APPENDIX H

SETTLEMENT ANALYSES FOR SCA

GEOSYNTEC CONSULTANTS

COMPUTATION COVER SHEET

Client: Honeywell **Project:** Onondaga Lake SCA IDS **Project/Proposal #:** GJ4299 **Task #:** 04

TITLE OF COMPUTATIONS **SETTLEMENT ANALYSES FOR SCA DESIGN**

COMPUTATIONS BY:
Signature: Cao Yiwen — DATE: 8.4.09
Printed Name and Title: Yiwen Cao, Project Engineer

ASSUMPTIONS AND PROCEDURES CHECKED BY:
(Peer Reviewer)
Signature: R. Kulasingam — DATE: 8/4/2009
Printed Name and Title: R. Kulasingam, Project Engineer

COMPUTATIONS CHECKED BY:
Signature: Fan Zhu — DATE: 8.4.09
Printed Name and Title: Fan Zhu, Staff Engineer

COMPUTATIONS BACKCHECKED BY:
(Originator)
Signature: Cao Yiwen — DATE: 8.4.09
Printed Name and Title: Yiwen Cao, Project Engineer

APPROVED BY:
(PM or Designate)
Signature: — DATE: 4 AUG 2009
Printed Name and Title: Jay Beech, Principal

STATE OF NEW YORK · JAY F. BEECH · No. 066337 · LICENSED PROFESSIONAL ENGINEER

APPROVAL NOTES:

REVISIONS (Number and initial all revisions)

NO.	SHEET	DATE	BY	CHECKED BY	APPROVAL

SETTLEMENT ANALYSES FOR SCA

PURPOSE

This package was prepared in support of the design of the Sediment Consolidation Area (SCA) for the Onondaga Lake Bottom Site, which will be constructed on Wastebed 13. The location of the SCA on Wastebed 13 is shown in Figure 1. Specifically, the purpose of this package is:

(i) to calculate foundation settlement of the existing Solvay waste (SOLW) due to liner system and geotextile tube (geo-tube) placement, and to calculate the settlement of the dredge material inside the geo-tubes before cover placement (i.e., capping);

(ii) to calculate additional foundation and dredge material settlement after capping; and

(iii) to estimate the post-settlement grades for the liner system and the cover system, and to estimate tensile strains for the liner system. The performance of the liner system and the cover system is then evaluated to verify that:

a. positive drainage is maintained towards the leachate collection sumps;

b. positive drainage is maintained on the final cover surface; and

c. maximum tensile strains in the liner geosynthetic components do not exceed the maximum allowable tensile strains.

Once the filling sequence and operational issues associated with access and filtrate management have been finalized, additional settlement analyses will be performed, as needed, to confirm that positive drainage towards the sumps will be maintained during operations, closure, and post-closure. These additional analyses will be provided in the final design.

METHODOLOGY

Consolidation Settlement

Settlements of the SOLW and the dredge material in geo-tubes were calculated using equations for conventional one-dimensional (1-D) consolidation theory used in

geotechnical engineering [Holtz and Kovacs, 1981]. Settlements of the SOLW and dredge material in geo-tubes are caused by the following mechanisms:

- primary compression of the SOLW and the dredge material in geo-tubes due to overburden loading imposed by the SCA perimeter dikes, the liner system, the dredge material, and the final cover system; and
- secondary compression resulting from the plastic realignment of the fabric (i.e., creep) of SOLW and the dredge material in geo-tubes under the sustained loading.

The general forms of the settlement equations are given below:

Primary Settlement

$$S_p = \mathrm{C}_{r\varepsilon}\,\mathrm{H}\log\left(\frac{\sigma'_{vo} + \Delta\sigma'_v}{\sigma'_{vo}}\right) \quad \text{for } \sigma'_{vo} + \Delta\sigma'_v \le \sigma'_p \text{ ..... (1)}$$

$$S_p = \mathrm{C}_{r\varepsilon}\,\mathrm{H}\log\left(\frac{\sigma'_p}{\sigma'_{vo}}\right) + \mathrm{C}_{c\varepsilon}\,\mathrm{H}\log\left(\frac{\sigma'_{vo} + \Delta\sigma'_v}{\sigma'_p}\right) \quad \text{for } \sigma'_{vo} \le \sigma'_p \text{ and } \sigma'_{vo} + \Delta\sigma'_v > \sigma'_p \text{ . (2A)}$$

$$S_p = \mathrm{C}_{c\varepsilon}\,\mathrm{H}\log\left(\frac{\sigma'_{vo} + \Delta\sigma'_v}{\sigma'_{vo}}\right) \quad \text{for } \sigma'_{vo} \ge \sigma'_p \text{ .....(2B)}$$

Secondary Settlement

$$S_s = \mathrm{C}_{\alpha\varepsilon}\,\mathrm{H}\log\left(\frac{t_2}{t_1}\right) \text{ ..... (3)}$$

Total Settlement

$$S = S_p + S_s \text{ ..... (4)}$$

Where,

S_p = primary settlement;
S_s = secondary settlement;
S = total settlement;
$C_{c\varepsilon}$ = modified compression index;
$C_{r\varepsilon}$ = modified recompression index;

$C_{\alpha\varepsilon}$ = modified secondary compression index;

H = initial thickness of compressible layer;

σ'_{vo} = initial effective overburden stress;

σ'_p = preconsolidation pressure;

$\Delta\sigma'_v$ = increase in effective stress due to the loadings;

t_1 = time for completion of primary compression (assumed 0.5 years in this analysis). The time for completion of primary compression was estimated to range from several months (based on field settlement pilot study) to several years (based on laboratory consolidation tests). For the purpose of this calculation package, the time for completion of primary compression was assumed to be 0.5 years; and

t_2 = time when settlement due to secondary compression is computed (i.e., assuming 4 years to place geo-tubes, 1 year to place cover, and 30 years after closure, the t_2 is assumed to be 35 years for this analysis).

It is noted that the foundation and dredge material settlements were calculated for two time periods, at the time of closure (i.e., after geo-tube placement is complete but before the final cover has been constructed) and 30 years after closure.

During the operating period of 4 years, the foundation settlement was calculated assuming that all phases of geo-tubes were placed at the beginning of operations. The dredge material settlement was calculated assuming that the geo-tubes were placed on a yearly basis for 4 years (i.e., a quarter of the geo-tubes were placed at the beginning of year 1; a quarter of the tubes were placed at the beginning of year 2; etc.). For purposes of this analysis, a 4-year geo-tube placement approach was assumed so that the settlement due to the placement of geo-tubes on top of previously-placed geo-tubes could be incorporated into the calculations. The actual geo-tube phasing will be developed based on many considerations, including operational needs, observations during operations, etc.

For the after capping settlement calculations, the deformed geometry of the liner system, SCA perimeter dike, and the geo-tubes computed from the settlement analyses at closure (i.e., before cover placement) became the initial geometry. The proposed final cover system loading was assumed to be placed at the beginning of year 5. The foundation and dredge material settlement after closure was calculated due to the placement of the proposed final cover. The continued secondary settlement of foundation and dredge material due to the placement of the liner system, dike, and geo-tubes was also incorporated into the settlement evaluation.

Settlement Computation Model

Foundation and cover settlements were calculated using two different models, the surface settlement model (SSM) and the cross-section settlement model (CSM). The SSM produces post-settlement elevation and settlement (i.e., isopach) contour maps for a deformed surface. The CSM produces similar results along a cross section. The main difference between SSM and CSM is that the CSM considers the load-induced stress distribution within the foundation SOLW and the dredge material in geo-tubes while the SSM does not. The post-settlement contour maps produced using the SSM were used to evaluate whether positive drainage is maintained in the liner system and the final cover system. The post-settlement section figures produced using the CSM were used to evaluate the maximum strain in the geosynthetic components.

Surface Settlement Model (SSM)

Foundation and dredge material settlement based on SSM was calculated using EXCEL® spreadsheets. The details regarding loading and timing for the SSM calculations are provided in subsequent sections. A general summary of the steps used to perform the settlement calculations is presented as follows:

Step 1. Calculation points (approximately 2,300 for this analysis) were selected within the SCA footprint in order to represent the geometries of various surfaces (e.g., low permeability soil layer [LPSL]). For each calculation point, the northing, easting, and the elevation values of various surfaces were selected and stored.

Step 2. For each calculation point, the subsurface profile beneath the liner system (i.e., the SOLW) and the dredge material above the liner system were identified and broken into distinct layers (i.e., sub-layers) of specific thickness and material properties, and the center elevation of each sub-layer was identified.

Step 3. The initial effective vertical stress, the increase in the effective vertical stress, and the final effective vertical stress were calculated at the center of each sub-layer in the SOLW and dredge material in geo-tubes for each of the loadings described in subsequent sections.

Step 4. Using Equations 1 through 4, the settlements for each sub-layer in SOLW were calculated. The total foundation settlement at a calculation point was

found by summing the contribution of the settlement from each of the SOLW sub-layers beneath the bottom of the liner system.

Step 5. Post-settlement elevations of each SOLW sub-layer were obtained by subtracting the corresponding foundation settlement from its corresponding pre-settlement elevation.

Step 6. Using Equations 1 through 4, the settlement for each dredge material sub-layer within the geo-tubes was calculated. The total settlement of the geo-tube surface at a calculation point was found by summing the contribution of the total foundation settlement and the settlement from each of the dredge material sub-layers within the geo-tubes.

Step 7. Post-settlement elevations of each surface were obtained by subtracting the settlement from the pre-settlement elevation at each point.

Step 8. Post-settlement elevation or settlement isopach contour maps were created using the post-settlement or elevation data from all calculation points for the surface of concern.

Cross-section Settlement Model (CSM)

Since CSM can consider the Boussinesq stress distribution in the modeling layers, it is more accurate than SSM at modeling post-settlement strain along the liner system. Foundation and dredge material settlements based on CSM were calculated using EXCEL® spreadsheets. The steps for CSM are generally the same or similar to those for SSM and are presented as follows:

Step 1. Similar, but only a series of calculation points were taken from a cross section line. For the two cross-sections analyzed in this package, the number of calculation points ranged between 30 and 50.

Step 2. Same.

Step 3. Similar, except the increase in effective vertical stress was computed separately by considering the stress distribution based on Boussinesq theory.

Step 4. Same.

Step 5. Same.

Step 6. Same.

Step 7. Same.

Step 8. Pre- and post-settlement top of base liner elevations between a pair of adjacent calculation points were used to assess the pre- and post-settlement length of the liner between the two calculation points. The difference in length relative to the initial length between the calculation points was used to assess the calculated incremental strain in the liner system according to the following equation:

$$\varepsilon = \frac{L_0 - L_f}{L_o} \times 100 \text{ (percent)} \quad (5)$$

Where:

ε = strain in the liner system (- indicates tension, + indicates compression);

L_f = final length between calculation points based on post-settlement elevations; and

L_o = initial length between calculation points based on pre-settlement elevations.

The estimated tensile strains were compared to the conservatively recommended allowable tensile strain of 5% [Berg and Bonaparte, 1993] for the liner system geomembrane.

Tensile Strain Adjustment

The post-settlement liner tensile strain was evaluated for two time periods, at closure (before cover placement) and 30 years after closure. The calculated tensile strains at 30 years after closure are based on the liner condition at closure; however, the liner segments may already have been stretched during the operations period. Therefore, the calculated tensile strains at 30 years after closure need to be adjusted to include additional tensile strains during the operations period.

Assuming ε_1 and ε_2 represent the tensile strains calculated for the operations and post-closure periods, respectively.

$$\varepsilon_1 = \frac{L_0 - L_1}{L_o} = 1 - \frac{L_1}{L_o}, \quad \frac{L_1}{L_o} = 1 - \varepsilon_1 \quad (6)$$

$$\varepsilon_2 = \frac{L_1 - L_2}{L_1} = 1 - \frac{L_2}{L_1}, \quad \frac{L_2}{L_1} = 1 - \varepsilon_2 \quad \text{..... (7)}$$

Where:

L_o = initial length between calculation points based on pre-settlement elevations;

L_1 = final length between calculation points based on post-settlement elevations at closure;

L_2 = final length between calculation points based on post-settlement elevations 30 years after closure;

Assuming $\varepsilon_2^{'}$ represent the adjusted post-closure tensile strains.

$$\varepsilon_2^{'} = \frac{L_0 - L_2}{L_o} = 1 - \frac{L_2}{L_o} = 1 - \frac{L_2}{L_1} \times \frac{L_1}{L_o} \quad \text{..... (8)}$$

Substituting Equations 6 and 7 into Equation 8:

$$\begin{aligned} \varepsilon_2^{'} &= 1 - (1 - \varepsilon_2) \times (1 - \varepsilon_1) \\ &= 1 - 1 + \varepsilon_1 + \varepsilon_2 - \varepsilon_1\varepsilon_2 \\ &= \varepsilon_1 + \varepsilon_2 - \varepsilon_1\varepsilon_2 \quad \text{..... (9)} \end{aligned}$$

Since ε_1 and ε_2 are typically relatively small numbers (i.e., couple of percent), the term $\varepsilon_1\varepsilon_2$ is very small and can be removed from Equation 9. Thus, Equation 9 can be simplified as:

$$\varepsilon_2^{'} = \varepsilon_1 + \varepsilon_2 \quad \text{..... (10)}$$

Secondary Settlement Time Ratio

The secondary settlement components of the foundation and dredge material settlements were calculated for two time periods, at closure (before cover placement) and 30 years after closure. For the post-closure period, the calculated secondary settlement represents additional secondary settlement after closure.

Foundation SOLW

For the foundation SOLW, there are two loadings considered in the settlement analyses. The first one is the liner system and dredge material in geo-tubes loading placed at the beginning of the operations period (i.e., beginning of year 1), and the second one is the proposed final cover loading placed at closure (beginning of year 5). For each sub-layer in the foundation SOLW, it is assumed that the secondary settlement during the post-closure period is a continuation of the secondary settlement triggered by the placement of the dredge material in the geo-tubes. In other words, the secondary settlement during the post-closure period was assumed to not restart due to the placement of the proposed final cover.

Therefore, the additional secondary settlement during the post-closure period can be calculated as:

$$S_{post-closure} = \mathrm{C}_{\alpha\varepsilon}\ \mathrm{H} \log\left(\frac{T_3}{T_1}\right) - \mathrm{C}_{\alpha\varepsilon}\ \mathrm{H} \log\left(\frac{T_2}{T_1}\right) \quad \text{..... (11)}$$

Where:

$S_{post\text{-}closure}$ = additional secondary settlement during the post-closure period;
$C_{\alpha\varepsilon}$ = modified secondary compression index;
H = initial thickness of compressible layer;
T_1 = time for completion of primary compression (assumed 0.5 year);
T_2 = time at closure (assumed 4 years); and
T_3 = time 30 years after closure (assumed 35 years).

Equation 11 can be reorganized as:

$$\begin{aligned} S_{post-closure} &= \mathrm{C}_{\alpha\varepsilon}\ \mathrm{H} \left[\log\left(\frac{T_3}{T_1}\right) - \log\left(\frac{T_2}{T_1}\right)\right] \\ &= \mathrm{C}_{\alpha\varepsilon}\ \mathrm{H}\ \left[\log(T_3) - \log(T_1) - \log(T_2) + \log(T_1)\right] \\ &= \mathrm{C}_{\alpha\varepsilon}\ \mathrm{H}\ \left[\log(T_3) - \log(T_2)\right] \\ &= \mathrm{C}_{\alpha\varepsilon}\ \mathrm{H} \log\left(\frac{T_3}{T_2}\right) \quad \text{..... (12)} \end{aligned}$$

Observing Equations 11 and 12, the secondary settlement during the post-closure period can be calculated in one step per Equation 12 instead of in two steps per Equation 11. Comparing Equations 3 and 12, it can be assumed that the equivalent t_2/t_1 ratio in Equation 3 can be expressed as T_3/T_2 (i.e., 35/4=8.75) for secondary settlement of foundation SOLW.

Dredge Material in Geo-tubes

For the settlement of dredge material in geo-tubes, it was assumed that the geo-tubes were placed on a yearly basis for four years (i.e., a quarter of the geo-tubes were placed at the beginning of year 1; a quarter of the tubes were placed at the beginning of year 2; etc.). Per Equation 12, the equivalent time ratios can be calculated as 35/4 (8.75) for year 1 geo-tubes, 34/3 (11.33) for year 2 geo-tubes, 33/2 (16.5) for year 3 geo-tubes, and 32/1 (32) for year 4 geo-tubes.

ANALYSIS CASES

The following cases were analyzed using the SSM:

CASE 1: Settlement analysis for top of LPSL at the end of the operations period (i.e., end of year 4);

CASE 2: Settlement analysis for top of dredge material in geo-tubes at the end of the operations period (i.e., end of year 4);

CASE 3: Settlement analysis for top of LPSL 30 years after closure (i.e., end of year 35);

CASE 4: Settlement analysis for top of final cover 30 years after closure (i.e., end of year 35);

The following cases were analyzed using the CSM:

CASE 5: Settlement analysis for top of LPSL at the end of the operations period (i.e., end of year 4) along two cross sections [Figure 1];

CASE 6: Settlement analysis for top of dredge material in geo-tubes at the end of the operations period (i.e., end of year 4) along two cross sections [Figure 1]; and

CASE 7: Settlement analysis for top of LPSL 30 years after closure (i.e., end of year 35) along two cross sections [Figure 1].

SUBSURFACE STRATIGRAPHY

Detailed information regarding the subsurface stratigraphy was presented in a calculation package titled "*Subsurface Stratigraphy Model of Wastebed 13 for the Design of Sediment Consolidation Area*" (referred to as the Data Package). In summary, the subsurface stratigraphy consists primarily of three types of material: the SOLW, the dike soil, and the foundation soil, as shown schematically in Figure 2. The SOLW was divided into three zones (i.e., Zone 1, Zone 2, and Zone 3, as shown in Figure 2) based on the distinctive characteristics of each zone.

The groundwater table was assumed to be at elevation 375 ft as presented in the Data Package.

MATERIAL PROPERTIES

Detailed information regarding the material properties (i.e., unit weight and/or compressibility parameters) of the SOLW and the Wastebed 13 perimeter dike soil was also presented in the Data Package. The unit weight of the dredge material was estimated to be approximately 86 pcf based on lab results. The compressibility parameters of the dredge material are calculated and presented in Attachment 1 of this package. The unit weights of the soil liner, gravel drainage layer, and the final cover system were assumed to be 120 pcf.

Table 1 summarizes the material properties of the SOLW, soil liner, gravel layer, dredge material, final cover, and SCA perimeter dike soil.

SETTLEMENT CALCULATION SURFACES AND CROSS SECTIONS

Surface Settlement Model (SSM)

The pre-settlement grading plans of various SCA surfaces needed in the SSM (including from bottom to top: bottom of foundation SOLW, bottom of LPSL [i.e., existing grade], top of LPSL, top of gravel, and the potential top of geo-tube year 1, top of geo-tube year 2, top of geo-tube year 3, and top of geo-tube year 4 surfaces) are presented in Figures 3 through 10. The locations of the 2,300+ settlement calculation points are shown in

Figure 11. These calculation points were used to represent modeling surfaces. The pre-settlement proposed final cover grading plan was developed based on the deformed (i.e., settled) shape of the top of geo-tube year 4 surface; therefore, it includes settlement due to liner and geo-tube placement but not final cover placement. The proposed final cover surface was designed to provide positive drainage of surface water with a minimum of 0.5% slope and a minimum thickness of 21 inches on the top deck area.

Cross-section Settlement Model (CSM)

Two Cross Sections, A and B, were analyzed using the CSM. The locations of Cross Sections A and B are shown in Figure 1.

RESULTS

Surface Settlement Model (SSM)

CASE 1

The settlement isopach and post-settlement elevation maps for the top of LPSL (or bottom of gravel layer) at the end of operations period (i.e., end of year 4) are shown in Figures 12 and 13, respectively. The estimated settlement includes primary and secondary settlement of SOLW that occurred between the beginning of year 1 and the end of year 4. Per Figure 12, within the top deck area, the majority of the settlements are approximately 9 ft to 11 ft with the area above the subsurface berm having settlements ranging from 5 ft to 8 ft. Figure 13 indicates that the gravel layer functions as needed at the end of operations period (i.e., end of year 4) because there is no slope reversal or local ponding and liquid can freely drain towards the two collection sump areas. The spreadsheet output for settlement analysis for 10 representative calculation points (i.e., 501 through 510) is presented in Attachment 2. The locations of calculation points 501 through 510 are shown in Figure 11.

CASE 2

The settlement isopach and post-settlement elevation maps for the top of geo-tubes at the end of operations period (i.e., end of year 4) are shown in Figures 14 and 15, respectively. The estimated settlement includes primary and secondary settlement of dredge material in geo-tubes that occurred between the beginning of year 1 and the end of

year 4. Per Figure 14, within the top deck area, the majority of the settlements are approximately 10 ft to 15 ft with the area above the subsurface berm having settlements ranging from 5 ft to 9 ft. Figure 15 indicates that positive drainage is generally maintained in the southern part of the top deck area, along the northern edge, and along the area above the subsurface berm. Areas with relatively flat slopes are formed near the general vicinity of the two collection sumps. With the placement of the proposed final cover (Figure 16), the relatively flat slopes on top of the geo-tubes in these areas can be addressed, and a minimum of 0.5% positive slopes can be provided. The spreadsheet output for settlement analysis for 10 representative calculation points (i.e., 501 through 510) is presented in Attachment 3.

CASE 3

The settlement isopach and post-settlement elevation maps for the top of LPSL (or bottom of gravel layer) at 30 years after closure (i.e., end of year 35) are shown in Figures 17 and 18, respectively. It should be noted the settlement calculated for this case consists of: (i) the primary settlement of the SOLW due to the placement of the proposed final cover; and (ii) the continued secondary settlement of the SOLW between the beginning of year 5 and the end of year 35 due to the placement of the liner system, SCA perimeter dike, and the geo-tubes that occurred during years 1 through 4. Per Figure 17, within the top deck area, the majority of the settlements are approximately 1 ft to 2 ft with the area above the subsurface berm having settlements ranging from 0.5 ft to 1 ft. Figure 18 indicates that the gravel layer still functions as required at year 35 because there is no slope reversal or local ponding and liquid can freely drain toward the two collection sump areas. The spreadsheet output for settlement analysis for 10 representative calculation points (i.e., 501 through 510) is presented in Attachment 4.

CASE 4

The settlement isopach and post-settlement elevation maps for the top of final cover at the end of year 35 are shown in Figures 19 and 20, respectively. It should be noted that the starting point for this case is the deformed surfaces at the end of year 4. The settlement calculated for this case consists of: (i) the primary settlement of the dredge material in geo-tubes due to the placement of the proposed final cover; and (ii) the continued secondary settlement of the dredge material in geo-tubes due to the placement of the geo-tubes

themselves. Per Figure 19, within the top deck area, the majority of the settlements between the end of year 4 and the end of year 35 are approximately 2 ft to 4 ft. Figure 20 indicates that positive drainage is generally maintained throughout the top deck area allowing surface water to flow toward the low points along the edges. Any long term development of local low points can be addressed during maintenance. The spreadsheet output for settlement analysis for 10 representative calculation points (i.e., 501 through 510) is presented in Attachment 5.

Cross-section Settlement Model (CSM)

CASE 5

The stress distribution of geo-tube, liner, and SCA perimeter dike loading within the foundation SOLW along Cross Section A is shown in Figure 21. Figure 21 indicates that the load induced stress does not dissipate much in the center portion of the SCA cell because the loading condition remains relatively uniform for a long distance. The stress values do change significantly in the sideslope area and dike area due to changing load conditions within a short distance. The pre- vs. post- foundation settlement profiles at the end of year 4 along Cross Section A are shown in Figure 22 as an overall view and in Figures 23 and 24 as zoom-in view for the left and right berms, respectively. Three series of calculation results (pre-settlement slope, post-settlement slope, and post-settlement strain) are shown between two adjacent calculation points for the top of LPSL. According to Figure 22, at the end of year 4, the majority of the settlement for the top of LPSL ranged from 8 ft to 10 ft in the top deck area except above the subsurface berm area where the settlement was about 6 ft. This is consistent with the post-settlement analysis results using SSM (see CASE 1). There is generally no post-settlement liner tensile strain (negative value) underneath the top deck area except in a few localized areas with maximum tensile strain on the order of 0.4%. According to Figures 23 and 24, at the end of year 4, the post-settlement liner tensile strain values range from 0.1% to 0.5% in areas directly underneath the sideslope area, inside the top deck area, and along the dike inner sideslope. The settlements calculated at the toe of the dike are on the order of 1 ft.

The stress distribution of geo-tube, liner, and SCA perimeter dike loading within the foundation SOLW along Cross Section B is shown in Figure 25. The characteristics of the stress distribution are similar to that of Cross Section A. The pre- vs. post- foundation settlement profiles at the end of year 4 along Cross Section B are shown in Figure 26 as an

overall view and in Figures 27 and 28 as zoom-in view for the left and right berms, respectively. Three series of calculation results (pre-settlement slope, post-settlement slope, and post-settlement strain) are shown between two adjacent calculation points for the top of LPSL. According to Figure 26, at the end of year 4, the majority of the settlement for the top of LPSL ranged from 8 ft to 9 ft in the top deck area. This is consistent with the post-settlement analysis results using SSM (see CASE 1). There is no post-settlement liner tensile strain (negative value) in the top deck areas. According to Figures 27 and 28, at the end of year 4, the post-settlement liner tensile strain values range from 0.2% to 0.8% in the sideslope and inside dike areas. The settlements calculated at the toe of the dike are on the order of 0.7 ft and 0.2 ft for the left and right berms, respectively.

The spreadsheet output for the settlement analysis for 10 representative calculation points (i.e., 5 through 14, Cross Section A) is presented in Attachment 6.

CASE 6

The pre- vs. post-settlement profiles at the end of year 4 along Cross Section A are shown in Figure 29 for various layers of geo-tubes. According to Figure 29, at the end of year 4, the majority of the settlement for the top of the geo-tubes ranged from 11 ft to 12 ft in the top deck area except the area above the subsurface berm where the settlement was about 8 ft. This is consistent with the results using SSM (see CASE 2).

The pre- vs. post-settlement profiles at the end of year 4 along Cross Section B are shown in Figure 30 for various layers of geo-tubes. According to Figure 30, at the end of year 4, the majority of the settlements for the top of geo-tube phase 4 ranged from 12 ft to 15 ft in the top deck area. This is consistent with the results using SSM (see CASE 2).

The spreadsheet output for settlement analysis for 10 representative calculation points (i.e., 5 through 14, Cross Section A) is presented in Attachment 7.

CASE 7

The stress distribution of the proposed final cover loading within the dredge material in geo-tubes and foundation SOLW along Cross Section A is shown in Figure 31. Similar to the stress distribution due to geo-tube loading, the stress distribution due to final cover also remains relatively uniform in the center portion and highly variable in the cover sideslope and dike areas. The pre- (i.e., at the end of year 4) vs. post- (i.e., at the end of

year 35) foundation settlement profiles along Cross Section A are shown in Figure 32 as an overall view and in Figures 33 and 34 as zoom-in view for the left and right berms, respectively.

Three series of calculation results (pre-settlement slope [i.e., slope at the end of year 4], post-settlement slope, and post-settlement strain) are shown between two adjacent calculation points for the top of LPSL. It should be noted that the starting point for this case is the deformed profiles at the end of year 4. The settlement calculated for this case consists of: (i) the primary settlement of the SOLW due to the placement of the proposed final cover, and (ii) the continued secondary settlement of the SOLW between the beginning of year 5 and the end of year 35 due to the placement of the liner system, SCA perimeter dike, and the geo-tubes that occurred during years 1 through 4. According to Figure 32, at the end of year 35 as compared to the end of year 4, the majority of the settlements for the top of LPSL ranged from 1 ft to 1.5 ft in the top deck area except in the area above the subsurface berm where the settlement was about 0.5 ft. This is consistent with the results using SSM (see CASE 3).

There is generally no post-settlement liner tensile strain (negative value) in the top deck areas except some localized areas with maximum tensile strain on the order of 0.5%. It should be noted that the maximum 0.5% tensile strain is the adjusted strain. It is the sum of the liner tensile strain of 0.4% between calculation points 20 and 21 at the end of year 4 (Figure 22) and the additional liner tensile strain of 0.1% at the same location at the end of year 35 (Figure 32). According to Figures 23, 24, 33, and 34, at the end of year 35, the post-settlement liner tensile strain values (adjusted) range from 0.6% to 2.5% in areas directly underneath the cover sideslope area. The maximum liner tensile strains occurred along the inner side of the dike.

The stress distribution of the proposed final cover loading within the dredge material in geo-tubes and foundation SOLW along Cross Section B is shown in Figure 35. The characteristics of the stress distribution are similar to that of Cross Section A. The pre- (i.e., at the end of year 4) vs. post- (i.e., at the end of year 35) foundation settlement profiles along Cross Section A are shown in Figure 36 as an overall view and in Figures 37 and 38 as zoom-in view for the left and right berms, respectively. Three series of calculation results (pre-settlement slope, post-settlement slope, and post-settlement strain) are shown between two adjacent calculation points for the top of LPSL. According to Figure 36, at the end of year 35 as compared to the end of year 4, the majority of the settlements for the top of LPSL ranged from 1 ft to 1.5 ft in the top deck area. This is

consistent with the results using SSM (see CASE 3). There is no calculated post-settlement liner tensile strain in the top deck areas. According to Figures 27, 28, 37 and 38, at the end of year 35, the post-settlement liner tensile strain values (adjusted) range from 0.4% to 2.7% in areas directly underneath the cover sideslope area. The maximum liner tensile strains occurred along the inner side of the dike.

The spreadsheet output for settlement analysis for 10 representative calculation points (i.e., 5 through 14, Cross Section A) is presented in Attachment 8.

CONCLUSIONS

The analyses provided herein indicate that

(i) The anticipated foundation settlement during the operations period is 9 ft to 11 ft, and the anticipated settlement of dredge material in the geo-tubes during the operations period is 2.5 ft on average with a maximum of 5.0 ft.

(ii) Relatively small foundation and cover settlements are anticipated during the post-closure period. The additional foundation settlement during the post-closure period is estimated to be 1 ft to 2 ft. The additional cover settlement (i.e., settlement of dredge material in the geo-tubes) during the post-closure period is estimated to be 1.5 ft on average with a maximum of 2.5 ft.

(iii) The liquid collection layer (i.e., the gravel layer) is anticipated to function properly by allowing liquid to freely flow to the sump areas during the closure and post-closure periods. No slope reversal or local ponding is anticipated.

(iv) The maximum tensile strain on the liner system, which was calculated to be 2.7% during the closure and post-closure periods, is less than the allowable tensile strain of 5% for liner geomembrane. For the closure and post-closure periods, there was little or no liner tensile strain calculated for the majority of the liner system underneath the top deck area. According to the results, liner tensile strains were typically observed under the sideslope and in the dike areas. The maximum liner tensile strains typically occur on the inner side of dike sideslope areas.

(v) The proposed final cover is expected to perform properly during the post-closure period by maintaining positive drainage slopes. Any long term development of local low points can be addressed during maintenance.

REFERENCES

Berg, R.R. and Bonaparte, R., "*Long-Term Allowable Tensile Stresses for Polyethylene Geomembranes*," Geotextiles and Geomembranes, Vol. 12, 1993, pp. 287-306.

Holtz, R.D., and Kovacs, W.D. "*An Introduction to Geotechnical Engineering*," Prentice-Hall Inc., Englewood Cliffs, N.J., 1981.

U.S. Army Corps of Engineers, "*Settlement Analysis*," Engineer Manual 1110-1-1904, Washington, DC, September 1990.

Written by: **Yiwen Cao** Date: **6/10/2009** Reviewed by: **R. Kulasingam/Jay Beech** Date: **6/10/2009**

Client: **Honeywell** Project: **Onondaga Lake SCA IDS** Project/ Proposal No.: **GJ4299** Task No.: **04**

Tables

Table 1. Summary of Material Properties for Settlement Calculation

Material		Total Unit Weight (γ_i, pcf)	Overconsolidation Ratio (OCR)	Modified Compression Index ($C_{c\varepsilon}$)	Modified Recompression Index ($C_{r\varepsilon}$)	Coefficient of Secondary Compression ($C_{\alpha\varepsilon}$)(1)
SOLW	Zone 1	82	4.5 for D=0~10 ft 2.0 for D=10~20 ft 1.0 for D>20 ft	0.34	0.015	0.13% for $\sigma_v^{'}/\sigma_p^{'} \leq 1.0$ 0.83% for $\sigma_v^{'}/\sigma_p^{'} > 1.0$
	Zone 2			0.46	0.014	0.11% for $\sigma_v^{'}/\sigma_p^{'} \leq 1.0$ 0.91% for $\sigma_v^{'}/\sigma_p^{'} > 1.0$
	Zone 3			0.38	0.021	0.07% for $\sigma_v^{'}/\sigma_p^{'} \leq 1.0$ 0.70% for $\sigma_v^{'}/\sigma_p^{'} > 1.0$
Dike Soil, Soil Liner and Final Cover		120	N/A	N/A	N/A	N/A
Dredge Material		86	1.0	0.291	0.0045	0.08% for $\sigma_v^{'}/\sigma_p^{'} \leq 1.0$ 0.60% for $\sigma_v^{'}/\sigma_p^{'} > 1.0$
Gravel		120	N/A	N/A	N/A	N/A

(1) $\sigma_v^{'} = \sigma_{v0}^{'} + \Delta\sigma_v^{'}$ is the final effective vertical stress in SOLW; $\sigma_p^{'}$ is the pre-consolidation pressure.

Figures

Written by: **Yiwen Cao** Date: **6/10/2009** Reviewed by: **R. Kulasingam/Jay Beech** Date: **6/10/2009**

Client: **Honeywell** Project: **Onondaga Lake SCA IDS** Project/ Proposal No.: **GJ4299** Task No.: **04**

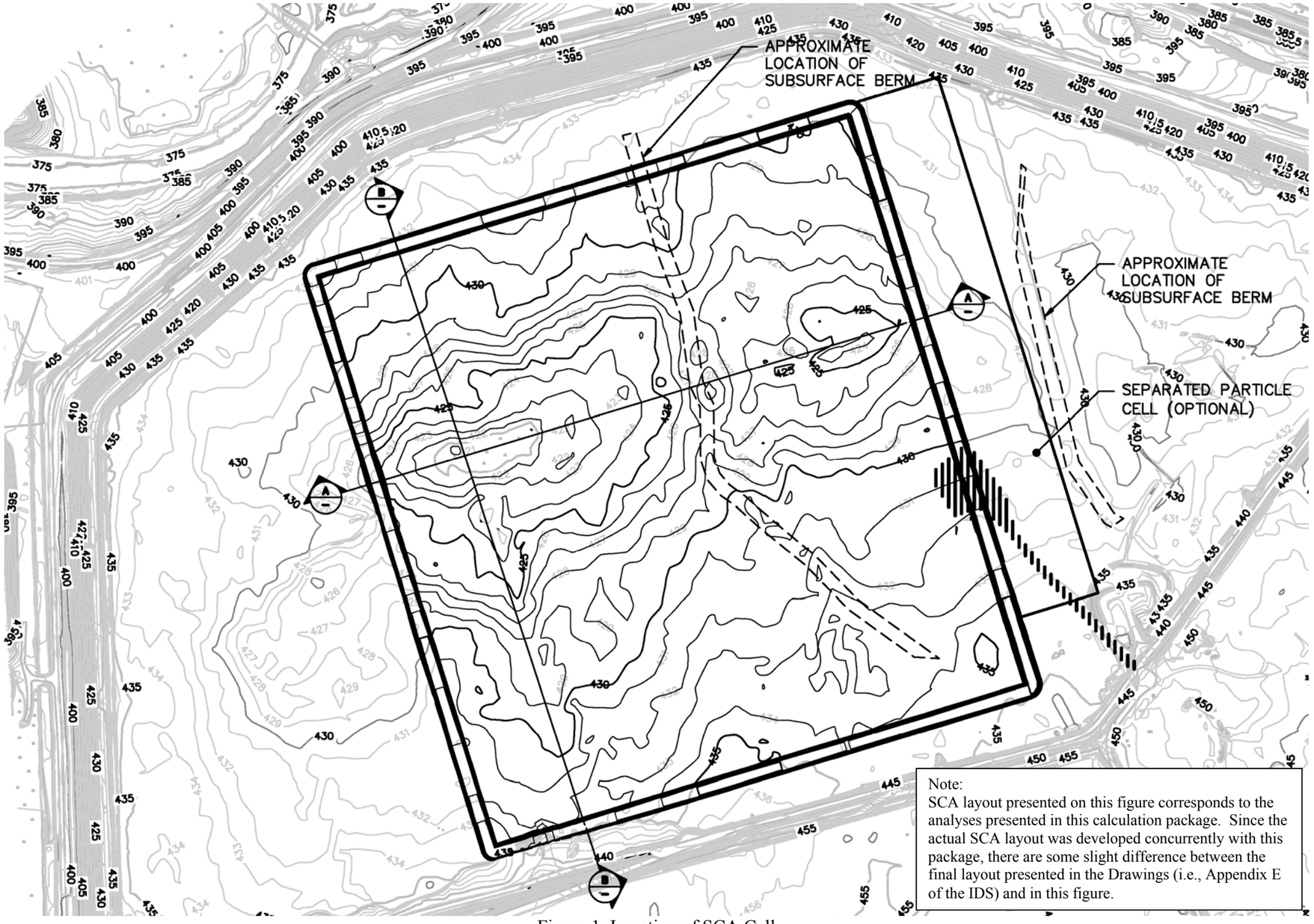


Figure 1. Location of SCA Cell

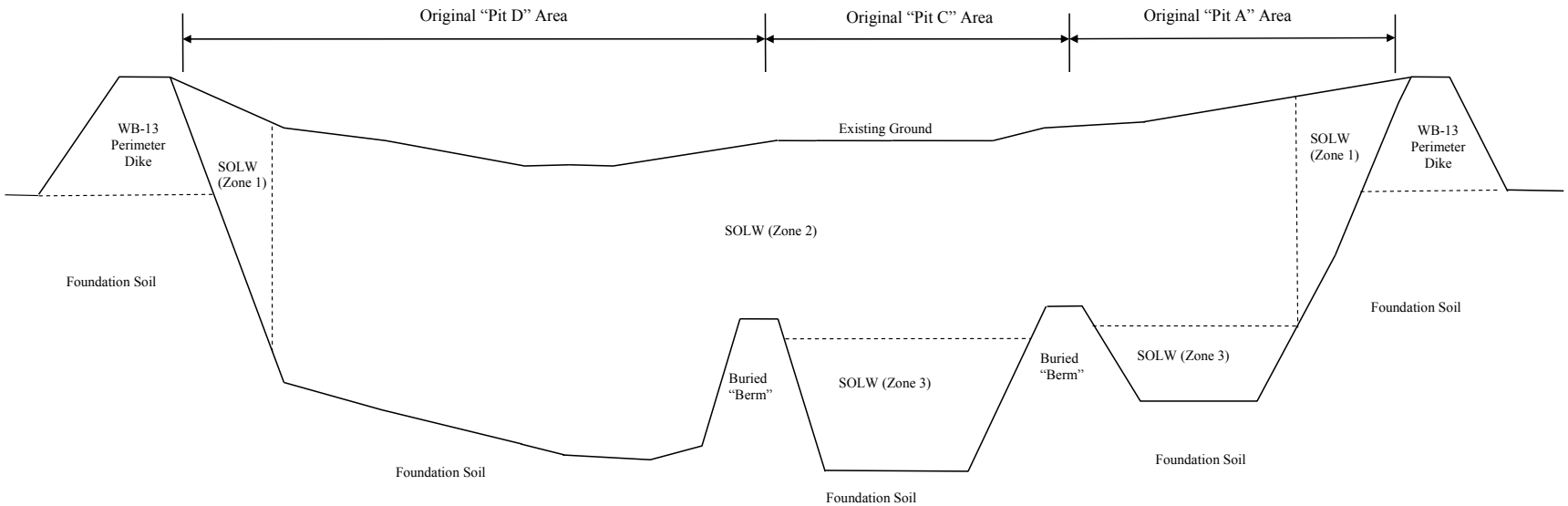
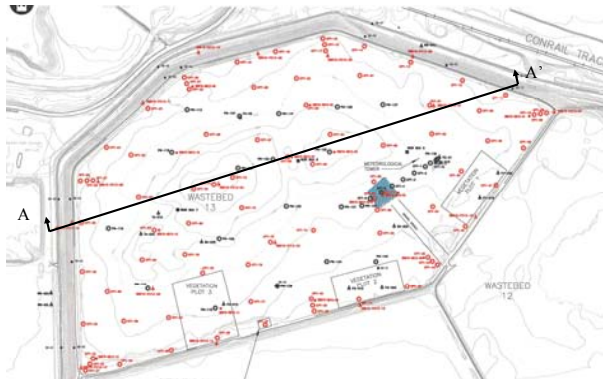


Figure 2. Schematic of Subsurface Profile
[not to scale; for the purpose of showing subsurface stratigraphy only; location of the section is shown below]



Written by:	Yiwen Cao	Date:	6/10/2009	Reviewed by:	R. Kulasingam/Jay Beech	Date:	6/10/2009

Client:	Honeywell	Project:	Onondaga Lake SCA IDS	Project/ Proposal No.:	GJ4299	Task No.:	04

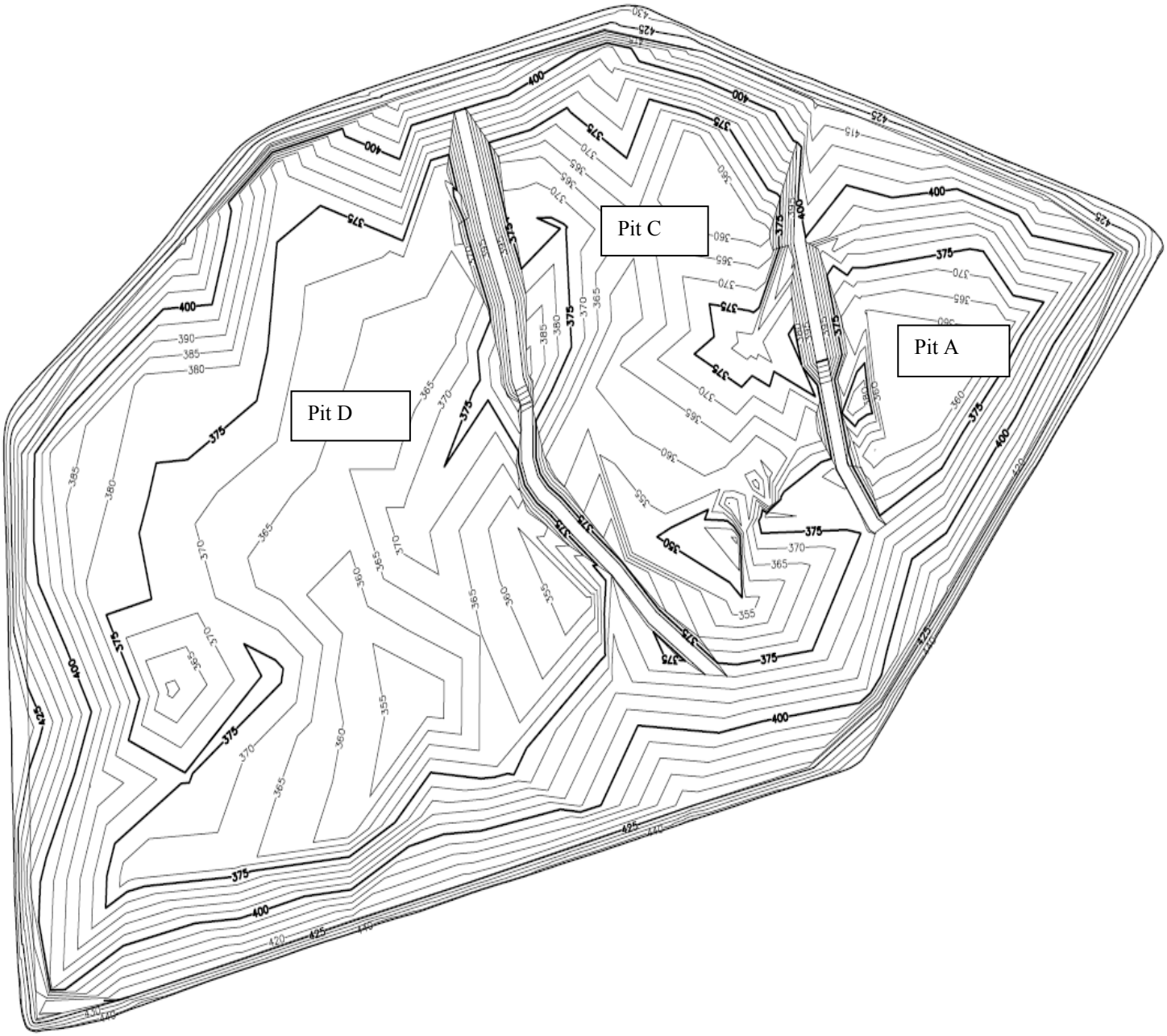


Figure 3. SCA Bottom of Foundation SOLW Grading Plan

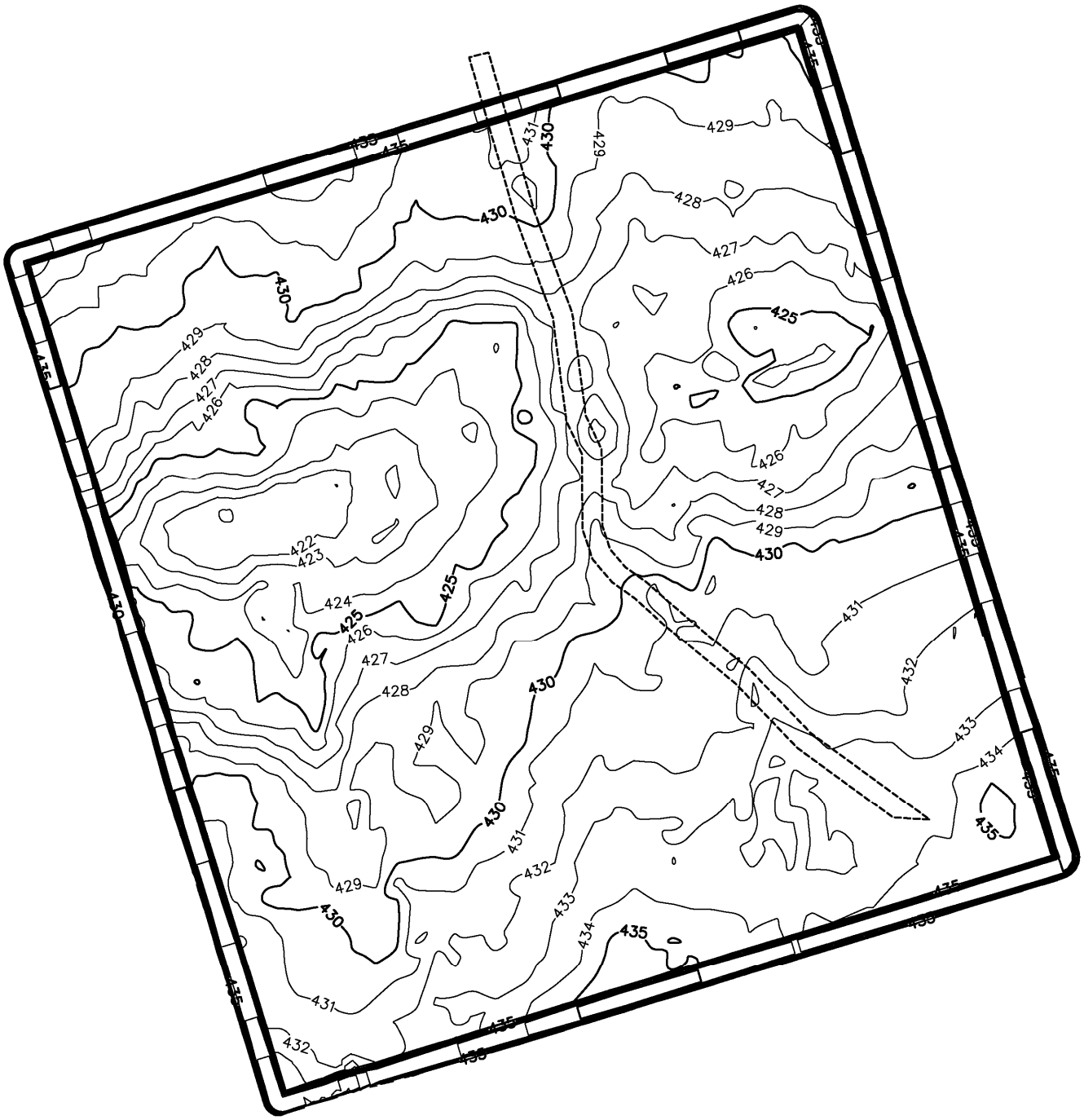


Figure 4. SCA Pre-Settlement Bottom of LPSL Grading Plan (i.e., existing grade)

Written by:	Yiwen Cao	Date:	6/10/2009	Reviewed by:	R. Kulasingam/Jay Beech	Date:	6/10/2009

Client:	Honeywell	Project:	Onondaga Lake SCA IDS	Project/ Proposal No.:	GJ4299	Task No.:	04

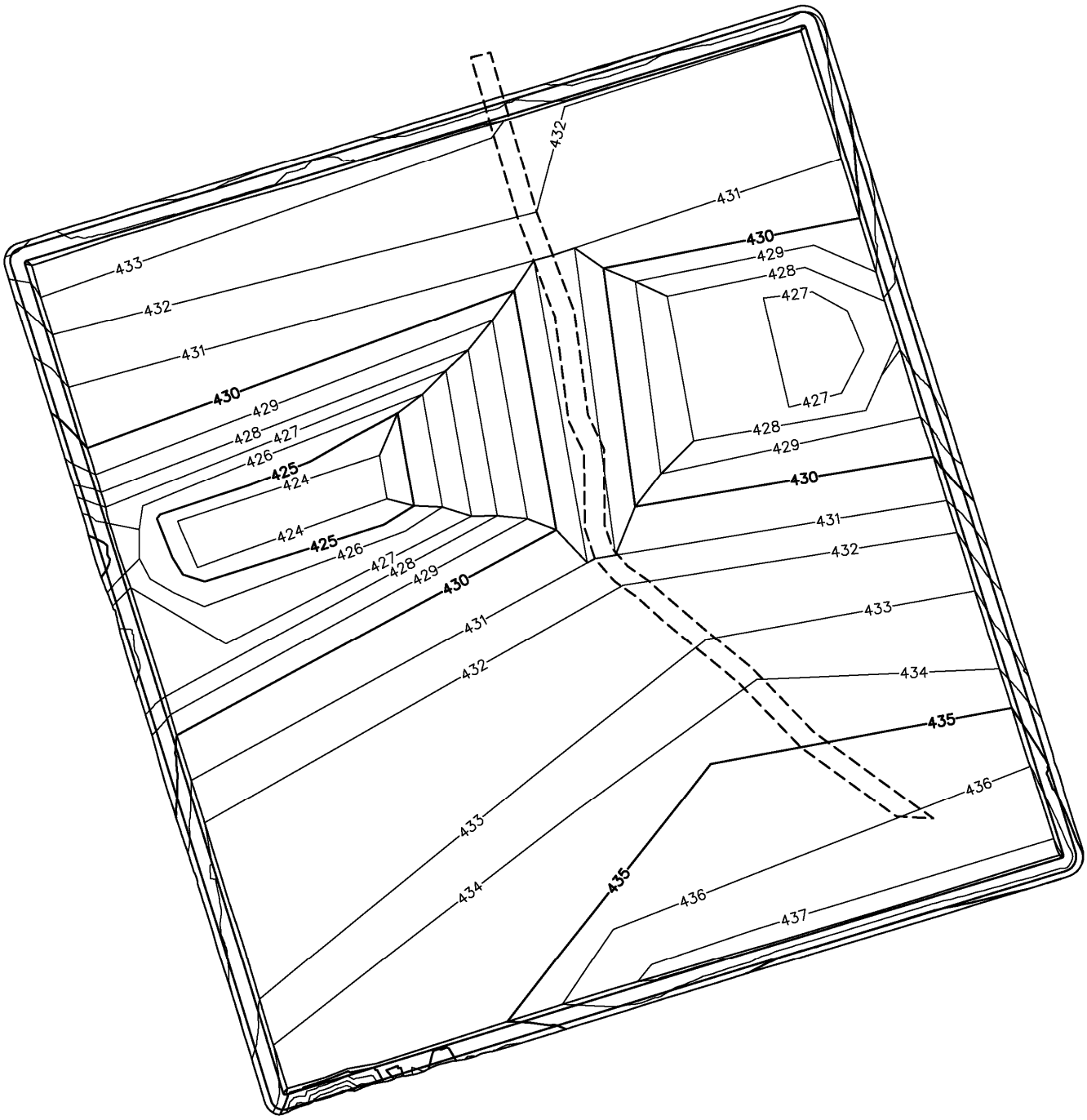


Figure 5. SCA Pre-Settlement Top of LPSL Grading Plan

Written by: **Yiwen Cao** Date: **6/10/2009** Reviewed by: **R. Kulasingam/Jay Beech** Date: **6/10/2009**

Client: **Honeywell** Project: **Onondaga Lake SCA IDS** Project/ Proposal No.: **GJ4299** Task No.: **04**

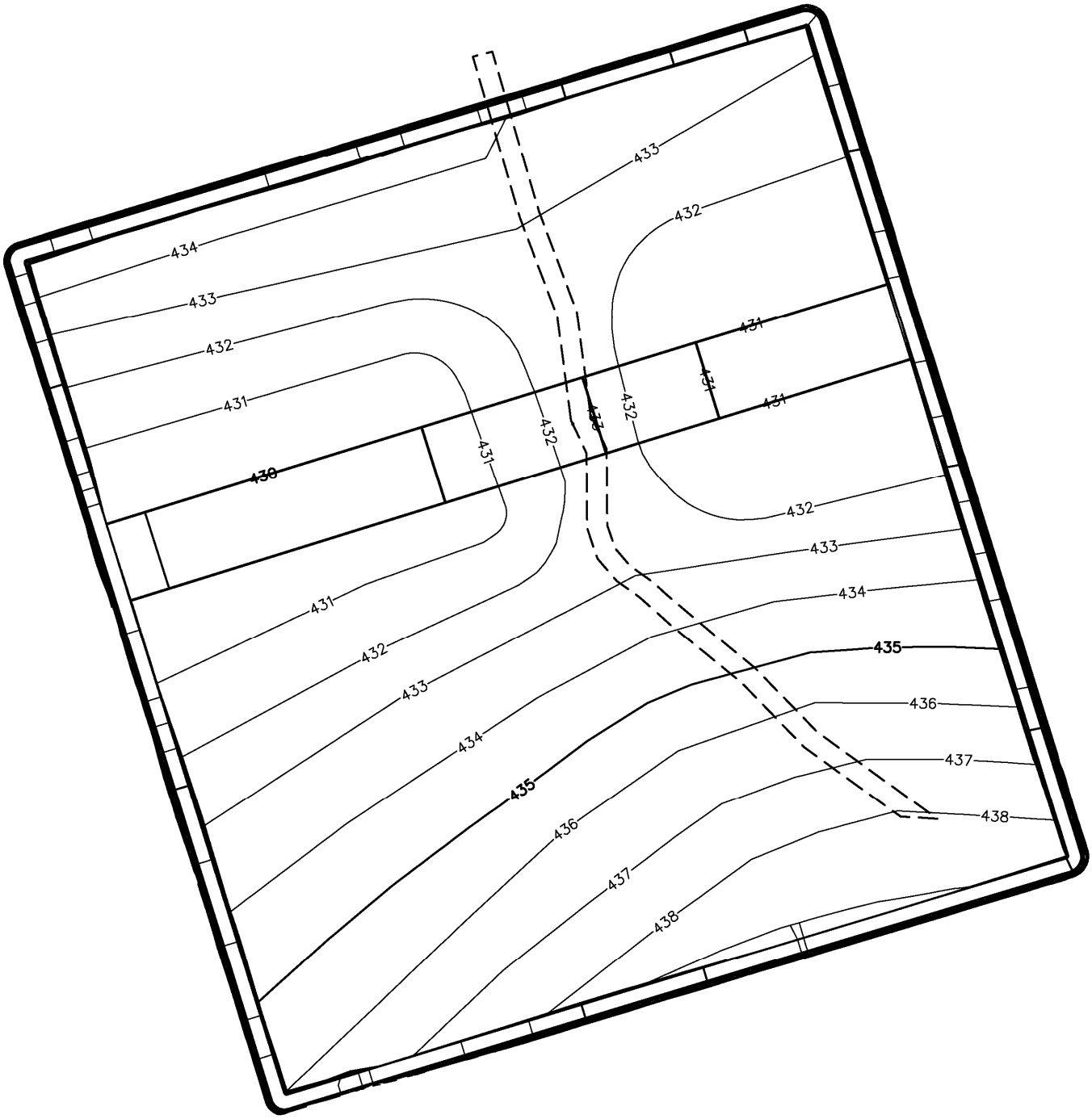


Figure 6. SCA Pre-Settlement Top of Gravel Grading Plan

Written by:	Yiwen Cao	Date:	6/10/2009	Reviewed by:	R. Kulasingam/Jay Beech	Date:	6/10/2009

Client:	Honeywell	Project:	Onondaga Lake SCA IDS	Project/ Proposal No.:	GJ4299	Task No.:	04

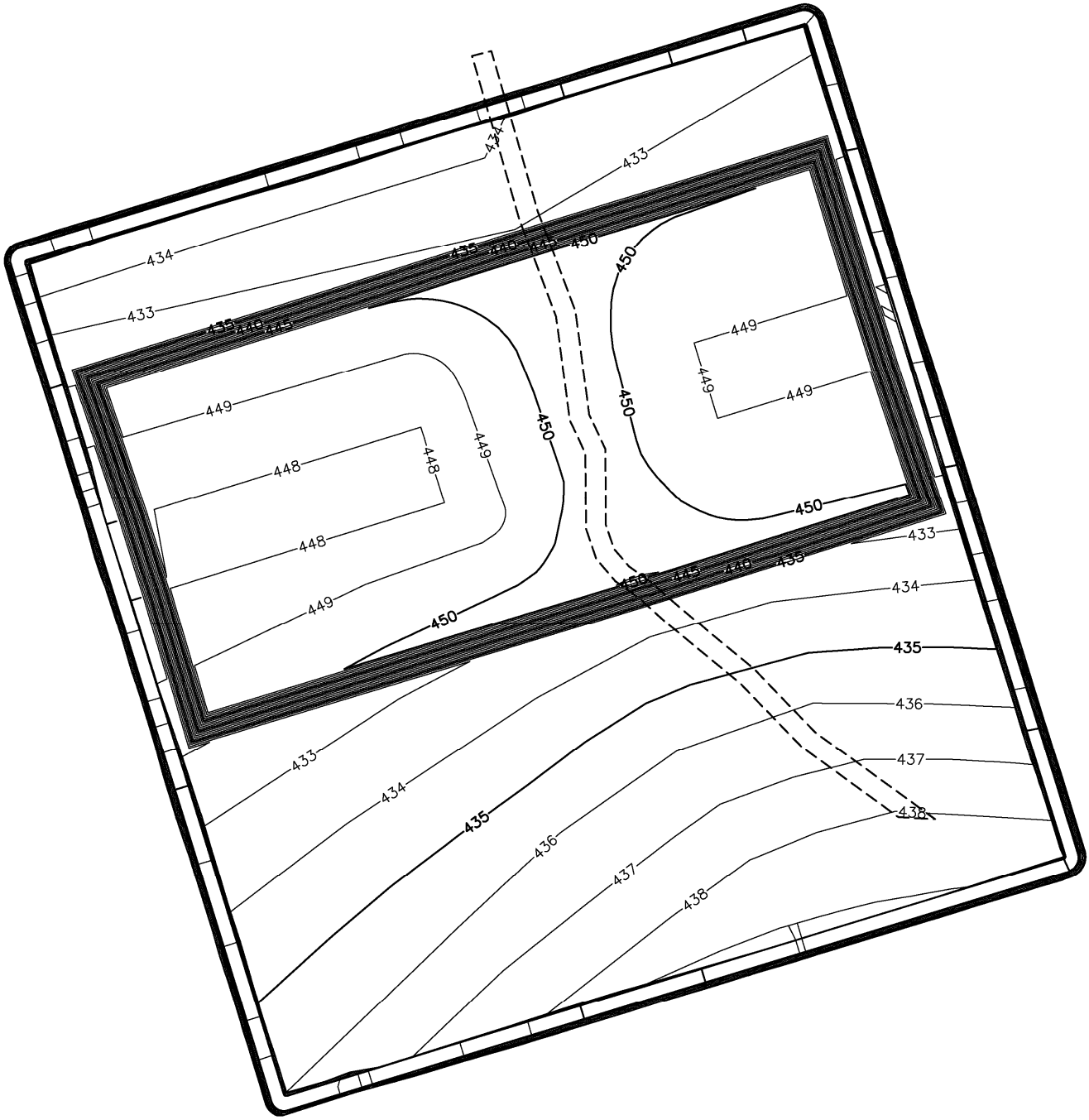


Figure 7. SCA Pre-Settlement Potential Top of Geo-tube Year 1 Grading Plan

Written by: **Yiwen Cao** Date: **6/10/2009** Reviewed by: **R. Kulasingam/Jay Beech** Date: **6/10/2009**

Client: **Honeywell** Project: **Onondaga Lake SCA IDS** Project/ Proposal No.: **GJ4299** Task No.: **04**

