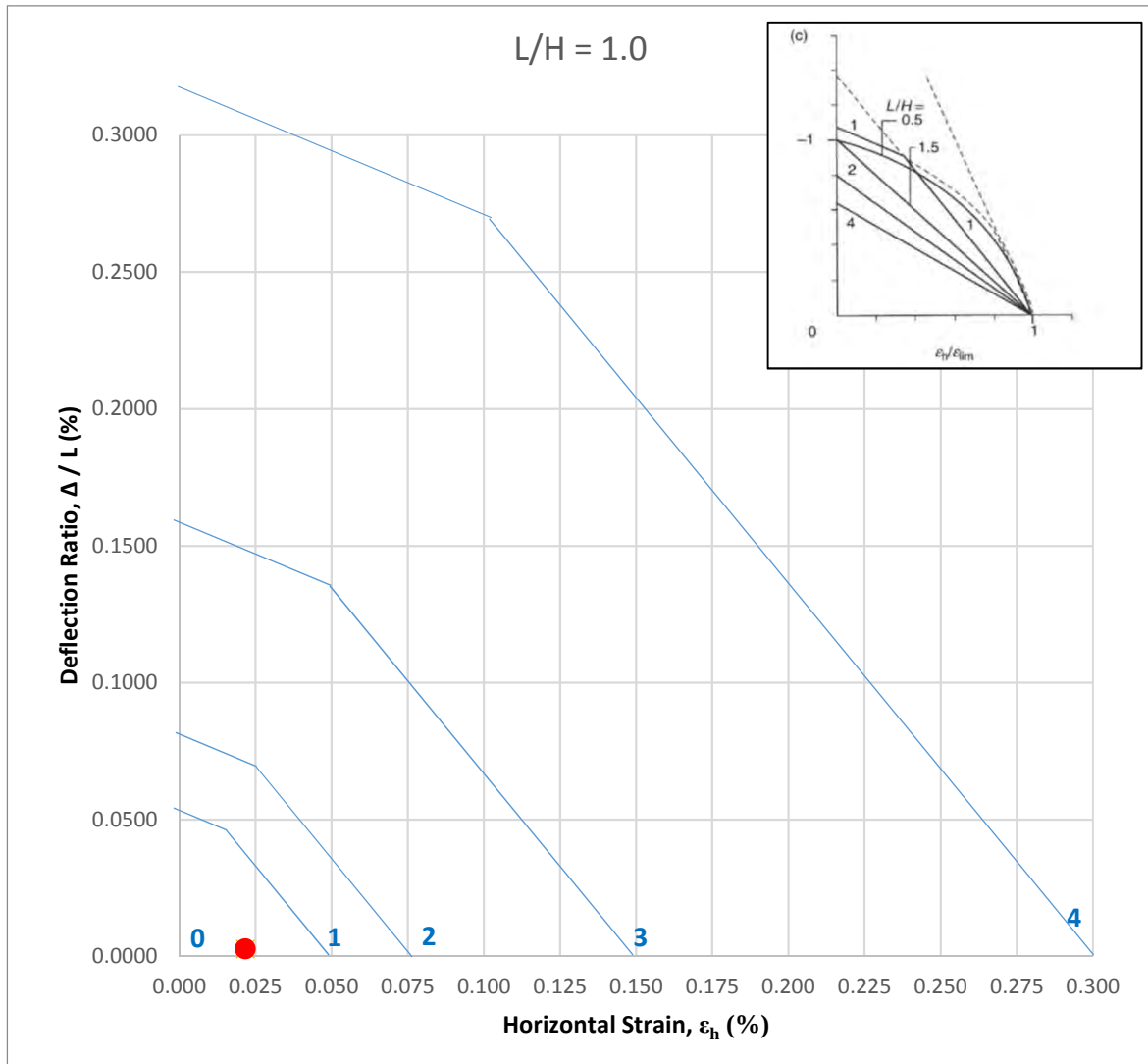
|                                         |      |    |
|-----------------------------------------|------|----|
| Change in vertical movement, $\Delta$ = | 0.20 | mm |
|-----------------------------------------|------|----|

### Horizontal Displacement Behind Wall Prediction:

|                                             |      |    |
|---------------------------------------------|------|----|
| Change in horizontal movement, $\delta_h$ = | 1.56 | mm |
|---------------------------------------------|------|----|