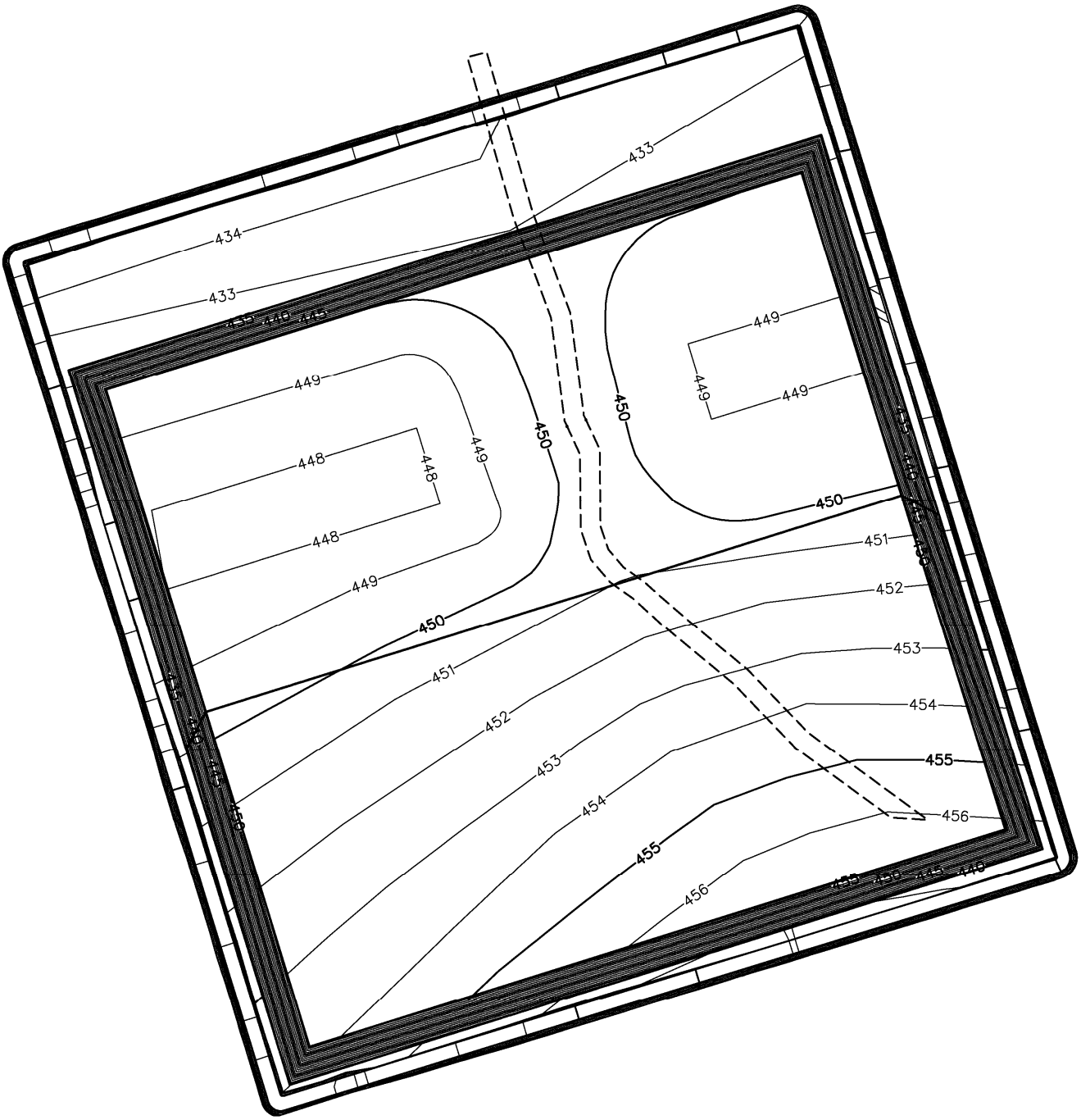


Figure 8. SCA Pre-Settlement Potential Top of Geo-tube Year 2 Grading Plan

Written by:	Yiwen Cao	Date:	6/10/2009	Reviewed by:	R. Kulasingam/Jay Beech	Date:	6/10/2009

Client:	Honeywell	Project:	Onondaga Lake SCA IDS	Project/ Proposal No.:	GJ4299	Task No.:	04

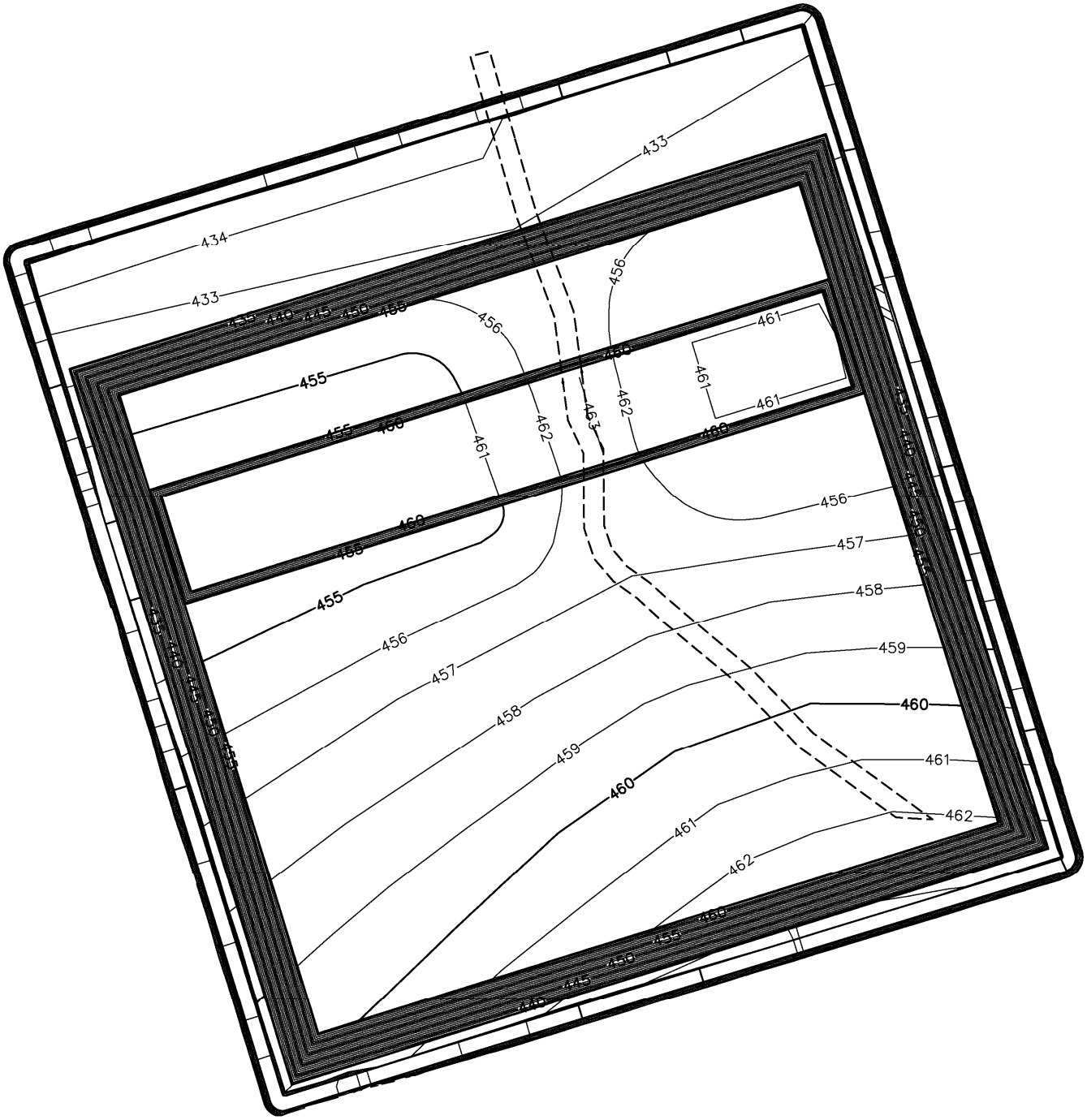


Figure 9. SCA Pre-Settlement Potential Top of Geo-tube Year 3 Grading Plan

Written by:	Yiwen Cao	Date:	6/10/2009	Reviewed by:	R. Kulasingam/Jay Beech	Date:	6/10/2009

Client:	Honeywell	Project:	Onondaga Lake SCA IDS	Project/ Proposal No.:	GJ4299	Task No.:	04

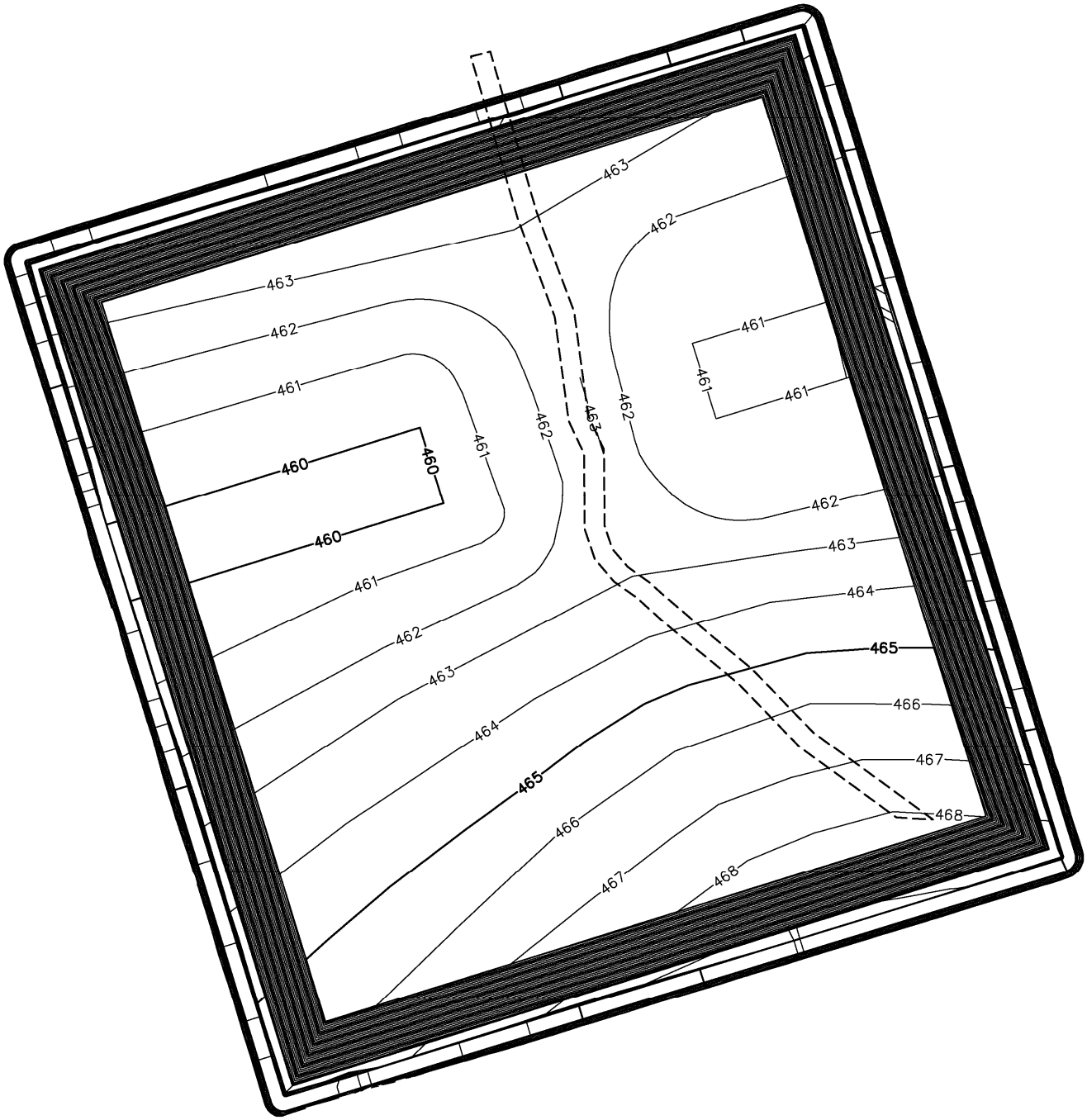


Figure 10. SCA Pre-Settlement Potential Top of Geo-tube Year 4 Grading Plan

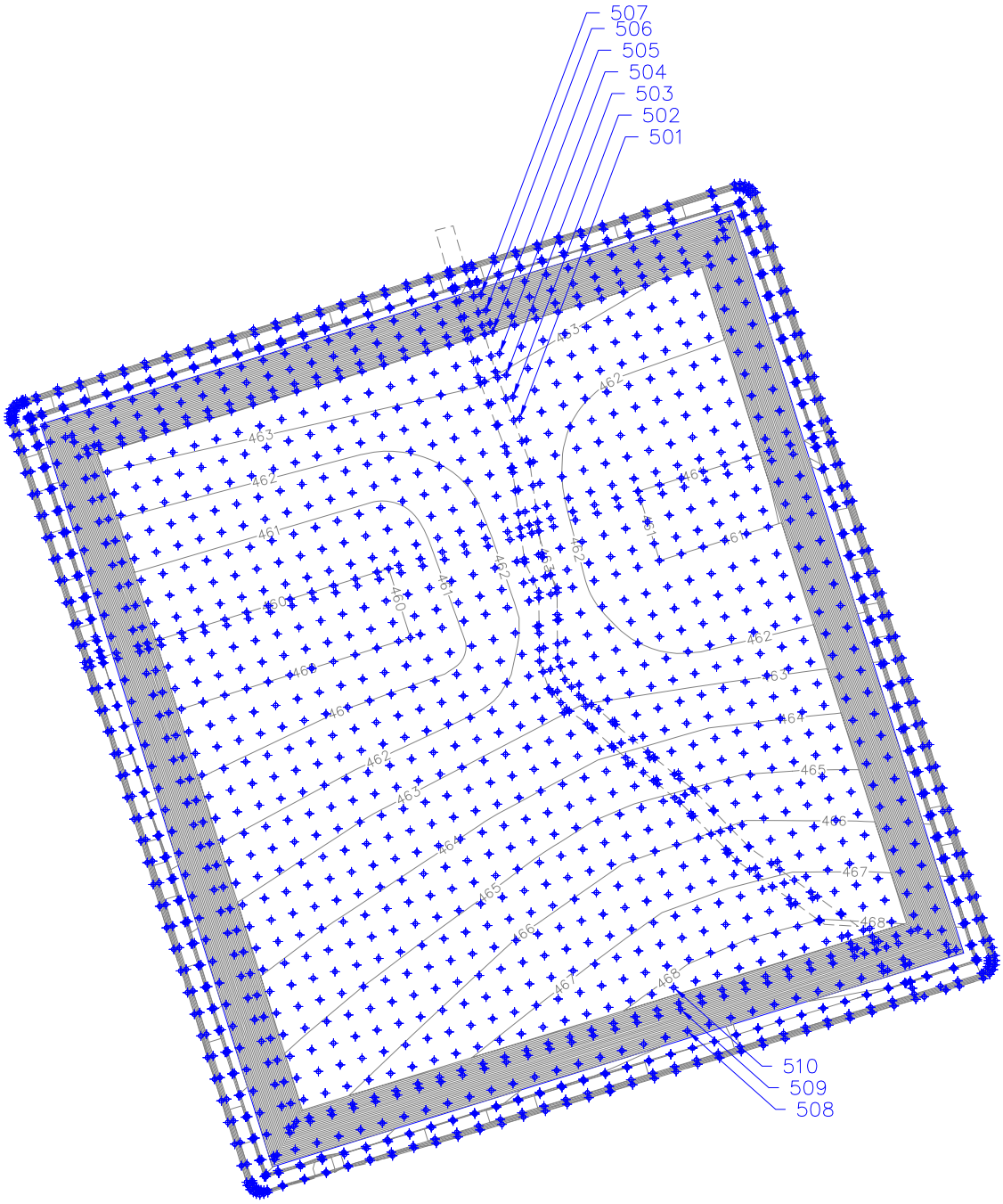


Figure 11. Settlement Calculation Points Shown on Top of Potential Geo-tube Year 4 Grading Plan

Written by:	Yiwen Cao	Date:	6/10/2009	Reviewed by:	R. Kulasingam/Jay Beech	Date:	6/10/2009

Client:	Honeywell	Project:	Onondaga Lake SCA IDS	Project/ Proposal No.:	GJ4299	Task No.:	04

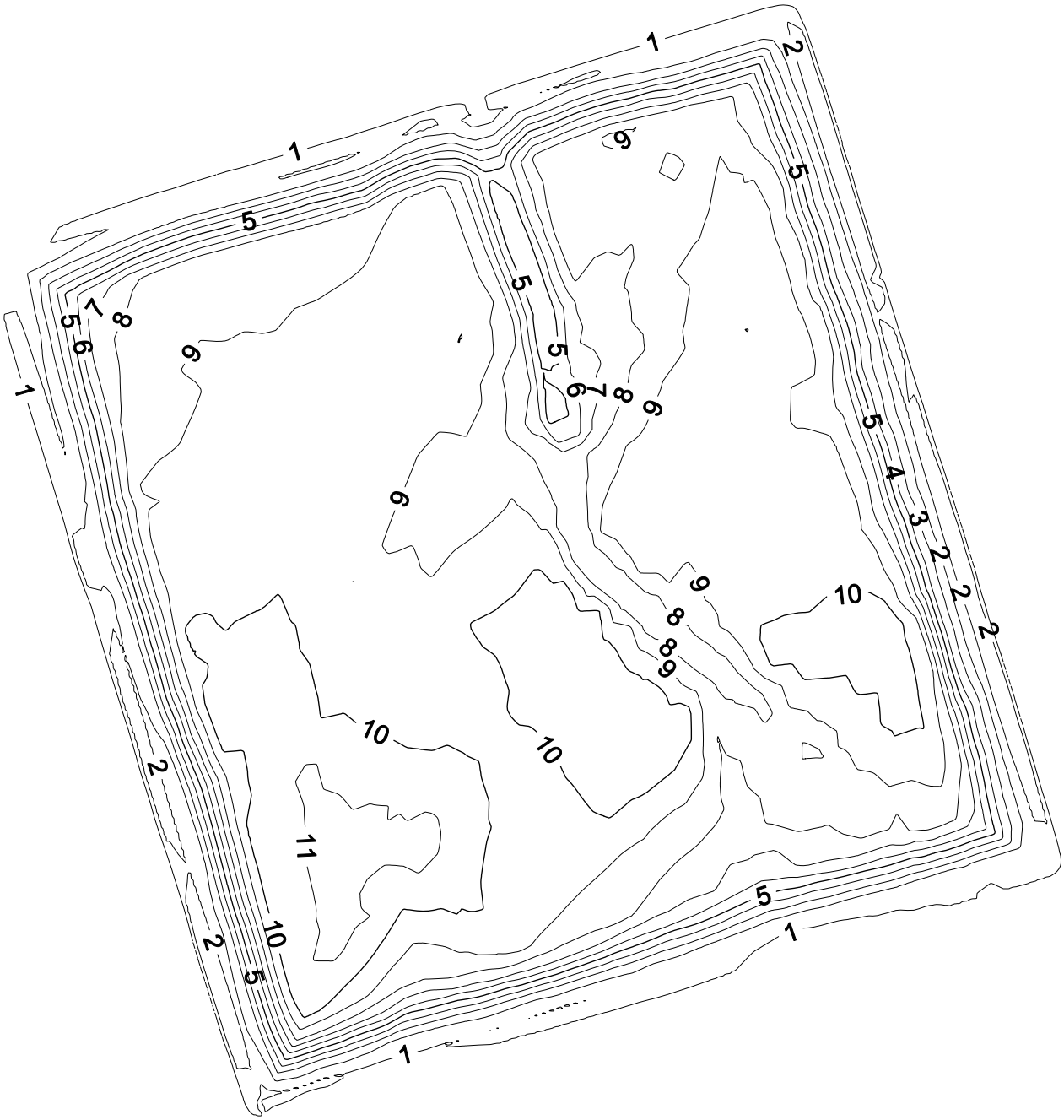


Figure 12. CASE 1: Top of LPSL Settlement from beginning of Year 1 to End of Year 4

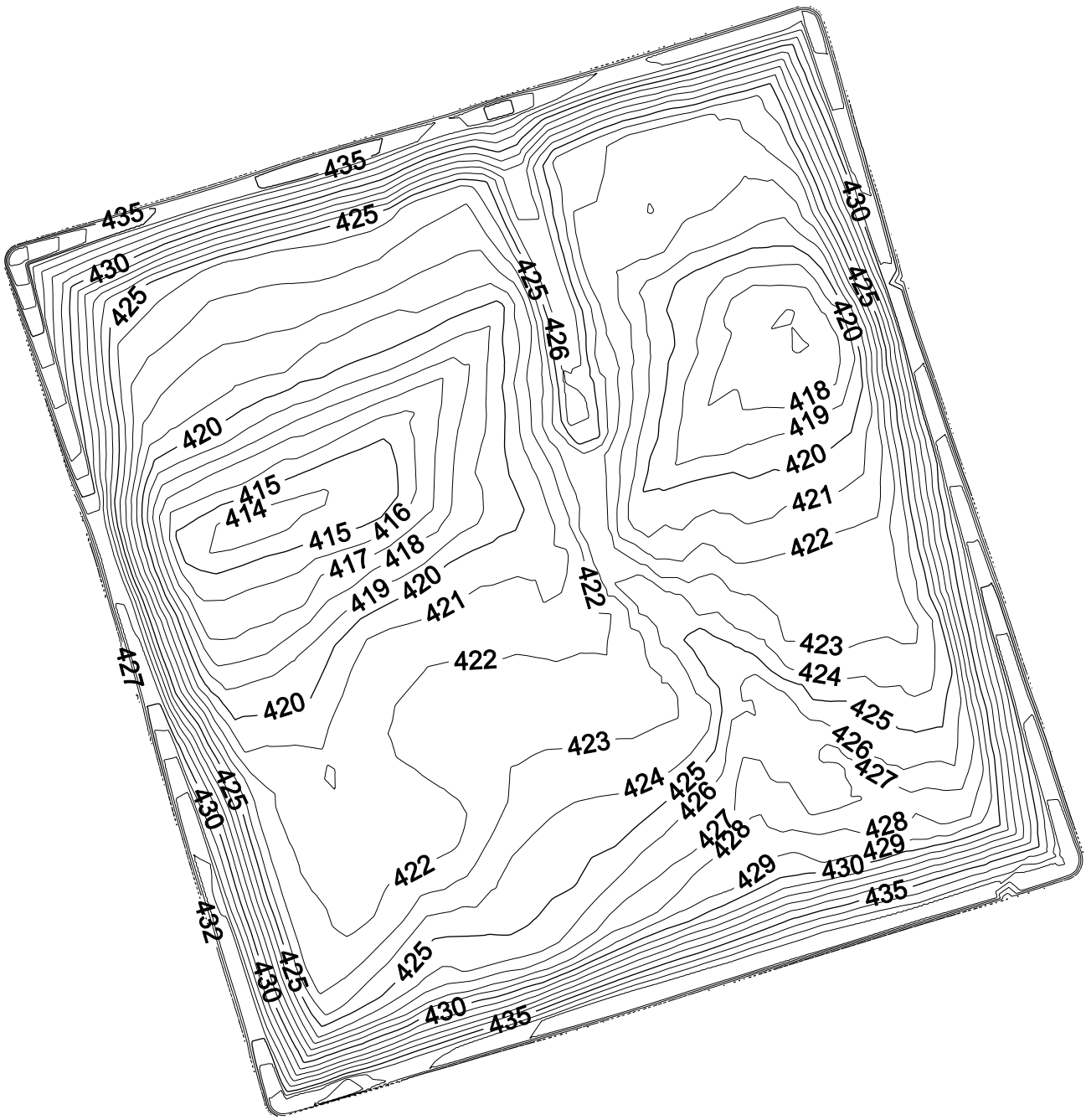


Figure 13. CASE 1: Top of LPSL Post-Settlement Elevation at the End of Year 4

Written by:	Yiwen Cao	Date:	6/10/2009	Reviewed by:	R. Kulasingam/Jay Beech	Date:	6/10/2009
Client:	Honeywell	Project:	Onondaga Lake SCA IDS	Project/ Proposal No.:	GJ4299	Task No.:	04

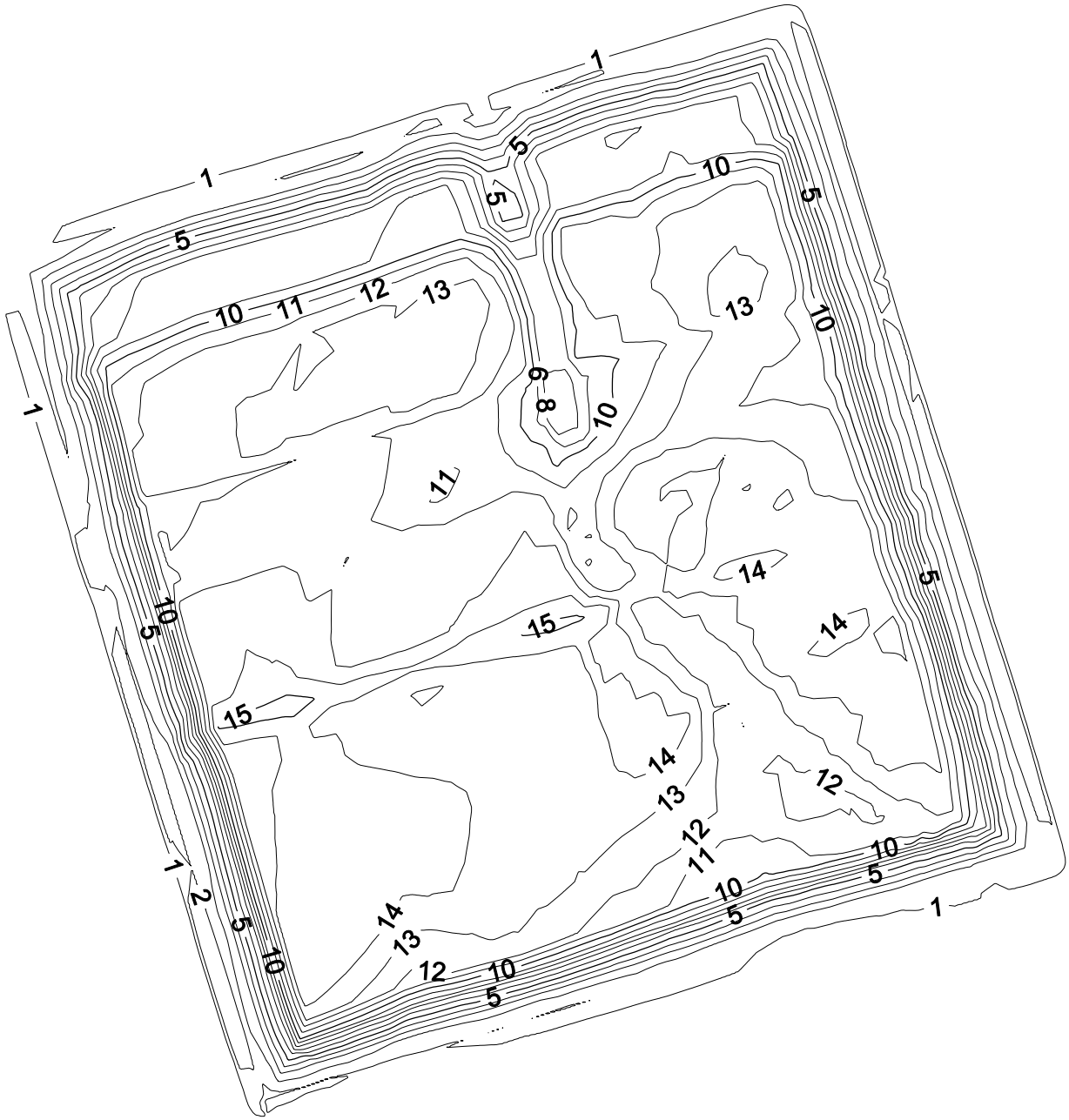


Figure 14. CASE 2: Top of Dredge Material in Geo-tubes Settlement from beginning of Year 1 to End of Year 4

Written by:	Yiwen Cao	Date:	6/10/2009	Reviewed by:	R. Kulasingam/Jay Beech	Date:	6/10/2009

Client:	Honeywell	Project:	Onondaga Lake SCA IDS	Project/ Proposal No.:	GJ4299	Task No.:	04

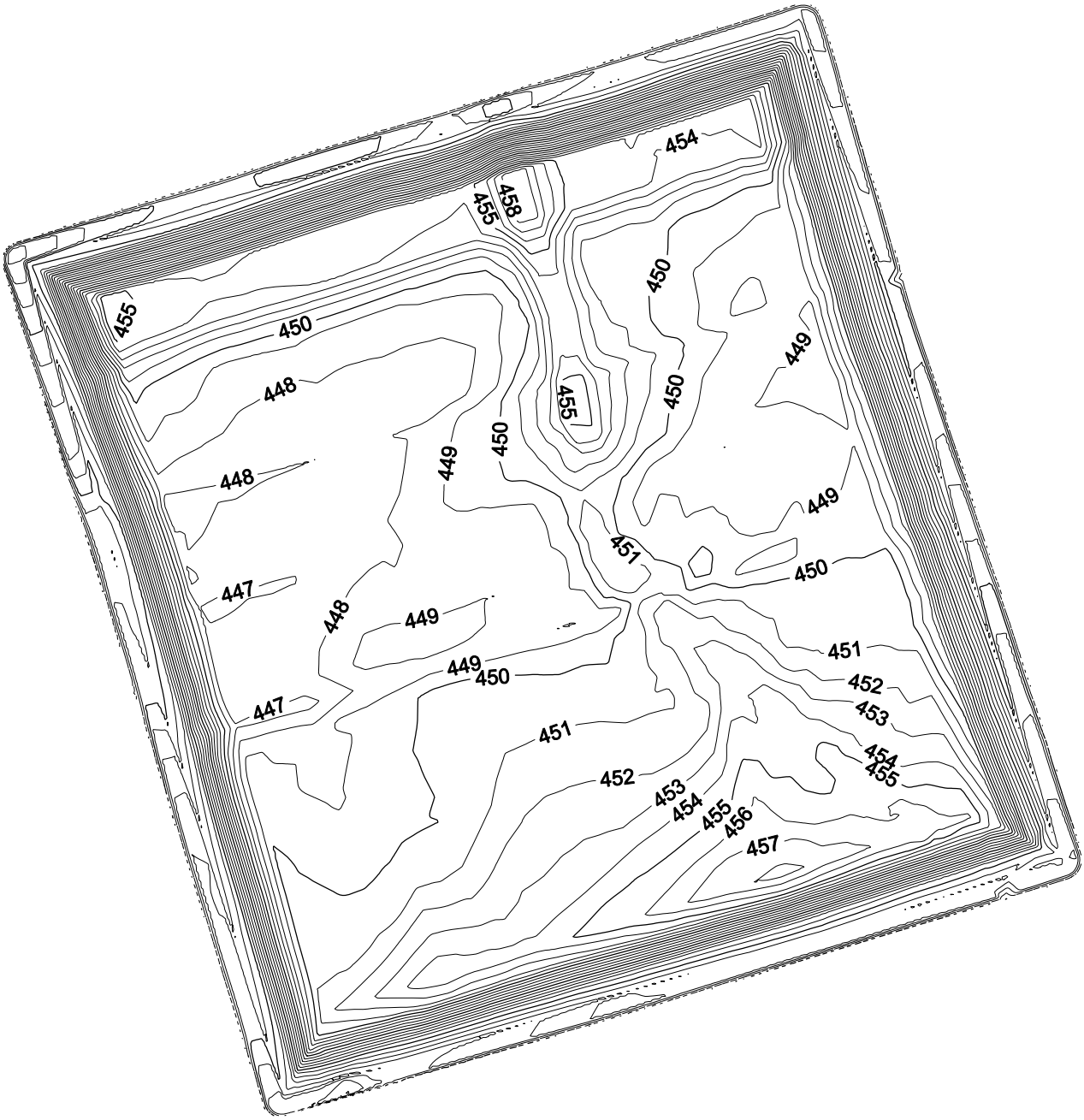


Figure 15. CASE 2: Top of Dredge Material in Geo-tubes Post-Settlement Elevation at the End of Year 4

Written by:	Yiwen Cao	Date:	6/10/2009	Reviewed by:	R. Kulasingam/Jay Beech	Date:	6/10/2009

Client:	Honeywell	Project:	Onondaga Lake SCA IDS	Project/ Proposal No.:	GJ4299	Task No.:	04

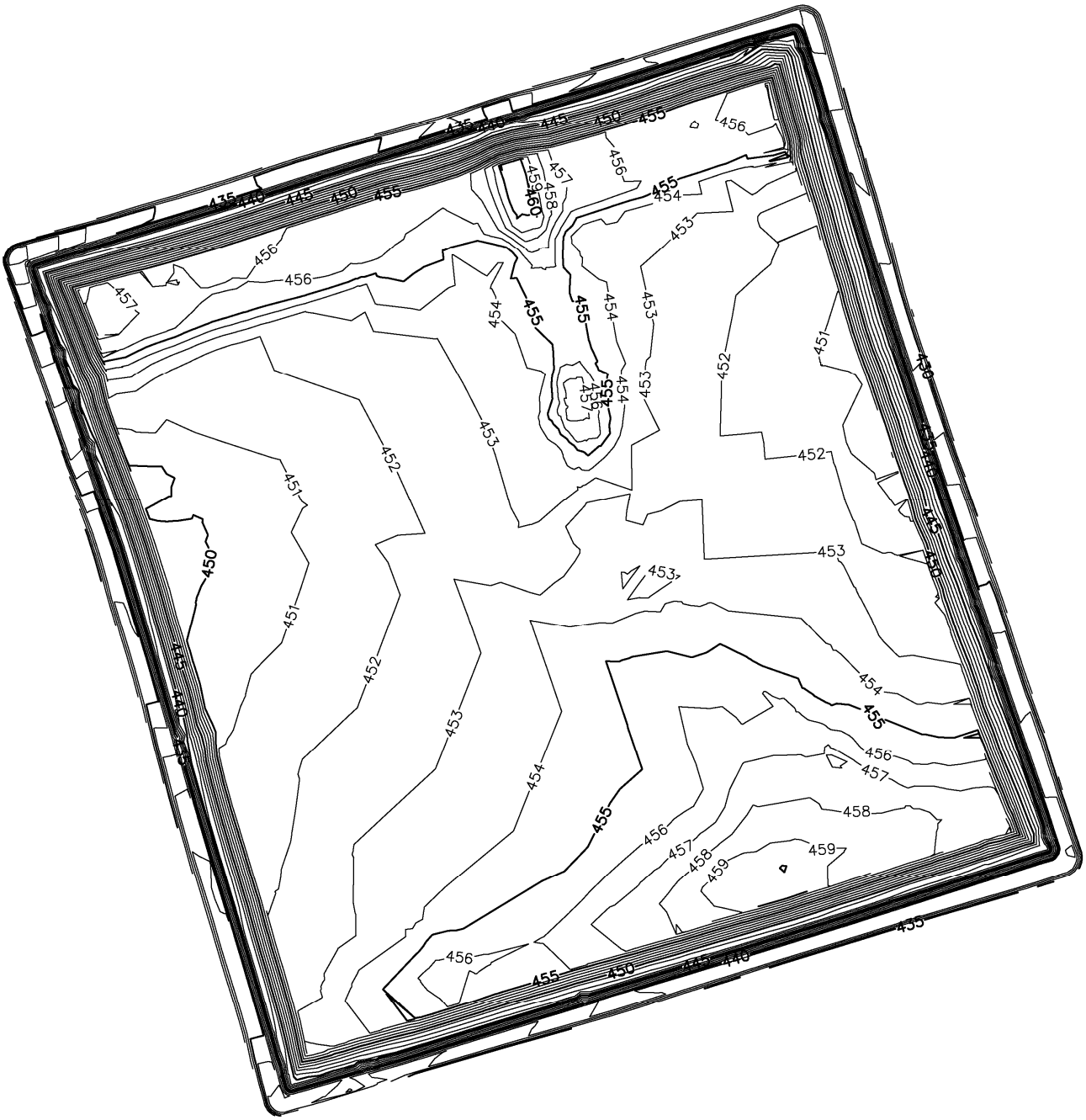


Figure 16. Proposed Pre-settlement Final Cover System Grading Plan at Beginning of Year 5

Written by:	Yiwen Cao	Date:	6/10/2009	Reviewed by:	R. Kulasingam/Jay Beech	Date:	6/10/2009
Client:	Honeywell	Project:	Onondaga Lake SCA IDS	Project/ Proposal No.:	GJ4299	Task No.:	04

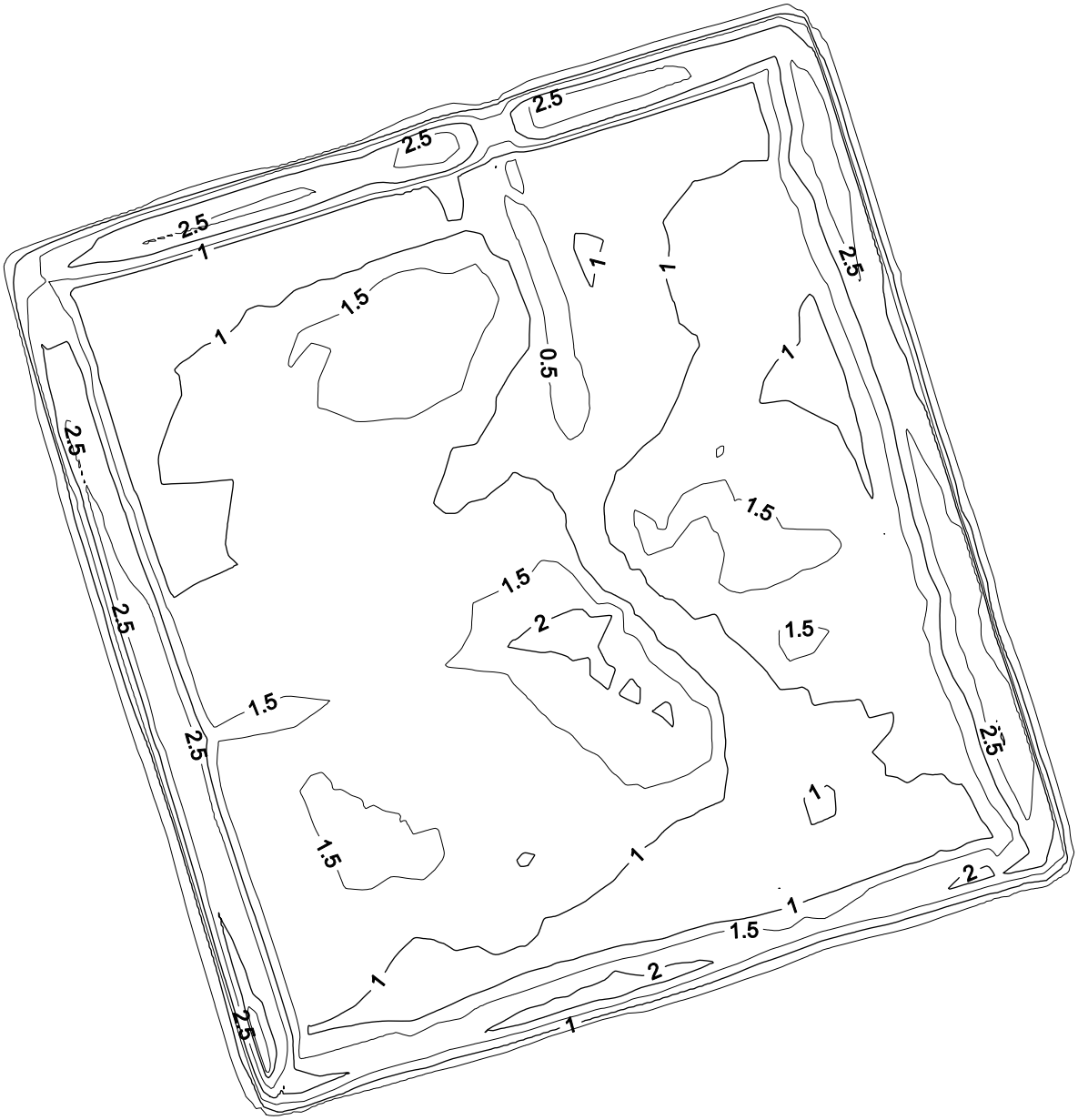


Figure 17. CASE 3: Top of LPSL Settlement from End of Year 4 to End of Year 35

Written by:	Yiwen Cao	Date:	6/10/2009	Reviewed by:	R. Kulasingam/Jay Beech	Date:	6/10/2009

Client:	Honeywell	Project:	Onondaga Lake SCA IDS	Project/ Proposal No.:	GJ4299	Task No.:	04

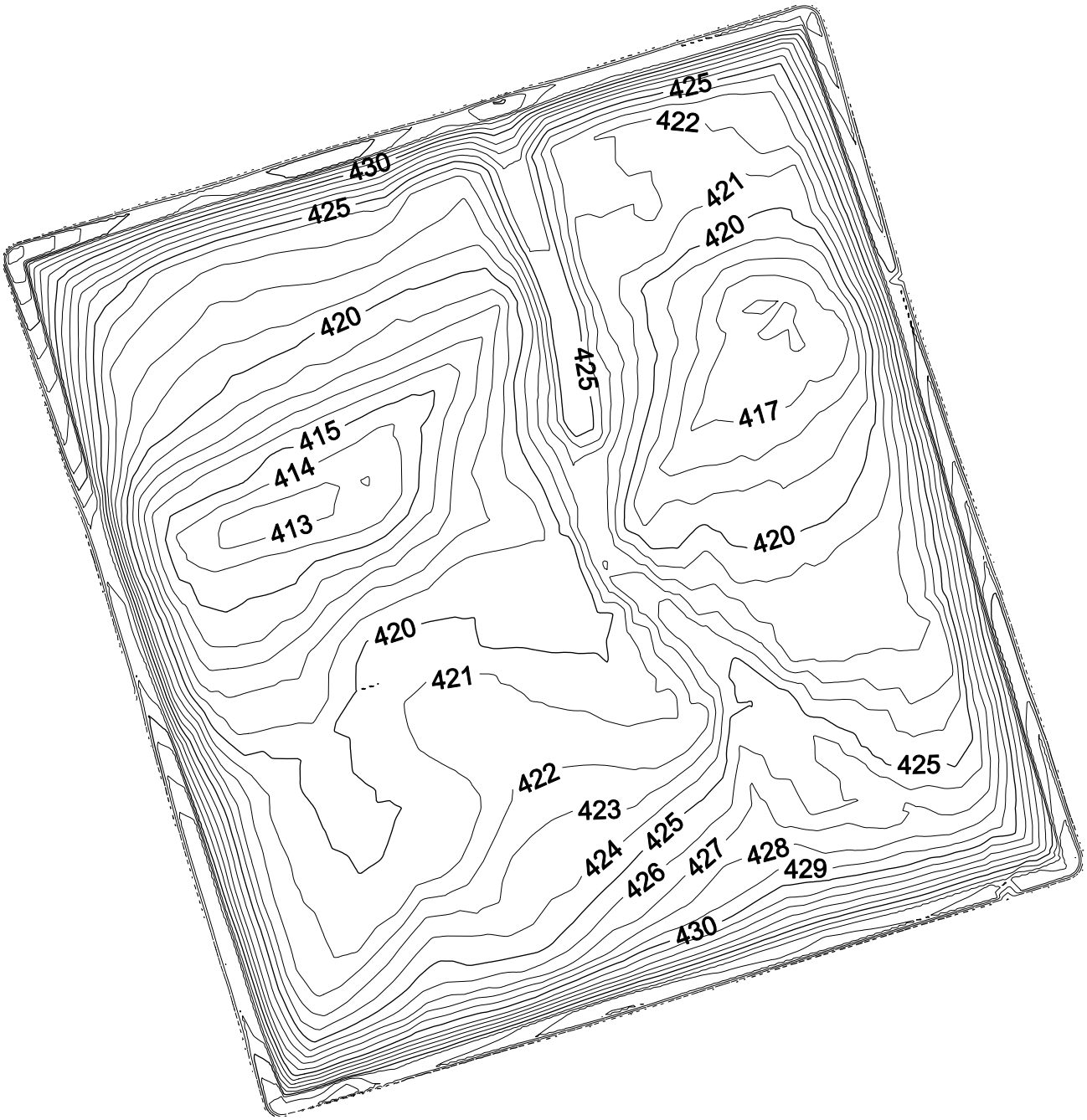


Figure 18. CASE 3: Top of LPSL Post-Settlement Elevations at End of Year 35

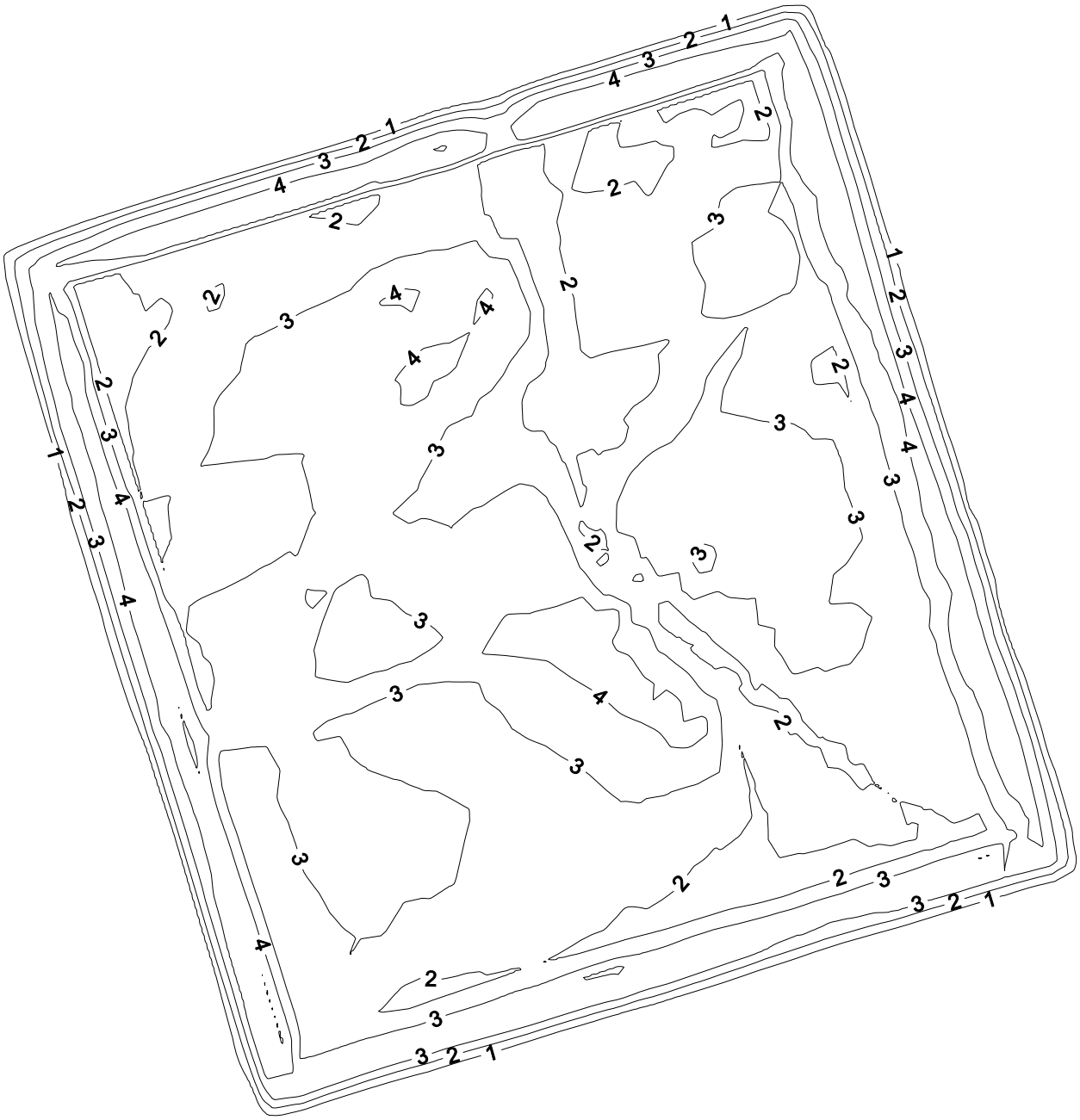


Figure 19. CASE 4: Top of Final Cover Settlement from End of Year 4 to End of Year 35

Written by:	Yiwen Cao	Date:	6/10/2009	Reviewed by:	R. Kulasingam/Jay Beech	Date:	6/10/2009

Client:	Honeywell	Project:	Onondaga Lake SCA IDS	Project/ Proposal No.:	GJ4299	Task No.:	04

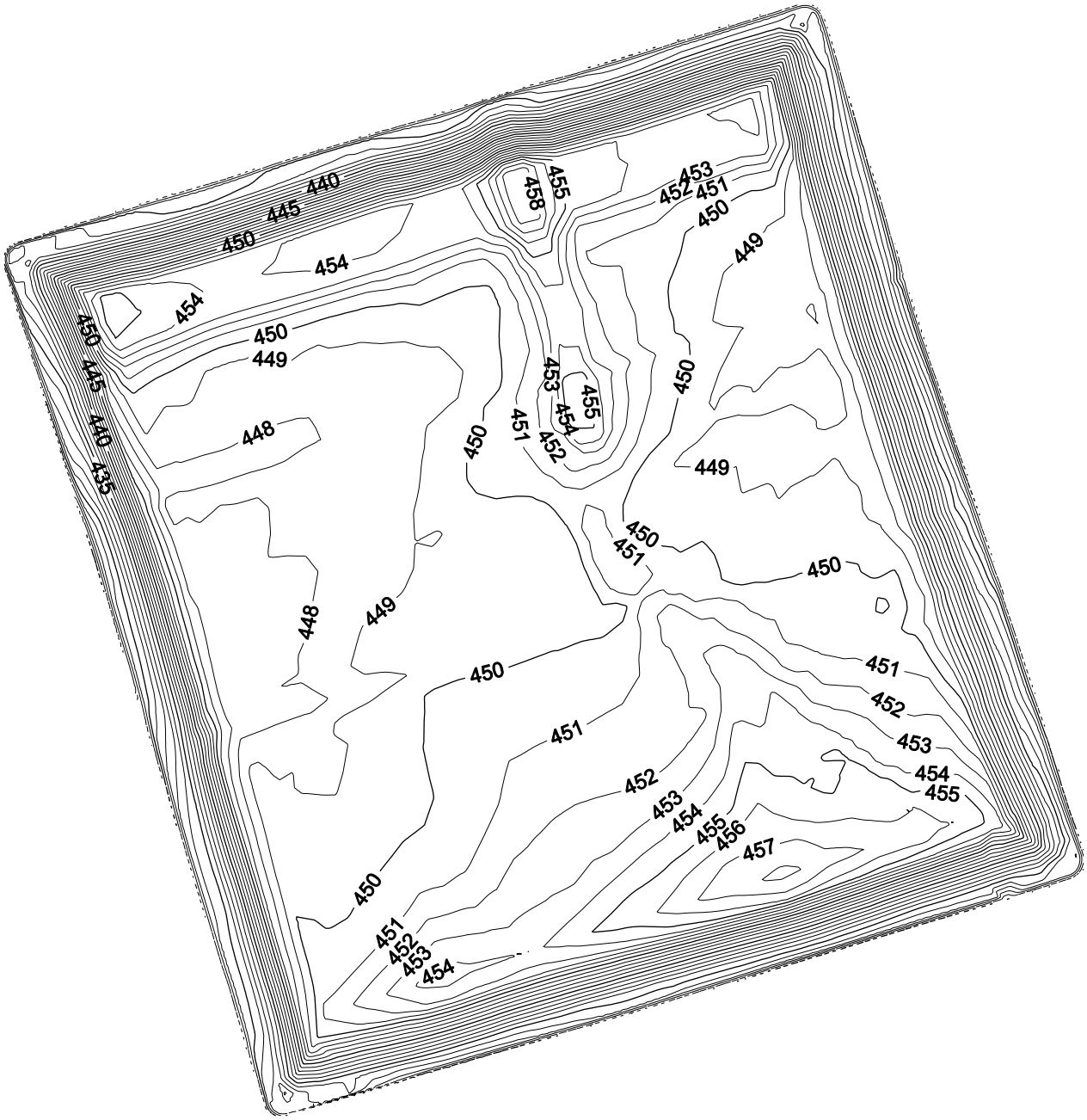


Figure 20. CASE 4: Top of Final Cover Post-Settlement Elevations at End of Year 35

Written by: **Yiwen Cao** Date: **6/10/2009** Reviewed by: **R. Kulasingam/Jay Beech** Date: **6/10/2009**

Client: **Honeywell** Project: **Onondaga Lake SCA IDS** Project/ Proposal No.: **GJ4299** Task No.: **04**

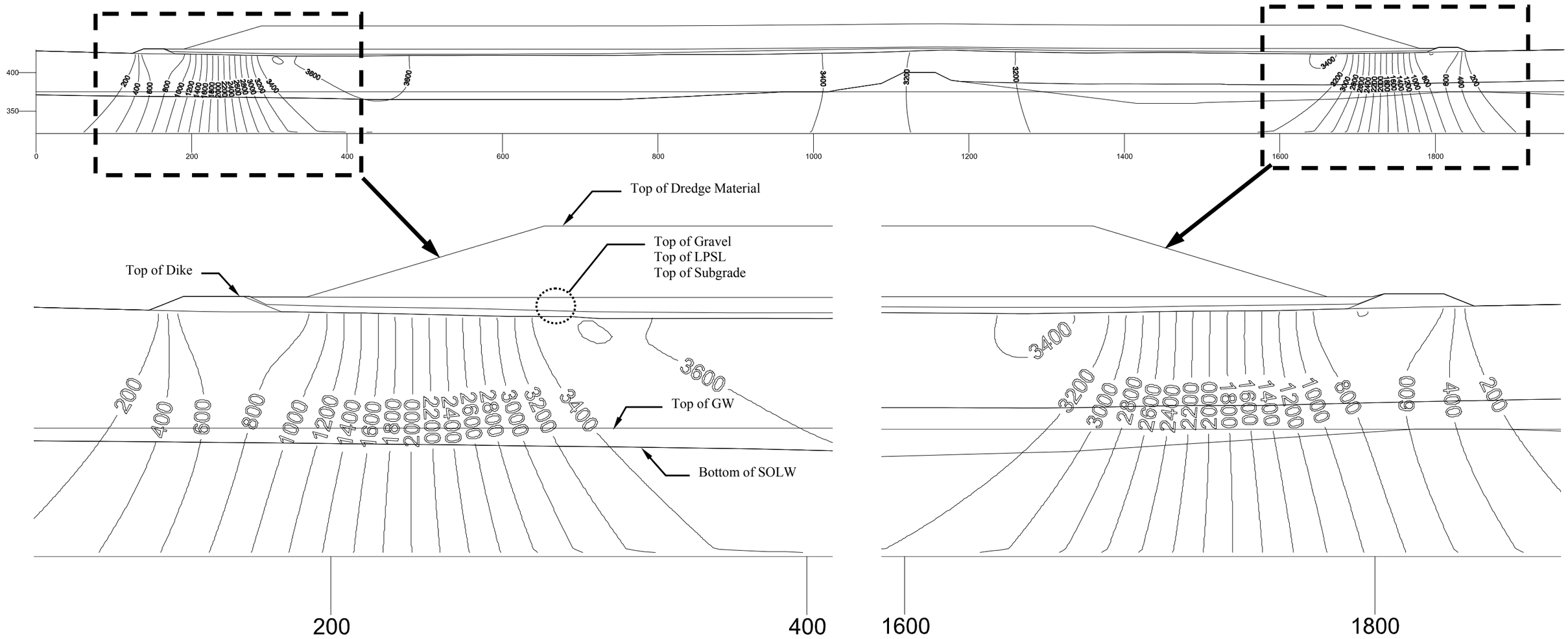


Figure 21. CASE 5: Stress Distribution of Geo-tubes, Liner, and Dike Loading along Cross Section A (units in psf)

Written by: **Yiwen Cao** Date: **6/10/2009** Reviewed by: **R. Kulasingam/Jay Beech** Date: **6/10/2009**

Client: **Honeywell** Project: **Onondaga Lake SCA IDS** Project/ Proposal No.: **GJ4299** Task No.: **04**

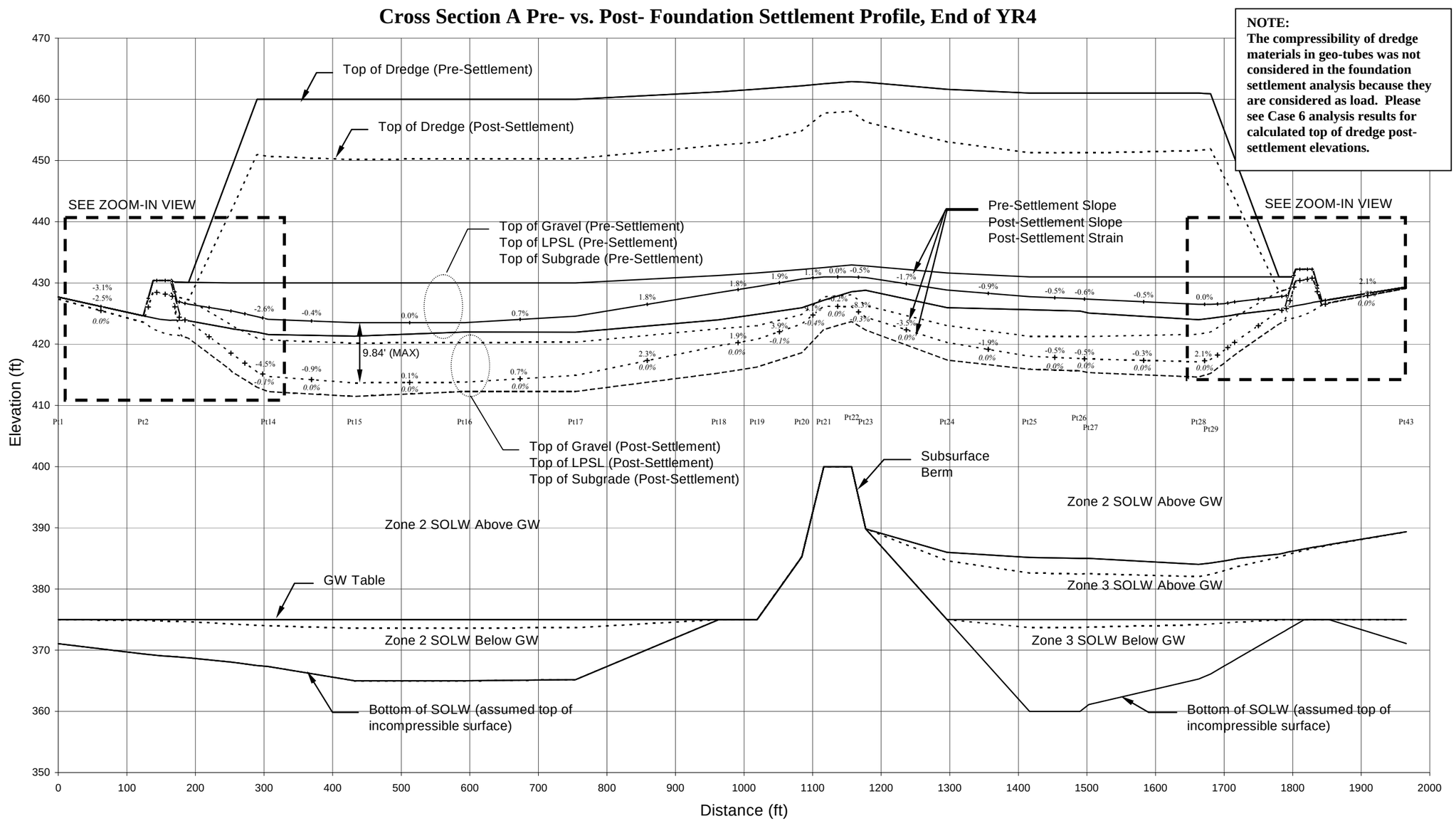


Figure 22. CASE 5: Foundation Settlement Analysis Result for Cross Section A (Overall View)

Written by: **Yiwen Cao** Date: **6/10/2009** Reviewed by: **R. Kulasingam/Jay Beech** Date: **6/10/2009**

Client: **Honeywell** Project: **Onondaga Lake SCA IDS** Project/ Proposal No.: **GJ4299** Task No.: **04**

Cross Section A Pre- vs. Post- Foundation Settlement Profile, End of YR4

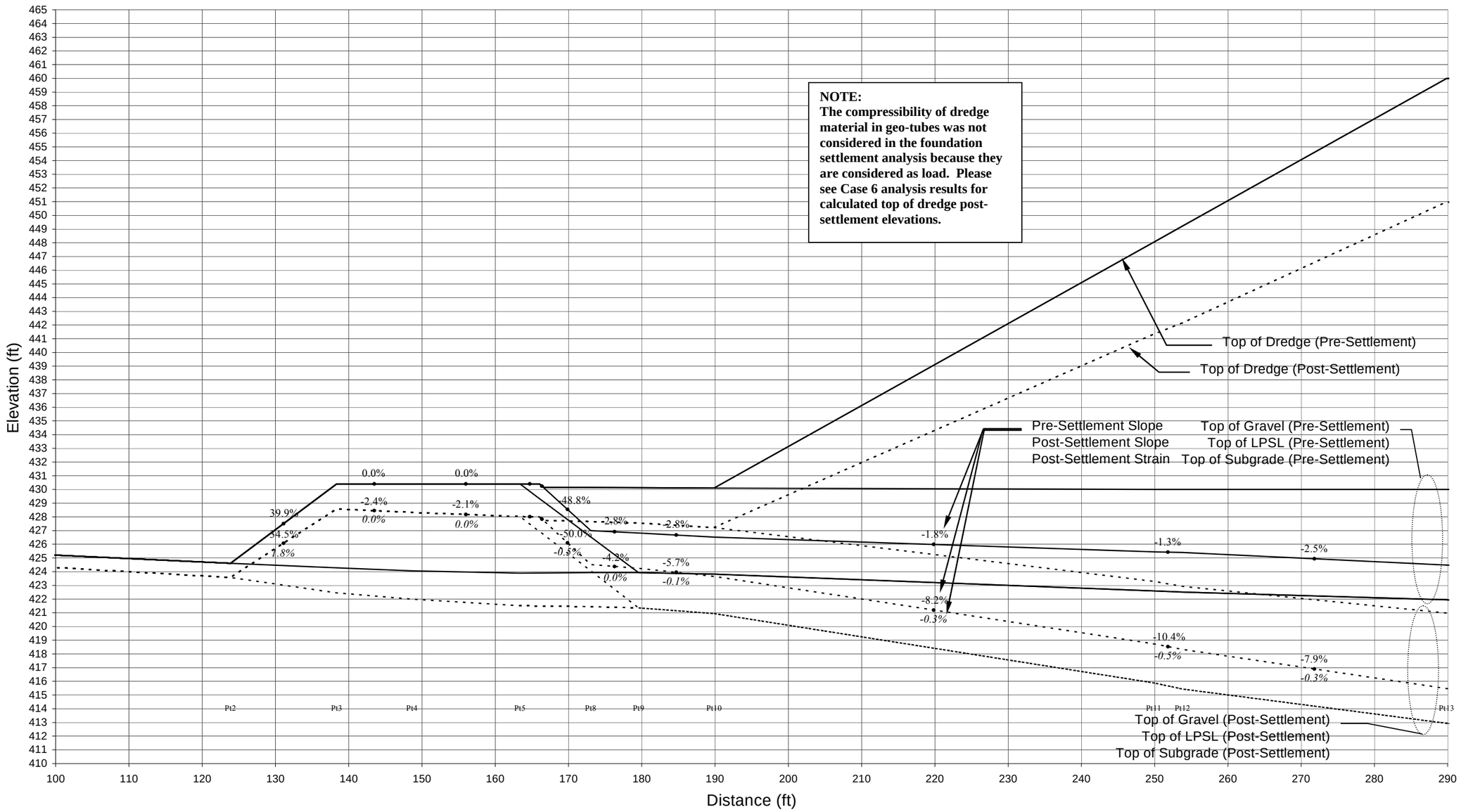


Figure 23. CASE 5: Foundation Settlement Analysis Result for Cross Section A (Zoom-in View, Left Berm)

Written by: **Yiwen Cao** Date: **6/10/2009** Reviewed by: **R. Kulasingam/Jay Beech** Date: **6/10/2009**

Client: **Honeywell** Project: **Onondaga Lake SCA IDS** Project/ Proposal No.: **GJ4299** Task No.: **04**

Cross Section A Pre- vs. Post- Foundation Settlement Profile, End of YR4

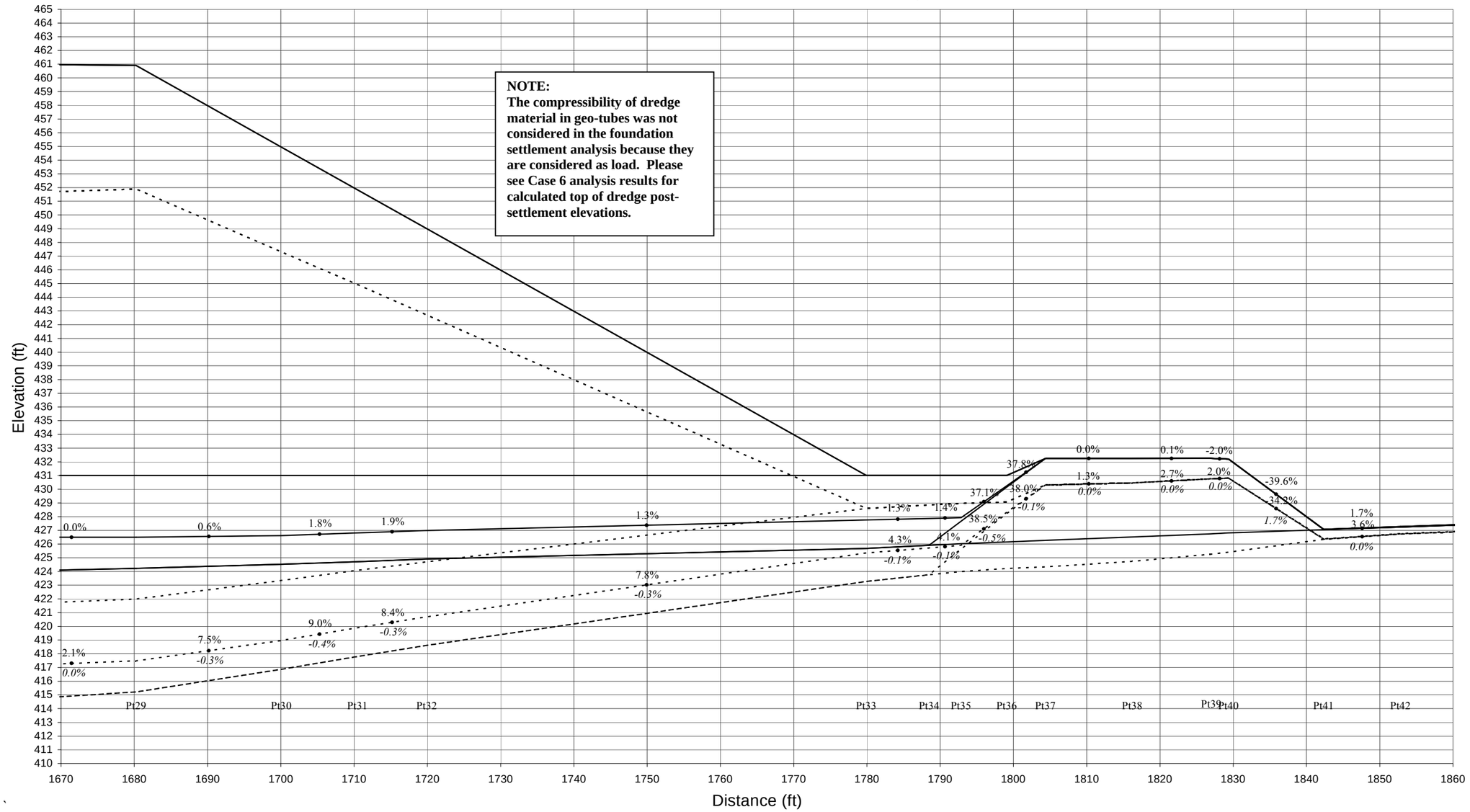


Figure 24. CASE 5: Foundation Settlement Analysis Result for Cross Section A (Zoom-in View, Right Berm)

Written by: **Yiwen Cao** Date: **6/10/2009** Reviewed by: **R. Kulasingam/Jay Beech** Date: **6/10/2009**

Client: **Honeywell** Project: **Onondaga Lake SCA IDS** Project/ Proposal No.: **GJ4299** Task No.: **04**

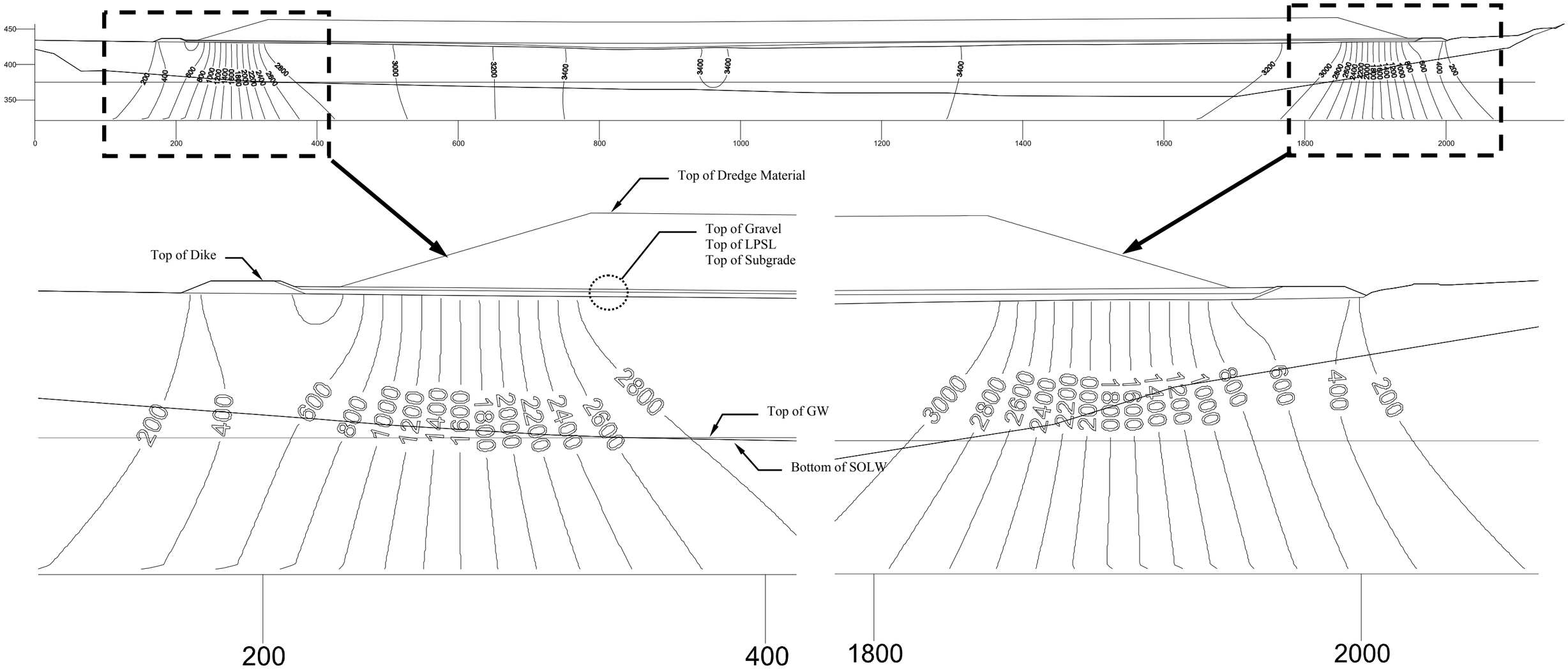


Figure 25. CASE 5: Stress Distribution of Geo-tube, Liner, and Dike Loading along Cross Section B (units in psf)

Written by: **Yiwen Cao** Date: **6/10/2009** Reviewed by: **R. Kulasingam/Jay Beech** Date: **6/10/2009**

Client: **Honeywell** Project: **Onondaga Lake SCA IDS** Project/ Proposal No.: **GJ4299** Task No.: **04**

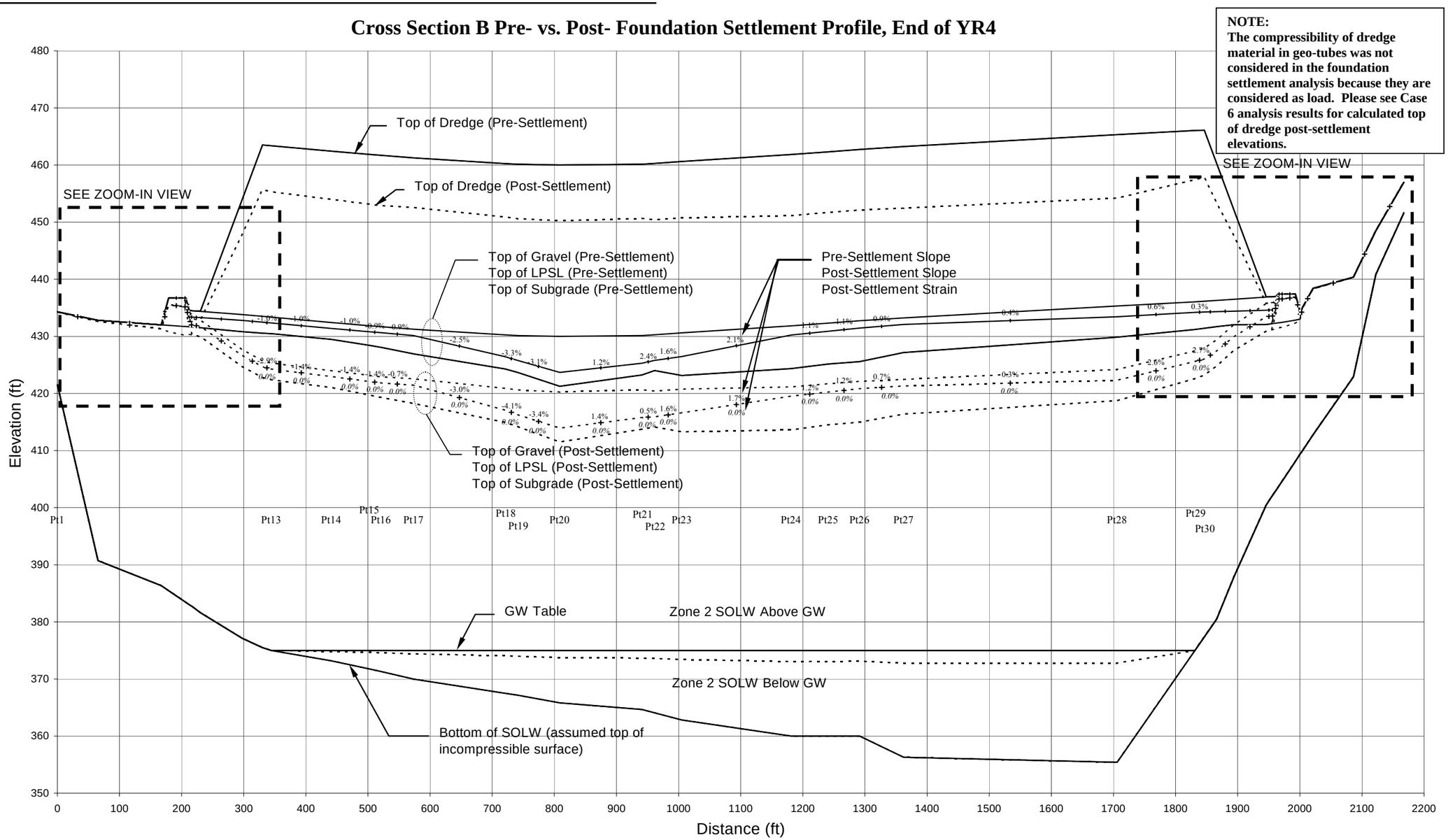


Figure 26. CASE 5: Foundation Settlement Analysis Result for Cross Section B (Overall View)

Written by: **Yiwen Cao** Date: **6/10/2009** Reviewed by: **R. Kulasingam/Jay Beech** Date: **6/10/2009**

Client: **Honeywell** Project: **Onondaga Lake SCA IDS** Project/ Proposal No.: **GJ4299** Task No.: **04**

Cross Section B Pre- vs. Post- Foundation Settlement Profile, End of YR4

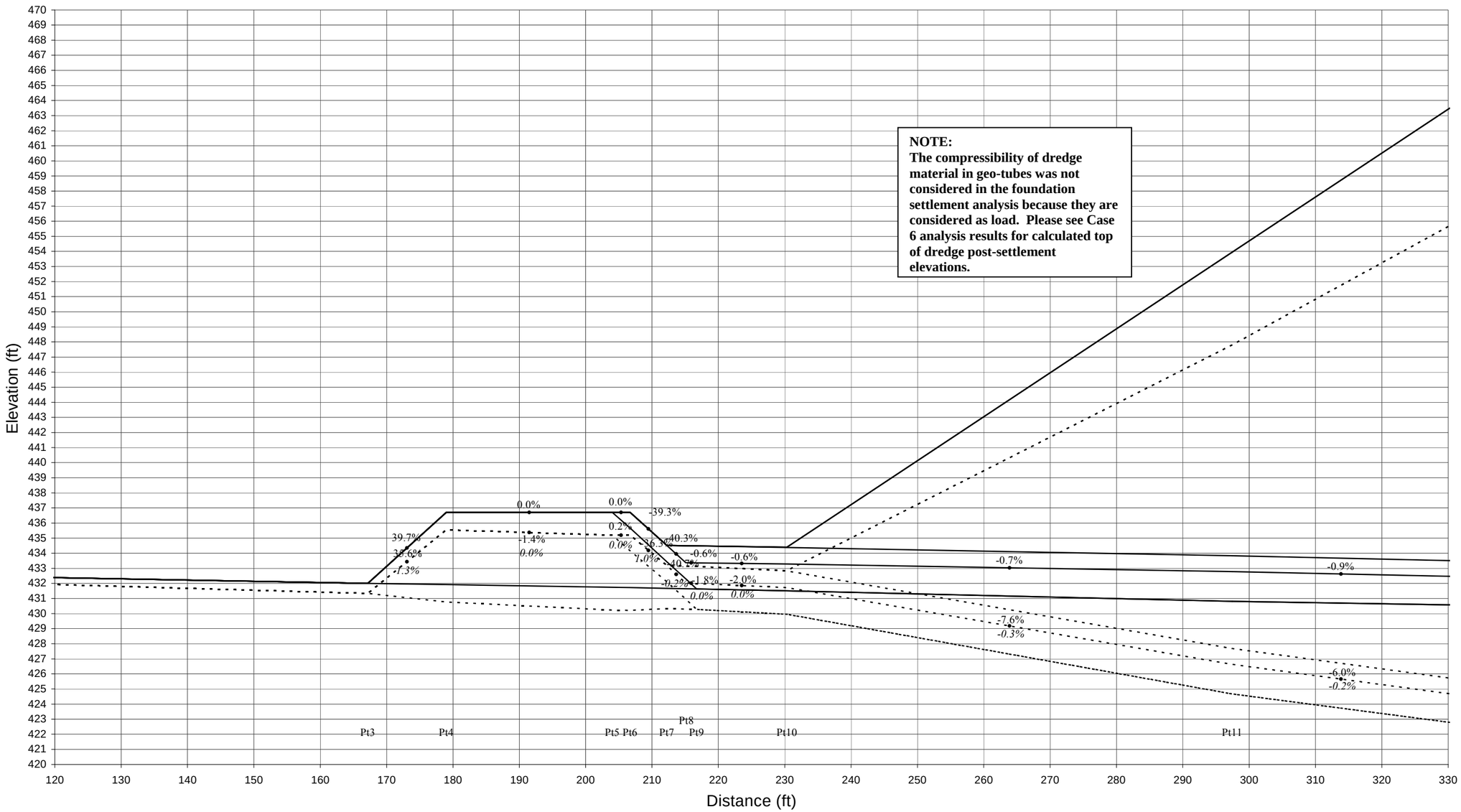


Figure 27. CASE 5: Foundation Settlement Analysis Result for Cross Section B (Zoom-in View, Left Berm)

Written by: **Yiwen Cao** Date: **6/10/2009** Reviewed by: **R. Kulasingam/Jay Beech** Date: **6/10/2009**

Client: **Honeywell** Project: **Onondaga Lake SCA IDS** Project/ Proposal No.: **GJ4299** Task No.: **04**

Cross Section B Pre- vs. Post- Foundation Settlement Profile, End of YR4

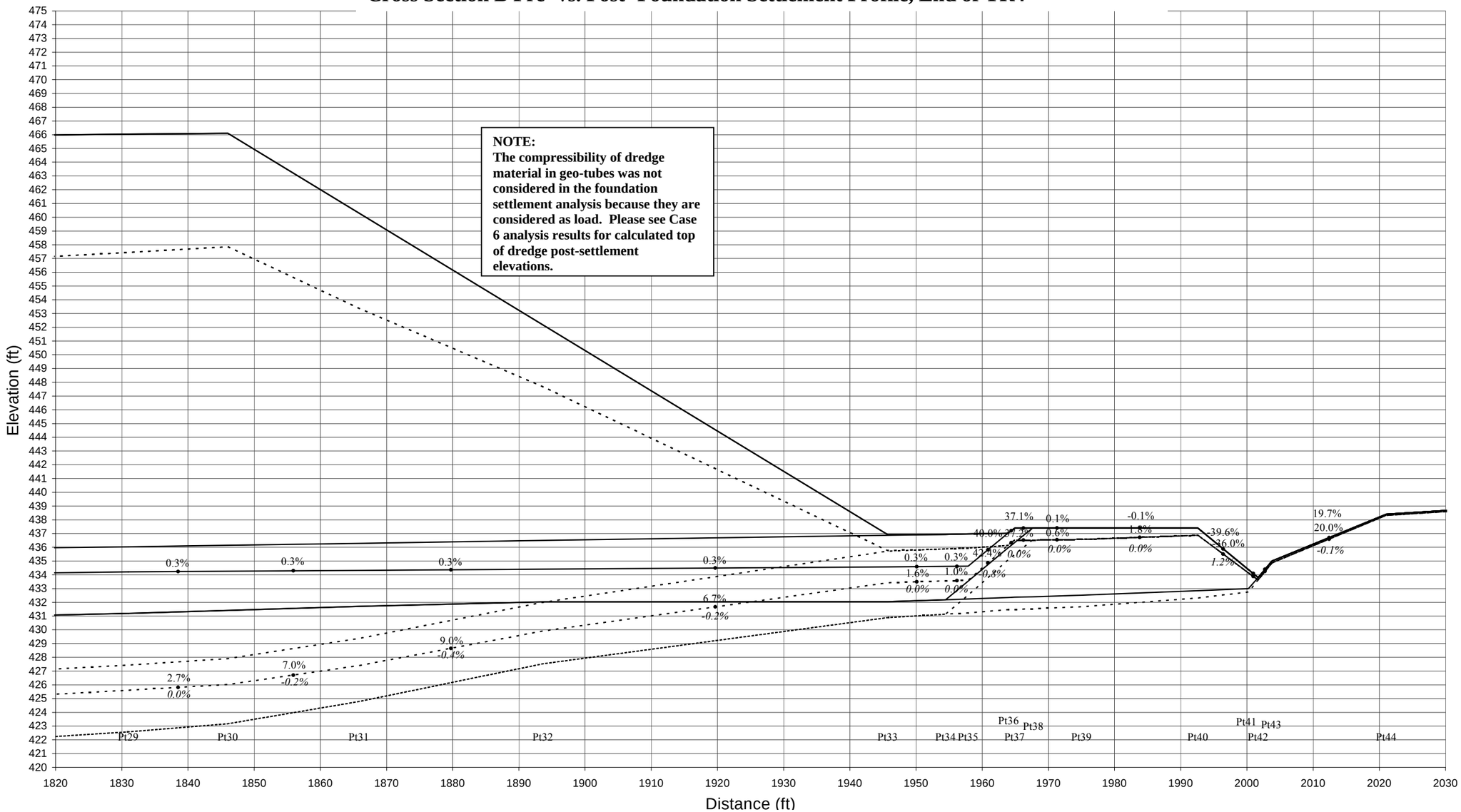


Figure 28. CASE 5: Foundation Settlement Analysis Result for Cross Section B (Zoom-in View, Right Berm)

Written by: **Yiwen Cao** Date: **6/10/2009** Reviewed by: **R. Kulasingam/Jay Beech** Date: **6/10/2009**

Client: **Honeywell** Project: **Onondaga Lake SCA IDS** Project/ Proposal No.: **GJ4299** Task No.: **04**

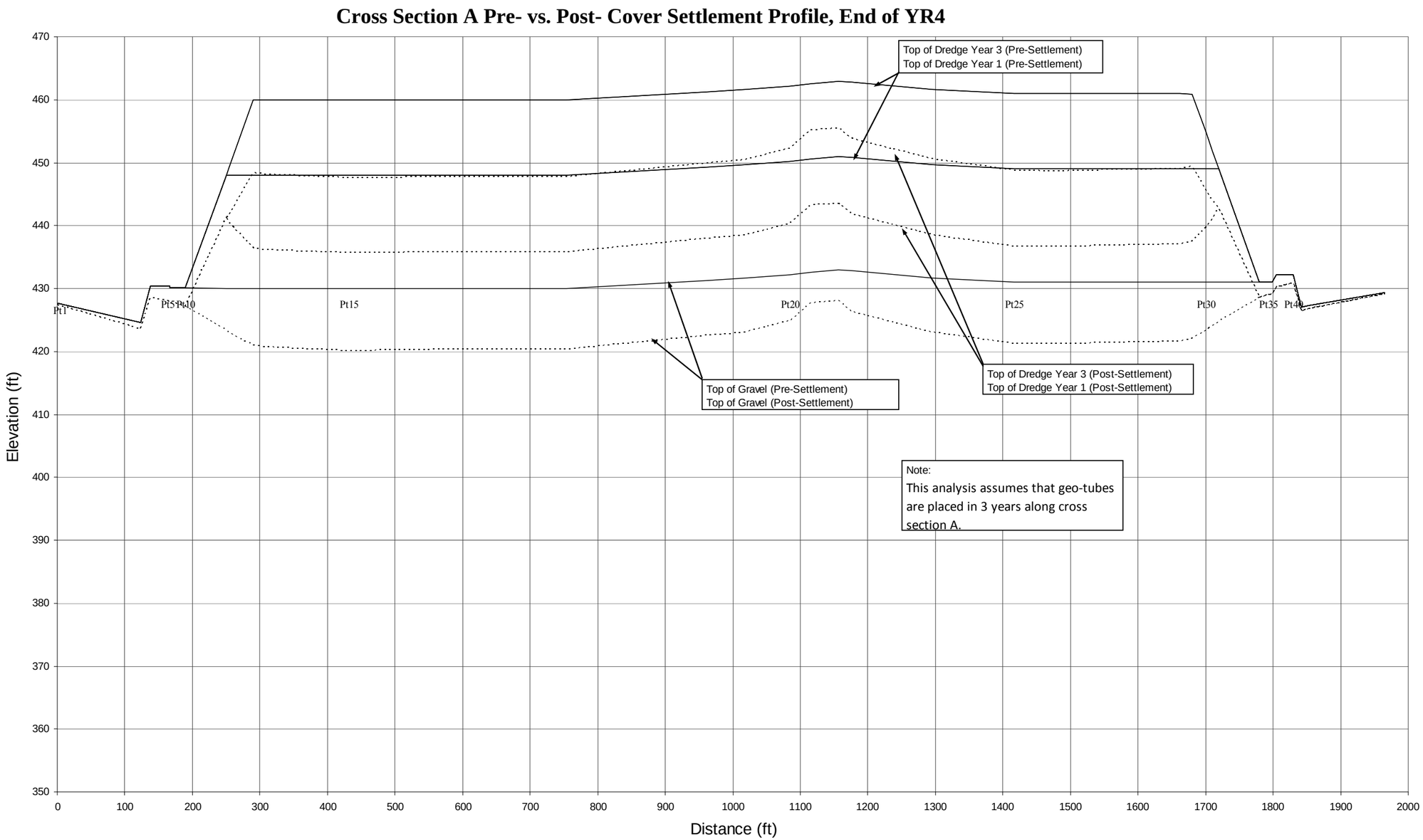


Figure 29. CASE 6: Cover Settlement Analysis Result for Cross Section A

Written by: **Yiwen Cao** Date: **6/10/2009** Reviewed by: **R. Kulasingam/Jay Beech** Date: **6/10/2009**

Client: **Honeywell** Project: **Onondaga Lake SCA IDS** Project/ Proposal No.: **GJ4299** Task No.: **04**

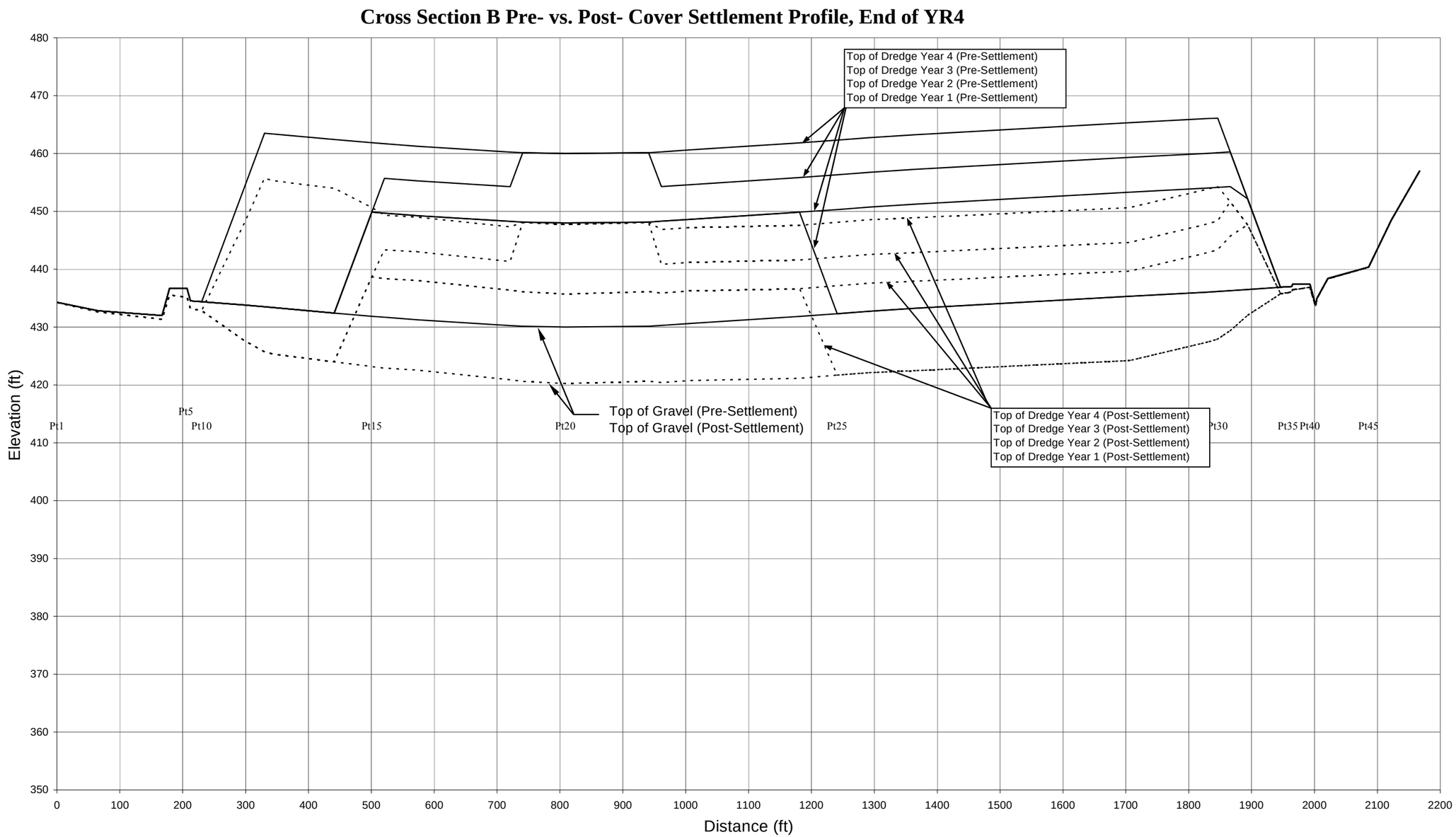


Figure 30. CASE 6: Cover Settlement Analysis Result for Cross Section B

Written by: **Yiwen Cao** Date: **6/10/2009** Reviewed by: **R. Kulasingam/Jay Beech** Date: **6/10/2009**

Client: **Honeywell** Project: **Onondaga Lake SCA IDS** Project/ Proposal No.: **GJ4299** Task No.: **04**

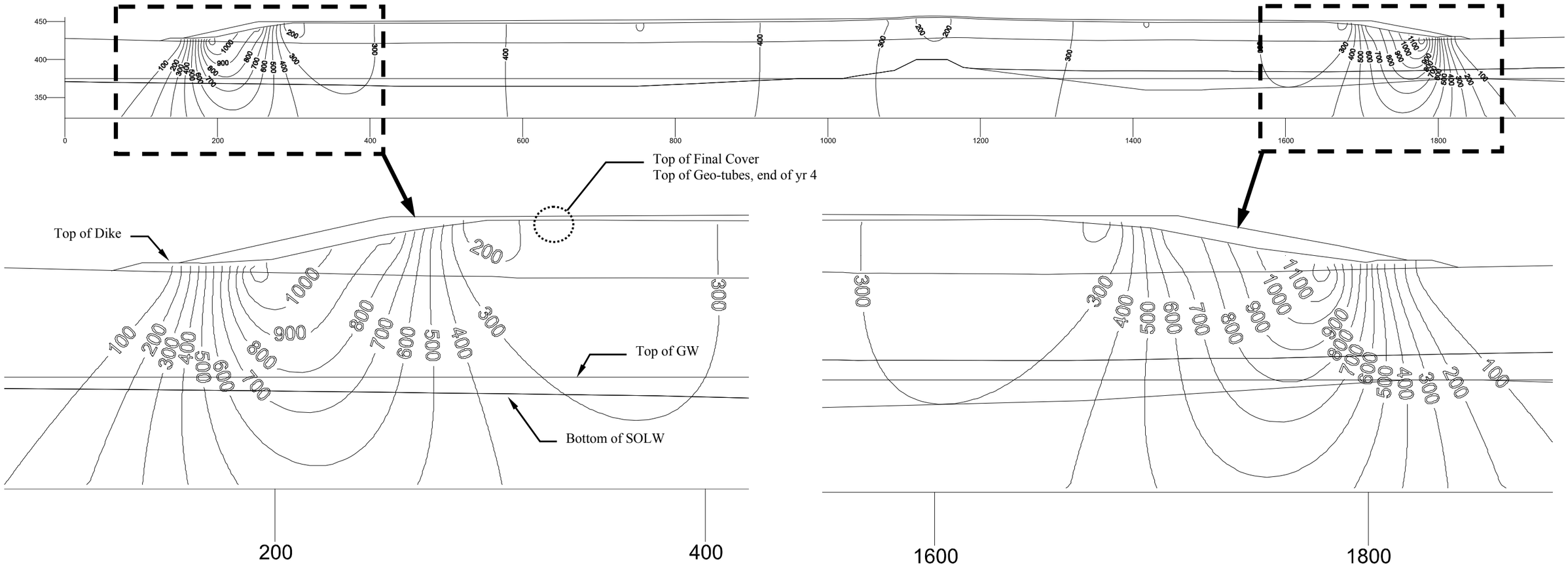


Figure 31. CASE 7: Stress Distribution of Proposed Final Cover Loading along Cross Section A (units in psf)

Written by: **Yiwen Cao** Date: **6/10/2009** Reviewed by: **R. Kulasingam/Jay Beech** Date: **6/10/2009**

Client: **Honeywell** Project: **Onondaga Lake SCA IDS** Project/ Proposal No.: **GJ4299** Task No.: **04**

Cross Section A Pre- vs. Post- Foundation Settlement Profile, End of YR35

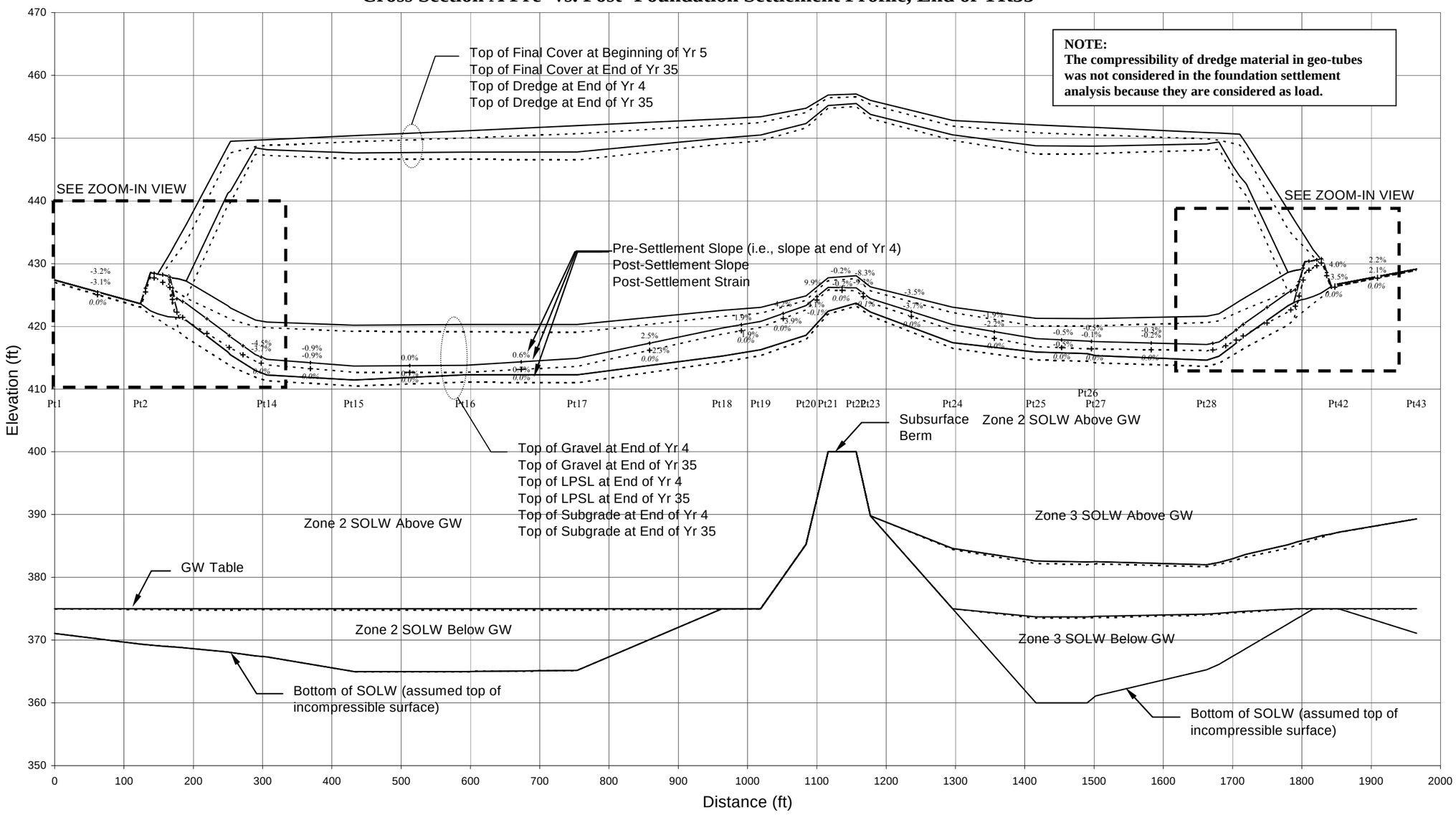


Figure 32. CASE 7: Foundation Settlement Analysis Result for Cross Section A (Overall View)

Written by: **Yiwen Cao** Date: **6/10/2009** Reviewed by: **R. Kulasingam/Jay Beech** Date: **6/10/2009**

Client: **Honeywell** Project: **Onondaga Lake SCA IDS** Project/ Proposal No.: **GJ4299** Task No.: **04**

Cross Section A Pre- vs. Post- Foundation Settlement Profile, End of YR35

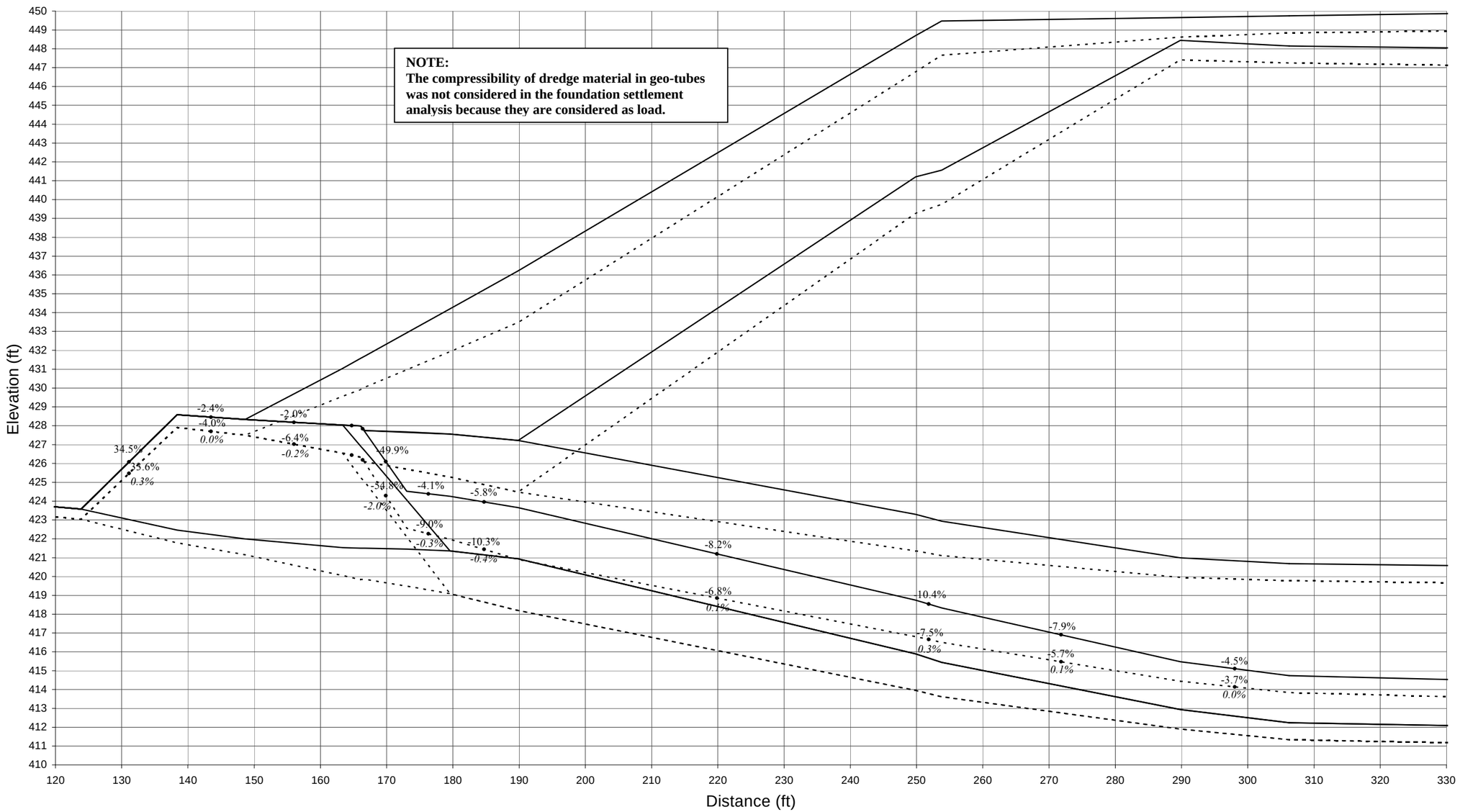


Figure 33. CASE 7: Foundation Settlement Analysis Result for Cross Section A (Left Berm)

Written by: **Yiwen Cao** Date: **6/10/2009** Reviewed by: **R. Kulasingam/Jay Beech** Date: **6/10/2009**

Client: **Honeywell** Project: **Onondaga Lake SCA IDS** Project/ Proposal No.: **GJ4299** Task No.: **04**

Cross Section A Pre- vs. Post- Foundation Settlement Profile, End of YR35

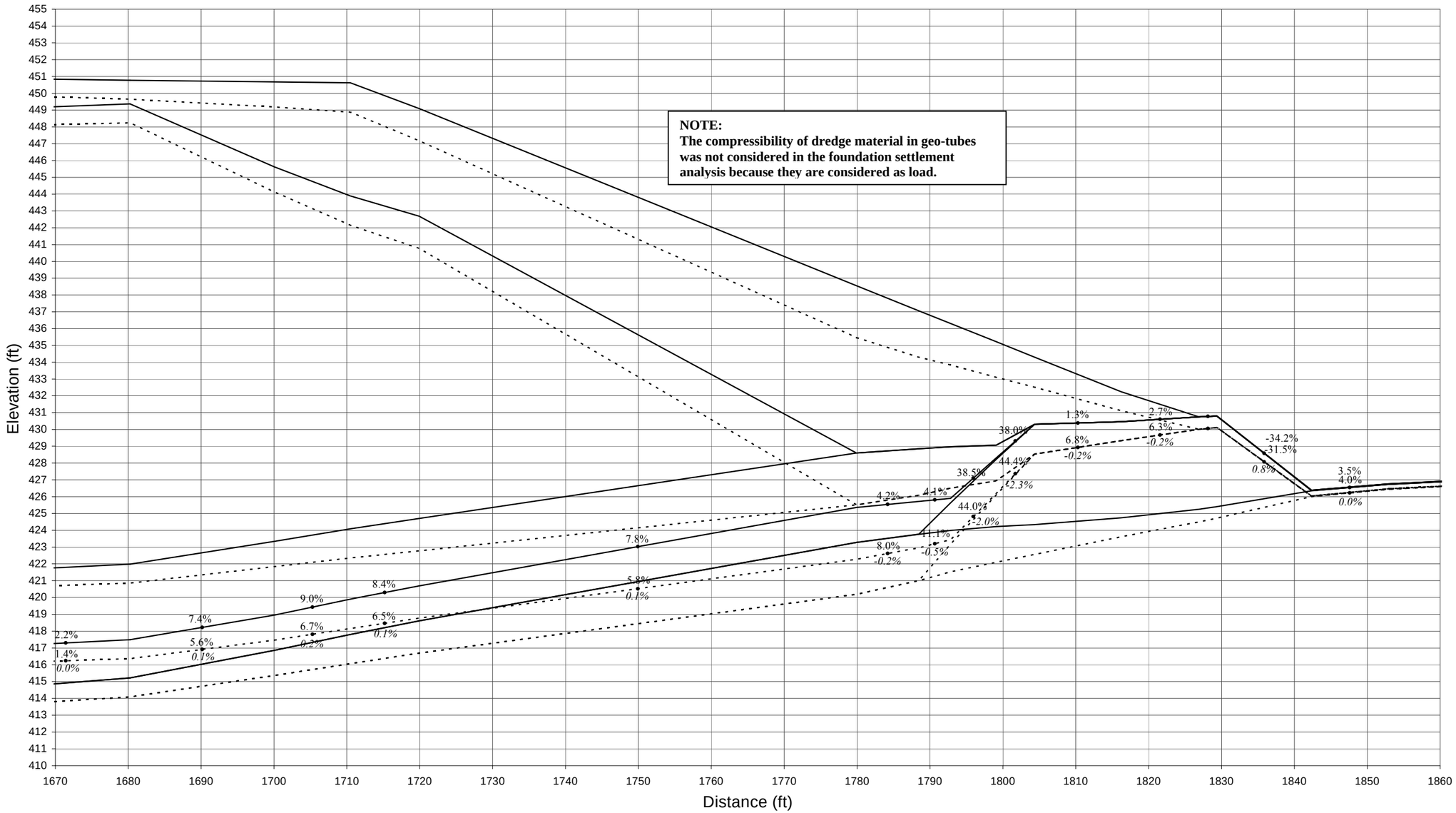


Figure 34. CASE 7: Foundation Settlement Analysis Result for Cross Section A (Right Berm)

Written by: **Yiwen Cao** Date: **6/10/2009** Reviewed by: **R. Kulasingam/Jay Beech** Date: **6/10/2009**

Client: **Honeywell** Project: **Onondaga Lake SCA IDS** Project/ Proposal No.: **GJ4299** Task No.: **04**

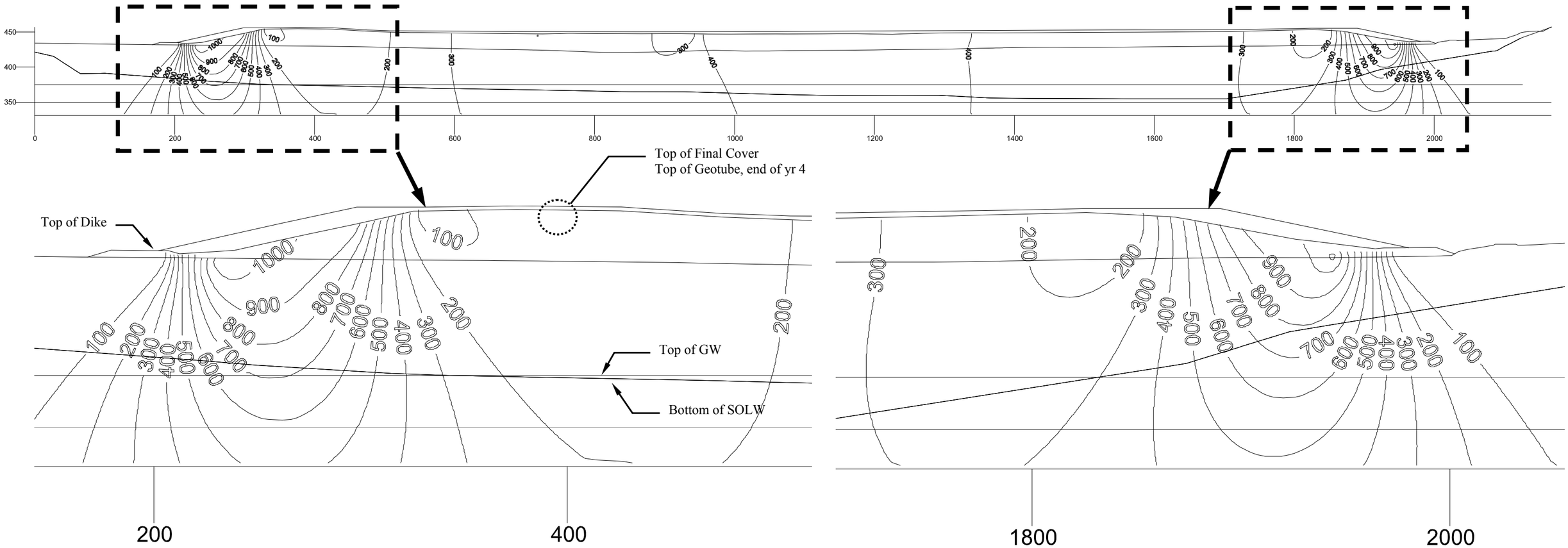


Figure 35. CASE 7: Stress Distribution of Proposed Final Cover Loading along Cross Section B (units in psf)

Written by: **Yiwen Cao** Date: **6/10/2009** Reviewed by: **R. Kulasingam/Jay Beech** Date: **6/10/2009**

Client: **Honeywell** Project: **Onondaga Lake SCA IDS** Project/ Proposal No.: **GJ4299** Task No.: **04**

Cross Section B Pre- vs. Post- Foundation Settlement Profile, End of YR35

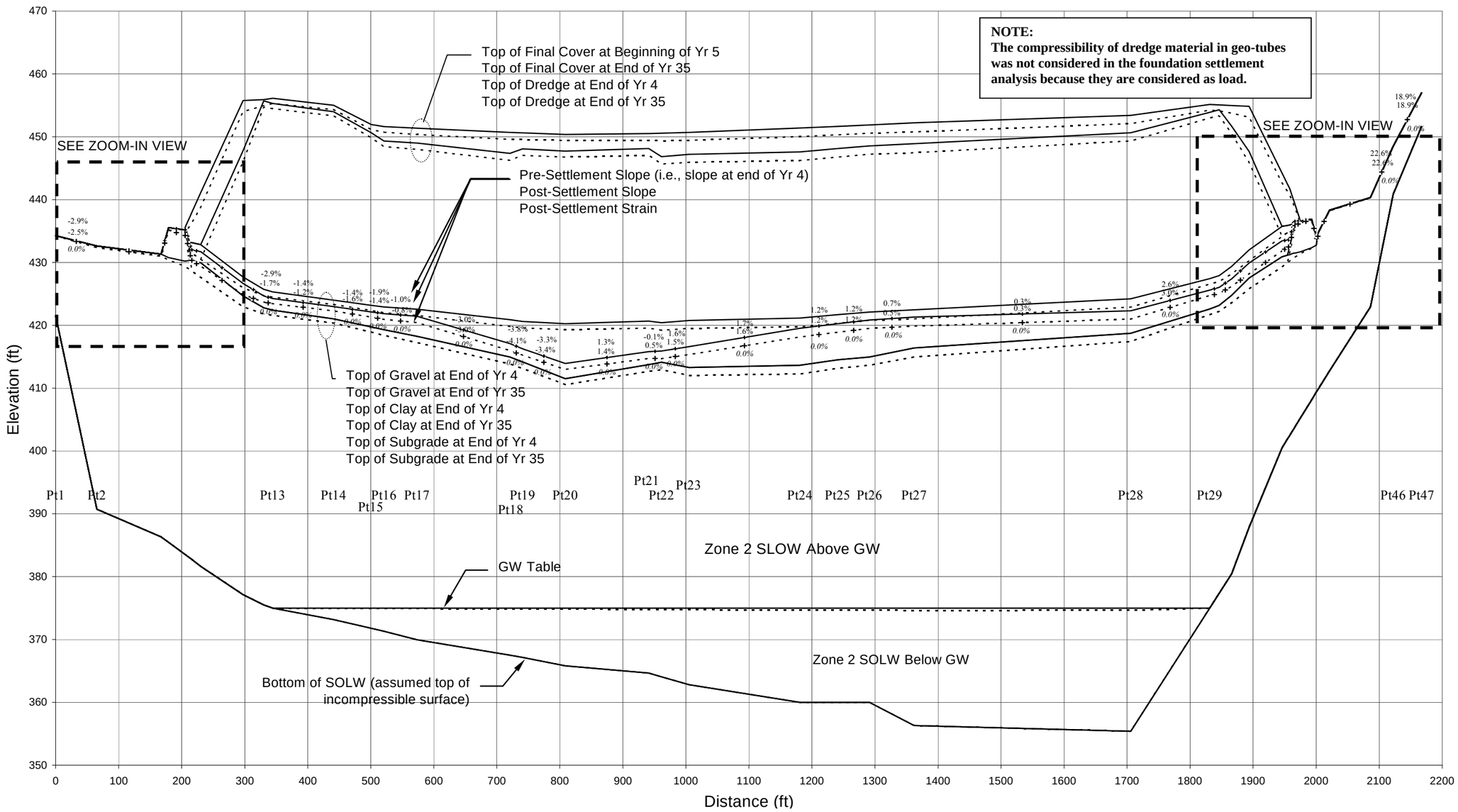


Figure 36. CASE 7: Foundation Settlement Analysis Result for Cross Section B (Overall View)

Written by: **Yiwen Cao** Date: **6/10/2009** Reviewed by: **R. Kulasingam/Jay Beech** Date: **6/10/2009**

Client: **Honeywell** Project: **Onondaga Lake SCA IDS** Project/ Proposal No.: **GJ4299** Task No.: **04**

Cross Section B Pre- vs. Post- Foundation Settlement Profile, End of YR35

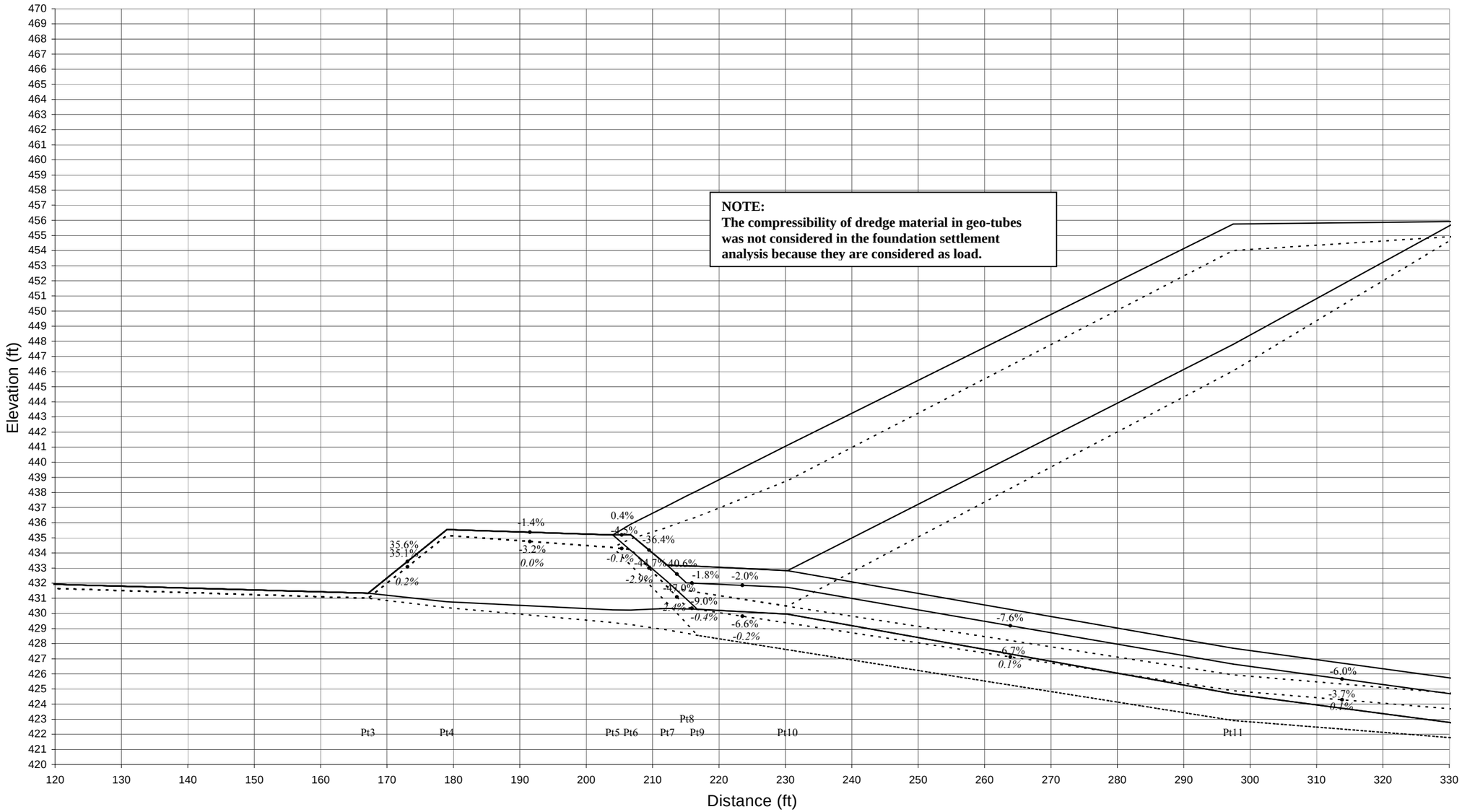


Figure 37. CASE 7: Foundation Settlement Analysis Result for Cross Section B (Left Berm)

Written by: **Yiwen Cao** Date: **6/10/2009** Reviewed by: **R. Kulasingam/Jay Beech** Date: **6/10/2009**

Client: **Honeywell** Project: **Onondaga Lake SCA IDS** Project/ Proposal No.: **GJ4299** Task No.: **04**

Cross Section B Pre- vs. Post- Foundation Settlement Profile, End of YR35

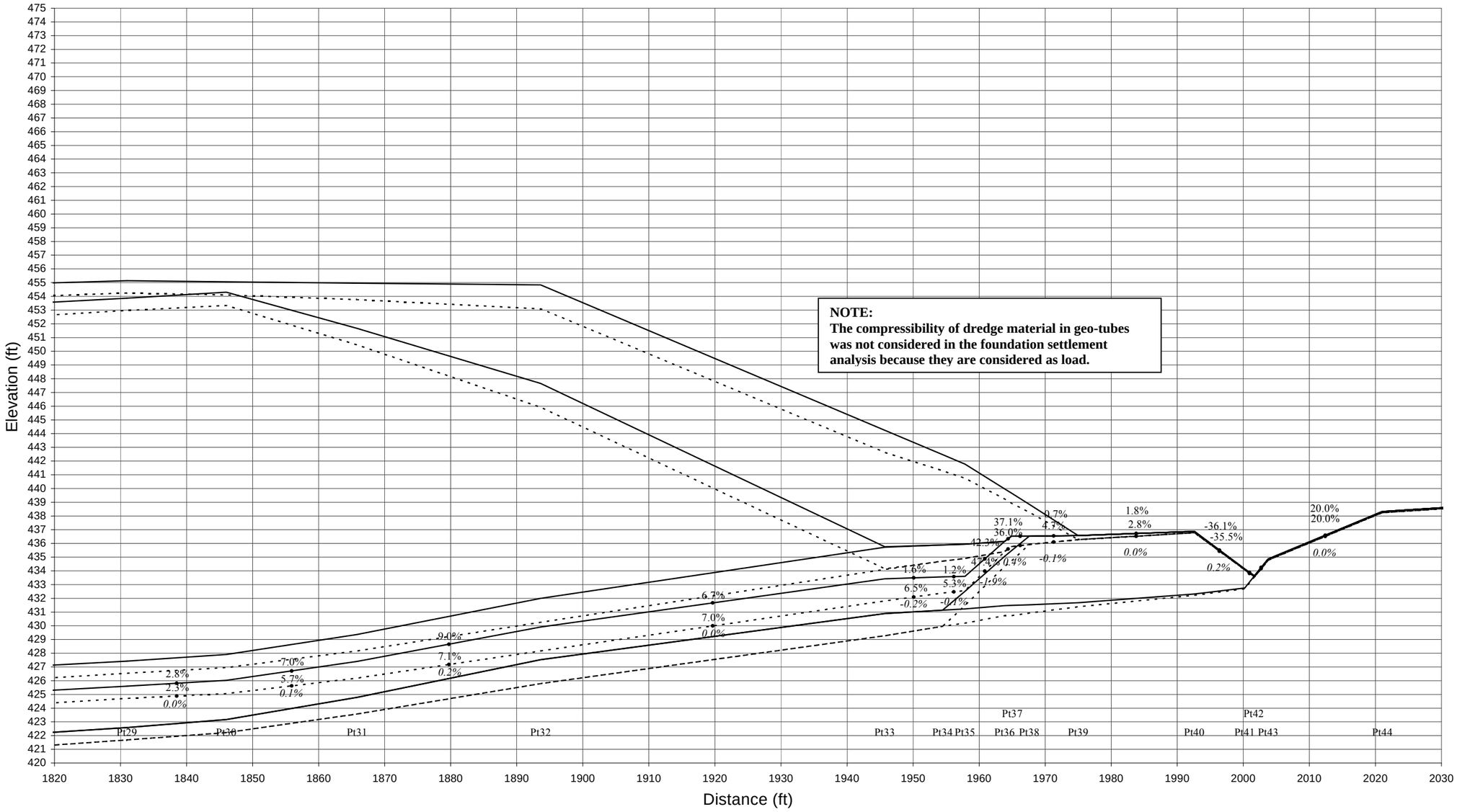


Figure 38. CASE 7: Foundation Settlement Analysis Result for Cross Section B (Right Berm)

Written by: **Yiwen Cao** Date: **6/10/2009** Reviewed by: **R. Kulasingam/Jay Beech** Date: **6/10/2009**

Client: **Honeywell** Project: **Onondaga Lake SCA IDS** Project/ Proposal No.: **GJ4299** Task No.: **04**

Attachment 1

Calculation of Compressibility Parameters for the Settled Dredge Material

CALCULATION OF COMPRESSIBILITY PARAMETERS FOR DREDGE MATERIAL INSIDE GEO-TUBES

Three parameters were calculated from laboratory test data of samples of dredge material provided to Geosyntec by Parsons: (i) Modified Compression Index ($C_{c\varepsilon}$); (ii) Modified Recompression Index ($C_{r\varepsilon}$); and (iii) Secondary Compression Index ($C_{\alpha\varepsilon}$).

The modified Compression Index ($C_{c\varepsilon}$) and modified Recompression Index ($C_{r\varepsilon}$) were computed using Equations 1-1 and 1-2 below:

$$C_{c\varepsilon} = C_c / (1 + e_0) \quad (1\text{-}1)$$

$$C_{r\varepsilon} = C_r / (1 + e_0) \quad (1\text{-}2)$$

Where:

$C_{c\varepsilon}$ = Modified Compression Index

C_c = Compression Index

$C_{r\varepsilon}$ = Modified Recompression Index

C_r = Recompression Index

e_0 = Initial Void Ratio

Seven samples that are considered representative of the anticipated dredge material were taken from borings within Sediment Management Unit (SMU) 1 and the modified compression and recompression parameters were calculated as shown in the following table.