Predicted from CIRIA C580 (Fig 2.11a) assuming excavation in front of a wall in stiff clay and based on 5 mm horizontal movement at wall

|                            |                         |
|----------------------------|-------------------------|
| Building Damage Category = | CATEGORY 0 - NEGLIGIBLE |
|----------------------------|-------------------------|



Wall Length, L = 7.2 m  
Wall Height, H = 8.5 m  
Change in horizontal movement,  $\delta_h$  = 1.56 mm  
Change in vertical movement,  $\Delta$  = 0.20 mm

Horizontal Strain:

$$\text{Horizontal Strain, } \epsilon_h = \frac{\delta_h \times 100}{L \times 1000}$$

$$\epsilon_h = 0.0217$$

Deflection Ratio:

$$\text{Deflection Ratio} = \frac{\Delta \times 100}{L \times 1000}$$

$$= 0.0028$$

## Ground Movement Assessment Summary



|                |        |
|----------------|--------|
| Project Number | J16180 |
| Issue          | 4.0    |
| Wall Reference | AW     |

### Input parameters:

|                  |       |   |
|------------------|-------|---|
| Wall Length, L = | 11.30 | m |
| Wall Height, H = | 4.60  | m |

|                           |      |   |
|---------------------------|------|---|
| Proposed basement depth = | 4.40 | m |
|---------------------------|------|---|

|         |      |
|---------|------|
| L / H = | 2.46 |
|---------|------|

### Vertical Displacement Behind Wall Prediction:

|                            |      |    |
|----------------------------|------|----|
| Differential total heave = | 1.50 | mm |
| Predicted from P-Disp      |      |    |

|                    |      |    |
|--------------------|------|----|
| Total settlement = | 0.00 | mm |
|--------------------|------|----|

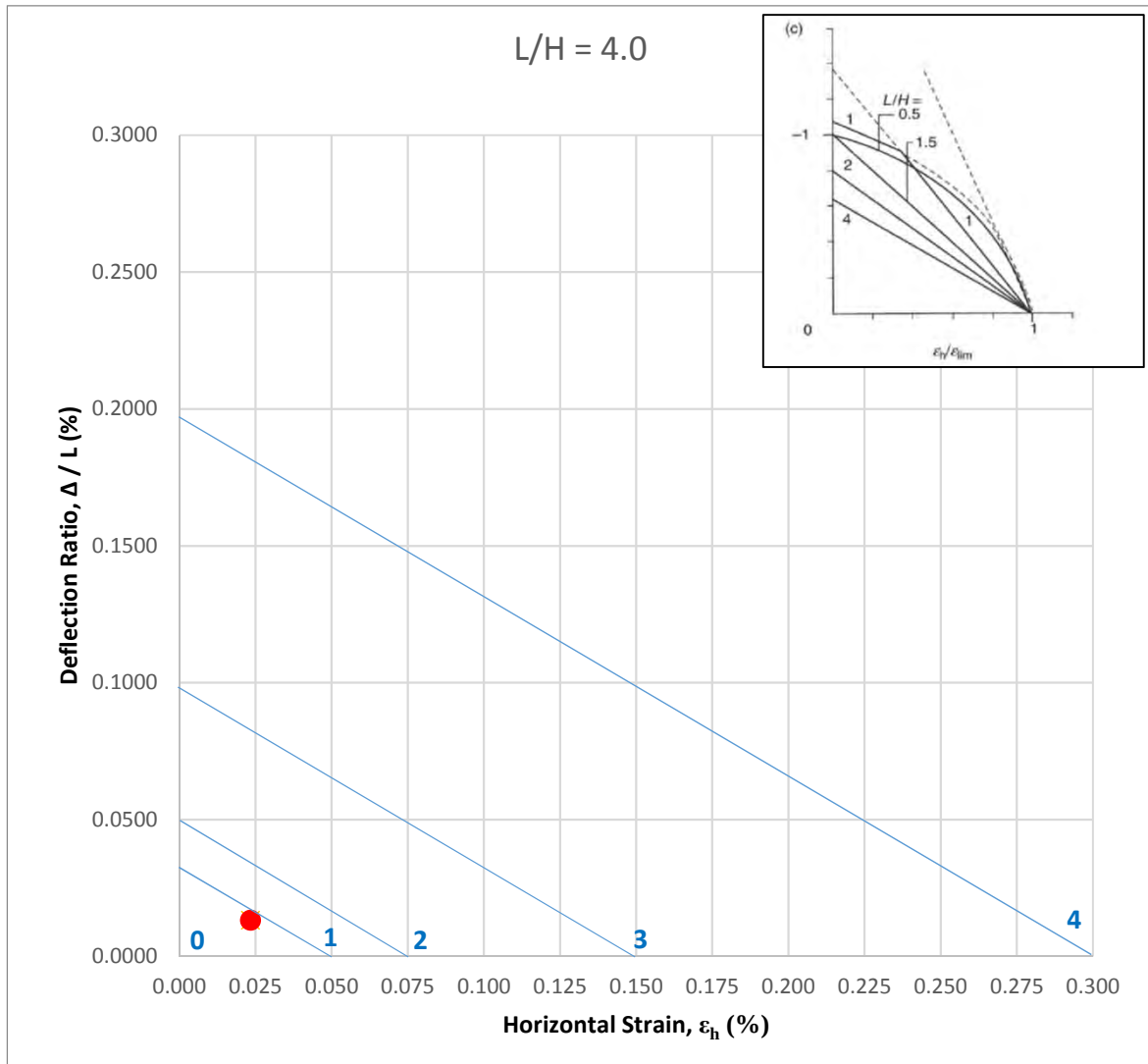
|                                         |      |    |
|-----------------------------------------|------|----|
| Change in vertical movement, $\Delta$ = | 1.50 | mm |
|-----------------------------------------|------|----|