Location ID	Field Sample ID	Compression Index (Cc)	Recompression Index (Cr)	Initial Void Ratio (e_0)	Modified Compression Index ($C_{c\varepsilon}$)	Modified Recompression Index ($C_{r\varepsilon}$)
OL-STA-10025	OL-0052-13	2.04	0.02	4.53	0.368539	0.003831
OL-STA-10026	OL-0052-19	1.22	0.03	3.17	0.291937	0.006516
OL-STA-10019	OL-0110-30	0.08	0.01	4.24	0.014589	0.002285
OL-STA-10023	OL-0052-06	1.59	0.02	3.38	0.362000	0.005415
OL-STA-10024	OL-0052-07	1.18	0.02	3.08	0.289855	0.004684
OL-STA-10024	OL-0052-09	2.84	0.03	4.93	0.479155	0.005397
OL-STA-10014	OL-0110-08	0.94	0.01	3.05	0.233329	0.003639

Based on the results of the laboratory testing, calculated average values of $C_{c\varepsilon}$=0.291 and $C_{r\varepsilon}$=0.0045 were input into the settlement calculations.

The modified Secondary Compression Index ($C_{\alpha\varepsilon}$) was calculated based on laboratory consolidation test data provided to Geosyntec by Parsons. These test data included 12 constant load steps for each of seven samples from the SMU 1 area. The percent strain as a function of time on a logarithmic scale for each load step was graphed and the modified secondary compression index found graphically using Equation 1-3 below.

$$C_{\alpha\varepsilon} = \Delta E_x / \Delta \log_{10} t \quad C_{\alpha\varepsilon} = \Delta E_X / \Delta \log_{10} t \qquad (1\text{-}3)$$

Where:

$C_{\alpha\varepsilon}$ = Modified Secondary Compression Index

ΔE_x = Change in strain

$\Delta \log_{10} t$ = Logarithmic change in time

This was repeated for every load step of the seven samples tested and results were compiled into tables. These $C_{\alpha\varepsilon}$ values were also graphed as a function of stress ratio, as shown in Figure 1-1 and a simplified design curve for $C_{\alpha\varepsilon}$ was created based upon the graphical distribution of values. The recommended secondary compression ratio for design is shown in Equations 1-4 and 1-5 below:

$$C_{\alpha\varepsilon} = 0.08\% \, for \, \frac{\sigma_v'}{P_c'} \le 1.0 \qquad (1\text{-}4)$$

$$C_{\alpha\varepsilon} = 0.60\% \, for \, \frac{\sigma_v'}{P_c'} > 1.0 \qquad (1\text{-}5)$$

Where:

σ_v' = Vertical Effective Stress (psf)

P_c' = Preconsolidation Pressure (psf)

This recommended design value envelope is a stair-step function based on the results of the laboratory testing. The design value of $C_{\alpha\varepsilon}$=0.08% for stress ratios smaller than 1.0

is identical to the numerical average of these tests. For stress ratios larger than 1.0, the numerical average is $C_{\alpha\varepsilon}$=0.26%, however, due to the presence of several large laboratory compression index values, the design value has been increased to a recommended design value of $C_{\alpha\varepsilon}$=0.60%. The higher design value will result in larger calculated secondary compression settlements, which is conservative.

Written by: Yiwen Cao Date: 6/10/2009 Reviewed by: R. Kulasingam/Jay Beech Date: 6/10/2009

Client: Honeywell Project: Onondaga Lake SCA IDS Project/ Proposal No.: GJ4299 Task No.: 04

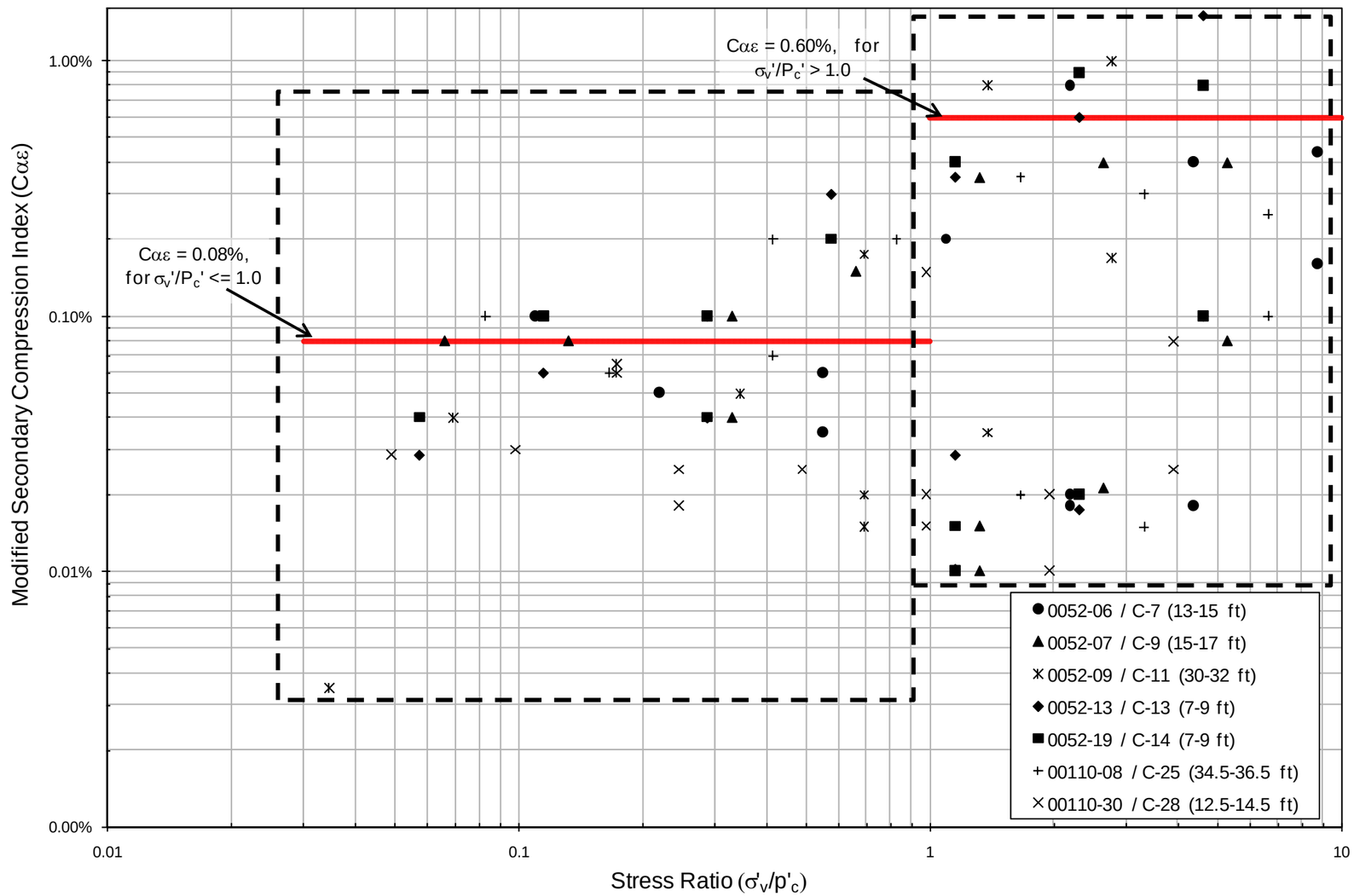


Figure 1-1: Secondary Compression Ratio of SOLW as a Function of Stress Ratio

Written by: **Yiwen Cao** Date: **6/10/2009** Reviewed by: **R. Kulasingam/Jay Beech** Date: **6/10/2009**

Client: **Honeywell** Project: **Onondaga Lake SCA IDS** Project/ Proposal No.: **GJ4299** Task No.: **04**

Attachment 2

CASE 1: Calculations of Foundation Settlement During Operations Period (Points 501 to 510)

Written by: **Yiwen Cao** Date: **6/10/2009** Reviewed by: **R. Kulasingam/Jay Beech** Date: **6/10/2009**

Client: **Honeywell** Project: **Onondaga Lake SCA IDS** Project/ Proposal No.: **GJ4299** Task No.: **04**

Settlement Prediction Model

Programmer: **Yiwen Cao, GeoSyntec Consultants**

Version Control V 1.002 11.14.2007

Project: **Onondaga Lake SCA 50%**

Notes:

Unit: **ft / psf**

Average Compaction Effort = **1440.00** kPa or psf

Consider Compaction Effort = **N** yes or no

Point #				**501**	**502**	**503**	**504**	**505**	**506**	**507**	**508**	**509**	**510**
Distance (meter or ft)				*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
ELEVATION (M/FT)	Line	1	Top of Dredge	*462.49*	*462.70*	*462.94*	*463.23*	*463.38*	*448.59*	*437.81*	*443.72*	*458.35*	*468.17*
	Line	2	Top of Dredge	*462.49*	*462.70*	*462.94*	*463.23*	*463.38*	*448.59*	*437.81*	*443.72*	*458.35*	*468.17*
	Line	3	Top of Gravel	*432.49*	*432.70*	*432.94*	*433.23*	*433.46*	*433.68*	*433.83*	*438.91*	*438.54*	*438.17*
	Line	4	Top of Clay	*431.03*	*431.32*	*431.73*	*432.00*	*432.22*	*432.44*	*432.67*	*437.01*	*436.53*	*436.05*
	Line	5	Top of Dike	*428.78*	*429.45*	*430.19*	*430.86*	*430.84*	*430.93*	*431.03*	*434.06*	*433.94*	*433.53*
	Line	6	Top of Subgrade	*428.78*	*429.45*	*430.19*	*430.86*	*430.84*	*430.93*	*431.03*	*434.06*	*433.94*	*433.53*
	Line	7		*426.68*	*427.23*	*427.84*	*428.51*	*428.49*	*428.59*	*428.71*	*431.98*	*431.67*	*431.10*
	Line	8		*424.59*	*425.01*	*425.49*	*426.15*	*426.13*	*426.25*	*426.39*	*429.90*	*429.40*	*428.66*
	Line	9		*422.49*	*422.79*	*423.15*	*423.80*	*423.78*	*423.92*	*424.07*	*427.83*	*427.14*	*426.23*
	Line	10		*420.40*	*420.57*	*420.80*	*421.45*	*421.43*	*421.58*	*421.74*	*425.75*	*424.87*	*423.79*
	Line	11		*418.30*	*418.35*	*418.45*	*419.09*	*419.07*	*419.24*	*419.42*	*423.67*	*422.61*	*421.36*
	Line	12		*416.21*	*416.14*	*416.11*	*416.74*	*416.72*	*416.90*	*417.10*	*421.60*	*420.34*	*418.93*
	Line	13		*414.12*	*413.92*	*413.76*	*414.39*	*414.37*	*414.56*	*414.78*	*419.52*	*418.07*	*416.49*
	Line	14		*412.02*	*411.70*	*411.42*	*412.04*	*412.02*	*412.23*	*412.46*	*417.44*	*415.81*	*414.06*
	Line	15		*409.93*	*409.48*	*409.07*	*409.68*	*409.66*	*409.89*	*410.13*	*415.37*	*413.54*	*411.62*
	Line	16		*407.83*	*407.26*	*406.72*	*407.33*	*407.31*	*407.55*	*407.81*	*413.29*	*411.27*	*409.19*
	Line	17		*405.74*	*405.04*	*404.38*	*404.98*	*404.96*	*405.21*	*405.49*	*411.21*	*409.01*	*406.75*
	Line	18		*403.65*	*402.83*	*402.03*	*402.63*	*402.60*	*402.87*	*403.17*	*409.14*	*406.74*	*404.32*
	Line	19		*401.55*	*400.61*	*399.68*	*400.27*	*400.25*	*400.54*	*400.84*	*407.06*	*404.48*	*401.88*
	Line	20		*399.46*	*398.39*	*397.34*	*397.92*	*397.90*	*398.20*	*398.52*	*404.98*	*402.21*	*399.45*
	Line	21		*397.36*	*396.17*	*394.99*	*395.57*	*395.55*	*395.86*	*396.20*	*402.91*	*399.94*	*397.01*
	Line	22		*395.27*	*393.95*	*392.65*	*393.21*	*393.19*	*393.52*	*393.88*	*400.83*	*397.68*	*394.58*
	Line	23	Bottom of Zone2 Above GW	*393.18*	*391.73*	*390.30*	*390.86*	*390.84*	*391.18*	*391.56*	*398.75*	*395.41*	*392.15*
	Line	24		*393.18*	*391.73*	*390.30*	*390.54*	*390.78*	*391.18*	*391.56*	*398.75*	*395.41*	*392.15*
	Line	25	Bottom of Zone 3 Above GW	*393.18*	*391.73*	*390.30*	*390.22*	*390.72*	*391.18*	*391.56*	*398.75*	*395.41*	*392.15*
	Line	26		*393.18*	*391.73*	*390.30*	*390.22*	*390.72*	*391.18*	*391.56*	*398.75*	*395.41*	*392.15*
	Line	27	Bottom of Zone 2 Below GW	*393.18*	*391.73*	*390.30*	*390.22*	*390.72*	*391.18*	*391.56*	*398.75*	*395.41*	*392.15*
	Line	28	Top of Incompressible Layer	*393.18*	*391.73*	*390.30*	*390.22*	*390.72*	*391.18*	*391.56*	*398.75*	*395.41*	*392.15*
	Line	29	GND for sigma_p	*428.78*	*429.45*	*430.19*	*430.86*	*430.77*	*431.00*	*431.07*	*434.10*	*433.94*	*433.53*
	Line	30	GW	*375.00*	*375.00*	*375.00*	*375.00*	*375.00*	*375.00*	*375.00*	*375.00*	*375.00*	*375.00*
	Line	31	ROCK	*393.18*	*391.73*	*390.30*	*390.22*	*390.72*	*391.18*	*391.56*	*398.75*	*395.41*	*392.15*
LAYER THICKNESS (M/FT)	Layer No.	From	To / Material										
	1	*1*	*2* / *Null Layer*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
	2	*2*	*3* / *Dredge*	*30.00*	*30.00*	*30.00*	*30.00*	*29.92*	*14.92*	*3.98*	*4.81*	*19.81*	*30.00*
	3	*3*	*4* / *Gravel*	*1.46*	*1.38*	*1.21*	*1.22*	*1.24*	*1.24*	*1.16*	*1.90*	*2.01*	*2.12*
	4	*4*	*5* / *Clay*	*2.25*	*1.87*	*1.55*	*1.15*	*1.38*	*1.51*	*1.63*	*2.95*	*2.59*	*2.52*
	5	*5*	*6* / *Dike*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
	6	*6*	*7* / *Zone2-Above-GW-1*	*2.09*	*2.22*	*2.35*	*2.35*	*2.35*	*2.34*	*2.32*	*2.08*	*2.27*	*2.43*
	7	*7*	*8* / *Zone2-Above-GW-2*	*2.09*	*2.22*	*2.35*	*2.35*	*2.35*	*2.34*	*2.32*	*2.08*	*2.27*	*2.43*
	8	*8*	*9* / *Zone2-Above-GW-3*	*2.09*	*2.22*	*2.35*	*2.35*	*2.35*	*2.34*	*2.32*	*2.08*	*2.27*	*2.43*
	9	*9*	*10* / *Zone2-Above-GW-4*	*2.09*	*2.22*	*2.35*	*2.35*	*2.35*	*2.34*	*2.32*	*2.08*	*2.27*	*2.43*
	10	*10*	*11* / *Zone2-Above-GW-5*	*2.09*	*2.22*	*2.35*	*2.35*	*2.35*	*2.34*	*2.32*	*2.08*	*2.27*	*2.43*
	11	*11*	*12* / *Zone2-Above-GW-6*	*2.09*	*2.22*	*2.35*	*2.35*	*2.35*	*2.34*	*2.32*	*2.08*	*2.27*	*2.43*
	12	*12*	*13* / *Zone2-Above-GW-7*	*2.09*	*2.22*	*2.35*	*2.35*	*2.35*	*2.34*	*2.32*	*2.08*	*2.27*	*2.43*
	13	*13*	*14* / *Zone2-Above-GW-8*	*2.09*	*2.22*	*2.35*	*2.35*	*2.35*	*2.34*	*2.32*	*2.08*	*2.27*	*2.43*
	14	*14*	*15* / *Zone2-Above-GW-9*	*2.09*	*2.22*	*2.35*	*2.35*	*2.35*	*2.34*	*2.32*	*2.08*	*2.27*	*2.43*
	15	*15*	*16* / *Zone2-Above-GW-10*	*2.09*	*2.22*	*2.35*	*2.35*	*2.35*	*2.34*	*2.32*	*2.08*	*2.27*	*2.43*
	16	*16*	*17* / *Zone2-Above-GW-11*	*2.09*	*2.22*	*2.35*	*2.35*	*2.35*	*2.34*	*2.32*	*2.08*	*2.27*	*2.43*
	17	*17*	*18* / *Zone2-Above-GW-12*	*2.09*	*2.22*	*2.35*	*2.35*	*2.35*	*2.34*	*2.32*	*2.08*	*2.27*	*2.43*
	18	*18*	*19* / *Zone2-Above-GW-13*	*2.09*	*2.22*	*2.35*	*2.35*	*2.35*	*2.34*	*2.32*	*2.08*	*2.27*	*2.43*
	19	*19*	*20* / *Zone2-Above-GW-14*	*2.09*	*2.22*	*2.35*	*2.35*	*2.35*	*2.34*	*2.32*	*2.08*	*2.27*	*2.43*
	20	*20*	*21* / *Zone2-Above-GW-15*	*2.09*	*2.22*	*2.35*	*2.35*	*2.35*	*2.34*	*2.32*	*2.08*	*2.27*	*2.43*
	21	*21*	*22* / *Zone2-Above-GW-16*	*2.09*	*2.22*	*2.35*	*2.35*	*2.35*	*2.34*	*2.32*	*2.08*	*2.27*	*2.43*
	22	*22*	*23* / *Zone2-Above-GW-17*	*2.09*	*2.22*	*2.35*	*2.35*	*2.35*	*2.34*	*2.32*	*2.08*	*2.27*	*2.43*
	23	*23*	*24* / *Zone3-Above-GW-1*	*0.00*	*0.00*	*0.00*	*0.32*	*0.06*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
	24	*24*	*25* / *Zone3-Above-GW-2*	*0.00*	*0.00*	*0.00*	*0.32*	*0.06*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
	25	*25*	*26* / *Zone2-Below-GW-18*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
	26	*26*	*27* / *Zone2-Below-GW-19*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
	27	*27*	*28* / *Zone3-Below-GW-3*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
	28												
	29	*29*	*30* / Soil Above GW	*53.78*	*54.45*	*55.19*	*55.86*	*55.77*	*56.00*	*56.07*	*59.10*	*58.94*	*58.53*
	30	*30*	*31* / Soil Below GW	*-18.18*	*-16.73*	*-15.30*	*-15.22*	*-15.72*	*-16.18*	*-16.56*	*-23.75*	*-20.41*	*-17.15*
	Thickness Check												
		From Line	To Line / SUM	*69.32*	*70.96*	*72.64*	*73.01*	*72.66*	*57.41*	*46.25*	*44.97*	*62.94*	*76.03*
		1	*28* / Thickness =	*69.32*	*70.96*	*72.64*	*73.01*	*72.66*	*57.41*	*46.25*	*44.97*	*62.94*	*76.03*
			Thickness Check	***OK***	***OK***	***OK***	***OK***	***OK***	***OK***	***OK***	***OK***	***OK***	***OK***

Written by: **Yiwen Cao** Date: **6/10/2009** Reviewed by: **R. Kulasingam/Jay Beech** Date: **6/10/2009**

Client: **Honeywell** Project: **Onondaga Lake SCA IDS** Project/ Proposal No.: **GJ4299** Task No.: **04**

UNIT WEIGHT	Layer No.	Material										
	1	*Null Layer*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	2	*Dredge*	86.0	86.0	86.0	86.0	86.0	86.0	86.0	86.0	86.0	86.0
	3	*Gravel*	120.0	120.0	120.0	120.0	120.0	120.0	120.0	120.0	120.0	120.0
	4	*Clay*	120.0	120.0	120.0	120.0	120.0	120.0	120.0	120.0	120.0	120.0
	5	*Dike*	120.0	120.0	120.0	120.0	120.0	120.0	120.0	120.0	120.0	120.0
	6	*Zone2-Above-GW-1*	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0
	7	*Zone2-Above-GW-2*	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0
	8	*Zone2-Above-GW-3*	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0
	9	*Zone2-Above-GW-4*	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0
	10	*Zone2-Above-GW-5*	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0
	11	*Zone2-Above-GW-6*	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0
	12	*Zone2-Above-GW-7*	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0
	13	*Zone2-Above-GW-8*	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0
	14	*Zone2-Above-GW-9*	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0
	15	*Zone2-Above-GW-10*	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0
	16	*Zone2-Above-GW-11*	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0
	17	*Zone2-Above-GW-12*	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0
	18	*Zone2-Above-GW-13*	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0
	19	*Zone2-Above-GW-14*	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0
	20	*Zone2-Above-GW-15*	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0
	21	*Zone2-Above-GW-16*	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0
	22	*Zone2-Above-GW-17*	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0
	23	*Zone3-Above-GW-1*	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0
	24	*Zone3-Above-GW-2*	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0
	25	*Zone2-Below-GW-18*	19.6	19.6	19.6	19.6	19.6	19.6	19.6	19.6	19.6	19.6
	26	*Zone2-Below-GW-19*	19.6	19.6	19.6	19.6	19.6	19.6	19.6	19.6	19.6	19.6
	27	*Zone3-Below-GW-3*	19.6	19.6	19.6	19.6	19.6	19.6	19.6	19.6	19.6	19.6
	28											
	29	*Soil Above GW*	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0
	30	*Soil below GW*	19.6	19.6	19.6	19.6	19.6	19.6	19.6	19.6	19.6	19.6
	Layer No.	***1*** **Null Layer**										
		Initial Stress Reference Layer (top of layer)	1	1	1	1	1	1	1	1	1	1
		Final Stress Reference Layer (top of layer)	1	1	1	1	1	1	1	1	1	1
		Midpoint Elevation, (m / ft)	462.49	462.70	462.94	463.23	463.38	448.59	437.81	443.72	458.35	468.17
		Initial Effective Stress, σ'_i (kPa /psf)	Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight
		Final Effective Stress, σ'_f (kPa/psf)	Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight
Elastic Method												
Modulus, E (kPa/psf)=		Strain										
		Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)												
Consolidation Properties												
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)												
OCR Manual Input Value												
OCR Computation Input												
Preconsolidation pressure, σ'_p (kPa / psf)												
Modified Primary Compression Index, $C_{c\varepsilon}$												
Modified Recompression Index, $C_{r\varepsilon}$												
Modified Secondary Compression Index, C_{α}												
ratio of t2 / t1												
Settlements												
Primary Settlement, (m / ft)												
Secondary Settlement (m / ft)												
Total Settlement (m / ft)												
		Elastic or Plastic (E/P)										
		Settlement of Layer 1 (m / ft)										

Written by: **Yiwen Cao** Date: **6/10/2009** Reviewed by: **R. Kulasingam/Jay Beech** Date: **6/10/2009**

Client: **Honeywell** Project: **Onondaga Lake SCA IDS** Project/ Proposal No.: **GJ4299** Task No.: **04**

Layer No. 2 **Dredge**											
Initial Stress Reference Layer (top of layer)		2	2	2	2	2	2	2	2	2	2
Final Stress Reference Layer (top of layer)		2	2	2	2	2	2	2	2	2	2
Midpoint Elevation, (m / ft)		447.49	447.70	447.94	448.23	448.42	441.14	435.82	441.32	448.44	453.17
Initial Effective Stress, σ'_i (kPa /psf)		Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight
Final Effective Stress, σ'_f (kPa/psf)		Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)											
OCR Manual Input Value											
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)											
Modified Primary Compression Index, $C_{c\varepsilon}$											
Modified Recompression Index, $C_{r\varepsilon}$											
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$											
ratio of t2 / t1											
Settlements											
Primary Settlement, (m / ft)											
Secondary Settlement (m / ft)											
Total Settlement (m / ft)											
Elastic or Plastic (E/P)											
Settlement of Layer 2 (m / ft)											
Layer No. 3 **Gravel**											
Initial Stress Reference Layer (top of layer)		3	3	3	3	3	3	3	3	3	3
Final Stress Reference Layer (top of layer)		3	3	3	3	3	3	3	3	3	3
Midpoint Elevation, (m / ft)		431.76	432.01	432.34	432.62	432.84	433.06	433.25	437.96	437.53	437.11
Initial Effective Stress, σ'_i (kPa /psf)		Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight
Final Effective Stress, σ'_f (kPa/psf)		Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)											
OCR Manual Input Value											
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)											
Modified Primary Compression Index, $C_{c\varepsilon}$											
Modified Recompression Index, $C_{r\varepsilon}$											
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$											
ratio of t2 / t1											
Settlements											
Primary Settlement, (m / ft)											
Secondary Settlement (m / ft)											
Total Settlement (m / ft)											
Elastic or Plastic (E/P)											
Settlement of Layer 3 (m / ft)											
Layer No. 4 **Clay**											
Initial Stress Reference Layer (top of layer)		4	4	4	4	4	4	4	4	4	4
Final Stress Reference Layer (top of layer)		4	4	4	4	4	4	4	4	4	4
Midpoint Elevation, (m / ft)		429.90	430.38	430.96	431.43	431.53	431.68	431.85	435.53	435.23	434.79
Initial Effective Stress, σ'_i (kPa /psf)		Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight
Final Effective Stress, σ'_f (kPa/psf)		Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)											
OCR Manual Input Value											
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)											
Modified Primary Compression Index, $C_{c\varepsilon}$											
Modified Recompression Index, $C_{r\varepsilon}$											
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$											
ratio of t2 / t1											
Settlements											
Primary Settlement, (m / ft)											
Secondary Settlement (m / ft)											
Total Settlement (m / ft)											
Elastic or Plastic (E/P)											
Settlement of Layer 4 (m / ft)											

Written by: **Yiwen Cao** Date: **6/10/2009** Reviewed by: **R. Kulasingam/Jay Beech** Date: **6/10/2009**

Client: **Honeywell** Project: **Onondaga Lake SCA IDS** Project/ Proposal No.: **GJ4299** Task No.: **04**

Layer No.	5	Dike									
Initial Stress Reference Layer (top of layer)	5	5	5	5	5	5	5	5	5	5
Final Stress Reference Layer (top of layer)	5	5	5	5	5	5	5	5	5	5
Midpoint Elevation, (m / ft)	428.78	429.45	430.19	430.86	430.84	430.93	431.03	434.06	433.94	433.53
Initial Effective Stress, σ'_i (kPa /psf)	Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight
Final Effective Stress, σ'_f (kPa/psf)	Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight
Elastic Method										
Modulus, E (kPa/psf)= Strain										
Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)										
Consolidation Properties										
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)										
OCR Manual Input Value										
OCR Computation Input										
Preconsolidation pressure, σ'_p (kPa / psf)										
Modified Primary Compression Index, $C_{c\varepsilon}$										
Modified Recompression Index, $C_{r\varepsilon}$										
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$										
ratio of t2 / t1										
Settlements										
Primary Settlement, (m / ft)										
Secondary Settlement (m / ft)										
Total Settlement (m / ft)										
Elastic or Plastic (E/P)										
Settlement of Layer 5 (m / ft)										
Layer No.	6	Zone2-Above-GW-1									
Initial Stress Reference Layer (top of layer)	6	6	6	6	6	6	6	6	6	6
Final Stress Reference Layer (top of layer)	1	1	1	1	1	1	1	1	1	1
Midpoint Elevation, (m / ft)	427.73	428.34	429.01	429.68	429.66	429.76	429.87	433.02	432.80	432.31
Initial Effective Stress, σ'_i (kPa /psf)	85.86	90.95	96.20	96.47	96.47	95.86	95.21	85.15	92.92	99.81
Final Effective Stress, σ'_f (kPa/psf)	3,111.83	3,061.26	3,006.64	2,960.57	2,984.40	1,708.37	773.20	1,081.52	2,348.71	3,236.67
Elastic Method										
Modulus, E (kPa/psf)= Strain										
Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)										
Consolidation Properties										
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)	MS	MS	MS	MS	MS	MS	MS	MS	MS	MS
OCR Manual Input Value	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
OCR Computation Input										
Preconsolidation pressure, σ'_p (kPa / psf)	386	409	433	434	409	457	440	399	418	449
Modified Primary Compression Index, $C_{c\varepsilon}$	0.460	0.460	0.460	0.460	0.460	0.460	0.460	0.460	0.460	0.460
Modified Recompression Index, $C_{r\varepsilon}$	0.014	0.014	0.014	0.014	0.014	0.014	0.014	0.014	0.014	0.014
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$	0.91%	0.91%	0.91%	0.91%	0.91%	0.91%	0.91%	0.91%	0.91%	0.91%
ratio of t2 / t1	8	8	8	8	8	8	8	8	8	8
Settlements										
Primary Settlement, (m / ft)	0.892	0.912	0.930	0.924	0.955	0.638	0.283	0.434	0.802	0.983
Secondary Settlement (m / ft)	0.017	0.018	0.019	0.019	0.019	0.019	0.019	0.017	0.019	0.020
Total Settlement (m / ft)	0.909	0.930	0.949	0.943	0.974	0.657	0.302	0.451	0.821	1.003
Elastic or Plastic (E/P)	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 6 (m / ft)	0.909	0.930	0.949	0.943	0.974	0.657	0.302	0.451	0.821	1.003
Layer No.	7	Zone2-Above-GW-2									
Initial Stress Reference Layer (top of layer)	6	6	6	6	6	6	6	6	6	6
Final Stress Reference Layer (top of layer)	1	1	1	1	1	1	1	1	1	1
Midpoint Elevation, (m / ft)	425.63	426.12	426.67	427.33	427.31	427.42	427.55	430.94	430.54	429.88
Initial Effective Stress, σ'_i (kPa /psf)	257.58	272.85	288.59	289.40	289.42	287.57	285.63	255.44	278.75	299.44
Final Effective Stress, σ'_f (kPa/psf)	3,283.55	3,243.16	3,199.04	3,153.50	3,177.34	1,900.09	963.61	1,251.81	2,534.55	3,436.30
Elastic Method										
Modulus, E (kPa/psf)= Strain										
Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)										
Consolidation Properties										
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)	MS	MS	MS	MS	MS	MS	MS	MS	MS	MS
OCR Manual Input Value	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
OCR Computation Input										
Preconsolidation pressure, σ'_p (kPa / psf)	1,159	1,228	1,299	1,302	1,277	1,320	1,297	1,165	1,254	1,347
Modified Primary Compression Index, $C_{c\varepsilon}$	0.460	0.460	0.460	0.460	0.460	0.460	0.460	0.460	0.460	0.460
Modified Recompression Index, $C_{r\varepsilon}$	0.014	0.014	0.014	0.014	0.014	0.014	0.014	0.014	0.014	0.014
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$	0.91%	0.91%	0.91%	0.91%	0.91%	0.91%	0.11%	0.91%	0.91%	0.91%
ratio of t2 / t1	8	8	8	8	8	8	8	8	8	8
Settlements										
Primary Settlement, (m / ft)	0.455	0.451	0.444	0.437	0.450	0.192	0.017	0.049	0.339	0.478
Secondary Settlement (m / ft)	0.017	0.018	0.019	0.019	0.019	0.019	0.002	0.017	0.019	0.020
Total Settlement (m / ft)	0.472	0.469	0.463	0.457	0.469	0.211	0.019	0.066	0.358	0.498
Elastic or Plastic (E/P)	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 7 (m / ft)	0.472	0.469	0.463	0.457	0.469	0.211	0.019	0.066	0.358	0.498

Written by: **Yiwen Cao** Date: **6/10/2009** Reviewed by: **R. Kulasingam/Jay Beech** Date: **6/10/2009**

Client: **Honeywell** Project: **Onondaga Lake SCA IDS** Project/ Proposal No.: **GJ4299** Task No.: **04**

Layer No.	*8*	**Zone2-Above-GW-3**									
Initial Stress Reference Layer (top of layer)		*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*
Final Stress Reference Layer (top of layer)		*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)		423.54	423.90	424.32	424.98	424.96	425.09	425.23	428.86	428.27	427.45
Initial Effective Stress, σ'_i (kPa /psf)		429.30	454.75	480.99	482.33	482.36	479.29	476.04	425.74	464.59	499.07
Final Effective Stress, σ'_f (kPa/psf)		3,455.27	3,425.06	3,391.43	3,346.43	3,370.28	2,091.80	1,154.03	1,422.11	2,720.39	3,635.93
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*
OCR Manual Input Value		*4.5*	*4.5*	*4.5*	*4.5*	*4.5*	*4.5*	*4.5*	*4.5*	*4.5*	*4.5*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		1,932	2,046	2,164	2,170	2,145	2,183	2,154	1,931	2,091	2,245
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*
Modified Recompression Index, $C_{r\varepsilon}$		*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.11%*	*0.11%*	*0.11%*	*0.91%*	*0.91%*
ratio of t2 / t1		*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*
Settlements											
Primary Settlement, (m / ft)		0.262	0.249	0.232	0.225	0.234	0.021	0.013	0.015	0.140	0.257
Secondary Settlement (m / ft)		0.017	0.018	0.019	0.019	0.019	0.002	0.002	0.002	0.019	0.020
Total Settlement (m / ft)		0.280	0.267	0.251	0.244	0.253	0.023	0.015	0.017	0.159	0.277
Elastic or Plastic (E/P)		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 8 (m / ft)		0.280	0.267	0.251	0.244	0.253	0.023	0.015	0.017	0.159	0.277
Layer No.	*9*	**Zone2-Above-GW-4**									
Initial Stress Reference Layer (top of layer)		*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*
Final Stress Reference Layer (top of layer)		*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)		421.45	421.68	421.97	422.62	422.60	422.75	422.91	426.79	426.01	425.01
Initial Effective Stress, σ'_i (kPa /psf)		601.02	636.65	673.38	675.26	675.30	671.00	666.46	596.03	650.43	698.70
Final Effective Stress, σ'_f (kPa/psf)		3,626.99	3,606.96	3,583.83	3,539.36	3,563.23	2,283.51	1,344.45	1,592.40	2,906.22	3,835.56
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*
OCR Manual Input Value		*4.5*	*4.5*	*4.5*	*4.5*	*4.5*	*4.5*	*4.5*	*4.5*	*4.5*	*4.5*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		2,705	2,865	3,030	3,039	3,014	3,045	3,011	2,698	2,927	3,144
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*
Modified Recompression Index, $C_{r\varepsilon}$		*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.11%*	*0.11%*	*0.11%*	*0.11%*	*0.91%*
ratio of t2 / t1		*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*
Settlements											
Primary Settlement, (m / ft)		0.142	0.122	0.100	0.093	0.100	0.017	0.010	0.012	0.021	0.119
Secondary Settlement (m / ft)		0.017	0.018	0.019	0.019	0.019	0.002	0.002	0.002	0.002	0.020
Total Settlement (m / ft)		0.159	0.141	0.119	0.113	0.119	0.020	0.012	0.014	0.023	0.139
Elastic or Plastic (E/P)		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 9 (m / ft)		0.159	0.141	0.119	0.113	0.119	0.020	0.012	0.014	0.023	0.139
Layer No.	*10*	**Zone2-Above-GW-5**									
Initial Stress Reference Layer (top of layer)		*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*
Final Stress Reference Layer (top of layer)		*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)		419.35	419.46	419.63	420.27	420.25	420.41	420.58	424.71	423.74	422.58
Initial Effective Stress, σ'_i (kPa /psf)		772.74	818.55	865.78	868.19	868.25	862.71	856.88	766.33	836.26	898.33
Final Effective Stress, σ'_f (kPa/psf)		3,798.71	3,788.86	3,776.22	3,732.29	3,756.17	2,475.23	1,534.87	1,762.70	3,092.06	4,035.19
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*
OCR Manual Input Value		*4.5*	*4.5*	*2.0*	*2.0*	*2.0*	*2.0*	*2.0*	*4.5*	*2.0*	*2.0*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		3,477	3,683	1,732	1,736	1,725	1,737	1,719	3,464	1,673	1,796
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*
Modified Recompression Index, $C_{r\varepsilon}$		*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.11%*	*0.11%*	*0.91%*	*0.91%*
ratio of t2 / t1		*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*
Settlements											
Primary Settlement, (m / ft)		0.056	0.033	0.375	0.370	0.376	0.175	0.008	0.011	0.288	0.404
Secondary Settlement (m / ft)		0.017	0.018	0.019	0.019	0.019	0.019	0.002	0.002	0.019	0.020
Total Settlement (m / ft)		0.073	0.051	0.395	0.389	0.395	0.195	0.011	0.013	0.306	0.424
Elastic or Plastic (E/P)		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 10 (m / ft)		0.073	0.051	0.395	0.389	0.395	0.195	0.011	0.013	0.306	0.424

Written by: **Yiwen Cao** Date: **6/10/2009** Reviewed by: **R. Kulasingam/Jay Beech** Date: **6/10/2009**

Client: **Honeywell** Project: **Onondaga Lake SCA IDS** Project/ Proposal No.: **GJ4299** Task No.: **04**

Layer No.	*11*	**Zone2-Above-GW-6**									
Initial Stress Reference Layer (top of layer)		*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*
Final Stress Reference Layer (top of layer)		*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)		417.26	417.24	417.28	417.92	417.90	418.07	418.26	422.63	421.47	420.14
Initial Effective Stress, σ'_i (kPa /psf)		944.46	1,000.45	1,058.17	1,061.12	1,061.19	1,054.43	1,047.30	936.62	1,022.10	1,097.96
Final Effective Stress, σ'_f (kPa/psf)		3,970.43	3,970.76	3,968.61	3,925.22	3,949.12	2,666.94	1,725.29	1,932.99	3,277.90	4,234.82
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*
OCR Manual Input Value		*2.0*	*2.0*	*2.0*	*2.0*	*2.0*	*2.0*	*2.0*	*2.0*	*2.0*	*2.0*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		1,889	2,001	2,116	2,122	2,111	2,120	2,100	1,880	2,044	2,196
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*
Modified Recompression Index, $C_{r\varepsilon}$		*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.11%*	*0.91%*	*0.91%*	*0.91%*
ratio of t2 / t1		*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*
Settlements											
Primary Settlement, (m / ft)		0.320	0.313	0.305	0.299	0.304	0.117	0.007	0.020	0.223	0.330
Secondary Settlement (m / ft)		0.017	0.018	0.019	0.019	0.019	0.019	0.002	0.017	0.019	0.020
Total Settlement (m / ft)		0.337	0.331	0.324	0.318	0.324	0.136	0.009	0.037	0.242	0.350
Elastic or Plastic (E/P)		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 11 (m / ft)		0.337	0.331	0.324	0.318	0.324	0.136	0.009	0.037	0.242	0.350
Layer No.	*12*	**Zone2-Above-GW-7**									
Initial Stress Reference Layer (top of layer)		*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*
Final Stress Reference Layer (top of layer)		*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)		415.16	415.03	414.93	415.57	415.55	415.73	415.94	420.56	419.21	417.71
Initial Effective Stress, σ'_i (kPa /psf)		1,116.18	1,182.35	1,250.57	1,254.05	1,254.14	1,246.14	1,237.72	1,106.92	1,207.94	1,297.59
Final Effective Stress, σ'_f (kPa/psf)		4,142.15	4,152.66	4,161.01	4,118.15	4,142.06	2,858.66	1,915.70	2,103.29	3,463.73	4,434.45
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*
OCR Manual Input Value		*2.0*	*2.0*	*2.0*	*2.0*	*2.0*	*2.0*	*2.0*	*2.0*	*2.0*	*2.0*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		2,232	2,365	2,501	2,508	2,497	2,504	2,481	2,221	2,416	2,595
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*
Modified Recompression Index, $C_{r\varepsilon}$		*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.11%*	*0.11%*	*0.91%*	*0.91%*
ratio of t2 / t1		*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*
Settlements											
Primary Settlement, (m / ft)		0.267	0.259	0.248	0.243	0.248	0.072	0.006	0.008	0.173	0.271
Secondary Settlement (m / ft)		0.017	0.018	0.019	0.019	0.019	0.019	0.002	0.002	0.019	0.020
Total Settlement (m / ft)		0.285	0.277	0.268	0.262	0.267	0.091	0.008	0.010	0.191	0.291
Elastic or Plastic (E/P)		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 12 (m / ft)		0.285	0.277	0.268	0.262	0.267	0.091	0.008	0.010	0.191	0.291
Layer No.	*13*	**Zone2-Above-GW-8**									
Initial Stress Reference Layer (top of layer)		*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*
Final Stress Reference Layer (top of layer)		*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)		413.07	412.81	412.59	413.21	413.19	413.40	413.62	418.48	416.94	415.27
Initial Effective Stress, σ'_i (kPa /psf)		1,288	1,364	1,443	1,447	1,447	1,438	1,428	1,277	1,394	1,497
Final Effective Stress, σ'_f (kPa/psf)		4,314	4,335	4,353	4,311	4,335	3,050	2,106	2,274	3,650	4,634
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*
OCR Manual Input Value		*2.0*	*2.0*	*2.0*	*2.0*	*2.0*	*2.0*	*2.0*	*2.0*	*2.0*	*2.0*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		2,576	2,728	2,886	2,894	2,883	2,887	2,862	2,561	2,788	2,994
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*
Modified Recompression Index, $C_{r\varepsilon}$		*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.11%*	*0.11%*	*0.91%*	*0.91%*
ratio of t2 / t1		*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*
Settlements											
Primary Settlement, (m / ft)		0.225	0.214	0.203	0.197	0.202	0.036	0.005	0.007	0.132	0.223
Secondary Settlement (m / ft)		0.017	0.018	0.019	0.019	0.019	0.019	0.002	0.002	0.019	0.020
Total Settlement (m / ft)		0.242	0.233	0.222	0.217	0.221	0.055	0.008	0.009	0.150	0.243
Elastic or Plastic (E/P)		p	p	p	p	p	p	p	p	p	p
		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 13 (m / ft)		0.242	0.233	0.222	0.217	0.221	0.055	0.008	0.009	0.150	0.243

Written by: **Yiwen Cao** Date: **6/10/2009** Reviewed by: **R. Kulasingam/Jay Beech** Date: **6/10/2009**

Client: **Honeywell** Project: **Onondaga Lake SCA IDS** Project/ Proposal No.: **GJ4299** Task No.: **04**

Layer No.	*14*	**Zone2-Above-GW-9**									
Initial Stress Reference Layer (top of layer)		*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*
Final Stress Reference Layer (top of layer)		*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)		410.98	410.59	410.24	410.86	410.84	411.06	411.29	416.40	414.67	412.84
Initial Effective Stress, σ'_i (kPa /psf)		1,460	1,546	1,635	1,640	1,640	1,630	1,619	1,448	1,580	1,697
Final Effective Stress, σ'_f (kPa/psf)		4,486	4,516	4,546	4,504	4,528	3,242	2,297	2,444	3,835	4,834
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*
OCR Manual Input Value		*2.0*	*2.0*	*2.0*	*2.0*	*2.0*	*2.0*	*2.0*	*2.0*	*2.0*	*1.0*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		2,919	3,092	3,271	3,280	3,269	3,271	3,242	2,902	3,159	1,697
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*
Modified Recompression Index, $C_{r\varepsilon}$		*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.11%*	*0.11%*	*0.11%*	*0.91%*	*0.91%*
ratio of t2 / t1		*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*
Settlements											
Primary Settlement, (m / ft)		0.189	0.177	0.164	0.159	0.163	0.010	0.005	0.007	0.097	0.509
Secondary Settlement (m / ft)		0.017	0.018	0.019	0.019	0.019	0.002	0.002	0.002	0.019	0.020
Total Settlement (m / ft)		0.206	0.195	0.183	0.178	0.182	0.012	0.007	0.009	0.116	0.529
Elastic or Plastic (E/P)		p	p	p	p	p	p	p	p	p	p
		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 14 (m / ft)		0.206	0.195	0.183	0.178	0.182	0.012	0.007	0.009	0.116	0.529
Layer No.	*15*	**Zone2-Above-GW-10**									
Initial Stress Reference Layer (top of layer)		*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*
Final Stress Reference Layer (top of layer)		*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)		408.88	408.37	407.90	408.51	408.49	408.72	408.97	414.33	412.41	410.40
Initial Effective Stress, σ'_i (kPa /psf)		1,631	1,728	1,828	1,833	1,833	1,821	1,809	1,618	1,765	1,896
Final Effective Stress, σ'_f (kPa/psf)		4,657	4,698	4,738	4,697	4,721	3,434	2,487	2,614	4,021	5,033
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*
OCR Manual Input Value		*2.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*2.0*	*1.0*	*1.0*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		3,263	1,728	1,828	1,833	1,827	1,827	1,812	3,243	1,765	1,896
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*
Modified Recompression Index, $C_{r\varepsilon}$		*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.11%*	*0.91%*	*0.91%*
ratio of t2 / t1		*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*
Settlements											
Primary Settlement, (m / ft)		0.158	0.443	0.446	0.442	0.445	0.295	0.147	0.006	0.373	0.475
Secondary Settlement (m / ft)		0.017	0.018	0.019	0.019	0.019	0.019	0.019	0.002	0.019	0.020
Total Settlement (m / ft)		0.175	0.461	0.466	0.462	0.464	0.314	0.166	0.008	0.391	0.495
Elastic or Plastic (E/P)		p	p	p	p	p	p	p	p	p	p
		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 15 (m / ft)		0.175	0.461	0.466	0.462	0.464	0.314	0.166	0.008	0.391	0.495
Layer No.	*16*	**Zone2-Above-GW-11**									
Initial Stress Reference Layer (top of layer)		*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*
Final Stress Reference Layer (top of layer)		*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)		406.79	406.15	405.55	406.15	406.13	406.38	406.65	412.25	410.14	407.97
Initial Effective Stress, σ'_i (kPa /psf)		1,803	1,910	2,020	2,026	2,026	2,013	1,999	1,788	1,951	2,096
Final Effective Stress, σ'_f (kPa/psf)		4,829	4,880	4,931	4,890	4,914	3,626	2,677	2,784	4,207	5,233
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*
OCR Manual Input Value		*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		1,803	1,910	2,020	2,026	2,020	2,019	2,002	1,792	1,951	2,096
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*
Modified Recompression Index, $C_{r\varepsilon}$		*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*
ratio of t2 / t1		*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*
Settlements											
Primary Settlement, (m / ft)		0.412	0.416	0.418	0.414	0.416	0.274	0.135	0.183	0.348	0.445
Secondary Settlement (m / ft)		0.017	0.018	0.019	0.019	0.019	0.019	0.019	0.017	0.019	0.020
Total Settlement (m / ft)		0.429	0.434	0.438	0.434	0.436	0.293	0.154	0.200	0.366	0.465
Elastic or Plastic (E/P)		p	p	p	p	p	p	p	p	p	p
		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 16 (m / ft)		0.429	0.434	0.438	0.434	0.436	0.293	0.154	0.200	0.366	0.465

Written by: **Yiwen Cao** Date: **6/10/2009** Reviewed by: **R. Kulasingam/Jay Beech** Date: **6/10/2009**

Client: **Honeywell** Project: **Onondaga Lake SCA IDS** Project/ Proposal No.: **GJ4299** Task No.: **04**

Layer No.	*17*	**Zone2-Above-GW-12**									
Initial Stress Reference Layer (top of layer)		*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*
Final Stress Reference Layer (top of layer)		*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)		404.69	403.93	403.20	403.80	403.78	404.04	404.33	410.17	407.88	405.54
Initial Effective Stress, σ'_i (kPa /psf)		1,975	2,092	2,213	2,219	2,219	2,205	2,190	1,958	2,137	2,296
Final Effective Stress, σ'_f (kPa/psf)		5,001	5,062	5,123	5,083	5,107	3,817	2,868	2,955	4,393	5,433
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*
OCR Manual Input Value		*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		1,975	2,092	2,213	2,219	2,213	2,210	2,192	1,962	2,137	2,296
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*
Modified Recompression Index, $C_{r\varepsilon}$		*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*
ratio of t2 / t1		*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*
Settlements											
Primary Settlement, (m / ft)		0.389	0.392	0.394	0.390	0.392	0.255	0.125	0.170	0.326	0.419
Secondary Settlement (m / ft)		0.017	0.018	0.019	0.019	0.019	0.019	0.019	0.017	0.019	0.020
Total Settlement (m / ft)		0.406	0.410	0.413	0.409	0.411	0.274	0.144	0.187	0.345	0.439
Elastic or Plastic (E/P)		p	p	p	p	p	p	p	p	p	p
		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 17 (m / ft)		0.406	0.410	0.413	0.409	0.411	0.274	0.144	0.187	0.345	0.439
Layer No.	*18*	**Zone2-Above-GW-13**									
Initial Stress Reference Layer (top of layer)		*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*
Final Stress Reference Layer (top of layer)		*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)		402.60	401.72	400.86	401.45	401.43	401.71	402.01	408.10	405.61	403.10
Initial Effective Stress, σ'_i (kPa /psf)		2,146	2,274	2,405	2,412	2,412	2,396	2,380	2,129	2,323	2,495
Final Effective Stress, σ'_f (kPa/psf)		5,172	5,244	5,315	5,276	5,300	4,009	3,058	3,125	4,579	5,632
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*
OCR Manual Input Value		*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		2,147	2,274	2,405	2,412	2,406	2,402	2,383	2,132	2,323	2,495
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*
Modified Recompression Index, $C_{r\varepsilon}$		*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*
ratio of t2 / t1		*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*
Settlements											
Primary Settlement, (m / ft)		0.368	0.370	0.372	0.368	0.370	0.239	0.116	0.159	0.307	0.396
Secondary Settlement (m / ft)		0.017	0.018	0.019	0.019	0.019	0.019	0.019	0.017	0.019	0.020
Total Settlement (m / ft)		0.385	0.389	0.391	0.387	0.389	0.258	0.135	0.176	0.326	0.416
Elastic or Plastic (E/P)		p	p	p	p	p	p	p	p	p	p
		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 18 (m / ft)		0.385	0.389	0.391	0.387	0.389	0.258	0.135	0.176	0.326	0.416
Layer No.	*19*	**Zone2-Above-GW-14**									
Initial Stress Reference Layer (top of layer)		*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*
Final Stress Reference Layer (top of layer)		*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)		400.50	399.50	398.51	399.10	399.07	399.37	399.68	406.02	403.34	400.67
Initial Effective Stress, σ'_i (kPa /psf)		2,318	2,456	2,597	2,605	2,605	2,588	2,571	2,299	2,509	2,695
Final Effective Stress, σ'_f (kPa/psf)		5,344	5,426	5,508	5,469	5,493	4,201	3,249	3,295	4,765	5,832
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*
OCR Manual Input Value		*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		2,318	2,456	2,597	2,605	2,599	2,594	2,573	2,302	2,509	2,695
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*
Modified Recompression Index, $C_{r\varepsilon}$		*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*
ratio of t2 / t1		*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*
Settlements											
Primary Settlement, (m / ft)		0.349	0.351	0.352	0.349	0.351	0.225	0.108	0.149	0.290	0.375
Secondary Settlement (m / ft)		0.017	0.018	0.019	0.019	0.019	0.019	0.019	0.017	0.019	0.020
Total Settlement (m / ft)		0.367	0.370	0.372	0.368	0.370	0.244	0.127	0.166	0.309	0.395
Elastic or Plastic (E/P)		p	p	p	p	p	p	p	p	p	p
		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 19 (m / ft)		0.367	0.370	0.372	0.368	0.370	0.244	0.127	0.166	0.309	0.395

Written by: **Yiwen Cao** Date: **6/10/2009** Reviewed by: **R. Kulasingam/Jay Beech** Date: **6/10/2009**

Client: **Honeywell** Project: **Onondaga Lake SCA IDS** Project/ Proposal No.: **GJ4299** Task No.: **04**

Layer No.	*20*	**Zone2-Above-GW-15**									
Initial Stress Reference Layer (top of layer)		*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*
Final Stress Reference Layer (top of layer)		*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)		398.41	397.28	396.16	396.74	396.72	397.03	397.36	403.94	401.08	398.23
Initial Effective Stress, σ'_i (kPa /psf)		2,490	2,638	2,790	2,797	2,798	2,780	2,761	2,469	2,695	2,895
Final Effective Stress, σ'_f (kPa/psf)		5,516	5,608	5,700	5,662	5,686	4,392	3,439	3,466	4,950	6,031
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*
OCR Manual Input Value		*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		2,490	2,638	2,790	2,797	2,792	2,786	2,764	2,473	2,695	2,894
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*
Modified Recompression Index, $C_{r\varepsilon}$		*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*
ratio of t2 / t1		*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*
Settlements											
Primary Settlement, (m / ft)		0.333	0.334	0.335	0.331	0.333	0.213	0.101	0.140	0.275	0.357
Secondary Settlement (m / ft)		0.017	0.018	0.019	0.019	0.019	0.019	0.019	0.017	0.019	0.020
Total Settlement (m / ft)		0.350	0.353	0.354	0.351	0.353	0.232	0.121	0.157	0.294	0.377
Elastic or Plastic (E/P)		p	p	p	p	p	p	p	p	p	p
		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 20 (m / ft)		0.350	0.353	0.354	0.351	0.353	0.232	0.121	0.157	0.294	0.377
Layer No.	*21*	**Zone2-Above-GW-16**									
Initial Stress Reference Layer (top of layer)		*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*
Final Stress Reference Layer (top of layer)		*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)		396.32	395.06	393.82	394.39	394.37	394.69	395.04	401.87	398.81	395.80
Initial Effective Stress, σ'_i (kPa /psf)		2,662	2,819	2,982	2,990	2,991	2,972	2,951	2,640	2,880	3,094
Final Effective Stress, σ'_f (kPa/psf)		5,688	5,790	5,893	5,855	5,879	4,584	3,629	3,636	5,136	6,231
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*
OCR Manual Input Value		*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		2,662	2,819	2,982	2,990	2,985	2,977	2,954	2,643	2,880	3,094
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*
Modified Recompression Index, $C_{r\varepsilon}$		*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*
ratio of t2 / t1		*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*
Settlements											
Primary Settlement, (m / ft)		0.318	0.319	0.319	0.316	0.318	0.202	0.096	0.132	0.262	0.340
Secondary Settlement (m / ft)		0.017	0.018	0.019	0.019	0.019	0.019	0.019	0.017	0.019	0.020
Total Settlement (m / ft)		0.335	0.337	0.339	0.335	0.337	0.221	0.115	0.149	0.280	0.360
Elastic or Plastic (E/P)		p	p	p	p	p	p	p	p	p	p
		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 21 (m / ft)		0.335	0.337	0.339	0.335	0.337	0.221	0.115	0.149	0.280	0.360
Layer No.	*22*	**Zone2-Above-GW-17**									
Initial Stress Reference Layer (top of layer)		*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*
Final Stress Reference Layer (top of layer)		*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)		394.22	392.84	391.47	392.04	392.02	392.35	392.72	399.79	396.54	393.36
Initial Effective Stress, σ'_i (kPa /psf)		2,833	3,001	3,175	3,183	3,184	3,163	3,142	2,810	3,066	3,294
Final Effective Stress, σ'_f (kPa/psf)		5,859	5,972	6,085	6,047	6,072	4,776	3,820	3,806	5,322	6,431
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*
OCR Manual Input Value		*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		2,833	3,001	3,175	3,183	3,178	3,169	3,145	2,813	3,066	3,294
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*
Modified Recompression Index, $C_{r\varepsilon}$		*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*
ratio of t2 / t1		*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*
Settlements											
Primary Settlement, (m / ft)		0.304	0.305	0.305	0.302	0.303	0.192	0.090	0.125	0.250	0.325
Secondary Settlement (m / ft)		0.017	0.018	0.019	0.019	0.019	0.019	0.019	0.017	0.019	0.020
Total Settlement (m / ft)		0.321	0.323	0.324	0.321	0.323	0.211	0.109	0.142	0.268	0.345
Elastic or Plastic (E/P)		p	p	p	p	p	p	p	p	p	p
		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 22 (m / ft)		0.321	0.323	0.324	0.321	0.323	0.211	0.109	0.142	0.268	0.345

Written by: **Yiwen Cao** Date: **6/10/2009** Reviewed by: **R. Kulasingam/Jay Beech** Date: **6/10/2009**

Client: **Honeywell** Project: **Onondaga Lake SCA IDS** Project/ Proposal No.: **GJ4299** Task No.: **04**

Layer No.	*23*	**Zone3-Above-GW-1**									
Initial Stress Reference Layer (top of layer)		*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*
Final Stress Reference Layer (top of layer)		*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)		393.18	391.73	390.30	390.70	390.81	391.18	391.56	398.75	395.41	392.15
Initial Effective Stress, σ'_i (kPa /psf)		2,919	3,092	3,271	3,293	3,283	3,259	3,237	2,895	3,159	3,394
Final Effective Stress, σ'_f (kPa/psf)		5,945	6,063	6,181	6,157	6,170	4,872	3,915	3,891	5,415	6,531
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*
OCR Manual Input Value		*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		2,919	3,092	3,271	3,293	3,277	3,265	3,240	2,898	3,159	3,394
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.380*	*0.380*	*0.380*	*0.380*	*0.380*	*0.380*	*0.380*	*0.380*	*0.380*	*0.380*
Modified Recompression Index, $C_{r\varepsilon}$		*0.021*	*0.021*	*0.021*	*0.021*	*0.021*	*0.021*	*0.021*	*0.021*	*0.021*	*0.021*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.70%*	*0.70%*	*0.70%*	*0.70%*	*0.70%*	*0.70%*	*0.70%*	*0.70%*	*0.70%*	*0.70%*
ratio of t2 / t1		*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*
Settlements											
Primary Settlement, (m / ft)		0.000	0.000	0.000	0.033	0.006	0.000	0.000	0.000	0.000	0.000
Secondary Settlement (m / ft)		0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000
Total Settlement (m / ft)		0.000	0.000	0.000	0.035	0.007	0.000	0.000	0.000	0.000	0.000
Elastic or Plastic (E/P)		p	p	p	p	p	p	p	p	p	p
		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 23 (m / ft)		0.000	0.000	0.000	0.035	0.007	0.000	0.000	0.000	0.000	0.000
Layer No.	*24*	**Zone3-Above-GW-2**									
Initial Stress Reference Layer (top of layer)		*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*
Final Stress Reference Layer (top of layer)		*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)		393.18	391.73	390.30	390.38	390.75	391.18	391.56	398.75	395.41	392.15
Initial Effective Stress, σ'_i (kPa /psf)		2,919	3,092	3,271	3,319	3,288	3,259	3,237	2,895	3,159	3,394
Final Effective Stress, σ'_f (kPa/psf)		5,945	6,063	6,181	6,183	6,175	4,872	3,915	3,891	5,415	6,531
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*
OCR Manual Input Value		*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		2,919	3,092	3,271	3,319	3,282	3,265	3,240	2,898	3,159	3,394
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.380*	*0.380*	*0.380*	*0.380*	*0.380*	*0.380*	*0.380*	*0.380*	*0.380*	*0.380*
Modified Recompression Index, $C_{r\varepsilon}$		*0.021*	*0.021*	*0.021*	*0.021*	*0.021*	*0.021*	*0.021*	*0.021*	*0.021*	*0.021*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.70%*	*0.70%*	*0.70%*	*0.70%*	*0.70%*	*0.70%*	*0.70%*	*0.70%*	*0.70%*	*0.70%*
ratio of t2 / t1		*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*
Settlements											
Primary Settlement, (m / ft)		0.000	0.000	0.000	0.033	0.006	0.000	0.000	0.000	0.000	0.000
Secondary Settlement (m / ft)		0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000
Total Settlement (m / ft)		0.000	0.000	0.000	0.035	0.007	0.000	0.000	0.000	0.000	0.000
Elastic or Plastic (E/P)		p	p	p	p	p	p	p	p	p	p
		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 24 (m / ft)		0.000	0.000	0.000	0.035	0.007	0.000	0.000	0.000	0.000	0.000
Layer No.	*25*	**Zone2-Below-GW-18**									
Initial Stress Reference Layer (top of layer)		*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*
Final Stress Reference Layer (top of layer)		*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)		393.18	391.73	390.30	390.22	390.72	391.18	391.56	398.75	395.41	392.15
Initial Effective Stress, σ'_i (kPa /psf)		2,919.23	3,092.29	3,270.71	3,332.51	3,290.01	3,259.14	3,237.11	2,895.01	3,159.22	3,393.68
Final Effective Stress, σ'_f (kPa/psf)		5,945.20	6,062.61	6,181.15	6,196.61	6,177.94	4,871.65	3,915.09	3,891.38	5,415.02	6,530.54
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*
OCR Manual Input Value		*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		2,919	3,092	3,271	3,333	3,284	3,265	3,240	2,898	3,159	3,394
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*
Modified Recompression Index, $C_{r\varepsilon}$		*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*
ratio of t2 / t1		*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*
Settlements											
Primary Settlement, (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Secondary Settlement (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total Settlement (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Elastic or Plastic (E/P)											
		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 25 (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Written by: **Yiwen Cao** Date: **6/10/2009** Reviewed by: **R. Kulasingam/Jay Beech** Date: **6/10/2009**

Client: **Honeywell** Project: **Onondaga Lake SCA IDS** Project/ Proposal No.: **GJ4299** Task No.: **04**

Layer No.	*26*	**Zone2-Below-GW-19**									
Initial Stress Reference Layer (top of layer)		*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*
Final Stress Reference Layer (top of layer)		*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)		393.18	391.73	390.30	390.22	390.72	391.18	391.56	398.75	395.41	392.15
Initial Effective Stress, σ'_i (kPa /psf)		2,919.23	3,092.29	3,270.71	3,332.51	3,290.01	3,259.14	3,237.11	2,895.01	3,159.22	3,393.68
Final Effective Stress, σ'_f (kPa/psf)		5,945.20	6,062.61	6,181.15	6,196.61	6,177.94	4,871.65	3,915.09	3,891.38	5,415.02	6,530.54
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*
OCR Manual Input Value		*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		2,919	3,092	3,271	3,333	3,284	3,265	3,240	2,898	3,159	3,394
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*
Modified Recompression Index, $C_{r\varepsilon}$		*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*
ratio of t2 / t1		*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*
Settlements											
Primary Settlement, (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Secondary Settlement (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total Settlement (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Elastic or Plastic (E/P)		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 26 (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Layer No.	*27*	**Zone3-Below-GW-3**									
Initial Stress Reference Layer (top of layer)		*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*
Final Stress Reference Layer (top of layer)		*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)		393.18	391.73	390.30	390.22	390.72	391.18	391.56	398.75	395.41	392.15
Initial Effective Stress, σ'_i (kPa /psf)		2,919.23	3,092.29	3,270.71	3,332.51	3,290.01	3,259.14	3,237.11	2,895.01	3,159.22	3,393.68
Final Effective Stress, σ'_f (kPa/psf)		5,945.20	6,062.61	6,181.15	6,196.61	6,177.94	4,871.65	3,915.09	3,891.38	5,415.02	6,530.54
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*
OCR Manual Input Value		*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		2,919	3,092	3,271	3,333	3,284	3,265	3,240	2,898	3,159	3,394
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.380*	*0.380*	*0.380*	*0.380*	*0.380*	*0.380*	*0.380*	*0.380*	*0.380*	*0.380*
Modified Recompression Index, $C_{r\varepsilon}$		*0.021*	*0.021*	*0.021*	*0.021*	*0.021*	*0.021*	*0.021*	*0.021*	*0.021*	*0.021*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.70%*	*0.70%*	*0.70%*	*0.70%*	*0.70%*	*0.70%*	*0.70%*	*0.70%*	*0.70%*	*0.70%*
ratio of t2 / t1		*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*
Settlements											
Primary Settlement, (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Secondary Settlement (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total Settlement (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Elastic or Plastic (E/P)		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 27 (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Written by: **Yiwen Cao** Date: **6/10/2009** Reviewed by: **R. Kulasingam/Jay Beech** Date: **6/10/2009**

Client: **Honeywell** Project: **Onondaga Lake SCA IDS** Project/ Proposal No.: **GJ4299** Task No.: **04**

	Layer No.	Material										
LAYER SETTLEMENT	1	*Null Layer*										
	2	*Dredge*										
	3	*Gravel*										
	4	*Clay*										
	5	*Dike*										
	6	*Zone2-Above-GW-1*	0.909	0.930	0.949	0.943	0.974	0.657	0.302	0.451	0.821	1.003
	7	*Zone2-Above-GW-2*	0.472	0.469	0.463	0.457	0.469	0.211	0.019	0.066	0.358	0.498
	8	*Zone2-Above-GW-3*	0.280	0.267	0.251	0.244	0.253	0.023	0.015	0.017	0.159	0.277
	9	*Zone2-Above-GW-4*	0.159	0.141	0.119	0.113	0.119	0.020	0.012	0.014	0.023	0.139
	10	*Zone2-Above-GW-5*	0.073	0.051	0.395	0.389	0.395	0.195	0.011	0.013	0.306	0.424
	11	*Zone2-Above-GW-6*	0.337	0.331	0.324	0.318	0.324	0.136	0.009	0.037	0.242	0.350
	12	*Zone2-Above-GW-7*	0.285	0.277	0.268	0.262	0.267	0.091	0.008	0.010	0.191	0.291
	13	*Zone2-Above-GW-8*	0.242	0.233	0.222	0.217	0.221	0.055	0.008	0.009	0.150	0.243
	14	*Zone2-Above-GW-9*	0.206	0.195	0.183	0.178	0.182	0.012	0.007	0.009	0.116	0.529
	15	*Zone2-Above-GW-10*	0.175	0.461	0.466	0.462	0.464	0.314	0.166	0.008	0.391	0.495
	16	*Zone2-Above-GW-11*	0.429	0.434	0.438	0.434	0.436	0.293	0.154	0.200	0.366	0.465
	17	*Zone2-Above-GW-12*	0.406	0.410	0.413	0.409	0.411	0.274	0.144	0.187	0.345	0.439
	18	*Zone2-Above-GW-13*	0.385	0.389	0.391	0.387	0.389	0.258	0.135	0.176	0.326	0.416
	19	*Zone2-Above-GW-14*	0.367	0.370	0.372	0.368	0.370	0.244	0.127	0.166	0.309	0.395
	20	*Zone2-Above-GW-15*	0.350	0.353	0.354	0.351	0.353	0.232	0.121	0.157	0.294	0.377
	21	*Zone2-Above-GW-16*	0.335	0.337	0.339	0.335	0.337	0.221	0.115	0.149	0.280	0.360
	22	*Zone2-Above-GW-17*	0.321	0.323	0.324	0.321	0.323	0.211	0.109	0.142	0.268	0.345
	23	*Zone3-Above-GW-1*	0.000	0.000	0.000	0.035	0.007	0.000	0.000	0.000	0.000	0.000
	24	*Zone3-Above-GW-2*	0.000	0.000	0.000	0.035	0.007	0.000	0.000	0.000	0.000	0.000
	25	*Zone2-Below-GW-18*	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	26	*Zone2-Below-GW-19*	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	27	*Zone3-Below-GW-3*	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	28											
	29	*Soil Above GW*										
	30	*Soil Below GW*										
		TOTAL SETTLEMENT	**5.73**	**5.97**	**6.27**	**6.26**	**6.30**	**3.45**	**1.46**	**1.81**	**4.95**	**7.05**
POST-SETTLEMENT ELEVATION(M/FT)	Line	1	456.76	456.73	456.67	456.97	457.08	445.15	436.35	441.91	453.40	461.13
	Line	2	456.76	456.73	456.67	456.97	457.08	445.15	436.35	441.91	453.40	461.13
	Line	3	426.76	426.73	426.67	426.97	427.16	430.23	432.37	437.10	433.59	431.13
	Line	4	425.30	425.35	425.46	425.75	425.92	428.99	431.21	435.19	431.58	429.00
	Line	5	423.05	423.47	423.92	424.60	424.54	427.48	429.57	432.24	428.99	426.49
	Line	6	423.05	423.47	423.92	424.60	424.54	427.48	429.57	432.24	428.99	426.49
	Line	7	421.86	422.19	422.52	423.19	423.16	425.80	427.55	430.62	427.55	425.05
	Line	8	420.24	420.44	420.63	421.30	421.28	423.67	425.25	428.61	425.64	423.12
	Line	9	418.42	418.49	418.54	419.19	419.18	421.36	422.94	426.55	423.53	420.96
	Line	10	416.49	416.41	416.31	416.95	416.94	419.04	420.63	424.49	421.29	418.66
	Line	11	414.47	414.24	414.36	414.98	414.98	416.90	418.32	422.42	419.33	416.65
	Line	12	412.71	412.35	412.34	412.95	412.96	414.70	416.01	420.38	417.30	414.57
	Line	13	410.90	410.41	410.26	410.86	410.87	412.45	413.69	418.32	415.23	412.43
	Line	14	409.05	408.43	408.14	408.72	408.74	410.17	411.38	416.25	413.11	410.23
	Line	15	407.16	406.40	405.97	406.55	406.57	407.84	409.06	414.18	410.96	408.33
	Line	16	405.24	404.65	404.09	404.66	404.68	405.82	406.91	412.11	409.09	406.39
	Line	17	403.58	402.86	402.18	402.74	402.76	403.77	404.74	410.23	407.19	404.42
	Line	18	401.89	401.05	400.25	400.79	400.82	401.71	402.56	408.34	405.26	402.42
	Line	19	400.18	399.23	398.30	398.83	398.86	399.63	400.37	406.44	403.32	400.41
	Line	20	398.45	397.38	396.32	396.84	396.87	397.54	398.18	404.53	401.37	398.37
	Line	21	396.71	395.51	394.33	394.84	394.87	395.43	395.98	402.61	399.39	396.31
	Line	22	394.95	393.63	392.32	392.82	392.86	393.31	393.77	400.69	397.41	394.23
	Line	23	393.18	391.73	390.30	390.79	390.83	391.18	391.56	398.75	395.41	392.15
	Line	24	393.18	391.73	390.30	390.50	390.77	391.18	391.56	398.75	395.41	392.15
	Line	25	393.18	391.73	390.30	390.22	390.72	391.18	391.56	398.75	395.41	392.15
	Line	26	393.18	391.73	390.30	390.22	390.72	391.18	391.56	398.75	395.41	392.15
	Line	27	393.18	391.73	390.30	390.22	390.72	391.18	391.56	398.75	395.41	392.15
	Line	28	393.18	391.73	390.30	390.22	390.72	391.18	391.56	398.75	395.41	392.15
	Line	29										
	Line	30										
	Line	31										

Written by: **Yiwen Cao** Date: **6/10/2009** Reviewed by: **R. Kulasingam/Jay Beech** Date: **6/10/2009**

Client: **Honeywell** Project: **Onondaga Lake SCA IDS** Project/ Proposal No.: **GJ4299** Task No.: **04**

Attachment 3

CASE 2: Calculations of Cover Settlement During Operations Period (Points 501 to 510)

Written by: **Yiwen Cao** Date: **6/10/2009** Reviewed by: **R. Kulasingam/Jay Beech** Date: **6/10/2009**

Client: **Honeywell** Project: **Onondaga Lake SCA IDS** Project/ Proposal No.: **GJ4299** Task No.: **04**

Settlement Prediction Model

Programmer: **Yiwen Cao, GeoSyntec Consultants**

Version Control V 1.002 11.14.2007

Project: **Onondaga Lake SCA 50%**

Notes:

Unit: **ft / psf**

Average Compaction Effort = **1440.00** kPa or psf

Consider Compaction Effort = **N** yes or no

Point #				**501**	**502**	**503**	**504**	**505**	**506**	**507**	**508**	**509**	**510**
Distance (meter or ft)				*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
ELEVATION(M/FT)	Line	1	Top of Year 4 Dredge	*462.49*	*462.70*	*462.94*	*463.23*	*463.38*	*448.59*	*437.81*	*443.72*	*458.35*	*468.17*
	Line	2	Top of Year 4 Dredge	*462.49*	*462.70*	*462.94*	*463.23*	*463.38*	*448.59*	*437.81*	*443.72*	*458.35*	*468.17*
	Line	3		*461.49*	*459.66*	*457.94*	*458.23*	*458.40*	*446.11*	*437.15*	*443.72*	*458.35*	*467.17*
	Line	4		*460.49*	*456.61*	*452.94*	*453.23*	*453.41*	*443.62*	*436.48*	*443.72*	*458.35*	*466.17*
	Line	5		*459.49*	*453.57*	*447.94*	*448.23*	*448.42*	*441.14*	*435.82*	*443.72*	*458.35*	*465.17*
	Line	6		*458.49*	*450.53*	*442.94*	*443.23*	*443.44*	*438.65*	*435.16*	*443.72*	*458.35*	*464.17*
	Line	7		*457.49*	*447.49*	*437.94*	*438.23*	*438.45*	*436.16*	*434.49*	*443.72*	*458.35*	*463.17*
	Line	8	Top of Year 3 Dredge	*456.49*	*444.45*	*432.94*	*433.23*	*433.46*	*433.68*	*433.83*	*443.72*	*458.35*	*462.17*
	Line	9		*455.63*	*444.45*	*432.94*	*433.23*	*433.46*	*433.68*	*433.83*	*443.72*	*458.09*	*461.32*
	Line	10		*454.78*	*444.45*	*432.94*	*433.23*	*433.46*	*433.68*	*433.83*	*443.72*	*457.83*	*460.46*
	Line	11		*453.92*	*444.45*	*432.94*	*433.23*	*433.46*	*433.68*	*433.83*	*443.72*	*457.57*	*459.60*
	Line	12		*453.06*	*444.45*	*432.94*	*433.23*	*433.46*	*433.68*	*433.83*	*443.72*	*457.31*	*458.74*
	Line	13		*452.21*	*444.45*	*432.94*	*433.23*	*433.46*	*433.68*	*433.83*	*443.72*	*457.06*	*457.89*
	Line	14		*451.35*	*444.45*	*432.94*	*433.23*	*433.46*	*433.68*	*433.83*	*443.72*	*456.80*	*457.03*
	Line	15	Top of Year 2 Dredge	*450.49*	*444.45*	*432.94*	*433.23*	*433.46*	*433.68*	*433.83*	*443.72*	*456.54*	*456.17*
	Line	16		*450.49*	*444.45*	*432.94*	*433.23*	*433.46*	*433.68*	*433.83*	*443.04*	*453.97*	*453.60*
	Line	17		*450.49*	*444.45*	*432.94*	*433.23*	*433.46*	*433.68*	*433.83*	*442.35*	*451.40*	*451.03*
	Line	18		*450.49*	*444.45*	*432.94*	*433.23*	*433.46*	*433.68*	*433.83*	*441.66*	*448.82*	*448.46*
	Line	19		*450.49*	*444.45*	*432.94*	*433.23*	*433.46*	*433.68*	*433.83*	*440.97*	*446.25*	*445.89*
	Line	20		*450.49*	*444.45*	*432.94*	*433.23*	*433.46*	*433.68*	*433.83*	*440.29*	*443.68*	*443.32*
	Line	21		*450.49*	*444.45*	*432.94*	*433.23*	*433.46*	*433.68*	*433.83*	*439.60*	*441.11*	*440.74*
	Line	22	Top of Year 1 Dredge	*450.49*	*444.45*	*432.94*	*433.23*	*433.46*	*433.68*	*433.83*	*438.91*	*438.54*	*438.17*
	Line	23		*447.49*	*442.49*	*432.94*	*433.23*	*433.46*	*433.68*	*433.83*	*438.91*	*438.54*	*438.17*
	Line	24		*444.49*	*440.53*	*432.94*	*433.23*	*433.46*	*433.68*	*433.83*	*438.91*	*438.54*	*438.17*
	Line	25		*441.49*	*438.57*	*432.94*	*433.23*	*433.46*	*433.68*	*433.83*	*438.91*	*438.54*	*438.17*
	Line	26		*438.49*	*436.61*	*432.94*	*433.23*	*433.46*	*433.68*	*433.83*	*438.91*	*438.54*	*438.17*
	Line	27		*435.49*	*434.66*	*432.94*	*433.23*	*433.46*	*433.68*	*433.83*	*438.91*	*438.54*	*438.17*
	Line	28	Top of Gravel(Top of Incompressil	*432.49*	*432.70*	*432.94*	*433.23*	*433.46*	*433.68*	*433.83*	*438.91*	*438.54*	*438.17*
	Line	29	GND for sigma_p	*428.78*	*429.45*	*430.19*	*430.86*	*430.77*	*431.00*	*431.07*	*434.10*	*433.94*	*433.53*
	Line	30	GW	*375.00*	*375.00*	*375.00*	*375.00*	*375.00*	*375.00*	*375.00*	*375.00*	*375.00*	*375.00*
	Line	31	ROCK	*432.49*	*432.70*	*432.94*	*433.23*	*433.46*	*433.68*	*433.83*	*438.91*	*438.54*	*438.17*
LAYER THICKNESS (M/FT)	Layer No.	From	To / Material										
	1	*1*	*2* / *Null Layer*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
	2	*2*	*3* / *YR4-1*	*1.00*	*3.04*	*5.00*	*5.00*	*4.99*	*2.49*	*0.66*	*0.00*	*0.00*	*1.00*
	3	*3*	*4* / *YR4-2*	*1.00*	*3.04*	*5.00*	*5.00*	*4.99*	*2.49*	*0.66*	*0.00*	*0.00*	*1.00*
	4	*4*	*5* / *YR4-3*	*1.00*	*3.04*	*5.00*	*5.00*	*4.99*	*2.49*	*0.66*	*0.00*	*0.00*	*1.00*
	5	*5*	*6* / *YR4-4*	*1.00*	*3.04*	*5.00*	*5.00*	*4.99*	*2.49*	*0.66*	*0.00*	*0.00*	*1.00*
	6	*6*	*7* / *YR4-5*	*1.00*	*3.04*	*5.00*	*5.00*	*4.99*	*2.49*	*0.66*	*0.00*	*0.00*	*1.00*
	7	*7*	*8* / *YR4-6*	*1.00*	*3.04*	*5.00*	*5.00*	*4.99*	*2.49*	*0.66*	*0.00*	*0.00*	*1.00*
	8	*8*	*9* / *YR3-1*	*0.86*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.26*	*0.86*
	9	*9*	*10* / *YR3-2*	*0.86*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.26*	*0.86*
	10	*10*	*11* / *YR3-3*	*0.86*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.26*	*0.86*
	11	*11*	*12* / *YR3-4*	*0.86*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.26*	*0.86*
	12	*12*	*13* / *YR3-5*	*0.86*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.26*	*0.86*
	13	*13*	*14* / *YR3-6*	*0.86*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.26*	*0.86*
	14	*14*	*15* / *YR3-7*	*0.86*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.26*	*0.86*
	15	*15*	*16* / *YR2-1*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.69*	*2.57*	*2.57*
	16	*16*	*17* / *YR2-2*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.69*	*2.57*	*2.57*
	17	*17*	*18* / *YR2-3*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.69*	*2.57*	*2.57*
	18	*18*	*19* / *YR2-4*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.69*	*2.57*	*2.57*
	19	*19*	*20* / *YR2-5*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.69*	*2.57*	*2.57*
	20	*20*	*21* / *YR2-6*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.69*	*2.57*	*2.57*
	21	*21*	*22* / *YR2-7*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.69*	*2.57*	*2.57*
	22	*22*	*23* / *YR1-1*	*3.00*	*1.96*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
	23	*23*	*24* / *YR1-2*	*3.00*	*1.96*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
	24	*24*	*25* / *YR1-3*	*3.00*	*1.96*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
	25	*25*	*26* / *YR1-4*	*3.00*	*1.96*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
	26	*26*	*27* / *YR1-5*	*3.00*	*1.96*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
	27	*27*	*28* / *YR1-6*	*3.00*	*1.96*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
	28												
	29												
	30												
	Thickness Check												
		From Line	To Line / SUM	*30.00*	*30.00*	*30.00*	*30.00*	*29.92*	*14.92*	*3.98*	*4.81*	*19.81*	*30.00*
		1	*28* / Thickness =	*30.00*	*30.00*	*30.00*	*30.00*	*29.92*	*14.92*	*3.98*	*4.81*	*19.81*	*30.00*
			Thickness Check	***OK***	***OK***	***OK***	***OK***	***OK***	***OK***	***OK***	***OK***	***OK***	***OK***

Written by: **Yiwen Cao** Date: **6/10/2009** Reviewed by: **R. Kulasingam/Jay Beech** Date: **6/10/2009**

Client: **Honeywell** Project: **Onondaga Lake SCA IDS** Project/ Proposal No.: **GJ4299** Task No.: **04**

	Layer No.	Material										
UNIT WEIGHT	1	*Null Layer*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*
	2	*YR4-1*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*
	3	*YR4-2*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*
	4	*YR4-3*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*
	5	*YR4-4*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*
	6	*YR4-5*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*
	7	*YR4-6*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*
	8	*YR3-1*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*
	9	*YR3-2*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*
	10	*YR3-3*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*
	11	*YR3-4*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*
	12	*YR3-5*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*
	13	*YR3-6*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*
	14	*YR3-7*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*
	15	*YR2-1*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*
	16	*YR2-2*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*
	17	*YR2-3*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*
	18	*YR2-4*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*
	19	*YR2-5*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*
	20	*YR2-6*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*
	21	*YR2-7*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*
	22	*YR1-1*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*
	23	*YR1-2*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*
	24	*YR1-3*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*
	25	*YR1-4*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*
	26	*YR1-5*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*
	27	*YR1-6*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*
	28											
	29		*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*
	30	*Soil below GW*	*19.6*	*19.6*	*19.6*	*19.6*	*19.6*	*19.6*	*19.6*	*19.6*	*19.6*	*19.6*
	Layer No.	***1*** **Null Layer**										
		Initial Stress Reference Layer (top of layer)	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
		Final Stress Reference Layer (top of layer)	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
		Midpoint Elevation, (m / ft)	462.49	462.70	462.94	463.23	463.38	448.59	437.81	443.72	458.35	468.17
		Initial Effective Stress, σ'_i (kPa /psf)	Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight
		Final Effective Stress, σ'_f (kPa/psf)	Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight
Elastic Method												
Modulus, E (kPa/psf)=		Strain										
		Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)												
Consolidation Properties												
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)												
OCR Manual Input Value												
OCR Computation Input												
Preconsolidation pressure, σ'_p (kPa / psf)												
Modified Primary Compression Index, $C_{c\varepsilon}$												
Modified Recompression Index, $C_{r\varepsilon}$												
Modified Secondary Compression Index, C_α												
ratio of t2 / t1												
Settlements												
Primary Settlement, (m / ft)												
Secondary Settlement (m / ft)												
Total Settlement (m / ft)												
		Elastic or Plastic (E/P)										
		Settlement of Layer 1 (m / ft)										

Written by: **Yiwen Cao** Date: **6/10/2009** Reviewed by: **R. Kulasingam/Jay Beech** Date: **6/10/2009**

Client: **Honeywell** Project: **Onondaga Lake SCA IDS** Project/ Proposal No.: **GJ4299** Task No.: **04**

Layer No.	*2*	**YR4-1**									
Initial Stress Reference Layer (top of layer)	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*
Final Stress Reference Layer (top of layer)	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)	461.99	461.18	460.44	460.73	460.89	447.35	437.48	443.72	458.35	467.67
Initial Effective Stress, σ'_i (kPa /psf)	43.00	130.80	215.00	215.00	214.41	106.91	28.51	0.00	0.00	43.00
Final Effective Stress, σ'_f (kPa/psf)	43.00	130.80	215.00	215.00	214.41	106.91	28.51	0.00	0.00	43.00
Elastic Method										
Modulus, E (kPa/psf)= Strain										
Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)										
Consolidation Properties										
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*
OCR Manual Input Value	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input										
Preconsolidation pressure, σ'_p (kPa / psf)	43	131	215	215	214	107	29	0	0	43
Modified Primary Compression Index, $C_{c\varepsilon}$	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*
Modified Recompression Index, $C_{r\varepsilon}$	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$	*0.08%*	*0.08%*	*0.08%*	*0.08%*	*0.08%*	*0.08%*	*0.08%*	*0.08%*	*0.08%*	*0.08%*
ratio of t2 / t1	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*
Settlements										
Primary Settlement, (m / ft)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Secondary Settlement (m / ft)	0.000	0.001	0.001	0.001	0.001	0.001	0.000	0.000	0.000	0.000
Total Settlement (m / ft)	0.000	0.001	0.001	0.001	0.001	0.001	0.000	0.000	0.000	0.000
Elastic or Plastic (E/P)	P	P	P	P	P	P	P	P	P	P
	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 2 (m / ft)	0.000	0.001	0.001	0.001	0.001	0.001	0.000	0.000	0.000	0.000
Layer No.	*3*	**YR4-2**									
Initial Stress Reference Layer (top of layer)	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*
Final Stress Reference Layer (top of layer)	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)	460.99	458.14	455.44	455.73	455.90	444.87	436.82	443.72	458.35	466.67
Initial Effective Stress, σ'_i (kPa /psf)	129.00	392.40	645.00	645.00	643.24	320.73	85.54	0.00	0.00	129.00
Final Effective Stress, σ'_f (kPa/psf)	129.00	392.40	645.00	645.00	643.24	320.73	85.54	0.00	0.00	129.00
Elastic Method										
Modulus, E (kPa/psf)= Strain										
Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)										
Consolidation Properties										
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*
OCR Manual Input Value	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input										
Preconsolidation pressure, σ'_p (kPa / psf)	129	392	645	645	643	321	86	0	0	129
Modified Primary Compression Index, $C_{c\varepsilon}$	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*
Modified Recompression Index, $C_{r\varepsilon}$	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$	*0.08%*	*0.08%*	*0.08%*	*0.08%*	*0.08%*	*0.08%*	*0.08%*	*0.08%*	*0.08%*	*0.08%*
ratio of t2 / t1	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*
Settlements										
Primary Settlement, (m / ft)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Secondary Settlement (m / ft)	0.000	0.001	0.001	0.001	0.001	0.001	0.000	0.000	0.000	0.000
Total Settlement (m / ft)	0.000	0.001	0.001	0.001	0.001	0.001	0.000	0.000	0.000	0.000
Elastic or Plastic (E/P)	P	P	P	P	P	P	P	P	P	P
	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 3 (m / ft)	0.000	0.001	0.001	0.001	0.001	0.001	0.000	0.000	0.000	0.000
Layer No.	*4*	**YR4-3**									
Initial Stress Reference Layer (top of layer)	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*
Final Stress Reference Layer (top of layer)	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)	459.99	455.09	450.44	450.73	450.92	442.38	436.15	443.72	458.35	465.67
Initial Effective Stress, σ'_i (kPa /psf)	215.00	654.00	1,075.00	1,075.00	1,072.06	534.55	142.56	0.00	0.00	215.00
Final Effective Stress, σ'_f (kPa/psf)	215.00	654.00	1,075.00	1,075.00	1,072.06	534.55	142.56	0.00	0.00	215.00
Elastic Method										
Modulus, E (kPa/psf)= Strain										
Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)										
Consolidation Properties										
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*
OCR Manual Input Value	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input										
Preconsolidation pressure, σ'_p (kPa / psf)	215	654	1,075	1,075	1,072	535	143	0	0	215
Modified Primary Compression Index, $C_{c\varepsilon}$	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*
Modified Recompression Index, $C_{r\varepsilon}$	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$	*0.08%*	*0.08%*	*0.08%*	*0.08%*	*0.08%*	*0.08%*	*0.08%*	*0.08%*	*0.08%*	*0.08%*
ratio of t2 / t1	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*
Settlements										
Primary Settlement, (m / ft)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Secondary Settlement (m / ft)	0.000	0.001	0.001	0.001	0.001	0.001	0.000	0.000	0.000	0.000
Total Settlement (m / ft)	0.000	0.001	0.001	0.001	0.001	0.001	0.000	0.000	0.000	0.000
Elastic or Plastic (E/P)	P	P	P	P	P	P	P	P	P	P
	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 4 (m / ft)	0.000	0.001	0.001	0.001	0.001	0.001	0.000	0.000	0.000	0.000

Written by: **Yiwen Cao** Date: **6/10/2009** Reviewed by: **R. Kulasingam/Jay Beech** Date: **6/10/2009**

Client: **Honeywell** Project: **Onondaga Lake SCA IDS** Project/ Proposal No.: **GJ4299** Task No.: **04**

Layer No.	*5*	**YR4-4**									
Initial Stress Reference Layer (top of layer)	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*
Final Stress Reference Layer (top of layer)	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)	458.99	452.05	445.44	445.73	445.93	439.89	435.49	443.72	458.35	464.67
Initial Effective Stress, σ'_i (kPa /psf)	301.00	915.60	1,505.00	1,505.00	1,500.89	748.37	199.58	0.00	0.00	301.00
Final Effective Stress, σ'_f (kPa/psf)	301.00	915.60	1,505.00	1,505.00	1,500.89	748.37	199.58	0.00	0.00	301.00
Elastic Method										
Modulus, E (kPa/psf)= Strain										
Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)										
Consolidation Properties										
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*
OCR Manual Input Value	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input										
Preconsolidation pressure, σ'_p (kPa / psf)	301	916	1,505	1,505	1,501	748	200	0	0	301
Modified Primary Compression Index, $C_{c\varepsilon}$	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*
Modified Recompression Index, $C_{r\varepsilon}$	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$	*0.08%*	*0.08%*	*0.08%*	*0.08%*	*0.08%*	*0.08%*	*0.08%*	*0.08%*	*0.08%*	*0.08%*
ratio of t2 / t1	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*
Settlements										
Primary Settlement, (m / ft)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Secondary Settlement (m / ft)	0.00024	0.00073	0.00120	0.00120	0.00120	0.00060	0.00016	0.00000	0.00000	0.00024
Total Settlement (m / ft)	0.000	0.001	0.001	0.001	0.001	0.001	0.000	0.000	0.000	0.000
Elastic or Plastic (E/P)	P	P	P	P	P	P	P	P	P	P
	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 5 (m / ft)	0.000	0.001	0.001	0.001	0.001	0.001	0.000	0.000	0.000	0.000
Layer No.	*6*	**YR4-5**									
Initial Stress Reference Layer (top of layer)	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*
Final Stress Reference Layer (top of layer)	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)	457.99	449.01	440.44	440.73	440.94	437.41	434.83	443.72	458.35	463.67
Initial Effective Stress, σ'_i (kPa /psf)	387.00	1,177.20	1,935.00	1,935.00	1,929.71	962.19	256.61	0.00	0.00	387.00
Final Effective Stress, σ'_f (kPa/psf)	387.00	1,177.20	1,935.00	1,935.00	1,929.71	962.19	256.61	0.00	0.00	387.00
Elastic Method										
Modulus, E (kPa/psf)= Strain										
Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)										
Consolidation Properties										
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*
OCR Manual Input Value	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input										
Preconsolidation pressure, σ'_p (kPa / psf)	387	1,177	1,935	1,935	1,930	962	257	0	0	387
Modified Primary Compression Index, $C_{c\varepsilon}$	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*
Modified Recompression Index, $C_{r\varepsilon}$	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$	*0.08%*	*0.08%*	*0.08%*	*0.08%*	*0.08%*	*0.08%*	*0.08%*	*0.08%*	*0.08%*	*0.08%*
ratio of t2 / t1	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*
Settlements										
Primary Settlement, (m / ft)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Secondary Settlement (m / ft)	0.000	0.001	0.001	0.001	0.001	0.001	0.000	0.000	0.000	0.000
Total Settlement (m / ft)	0.000	0.001	0.001	0.001	0.001	0.001	0.000	0.000	0.000	0.000
Elastic or Plastic (E/P)	P	P	P	P	P	P	P	P	P	P
	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 6 (m / ft)	0.000	0.001	0.001	0.001	0.001	0.001	0.000	0.000	0.000	0.000
Layer No.	*7*	**YR4-6**									
Initial Stress Reference Layer (top of layer)	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*
Final Stress Reference Layer (top of layer)	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)	456.99	445.97	435.44	435.73	435.96	434.92	434.16	443.72	458.35	462.67
Initial Effective Stress, σ'_i (kPa /psf)	473.00	1,438.80	2,365.00	2,365.00	2,358.54	1,176.01	313.63	0.00	0.00	473.00
Final Effective Stress, σ'_f (kPa/psf)	473.00	1,438.80	2,365.00	2,365.00	2,358.54	1,176.01	313.63	0.00	0.00	473.00
Elastic Method										
Modulus, E (kPa/psf)= Strain										
Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)										
Consolidation Properties										
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*
OCR Manual Input Value	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input										
Preconsolidation pressure, σ'_p (kPa / psf)	473	1,439	2,365	2,365	2,359	1,176	314	0	0	473
Modified Primary Compression Index, $C_{c\varepsilon}$	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*
Modified Recompression Index, $C_{r\varepsilon}$	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$	*0.08%*	*0.08%*	*0.08%*	*0.08%*	*0.08%*	*0.08%*	*0.08%*	*0.08%*	*0.08%*	*0.08%*
ratio of t2 / t1	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*
Settlements										
Primary Settlement, (m / ft)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Secondary Settlement (m / ft)	0.000	0.001	0.001	0.001	0.001	0.001	0.000	0.000	0.000	0.000
Total Settlement (m / ft)	0.000	0.001	0.001	0.001	0.001	0.001	0.000	0.000	0.000	0.000
Elastic or Plastic (E/P)										
	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 7 (m / ft)	0.000	0.001	0.001	0.001	0.001	0.001	0.000	0.000	0.000	0.000

Written by: **Yiwen Cao** Date: **6/10/2009** Reviewed by: **R. Kulasingam/Jay Beech** Date: **6/10/2009**

Client: **Honeywell** Project: **Onondaga Lake SCA IDS** Project/ Proposal No.: **GJ4299** Task No.: **04**

Layer No. *8* **YR3-1**											
Initial Stress Reference Layer (top of layer)		*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*
Final Stress Reference Layer (top of layer)		*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)		456.06	444.45	432.94	433.23	433.46	433.68	433.83	443.72	458.22	461.74
Initial Effective Stress, σ'_i (kPa /psf)		36.86	0.00	0.00	0.00	0.00	0.00	0.00	0.01	11.12	36.86
Final Effective Stress, σ'_f (kPa/psf)		552.86	1,569.59	2,580.00	2,580.00	2,572.95	1,282.92	342.14	0.01	11.12	552.86
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*
OCR Manual Input Value		*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		37	0	0	0	0	0	0	0	11	37
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*
Modified Recompression Index, $C_{r\varepsilon}$		*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.08%*	*0.08%*	*0.60%*
ratio of t2 / t1		*4*	*4*	*4*	*4*	*4*	*4*	*4*	*4*	*4*	*4*
Settlements											
Primary Settlement, (m / ft)		0.294	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.294
Secondary Settlement (m / ft)		0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003
Total Settlement (m / ft)		0.297	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.297
Elastic or Plastic (E/P)		P	P	P	P	P	P	P	P	P	P
		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 8 (m / ft)		0.297	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.297
Layer No. *9* **YR3-2**											
Initial Stress Reference Layer (top of layer)		*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*
Final Stress Reference Layer (top of layer)		*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)		455.21	444.45	432.94	433.23	433.46	433.68	433.83	443.72	457.96	460.89
Initial Effective Stress, σ'_i (kPa /psf)		110.57	0.00	0.00	0.00	0.00	0.00	0.00	0.02	33.37	110.57
Final Effective Stress, σ'_f (kPa/psf)		626.57	1,569.59	2,580.00	2,580.00	2,572.95	1,282.92	342.14	0.02	33.37	626.57
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*
OCR Manual Input Value		*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		111	0	0	0	0	0	0	0	33	111
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*
Modified Recompression Index, $C_{r\varepsilon}$		*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.08%*	*0.08%*	*0.60%*
ratio of t2 / t1		*4*	*4*	*4*	*4*	*4*	*4*	*4*	*4*	*4*	*4*
Settlements											
Primary Settlement, (m / ft)		0.188	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.188
Secondary Settlement (m / ft)		0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003
Total Settlement (m / ft)		0.191	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.191
Elastic or Plastic (E/P)		P	P	P	P	P	P	P	P	P	P
		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 9 (m / ft)		0.191	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.191
Layer No. *10* **YR3-3**											
Initial Stress Reference Layer (top of layer)		*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*
Final Stress Reference Layer (top of layer)		*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)		454.35	444.45	432.94	433.23	433.46	433.68	433.83	443.72	457.70	460.03
Initial Effective Stress, σ'_i (kPa /psf)		184.29	0.00	0.00	0.00	0.00	0.00	0.00	0.03	55.61	184.29
Final Effective Stress, σ'_f (kPa/psf)		700.29	1,569.59	2,580.00	2,580.00	2,572.95	1,282.92	342.14	0.03	55.61	700.29
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*
OCR Manual Input Value		*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		184	0	0	0	0	0	0	0	56	184
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*
Modified Recompression Index, $C_{r\varepsilon}$		*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.08%*	*0.08%*	*0.60%*
ratio of t2 / t1		*4*	*4*	*4*	*4*	*4*	*4*	*4*	*4*	*4*	*4*
Settlements											
Primary Settlement, (m / ft)		0.145	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.145
Secondary Settlement (m / ft)		0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003
Total Settlement (m / ft)		0.148	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.148
Elastic or Plastic (E/P)		P	P	P	P	P	P	P	P	P	P
		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 10 (m / ft)		0.148	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.148

Written by: **Yiwen Cao** Date: **6/10/2009** Reviewed by: **R. Kulasingam/Jay Beech** Date: **6/10/2009**

Client: **Honeywell** Project: **Onondaga Lake SCA IDS** Project/ Proposal No.: **GJ4299** Task No.: **04**

Layer No. *11* **YR3-4**											
Initial Stress Reference Layer (top of layer)		*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*
Final Stress Reference Layer (top of layer)		*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)		453.49	444.45	432.94	433.23	433.46	433.68	433.83	443.72	457.44	459.17
Initial Effective Stress, σ'_i (kPa /psf)		258.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	77.86	258.00
Final Effective Stress, σ'_f (kPa/psf)		774.00	1,569.59	2,580.00	2,580.00	2,572.95	1,282.92	342.14	0.04	77.86	774.00
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*
OCR Manual Input Value		*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		258	0	0	0	0	0	0	0	78	258
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*
Modified Recompression Index, $C_{r\varepsilon}$		*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.08%*	*0.08%*	*0.60%*
ratio of t2 / t1		*4*	*4*	*4*	*4*	*4*	*4*	*4*	*4*	*4*	*4*
Settlements											
Primary Settlement, (m / ft)		0.119	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.119
Secondary Settlement (m / ft)		0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003
Total Settlement (m / ft)		0.122	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.122
Elastic or Plastic (E/P)		P	P	P	P	P	P	P	P	P	P
		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 11 (m / ft)		0.122	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.122
Layer No. *12* **YR3-5**											
Initial Stress Reference Layer (top of layer)		*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*
Final Stress Reference Layer (top of layer)		*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)		452.63	444.45	432.94	433.23	433.46	433.68	433.83	443.72	457.18	458.32
Initial Effective Stress, σ'_i (kPa /psf)		331.71	0.00	0.00	0.00	0.00	0.00	0.00	0.06	100.10	331.71
Final Effective Stress, σ'_f (kPa/psf)		847.71	1,569.59	2,580.00	2,580.00	2,572.95	1,282.92	342.14	0.06	100.10	847.71
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*
OCR Manual Input Value		*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		332	0	0	0	0	0	0	0	100	332
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*
Modified Recompression Index, $C_{r\varepsilon}$		*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.08%*	*0.08%*	*0.60%*
ratio of t2 / t1		*4*	*4*	*4*	*4*	*4*	*4*	*4*	*4*	*4*	*4*
Settlements											
Primary Settlement, (m / ft)		0.102	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.102
Secondary Settlement (m / ft)		0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003
Total Settlement (m / ft)		0.105	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.105
Elastic or Plastic (E/P)		P	P	P	P	P	P	P	P	P	P
		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 12 (m / ft)		0.105	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.105
Layer No. *13* **YR3-6**											
Initial Stress Reference Layer (top of layer)		*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*
Final Stress Reference Layer (top of layer)		*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)		451.78	444.45	432.94	433.23	433.46	433.68	433.83	443.72	456.93	457.46
Initial Effective Stress, σ'_i (kPa /psf)		405	0	0	0	0	0	0	0	122	405
Final Effective Stress, σ'_f (kPa/psf)		921	1,570	2,580	2,580	2,573	1,283	342	0	122	921
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*
OCR Manual Input Value		*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		405	0	0	0	0	0	0	0	122	405
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*
Modified Recompression Index, $C_{r\varepsilon}$		*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.08%*	*0.08%*	*0.60%*
ratio of t2 / t1		*4*	*4*	*4*	*4*	*4*	*4*	*4*	*4*	*4*	*4*
Settlements											
Primary Settlement, (m / ft)		0.089	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.089
Secondary Settlement (m / ft)		0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003
Total Settlement (m / ft)		0.092	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.092
Elastic or Plastic (E/P)		P	P	P	P	P	P	P	P	P	P
		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 13 (m / ft)		0.092	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.092

Written by: **Yiwen Cao** Date: **6/10/2009** Reviewed by: **R. Kulasingam/Jay Beech** Date: **6/10/2009**

Client: **Honeywell** Project: **Onondaga Lake SCA IDS** Project/ Proposal No.: **GJ4299** Task No.: **04**

Layer No. *14* **YR3-7**											
Initial Stress Reference Layer (top of layer)		*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*
Final Stress Reference Layer (top of layer)		*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)		450.92	444.45	432.94	433.23	433.46	433.68	433.83	443.72	456.67	456.60
Initial Effective Stress, σ'_i (kPa /psf)		479	0	0	0	0	0	0	0	145	479
Final Effective Stress, σ'_f (kPa/psf)		995	1,570	2,580	2,580	2,573	1,283	342	0	145	995
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*
OCR Manual Input Value		*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		479	0	0	0	0	0	0	0	145	479
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*
Modified Recompression Index, $C_{r\varepsilon}$		*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.08%*	*0.08%*	*0.60%*
ratio of t2 / t1		*4*	*4*	*4*	*4*	*4*	*4*	*4*	*4*	*4*	*4*
Settlements											
Primary Settlement, (m / ft)		0.079	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.079
Secondary Settlement (m / ft)		0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003
Total Settlement (m / ft)		0.082	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.082
Elastic or Plastic (E/P)		P	P	P	P	P	P	P	P	P	P
		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 14 (m / ft)		0.082	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.082
Layer No. *15* **YR2-1**											
Initial Stress Reference Layer (top of layer)		*15*	*15*	*15*	*15*	*15*	*15*	*15*	*15*	*15*	*15*
Final Stress Reference Layer (top of layer)		*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)		450.49	444.45	432.94	433.23	433.46	433.68	433.83	443.38	455.25	454.89
Initial Effective Stress, σ'_i (kPa /psf)		0	0	0	0	0	0	0	30	111	111
Final Effective Stress, σ'_f (kPa/psf)		1,032	1,570	2,580	2,580	2,573	1,283	342	30	266	1,143
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*
OCR Manual Input Value		*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		0	0	0	0	0	0	0	30	111	111
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*
Modified Recompression Index, $C_{r\varepsilon}$		*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*
ratio of t2 / t1		*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*
Settlements											
Primary Settlement, (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.286	0.760
Secondary Settlement (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.012	0.012
Total Settlement (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.298	0.772
Elastic or Plastic (E/P)		P	P	P	P	P	P	P	P	P	P
		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 15 (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.298	0.772
Layer No. *16* **YR2-2**											
Initial Stress Reference Layer (top of layer)		*15*	*15*	*15*	*15*	*15*	*15*	*15*	*15*	*15*	*15*
Final Stress Reference Layer (top of layer)		*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)		450.49	444.45	432.94	433.23	433.46	433.68	433.83	442.69	452.68	452.32
Initial Effective Stress, σ'_i (kPa /psf)		0	0	0	0	0	0	0	89	332	332
Final Effective Stress, σ'_f (kPa/psf)		1,032	1,570	2,580	2,580	2,573	1,283	342	89	487	1,364
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*
OCR Manual Input Value		*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		0	0	0	0	0	0	0	89	332	332
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*
Modified Recompression Index, $C_{r\varepsilon}$		*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*
ratio of t2 / t1		*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*
Settlements											
Primary Settlement, (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.125	0.460
Secondary Settlement (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.012	0.012
Total Settlement (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.137	0.472
Elastic or Plastic (E/P)		P	P	P	P	P	P	P	P	P	P
		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 16 (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.137	0.472

Written by: **Yiwen Cao** Date: **6/10/2009** Reviewed by: **R. Kulasingam/Jay Beech** Date: **6/10/2009**

Client: **Honeywell** Project: **Onondaga Lake SCA IDS** Project/ Proposal No.: **GJ4299** Task No.: **04**

Layer No. *17* **YR2-3**											
Initial Stress Reference Layer (top of layer)		*15*	*15*	*15*	*15*	*15*	*15*	*15*	*15*	*15*	*15*
Final Stress Reference Layer (top of layer)		*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)		450.49	444.45	432.94	433.23	433.46	433.68	433.83	442.00	450.11	449.74
Initial Effective Stress, σ'_i (kPa /psf)		0	0	0	0	0	0	0	148	553	553
Final Effective Stress, σ'_f (kPa/psf)		1,032	1,570	2,580	2,580	2,573	1,283	342	148	709	1,585
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*
OCR Manual Input Value		*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		0	0	0	0	0	0	0	148	553	553
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*
Modified Recompression Index, $C_{r\varepsilon}$		*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*
ratio of t2 / t1		*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*
Settlements											
Primary Settlement, (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.081	0.343
Secondary Settlement (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.012	0.012
Total Settlement (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.093	0.355
Elastic or Plastic (E/P)		P	P	P	P	P	P	P	P	P	P
		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 17 (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.093	0.355
Layer No. *18* **YR2-4**											
Initial Stress Reference Layer (top of layer)		*15*	*15*	*15*	*15*	*15*	*15*	*15*	*15*	*15*	*15*
Final Stress Reference Layer (top of layer)		*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)		450.49	444.45	432.94	433.23	433.46	433.68	433.83	441.32	447.54	447.17
Initial Effective Stress, σ'_i (kPa /psf)		0	0	0	0	0	0	0	207	774	774
Final Effective Stress, σ'_f (kPa/psf)		1,032	1,570	2,580	2,580	2,573	1,283	342	207	930	1,806
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*
OCR Manual Input Value		*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		0	0	0	0	0	0	0	207	774	774
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*
Modified Recompression Index, $C_{r\varepsilon}$		*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*
ratio of t2 / t1		*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*
Settlements											
Primary Settlement, (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.060	0.276
Secondary Settlement (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.012	0.012
Total Settlement (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.072	0.288
Elastic or Plastic (E/P)		P	P	P	P	P	P	P	P	P	P
		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 18 (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.072	0.288
Layer No. *19* **YR2-5**											
Initial Stress Reference Layer (top of layer)		*15*	*15*	*15*	*15*	*15*	*15*	*15*	*15*	*15*	*15*
Final Stress Reference Layer (top of layer)		*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)		450.49	444.45	432.94	433.23	433.46	433.68	433.83	440.63	444.97	444.60
Initial Effective Stress, σ'_i (kPa /psf)		0	0	0	0	0	0	0	266	995	995
Final Effective Stress, σ'_f (kPa/psf)		1,032	1,570	2,580	2,580	2,573	1,283	342	266	1,151	2,027
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*
OCR Manual Input Value		*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		0	0	0	0	0	0	0	266	995	995
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*
Modified Recompression Index, $C_{r\varepsilon}$		*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*
ratio of t2 / t1		*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*
Settlements											
Primary Settlement, (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.047	0.231
Secondary Settlement (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.012	0.012
Total Settlement (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.059	0.243
Elastic or Plastic (E/P)		P	P	P	P	P	P	P	P	P	P
		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 19 (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.059	0.243

Written by: **Yiwen Cao** Date: **6/10/2009** Reviewed by: **R. Kulasingam/Jay Beech** Date: **6/10/2009**

Client: **Honeywell** Project: **Onondaga Lake SCA IDS** Project/ Proposal No.: **GJ4299** Task No.: **04**

Layer No.	*20*	**YR2-6**									
Initial Stress Reference Layer (top of layer)	*15*	*15*	*15*	*15*	*15*	*15*	*15*	*15*	*15*	*15*
Final Stress Reference Layer (top of layer)	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)	450.49	444.45	432.94	433.23	433.46	433.68	433.83	439.94	442.40	442.03
Initial Effective Stress, σ'_i (kPa /psf)	0	0	0	0	0	0	0	325	1,216	1,216
Final Effective Stress, σ'_f (kPa/psf)	1,032	1,570	2,580	2,580	2,573	1,283	342	325	1,372	2,248
Elastic Method										
Modulus, E (kPa/psf)= Strain										
Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)										
Consolidation Properties										
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*
OCR Manual Input Value	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input										
Preconsolidation pressure, σ'_p (kPa / psf)	0	0	0	0	0	0	0	325	1,216	1,216
Modified Primary Compression Index, $C_{c\varepsilon}$	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*
Modified Recompression Index, $C_{r\varepsilon}$	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*
ratio of t2 / t1	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*
Settlements										
Primary Settlement, (m / ft)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.039	0.200
Secondary Settlement (m / ft)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.012	0.012
Total Settlement (m / ft)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.051	0.212
Elastic or Plastic (E/P)	P	P	P	P	P	P	P	P	P	P
	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 20 (m / ft)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.051	0.212
Layer No.	*21*	**YR2-7**								
Initial Stress Reference Layer (top of layer)	*15*	*15*	*15*	*15*	*15*	*15*	*15*	*15*	*15*	*15*
Final Stress Reference Layer (top of layer)	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)	450.49	444.45	432.94	433.23	433.46	433.68	433.83	439.25	439.82	439.46
Initial Effective Stress, σ'_i (kPa /psf)	0	0	0	0	0	0	0	384	1,437	1,437
Final Effective Stress, σ'_f (kPa/psf)	1,032	1,570	2,580	2,580	2,573	1,283	342	384	1,593	2,469
Elastic Method										
Modulus, E (kPa/psf)= Strain										
Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)										
Consolidation Properties										
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*
OCR Manual Input Value	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input										
Preconsolidation pressure, σ'_p (kPa / psf)	0	0	0	0	0	0	0	384	1,437	1,437
Modified Primary Compression Index, $C_{c\varepsilon}$	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*
Modified Recompression Index, $C_{r\varepsilon}$	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*
ratio of t2 / t1	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*
Settlements										
Primary Settlement, (m / ft)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.033	0.176
Secondary Settlement (m / ft)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.012	0.012
Total Settlement (m / ft)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.045	0.188
Elastic or Plastic (E/P)	P	P	P	P	P	P	P	P	P	P
	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 21 (m / ft)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.045	0.188
Layer No.	*22*	**YR1-1**								
Initial Stress Reference Layer (top of layer)	*22*	*22*	*22*	*22*	*22*	*22*	*22*	*22*	*22*	*22*
Final Stress Reference Layer (top of layer)	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)	448.99	443.47	432.94	433.23	433.46	433.68	433.83	438.91	438.54	438.17
Initial Effective Stress, σ'_i (kPa /psf)	129	84	0	0	0	0	0	0	0	0
Final Effective Stress, σ'_f (kPa/psf)	1,161	1,654	2,580	2,580	2,573	1,283	342	414	1,704	2,580
Elastic Method										
Modulus, E (kPa/psf)= Strain										
Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)										
Consolidation Properties										
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*
OCR Manual Input Value	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input										
Preconsolidation pressure, σ'_p (kPa / psf)	129	84	0	0	0	0	0	0	0	0
Modified Primary Compression Index, $C_{c\varepsilon}$	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*
Modified Recompression Index, $C_{r\varepsilon}$	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*
ratio of t2 / t1	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*
Settlements										
Primary Settlement, (m / ft)	0.834	0.738	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Secondary Settlement (m / ft)	0.016	0.011	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total Settlement (m / ft)	0.850	0.748	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Elastic or Plastic (E/P)	P	P	P	P	P	P	P	P	P	P
	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 22 (m / ft)	0.850	0.748	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Written by: **Yiwen Cao** Date: **6/10/2009** Reviewed by: **R. Kulasingam/Jay Beech** Date: **6/10/2009**

Client: **Honeywell** Project: **Onondaga Lake SCA IDS** Project/ Proposal No.: **GJ4299** Task No.: **04**

Layer No. *23* **YR1-2**											
Initial Stress Reference Layer (top of layer)		*22*	*22*	*22*	*22*	*22*	*22*	*22*	*22*	*22*	*22*
Final Stress Reference Layer (top of layer)		*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)		445.99	441.51	432.94	433.23	433.46	433.68	433.83	438.91	438.54	438.17
Initial Effective Stress, σ'_i (kPa /psf)		387	253	0	0	0	0	0	0	0	0
Final Effective Stress, σ'_f (kPa/psf)		1,419	1,822	2,580	2,580	2,573	1,283	342	414	1,704	2,580
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*
OCR Manual Input Value		*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		387	253	0	0	0	0	0	0	0	0
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*
Modified Recompression Index, $C_{r\varepsilon}$		*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*
ratio of t2 / t1		*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*
Settlements											
Primary Settlement, (m / ft)		0.493	0.490	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Secondary Settlement (m / ft)		0.016	0.011	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total Settlement (m / ft)		0.509	0.500	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Elastic or Plastic (E/P)		P	P	P	P	P	P	P	P	P	P
		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 23 (m / ft)		0.509	0.500	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Layer No. *24* **YR1-3**											
Initial Stress Reference Layer (top of layer)		*22*	*22*	*22*	*22*	*22*	*22*	*22*	*22*	*22*	*22*
Final Stress Reference Layer (top of layer)		*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)		442.99	439.55	432.94	433.23	433.46	433.68	433.83	438.91	438.54	438.17
Initial Effective Stress, σ'_i (kPa /psf)		645	421	0	0	0	0	0	0	0	0
Final Effective Stress, σ'_f (kPa/psf)		1,677	1,991	2,580	2,580	2,573	1,283	342	414	1,704	2,580
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*
OCR Manual Input Value		*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		645	421	0	0	0	0	0	0	0	0
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*
Modified Recompression Index, $C_{r\varepsilon}$		*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*
ratio of t2 / t1		*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*
Settlements											
Primary Settlement, (m / ft)		0.363	0.385	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Secondary Settlement (m / ft)		0.016	0.011	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total Settlement (m / ft)		0.379	0.396	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Elastic or Plastic (E/P)		P	P	P	P	P	P	P	P	P	P
		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 24 (m / ft)		0.379	0.396	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Layer No. *25* **YR1-4**											
Initial Stress Reference Layer (top of layer)		*22*	*22*	*22*	*22*	*22*	*22*	*22*	*22*	*22*	*22*
Final Stress Reference Layer (top of layer)		*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)		439.99	437.59	432.94	433.23	433.46	433.68	433.83	438.91	438.54	438.17
Initial Effective Stress, σ'_i (kPa /psf)		903.00	589.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Final Effective Stress, σ'_f (kPa/psf)		1,935.00	2,159.00	2,580.00	2,580.00	2,572.95	1,282.92	342.14	413.95	1,703.71	2,580.00
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*
OCR Manual Input Value		*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		903	589	0	0	0	0	0	0	0	0
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*
Modified Recompression Index, $C_{r\varepsilon}$		*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*
ratio of t2 / t1		*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*
Settlements											
Primary Settlement, (m / ft)		0.289	0.322	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Secondary Settlement (m / ft)		0.016	0.011	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total Settlement (m / ft)		0.306	0.332	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Elastic or Plastic (E/P)		P	P	P	P	P	P	P	P	P	P
		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 25 (m / ft)		0.306	0.332	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Written by: **Yiwen Cao** Date: **6/10/2009** Reviewed by: **R. Kulasingam/Jay Beech** Date: **6/10/2009**

Client: **Honeywell** Project: **Onondaga Lake SCA IDS** Project/ Proposal No.: **GJ4299** Task No.: **04**

Layer No. *26* **YR1-5**											
Initial Stress Reference Layer (top of layer)		*22*	*22*	*22*	*22*	*22*	*22*	*22*	*22*	*22*	*22*
Final Stress Reference Layer (top of layer)		*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)		436.99	435.64	432.94	433.23	433.46	433.68	433.83	438.91	438.54	438.17
Initial Effective Stress, σ'_i (kPa /psf)		1,161.00	757.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Final Effective Stress, σ'_f (kPa/psf)		2,193.00	2,327.40	2,580.00	2,580.00	2,572.95	1,282.92	342.14	413.95	1,703.71	2,580.00
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*
OCR Manual Input Value		*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		1,161	758	0	0	0	0	0	0	0	0
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*
Modified Recompression Index, $C_{r\varepsilon}$		*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*
ratio of t2 / t1		*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*
Settlements											
Primary Settlement, (m / ft)		0.241	0.278	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Secondary Settlement (m / ft)		0.016	0.011	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total Settlement (m / ft)		0.258	0.289	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Elastic or Plastic (E/P)		P	P	P	P	P	P	P	P	P	P
		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 26 (m / ft)		0.258	0.289	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Layer No. *27* **YR1-6**											
Initial Stress Reference Layer (top of layer)		*22*	*22*	*22*	*22*	*22*	*22*	*22*	*22*	*22*	*22*
Final Stress Reference Layer (top of layer)		*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)		433.99	433.68	432.94	433.23	433.46	433.68	433.83	438.91	438.54	438.17
Initial Effective Stress, σ'_i (kPa /psf)		1,419.00	926.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Final Effective Stress, σ'_f (kPa/psf)		2,451.00	2,495.80	2,580.00	2,580.00	2,572.95	1,282.92	342.14	413.95	1,703.71	2,580.00
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*
OCR Manual Input Value		*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		1,419	926	0	0	0	0	0	0	0	0
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*
Modified Recompression Index, $C_{r\varepsilon}$		*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*
ratio of t2 / t1		*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*
Settlements											
Primary Settlement, (m / ft)		0.207	0.246	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Secondary Settlement (m / ft)		0.016	0.011	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total Settlement (m / ft)		0.224	0.256	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Elastic or Plastic (E/P)		P	P	P	P	P	P	P	P	P	P
		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 27 (m / ft)		0.224	0.256	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Written by: **Yiwen Cao** Date: **6/10/2009** Reviewed by: **R. Kulasingam/Jay Beech** Date: **6/10/2009**

Client: **Honeywell** Project: **Onondaga Lake SCA IDS** Project/ Proposal No.: **GJ4299** Task No.: **04**

LAYER SETTLEMENT	Layer No.	Material										
	1	*Null Layer*										
	2	*YR4-1*	0.000	0.001	0.001	0.001	0.001	0.001	0.000	0.000	0.000	0.000
	3	*YR4-2*	0.000	0.001	0.001	0.001	0.001	0.001	0.000	0.000	0.000	0.000
	4	*YR4-3*	0.000	0.001	0.001	0.001	0.001	0.001	0.000	0.000	0.000	0.000
	5	*YR4-4*	0.000	0.001	0.001	0.001	0.001	0.001	0.000	0.000	0.000	0.000
	6	*YR4-5*	0.000	0.001	0.001	0.001	0.001	0.001	0.000	0.000	0.000	0.000
	7	*YR4-6*	0.000	0.001	0.001	0.001	0.001	0.001	0.000	0.000	0.000	0.000
	8	*YR3-1*	0.297	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.297
	9	*YR3-2*	0.191	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.191
	10	*YR3-3*	0.148	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.148
	11	*YR3-4*	0.122	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.122
	12	*YR3-5*	0.105	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.105
	13	*YR3-6*	0.092	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.092
	14	*YR3-7*	0.082	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.082
	15	*YR2-1*	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.298	0.772
	16	*YR2-2*	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.137	0.472
	17	*YR2-3*	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.093	0.355
	18	*YR2-4*	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.072	0.288
	19	*YR2-5*	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.059	0.243
	20	*YR2-6*	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.051	0.212
	21	*YR2-7*	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.045	0.188
	22	*YR1-1*	0.850	0.748	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	23	*YR1-2*	0.509	0.500	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	24	*YR1-3*	0.379	0.396	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	25	*YR1-4*	0.306	0.332	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	26	*YR1-5*	0.258	0.289	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	27	*YR1-6*	0.224	0.256	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	28	*Additional Foundation Settlement*	5.730	5.970	6.270	6.258	6.301	3.448	1.462	1.812	4.946	7.046
	29											
	30											
		TOTAL SETTLEMENT	**9.29**	**8.50**	**6.28**	**6.26**	**6.31**	**3.45**	**1.46**	**1.84**	**5.70**	**10.61**
POST-SETTLEMENT ELEVATION(M/FT)	Line	1 Top of Year 4 Dredge	453.20	454.20	456.66	456.96	457.07	445.14	436.35	441.89	452.65	457.56
	Line	2 Top of Year 4 Dredge	453.20	454.20	456.66	456.96	457.07	445.14	436.35	441.89	452.65	457.56
	Line	3	452.20	451.16	451.66	451.96	452.09	442.66	435.68	441.89	452.65	456.56
	Line	4	451.20	448.12	446.66	446.96	447.10	440.17	435.02	441.89	452.65	455.56
	Line	5	450.20	445.08	441.67	441.97	442.12	437.69	434.36	441.89	452.65	454.56
	Line	6	449.20	442.04	436.67	436.97	437.13	435.20	433.70	441.89	452.65	453.56
	Line	7	448.20	439.00	431.67	431.97	432.15	432.71	433.03	441.89	452.65	452.56
	Line	8 Top of Year 3 Dredge	447.20	435.96	426.67	426.97	427.16	430.23	432.37	441.89	452.65	451.56
	Line	9	446.64	435.96	426.67	426.97	427.16	430.23	432.37	441.89	452.39	451.00
	Line	10	445.97	435.96	426.67	426.97	427.16	430.23	432.37	441.89	452.13	450.33
	Line	11	445.26	435.96	426.67	426.97	427.16	430.23	432.37	441.89	451.87	449.62
	Line	12	444.53	435.96	426.67	426.97	427.16	430.23	432.37	441.89	451.61	448.89
	Line	13	443.78	435.96	426.67	426.97	427.16	430.23	432.37	441.89	451.35	448.14
	Line	14	443.01	435.96	426.67	426.97	427.16	430.23	432.37	441.89	451.10	447.37
	Line	15 Top of Year 2 Dredge	442.24	435.96	426.67	426.97	427.16	430.23	432.37	441.89	450.84	446.60
	Line	16	442.24	435.96	426.67	426.97	427.16	430.23	432.37	441.20	448.56	444.80
	Line	17	442.24	435.96	426.67	426.97	427.16	430.23	432.37	440.52	446.13	442.70
	Line	18	442.24	435.96	426.67	426.97	427.16	430.23	432.37	439.83	443.65	440.48
	Line	19	442.24	435.96	426.67	426.97	427.16	430.23	432.37	439.15	441.15	438.20
	Line	20	442.24	435.96	426.67	426.97	427.16	430.23	432.37	438.47	438.64	435.87
	Line	21	442.24	435.96	426.67	426.97	427.16	430.23	432.37	437.78	436.12	433.51
	Line	22 Top of Year 1 Dredge	442.24	435.96	426.67	426.97	427.16	430.23	432.37	437.10	433.59	431.13
	Line	23	440.09	434.75	426.67	426.97	427.16	430.23	432.37	437.10	433.59	431.13
	Line	24	437.60	433.29	426.67	426.97	427.16	430.23	432.37	437.10	433.59	431.13
	Line	25	434.98	431.72	426.67	426.97	427.16	430.23	432.37	437.10	433.59	431.13
	Line	26	432.28	430.10	426.67	426.97	427.16	430.23	432.37	437.10	433.59	431.13
	Line	27	429.54	428.43	426.67	426.97	427.16	430.23	432.37	437.10	433.59	431.13
	Line	28 Top of Gravel(Top of Incompressil	426.76	426.73	426.67	426.97	427.16	430.23	432.37	437.10	433.59	431.13
	Line	29										
	Line	30										
	Line	31										

Written by: **Yiwen Cao** Date: **6/10/2009** Reviewed by: **R. Kulasingam/Jay Beech** Date: **6/10/2009**

Client: **Honeywell** Project: **Onondaga Lake SCA IDS** Project/ Proposal No.: **GJ4299** Task No.: **04**

Attachment 4

CASE 3: Calculations of Foundation Settlement During Post-Closure Period (Points 501 to 510)

Written by: **Yiwen Cao** Date: **6/10/2009** Reviewed by: **R. Kulasingam/Jay Beech** Date: **6/10/2009**

Client: **Honeywell** Project: **Onondaga Lake SCA IDS** Project/ Proposal No.: **GJ4299** Task No.: **04**

Settlement Prediction Model

Programmer: **Yiwen Cao, GeoSyntec Consultants**

Version Control V 1.002 11.14.2007

Project: **Onondaga Lake SCA 50%**

Notes:

Unit: **ft / psf**

Average Compaction Effort = **1440.00** kPa or psf

Consider Compaction Effort = **N** yes or no

Point #				**501**	**502**	**503**	**504**	**505**	**506**	**507**	**508**	**509**	**510**
Distance (meter or ft)				*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
ELEVATION (M/FT)	Line	1	Top of Final Cover	*455.16*	*456.12*	*458.41*	*458.82*	*458.89*	*452.93*	*444.41*	*449.81*	*459.01*	*459.26*
	Line	2	Top of Dredge	*453.20*	*454.20*	*456.66*	*456.96*	*457.07*	*445.14*	*436.35*	*441.89*	*452.65*	*457.56*
	Line	3	Top of Gravel	*426.76*	*426.73*	*426.67*	*426.97*	*427.16*	*430.23*	*432.37*	*437.10*	*433.59*	*431.13*
	Line	4	Top of Clay	*425.30*	*425.35*	*425.46*	*425.75*	*425.92*	*428.99*	*431.21*	*435.19*	*431.58*	*429.00*
	Line	5	Top of Dike	*423.05*	*423.47*	*423.92*	*424.60*	*424.54*	*427.48*	*429.57*	*432.24*	*428.99*	*426.49*
	Line	6	Top of Subgrade	*423.05*	*423.47*	*423.92*	*424.60*	*424.54*	*427.48*	*429.57*	*432.24*	*428.99*	*426.49*
	Line	7		*421.29*	*421.60*	*421.94*	*422.61*	*422.56*	*425.34*	*427.33*	*430.27*	*427.01*	*424.47*
	Line	8		*419.54*	*419.74*	*419.96*	*420.62*	*420.57*	*423.21*	*425.10*	*428.30*	*425.04*	*422.45*
	Line	9		*417.78*	*417.87*	*417.99*	*418.63*	*418.59*	*421.07*	*422.86*	*426.33*	*423.06*	*420.43*
	Line	10		*416.02*	*416.00*	*416.01*	*416.64*	*416.61*	*418.94*	*420.63*	*424.36*	*421.09*	*418.41*
	Line	11		*414.26*	*414.13*	*414.03*	*414.66*	*414.63*	*416.80*	*418.39*	*422.39*	*419.11*	*416.39*
	Line	12		*412.51*	*412.27*	*412.05*	*412.67*	*412.64*	*414.67*	*416.15*	*420.42*	*417.14*	*414.37*
	Line	13		*410.75*	*410.40*	*410.08*	*410.68*	*410.66*	*412.53*	*413.92*	*418.45*	*415.16*	*412.35*
	Line	14		*408.99*	*408.53*	*408.10*	*408.69*	*408.68*	*410.40*	*411.68*	*416.48*	*413.19*	*410.33*
	Line	15		*407.24*	*406.67*	*406.12*	*406.70*	*406.69*	*408.26*	*409.45*	*414.51*	*411.21*	*408.31*
	Line	16		*405.48*	*404.80*	*404.14*	*404.71*	*404.71*	*406.13*	*407.21*	*412.54*	*409.24*	*406.29*
	Line	17		*403.72*	*402.93*	*402.17*	*402.72*	*402.73*	*403.99*	*404.98*	*410.57*	*407.26*	*404.27*
	Line	18		*401.97*	*401.07*	*400.19*	*400.73*	*400.74*	*401.86*	*402.74*	*408.60*	*405.29*	*402.25*
	Line	19		*400.21*	*399.20*	*398.21*	*398.75*	*398.76*	*399.72*	*400.50*	*406.63*	*403.31*	*400.23*
	Line	20		*398.45*	*397.33*	*396.23*	*396.76*	*396.78*	*397.59*	*398.27*	*404.66*	*401.34*	*398.21*
	Line	21		*396.69*	*395.46*	*394.26*	*394.77*	*394.80*	*395.45*	*396.03*	*402.69*	*399.36*	*396.19*
	Line	22		*394.94*	*393.60*	*392.28*	*392.78*	*392.81*	*393.32*	*393.80*	*400.72*	*397.39*	*394.17*
	Line	23	Bottom of Zone2 Above GW	*393.18*	*391.73*	*390.30*	*390.79*	*390.83*	*391.18*	*391.56*	*398.75*	*395.41*	*392.15*
	Line	24		*393.18*	*391.73*	*390.30*	*390.51*	*390.78*	*391.18*	*391.56*	*398.75*	*395.41*	*392.15*
	Line	25	Bottom of Zone 3 Above GW	*393.18*	*391.73*	*390.30*	*390.22*	*390.72*	*391.18*	*391.56*	*398.75*	*395.41*	*392.15*
	Line	26		*393.18*	*391.73*	*390.30*	*390.22*	*390.72*	*391.18*	*391.56*	*398.75*	*395.41*	*392.15*
	Line	27	Bottom of Zone 2 Below GW	*393.18*	*391.73*	*390.30*	*390.22*	*390.72*	*391.18*	*391.56*	*398.75*	*395.41*	*392.15*
	Line	28	Top of Incompressible Layer	*393.18*	*391.73*	*390.30*	*390.22*	*390.72*	*391.18*	*391.56*	*398.75*	*395.41*	*392.15*
	Line	29	GND for sigma_p	*428.78*	*429.45*	*430.19*	*430.86*	*430.77*	*431.00*	*431.07*	*434.10*	*433.94*	*433.53*
	Line	30	GW	*375.00*	*375.00*	*375.00*	*375.00*	*375.00*	*375.00*	*375.00*	*375.00*	*375.00*	*375.00*
	Line	31	ROCK	*393.18*	*391.73*	*390.30*	*390.22*	*390.72*	*391.18*	*391.56*	*398.75*	*395.41*	*392.15*
LAYER THICKNESS (M/FT)	Layer No.	From	To / Material										
	1	*1*	*2* / *Cover*	*1.96*	*1.92*	*1.75*	*1.86*	*1.82*	*7.79*	*8.06*	*7.92*	*6.36*	*1.70*
	2	*2*	*3* / *Dredge*	*26.44*	*27.47*	*29.99*	*29.99*	*29.91*	*14.91*	*3.98*	*4.79*	*19.06*	*26.43*
	3	*3*	*4* / *Gravel*	*1.46*	*1.38*	*1.21*	*1.22*	*1.24*	*1.24*	*1.16*	*1.91*	*2.01*	*2.13*
	4	*4*	*5* / *Clay*	*2.25*	*1.88*	*1.54*	*1.15*	*1.38*	*1.51*	*1.64*	*2.95*	*2.59*	*2.51*
	5	*5*	*6* / *Dike*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
	6	*6*	*7* / *Zone2-Above-GW-1*	*1.76*	*1.87*	*1.98*	*1.99*	*1.98*	*2.14*	*2.24*	*1.97*	*1.98*	*2.02*
	7	*7*	*8* / *Zone2-Above-GW-2*	*1.76*	*1.87*	*1.98*	*1.99*	*1.98*	*2.14*	*2.24*	*1.97*	*1.98*	*2.02*
	8	*8*	*9* / *Zone2-Above-GW-3*	*1.76*	*1.87*	*1.98*	*1.99*	*1.98*	*2.14*	*2.24*	*1.97*	*1.98*	*2.02*
	9	*9*	*10* / *Zone2-Above-GW-4*	*1.76*	*1.87*	*1.98*	*1.99*	*1.98*	*2.14*	*2.24*	*1.97*	*1.98*	*2.02*
	10	*10*	*11* / *Zone2-Above-GW-5*	*1.76*	*1.87*	*1.98*	*1.99*	*1.98*	*2.14*	*2.24*	*1.97*	*1.98*	*2.02*
	11	*11*	*12* / *Zone2-Above-GW-6*	*1.76*	*1.87*	*1.98*	*1.99*	*1.98*	*2.14*	*2.24*	*1.97*	*1.98*	*2.02*
	12	*12*	*13* / *Zone2-Above-GW-7*	*1.76*	*1.87*	*1.98*	*1.99*	*1.98*	*2.14*	*2.24*	*1.97*	*1.98*	*2.02*
	13	*13*	*14* / *Zone2-Above-GW-8*	*1.76*	*1.87*	*1.98*	*1.99*	*1.98*	*2.14*	*2.24*	*1.97*	*1.98*	*2.02*
	14	*14*	*15* / *Zone2-Above-GW-9*	*1.76*	*1.87*	*1.98*	*1.99*	*1.98*	*2.14*	*2.24*	*1.97*	*1.98*	*2.02*
	15	*15*	*16* / *Zone2-Above-GW-10*	*1.76*	*1.87*	*1.98*	*1.99*	*1.98*	*2.14*	*2.24*	*1.97*	*1.98*	*2.02*
	16	*16*	*17* / *Zone2-Above-GW-11*	*1.76*	*1.87*	*1.98*	*1.99*	*1.98*	*2.14*	*2.24*	*1.97*	*1.98*	*2.02*
	17	*17*	*18* / *Zone2-Above-GW-12*	*1.76*	*1.87*	*1.98*	*1.99*	*1.98*	*2.14*	*2.24*	*1.97*	*1.98*	*2.02*
	18	*18*	*19* / *Zone2-Above-GW-13*	*1.76*	*1.87*	*1.98*	*1.99*	*1.98*	*2.14*	*2.24*	*1.97*	*1.98*	*2.02*
	19	*19*	*20* / *Zone2-Above-GW-14*	*1.76*	*1.87*	*1.98*	*1.99*	*1.98*	*2.14*	*2.24*	*1.97*	*1.98*	*2.02*
	20	*20*	*21* / *Zone2-Above-GW-15*	*1.76*	*1.87*	*1.98*	*1.99*	*1.98*	*2.14*	*2.24*	*1.97*	*1.98*	*2.02*
	21	*21*	*22* / *Zone2-Above-GW-16*	*1.76*	*1.87*	*1.98*	*1.99*	*1.98*	*2.14*	*2.24*	*1.97*	*1.98*	*2.02*
	22	*22*	*23* / *Zone2-Above-GW-17*	*1.76*	*1.87*	*1.98*	*1.99*	*1.98*	*2.14*	*2.24*	*1.97*	*1.98*	*2.02*
	23	*23*	*24* / *Zone3-Above-GW-1*	*0.00*	*0.00*	*0.00*	*0.29*	*0.06*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
	24	*24*	*25* / *Zone3-Above-GW-2*	*0.00*	*0.00*	*0.00*	*0.28*	*0.05*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
	25	*25*	*26* / *Zone2-Below-GW-18*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
	26	*26*	*27* / *Zone2-Below-GW-19*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
	27	*27*	*28* / *Zone3-Below-GW-3*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
	28												
	29	*29*	*30* / Soil Above GW	*53.78*	*54.45*	*55.19*	*55.86*	*55.77*	*56.00*	*56.07*	*59.10*	*58.94*	*58.53*
	30	*30*	*31* / Soil Below GW	*-18.18*	*-16.73*	*-15.30*	*-15.22*	*-15.72*	*-16.18*	*-16.56*	*-23.75*	*-20.41*	*-17.15*
	Thickness Check												
		From Line	To Line / SUM	*61.98*	*64.39*	*68.11*	*68.60*	*68.17*	*61.75*	*52.85*	*51.06*	*63.60*	*67.11*
		1	*28* / Thickness =	*61.98*	*64.39*	*68.11*	*68.60*	*68.17*	*61.75*	*52.85*	*51.06*	*63.60*	*67.11*
			Thickness Check	***OK***	***OK***	***OK***	***OK***	***OK***	***OK***	***OK***	***OK***	***OK***	***OK***

Written by: **Yiwen Cao** Date: **6/10/2009** Reviewed by: **R. Kulasingam/Jay Beech** Date: **6/10/2009**

Client: **Honeywell** Project: **Onondaga Lake SCA IDS** Project/ Proposal No.: **GJ4299** Task No.: **04**

	Layer No.	Material										
UNIT WEIGHT	1	*Cover*	*120.0*	*120.0*	*120.0*	*120.0*	*120.0*	*120.0*	*120.0*	*120.0*	*120.0*	*120.0*
	2	*Dredge*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*
	3	*Gravel*	*120.0*	*120.0*	*120.0*	*120.0*	*120.0*	*120.0*	*120.0*	*120.0*	*120.0*	*120.0*
	4	*Clay*	*120.0*	*120.0*	*120.0*	*120.0*	*120.0*	*120.0*	*120.0*	*120.0*	*120.0*	*120.0*
	5	*Dike*	*120.0*	*120.0*	*120.0*	*120.0*	*120.0*	*120.0*	*120.0*	*120.0*	*120.0*	*120.0*
	6	*Zone2-Above-GW-1*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*
	7	*Zone2-Above-GW-2*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*
	8	*Zone2-Above-GW-3*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*
	9	*Zone2-Above-GW-4*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*
	10	*Zone2-Above-GW-5*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*
	11	*Zone2-Above-GW-6*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*
	12	*Zone2-Above-GW-7*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*
	13	*Zone2-Above-GW-8*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*
	14	*Zone2-Above-GW-9*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*
	15	*Zone2-Above-GW-10*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*
	16	*Zone2-Above-GW-11*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*
	17	*Zone2-Above-GW-12*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*
	18	*Zone2-Above-GW-13*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*
	19	*Zone2-Above-GW-14*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*
	20	*Zone2-Above-GW-15*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*
	21	*Zone2-Above-GW-16*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*
	22	*Zone2-Above-GW-17*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*
	23	*Zone3-Above-GW-1*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*
	24	*Zone3-Above-GW-2*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*
	25	*Zone2-Below-GW-18*	*19.6*	*19.6*	*19.6*	*19.6*	*19.6*	*19.6*	*19.6*	*19.6*	*19.6*	*19.6*
	26	*Zone2-Below-GW-19*	*19.6*	*19.6*	*19.6*	*19.6*	*19.6*	*19.6*	*19.6*	*19.6*	*19.6*	*19.6*
	27	*Zone3-Below-GW-3*	*19.6*	*19.6*	*19.6*	*19.6*	*19.6*	*19.6*	*19.6*	*19.6*	*19.6*	*19.6*
	28											
	29	*Soil Above GW*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*
	30	*Soil below GW*	*19.6*	*19.6*	*19.6*	*19.6*	*19.6*	*19.6*	*19.6*	*19.6*	*19.6*	*19.6*
	Layer No.	***1*** **Cover**										
		Initial Stress Reference Layer (top of layer)	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
		Final Stress Reference Layer (top of layer)	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
		Midpoint Elevation, (m / ft)	454.18	455.16	457.54	457.89	457.98	449.04	440.38	445.85	455.83	458.41
		Initial Effective Stress, σ'_i (kPa /psf)	Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight
		Final Effective Stress, σ'_f (kPa/psf)	Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight
Elastic Method												
Modulus, E (kPa/psf)=		Strain										
		Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)												
Consolidation Properties												
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)												
OCR Manual Input Value												
OCR Computation Input												
Preconsolidation pressure, σ'_p (kPa / psf)												
Modified Primary Compression Index, $C_{c\varepsilon}$												
Modified Recompression Index, $C_{r\varepsilon}$												
Modified Secondary Compression Index, C_α												
ratio of t2 / t1												
Settlements												
Primary Settlement, (m / ft)												
Secondary Settlement (m / ft)												
Total Settlement (m / ft)												
		Elastic or Plastic (E/P)										
		Settlement of Layer 1 (m / ft)										

Written by: **Yiwen Cao** Date: **6/10/2009** Reviewed by: **R. Kulasingam/Jay Beech** Date: **6/10/2009**

Client: **Honeywell** Project: **Onondaga Lake SCA IDS** Project/ Proposal No.: **GJ4299** Task No.: **04**

Layer No.	*2*	**Dredge**									
Initial Stress Reference Layer (top of layer)	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*
Final Stress Reference Layer (top of layer)	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*
Midpoint Elevation, (m / ft)	439.98	440.47	441.67	441.97	442.12	437.69	434.36	439.50	443.12	444.35
Initial Effective Stress, σ'_i (kPa /psf)	Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight
Final Effective Stress, σ'_f (kPa/psf)	Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight
Elastic Method										
Modulus, E (kPa/psf)= _____ Strain										
Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)										
Consolidation Properties										
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)										
OCR Manual Input Value										
OCR Computation Input										
Preconsolidation pressure, σ'_p (kPa / psf)										
Modified Primary Compression Index, $C_{c\varepsilon}$										
Modified Recompression Index, $C_{r\varepsilon}$										
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$										
ratio of t2 / t1										
Settlements										
Primary Settlement, (m / ft)										
Secondary Settlement (m / ft)										
Total Settlement (m / ft)										
Elastic or Plastic (E/P)										
Settlement of Layer 2 (m / ft)										
Layer No.	*3*	**Gravel**									
Initial Stress Reference Layer (top of layer)	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*
Final Stress Reference Layer (top of layer)	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*
Midpoint Elevation, (m / ft)	426.03	426.04	426.07	426.36	426.54	429.61	431.79	436.15	432.59	430.07
Initial Effective Stress, σ'_i (kPa /psf)	Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight
Final Effective Stress, σ'_f (kPa/psf)	Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight
Elastic Method										
Modulus, E (kPa/psf)= _____ Strain										
Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)										
Consolidation Properties										
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)										
OCR Manual Input Value										
OCR Computation Input										
Preconsolidation pressure, σ'_p (kPa / psf)										
Modified Primary Compression Index, $C_{c\varepsilon}$										
Modified Recompression Index, $C_{r\varepsilon}$										
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$										
ratio of t2 / t1										
Settlements										
Primary Settlement, (m / ft)										
Secondary Settlement (m / ft)										
Total Settlement (m / ft)										
Elastic or Plastic (E/P)										
Settlement of Layer 3 (m / ft)										
Layer No.	*4*	**Clay**									
Initial Stress Reference Layer (top of layer)	*4*	*4*	*4*	*4*	*4*	*4*	*4*	*4*	*4*	*4*
Final Stress Reference Layer (top of layer)	*4*	*4*	*4*	*4*	*4*	*4*	*4*	*4*	*4*	*4*
Midpoint Elevation, (m / ft)	424.18	424.41	424.69	425.18	425.23	428.24	430.39	433.72	430.29	427.75
Initial Effective Stress, σ'_i (kPa /psf)	Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight
Final Effective Stress, σ'_f (kPa/psf)	Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight
Elastic Method										
Modulus, E (kPa/psf)= _____ Strain										
Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)										
Consolidation Properties										
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)										
OCR Manual Input Value										
OCR Computation Input										
Preconsolidation pressure, σ'_p (kPa / psf)										
Modified Primary Compression Index, $C_{c\varepsilon}$										
Modified Recompression Index, $C_{r\varepsilon}$										
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$										
ratio of t2 / t1										
Settlements										
Primary Settlement, (m / ft)										
Secondary Settlement (m / ft)										
Total Settlement (m / ft)										
Elastic or Plastic (E/P)										
Settlement of Layer 4 (m / ft)										

Written by: **Yiwen Cao** Date: **6/10/2009** Reviewed by: **R. Kulasingam/Jay Beech** Date: **6/10/2009**

Client: **Honeywell** Project: **Onondaga Lake SCA IDS** Project/ Proposal No.: **GJ4299** Task No.: **04**

Layer No.	5	Dike									
Initial Stress Reference Layer (top of layer)			5	5	5	5	5	5	5	5	5	5
Final Stress Reference Layer (top of layer)			5	5	5	5	5	5	5	5	5	5
Midpoint Elevation, (m / ft)			423.05	423.47	423.92	424.60	424.54	427.48	429.57	432.24	428.99	426.49
Initial Effective Stress, σ'_i (kPa /psf)			Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight
Final Effective Stress, σ'_f (kPa/psf)			Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight
Elastic Method												
Modulus, E (kPa/psf)=		Strain										
		Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)												
Consolidation Properties												
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)												
OCR Manual Input Value												
OCR Computation Input												
Preconsolidation pressure, σ'_p (kPa / psf)												
Modified Primary Compression Index, $C_{c\varepsilon}$												
Modified Recompression Index, $C_{r\varepsilon}$												
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$												
ratio of t2 / t1												
Settlements												
Primary Settlement, (m / ft)												
Secondary Settlement (m / ft)												
Total Settlement (m / ft)												
Elastic or Plastic (E/P)												
Settlement of Layer 5 (m / ft)												
Layer No.	6	Zone2-Above-GW-1										
Initial Stress Reference Layer (top of layer)			2	2	2	2	2	2	2	2	2	2
Final Stress Reference Layer (top of layer)			1	1	1	1	1	1	1	1	1	1
Midpoint Elevation, (m / ft)			422.17	422.54	422.93	423.61	423.55	426.41	428.45	431.26	428.00	425.48
Initial Effective Stress, σ'_i (kPa /psf)			2,791.08	2,830.17	2,990.22	2,945.08	2,967.96	1,699.81	769.95	1,075.91	2,272.15	2,912.60
Final Effective Stress, σ'_f (kPa/psf)			3,026.28	3,060.57	3,200.22	3,168.28	3,186.36	2,634.61	1,737.15	2,026.31	3,035.35	3,116.60
Elastic Method												
Modulus, E (kPa/psf)=		Strain										
		Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)												
Consolidation Properties												
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)			MS	MS	MS	MS	MS	MS	MS	MS	MS	MS
OCR Manual Input Value			4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
OCR Computation Input												
Preconsolidation pressure, σ'_p (kPa / psf)			2,437	2,549	2,677	2,676	2,665	1,693	964	1,049	2,190	2,971
Modified Primary Compression Index, $C_{c\varepsilon}$			0.460	0.460	0.460	0.460	0.460	0.460	0.460	0.460	0.460	0.460
Modified Recompression Index, $C_{r\varepsilon}$			0.014	0.014	0.014	0.014	0.014	0.014	0.014	0.014	0.014	0.014
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$			0.91%	0.91%	0.91%	0.91%	0.91%	0.91%	0.91%	0.91%	0.91%	0.91%
ratio of t2 / t1			8.75	8.75	8.75	8.75	8.75	8.75	8.75	8.75	8.75	8.75
Settlements												
Primary Settlement, (m / ft)			0.028	0.029	0.027	0.029	0.028	0.187	0.266	0.249	0.114	0.020
Secondary Settlement (m / ft)			0.015	0.016	0.017	0.017	0.017	0.018	0.019	0.017	0.017	0.017
Total Settlement (m / ft)			0.043	0.045	0.044	0.046	0.045	0.205	0.285	0.266	0.131	0.037
Elastic or Plastic (E/P)			1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 6 (m / ft)			0.043	0.045	0.044	0.046	0.045	0.205	0.285	0.266	0.131	0.037
Layer No.	7	Zone2-Above-GW-2										
Initial Stress Reference Layer (top of layer)			2	2	2	2	2	2	2	2	2	2
Final Stress Reference Layer (top of layer)			1	1	1	1	1	1	1	1	1	1
Midpoint Elevation, (m / ft)			420.41	420.67	420.95	421.62	421.57	424.28	426.22	429.29	426.03	423.46
Initial Effective Stress, σ'_i (kPa /psf)			2,935.16	2,983.27	3,152.39	3,108.17	3,130.56	1,874.90	953.29	1,237.45	2,434.12	3,078.24
Final Effective Stress, σ'_f (kPa/psf)			3,170.36	3,213.67	3,362.39	3,331.37	3,348.96	2,809.70	1,920.49	2,187.85	3,197.32	3,282.24
Elastic Method												
Modulus, E (kPa/psf)=		Strain										
		Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)												
Consolidation Properties												
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)			MS	MS	MS	MS	MS	MS	MS	MS	MS	MS
OCR Manual Input Value			4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	2.0
OCR Computation Input												
Preconsolidation pressure, σ'_p (kPa / psf)			3,085	3,238	3,407	3,410	3,397	2,481	1,789	1,776	2,919	1,652
Modified Primary Compression Index, $C_{c\varepsilon}$			0.460	0.460	0.460	0.460	0.460	0.460	0.460	0.460	0.460	0.460
Modified Recompression Index, $C_{r\varepsilon}$			0.014	0.014	0.014	0.014	0.014	0.014	0.014	0.014	0.014	0.014
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$			0.91%	0.11%	0.11%	0.11%	0.11%	0.91%	0.91%	0.91%	0.91%	0.91%
ratio of t2 / t1			8.75	8.75	8.75	8.75	8.75	8.75	8.75	8.75	8.75	8.75
Settlements												
Primary Settlement, (m / ft)			0.010	0.001	0.001	0.001	0.001	0.057	0.040	0.086	0.038	0.026
Secondary Settlement (m / ft)			0.015	0.002	0.002	0.002	0.002	0.018	0.019	0.017	0.017	0.017
Total Settlement (m / ft)			0.025	0.003	0.003	0.003	0.003	0.075	0.059	0.103	0.055	0.043
Elastic or Plastic (E/P)			1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 7 (m / ft)			0.025	0.003	0.003	0.003	0.003	0.075	0.059	0.103	0.055	0.043

Written by: **Yiwen Cao** Date: **6/10/2009** Reviewed by: **R. Kulasingam/Jay Beech** Date: **6/10/2009**

Client: **Honeywell** Project: **Onondaga Lake SCA IDS** Project/ Proposal No.: **GJ4299** Task No.: **04**

Layer No.	*8*	**Zone2-Above-GW-3**									
Initial Stress Reference Layer (top of layer)		*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*
Final Stress Reference Layer (top of layer)		*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)		418.66	418.80	418.98	419.63	419.58	422.14	423.98	427.32	424.05	421.44
Initial Effective Stress, σ'_i (kPa /psf)		3,079.24	3,136.37	3,314.56	3,271.25	3,293.16	2,050.00	1,136.64	1,398.99	2,596.10	3,243.88
Final Effective Stress, σ'_f (kPa/psf)		3,314.44	3,366.77	3,524.56	3,494.45	3,511.56	2,984.80	2,103.84	2,349.39	3,359.30	3,447.88
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*
OCR Manual Input Value		*2.0*	*2.0*	*2.0*	*2.0*	*2.0*	*4.5*	*4.5*	*4.5*	*4.5*	*2.0*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		1,659	1,745	1,838	1,842	1,835	3,269	2,614	2,503	3,648	1,983
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*
Modified Recompression Index, $C_{r\varepsilon}$		*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.11%*	*0.11%*	*0.11%*	*0.11%*	*0.91%*
ratio of t2 / t1		*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*
Settlements											
Primary Settlement, (m / ft)		0.026	0.026	0.024	0.026	0.025	0.005	0.008	0.006	0.003	0.025
Secondary Settlement (m / ft)		0.015	0.016	0.017	0.017	0.017	0.002	0.002	0.002	0.002	0.017
Total Settlement (m / ft)		0.041	0.042	0.041	0.043	0.042	0.007	0.011	0.008	0.005	0.042
Elastic or Plastic (E/P)		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 8 (m / ft)		0.041	0.042	0.041	0.043	0.042	0.007	0.011	0.008	0.005	0.042
Layer No.	*9*	**Zone2-Above-GW-4**									
Initial Stress Reference Layer (top of layer)		*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*
Final Stress Reference Layer (top of layer)		*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)		416.90	416.94	417.00	417.64	417.60	420.01	421.74	425.35	422.08	419.42
Initial Effective Stress, σ'_i (kPa /psf)		3,223.32	3,289.47	3,476.72	3,434.33	3,455.76	2,225.09	1,319.98	1,560.53	2,758.07	3,409.52
Final Effective Stress, σ'_f (kPa/psf)		3,458.52	3,519.87	3,686.72	3,657.53	3,674.16	3,159.89	2,287.18	2,510.93	3,521.27	3,613.52
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*
OCR Manual Input Value		*2.0*	*2.0*	*2.0*	*2.0*	*2.0*	*2.0*	*4.5*	*4.5*	*2.0*	*2.0*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		1,948	2,052	2,163	2,168	2,160	1,803	3,440	3,230	1,945	2,314
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*
Modified Recompression Index, $C_{r\varepsilon}$		*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.11%*	*0.11%*	*0.91%*	*0.91%*
ratio of t2 / t1		*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*
Settlements											
Primary Settlement, (m / ft)		0.025	0.025	0.023	0.025	0.024	0.150	0.007	0.006	0.096	0.023
Secondary Settlement (m / ft)		0.015	0.016	0.017	0.017	0.017	0.018	0.002	0.002	0.017	0.017
Total Settlement (m / ft)		0.040	0.041	0.040	0.042	0.041	0.168	0.010	0.008	0.113	0.041
Elastic or Plastic (E/P)		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 9 (m / ft)		0.040	0.041	0.040	0.042	0.041	0.168	0.010	0.008	0.113	0.041
Layer No.	*10*	**Zone2-Above-GW-5**									
Initial Stress Reference Layer (top of layer)		*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*
Final Stress Reference Layer (top of layer)		*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)		415.14	415.07	415.02	415.65	415.62	417.87	419.51	423.38	420.10	417.40
Initial Effective Stress, σ'_i (kPa /psf)		3,367.39	3,442.56	3,638.89	3,597.42	3,618.37	2,400.18	1,503.32	1,722.07	2,920.04	3,575.16
Final Effective Stress, σ'_f (kPa/psf)		3,602.59	3,672.96	3,848.89	3,820.62	3,836.77	3,334.98	2,470.52	2,672.47	3,683.24	3,779.16
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*
OCR Manual Input Value		*2.0*	*2.0*	*2.0*	*2.0*	*2.0*	*2.0*	*2.0*	*2.0*	*2.0*	*2.0*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		2,236	2,358	2,487	2,494	2,485	2,153	1,895	1,759	2,269	2,645
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*
Modified Recompression Index, $C_{r\varepsilon}$		*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*
ratio of t2 / t1		*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*
Settlements											
Primary Settlement, (m / ft)		0.024	0.024	0.022	0.024	0.023	0.140	0.122	0.165	0.092	0.022
Secondary Settlement (m / ft)		0.015	0.016	0.017	0.017	0.017	0.018	0.019	0.017	0.017	0.017
Total Settlement (m / ft)		0.039	0.040	0.039	0.041	0.040	0.159	0.141	0.182	0.109	0.040
Elastic or Plastic (E/P)		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 10 (m / ft)		0.039	0.040	0.039	0.041	0.040	0.159	0.141	0.182	0.109	0.040

Written by: **Yiwen Cao** Date: **6/10/2009** Reviewed by: **R. Kulasingam/Jay Beech** Date: **6/10/2009**

Client: **Honeywell** Project: **Onondaga Lake SCA IDS** Project/ Proposal No.: **GJ4299** Task No.: **04**

Layer No.	*11*	**Zone2-Above-GW-6**									
Initial Stress Reference Layer (top of layer)		*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*
Final Stress Reference Layer (top of layer)		*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)		413.39	413.20	413.04	413.66	413.63	415.74	417.27	421.41	418.13	415.38
Initial Effective Stress, σ'_i (kPa /psf)		3,511.47	3,595.66	3,801.06	3,760.50	3,780.97	2,575.28	1,686.66	1,883.61	3,082.02	3,740.80
Final Effective Stress, σ'_f (kPa/psf)		3,746.67	3,826.06	4,011.06	3,983.70	3,999.37	3,510.08	2,653.86	2,834.01	3,845.22	3,944.80
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*
OCR Manual Input Value		*2.0*	*2.0*	*2.0*	*2.0*	*2.0*	*2.0*	*2.0*	*2.0*	*2.0*	*2.0*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		2,524	2,664	2,811	2,820	2,811	2,503	2,262	2,082	2,593	2,977
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*
Modified Recompression Index, $C_{r\varepsilon}$		*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*
ratio of t2 / t1		*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*
Settlements											
Primary Settlement, (m / ft)		0.023	0.023	0.021	0.023	0.022	0.132	0.075	0.123	0.087	0.021
Secondary Settlement (m / ft)		0.015	0.016	0.017	0.017	0.017	0.018	0.019	0.017	0.017	0.017
Total Settlement (m / ft)		0.038	0.039	0.038	0.040	0.039	0.150	0.095	0.139	0.104	0.039
Elastic or Plastic (E/P)		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 11 (m / ft)		0.038	0.039	0.038	0.040	0.039	0.150	0.095	0.139	0.104	0.039
Layer No.	*12*	**Zone2-Above-GW-7**									
Initial Stress Reference Layer (top of layer)		*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*
Final Stress Reference Layer (top of layer)		*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)		411.63	411.33	411.07	411.67	411.65	413.60	415.04	419.44	416.15	413.36
Initial Effective Stress, σ'_i (kPa /psf)		3,655.55	3,748.76	3,963.23	3,923.58	3,943.57	2,750.37	1,870.01	2,045.15	3,243.99	3,906.44
Final Effective Stress, σ'_f (kPa/psf)		3,890.75	3,979.16	4,173.23	4,146.78	4,161.97	3,685.17	2,837.21	2,995.55	4,007.19	4,110.44
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*
OCR Manual Input Value		*2.0*	*2.0*	*2.0*	*2.0*	*2.0*	*2.0*	*2.0*	*2.0*	*2.0*	*1.0*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		2,812	2,970	3,136	3,147	3,136	2,854	2,629	2,405	2,917	1,654
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*
Modified Recompression Index, $C_{r\varepsilon}$		*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*
ratio of t2 / t1		*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*
Settlements											
Primary Settlement, (m / ft)		0.022	0.022	0.020	0.022	0.021	0.110	0.039	0.088	0.083	0.021
Secondary Settlement (m / ft)		0.015	0.016	0.017	0.017	0.017	0.018	0.019	0.017	0.017	0.017
Total Settlement (m / ft)		0.037	0.038	0.037	0.039	0.038	0.128	0.058	0.105	0.100	0.038
Elastic or Plastic (E/P)		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 12 (m / ft)		0.037	0.038	0.037	0.039	0.038	0.128	0.058	0.105	0.100	0.038
Layer No.	*13*	**Zone2-Above-GW-8**									
Initial Stress Reference Layer (top of layer)		*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*
Final Stress Reference Layer (top of layer)		*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)		409.87	409.47	409.09	409.68	409.67	411.47	412.80	417.47	414.18	411.34
Initial Effective Stress, σ'_i (kPa /psf)		3,800	3,902	4,125	4,087	4,106	2,925	2,053	2,207	3,406	4,072
Final Effective Stress, σ'_f (kPa/psf)		4,035	4,132	4,335	4,310	4,325	3,860	3,021	3,157	4,169	4,276
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*
OCR Manual Input Value		*2.0*	*2.0*	*1.0*	*1.0*	*1.0*	*2.0*	*2.0*	*2.0*	*2.0*	*1.0*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		3,100	3,276	1,730	1,736	1,730	3,204	2,995	2,728	3,241	1,820
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*
Modified Recompression Index, $C_{r\varepsilon}$		*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*
ratio of t2 / t1		*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*
Settlements											
Primary Settlement, (m / ft)		0.021	0.021	0.020	0.021	0.021	0.081	0.009	0.060	0.080	0.020
Secondary Settlement (m / ft)		0.015	0.016	0.017	0.017	0.017	0.018	0.019	0.017	0.017	0.017
Total Settlement (m / ft)		0.036	0.037	0.037	0.038	0.038	0.099	0.028	0.077	0.097	0.037
Elastic or Plastic (E/P)		p	p	p	p	p	p	p	p	p	p
		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 13 (m / ft)		0.036	0.037	0.037	0.038	0.038	0.099	0.028	0.077	0.097	0.037

Written by: **Yiwen Cao** Date: **6/10/2009** Reviewed by: **R. Kulasingam/Jay Beech** Date: **6/10/2009**

Client: **Honeywell** Project: **Onondaga Lake SCA IDS** Project/ Proposal No.: **GJ4299** Task No.: **04**

Layer No.	*14*	**Zone2-Above-GW-9**									
Initial Stress Reference Layer (top of layer)		*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*
Final Stress Reference Layer (top of layer)		*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)		408.12	407.60	407.11	407.70	407.69	409.33	410.57	415.50	412.20	409.32
Initial Effective Stress, σ'_i (kPa /psf)		3,944	4,055	4,288	4,250	4,269	3,101	2,237	2,368	3,568	4,238
Final Effective Stress, σ'_f (kPa/psf)		4,179	4,285	4,498	4,473	4,487	4,035	3,204	3,319	4,331	4,442
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*
OCR Manual Input Value		*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*2.0*	*1.0*	*1.0*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		1,694	1,791	1,892	1,899	1,893	1,777	1,681	3,051	1,782	1,985
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*
Modified Recompression Index, $C_{r\varepsilon}$		*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*
ratio of t2 / t1		*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*
Settlements											
Primary Settlement, (m / ft)		0.020	0.021	0.019	0.020	0.020	0.112	0.161	0.036	0.076	0.019
Secondary Settlement (m / ft)		0.015	0.016	0.017	0.017	0.017	0.018	0.019	0.017	0.017	0.017
Total Settlement (m / ft)		0.035	0.037	0.036	0.037	0.037	0.131	0.180	0.053	0.093	0.036
Elastic or Plastic (E/P)		p	p	p	p	p	p	p	p	p	p
		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 14 (m / ft)		0.035	0.037	0.036	0.037	0.037	0.131	0.180	0.053	0.093	0.036
Layer No.	*15*	**Zone2-Above-GW-10**									
Initial Stress Reference Layer (top of layer)		*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*
Final Stress Reference Layer (top of layer)		*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)		406.36	405.73	405.13	405.71	405.70	407.19	408.33	413.53	410.22	407.30
Initial Effective Stress, σ'_i (kPa /psf)		4,088	4,208	4,450	4,413	4,431	3,276	2,420	2,530	3,730	4,403
Final Effective Stress, σ'_f (kPa/psf)		4,323	4,438	4,660	4,636	4,650	4,210	3,387	3,480	4,493	4,607
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*
OCR Manual Input Value		*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		1,838	1,944	2,054	2,063	2,056	1,952	1,864	1,687	1,944	2,151
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*
Modified Recompression Index, $C_{r\varepsilon}$		*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*
ratio of t2 / t1		*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*
Settlements											
Primary Settlement, (m / ft)		0.020	0.020	0.018	0.020	0.019	0.107	0.150	0.126	0.073	0.018
Secondary Settlement (m / ft)		0.015	0.016	0.017	0.017	0.017	0.018	0.019	0.017	0.017	0.017
Total Settlement (m / ft)		0.035	0.036	0.035	0.037	0.036	0.125	0.169	0.142	0.090	0.036
Elastic or Plastic (E/P)		p	p	p	p	p	p	p	p	p	p
		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 15 (m / ft)		0.035	0.036	0.035	0.037	0.036	0.125	0.169	0.142	0.090	0.036
Layer No.	*16*	**Zone2-Above-GW-11**									
Initial Stress Reference Layer (top of layer)		*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*
Final Stress Reference Layer (top of layer)		*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)		404.60	403.87	403.15	403.72	403.72	405.06	406.09	411.56	408.25	405.28
Initial Effective Stress, σ'_i (kPa /psf)		4,232	4,361	4,612	4,576	4,594	3,451	2,603	2,691	3,892	4,569
Final Effective Stress, σ'_f (kPa/psf)		4,467	4,592	4,822	4,799	4,812	4,386	3,571	3,642	4,655	4,773
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*
OCR Manual Input Value		*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		1,982	2,098	2,217	2,226	2,218	2,127	2,048	1,849	2,106	2,317
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*
Modified Recompression Index, $C_{r\varepsilon}$		*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*
ratio of t2 / t1		*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*
Settlements											
Primary Settlement, (m / ft)		0.019	0.019	0.018	0.019	0.018	0.102	0.141	0.119	0.071	0.018
Secondary Settlement (m / ft)		0.015	0.016	0.017	0.017	0.017	0.018	0.019	0.017	0.017	0.017
Total Settlement (m / ft)		0.034	0.035	0.035	0.036	0.035	0.121	0.160	0.136	0.088	0.035
Elastic or Plastic (E/P)		p	p	p	p	p	p	p	p	p	p
		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 16 (m / ft)		0.034	0.035	0.035	0.036	0.035	0.121	0.160	0.136	0.088	0.035

Written by: **Yiwen Cao** Date: **6/10/2009** Reviewed by: **R. Kulasingam/Jay Beech** Date: **6/10/2009**

Client: **Honeywell** Project: **Onondaga Lake SCA IDS** Project/ Proposal No.: **GJ4299** Task No.: **04**

Layer No. *17* **Zone2-Above-GW-12**											
Initial Stress Reference Layer (top of layer)		2	2	2	2	2	2	2	2	2	2
Final Stress Reference Layer (top of layer)		1	1	1	1	1	1	1	1	1	1
Midpoint Elevation, (m / ft)		402.84	402.00	401.18	401.73	401.74	402.92	403.86	409.59	406.27	403.26
Initial Effective Stress, σ'_i (kPa /psf)		4,376	4,514	4,774	4,739	4,757	3,626	2,787	2,853	4,054	4,735
Final Effective Stress, σ'_f (kPa/psf)		4,611	4,745	4,984	4,962	4,975	4,561	3,754	3,803	4,817	4,939
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*
OCR Manual Input Value		*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		2,126	2,251	2,379	2,389	2,381	2,302	2,231	2,010	2,268	2,482
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*
Modified Recompression Index, $C_{r\varepsilon}$		*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*
ratio of t2 / t1		*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*
Settlements											
Primary Settlement, (m / ft)		0.018	0.019	0.017	0.018	0.018	0.098	0.133	0.113	0.068	0.017
Secondary Settlement (m / ft)		0.015	0.016	0.017	0.017	0.017	0.018	0.019	0.017	0.017	0.017
Total Settlement (m / ft)		0.033	0.035	0.034	0.035	0.035	0.116	0.152	0.130	0.085	0.034
Elastic or Plastic (E/P)		p	p	p	p	p	p	p	p	p	p
		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 17 (m / ft)		0.033	0.035	0.034	0.035	0.035	0.116	0.152	0.130	0.085	0.034
Layer No. *18* **Zone2-Above-GW-13**											
Initial Stress Reference Layer (top of layer)		2	2	2	2	2	2	2	2	2	2
Final Stress Reference Layer (top of layer)		1	1	1	1	1	1	1	1	1	1
Midpoint Elevation, (m / ft)		401.09	400.13	399.20	399.74	399.75	400.79	401.62	407.62	404.30	401.24
Initial Effective Stress, σ'_i (kPa /psf)		4,520	4,667	4,936	4,902	4,919	3,801	2,970	3,014	4,216	4,900
Final Effective Stress, σ'_f (kPa/psf)		4,755	4,898	5,146	5,125	5,138	4,736	3,937	3,965	4,979	5,104
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*
OCR Manual Input Value		*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		2,271	2,404	2,541	2,552	2,543	2,477	2,414	2,172	2,430	2,648
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*
Modified Recompression Index, $C_{r\varepsilon}$		*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*
ratio of t2 / t1		*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*
Settlements											
Primary Settlement, (m / ft)		0.018	0.018	0.016	0.018	0.017	0.094	0.126	0.108	0.066	0.016
Secondary Settlement (m / ft)		0.015	0.016	0.017	0.017	0.017	0.018	0.019	0.017	0.017	0.017
Total Settlement (m / ft)		0.033	0.034	0.033	0.035	0.034	0.112	0.145	0.125	0.083	0.034
Elastic or Plastic (E/P)		p	p	p	p	p	p	p	p	p	p
		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 18 (m / ft)		0.033	0.034	0.033	0.035	0.034	0.112	0.145	0.125	0.083	0.034
Layer No. *19* **Zone2-Above-GW-14**											
Initial Stress Reference Layer (top of layer)		2	2	2	2	2	2	2	2	2	2
Final Stress Reference Layer (top of layer)		1	1	1	1	1	1	1	1	1	1
Midpoint Elevation, (m / ft)		399.33	398.26	397.22	397.75	397.77	398.65	399.39	405.65	402.32	399.22
Initial Effective Stress, σ'_i (kPa /psf)		4,664	4,820	5,098	5,065	5,082	3,976	3,153	3,176	4,378	5,066
Final Effective Stress, σ'_f (kPa/psf)		4,899	5,051	5,308	5,288	5,300	4,911	4,121	4,126	5,141	5,270
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*
OCR Manual Input Value		*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		2,415	2,557	2,703	2,715	2,706	2,652	2,598	2,333	2,592	2,813
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*
Modified Recompression Index, $C_{r\varepsilon}$		*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*
ratio of t2 / t1		*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*
Settlements											
Primary Settlement, (m / ft)		0.017	0.017	0.016	0.017	0.017	0.090	0.119	0.103	0.063	0.016
Secondary Settlement (m / ft)		0.015	0.016	0.017	0.017	0.017	0.018	0.019	0.017	0.017	0.017
Total Settlement (m / ft)		0.032	0.033	0.033	0.034	0.034	0.108	0.139	0.120	0.080	0.033
Elastic or Plastic (E/P)		p	p	p	p	p	p	p	p	p	p
		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 19 (m / ft)		0.032	0.033	0.033	0.034	0.034	0.108	0.139	0.120	0.080	0.033

Written by: **Yiwen Cao** Date: **6/10/2009** Reviewed by: **R. Kulasingam/Jay Beech** Date: **6/10/2009**

Client: **Honeywell** Project: **Onondaga Lake SCA IDS** Project/ Proposal No.: **GJ4299** Task No.: **04**

Layer No.	*20*	**Zone2-Above-GW-15**									
Initial Stress Reference Layer (top of layer)		*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*
Final Stress Reference Layer (top of layer)		*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)		397.57	396.40	395.24	395.76	395.79	396.52	397.15	403.68	400.35	397.20
Initial Effective Stress, σ'_i (kPa /psf)		4,808	4,974	5,261	5,228	5,244	4,151	3,337	3,337	4,540	5,232
Final Effective Stress, σ'_f (kPa/psf)		5,043	5,204	5,471	5,451	5,463	5,086	4,304	4,288	5,303	5,436
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*
OCR Manual Input Value		*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		2,559	2,710	2,865	2,878	2,869	2,828	2,781	2,495	2,754	2,979
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*
Modified Recompression Index, $C_{r\varepsilon}$		*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*
ratio of t2 / t1		*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*
Settlements											
Primary Settlement, (m / ft)		0.017	0.017	0.015	0.017	0.016	0.087	0.114	0.099	0.061	0.015
Secondary Settlement (m / ft)		0.015	0.016	0.017	0.017	0.017	0.018	0.019	0.017	0.017	0.017
Total Settlement (m / ft)		0.032	0.033	0.032	0.034	0.033	0.105	0.133	0.116	0.078	0.033
Elastic or Plastic (E/P)		p	p	p	p	p	p	p	p	p	p
		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 20 (m / ft)		0.032	0.033	0.032	0.034	0.033	0.105	0.133	0.116	0.078	0.033
Layer No.	*21*	**Zone2-Above-GW-16**									
Initial Stress Reference Layer (top of layer)		*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*
Final Stress Reference Layer (top of layer)		*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)		395.82	394.53	393.27	393.77	393.80	394.38	394.91	401.71	398.37	395.18
Initial Effective Stress, σ'_i (kPa /psf)		4,952	5,127	5,423	5,391	5,407	4,326	3,520	3,499	4,702	5,397
Final Effective Stress, σ'_f (kPa/psf)		5,187	5,357	5,633	5,615	5,625	5,261	4,487	4,449	5,465	5,601
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*
OCR Manual Input Value		*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		2,703	2,863	3,027	3,041	3,031	3,003	2,964	2,656	2,916	3,145
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*
Modified Recompression Index, $C_{r\varepsilon}$		*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*
ratio of t2 / t1		*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*
Settlements											
Primary Settlement, (m / ft)		0.016	0.016	0.015	0.016	0.016	0.083	0.108	0.095	0.059	0.015
Secondary Settlement (m / ft)		0.015	0.016	0.017	0.017	0.017	0.018	0.019	0.017	0.017	0.017
Total Settlement (m / ft)		0.031	0.032	0.032	0.033	0.033	0.102	0.128	0.111	0.076	0.032
Elastic or Plastic (E/P)		p	p	p	p	p	p	p	p	p	p
		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 21 (m / ft)		0.031	0.032	0.032	0.033	0.033	0.102	0.128	0.111	0.076	0.032
Layer No.	*22*	**Zone2-Above-GW-17**									
Initial Stress Reference Layer (top of layer)		*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*
Final Stress Reference Layer (top of layer)		*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)		394.06	392.66	391.29	391.78	391.82	392.25	392.68	399.74	396.40	393.16
Initial Effective Stress, σ'_i (kPa /psf)		5,096	5,280	5,585	5,554	5,570	4,501	3,703	3,661	4,864	5,563
Final Effective Stress, σ'_f (kPa/psf)		5,332	5,510	5,795	5,778	5,788	5,436	4,671	4,611	5,627	5,767
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*
OCR Manual Input Value		*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		2,847	3,016	3,190	3,204	3,194	3,178	3,148	2,818	3,078	3,310
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*
Modified Recompression Index, $C_{r\varepsilon}$		*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*
ratio of t2 / t1		*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*
Settlements											
Primary Settlement, (m / ft)		0.016	0.016	0.015	0.016	0.015	0.080	0.104	0.091	0.058	0.015
Secondary Settlement (m / ft)		0.015	0.016	0.017	0.017	0.017	0.018	0.019	0.017	0.017	0.017
Total Settlement (m / ft)		0.031	0.032	0.032	0.033	0.032	0.099	0.123	0.108	0.074	0.032
Elastic or Plastic (E/P)		p	p	p	p	p	p	p	p	p	p
		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 22 (m / ft)		0.031	0.032	0.032	0.033	0.032	0.099	0.123	0.108	0.074	0.032

Written by: **Yiwen Cao** Date: **6/10/2009** Reviewed by: **R. Kulasingam/Jay Beech** Date: **6/10/2009**

Client: **Honeywell** Project: **Onondaga Lake SCA IDS** Project/ Proposal No.: **GJ4299** Task No.: **04**

Layer No.	*23*	**Zone3-Above-GW-1**									
Initial Stress Reference Layer (top of layer)		*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*
Final Stress Reference Layer (top of layer)		*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)		393.18	391.73	390.30	390.65	390.80	391.18	391.56	398.75	395.41	392.15
Initial Effective Stress, σ'_i (kPa /psf)		5,168	5,356	5,666	5,648	5,653	4,589	3,795	3,741	4,945	5,646
Final Effective Stress, σ'_f (kPa/psf)		5,404	5,587	5,876	5,871	5,872	5,524	4,762	4,692	5,708	5,850
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*
OCR Manual Input Value		*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		2,919	3,093	3,271	3,297	3,277	3,265	3,239	2,899	3,159	3,393
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.380*	*0.380*	*0.380*	*0.380*	*0.380*	*0.380*	*0.380*	*0.380*	*0.380*	*0.380*
Modified Recompression Index, $C_{r\varepsilon}$		*0.021*	*0.021*	*0.021*	*0.021*	*0.021*	*0.021*	*0.021*	*0.021*	*0.021*	*0.021*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.70%*	*0.70%*	*0.70%*	*0.70%*	*0.70%*	*0.70%*	*0.70%*	*0.70%*	*0.70%*	*0.70%*
ratio of t2 / t1		*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*
Settlements											
Primary Settlement, (m / ft)		0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000
Secondary Settlement (m / ft)		0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000
Total Settlement (m / ft)		0.000	0.000	0.000	0.004	0.001	0.000	0.000	0.000	0.000	0.000
Elastic or Plastic (E/P)		p	p	p	p	p	p	p	p	p	p
		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 23 (m / ft)		0.000	0.000	0.000	0.004	0.001	0.000	0.000	0.000	0.000	0.000
Layer No.	*24*	**Zone3-Above-GW-2**									
Initial Stress Reference Layer (top of layer)		*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*
Final Stress Reference Layer (top of layer)		*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)		393.18	391.73	390.30	390.36	390.75	391.18	391.56	398.75	395.41	392.15
Initial Effective Stress, σ'_i (kPa /psf)		5,168	5,356	5,666	5,671	5,658	4,589	3,795	3,741	4,945	5,646
Final Effective Stress, σ'_f (kPa/psf)		5,404	5,587	5,876	5,894	5,876	5,524	4,762	4,692	5,708	5,850
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*
OCR Manual Input Value		*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		2,919	3,093	3,271	3,321	3,282	3,265	3,239	2,899	3,159	3,393
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.380*	*0.380*	*0.380*	*0.380*	*0.380*	*0.380*	*0.380*	*0.380*	*0.380*	*0.380*
Modified Recompression Index, $C_{r\varepsilon}$		*0.021*	*0.021*	*0.021*	*0.021*	*0.021*	*0.021*	*0.021*	*0.021*	*0.021*	*0.021*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.70%*	*0.70%*	*0.70%*	*0.70%*	*0.70%*	*0.70%*	*0.70%*	*0.70%*	*0.70%*	*0.70%*
ratio of t2 / t1		*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*
Settlements											
Primary Settlement, (m / ft)		0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000
Secondary Settlement (m / ft)		0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000
Total Settlement (m / ft)		0.000	0.000	0.000	0.004	0.001	0.000	0.000	0.000	0.000	0.000
Elastic or Plastic (E/P)		p	p	p	p	p	p	p	p	p	p
		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 24 (m / ft)		0.000	0.000	0.000	0.004	0.001	0.000	0.000	0.000	0.000	0.000
Layer No.	*25*	**Zone2-Below-GW-18**									
Initial Stress Reference Layer (top of layer)		*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*
Final Stress Reference Layer (top of layer)		*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)		393.18	391.73	390.30	390.22	390.72	391.18	391.56	398.75	395.41	392.15
Initial Effective Stress, σ'_i (kPa /psf)		5,168.38	5,356.30	5,665.98	5,682.70	5,659.90	4,588.86	3,795.10	3,741.32	4,944.72	5,645.66
Final Effective Stress, σ'_f (kPa/psf)		5,403.58	5,586.70	5,875.98	5,905.90	5,878.30	5,523.66	4,762.30	4,691.72	5,707.92	5,849.66
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*
OCR Manual Input Value		*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		2,919	3,093	3,271	3,332	3,284	3,265	3,239	2,899	3,159	3,393
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*
Modified Recompression Index, $C_{r\varepsilon}$		*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*
ratio of t2 / t1		*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*
Settlements											
Primary Settlement, (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Secondary Settlement (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total Settlement (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Elastic or Plastic (E/P)											
		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 25 (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Written by: **Yiwen Cao** Date: **6/10/2009** Reviewed by: **R. Kulasingam/Jay Beech** Date: **6/10/2009**

Client: **Honeywell** Project: **Onondaga Lake SCA IDS** Project/ Proposal No.: **GJ4299** Task No.: **04**

Layer No.	*26*	**Zone2-Below-GW-19**									
Initial Stress Reference Layer (top of layer)		*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*
Final Stress Reference Layer (top of layer)		*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)		393.18	391.73	390.30	390.22	390.72	391.18	391.56	398.75	395.41	392.15
Initial Effective Stress, σ'_i (kPa /psf)		5,168.38	5,356.30	5,665.98	5,682.70	5,659.90	4,588.86	3,795.10	3,741.32	4,944.72	5,645.66
Final Effective Stress, σ'_f (kPa/psf)		5,403.58	5,586.70	5,875.98	5,905.90	5,878.30	5,523.66	4,762.30	4,691.72	5,707.92	5,849.66
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*
OCR Manual Input Value		*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		2,919	3,093	3,271	3,332	3,284	3,265	3,239	2,899	3,159	3,393
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*
Modified Recompression Index, $C_{r\varepsilon}$		*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*
ratio of t2 / t1		*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*
Settlements											
Primary Settlement, (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Secondary Settlement (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total Settlement (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Elastic or Plastic (E/P)		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 26 (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Layer No.	*27*	**Zone3-Below-GW-3**									
Initial Stress Reference Layer (top of layer)		*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*
Final Stress Reference Layer (top of layer)		*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)		393.18	391.73	390.30	390.22	390.72	391.18	391.56	398.75	395.41	392.15
Initial Effective Stress, σ'_i (kPa /psf)		5,168.38	5,356.30	5,665.98	5,682.70	5,659.90	4,588.86	3,795.10	3,741.32	4,944.72	5,645.66
Final Effective Stress, σ'_f (kPa/psf)		5,403.58	5,586.70	5,875.98	5,905.90	5,878.30	5,523.66	4,762.30	4,691.72	5,707.92	5,849.66
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*
OCR Manual Input Value		*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		2,919	3,093	3,271	3,332	3,284	3,265	3,239	2,899	3,159	3,393
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.380*	*0.380*	*0.380*	*0.380*	*0.380*	*0.380*	*0.380*	*0.380*	*0.380*	*0.380*
Modified Recompression Index, $C_{r\varepsilon}$		*0.021*	*0.021*	*0.021*	*0.021*	*0.021*	*0.021*	*0.021*	*0.021*	*0.021*	*0.021*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.70%*	*0.70%*	*0.70%*	*0.70%*	*0.70%*	*0.70%*	*0.70%*	*0.70%*	*0.70%*	*0.70%*
ratio of t2 / t1		*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*
Settlements											
Primary Settlement, (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Secondary Settlement (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total Settlement (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Elastic or Plastic (E/P)		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 27 (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Written by: **Yiwen Cao** Date: **6/10/2009** Reviewed by: **R. Kulasingam/Jay Beech** Date: **6/10/2009**

Client: **Honeywell** Project: **Onondaga Lake SCA IDS** Project/ Proposal No.: **GJ4299** Task No.: **04**

	Layer No.	Material										
LAYER SETTLEMENT	1	*Cover*										
	2	*Dredge*										
	3	*Gravel*										
	4	*Clay*										
	5	*Dike*										
	6	*Zone2-Above-GW-1*	0.043	0.045	0.044	0.046	0.045	0.205	0.285	0.266	0.131	0.037
	7	*Zone2-Above-GW-2*	0.025	0.003	0.003	0.003	0.003	0.075	0.059	0.103	0.055	0.043
	8	*Zone2-Above-GW-3*	0.041	0.042	0.041	0.043	0.042	0.007	0.011	0.008	0.005	0.042
	9	*Zone2-Above-GW-4*	0.040	0.041	0.040	0.042	0.041	0.168	0.010	0.008	0.113	0.041
	10	*Zone2-Above-GW-5*	0.039	0.040	0.039	0.041	0.040	0.159	0.141	0.182	0.109	0.040
	11	*Zone2-Above-GW-6*	0.038	0.039	0.038	0.040	0.039	0.150	0.095	0.139	0.104	0.039
	12	*Zone2-Above-GW-7*	0.037	0.038	0.037	0.039	0.038	0.128	0.058	0.105	0.100	0.038
	13	*Zone2-Above-GW-8*	0.036	0.037	0.037	0.038	0.038	0.099	0.028	0.077	0.097	0.037
	14	*Zone2-Above-GW-9*	0.035	0.037	0.036	0.037	0.037	0.131	0.180	0.053	0.093	0.036
	15	*Zone2-Above-GW-10*	0.035	0.036	0.035	0.037	0.036	0.125	0.169	0.142	0.090	0.036
	16	*Zone2-Above-GW-11*	0.034	0.035	0.035	0.036	0.035	0.121	0.160	0.136	0.088	0.035
	17	*Zone2-Above-GW-12*	0.033	0.035	0.034	0.035	0.035	0.116	0.152	0.130	0.085	0.034
	18	*Zone2-Above-GW-13*	0.033	0.034	0.033	0.035	0.034	0.112	0.145	0.125	0.083	0.034
	19	*Zone2-Above-GW-14*	0.032	0.033	0.033	0.034	0.034	0.108	0.139	0.120	0.080	0.033
	20	*Zone2-Above-GW-15*	0.032	0.033	0.032	0.034	0.033	0.105	0.133	0.116	0.078	0.033
	21	*Zone2-Above-GW-16*	0.031	0.032	0.032	0.033	0.033	0.102	0.128	0.111	0.076	0.032
	22	*Zone2-Above-GW-17*	0.031	0.032	0.032	0.033	0.032	0.099	0.123	0.108	0.074	0.032
	23	*Zone3-Above-GW-1*	0.000	0.000	0.000	0.004	0.001	0.000	0.000	0.000	0.000	0.000
	24	*Zone3-Above-GW-2*	0.000	0.000	0.000	0.004	0.001	0.000	0.000	0.000	0.000	0.000
	25	*Zone2-Below-GW-18*	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	26	*Zone2-Below-GW-19*	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	27	*Zone3-Below-GW-3*	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	28											
	29	*Soil Above GW*										
	30	*Soil Below GW*										
		TOTAL SETTLEMENT	**0.60**	**0.59**	**0.58**	**0.61**	**0.60**	**2.01**	**2.01**	**1.93**	**1.46**	**0.62**
POST-SETTLEMENT ELEVATION(M/FT)	Line	1	454.56	455.53	457.83	458.21	458.29	450.92	442.40	447.88	457.55	458.64
	Line	2	452.60	453.61	456.08	456.35	456.47	443.13	434.34	439.96	451.19	456.94
	Line	3	426.16	426.14	426.09	426.36	426.56	428.22	430.36	435.17	432.13	430.51
	Line	4	424.70	424.76	424.88	425.14	425.32	426.98	429.20	433.26	430.12	428.38
	Line	5	422.45	422.88	423.34	423.99	423.94	425.47	427.56	430.31	427.53	425.87
	Line	6	422.45	422.88	423.34	423.99	423.94	425.47	427.56	430.31	427.53	425.87
	Line	7	420.74	421.05	421.41	422.04	422.00	423.54	425.60	428.61	425.68	423.89
	Line	8	419.01	419.19	419.43	420.06	420.02	421.48	423.43	426.74	423.76	421.91
	Line	9	417.29	417.37	417.49	418.11	418.08	419.35	421.20	424.78	421.79	419.93
	Line	10	415.58	415.54	415.56	416.17	416.14	417.38	418.98	422.82	419.93	417.95
	Line	11	413.86	413.71	413.62	414.22	414.20	415.41	416.88	421.03	418.06	415.97
	Line	12	412.14	411.89	411.68	412.27	412.26	413.42	414.74	419.20	416.19	413.99
	Line	13	410.42	410.06	409.74	410.32	410.31	411.42	412.56	417.33	414.32	412.01
	Line	14	408.70	408.23	407.80	408.37	408.37	409.38	410.35	415.44	412.44	410.02
	Line	15	406.98	406.40	405.86	406.42	406.42	407.37	408.30	413.52	410.56	408.04
	Line	16	405.25	404.57	403.91	404.46	404.47	405.36	406.23	411.69	408.67	406.06
	Line	17	403.53	402.73	401.97	402.51	402.53	403.35	404.16	409.86	406.78	404.07
	Line	18	401.81	400.90	400.03	400.56	400.58	401.33	402.07	408.02	404.89	402.09
	Line	19	400.08	399.07	398.08	398.60	398.63	399.31	399.98	406.18	403.00	400.10
	Line	20	398.36	397.23	396.14	396.65	396.68	397.28	397.88	404.33	401.11	398.11
	Line	21	396.63	395.40	394.19	394.69	394.73	395.25	395.78	402.47	399.21	396.13
	Line	22	394.91	393.57	392.25	392.74	392.78	393.22	393.67	400.61	397.31	394.14
	Line	23	393.18	391.73	390.30	390.78	390.83	391.18	391.56	398.75	395.41	392.15
	Line	24	393.18	391.73	390.30	390.50	390.77	391.18	391.56	398.75	395.41	392.15
	Line	25	393.18	391.73	390.30	390.22	390.72	391.18	391.56	398.75	395.41	392.15
	Line	26	393.18	391.73	390.30	390.22	390.72	391.18	391.56	398.75	395.41	392.15
	Line	27	393.18	391.73	390.30	390.22	390.72	391.18	391.56	398.75	395.41	392.15
	Line	28	393.18	391.73	390.30	390.22	390.72	391.18	391.56	398.75	395.41	392.15
	Line	29										
	Line	30										
	Line	31										