### Horizontal Displacement Behind Wall Prediction:

|                                             |      |    |
|---------------------------------------------|------|----|
| Change in horizontal movement, $\delta_h$ = | 2.64 | mm |
|---------------------------------------------|------|----|

Predicted from CIRIA C580 (Fig 2.11a) assuming excavation in front of a wall in stiff clay and based on 5 mm horizontal movement at wall

|                            |                         |
|----------------------------|-------------------------|
| Building Damage Category = | CATEGORY 0 - NEGLIGIBLE |
|----------------------------|-------------------------|



Wall Length, L = 11.3 m  
Wall Height, H = 4.6 m  
Change in horizontal movement,  $\delta_h$  = 2.64 mm  
Change in vertical movement,  $\Delta$  = 1.50 mm

Horizontal Strain:

$$\text{Horizontal Strain, } \epsilon_h = \frac{\delta_h \times 100}{L \times 1000}$$

$$\epsilon_h = 0.0234$$

Deflection Ratio:

$$\text{Deflection Ratio} = \frac{\Delta \times 100}{L \times 1000}$$

$$= 0.0133$$

## Ground Movement Assessment Summary



|                |        |
|----------------|--------|
| Project Number | J16180 |
| Issue          | 4.0    |
| Wall Reference | AU     |

### Input parameters:

|                  |      |   |
|------------------|------|---|
| Wall Length, L = | 7.10 | m |
| Wall Height, H = | 4.60 | m |

|                           |      |   |
|---------------------------|------|---|
| Proposed basement depth = | 4.40 | m |
|---------------------------|------|---|

|         |      |
|---------|------|
| L / H = | 1.54 |
|---------|------|

### Vertical Displacement Behind Wall Prediction:

|                            |      |    |
|----------------------------|------|----|
| Differential total heave = | 2.40 | mm |
| Predicted from P-Disp      |      |    |

|                    |      |    |
|--------------------|------|----|
| Total settlement = | 0.00 | mm |
|--------------------|------|----|

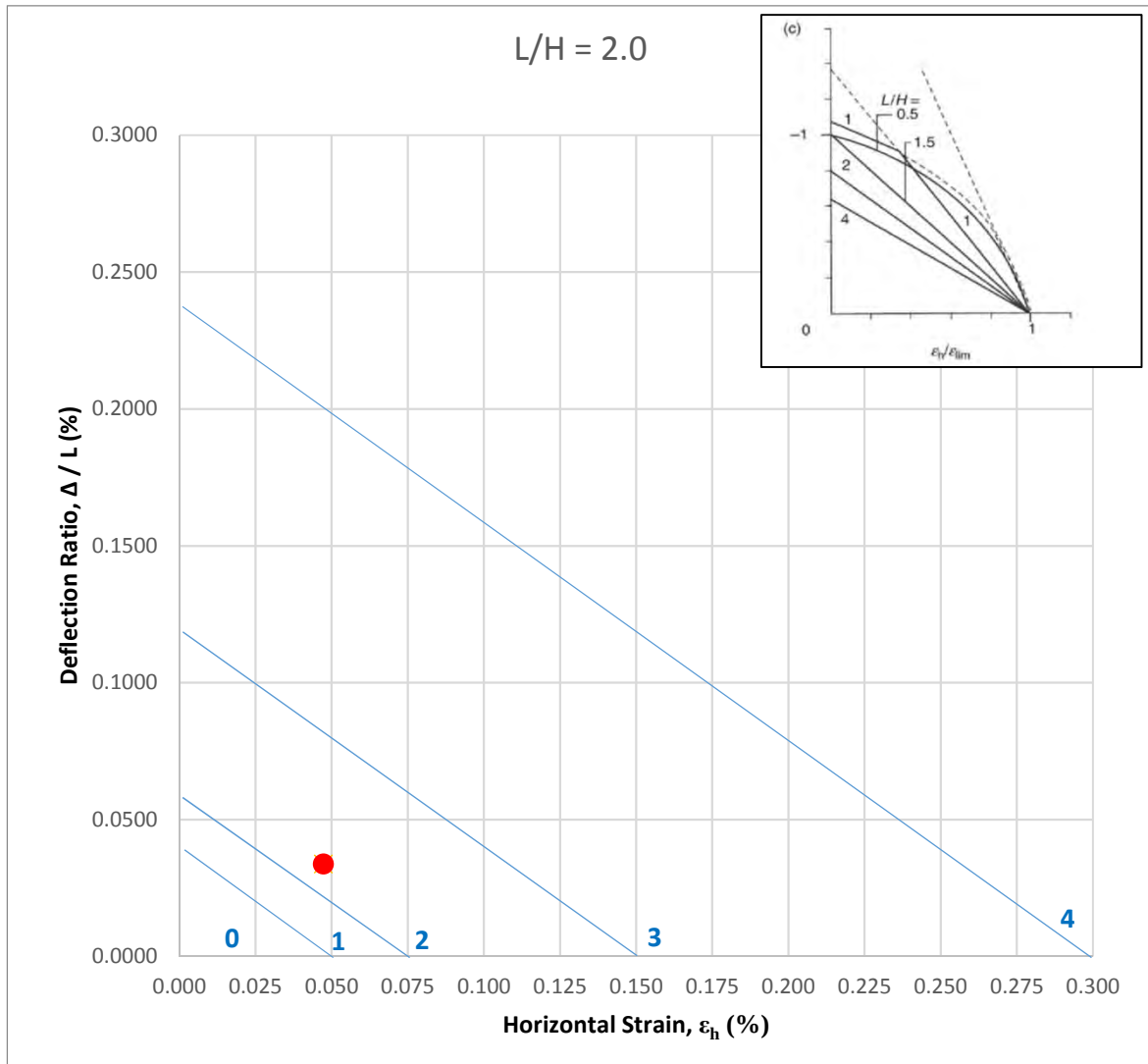
|                                         |      |    |
|-----------------------------------------|------|----|
| Change in vertical movement, $\Delta$ = | 2.40 | mm |
|-----------------------------------------|------|----|

### Horizontal Displacement Behind Wall Prediction:

|                                             |      |    |
|---------------------------------------------|------|----|
| Change in horizontal movement, $\delta_h$ = | 3.36 | mm |
|---------------------------------------------|------|----|

Predicted from CIRIA C580 (Fig 2.11a) assuming excavation in front of a wall in stiff clay and based on 5 mm horizontal movement at wall

|                            |                     |
|----------------------------|---------------------|
| Building Damage Category = | CATEGORY 2 - SLIGHT |
|----------------------------|---------------------|



Wall Length, L = 7.1 m  
Wall Height, H = 4.6 m  
Change in horizontal movement,  $\delta_h$  = 3.36 mm  
Change in vertical movement,  $\Delta$  = 2.40 mm

Horizontal Strain:

$$\text{Horizontal Strain, } \epsilon_h = \frac{\delta_h \times 100}{L \times 1000}$$

$$\epsilon_h = 0.0473$$

Deflection Ratio:

$$\text{Deflection Ratio} = \frac{\Delta \times 100}{L \times 1000}$$

$$= 0.0338$$