Written by: **Yiwen Cao** Date: **6/10/2009** Reviewed by: **R. Kulasingam/Jay Beech** Date: **6/10/2009**

Client: **Honeywell** Project: **Onondaga Lake SCA IDS** Project/ Proposal No.: **GJ4299** Task No.: **04**

Attachment 5

CASE 4: Calculations of Cover Settlement During Post-Closure Period (Points 501 to 510)

Written by: **Yiwen Cao** Date: **6/10/2009** Reviewed by: **R. Kulasingam/Jay Beech** Date: **6/10/2009**

Client: **Honeywell** Project: **Onondaga Lake SCA IDS** Project/ Proposal No.: **GJ4299** Task No.: **04**

Settlement Prediction Model

Programmer: **Yiwen Cao, GeoSyntec Consultants**

Version Control V 1.002 11.14.2007

Project: **Onondaga Lake SCA 50%**

Notes:

Unit: **ft / psf**

Average Compaction Effort = **1440.00** kPa or psf

Consider Compaction Effort = **N** yes or no

Point #				**501**	**502**	**503**	**504**	**505**	**506**	**507**	**508**	**509**	**510**
Distance (meter or ft)				*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
ELEVATION(M/FT)	Line	1	Top of Final Cover	*455.16*	*456.12*	*458.41*	*458.82*	*458.89*	*452.93*	*444.41*	*449.81*	*459.01*	*459.26*
	Line	2	Top of Year 4 Dredge	*453.20*	*454.20*	*456.66*	*456.96*	*457.07*	*445.14*	*436.35*	*441.89*	*452.65*	*457.56*
	Line	3		*452.20*	*451.16*	*451.66*	*451.96*	*452.09*	*442.66*	*435.69*	*441.89*	*452.65*	*456.56*
	Line	4		*451.20*	*448.12*	*446.66*	*446.96*	*447.10*	*440.17*	*435.02*	*441.89*	*452.65*	*455.56*
	Line	5		*450.20*	*445.08*	*441.67*	*441.97*	*442.12*	*437.69*	*434.36*	*441.89*	*452.65*	*454.56*
	Line	6		*449.20*	*442.04*	*436.67*	*436.97*	*437.13*	*435.20*	*433.70*	*441.89*	*452.65*	*453.56*
	Line	7		*448.20*	*439.00*	*431.67*	*431.97*	*432.15*	*432.72*	*433.03*	*441.89*	*452.65*	*452.56*
	Line	8	Top of Year 3 Dredge	*447.20*	*435.96*	*426.67*	*426.97*	*427.16*	*430.23*	*432.37*	*441.89*	*452.65*	*451.56*
	Line	9		*446.49*	*435.96*	*426.67*	*426.97*	*427.16*	*430.23*	*432.37*	*441.89*	*452.39*	*450.85*
	Line	10		*445.78*	*435.96*	*426.67*	*426.97*	*427.16*	*430.23*	*432.37*	*441.89*	*452.13*	*450.14*
	Line	11		*445.07*	*435.96*	*426.67*	*426.97*	*427.16*	*430.23*	*432.37*	*441.89*	*451.87*	*449.43*
	Line	12		*444.37*	*435.96*	*426.67*	*426.97*	*427.16*	*430.23*	*432.37*	*441.89*	*451.62*	*448.73*
	Line	13		*443.66*	*435.96*	*426.67*	*426.97*	*427.16*	*430.23*	*432.37*	*441.89*	*451.36*	*448.02*
	Line	14		*442.95*	*435.96*	*426.67*	*426.97*	*427.16*	*430.23*	*432.37*	*441.89*	*451.10*	*447.31*
	Line	15	Top of Year 2 Dredge	*442.24*	*435.96*	*426.67*	*426.97*	*427.16*	*430.23*	*432.37*	*441.89*	*450.84*	*446.60*
	Line	16		*442.24*	*435.96*	*426.67*	*426.97*	*427.16*	*430.23*	*432.37*	*441.21*	*448.38*	*444.39*
	Line	17		*442.24*	*435.96*	*426.67*	*426.97*	*427.16*	*430.23*	*432.37*	*440.52*	*445.91*	*442.18*
	Line	18		*442.24*	*435.96*	*426.67*	*426.97*	*427.16*	*430.23*	*432.37*	*439.84*	*443.45*	*439.97*
	Line	19		*442.24*	*435.96*	*426.67*	*426.97*	*427.16*	*430.23*	*432.37*	*439.15*	*440.98*	*437.76*
	Line	20		*442.24*	*435.96*	*426.67*	*426.97*	*427.16*	*430.23*	*432.37*	*438.47*	*438.52*	*435.55*
	Line	21		*442.24*	*435.96*	*426.67*	*426.97*	*427.16*	*430.23*	*432.37*	*437.78*	*436.05*	*433.34*
	Line	22	Top of Year 1 Dredge	*442.24*	*435.96*	*426.67*	*426.97*	*427.16*	*430.23*	*432.37*	*437.10*	*433.59*	*431.13*
	Line	23		*439.66*	*434.42*	*426.67*	*426.97*	*427.16*	*430.23*	*432.37*	*437.10*	*433.59*	*431.13*
	Line	24		*437.08*	*432.88*	*426.67*	*426.97*	*427.16*	*430.23*	*432.37*	*437.10*	*433.59*	*431.13*
	Line	25		*434.50*	*431.35*	*426.67*	*426.97*	*427.16*	*430.23*	*432.37*	*437.10*	*433.59*	*431.13*
	Line	26		*431.92*	*429.81*	*426.67*	*426.97*	*427.16*	*430.23*	*432.37*	*437.10*	*433.59*	*431.13*
	Line	27		*429.34*	*428.27*	*426.67*	*426.97*	*427.16*	*430.23*	*432.37*	*437.10*	*433.59*	*431.13*
	Line	28	Top of Gravel(Top of Incompressil	*426.76*	*426.73*	*426.67*	*426.97*	*427.16*	*430.23*	*432.37*	*437.10*	*433.59*	*431.13*
	Line	29	GND for sigma_p	*428.78*	*429.45*	*430.19*	*430.86*	*430.77*	*431.00*	*431.07*	*434.10*	*433.94*	*433.53*
	Line	30	GW	*375.00*	*375.00*	*375.00*	*375.00*	*375.00*	*375.00*	*375.00*	*375.00*	*375.00*	*375.00*
	Line	31	ROCK	*426.76*	*426.73*	*426.67*	*426.97*	*427.16*	*430.23*	*432.37*	*437.10*	*433.59*	*431.13*
LAYER THICKNESS (M/FT)	Layer No.	From	To / Material										
	1	*1*	*2* / *Cover*	*1.96*	*1.92*	*1.75*	*1.86*	*1.82*	*7.79*	*8.06*	*7.92*	*6.36*	*1.70*
	2	*2*	*3* / *YR4-1*	*1.00*	*3.04*	*5.00*	*5.00*	*4.99*	*2.49*	*0.66*	*0.00*	*0.00*	*1.00*
	3	*3*	*4* / *YR4-2*	*1.00*	*3.04*	*5.00*	*5.00*	*4.99*	*2.49*	*0.66*	*0.00*	*0.00*	*1.00*
	4	*4*	*5* / *YR4-3*	*1.00*	*3.04*	*5.00*	*5.00*	*4.99*	*2.49*	*0.66*	*0.00*	*0.00*	*1.00*
	5	*5*	*6* / *YR4-4*	*1.00*	*3.04*	*5.00*	*5.00*	*4.99*	*2.49*	*0.66*	*0.00*	*0.00*	*1.00*
	6	*6*	*7* / *YR4-5*	*1.00*	*3.04*	*5.00*	*5.00*	*4.99*	*2.49*	*0.66*	*0.00*	*0.00*	*1.00*
	7	*7*	*8* / *YR4-6*	*1.00*	*3.04*	*5.00*	*5.00*	*4.98*	*2.48*	*0.66*	*0.00*	*0.00*	*1.00*
	8	*8*	*9* / *YR3-1*	*0.71*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.26*	*0.71*
	9	*9*	*10* / *YR3-2*	*0.71*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.26*	*0.71*
	10	*10*	*11* / *YR3-3*	*0.71*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.26*	*0.71*
	11	*11*	*12* / *YR3-4*	*0.71*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.26*	*0.71*
	12	*12*	*13* / *YR3-5*	*0.71*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.26*	*0.71*
	13	*13*	*14* / *YR3-6*	*0.71*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.26*	*0.71*
	14	*14*	*15* / *YR3-7*	*0.71*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.26*	*0.71*
	15	*15*	*16* / *YR2-1*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.68*	*2.46*	*2.21*
	16	*16*	*17* / *YR2-2*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.68*	*2.46*	*2.21*
	17	*17*	*18* / *YR2-3*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.68*	*2.46*	*2.21*
	18	*18*	*19* / *YR2-4*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.68*	*2.46*	*2.21*
	19	*19*	*20* / *YR2-5*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.68*	*2.46*	*2.21*
	20	*20*	*21* / *YR2-6*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.68*	*2.46*	*2.21*
	21	*21*	*22* / *YR2-7*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.68*	*2.46*	*2.21*
	22	*22*	*23* / *YR1-1*	*2.58*	*1.54*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
	23	*23*	*24* / *YR1-2*	*2.58*	*1.54*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
	24	*24*	*25* / *YR1-3*	*2.58*	*1.54*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
	25	*25*	*26* / *YR1-4*	*2.58*	*1.54*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
	26	*26*	*27* / *YR1-5*	*2.58*	*1.54*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
	27	*27*	*28* / *YR1-6*	*2.58*	*1.54*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
	28												
	29												
	30												
	Thickness Check												
		From Line	To Line / SUM	*28.40*	*29.39*	*31.74*	*31.85*	*31.73*	*22.70*	*12.04*	*12.71*	*25.42*	*28.13*
		1	*28* / Thickness =	*28.40*	*29.39*	*31.74*	*31.85*	*31.73*	*22.70*	*12.04*	*12.71*	*25.42*	*28.13*
			Thickness Check	***OK***	***OK***	***OK***	***OK***	***OK***	***OK***	***OK***	***OK***	***OK***	***OK***

Written by: **Yiwen Cao** Date: **6/10/2009** Reviewed by: **R. Kulasingam/Jay Beech** Date: **6/10/2009**

Client: **Honeywell** Project: **Onondaga Lake SCA IDS** Project/ Proposal No.: **GJ4299** Task No.: **04**

	Layer No.	Material										
UNIT WEIGHT	1	*Cover*	*120.0*	*120.0*	*120.0*	*120.0*	*120.0*	*120.0*	*120.0*	*120.0*	*120.0*	*120.0*
	2	*YR4-1*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*
	3	*YR4-2*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*
	4	*YR4-3*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*
	5	*YR4-4*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*
	6	*YR4-5*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*
	7	*YR4-6*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*
	8	*YR3-1*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*
	9	*YR3-2*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*
	10	*YR3-3*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*
	11	*YR3-4*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*
	12	*YR3-5*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*
	13	*YR3-6*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*
	14	*YR3-7*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*
	15	*YR2-1*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*
	16	*YR2-2*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*
	17	*YR2-3*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*
	18	*YR2-4*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*
	19	*YR2-5*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*
	20	*YR2-6*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*
	21	*YR2-7*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*
	22	*YR1-1*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*
	23	*YR1-2*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*
	24	*YR1-3*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*
	25	*YR1-4*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*
	26	*YR1-5*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*
	27	*YR1-6*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*
	28											
	29		*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*
	30	*Soil below GW*	*19.6*	*19.6*	*19.6*	*19.6*	*19.6*	*19.6*	*19.6*	*19.6*	*19.6*	*19.6*
	Layer No.	***1*** **Cover**										
		Initial Stress Reference Layer (top of layer)	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
		Final Stress Reference Layer (top of layer)	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
		Midpoint Elevation, (m / ft)	454.18	455.16	457.54	457.89	457.98	449.04	440.38	445.85	455.83	458.41
		Initial Effective Stress, σ'_i (kPa /psf)	Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight
		Final Effective Stress, σ'_f (kPa/psf)	Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight
Elastic Method												
Modulus, E (kPa/psf)= _____		Strain										
		Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)												
Consolidation Properties												
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)												
OCR Manual Input Value												
OCR Computation Input												
Preconsolidation pressure, σ'_p (kPa / psf)												
Modified Primary Compression Index, $C_{c\varepsilon}$												
Modified Recompression Index, $C_{r\varepsilon}$												
Modified Secondary Compression Index, C_α												
ratio of t2 / t1												
Settlements												
Primary Settlement, (m / ft)												
Secondary Settlement (m / ft)												
Total Settlement (m / ft)												
		Elastic or Plastic (E/P)										
		Settlement of Layer 1 (m / ft)										

Written by: **Yiwen Cao** Date: **6/10/2009** Reviewed by: **R. Kulasingam/Jay Beech** Date: **6/10/2009**

Client: **Honeywell** Project: **Onondaga Lake SCA IDS** Project/ Proposal No.: **GJ4299** Task No.: **04**

Layer No.	*2*	**YR4-1**									
Initial Stress Reference Layer (top of layer)	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*
Final Stress Reference Layer (top of layer)	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)	452.70	452.68	454.16	454.46	454.58	443.90	436.02	441.89	452.65	457.06
Initial Effective Stress, σ'_i (kPa /psf)	43.00	130.72	214.93	214.93	214.36	106.86	28.52	0.00	0.00	43.00
Final Effective Stress, σ'_f (kPa/psf)	278.20	361.12	424.93	438.13	432.76	1,041.66	995.72	950.40	763.20	247.00
Elastic Method										
Modulus, E (kPa/psf)= Strain										
Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)										
Consolidation Properties										
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*
OCR Manual Input Value	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input										
Preconsolidation pressure, σ'_p (kPa / psf)	43	131	215	215	214	107	29	0	0	43
Modified Primary Compression Index, $C_{c\varepsilon}$	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*
Modified Recompression Index, $C_{r\varepsilon}$	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*
ratio of t2 / t1	*32.00*	*32.00*	*32.00*	*32.00*	*32.00*	*32.00*	*32.00*	*32.00*	*32.00*	*32.00*
Settlements										
Primary Settlement, (m / ft)	0.236	0.391	0.431	0.450	0.443	0.716	0.298	0.000	0.000	0.221
Secondary Settlement (m / ft)	0.009	0.027	0.045	0.045	0.045	0.022	0.006	0.000	0.000	0.009
Total Settlement (m / ft)	0.245	0.418	0.476	0.496	0.488	0.738	0.304	0.000	0.000	0.230
Elastic or Plastic (E/P)	P	P	P	P	P	P	P	P	P	P
	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 2 (m / ft)	0.245	0.418	0.476	0.496	0.488	0.738	0.304	0.000	0.000	0.230
Layer No.	*3*	**YR4-2**								
Initial Stress Reference Layer (top of layer)	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*
Final Stress Reference Layer (top of layer)	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)	451.70	449.64	449.16	449.46	449.59	441.41	435.36	441.89	452.65	456.06
Initial Effective Stress, σ'_i (kPa /psf)	129.00	392.16	644.79	644.79	643.07	320.57	85.57	0.00	0.00	129.00
Final Effective Stress, σ'_f (kPa/psf)	364.20	622.56	854.79	867.99	861.47	1,255.37	1,052.77	950.40	763.20	333.00
Elastic Method										
Modulus, E (kPa/psf)= Strain										
Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)										
Consolidation Properties										
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*
OCR Manual Input Value	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input										
Preconsolidation pressure, σ'_p (kPa / psf)	129	392	645	645	643	321	86	0	0	129
Modified Primary Compression Index, $C_{c\varepsilon}$	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*
Modified Recompression Index, $C_{r\varepsilon}$	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*
ratio of t2 / t1	*32.00*	*32.00*	*32.00*	*32.00*	*32.00*	*32.00*	*32.00*	*32.00*	*32.00*	*32.00*
Settlements										
Primary Settlement, (m / ft)	0.131	0.178	0.178	0.188	0.184	0.429	0.211	0.000	0.000	0.120
Secondary Settlement (m / ft)	0.009	0.027	0.045	0.045	0.045	0.022	0.006	0.000	0.000	0.009
Total Settlement (m / ft)	0.140	0.205	0.223	0.233	0.229	0.452	0.217	0.000	0.000	0.129
Elastic or Plastic (E/P)	P	P	P	P	P	P	P	P	P	P
	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 3 (m / ft)	0.140	0.205	0.223	0.233	0.229	0.452	0.217	0.000	0.000	0.129
Layer No.	*4*	**YR4-3**								
Initial Stress Reference Layer (top of layer)	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*
Final Stress Reference Layer (top of layer)	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)	450.70	446.60	444.16	444.46	444.61	438.93	434.69	441.89	452.65	455.06
Initial Effective Stress, σ'_i (kPa /psf)	215.00	653.60	1,074.64	1,074.64	1,071.78	534.28	142.62	0.00	0.00	215.00
Final Effective Stress, σ'_f (kPa/psf)	450.20	884.00	1,284.64	1,297.84	1,290.18	1,469.08	1,109.82	950.40	763.20	419.00
Elastic Method										
Modulus, E (kPa/psf)= Strain										
Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)										
Consolidation Properties										
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*
OCR Manual Input Value	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input										
Preconsolidation pressure, σ'_p (kPa / psf)	215	654	1,075	1,075	1,072	534	143	0	0	215
Modified Primary Compression Index, $C_{c\varepsilon}$	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*
Modified Recompression Index, $C_{r\varepsilon}$	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*
ratio of t2 / t1	*32.00*	*32.00*	*32.00*	*32.00*	*32.00*	*32.00*	*32.00*	*32.00*	*32.00*	*32.00*
Settlements										
Primary Settlement, (m / ft)	0.094	0.116	0.113	0.119	0.117	0.318	0.172	0.000	0.000	0.084
Secondary Settlement (m / ft)	0.009	0.027	0.045	0.045	0.045	0.022	0.006	0.000	0.000	0.009
Total Settlement (m / ft)	0.103	0.144	0.158	0.164	0.162	0.340	0.178	0.000	0.000	0.093
Elastic or Plastic (E/P)	P	P	P	P	P	P	P	P	P	P
	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 4 (m / ft)	0.103	0.144	0.158	0.164	0.162	0.340	0.178	0.000	0.000	0.093

Written by: **Yiwen Cao** Date: **6/10/2009** Reviewed by: **R. Kulasingam/Jay Beech** Date: **6/10/2009**

Client: **Honeywell** Project: **Onondaga Lake SCA IDS** Project/ Proposal No.: **GJ4299** Task No.: **04**

Layer No.	*5*	**YR4-4**									
Initial Stress Reference Layer (top of layer)	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*
Final Stress Reference Layer (top of layer)	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)	449.70	443.56	439.17	439.47	439.62	436.44	434.03	441.89	452.65	454.06
Initial Effective Stress, σ'_i (kPa /psf)	301.00	915.04	1,504.50	1,504.50	1,500.49	747.99	199.66	0.00	0.00	301.00
Final Effective Stress, σ'_f (kPa/psf)	536.20	1,145.44	1,714.50	1,727.70	1,718.89	1,682.79	1,166.86	950.40	763.20	505.00
Elastic Method										
Modulus, E (kPa/psf)= Strain										
Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)										
Consolidation Properties										
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*
OCR Manual Input Value	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input										
Preconsolidation pressure, σ'_p (kPa / psf)	301	915	1,504	1,504	1,500	748	200	0	0	301
Modified Primary Compression Index, $C_{c\varepsilon}$	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*
Modified Recompression Index, $C_{r\varepsilon}$	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*
ratio of t2 / t1	*32.00*	*32.00*	*32.00*	*32.00*	*32.00*	*32.00*	*32.00*	*32.00*	*32.00*	*32.00*
Settlements										
Primary Settlement, (m / ft)	0.073	0.086	0.083	0.087	0.086	0.255	0.148	0.000	0.000	0.065
Secondary Settlement (m / ft)	0.00903	0.02745	0.04514	0.04514	0.04502	0.02244	0.00599	0.00000	0.00000	0.00903
Total Settlement (m / ft)	0.082	0.114	0.128	0.133	0.131	0.277	0.154	0.000	0.000	0.075
Elastic or Plastic (E/P)	P	P	P	P	P	P	P	P	P	P
	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 5 (m / ft)	0.082	0.114	0.128	0.133	0.131	0.277	0.154	0.000	0.000	0.075
Layer No.	*6*	**YR4-5**								
Initial Stress Reference Layer (top of layer)	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*
Final Stress Reference Layer (top of layer)	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)	448.70	440.52	434.17	434.47	434.64	433.96	433.37	441.89	452.65	453.06
Initial Effective Stress, σ'_i (kPa /psf)	387.00	1,176.48	1,934.36	1,934.36	1,929.20	961.70	256.71	0.00	0.00	387.00
Final Effective Stress, σ'_f (kPa/psf)	622.20	1,406.88	2,144.36	2,157.56	2,147.60	1,896.50	1,223.91	950.40	763.20	591.00
Elastic Method										
Modulus, E (kPa/psf)= Strain										
Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)										
Consolidation Properties										
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*
OCR Manual Input Value	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input										
Preconsolidation pressure, σ'_p (kPa / psf)	387	1,176	1,934	1,934	1,929	962	257	0	0	387
Modified Primary Compression Index, $C_{c\varepsilon}$	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*
Modified Recompression Index, $C_{r\varepsilon}$	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*
ratio of t2 / t1	*32.00*	*32.00*	*32.00*	*32.00*	*32.00*	*32.00*	*32.00*	*32.00*	*32.00*	*32.00*
Settlements										
Primary Settlement, (m / ft)	0.060	0.069	0.065	0.069	0.068	0.214	0.131	0.000	0.000	0.054
Secondary Settlement (m / ft)	0.009	0.027	0.045	0.045	0.045	0.022	0.006	0.000	0.000	0.009
Total Settlement (m / ft)	0.069	0.096	0.110	0.114	0.113	0.236	0.137	0.000	0.000	0.063
Elastic or Plastic (E/P)	P	P	P	P	P	P	P	P	P	P
	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 6 (m / ft)	0.069	0.096	0.110	0.114	0.113	0.236	0.137	0.000	0.000	0.063
Layer No.	*7*	**YR4-6**								
Initial Stress Reference Layer (top of layer)	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*
Final Stress Reference Layer (top of layer)	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)	447.70	437.48	429.17	429.47	429.65	431.47	432.70	441.89	452.65	452.06
Initial Effective Stress, σ'_i (kPa /psf)	473.00	1,437.92	2,364.21	2,364.21	2,357.91	1,175.41	313.76	0.00	0.00	473.00
Final Effective Stress, σ'_f (kPa/psf)	708.20	1,668.32	2,574.21	2,587.41	2,576.31	2,110.21	1,280.96	950.40	763.20	677.00
Elastic Method										
Modulus, E (kPa/psf)= Strain										
Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)										
Consolidation Properties										
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*
OCR Manual Input Value	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input										
Preconsolidation pressure, σ'_p (kPa / psf)	473	1,438	2,364	2,364	2,358	1,175	314	0	0	473
Modified Primary Compression Index, $C_{c\varepsilon}$	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*
Modified Recompression Index, $C_{r\varepsilon}$	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*
ratio of t2 / t1	*32.00*	*32.00*	*32.00*	*32.00*	*32.00*	*32.00*	*32.00*	*32.00*	*32.00*	*32.00*
Settlements										
Primary Settlement, (m / ft)	0.051	0.057	0.054	0.057	0.056	0.184	0.118	0.000	0.000	0.045
Secondary Settlement (m / ft)	0.009	0.027	0.045	0.045	0.045	0.022	0.006	0.000	0.000	0.009
Total Settlement (m / ft)	0.060	0.085	0.099	0.102	0.101	0.206	0.124	0.000	0.000	0.054
Elastic or Plastic (E/P)										
	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 7 (m / ft)	0.060	0.085	0.099	0.102	0.101	0.206	0.124	0.000	0.000	0.054

Written by: **Yiwen Cao** Date: **6/10/2009** Reviewed by: **R. Kulasingam/Jay Beech** Date: **6/10/2009**

Client: **Honeywell** Project: **Onondaga Lake SCA IDS** Project/ Proposal No.: **GJ4299** Task No.: **04**

Layer No.	*8*	**YR3-1**									
Initial Stress Reference Layer (top of layer)		*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*
Final Stress Reference Layer (top of layer)		*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)		446.85	435.96	426.67	426.97	427.16	430.23	432.37	441.89	452.52	451.21
Initial Effective Stress, σ'_i (kPa /psf)		546.47	1,568.64	2,579.14	2,579.14	2,572.26	1,282.26	342.28	0.00	11.12	546.47
Final Effective Stress, σ'_f (kPa/psf)		781.67	1,799.04	2,789.14	2,802.34	2,790.66	2,217.06	1,309.48	950.40	774.32	750.47
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*
OCR Manual Input Value		*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		546	1,569	2,579	2,579	2,572	1,282	342	0	11	546
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*
Modified Recompression Index, $C_{r\varepsilon}$		*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*
ratio of t2 / t1		*16.50*	*16.50*	*16.50*	*16.50*	*16.50*	*16.50*	*16.50*	*16.50*	*16.50*	*16.50*
Settlements											
Primary Settlement, (m / ft)		0.032	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.139	0.028
Secondary Settlement (m / ft)		0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.005
Total Settlement (m / ft)		0.037	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.141	0.034
Elastic or Plastic (E/P)		P	P	P	P	P	P	P	P	P	P
		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 8 (m / ft)		0.037	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.141	0.034
Layer No.	*9*	**YR3-2**									
Initial Stress Reference Layer (top of layer)		*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*
Final Stress Reference Layer (top of layer)		*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)		446.14	435.96	426.67	426.97	427.16	430.23	432.37	441.89	452.26	450.50
Initial Effective Stress, σ'_i (kPa /psf)		607.41	1,568.64	2,579.14	2,579.14	2,572.26	1,282.26	342.28	0.00	33.36	607.41
Final Effective Stress, σ'_f (kPa/psf)		842.61	1,799.04	2,789.14	2,802.34	2,790.66	2,217.06	1,309.48	950.40	796.56	811.41
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*
OCR Manual Input Value		*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		607	1,569	2,579	2,579	2,572	1,282	342	0	33	607
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*
Modified Recompression Index, $C_{r\varepsilon}$		*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*
ratio of t2 / t1		*16.50*	*16.50*	*16.50*	*16.50*	*16.50*	*16.50*	*16.50*	*16.50*	*16.50*	*16.50*
Settlements											
Primary Settlement, (m / ft)		0.029	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.104	0.026
Secondary Settlement (m / ft)		0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.005
Total Settlement (m / ft)		0.035	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.106	0.031
Elastic or Plastic (E/P)		P	P	P	P	P	P	P	P	P	P
		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 9 (m / ft)		0.035	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.106	0.031
Layer No.	*10*	**YR3-3**									
Initial Stress Reference Layer (top of layer)		*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*
Final Stress Reference Layer (top of layer)		*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)		445.43	435.96	426.67	426.97	427.16	430.23	432.37	441.89	452.00	449.79
Initial Effective Stress, σ'_i (kPa /psf)		668.34	1,568.64	2,579.14	2,579.14	2,572.26	1,282.26	342.28	0.00	55.59	668.34
Final Effective Stress, σ'_f (kPa/psf)		903.54	1,799.04	2,789.14	2,802.34	2,790.66	2,217.06	1,309.48	950.40	818.79	872.34
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*
OCR Manual Input Value		*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		668	1,569	2,579	2,579	2,572	1,282	342	0	56	668
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*
Modified Recompression Index, $C_{r\varepsilon}$		*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*
ratio of t2 / t1		*16.50*	*16.50*	*16.50*	*16.50*	*16.50*	*16.50*	*16.50*	*16.50*	*16.50*	*16.50*
Settlements											
Primary Settlement, (m / ft)		0.027	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.088	0.024
Secondary Settlement (m / ft)		0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.005
Total Settlement (m / ft)		0.032	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.090	0.029
Elastic or Plastic (E/P)		P	P	P	P	P	P	P	P	P	P
		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 10 (m / ft)		0.032	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.090	0.029

Written by: **Yiwen Cao** Date: **6/10/2009** Reviewed by: **R. Kulasingam/Jay Beech** Date: **6/10/2009**

Client: **Honeywell** Project: **Onondaga Lake SCA IDS** Project/ Proposal No.: **GJ4299** Task No.: **04**

Layer No.	*11*	**YR3-4**									
Initial Stress Reference Layer (top of layer)		*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*
Final Stress Reference Layer (top of layer)		*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)		444.72	435.96	426.67	426.97	427.16	430.23	432.37	441.89	451.75	449.08
Initial Effective Stress, σ'_i (kPa /psf)		729.28	1,568.64	2,579.14	2,579.14	2,572.26	1,282.26	342.28	0.00	77.83	729.28
Final Effective Stress, σ'_f (kPa/psf)		964.48	1,799.04	2,789.14	2,802.34	2,790.66	2,217.06	1,309.48	950.40	841.03	933.28
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*
OCR Manual Input Value		*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		729	1,569	2,579	2,579	2,572	1,282	342	0	78	729
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*
Modified Recompression Index, $C_{r\varepsilon}$		*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*
ratio of t2 / t1		*16.50*	*16.50*	*16.50*	*16.50*	*16.50*	*16.50*	*16.50*	*16.50*	*16.50*	*16.50*
Settlements											
Primary Settlement, (m / ft)		0.025	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.078	0.022
Secondary Settlement (m / ft)		0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.005
Total Settlement (m / ft)		0.030	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.080	0.027
Elastic or Plastic (E/P)		P	P	P	P	P	P	P	P	P	P
		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 11 (m / ft)		0.030	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.080	0.027
Layer No.	*12*	**YR3-5**									
Initial Stress Reference Layer (top of layer)		*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*
Final Stress Reference Layer (top of layer)		*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)		444.01	435.96	426.67	426.97	427.16	430.23	432.37	441.89	451.49	448.37
Initial Effective Stress, σ'_i (kPa /psf)		790.22	1,568.64	2,579.14	2,579.14	2,572.26	1,282.26	342.28	0.00	100.07	790.22
Final Effective Stress, σ'_f (kPa/psf)		1,025.42	1,799.04	2,789.14	2,802.34	2,790.66	2,217.06	1,309.48	950.40	863.27	994.22
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*
OCR Manual Input Value		*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		790	1,569	2,579	2,579	2,572	1,282	342	0	100	790
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*
Modified Recompression Index, $C_{r\varepsilon}$		*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*
ratio of t2 / t1		*16.50*	*16.50*	*16.50*	*16.50*	*16.50*	*16.50*	*16.50*	*16.50*	*16.50*	*16.50*
Settlements											
Primary Settlement, (m / ft)		0.023	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.071	0.021
Secondary Settlement (m / ft)		0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.005
Total Settlement (m / ft)		0.029	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.072	0.026
Elastic or Plastic (E/P)		P	P	P	P	P	P	P	P	P	P
		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 12 (m / ft)		0.029	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.072	0.026
Layer No.	*13*	**YR3-6**									
Initial Stress Reference Layer (top of layer)		*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*
Final Stress Reference Layer (top of layer)		*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)		443.30	435.96	426.67	426.97	427.16	430.23	432.37	441.89	451.23	447.66
Initial Effective Stress, σ'_i (kPa /psf)		851	1,569	2,579	2,579	2,572	1,282	342	0	122	851
Final Effective Stress, σ'_f (kPa/psf)		1,086	1,799	2,789	2,802	2,791	2,217	1,309	950	886	1,055
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*
OCR Manual Input Value		*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		851	1,569	2,579	2,579	2,572	1,282	342	0	122	851
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*
Modified Recompression Index, $C_{r\varepsilon}$		*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*
ratio of t2 / t1		*16.50*	*16.50*	*16.50*	*16.50*	*16.50*	*16.50*	*16.50*	*16.50*	*16.50*	*16.50*
Settlements											
Primary Settlement, (m / ft)		0.022	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.065	0.019
Secondary Settlement (m / ft)		0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.005
Total Settlement (m / ft)		0.027	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.067	0.024
Elastic or Plastic (E/P)		P	P	P	P	P	P	P	P	P	P
		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 13 (m / ft)		0.027	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.067	0.024

Written by: **Yiwen Cao** Date: **6/10/2009** Reviewed by: **R. Kulasingam/Jay Beech** Date: **6/10/2009**

Client: **Honeywell** Project: **Onondaga Lake SCA IDS** Project/ Proposal No.: **GJ4299** Task No.: **04**

Layer No. *14* **YR3-7**											
Initial Stress Reference Layer (top of layer)		*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*
Final Stress Reference Layer (top of layer)		*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)		442.59	435.96	426.67	426.97	427.16	430.23	432.37	441.89	450.97	446.95
Initial Effective Stress, σ'_i (kPa /psf)		912	1,569	2,579	2,579	2,572	1,282	342	0	145	912
Final Effective Stress, σ'_f (kPa/psf)		1,147	1,799	2,789	2,802	2,791	2,217	1,309	950	908	1,116
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*
OCR Manual Input Value		*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		912	1,569	2,579	2,579	2,572	1,282	342	0	145	912
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*
Modified Recompression Index, $C_{r\varepsilon}$		*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*
ratio of t2 / t1		*16.50*	*16.50*	*16.50*	*16.50*	*16.50*	*16.50*	*16.50*	*16.50*	*16.50*	*16.50*
Settlements											
Primary Settlement, (m / ft)		0.021	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.060	0.018
Secondary Settlement (m / ft)		0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.005
Total Settlement (m / ft)		0.026	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.062	0.023
Elastic or Plastic (E/P)		P	P	P	P	P	P	P	P	P	P
		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 14 (m / ft)		0.026	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.062	0.023
Layer No. *15* **YR2-1**											
Initial Stress Reference Layer (top of layer)		*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*
Final Stress Reference Layer (top of layer)		*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)		442.24	435.96	426.67	426.97	427.16	430.23	432.37	441.55	449.61	445.50
Initial Effective Stress, σ'_i (kPa /psf)		943	1,569	2,579	2,579	2,572	1,282	342	29	262	1,038
Final Effective Stress, σ'_f (kPa/psf)		1,178	1,799	2,789	2,802	2,791	2,217	1,309	980	1,025	1,242
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*
OCR Manual Input Value		*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		943	1,569	2,579	2,579	2,572	1,282	342	29	262	1,038
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*
Modified Recompression Index, $C_{r\varepsilon}$		*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*
ratio of t2 / t1		*11.33*	*11.33*	*11.33*	*11.33*	*11.33*	*11.33*	*11.33*	*11.33*	*11.33*	*11.33*
Settlements											
Primary Settlement, (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.304	0.426	0.050
Secondary Settlement (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.004	0.016	0.014
Total Settlement (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.308	0.441	0.064
Elastic or Plastic (E/P)		P	P	P	P	P	P	P	P	P	P
		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 15 (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.308	0.441	0.064
Layer No. *16* **YR2-2**											
Initial Stress Reference Layer (top of layer)		*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*
Final Stress Reference Layer (top of layer)		*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)		442.24	435.96	426.67	426.97	427.16	430.23	432.37	440.86	447.14	443.29
Initial Effective Stress, σ'_i (kPa /psf)		943	1,569	2,579	2,579	2,572	1,282	342	88	474	1,228
Final Effective Stress, σ'_f (kPa/psf)		1,178	1,799	2,789	2,802	2,791	2,217	1,309	1,039	1,237	1,432
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*
OCR Manual Input Value		*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		943	1,569	2,579	2,579	2,572	1,282	342	88	474	1,228
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*
Modified Recompression Index, $C_{r\varepsilon}$		*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*
ratio of t2 / t1		*11.33*	*11.33*	*11.33*	*11.33*	*11.33*	*11.33*	*11.33*	*11.33*	*11.33*	*11.33*
Settlements											
Primary Settlement, (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.213	0.299	0.043
Secondary Settlement (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.004	0.016	0.014
Total Settlement (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.218	0.315	0.057
Elastic or Plastic (E/P)		P	P	P	P	P	P	P	P	P	P
		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 16 (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.218	0.315	0.057

Written by: **Yiwen Cao** Date: **6/10/2009** Reviewed by: **R. Kulasingam/Jay Beech** Date: **6/10/2009**

Client: **Honeywell** Project: **Onondaga Lake SCA IDS** Project/ Proposal No.: **GJ4299** Task No.: **04**

Layer No. *17* **YR2-3**											
Initial Stress Reference Layer (top of layer)		2	2	2	2	2	2	2	2	2	2
Final Stress Reference Layer (top of layer)		1	1	1	1	1	1	1	1	1	1
Midpoint Elevation, (m / ft)		442.24	435.96	426.67	426.97	427.16	430.23	432.37	440.18	444.68	441.08
Initial Effective Stress, σ'_i (kPa /psf)		943	1,569	2,579	2,579	2,572	1,282	342	147	685	1,418
Final Effective Stress, σ'_f (kPa/psf)		1,178	1,799	2,789	2,802	2,791	2,217	1,309	1,098	1,449	1,622
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*
OCR Manual Input Value		*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		943	1,569	2,579	2,579	2,572	1,282	342	147	685	1,418
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*
Modified Recompression Index, $C_{r\varepsilon}$		*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*
ratio of t2 / t1		*11.33*	*11.33*	*11.33*	*11.33*	*11.33*	*11.33*	*11.33*	*11.33*	*11.33*	*11.33*
Settlements											
Primary Settlement, (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.174	0.233	0.038
Secondary Settlement (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.004	0.016	0.014
Total Settlement (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.178	0.249	0.052
Elastic or Plastic (E/P)		P	P	P	P	P	P	P	P	P	P
		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 17 (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.178	0.249	0.052
Layer No. *18* **YR2-4**											
Initial Stress Reference Layer (top of layer)		2	2	2	2	2	2	2	2	2	2
Final Stress Reference Layer (top of layer)		1	1	1	1	1	1	1	1	1	1
Midpoint Elevation, (m / ft)		442.24	435.96	426.67	426.97	427.16	430.23	432.37	439.50	442.22	438.87
Initial Effective Stress, σ'_i (kPa /psf)		943	1,569	2,579	2,579	2,572	1,282	342	206	897	1,608
Final Effective Stress, σ'_f (kPa/psf)		1,178	1,799	2,789	2,802	2,791	2,217	1,309	1,156	1,661	1,812
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*
OCR Manual Input Value		*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		943	1,569	2,579	2,579	2,572	1,282	342	206	897	1,608
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*
Modified Recompression Index, $C_{r\varepsilon}$		*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*
ratio of t2 / t1		*11.33*	*11.33*	*11.33*	*11.33*	*11.33*	*11.33*	*11.33*	*11.33*	*11.33*	*11.33*
Settlements											
Primary Settlement, (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.149	0.192	0.033
Secondary Settlement (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.004	0.016	0.014
Total Settlement (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.154	0.207	0.047
Elastic or Plastic (E/P)		P	P	P	P	P	P	P	P	P	P
		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 18 (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.154	0.207	0.047
Layer No. *19* **YR2-5**											
Initial Stress Reference Layer (top of layer)		2	2	2	2	2	2	2	2	2	2
Final Stress Reference Layer (top of layer)		1	1	1	1	1	1	1	1	1	1
Midpoint Elevation, (m / ft)		442.24	435.96	426.67	426.97	427.16	430.23	432.37	438.81	439.75	436.66
Initial Effective Stress, σ'_i (kPa /psf)		943	1,569	2,579	2,579	2,572	1,282	342	265	1,109	1,798
Final Effective Stress, σ'_f (kPa/psf)		1,178	1,799	2,789	2,802	2,791	2,217	1,309	1,215	1,873	2,002
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*
OCR Manual Input Value		*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		943	1,569	2,579	2,579	2,572	1,282	342	265	1,109	1,798
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*
Modified Recompression Index, $C_{r\varepsilon}$		*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*
ratio of t2 / t1		*11.33*	*11.33*	*11.33*	*11.33*	*11.33*	*11.33*	*11.33*	*11.33*	*11.33*	*11.33*
Settlements											
Primary Settlement, (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.132	0.163	0.030
Secondary Settlement (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.004	0.016	0.014
Total Settlement (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.136	0.179	0.044
Elastic or Plastic (E/P)		P	P	P	P	P	P	P	P	P	P
		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 19 (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.136	0.179	0.044

Written by: **Yiwen Cao** Date: **6/10/2009** Reviewed by: **R. Kulasingam/Jay Beech** Date: **6/10/2009**

Client: **Honeywell** Project: **Onondaga Lake SCA IDS** Project/ Proposal No.: **GJ4299** Task No.: **04**

Layer No. *20* **YR2-6**											
Initial Stress Reference Layer (top of layer)		2	2	2	2	2	2	2	2	2	2
Final Stress Reference Layer (top of layer)		1	1	1	1	1	1	1	1	1	1
Midpoint Elevation, (m / ft)		442.24	435.96	426.67	426.97	427.16	430.23	432.37	438.13	437.29	434.45
Initial Effective Stress, σ'_i (kPa /psf)		943	1,569	2,579	2,579	2,572	1,282	342	324	1,321	1,988
Final Effective Stress, σ'_f (kPa/psf)		1,178	1,799	2,789	2,802	2,791	2,217	1,309	1,274	2,084	2,192
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*
OCR Manual Input Value		*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		943	1,569	2,579	2,579	2,572	1,282	342	324	1,321	1,988
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*
Modified Recompression Index, $C_{r\varepsilon}$		*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*
ratio of t2 / t1		*11.33*	*11.33*	*11.33*	*11.33*	*11.33*	*11.33*	*11.33*	*11.33*	*11.33*	*11.33*
Settlements											
Primary Settlement, (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.119	0.142	0.027
Secondary Settlement (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.004	0.016	0.014
Total Settlement (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.123	0.158	0.041
Elastic or Plastic (E/P)		P	P	P	P	P	P	P	P	P	P
		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 20 (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.123	0.158	0.041
Layer No. *21* **YR2-7**											
Initial Stress Reference Layer (top of layer)		2	2	2	2	2	2	2	2	2	2
Final Stress Reference Layer (top of layer)		1	1	1	1	1	1	1	1	1	1
Midpoint Elevation, (m / ft)		442.24	435.96	426.67	426.97	427.16	430.23	432.37	437.44	434.82	432.24
Initial Effective Stress, σ'_i (kPa /psf)		943	1,569	2,579	2,579	2,572	1,282	342	383	1,533	2,178
Final Effective Stress, σ'_f (kPa/psf)		1,178	1,799	2,789	2,802	2,791	2,217	1,309	1,333	2,296	2,382
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*
OCR Manual Input Value		*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		943	1,569	2,579	2,579	2,572	1,282	342	383	1,533	2,178
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*
Modified Recompression Index, $C_{r\varepsilon}$		*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*
ratio of t2 / t1		*11.33*	*11.33*	*11.33*	*11.33*	*11.33*	*11.33*	*11.33*	*11.33*	*11.33*	*11.33*
Settlements											
Primary Settlement, (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.108	0.126	0.025
Secondary Settlement (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.004	0.016	0.014
Total Settlement (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.112	0.142	0.039
Elastic or Plastic (E/P)		P	P	P	P	P	P	P	P	P	P
		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 21 (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.112	0.142	0.039
Layer No. *22* **YR1-1**											
Initial Stress Reference Layer (top of layer)		2	2	2	2	2	2	2	2	2	2
Final Stress Reference Layer (top of layer)		1	1	1	1	1	1	1	1	1	1
Midpoint Elevation, (m / ft)		440.95	435.19	426.67	426.97	427.16	430.23	432.37	437.10	433.59	431.13
Initial Effective Stress, σ'_i (kPa /psf)		1,054	1,635	2,579	2,579	2,572	1,282	342	412	1,639	2,273
Final Effective Stress, σ'_f (kPa/psf)		1,289	1,865	2,789	2,802	2,791	2,217	1,309	1,362	2,402	2,477
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*
OCR Manual Input Value		*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		1,054	1,635	2,579	2,579	2,572	1,282	342	412	1,639	2,273
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*
Modified Recompression Index, $C_{r\varepsilon}$		*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*
ratio of t2 / t1		*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*
Settlements											
Primary Settlement, (m / ft)		0.066	0.026	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Secondary Settlement (m / ft)		0.015	0.009	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total Settlement (m / ft)		0.080	0.034	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Elastic or Plastic (E/P)		P	P	P	P	P	P	P	P	P	P
		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 22 (m / ft)		0.080	0.034	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Written by: **Yiwen Cao** Date: **6/10/2009** Reviewed by: **R. Kulasingam/Jay Beech** Date: **6/10/2009**

Client: **Honeywell** Project: **Onondaga Lake SCA IDS** Project/ Proposal No.: **GJ4299** Task No.: **04**

Layer No. *23* **YR1-2**											
Initial Stress Reference Layer (top of layer)		*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*
Final Stress Reference Layer (top of layer)		*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)		438.37	433.65	426.67	426.97	427.16	430.23	432.37	437.10	433.59	431.13
Initial Effective Stress, σ'_i (kPa /psf)		1,275	1,767	2,579	2,579	2,572	1,282	342	412	1,639	2,273
Final Effective Stress, σ'_f (kPa/psf)		1,511	1,997	2,789	2,802	2,791	2,217	1,309	1,362	2,402	2,477
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*
OCR Manual Input Value		*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		1,275	1,767	2,579	2,579	2,572	1,282	342	412	1,639	2,273
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*
Modified Recompression Index, $C_{r\varepsilon}$		*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*
ratio of t2 / t1		*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*
Settlements											
Primary Settlement, (m / ft)		0.055	0.024	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Secondary Settlement (m / ft)		0.015	0.009	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total Settlement (m / ft)		0.070	0.033	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Elastic or Plastic (E/P)		P	P	P	P	P	P	P	P	P	P
		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 23 (m / ft)		0.070	0.033	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Layer No. *24* **YR1-3**											
Initial Stress Reference Layer (top of layer)		*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*
Final Stress Reference Layer (top of layer)		*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)		435.79	432.11	426.67	426.97	427.16	430.23	432.37	437.10	433.59	431.13
Initial Effective Stress, σ'_i (kPa /psf)		1,497	1,899	2,579	2,579	2,572	1,282	342	412	1,639	2,273
Final Effective Stress, σ'_f (kPa/psf)		1,732	2,130	2,789	2,802	2,791	2,217	1,309	1,362	2,402	2,477
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*
OCR Manual Input Value		*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		1,497	1,899	2,579	2,579	2,572	1,282	342	412	1,639	2,273
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*
Modified Recompression Index, $C_{r\varepsilon}$		*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*
ratio of t2 / t1		*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*
Settlements											
Primary Settlement, (m / ft)		0.048	0.022	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Secondary Settlement (m / ft)		0.015	0.009	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total Settlement (m / ft)		0.062	0.031	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Elastic or Plastic (E/P)		P	P	P	P	P	P	P	P	P	P
		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 24 (m / ft)		0.062	0.031	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Layer No. *25* **YR1-4**											
Initial Stress Reference Layer (top of layer)		*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*
Final Stress Reference Layer (top of layer)		*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)		433.21	430.58	426.67	426.97	427.16	430.23	432.37	437.10	433.59	431.13
Initial Effective Stress, σ'_i (kPa /psf)		1,719.14	2,031.68	2,579.14	2,579.14	2,572.26	1,282.26	342.28	411.94	1,639.16	2,272.98
Final Effective Stress, σ'_f (kPa/psf)		1,954.34	2,262.08	2,789.14	2,802.34	2,790.66	2,217.06	1,309.48	1,362.34	2,402.36	2,476.98
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*
OCR Manual Input Value		*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		1,719	2,032	2,579	2,579	2,572	1,282	342	412	1,639	2,273
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*
Modified Recompression Index, $C_{r\varepsilon}$		*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*
ratio of t2 / t1		*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*
Settlements											
Primary Settlement, (m / ft)		0.042	0.021	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Secondary Settlement (m / ft)		0.015	0.009	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total Settlement (m / ft)		0.056	0.030	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Elastic or Plastic (E/P)		P	P	P	P	P	P	P	P	P	P
		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 25 (m / ft)		0.056	0.030	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Written by: **Yiwen Cao** Date: **6/10/2009** Reviewed by: **R. Kulasingam/Jay Beech** Date: **6/10/2009**

Client: **Honeywell** Project: **Onondaga Lake SCA IDS** Project/ Proposal No.: **GJ4299** Task No.: **04**

Layer No. *26* **YR1-5**											
Initial Stress Reference Layer (top of layer)		*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*
Final Stress Reference Layer (top of layer)		*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)		430.63	429.04	426.67	426.97	427.16	430.23	432.37	437.10	433.59	431.13
Initial Effective Stress, σ'_i (kPa /psf)		1,941.02	2,163.97	2,579.14	2,579.14	2,572.26	1,282.26	342.28	411.94	1,639.16	2,272.98
Final Effective Stress, σ'_f (kPa/psf)		2,176.22	2,394.37	2,789.14	2,802.34	2,790.66	2,217.06	1,309.48	1,362.34	2,402.36	2,476.98
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*
OCR Manual Input Value		*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		1,941	2,164	2,579	2,579	2,572	1,282	342	412	1,639	2,273
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*
Modified Recompression Index, $C_{r\varepsilon}$		*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*
ratio of t2 / t1		*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*
Settlements											
Primary Settlement, (m / ft)		0.037	0.020	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Secondary Settlement (m / ft)		0.015	0.009	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total Settlement (m / ft)		0.052	0.028	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Elastic or Plastic (E/P)		P	P	P	P	P	P	P	P	P	P
		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 26 (m / ft)		0.052	0.028	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Layer No. *27* **YR1-6**											
Initial Stress Reference Layer (top of layer)		*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*
Final Stress Reference Layer (top of layer)		*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)		428.05	427.50	426.67	426.97	427.16	430.23	432.37	437.10	433.59	431.13
Initial Effective Stress, σ'_i (kPa /psf)		2,162.90	2,296.27	2,579.14	2,579.14	2,572.26	1,282.26	342.28	411.94	1,639.16	2,272.98
Final Effective Stress, σ'_f (kPa/psf)		2,398.10	2,526.67	2,789.14	2,802.34	2,790.66	2,217.06	1,309.48	1,362.34	2,402.36	2,476.98
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*
OCR Manual Input Value		*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		2,163	2,296	2,579	2,579	2,572	1,282	342	412	1,639	2,273
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*
Modified Recompression Index, $C_{r\varepsilon}$		*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*
ratio of t2 / t1		*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*
Settlements											
Primary Settlement, (m / ft)		0.034	0.019	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Secondary Settlement (m / ft)		0.015	0.009	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total Settlement (m / ft)		0.048	0.027	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Elastic or Plastic (E/P)		P	P	P	P	P	P	P	P	P	P
		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 27 (m / ft)		0.048	0.027	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Written by: **Yiwen Cao** Date: **6/10/2009** Reviewed by: **R. Kulasingam/Jay Beech** Date: **6/10/2009**

Client: **Honeywell** Project: **Onondaga Lake SCA IDS** Project/ Proposal No.: **GJ4299** Task No.: **04**

LAYER SETTLEMENT	Layer No.	Material										
	1	*Cover*										
	2	*YR4-1*	0.245	0.418	0.476	0.496	0.488	0.738	0.304	0.000	0.000	0.230
	3	*YR4-2*	0.140	0.205	0.223	0.233	0.229	0.452	0.217	0.000	0.000	0.129
	4	*YR4-3*	0.103	0.144	0.158	0.164	0.162	0.340	0.178	0.000	0.000	0.093
	5	*YR4-4*	0.082	0.114	0.128	0.133	0.131	0.277	0.154	0.000	0.000	0.075
	6	*YR4-5*	0.069	0.096	0.110	0.114	0.113	0.236	0.137	0.000	0.000	0.063
	7	*YR4-6*	0.060	0.085	0.099	0.102	0.101	0.206	0.124	0.000	0.000	0.054
	8	*YR3-1*	0.037	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.141	0.034
	9	*YR3-2*	0.035	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.106	0.031
	10	*YR3-3*	0.032	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.090	0.029
	11	*YR3-4*	0.030	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.080	0.027
	12	*YR3-5*	0.029	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.072	0.026
	13	*YR3-6*	0.027	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.067	0.024
	14	*YR3-7*	0.026	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.062	0.023
	15	*YR2-1*	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.308	0.441	0.064
	16	*YR2-2*	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.218	0.315	0.057
	17	*YR2-3*	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.178	0.249	0.052
	18	*YR2-4*	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.154	0.207	0.047
	19	*YR2-5*	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.136	0.179	0.044
	20	*YR2-6*	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.123	0.158	0.041
	21	*YR2-7*	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.112	0.142	0.039
	22	*YR1-1*	0.080	0.034	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	23	*YR1-2*	0.070	0.033	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	24	*YR1-3*	0.062	0.031	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	25	*YR1-4*	0.056	0.030	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	26	*YR1-5*	0.052	0.028	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	27	*YR1-6*	0.048	0.027	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	28	*Additional Foundation Settlement*	0.596	0.594	0.581	0.614	0.597	2.010	2.015	1.929	1.463	0.621
	29											
	30											
		TOTAL SETTLEMENT	**1.88**	**1.84**	**1.78**	**1.86**	**1.82**	**4.26**	**3.13**	**3.16**	**3.77**	**1.80**
POST-SETTLEMENT ELEVATION(M/FT)	Line	1 Top of Final Cover	453.28	454.28	456.63	456.96	457.07	448.67	441.28	446.65	455.24	457.46
	Line	2 Top of Year 4 Dredge	451.32	452.36	454.88	455.10	455.25	440.88	433.22	438.73	448.88	455.76
	Line	3	450.57	449.74	450.36	450.60	450.75	439.13	432.86	438.73	448.88	454.99
	Line	4	449.71	446.90	445.59	445.84	446.00	437.10	432.42	438.73	448.88	454.11
	Line	5	448.81	444.01	440.75	441.00	441.17	434.96	431.93	438.73	448.88	453.21
	Line	6	447.89	441.08	435.88	436.14	436.32	432.75	431.42	438.73	448.88	452.28
	Line	7	446.96	438.14	430.99	431.25	431.45	430.50	430.89	438.73	448.88	451.35
	Line	8 Top of Year 3 Dredge	446.02	435.18	426.09	426.36	426.56	428.22	430.36	438.73	448.88	450.40
	Line	9	445.35	435.18	426.09	426.36	426.56	428.22	430.36	438.73	448.76	449.72
	Line	10	444.67	435.18	426.09	426.36	426.56	428.22	430.36	438.73	448.61	449.05
	Line	11	444.00	435.18	426.09	426.36	426.56	428.22	430.36	438.73	448.44	448.37
	Line	12	443.32	435.18	426.09	426.36	426.56	428.22	430.36	438.73	448.26	447.69
	Line	13	442.64	435.18	426.09	426.36	426.56	428.22	430.36	438.73	448.07	447.00
	Line	14	441.96	435.18	426.09	426.36	426.56	428.22	430.36	438.73	447.88	446.32
	Line	15 Top of Year 2 Dredge	441.28	435.18	426.09	426.36	426.56	428.22	430.36	438.73	447.69	445.63
	Line	16	441.28	435.18	426.09	426.36	426.56	428.22	430.36	438.35	445.66	443.49
	Line	17	441.28	435.18	426.09	426.36	426.56	428.22	430.36	437.89	443.51	441.34
	Line	18	441.28	435.18	426.09	426.36	426.56	428.22	430.36	437.38	441.30	439.18
	Line	19	441.28	435.18	426.09	426.36	426.56	428.22	430.36	436.85	439.04	437.01
	Line	20	441.28	435.18	426.09	426.36	426.56	428.22	430.36	436.30	436.76	434.85
	Line	21	441.28	435.18	426.09	426.36	426.56	428.22	430.36	435.74	434.45	432.68
	Line	22 Top of Year 1 Dredge	441.28	435.18	426.09	426.36	426.56	428.22	430.36	435.17	432.13	430.51
	Line	23	438.78	433.68	426.09	426.36	426.56	428.22	430.36	435.17	432.13	430.51
	Line	24	436.27	432.17	426.09	426.36	426.56	428.22	430.36	435.17	432.13	430.51
	Line	25	433.75	430.67	426.09	426.36	426.56	428.22	430.36	435.17	432.13	430.51
	Line	26	431.22	429.16	426.09	426.36	426.56	428.22	430.36	435.17	432.13	430.51
	Line	27	428.70	427.65	426.09	426.36	426.56	428.22	430.36	435.17	432.13	430.51
	Line	28 Top of Gravel(Top of Incompressil	426.16	426.14	426.09	426.36	426.56	428.22	430.36	435.17	432.13	430.51
	Line	29										
	Line	30										
	Line	31										

Written by: **Yiwen Cao** Date: **6/10/2009** Reviewed by: **R. Kulasingam/Jay Beech** Date: **6/10/2009**

Client: **Honeywell** Project: **Onondaga Lake SCA IDS** Project/ Proposal No.: **GJ4299** Task No.: **04**

Attachment 6

CASE 5: Calculations of Foundation Settlement During Operations Period (Cross Section A, Points 5 to 14)

Written by: **Yiwen Cao** Date: **6/10/2009** Reviewed by: **R. Kulasingam/Jay Beech** Date: **6/10/2009**

Client: **Honeywell** Project: **Onondaga Lake SCA IDS** Project/ Proposal No.: **GJ4299** Task No.: **04**

Settlement Prediction Model

Programmer: **Yiwen Cao, GeoSyntec Consultants**

Version Control V 1.002 11.14.2007

Project: **Onondaga Lake SCA 50%**

Notes:

Unit: **ft / psf**

Average Compaction Effort = **1440.00** kPa or psf

Consider Compaction Effort = **N** yes or no

Point #				**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**
Distance (meter or ft)				*163.38*	*166.04*	*166.70*	*173.04*	*179.56*	*189.86*	*249.86*	*253.80*	*289.83*	*306.25*
ELEVATION(M/FT)	Line	1	Top of Dredge	*430.40*	*430.40*	*430.15*	*430.15*	*430.13*	*430.10*	*448.04*	*449.22*	*459.99*	*460.00*
	Line	2	Top of Dredge	*430.40*	*430.40*	*430.15*	*430.15*	*430.13*	*430.10*	*448.04*	*449.22*	*459.99*	*460.00*
	Line	3	Top of Gravel	*430.40*	*430.40*	*430.15*	*430.13*	*430.12*	*430.10*	*430.00*	*430.00*	*430.00*	*430.00*
	Line	4	Top of Clay	*430.40*	*430.40*	*430.09*	*427.00*	*426.82*	*426.53*	*425.45*	*425.40*	*424.49*	*424.06*
	Line	5	Top of Dike	*430.40*	*429.33*	*429.07*	*426.54*	*423.93*	*423.82*	*422.60*	*422.51*	*421.95*	*421.56*
	Line	6	Top of Subgrade	*423.90*	*423.91*	*423.91*	*423.93*	*423.93*	*423.82*	*422.60*	*422.51*	*421.95*	*421.56*
	Line	7		*421.02*	*421.03*	*421.03*	*421.05*	*421.05*	*420.95*	*419.80*	*419.72*	*419.19*	*418.82*
	Line	8		*418.15*	*418.16*	*418.16*	*418.17*	*418.17*	*418.08*	*417.00*	*416.92*	*416.43*	*416.08*
	Line	9		*415.27*	*415.28*	*415.28*	*415.30*	*415.30*	*415.20*	*414.20*	*414.13*	*413.66*	*413.34*
	Line	10		*412.39*	*412.40*	*412.40*	*412.42*	*412.42*	*412.33*	*411.40*	*411.33*	*410.90*	*410.60*
	Line	11		*409.52*	*409.52*	*409.52*	*409.54*	*409.54*	*409.46*	*408.60*	*408.54*	*408.14*	*407.87*
	Line	12		*406.64*	*406.65*	*406.65*	*406.66*	*406.66*	*406.59*	*405.80*	*405.74*	*405.38*	*405.13*
	Line	13		*403.76*	*403.77*	*403.77*	*403.78*	*403.78*	*403.72*	*403.00*	*402.95*	*402.62*	*402.39*
	Line	14		*400.89*	*400.89*	*400.89*	*400.90*	*400.90*	*400.85*	*400.20*	*400.15*	*399.86*	*399.65*
	Line	15		*398.01*	*398.02*	*398.02*	*398.03*	*398.03*	*397.97*	*397.40*	*397.36*	*397.09*	*396.91*
	Line	16		*395.14*	*395.14*	*395.14*	*395.15*	*395.15*	*395.10*	*394.60*	*394.56*	*394.33*	*394.17*
	Line	17		*392.26*	*392.26*	*392.26*	*392.27*	*392.27*	*392.23*	*391.80*	*391.77*	*391.57*	*391.43*
	Line	18		*389.38*	*389.39*	*389.39*	*389.39*	*389.39*	*389.36*	*389.00*	*388.97*	*388.81*	*388.69*
	Line	19		*386.51*	*386.51*	*386.51*	*386.51*	*386.51*	*386.49*	*386.20*	*386.18*	*386.05*	*385.96*
	Line	20		*383.63*	*383.63*	*383.63*	*383.63*	*383.63*	*383.62*	*383.40*	*383.38*	*383.29*	*383.22*
	Line	21		*380.75*	*380.75*	*380.75*	*380.76*	*380.76*	*380.74*	*380.60*	*380.59*	*380.52*	*380.48*
	Line	22		*377.88*	*377.88*	*377.88*	*377.88*	*377.88*	*377.87*	*377.80*	*377.79*	*377.76*	*377.74*
	Line	23	Bottom of Zone2 Above GW	*375.00*	*375.00*	*375.00*	*375.00*	*375.00*	*375.00*	*375.00*	*375.00*	*375.00*	*375.00*
	Line	24		*375.00*	*375.00*	*375.00*	*375.00*	*375.00*	*375.00*	*375.00*	*375.00*	*375.00*	*375.00*
	Line	25	Bottom of Zone 3 Above GW	*375.00*	*375.00*	*375.00*	*375.00*	*375.00*	*375.00*	*375.00*	*375.00*	*375.00*	*375.00*
	Line	26		*371.99*	*371.98*	*371.98*	*371.95*	*371.92*	*371.88*	*371.55*	*371.52*	*371.25*	*371.17*
	Line	27	Bottom of Zone 2 Below GW	*368.98*	*368.95*	*368.95*	*368.90*	*368.84*	*368.75*	*368.09*	*368.03*	*367.49*	*367.33*
	Line	28	Top of Incompressible Layer	*368.98*	*368.95*	*368.95*	*368.90*	*368.84*	*368.75*	*368.09*	*368.03*	*367.49*	*367.33*
	Line	29	GND for sigma_p	*423.90*	*423.91*	*423.91*	*423.93*	*423.93*	*423.82*	*422.60*	*422.51*	*421.95*	*421.56*
	Line	30	GW	*375.00*	*375.00*	*375.00*	*375.00*	*375.00*	*375.00*	*375.00*	*375.00*	*375.00*	*375.00*
	Line	31	ROCK	*368.98*	*368.95*	*368.95*	*368.90*	*368.84*	*368.75*	*368.09*	*368.03*	*367.49*	*367.33*
LAYER THICKNESS (M/FT)	Layer No.	From	To / Material										
	1	*1*	*2* *Null Layer*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
	2	*2*	*3* *Dredge*	*0.00*	*0.00*	*0.00*	*0.02*	*0.01*	*0.00*	*18.04*	*19.22*	*29.99*	*30.00*
	3	*3*	*4* *Gravel*	*0.00*	*0.00*	*0.06*	*3.13*	*3.30*	*3.57*	*4.55*	*4.60*	*5.51*	*5.94*
	4	*4*	*5* *Clay*	*0.00*	*1.07*	*1.02*	*0.46*	*2.89*	*2.71*	*2.85*	*2.89*	*2.54*	*2.50*
	5	*5*	*6* *Dike*	*6.50*	*5.42*	*5.16*	*2.61*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
	6	*6*	*7* *Zone2-Above-GW-1*	*2.88*	*2.88*	*2.88*	*2.88*	*2.88*	*2.87*	*2.80*	*2.79*	*2.76*	*2.74*
	7	*7*	*8* *Zone2-Above-GW-2*	*2.88*	*2.88*	*2.88*	*2.88*	*2.88*	*2.87*	*2.80*	*2.79*	*2.76*	*2.74*
	8	*8*	*9* *Zone2-Above-GW-3*	*2.88*	*2.88*	*2.88*	*2.88*	*2.88*	*2.87*	*2.80*	*2.79*	*2.76*	*2.74*
	9	*9*	*10* *Zone2-Above-GW-4*	*2.88*	*2.88*	*2.88*	*2.88*	*2.88*	*2.87*	*2.80*	*2.79*	*2.76*	*2.74*
	10	*10*	*11* *Zone2-Above-GW-5*	*2.88*	*2.88*	*2.88*	*2.88*	*2.88*	*2.87*	*2.80*	*2.79*	*2.76*	*2.74*
	11	*11*	*12* *Zone2-Above-GW-6*	*2.88*	*2.88*	*2.88*	*2.88*	*2.88*	*2.87*	*2.80*	*2.79*	*2.76*	*2.74*
	12	*12*	*13* *Zone2-Above-GW-7*	*2.88*	*2.88*	*2.88*	*2.88*	*2.88*	*2.87*	*2.80*	*2.79*	*2.76*	*2.74*
	13	*13*	*14* *Zone2-Above-GW-8*	*2.88*	*2.88*	*2.88*	*2.88*	*2.88*	*2.87*	*2.80*	*2.79*	*2.76*	*2.74*
	14	*14*	*15* *Zone2-Above-GW-9*	*2.88*	*2.88*	*2.88*	*2.88*	*2.88*	*2.87*	*2.80*	*2.79*	*2.76*	*2.74*
	15	*15*	*16* *Zone2-Above-GW-10*	*2.88*	*2.88*	*2.88*	*2.88*	*2.88*	*2.87*	*2.80*	*2.79*	*2.76*	*2.74*
	16	*16*	*17* *Zone2-Above-GW-11*	*2.88*	*2.88*	*2.88*	*2.88*	*2.88*	*2.87*	*2.80*	*2.79*	*2.76*	*2.74*
	17	*17*	*18* *Zone2-Above-GW-12*	*2.88*	*2.88*	*2.88*	*2.88*	*2.88*	*2.87*	*2.80*	*2.79*	*2.76*	*2.74*
	18	*18*	*19* *Zone2-Above-GW-13*	*2.88*	*2.88*	*2.88*	*2.88*	*2.88*	*2.87*	*2.80*	*2.79*	*2.76*	*2.74*
	19	*19*	*20* *Zone2-Above-GW-14*	*2.88*	*2.88*	*2.88*	*2.88*	*2.88*	*2.87*	*2.80*	*2.79*	*2.76*	*2.74*
	20	*20*	*21* *Zone2-Above-GW-15*	*2.88*	*2.88*	*2.88*	*2.88*	*2.88*	*2.87*	*2.80*	*2.79*	*2.76*	*2.74*
	21	*21*	*22* *Zone2-Above-GW-16*	*2.88*	*2.88*	*2.88*	*2.88*	*2.88*	*2.87*	*2.80*	*2.79*	*2.76*	*2.74*
	22	*22*	*23* *Zone2-Above-GW-17*	*2.88*	*2.88*	*2.88*	*2.88*	*2.88*	*2.87*	*2.80*	*2.79*	*2.76*	*2.74*
	23	*23*	*24* *Zone3-Above-GW-1*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
	24	*24*	*25* *Zone3-Above-GW-2*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
	25	*25*	*26* *Zone2-Below-GW-18*	*3.01*	*3.02*	*3.02*	*3.05*	*3.08*	*3.13*	*3.46*	*3.49*	*3.76*	*3.84*
	26	*26*	*27* *Zone2-Below-GW-19*	*3.01*	*3.03*	*3.03*	*3.05*	*3.08*	*3.13*	*3.45*	*3.49*	*3.76*	*3.83*
	27	*27*	*28* *Zone3-Below-GW-3*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
	28												
	29	*29*	*30* Soil Above GW	*48.90*	*48.91*	*48.91*	*48.93*	*48.93*	*48.82*	*47.60*	*47.51*	*46.95*	*46.56*
	30	*30*	*31* Soil Below GW	*6.02*	*6.05*	*6.05*	*6.10*	*6.16*	*6.25*	*6.91*	*6.97*	*7.51*	*7.67*
	Thickness Check												
		From Line	To Line / SUM	*61.42*	*61.45*	*61.20*	*61.25*	*61.29*	*61.35*	*79.95*	*81.19*	*92.50*	*92.67*
		1	*28* Thickness =	*61.42*	*61.45*	*61.20*	*61.25*	*61.29*	*61.35*	*79.95*	*81.19*	*92.50*	*92.67*
			Thickness Check	***OK***	***OK***	***OK***	***OK***	***OK***	***OK***	***OK***	***OK***	***OK***	***OK***

Written by: **Yiwen Cao** Date: **6/10/2009** Reviewed by: **R. Kulasingam/Jay Beech** Date: **6/10/2009**

Client: **Honeywell** Project: **Onondaga Lake SCA IDS** Project/ Proposal No.: **GJ4299** Task No.: **04**

UNIT WEIGHT	Layer No.	Material										
	1	*Null Layer*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	2	*Dredge*	86.0	86.0	86.0	86.0	86.0	86.0	86.0	86.0	86.0	86.0
	3	*Gravel*	120.0	120.0	120.0	120.0	120.0	120.0	120.0	120.0	120.0	120.0
	4	*Clay*	120.0	120.0	120.0	120.0	120.0	120.0	120.0	120.0	120.0	120.0
	5	*Dike*	120.0	120.0	120.0	120.0	120.0	120.0	120.0	120.0	120.0	120.0
	6	*Zone2-Above-GW-1*	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0
	7	*Zone2-Above-GW-2*	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0
	8	*Zone2-Above-GW-3*	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0
	9	*Zone2-Above-GW-4*	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0
	10	*Zone2-Above-GW-5*	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0
	11	*Zone2-Above-GW-6*	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0
	12	*Zone2-Above-GW-7*	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0
	13	*Zone2-Above-GW-8*	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0
	14	*Zone2-Above-GW-9*	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0
	15	*Zone2-Above-GW-10*	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0
	16	*Zone2-Above-GW-11*	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0
	17	*Zone2-Above-GW-12*	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0
	18	*Zone2-Above-GW-13*	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0
	19	*Zone2-Above-GW-14*	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0
	20	*Zone2-Above-GW-15*	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0
	21	*Zone2-Above-GW-16*	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0
	22	*Zone2-Above-GW-17*	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0
	23	*Zone3-Above-GW-1*	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0
	24	*Zone3-Above-GW-2*	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0
	25	*Zone2-Below-GW-18*	19.6	19.6	19.6	19.6	19.6	19.6	19.6	19.6	19.6	19.6
	26	*Zone2-Below-GW-19*	19.6	19.6	19.6	19.6	19.6	19.6	19.6	19.6	19.6	19.6
	27	*Zone3-Below-GW-3*	19.6	19.6	19.6	19.6	19.6	19.6	19.6	19.6	19.6	19.6
	28											
	29	*Soil Above GW*	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0
	30	*Soil below GW*	19.6	19.6	19.6	19.6	19.6	19.6	19.6	19.6	19.6	19.6
	Layer No.	***1*** **Null Layer**										
		Initial Stress Reference Layer (top of layer)	1	1	1	1	1	1	1	1	1	1
		Final Stress Reference Layer (top of layer)	1	1	1	1	1	1	1	1	1	1
	Midpoint Elevation, (m / ft)		430.40	430.40	430.15	430.15	430.13	430.10	448.04	449.22	459.99	460.00
	Initial Effective Stress, σ'_i (kPa /psf)		Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight
	Final Effective Stress, σ'_f (kPa/psf)		Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight
Elastic Method												
Modulus, E (kPa/psf)= _____		Strain										
		Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)												
Consolidation Properties												
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)												
OCR Manual Input Value												
OCR Computation Input												
Preconsolidation pressure, σ'_p (kPa / psf)												
Modified Primary Compression Index, $C_{c\varepsilon}$												
Modified Recompression Index, $C_{r\varepsilon}$												
Modified Secondary Compression Index, C_α												
ratio of t2 / t1												
Settlements												
Primary Settlement, (m / ft)												
Secondary Settlement (m / ft)												
Total Settlement (m / ft)												
		Elastic or Plastic (E/P)										
		Settlement of Layer 1 (m / ft)										

Written by: **Yiwen Cao** Date: **6/10/2009** Reviewed by: **R. Kulasingam/Jay Beech** Date: **6/10/2009**

Client: **Honeywell** Project: **Onondaga Lake SCA IDS** Project/ Proposal No.: **GJ4299** Task No.: **04**

Layer No.	*2*	**Dredge**									
Initial Stress Reference Layer (top of layer)		*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*
Final Stress Reference Layer (top of layer)		*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*
Midpoint Elevation, (m / ft)		430.40	430.40	430.15	430.14	430.13	430.10	439.02	439.61	445.00	445.00
Initial Effective Stress, σ'_i (kPa /psf)		Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight
Final Effective Stress, σ'_f (kPa/psf)		Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)											
OCR Manual Input Value											
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)											
Modified Primary Compression Index, $C_{c\varepsilon}$											
Modified Recompression Index, $C_{r\varepsilon}$											
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$											
ratio of t2 / t1											
Settlements											
Primary Settlement, (m / ft)											
Secondary Settlement (m / ft)											
Total Settlement (m / ft)											
Elastic or Plastic (E/P)											
Settlement of Layer 2 (m / ft)											
Layer No.	*3*	**Gravel**									
Initial Stress Reference Layer (top of layer)		*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*
Final Stress Reference Layer (top of layer)		*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*
Midpoint Elevation, (m / ft)		430.40	430.40	430.12	428.57	428.47	428.32	427.73	427.70	427.25	427.03
Initial Effective Stress, σ'_i (kPa /psf)		Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight
Final Effective Stress, σ'_f (kPa/psf)		Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)											
OCR Manual Input Value											
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)											
Modified Primary Compression Index, $C_{c\varepsilon}$											
Modified Recompression Index, $C_{r\varepsilon}$											
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$											
ratio of t2 / t1											
Settlements											
Primary Settlement, (m / ft)											
Secondary Settlement (m / ft)											
Total Settlement (m / ft)											
Elastic or Plastic (E/P)											
Settlement of Layer 3 (m / ft)											
Layer No.	*4*	**Clay**									
Initial Stress Reference Layer (top of layer)		*4*	*4*	*4*	*4*	*4*	*4*	*4*	*4*	*4*	*4*
Final Stress Reference Layer (top of layer)		*4*	*4*	*4*	*4*	*4*	*4*	*4*	*4*	*4*	*4*
Midpoint Elevation, (m / ft)		430.40	429.87	429.58	426.77	425.38	425.18	424.03	423.96	423.22	422.81
Initial Effective Stress, σ'_i (kPa /psf)		Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight
Final Effective Stress, σ'_f (kPa/psf)		Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)											
OCR Manual Input Value											
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)											
Modified Primary Compression Index, $C_{c\varepsilon}$											
Modified Recompression Index, $C_{r\varepsilon}$											
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$											
ratio of t2 / t1											
Settlements											
Primary Settlement, (m / ft)											
Secondary Settlement (m / ft)											
Total Settlement (m / ft)											
Elastic or Plastic (E/P)											
Settlement of Layer 4 (m / ft)											

Written by: **Yiwen Cao** Date: **6/10/2009** Reviewed by: **R. Kulasingam/Jay Beech** Date: **6/10/2009**

Client: **Honeywell** Project: **Onondaga Lake SCA IDS** Project/ Proposal No.: **GJ4299** Task No.: **04**

Layer No.	5	Dike									
Initial Stress Reference Layer (top of layer)			5	5	5	5	5	5	5	5	5	5
Final Stress Reference Layer (top of layer)			5	5	5	5	5	5	5	5	5	5
Midpoint Elevation, (m / ft)			427.15	426.62	426.49	425.24	423.93	423.82	422.60	422.51	421.95	421.56
Initial Effective Stress, σ'_i (kPa /psf)			Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight
Final Effective Stress, σ'_f (kPa/psf)			Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight
Elastic Method												
Modulus, E (kPa/psf)=		Strain										
		Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)												
Consolidation Properties												
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)												
OCR Manual Input Value												
OCR Computation Input												
Preconsolidation pressure, σ'_p (kPa / psf)												
Modified Primary Compression Index, $C_{c\varepsilon}$												
Modified Recompression Index, $C_{r\varepsilon}$												
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$												
ratio of t2 / t1												
Settlements												
Primary Settlement, (m / ft)												
Secondary Settlement (m / ft)												
Total Settlement (m / ft)												
Elastic or Plastic (E/P)												
Settlement of Layer 5 (m / ft)												
Layer No.	6	Zone2-Above-GW-1										
Initial Stress Reference Layer (top of layer)			6	6	6	6	6	6	6	6	6	6
Final Stress Reference Layer (top of layer)			1	1	1	1	1	1	1	1	1	1
Midpoint Elevation, (m / ft)			422.46	422.47	422.47	422.49	422.49	422.38	421.20	421.11	420.57	420.19
Initial Effective Stress, σ'_i (kPa /psf)			118	118	118	118	118	118	115	115	113	112
Final Effective Stress, σ'_f (kPa/psf)			892	881	881	865	862	895	2,514	2,675	3,653	3,705
Elastic Method												
Modulus, E (kPa/psf)=		Strain										
		Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)												
Consolidation Properties												
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)			MS	MS	MS	MS	MS	MS	MS	MS	MS	MS
OCR Manual Input Value			4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
OCR Computation Input												
Preconsolidation pressure, σ'_p (kPa / psf)			531	531	531	531	531	530	517	516	510	505
Modified Primary Compression Index, $C_{c\varepsilon}$			0.460	0.460	0.460	0.460	0.460	0.460	0.460	0.460	0.460	0.460
Modified Recompression Index, $C_{r\varepsilon}$			0.014	0.014	0.014	0.014	0.014	0.014	0.014	0.014	0.014	0.014
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$			0.91%	0.91%	0.91%	0.91%	0.91%	0.91%	0.91%	0.91%	0.91%	0.91%
ratio of t2 / t1			8	8	8	8	8	8	8	8	8	8
Settlements												
Primary Settlement, (m / ft)			0.325	0.317	0.317	0.307	0.305	0.327	0.911	0.945	1.112	1.115
Secondary Settlement (m / ft)			0.024	0.024	0.024	0.024	0.024	0.024	0.023	0.023	0.023	0.023
Total Settlement (m / ft)			0.348	0.341	0.341	0.330	0.328	0.351	0.934	0.968	1.135	1.138
Elastic or Plastic (E/P)			1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 6 (m / ft)			0.348	0.341	0.341	0.330	0.328	0.351	0.934	0.968	1.135	1.138
Layer No.	7	Zone2-Above-GW-2										
Initial Stress Reference Layer (top of layer)			6	6	6	6	6	6	6	6	6	6
Final Stress Reference Layer (top of layer)			1	1	1	1	1	1	1	1	1	1
Midpoint Elevation, (m / ft)			419.59	419.59	419.59	419.61	419.61	419.51	418.40	418.32	417.81	417.45
Initial Effective Stress, σ'_i (kPa /psf)			354	354	354	354	354	353	344	344	340	337
Final Effective Stress, σ'_f (kPa/psf)			1,123	1,116	1,116	1,103	1,101	1,150	2,742	2,905	3,860	3,948
Elastic Method												
Modulus, E (kPa/psf)=		Strain										
		Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)												
Consolidation Properties												
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)			MS	MS	MS	MS	MS	MS	MS	MS	MS	MS
OCR Manual Input Value			4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
OCR Computation Input												
Preconsolidation pressure, σ'_p (kPa / psf)			1,592	1,592	1,592	1,593	1,593	1,590	1,550	1,547	1,529	1,516
Modified Primary Compression Index, $C_{c\varepsilon}$			0.460	0.460	0.460	0.460	0.460	0.460	0.460	0.460	0.460	0.460
Modified Recompression Index, $C_{r\varepsilon}$			0.014	0.014	0.014	0.014	0.014	0.014	0.014	0.014	0.014	0.014
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$			0.11%	0.11%	0.11%	0.11%	0.11%	0.11%	0.91%	0.91%	0.91%	0.91%
ratio of t2 / t1			8	8	8	8	8	8	8	8	8	8
Settlements												
Primary Settlement, (m / ft)			0.020	0.020	0.020	0.020	0.020	0.021	0.345	0.377	0.536	0.549
Secondary Settlement (m / ft)			0.003	0.003	0.003	0.003	0.003	0.003	0.023	0.023	0.023	0.023
Total Settlement (m / ft)			0.023	0.023	0.023	0.023	0.023	0.023	0.368	0.400	0.559	0.571
Elastic or Plastic (E/P)			1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 7 (m / ft)			0.023	0.023	0.023	0.023	0.023	0.023	0.368	0.400	0.559	0.571

Written by: **Yiwen Cao** Date: **6/10/2009** Reviewed by: **R. Kulasingam/Jay Beech** Date: **6/10/2009**

Client: **Honeywell** Project: **Onondaga Lake SCA IDS** Project/ Proposal No.: **GJ4299** Task No.: **04**

Layer No.	*8*	**Zone2-Above-GW-3**									
Initial Stress Reference Layer (top of layer)		*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*
Final Stress Reference Layer (top of layer)		*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)		416.71	416.72	416.72	416.73	416.73	416.64	415.60	415.52	415.05	414.71
Initial Effective Stress, σ'_i (kPa /psf)		590	590	590	590	590	589	574	573	566	561
Final Effective Stress, σ'_f (kPa/psf)		1,355	1,351	1,351	1,343	1,343	1,406	2,970	3,131	4,067	4,171
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*
OCR Manual Input Value		*4.5*	*4.5*	*4.5*	*4.5*	*4.5*	*4.5*	*4.5*	*4.5*	*4.5*	*4.5*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		2,654	2,654	2,654	2,655	2,655	2,649	2,583	2,578	2,548	2,527
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*
Modified Recompression Index, $C_{r\varepsilon}$		*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.11%*	*0.11%*	*0.11%*	*0.11%*	*0.11%*	*0.11%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*
ratio of t2 / t1		*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*
Settlements											
Primary Settlement, (m / ft)		0.015	0.014	0.014	0.014	0.014	0.015	0.104	0.134	0.283	0.299
Secondary Settlement (m / ft)		0.003	0.003	0.003	0.003	0.003	0.003	0.023	0.023	0.023	0.023
Total Settlement (m / ft)		0.017	0.017	0.017	0.017	0.017	0.018	0.127	0.157	0.306	0.322
Elastic or Plastic (E/P)		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 8 (m / ft)		0.017	0.017	0.017	0.017	0.017	0.018	0.127	0.157	0.306	0.322
Layer No.	*9*	**Zone2-Above-GW-4**									
Initial Stress Reference Layer (top of layer)		*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*
Final Stress Reference Layer (top of layer)		*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)		413.83	413.84	413.84	413.86	413.86	413.77	412.80	412.73	412.28	411.97
Initial Effective Stress, σ'_i (kPa /psf)		826	826	826	826	826	824	804	802	793	786
Final Effective Stress, σ'_f (kPa/psf)		1,587	1,586	1,586	1,583	1,589	1,664	3,200	3,357	4,274	4,390
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*
OCR Manual Input Value		*2.0*	*2.0*	*2.0*	*2.0*	*2.0*	*2.0*	*4.5*	*4.5*	*4.5*	*4.5*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		1,651	1,651	1,651	1,652	1,652	1,648	3,616	3,609	3,567	3,537
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*
Modified Recompression Index, $C_{r\varepsilon}$		*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.11%*	*0.11%*	*0.11%*	*0.11%*	*0.11%*	*0.91%*	*0.11%*	*0.11%*	*0.91%*	*0.91%*
ratio of t2 / t1		*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*
Settlements											
Primary Settlement, (m / ft)		0.011	0.011	0.011	0.011	0.011	0.017	0.024	0.024	0.125	0.143
Secondary Settlement (m / ft)		0.003	0.003	0.003	0.003	0.003	0.024	0.003	0.003	0.023	0.023
Total Settlement (m / ft)		0.014	0.014	0.014	0.014	0.014	0.041	0.026	0.027	0.148	0.166
Elastic or Plastic (E/P)		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 9 (m / ft)		0.014	0.014	0.014	0.014	0.014	0.041	0.026	0.027	0.148	0.166
Layer No.	*10*	**Zone2-Above-GW-5**									
Initial Stress Reference Layer (top of layer)		*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*
Final Stress Reference Layer (top of layer)		*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)		410.96	410.96	410.96	410.98	410.98	410.90	410.00	409.93	409.52	409.24
Initial Effective Stress, σ'_i (kPa /psf)		1,061	1,062	1,062	1,062	1,062	1,060	1,033	1,031	1,019	1,011
Final Effective Stress, σ'_f (kPa/psf)		1,820	1,822	1,822	1,825	1,836	1,921	3,427	3,583	4,480	4,605
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*
OCR Manual Input Value		*2.0*	*2.0*	*2.0*	*2.0*	*2.0*	*2.0*	*2.0*	*2.0*	*2.0*	*2.0*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		2,123	2,123	2,123	2,124	2,124	2,119	2,066	2,062	2,038	2,021
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*
Modified Recompression Index, $C_{r\varepsilon}$		*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.11%*	*0.11%*	*0.11%*	*0.11%*	*0.11%*	*0.11%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*
ratio of t2 / t1		*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*
Settlements											
Primary Settlement, (m / ft)		0.009	0.009	0.009	0.009	0.010	0.010	0.295	0.320	0.446	0.462
Secondary Settlement (m / ft)		0.003	0.003	0.003	0.003	0.003	0.003	0.023	0.023	0.023	0.023
Total Settlement (m / ft)		0.012	0.012	0.012	0.012	0.012	0.013	0.318	0.343	0.469	0.485
Elastic or Plastic (E/P)		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 10 (m / ft)		0.012	0.012	0.012	0.012	0.012	0.013	0.318	0.343	0.469	0.485

Written by: **Yiwen Cao** Date: **6/10/2009** Reviewed by: **R. Kulasingam/Jay Beech** Date: **6/10/2009**

Client: **Honeywell** Project: **Onondaga Lake SCA IDS** Project/ Proposal No.: **GJ4299** Task No.: **04**

Layer No.	*11*	**Zone2-Above-GW-6**									
Initial Stress Reference Layer (top of layer)		*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*
Final Stress Reference Layer (top of layer)		*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)		408.08	408.09	408.09	408.10	408.10	408.03	407.20	407.14	406.76	406.50
Initial Effective Stress, σ'_i (kPa /psf)		1,297	1,298	1,298	1,298	1,298	1,295	1,263	1,260	1,246	1,235
Final Effective Stress, σ'_f (kPa/psf)		2,054	2,058	2,058	2,068	2,085	2,178	3,654	3,808	4,686	4,818
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*
OCR Manual Input Value		*2.0*	*2.0*	*2.0*	*2.0*	*2.0*	*2.0*	*2.0*	*2.0*	*2.0*	*2.0*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		2,595	2,595	2,595	2,596	2,596	2,590	2,526	2,521	2,491	2,470
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*
Modified Recompression Index, $C_{r\varepsilon}$		*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.11%*	*0.11%*	*0.11%*	*0.11%*	*0.11%*	*0.11%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*
ratio of t2 / t1		*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*
Settlements											
Primary Settlement, (m / ft)		0.008	0.008	0.008	0.008	0.008	0.009	0.218	0.242	0.360	0.377
Secondary Settlement (m / ft)		0.003	0.003	0.003	0.003	0.003	0.003	0.023	0.023	0.023	0.023
Total Settlement (m / ft)		0.011	0.011	0.011	0.011	0.011	0.012	0.241	0.265	0.383	0.400
Elastic or Plastic (E/P)		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 11 (m / ft)		0.011	0.011	0.011	0.011	0.011	0.012	0.241	0.265	0.383	0.400
Layer No.	*12*	**Zone2-Above-GW-7**									
Initial Stress Reference Layer (top of layer)		*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*
Final Stress Reference Layer (top of layer)		*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)		405.20	405.21	405.21	405.22	405.22	405.15	404.40	404.34	404.00	403.76
Initial Effective Stress, σ'_i (kPa /psf)		1,533	1,533	1,533	1,534	1,534	1,531	1,492	1,490	1,472	1,460
Final Effective Stress, σ'_f (kPa/psf)		2,288	2,295	2,295	2,311	2,335	2,435	3,880	4,033	4,891	5,030
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*
OCR Manual Input Value		*2.0*	*2.0*	*2.0*	*2.0*	*2.0*	*2.0*	*2.0*	*2.0*	*2.0*	*2.0*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		3,066	3,067	3,067	3,068	3,068	3,061	2,985	2,979	2,944	2,920
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*
Modified Recompression Index, $C_{r\varepsilon}$		*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.11%*	*0.11%*	*0.11%*	*0.11%*	*0.11%*	*0.11%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*
ratio of t2 / t1		*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*
Settlements											
Primary Settlement, (m / ft)		0.007	0.007	0.007	0.007	0.007	0.008	0.159	0.181	0.292	0.309
Secondary Settlement (m / ft)		0.003	0.003	0.003	0.003	0.003	0.003	0.023	0.023	0.023	0.023
Total Settlement (m / ft)		0.010	0.010	0.010	0.010	0.010	0.011	0.182	0.204	0.314	0.332
Elastic or Plastic (E/P)		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 12 (m / ft)		0.010	0.010	0.010	0.010	0.010	0.011	0.182	0.204	0.314	0.332
Layer No.	*13*	**Zone2-Above-GW-8**									
Initial Stress Reference Layer (top of layer)		*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*
Final Stress Reference Layer (top of layer)		*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)		402.33	402.33	402.33	402.34	402.34	402.28	401.60	401.55	401.24	401.02
Initial Effective Stress, σ'_i (kPa /psf)		1,769	1,769	1,769	1,770	1,770	1,766	1,722	1,719	1,698	1,684
Final Effective Stress, σ'_f (kPa/psf)		2,522	2,533	2,533	2,556	2,585	2,692	4,107	4,258	5,096	5,239
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*
OCR Manual Input Value		*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		1,769	1,769	1,769	1,770	1,770	1,766	1,722	1,719	1,698	1,684
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*
Modified Recompression Index, $C_{r\varepsilon}$		*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*
ratio of t2 / t1		*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*
Settlements											
Primary Settlement, (m / ft)		0.204	0.206	0.206	0.211	0.218	0.242	0.486	0.506	0.606	0.621
Secondary Settlement (m / ft)		0.024	0.024	0.024	0.024	0.024	0.024	0.023	0.023	0.023	0.023
Total Settlement (m / ft)		0.228	0.230	0.230	0.235	0.241	0.265	0.509	0.529	0.629	0.643
Elastic or Plastic (E/P)		p	p	p	p	p	p	p	p	p	p
		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 13 (m / ft)		0.228	0.230	0.230	0.235	0.241	0.265	0.509	0.529	0.629	0.643

Written by: **Yiwen Cao** Date: **6/10/2009** Reviewed by: **R. Kulasingam/Jay Beech** Date: **6/10/2009**

Client: **Honeywell** Project: **Onondaga Lake SCA IDS** Project/ Proposal No.: **GJ4299** Task No.: **04**

Layer No. *14* **Zone2-Above-GW-9**											
Initial Stress Reference Layer (top of layer)		*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*
Final Stress Reference Layer (top of layer)		*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)		399.45	399.46	399.46	399.47	399.47	399.41	398.80	398.76	398.48	398.28
Initial Effective Stress, σ'_i (kPa /psf)		2,005	2,005	2,005	2,006	2,006	2,002	1,952	1,948	1,925	1,909
Final Effective Stress, σ'_f (kPa/psf)		2,758	2,772	2,772	2,800	2,835	2,947	4,333	4,482	5,301	5,448
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*
OCR Manual Input Value		*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		2,005	2,005	2,005	2,006	2,006	2,002	1,952	1,948	1,925	1,909
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*
Modified Recompression Index, $C_{r\varepsilon}$		*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*
ratio of t2 / t1		*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*
Settlements											
Primary Settlement, (m / ft)		0.183	0.186	0.186	0.192	0.199	0.222	0.446	0.465	0.559	0.574
Secondary Settlement (m / ft)		0.024	0.024	0.024	0.024	0.024	0.024	0.023	0.023	0.023	0.023
Total Settlement (m / ft)		0.207	0.210	0.210	0.215	0.222	0.246	0.469	0.488	0.582	0.596
Elastic or Plastic (E/P)		p	p	p	p	p	p	p	p	p	p
		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 14 (m / ft)		0.207	0.210	0.210	0.215	0.222	0.246	0.469	0.488	0.582	0.596
Layer No. *15* **Zone2-Above-GW-10**											
Initial Stress Reference Layer (top of layer)		*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*
Final Stress Reference Layer (top of layer)		*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)		396.57	396.58	396.58	396.59	396.59	396.54	396.00	395.96	395.71	395.54
Initial Effective Stress, σ'_i (kPa /psf)		2,241	2,241	2,241	2,242	2,242	2,237	2,181	2,177	2,151	2,134
Final Effective Stress, σ'_f (kPa/psf)		2,995	3,011	3,011	3,045	3,085	3,202	4,559	4,705	5,505	5,655
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*
OCR Manual Input Value		*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		2,241	2,241	2,241	2,242	2,242	2,237	2,181	2,177	2,151	2,134
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*
Modified Recompression Index, $C_{r\varepsilon}$		*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*
ratio of t2 / t1		*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*
Settlements											
Primary Settlement, (m / ft)		0.167	0.170	0.170	0.176	0.183	0.206	0.412	0.430	0.518	0.533
Secondary Settlement (m / ft)		0.024	0.024	0.024	0.024	0.024	0.024	0.023	0.023	0.023	0.023
Total Settlement (m / ft)		0.190	0.193	0.193	0.200	0.207	0.229	0.435	0.453	0.541	0.556
Elastic or Plastic (E/P)		p	p	p	p	p	p	p	p	p	p
		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 15 (m / ft)		0.190	0.193	0.193	0.200	0.207	0.229	0.435	0.453	0.541	0.556
Layer No. *16* **Zone2-Above-GW-11**											
Initial Stress Reference Layer (top of layer)		*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*
Final Stress Reference Layer (top of layer)		*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)		393.70	393.70	393.70	393.71	393.71	393.67	393.20	393.17	392.95	392.80
Initial Effective Stress, σ'_i (kPa /psf)		2,477	2,477	2,477	2,478	2,478	2,473	2,411	2,406	2,378	2,358
Final Effective Stress, σ'_f (kPa/psf)		3,232	3,251	3,251	3,290	3,334	3,457	4,784	4,928	5,709	5,862
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*
OCR Manual Input Value		*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		2,477	2,477	2,477	2,478	2,478	2,473	2,411	2,406	2,378	2,358
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*
Modified Recompression Index, $C_{r\varepsilon}$		*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*
ratio of t2 / t1		*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*
Settlements											
Primary Settlement, (m / ft)		0.153	0.156	0.156	0.163	0.171	0.192	0.383	0.400	0.483	0.498
Secondary Settlement (m / ft)		0.024	0.024	0.024	0.024	0.024	0.024	0.023	0.023	0.023	0.023
Total Settlement (m / ft)		0.177	0.180	0.180	0.187	0.194	0.216	0.406	0.423	0.506	0.521
Elastic or Plastic (E/P)		p	p	p	p	p	p	p	p	p	p
		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 16 (m / ft)		0.177	0.180	0.180	0.187	0.194	0.216	0.406	0.423	0.506	0.521

Written by: **Yiwen Cao** Date: **6/10/2009** Reviewed by: **R. Kulasingam/Jay Beech** Date: **6/10/2009**

Client: **Honeywell** Project: **Onondaga Lake SCA IDS** Project/ Proposal No.: **GJ4299** Task No.: **04**

Layer No.	*17*	**Zone2-Above-GW-12**									
Initial Stress Reference Layer (top of layer)		*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*
Final Stress Reference Layer (top of layer)		*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)		390.82	390.82	390.82	390.83	390.83	390.79	390.40	390.37	390.19	390.06
Initial Effective Stress, σ'_i (kPa /psf)		2,713	2,713	2,713	2,714	2,714	2,708	2,640	2,635	2,604	2,583
Final Effective Stress, σ'_f (kPa/psf)		3,470	3,491	3,491	3,535	3,584	3,710	5,010	5,151	5,914	6,068
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*
OCR Manual Input Value		*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		2,713	2,713	2,713	2,714	2,714	2,708	2,640	2,635	2,604	2,583
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*
Modified Recompression Index, $C_{r\varepsilon}$		*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*
ratio of t2 / t1		*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*
Settlements											
Primary Settlement, (m / ft)		0.142	0.145	0.145	0.152	0.160	0.181	0.358	0.374	0.452	0.467
Secondary Settlement (m / ft)		0.024	0.024	0.024	0.024	0.024	0.024	0.023	0.023	0.023	0.023
Total Settlement (m / ft)		0.165	0.169	0.169	0.176	0.183	0.204	0.381	0.397	0.475	0.490
Elastic or Plastic (E/P)		p	p	p	p	p	p	p	p	p	p
		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 17 (m / ft)		0.165	0.169	0.169	0.176	0.183	0.204	0.381	0.397	0.475	0.490
Layer No.	*18*	**Zone2-Above-GW-13**									
Initial Stress Reference Layer (top of layer)		*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*
Final Stress Reference Layer (top of layer)		*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)		387.94	387.95	387.95	387.95	387.95	387.92	387.60	387.58	387.43	387.32
Initial Effective Stress, σ'_i (kPa /psf)		2,948	2,949	2,949	2,950	2,950	2,944	2,870	2,865	2,831	2,807
Final Effective Stress, σ'_f (kPa/psf)		3,710	3,733	3,733	3,781	3,833	3,963	5,235	5,373	6,118	6,274
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*
OCR Manual Input Value		*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		2,948	2,949	2,949	2,950	2,950	2,944	2,870	2,865	2,831	2,807
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*
Modified Recompression Index, $C_{r\varepsilon}$		*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*
ratio of t2 / t1		*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*
Settlements											
Primary Settlement, (m / ft)		0.132	0.135	0.135	0.143	0.151	0.171	0.336	0.351	0.425	0.440
Secondary Settlement (m / ft)		0.024	0.024	0.024	0.024	0.024	0.024	0.023	0.023	0.023	0.023
Total Settlement (m / ft)		0.156	0.159	0.159	0.166	0.174	0.194	0.359	0.374	0.448	0.463
Elastic or Plastic (E/P)		p	p	p	p	p	p	p	p	p	p
		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 18 (m / ft)		0.156	0.159	0.159	0.166	0.174	0.194	0.359	0.374	0.448	0.463
Layer No.	*19*	**Zone2-Above-GW-14**									
Initial Stress Reference Layer (top of layer)		*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*
Final Stress Reference Layer (top of layer)		*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)		385.07	385.07	385.07	385.07	385.07	385.05	384.80	384.78	384.67	384.59
Initial Effective Stress, σ'_i (kPa /psf)		3,184	3,185	3,185	3,186	3,186	3,179	3,100	3,094	3,057	3,032
Final Effective Stress, σ'_f (kPa/psf)		3,950	3,975	3,975	4,026	4,082	4,216	5,460	5,595	6,323	6,479
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*
OCR Manual Input Value		*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		3,184	3,185	3,185	3,186	3,186	3,179	3,100	3,094	3,057	3,032
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*
Modified Recompression Index, $C_{r\varepsilon}$		*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*
ratio of t2 / t1		*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*
Settlements											
Primary Settlement, (m / ft)		0.124	0.127	0.127	0.135	0.142	0.162	0.317	0.331	0.401	0.416
Secondary Settlement (m / ft)		0.024	0.024	0.024	0.024	0.024	0.024	0.023	0.023	0.023	0.023
Total Settlement (m / ft)		0.147	0.151	0.151	0.158	0.166	0.186	0.340	0.354	0.424	0.438
Elastic or Plastic (E/P)		p	p	p	p	p	p	p	p	p	p
		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 19 (m / ft)		0.147	0.151	0.151	0.158	0.166	0.186	0.340	0.354	0.424	0.438

Written by: **Yiwen Cao** Date: **6/10/2009** Reviewed by: **R. Kulasingam/Jay Beech** Date: **6/10/2009**

Client: **Honeywell** Project: **Onondaga Lake SCA IDS** Project/ Proposal No.: **GJ4299** Task No.: **04**

Layer No.	*20*	**Zone2-Above-GW-15**									
Initial Stress Reference Layer (top of layer)		*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*
Final Stress Reference Layer (top of layer)		*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)		382.19	382.19	382.19	382.20	382.20	382.18	382.00	381.99	381.90	381.85
Initial Effective Stress, σ'_i (kPa /psf)		3,420	3,421	3,421	3,422	3,422	3,415	3,329	3,323	3,284	3,256
Final Effective Stress, σ'_f (kPa/psf)		4,191	4,217	4,217	4,272	4,331	4,468	5,684	5,817	6,527	6,684
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*
OCR Manual Input Value		*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		3,420	3,421	3,421	3,422	3,422	3,415	3,329	3,323	3,284	3,256
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*
Modified Recompression Index, $C_{r\varepsilon}$		*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*
ratio of t2 / t1		*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*
Settlements											
Primary Settlement, (m / ft)		0.117	0.120	0.120	0.128	0.135	0.154	0.299	0.313	0.379	0.393
Secondary Settlement (m / ft)		0.024	0.024	0.024	0.024	0.024	0.024	0.023	0.023	0.023	0.023
Total Settlement (m / ft)		0.140	0.144	0.144	0.151	0.159	0.178	0.322	0.336	0.402	0.416
Elastic or Plastic (E/P)		p	p	p	p	p	p	p	p	p	p
		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 20 (m / ft)		0.140	0.144	0.144	0.151	0.159	0.178	0.322	0.336	0.402	0.416
Layer No.	*21*	**Zone2-Above-GW-16**									
Initial Stress Reference Layer (top of layer)		*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*
Final Stress Reference Layer (top of layer)		*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)		379.31	379.32	379.32	379.32	379.32	379.31	379.20	379.19	379.14	379.11
Initial Effective Stress, σ'_i (kPa /psf)		3,656	3,657	3,657	3,658	3,658	3,650	3,559	3,552	3,510	3,481
Final Effective Stress, σ'_f (kPa/psf)		4,433	4,461	4,461	4,518	4,580	4,719	5,909	6,038	6,733	6,889
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*
OCR Manual Input Value		*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		3,656	3,657	3,657	3,658	3,658	3,650	3,559	3,552	3,510	3,481
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*
Modified Recompression Index, $C_{r\varepsilon}$		*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*
ratio of t2 / t1		*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*
Settlements											
Primary Settlement, (m / ft)		0.111	0.114	0.114	0.121	0.129	0.147	0.284	0.296	0.359	0.374
Secondary Settlement (m / ft)		0.024	0.024	0.024	0.024	0.024	0.024	0.023	0.023	0.023	0.023
Total Settlement (m / ft)		0.134	0.138	0.138	0.145	0.153	0.171	0.307	0.319	0.382	0.396
Elastic or Plastic (E/P)		p	p	p	p	p	p	p	p	p	p
		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 21 (m / ft)		0.134	0.138	0.138	0.145	0.153	0.171	0.307	0.319	0.382	0.396
Layer No.	*22*	**Zone2-Above-GW-17**									
Initial Stress Reference Layer (top of layer)		*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*
Final Stress Reference Layer (top of layer)		*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)		376.44	376.44	376.44	376.44	376.44	376.44	376.40	376.40	376.38	376.37
Initial Effective Stress, σ'_i (kPa /psf)		3,892	3,893	3,893	3,894	3,894	3,885	3,788	3,781	3,737	3,706
Final Effective Stress, σ'_f (kPa/psf)		4,675	4,704	4,704	4,765	4,828	4,969	6,133	6,260	6,938	7,094
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*
OCR Manual Input Value		*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		3,892	3,893	3,893	3,894	3,894	3,885	3,788	3,781	3,737	3,706
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*
Modified Recompression Index, $C_{r\varepsilon}$		*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*
ratio of t2 / t1		*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*
Settlements											
Primary Settlement, (m / ft)		0.105	0.109	0.109	0.116	0.124	0.141	0.270	0.281	0.341	0.355
Secondary Settlement (m / ft)		0.024	0.024	0.024	0.024	0.024	0.024	0.023	0.023	0.023	0.023
Total Settlement (m / ft)		0.129	0.132	0.132	0.140	0.147	0.165	0.293	0.304	0.364	0.378
Elastic or Plastic (E/P)		p	p	p	p	p	p	p	p	p	p
		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 22 (m / ft)		0.129	0.132	0.132	0.140	0.147	0.165	0.293	0.304	0.364	0.378

Written by: **Yiwen Cao** Date: **6/10/2009** Reviewed by: **R. Kulasingam/Jay Beech** Date: **6/10/2009**

Client: **Honeywell** Project: **Onondaga Lake SCA IDS** Project/ Proposal No.: **GJ4299** Task No.: **04**

Layer No.	*23*	**Zone3-Above-GW-1**									
Initial Stress Reference Layer (top of layer)		*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*
Final Stress Reference Layer (top of layer)		*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)		375.00	375.00	375.00	375.00	375.00	375.00	375.00	375.00	375.00	375.00
Initial Effective Stress, σ'_i (kPa /psf)		4,010	4,011	4,011	4,012	4,012	4,003	3,903	3,896	3,850	3,818
Final Effective Stress, σ'_f (kPa/psf)		4,793	4,822	4,822	4,883	4,946	5,087	6,243	6,367	7,030	7,187
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*
OCR Manual Input Value		*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		4,010	4,011	4,011	4,012	4,012	4,003	3,903	3,896	3,850	3,818
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.380*	*0.380*	*0.380*	*0.380*	*0.380*	*0.380*	*0.380*	*0.380*	*0.380*	*0.380*
Modified Recompression Index, $C_{r\varepsilon}$		*0.021*	*0.021*	*0.021*	*0.021*	*0.021*	*0.021*	*0.021*	*0.021*	*0.021*	*0.021*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.70%*	*0.70%*	*0.70%*	*0.70%*	*0.70%*	*0.70%*	*0.70%*	*0.70%*	*0.70%*	*0.70%*
ratio of t2 / t1		*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*
Settlements											
Primary Settlement, (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Secondary Settlement (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total Settlement (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Elastic or Plastic (E/P)		p	p	p	p	p	p	p	p	p	p
		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 23 (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Layer No.	*24*	**Zone3-Above-GW-2**									
Initial Stress Reference Layer (top of layer)		*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*
Final Stress Reference Layer (top of layer)		*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)		375.00	375.00	375.00	375.00	375.00	375.00	375.00	375.00	375.00	375.00
Initial Effective Stress, σ'_i (kPa /psf)		4,010	4,011	4,011	4,012	4,012	4,003	3,903	3,896	3,850	3,818
Final Effective Stress, σ'_f (kPa/psf)		4,793	4,822	4,822	4,883	4,946	5,087	6,243	6,367	7,030	7,187
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*
OCR Manual Input Value		*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		4,010	4,011	4,011	4,012	4,012	4,003	3,903	3,896	3,850	3,818
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.380*	*0.380*	*0.380*	*0.380*	*0.380*	*0.380*	*0.380*	*0.380*	*0.380*	*0.380*
Modified Recompression Index, $C_{r\varepsilon}$		*0.021*	*0.021*	*0.021*	*0.021*	*0.021*	*0.021*	*0.021*	*0.021*	*0.021*	*0.021*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.70%*	*0.70%*	*0.70%*	*0.70%*	*0.70%*	*0.70%*	*0.70%*	*0.70%*	*0.70%*	*0.70%*
ratio of t2 / t1		*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*
Settlements											
Primary Settlement, (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Secondary Settlement (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total Settlement (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Elastic or Plastic (E/P)		p	p	p	p	p	p	p	p	p	p
		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 24 (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Layer No.	*25*	**Zone2-Below-GW-18**									
Initial Stress Reference Layer (top of layer)		*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*
Final Stress Reference Layer (top of layer)		*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)		373.50	373.49	373.49	373.48	373.46	373.44	373.27	373.26	373.12	373.08
Initial Effective Stress, σ'_i (kPa /psf)		4,039	4,040	4,040	4,042	4,042	4,034	3,937	3,930	3,887	3,856
Final Effective Stress, σ'_f (kPa/psf)		4,830	4,860	4,860	4,923	4,989	5,132	6,272	6,393	7,067	7,225
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*
OCR Manual Input Value		*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		4,039	4,040	4,040	4,042	4,042	4,034	3,937	3,930	3,887	3,856
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*
Modified Recompression Index, $C_{r\varepsilon}$		*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*
ratio of t2 / t1		*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*
Settlements											
Primary Settlement, (m / ft)		0.107	0.112	0.112	0.120	0.129	0.150	0.321	0.339	0.449	0.481
Secondary Settlement (m / ft)		0.025	0.025	0.025	0.025	0.025	0.026	0.028	0.029	0.031	0.032
Total Settlement (m / ft)		0.132	0.137	0.137	0.145	0.155	0.176	0.350	0.367	0.479	0.513
Elastic or Plastic (E/P)											
		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 25 (m / ft)		0.132	0.137	0.137	0.145	0.155	0.176	0.350	0.367	0.479	0.513

Written by: **Yiwen Cao** Date: **6/10/2009** Reviewed by: **R. Kulasingam/Jay Beech** Date: **6/10/2009**

Client: **Honeywell** Project: **Onondaga Lake SCA IDS** Project/ Proposal No.: **GJ4299** Task No.: **04**

Layer No.	*26*	**Zone2-Below-GW-19**									
Initial Stress Reference Layer (top of layer)		*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*
Final Stress Reference Layer (top of layer)		*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)		370.49	370.46	370.46	370.43	370.38	370.31	369.82	369.77	369.37	369.25
Initial Effective Stress, σ'_i (kPa /psf)		4,098	4,100	4,100	4,102	4,103	4,095	4,005	3,998	3,960	3,931
Final Effective Stress, σ'_f (kPa/psf)		4,897	4,928	4,928	4,993	5,061	5,207	6,334	6,453	7,100	7,261
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*
OCR Manual Input Value		*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		4,098	4,100	4,100	4,102	4,103	4,095	4,005	3,998	3,960	3,931
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*
Modified Recompression Index, $C_{r\varepsilon}$		*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*
ratio of t2 / t1		*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*
Settlements											
Primary Settlement, (m / ft)		0.107	0.111	0.111	0.120	0.129	0.150	0.316	0.333	0.438	0.470
Secondary Settlement (m / ft)		0.025	0.025	0.025	0.025	0.025	0.026	0.028	0.029	0.031	0.032
Total Settlement (m / ft)		0.132	0.136	0.136	0.145	0.154	0.176	0.345	0.362	0.469	0.502
Elastic or Plastic (E/P)		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 26 (m / ft)		0.132	0.136	0.136	0.145	0.154	0.176	0.345	0.362	0.469	0.502
Layer No.	*27*	**Zone3-Below-GW-3**									
Initial Stress Reference Layer (top of layer)		*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*
Final Stress Reference Layer (top of layer)		*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)		368.98	368.95	368.95	368.90	368.84	368.75	368.09	368.03	367.49	367.33
Initial Effective Stress, σ'_i (kPa /psf)		4,128	4,129	4,129	4,132	4,133	4,126	4,039	4,032	3,997	3,968
Final Effective Stress, σ'_f (kPa/psf)		4,934	4,967	4,967	5,034	5,104	5,252	6,368	6,487	7,137	7,299
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*
OCR Manual Input Value		*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		4,128	4,129	4,129	4,132	4,133	4,126	4,039	4,032	3,997	3,968
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.380*	*0.380*	*0.380*	*0.380*	*0.380*	*0.380*	*0.380*	*0.380*	*0.380*	*0.380*
Modified Recompression Index, $C_{r\varepsilon}$		*0.021*	*0.021*	*0.021*	*0.021*	*0.021*	*0.021*	*0.021*	*0.021*	*0.021*	*0.021*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.70%*	*0.70%*	*0.70%*	*0.70%*	*0.70%*	*0.70%*	*0.70%*	*0.70%*	*0.70%*	*0.70%*
ratio of t2 / t1		*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*
Settlements											
Primary Settlement, (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Secondary Settlement (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total Settlement (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Elastic or Plastic (E/P)		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 27 (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Written by: **Yiwen Cao** Date: **6/10/2009** Reviewed by: **R. Kulasingam/Jay Beech** Date: **6/10/2009**

Client: **Honeywell** Project: **Onondaga Lake SCA IDS** Project/ Proposal No.: **GJ4299** Task No.: **04**

	Layer No.	Material										
LAYER SETTLEMENT	1	*Null Layer*										
	2	*Dredge*										
	3	*Gravel*										
	4	*Clay*										
	5	*Dike*										
	6	*Zone2-Above-GW-1*	0.348	0.341	0.341	0.330	0.328	0.351	0.934	0.968	1.135	1.138
	7	*Zone2-Above-GW-2*	0.023	0.023	0.023	0.023	0.023	0.023	0.368	0.400	0.559	0.571
	8	*Zone2-Above-GW-3*	0.017	0.017	0.017	0.017	0.017	0.018	0.127	0.157	0.306	0.322
	9	*Zone2-Above-GW-4*	0.014	0.014	0.014	0.014	0.014	0.041	0.026	0.027	0.148	0.166
	10	*Zone2-Above-GW-5*	0.012	0.012	0.012	0.012	0.012	0.013	0.318	0.343	0.469	0.485
	11	*Zone2-Above-GW-6*	0.011	0.011	0.011	0.011	0.011	0.012	0.241	0.265	0.383	0.400
	12	*Zone2-Above-GW-7*	0.010	0.010	0.010	0.010	0.010	0.011	0.182	0.204	0.314	0.332
	13	*Zone2-Above-GW-8*	0.228	0.230	0.230	0.235	0.241	0.265	0.509	0.529	0.629	0.643
	14	*Zone2-Above-GW-9*	0.207	0.210	0.210	0.215	0.222	0.246	0.469	0.488	0.582	0.596
	15	*Zone2-Above-GW-10*	0.190	0.193	0.193	0.200	0.207	0.229	0.435	0.453	0.541	0.556
	16	*Zone2-Above-GW-11*	0.177	0.180	0.180	0.187	0.194	0.216	0.406	0.423	0.506	0.521
	17	*Zone2-Above-GW-12*	0.165	0.169	0.169	0.176	0.183	0.204	0.381	0.397	0.475	0.490
	18	*Zone2-Above-GW-13*	0.156	0.159	0.159	0.166	0.174	0.194	0.359	0.374	0.448	0.463
	19	*Zone2-Above-GW-14*	0.147	0.151	0.151	0.158	0.166	0.186	0.340	0.354	0.424	0.438
	20	*Zone2-Above-GW-15*	0.140	0.144	0.144	0.151	0.159	0.178	0.322	0.336	0.402	0.416
	21	*Zone2-Above-GW-16*	0.134	0.138	0.138	0.145	0.153	0.171	0.307	0.319	0.382	0.396
	22	*Zone2-Above-GW-17*	0.129	0.132	0.132	0.140	0.147	0.165	0.293	0.304	0.364	0.378
	23	*Zone3-Above-GW-1*	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	24	*Zone3-Above-GW-2*	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	25	*Zone2-Below-GW-18*	0.132	0.137	0.137	0.145	0.155	0.176	0.350	0.367	0.479	0.513
	26	*Zone2-Below-GW-19*	0.132	0.136	0.136	0.145	0.154	0.176	0.345	0.362	0.469	0.502
	27	*Zone3-Below-GW-3*	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	28											
	29	*Soil Above GW*										
	30	*Soil Below GW*										
		TOTAL SETTLEMENT	**2.37**	**2.41**	**2.41**	**2.48**	**2.57**	**2.88**	**6.71**	**7.07**	**9.01**	**9.32**
POST-SETTLEMENT ELEVATION(M/FT)	Line	1 Top of Dredge	428.03	427.99	427.74	427.67	427.56	427.22	441.33	442.15	450.98	450.68
	Line	2 Top of Dredge	428.03	427.99	427.74	427.67	427.56	427.22	441.33	442.15	450.98	450.68
	Line	3 Top of Gravel	428.03	427.99	427.74	427.65	427.55	427.22	423.29	422.93	420.99	420.68
	Line	4 Top of Clay	428.03	427.99	427.68	424.52	424.25	423.65	418.74	418.33	415.48	414.74
	Line	5 Top of Dike	428.03	426.92	426.66	424.06	421.36	420.94	415.89	415.44	412.94	412.24
	Line	6 Top of Subgrade	421.53	421.50	421.50	421.45	421.36	420.94	415.89	415.44	412.94	412.24
	Line	7	419.00	418.97	418.97	418.90	418.81	418.42	414.02	413.61	411.31	410.64
	Line	8	416.15	416.11	416.11	416.05	415.95	415.58	411.59	411.22	409.11	408.47
	Line	9	413.29	413.25	413.25	413.19	413.09	412.72	408.92	408.58	406.65	406.05
	Line	10	410.42	410.39	410.39	410.32	410.23	409.89	406.14	405.81	404.04	403.48
	Line	11	407.56	407.53	407.53	407.46	407.36	407.03	403.66	403.36	401.74	401.22
	Line	12	404.69	404.66	404.66	404.59	404.49	404.17	401.10	400.83	399.36	398.88
	Line	13	401.83	401.79	401.79	401.72	401.62	401.31	398.48	398.24	396.92	396.48
	Line	14	399.18	399.15	399.15	399.08	398.99	398.71	396.19	395.97	394.78	394.38
	Line	15	396.51	396.48	396.48	396.41	396.33	396.08	393.86	393.67	392.60	392.24
	Line	16	393.82	393.79	393.79	393.73	393.66	393.44	391.50	391.33	390.38	390.06
	Line	17	391.12	391.10	391.10	391.04	390.98	390.78	389.10	388.95	388.13	387.84
	Line	18	388.41	388.39	388.39	388.34	388.28	388.11	386.69	386.56	385.84	385.59
	Line	19	385.69	385.67	385.67	385.63	385.58	385.44	384.24	384.14	383.53	383.31
	Line	20	382.96	382.94	382.94	382.91	382.87	382.75	381.78	381.70	381.19	381.01
	Line	21	380.23	380.21	380.21	380.18	380.15	380.06	379.31	379.24	378.83	378.69
	Line	22	377.48	377.47	377.47	377.45	377.42	377.36	376.81	376.76	376.45	376.35
	Line	23 Bottom of Zone2 Above GW	374.74	374.73	374.73	374.71	374.69	374.65	374.31	374.27	374.05	373.99
	Line	24	374.74	374.73	374.73	374.71	374.69	374.65	374.31	374.27	374.05	373.99
	Line	25 Bottom of Zone 3 Above GW	374.74	374.73	374.73	374.71	374.69	374.65	374.31	374.27	374.05	373.99
	Line	26	371.86	371.84	371.84	371.81	371.77	371.70	371.20	371.15	370.78	370.66
	Line	27 Bottom of Zone 2 Below GW	368.98	368.95	368.95	368.90	368.84	368.75	368.09	368.03	367.49	367.33
	Line	28 Top of Incompressible Layer	368.98	368.95	368.95	368.90	368.84	368.75	368.09	368.03	367.49	367.33
	Line	29 GND										
	Line	30 GW										
	Line	31 ROCK										
POST-SETTLEMENT STRAINS & GRADES COMPUTATION												
	Layer No.	**4** Pre-Settlement Elevation	430.400	430.400	430.090	427.000	426.820	426.530	425.450	425.400	424.490	424.060
		Top of Clay Post-Settlement Elevation	428.027	427.993	427.683	424.520	424.246	423.655	418.738	418.328	415.476	414.737
Intial Liner Segment Length, L_0 (ft)			14.752	2.667	0.729	7.045	6.527	10.303	60.012	3.940	36.041	16.430
Post Settle. Liner Segment Length, L_o (ft)			14.755	2.667	0.729	7.078	6.530	10.315	60.203	3.961	36.143	16.441
Post Settlement Liner Strain (+ comp, - tension)			**0.0%**	0.0%	0.0%	**-0.5%**	**0.0%**	**-0.1%**	**-0.3%**	**-0.5%**	**-0.3%**	**-0.1%**
PreSettlement Slope (+ up, - down)			0.0%	0.0%	-47.0%	-48.8%	-2.8%	-2.8%	-1.8%	-1.3%	-2.5%	-2.6%
Post Settlement Slope			-2.1%	-1.3%	-47.0%	-50.0%	-4.2%	-5.7%	-8.2%	-10.4%	-7.9%	-4.5%
Grade Difference (+ steeper, - milder)			2.1%	1.3%	0.0%	1.2%	1.4%	2.9%	6.4%	9.1%	5.4%	1.9%

Written by: **Yiwen Cao** Date: **6/10/2009** Reviewed by: **R. Kulasingam/Jay Beech** Date: **6/10/2009**

Client: **Honeywell** Project: **Onondaga Lake SCA IDS** Project/ Proposal No.: **GJ4299** Task No.: **04**

Attachment 7

CASE 6: Calculations of Cover Settlement During Operations Period (Cross Section A, Points 5 to 14)

Written by: **Yiwen Cao** Date: **6/10/2009** Reviewed by: **R. Kulasingam/Jay Beech** Date: **6/10/2009**

Client: **Honeywell** Project: **Onondaga Lake SCA IDS** Project/ Proposal No.: **GJ4299** Task No.: **04**

Settlement Prediction Model

Programmer: **Yiwen Cao, GeoSyntec Consultants**

Version Control V 1.002 11.14.2007

Project: **Onondaga Lake SCA 50%**

Notes:

Unit: **ft / psf**

Average Compaction Effort = **1440.00** kPa or psf

Consider Compaction Effort = **N** yes or no

Point #				**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**
Distance (meter or ft)				*163.38*	*166.04*	*166.70*	*173.04*	*179.56*	*189.86*	*249.86*	*253.80*	*289.83*	*306.25*
ELEVATION (M/FT)	Line	1	Top of Year 4 Dredge	*430.40*	*430.40*	*430.15*	*430.15*	*430.13*	*430.10*	*448.04*	*449.22*	*459.99*	*460.00*
	Line	2	Top of Year 4 Dredge	*430.40*	*430.40*	*430.15*	*430.15*	*430.13*	*430.10*	*448.04*	*449.22*	*459.99*	*460.00*
	Line	3		*430.40*	*430.40*	*430.15*	*430.15*	*430.13*	*430.10*	*448.04*	*449.22*	*459.99*	*460.00*
	Line	4		*430.40*	*430.40*	*430.15*	*430.14*	*430.13*	*430.10*	*448.04*	*449.21*	*459.99*	*460.00*
	Line	5		*430.40*	*430.40*	*430.15*	*430.14*	*430.13*	*430.10*	*448.04*	*449.21*	*459.99*	*460.00*
	Line	6		*430.40*	*430.40*	*430.15*	*430.14*	*430.12*	*430.10*	*448.03*	*449.21*	*459.99*	*460.00*
	Line	7		*430.40*	*430.40*	*430.15*	*430.13*	*430.12*	*430.10*	*448.03*	*449.20*	*459.99*	*460.00*
	Line	8	Top of Year 3 Dredge	*430.40*	*430.40*	*430.15*	*430.13*	*430.12*	*430.10*	*448.03*	*449.20*	*459.99*	*460.00*
	Line	9		*430.40*	*430.40*	*430.15*	*430.13*	*430.12*	*430.10*	*448.03*	*449.03*	*458.28*	*458.29*
	Line	10		*430.40*	*430.40*	*430.15*	*430.13*	*430.12*	*430.10*	*448.02*	*448.86*	*456.56*	*456.57*
	Line	11		*430.40*	*430.40*	*430.15*	*430.13*	*430.12*	*430.10*	*448.02*	*448.69*	*454.85*	*454.86*
	Line	12		*430.40*	*430.40*	*430.15*	*430.13*	*430.12*	*430.10*	*448.01*	*448.51*	*453.14*	*453.14*
	Line	13		*430.40*	*430.40*	*430.15*	*430.13*	*430.12*	*430.10*	*448.01*	*448.34*	*451.43*	*451.43*
	Line	14		*430.40*	*430.40*	*430.15*	*430.13*	*430.12*	*430.10*	*448.00*	*448.17*	*449.71*	*449.71*
	Line	15	Top of Year 2 Dredge	*430.40*	*430.40*	*430.15*	*430.13*	*430.12*	*430.10*	*448.00*	*448.00*	*448.00*	*448.00*
	Line	16		*430.40*	*430.40*	*430.15*	*430.13*	*430.12*	*430.10*	*448.00*	*448.00*	*448.00*	*448.00*
	Line	17		*430.40*	*430.40*	*430.15*	*430.13*	*430.12*	*430.10*	*448.00*	*448.00*	*448.00*	*448.00*
	Line	18		*430.40*	*430.40*	*430.15*	*430.13*	*430.12*	*430.10*	*448.00*	*448.00*	*448.00*	*448.00*
	Line	19		*430.40*	*430.40*	*430.15*	*430.13*	*430.12*	*430.10*	*448.00*	*448.00*	*448.00*	*448.00*
	Line	20		*430.40*	*430.40*	*430.15*	*430.13*	*430.12*	*430.10*	*448.00*	*448.00*	*448.00*	*448.00*
	Line	21		*430.40*	*430.40*	*430.15*	*430.13*	*430.12*	*430.10*	*448.00*	*448.00*	*448.00*	*448.00*
	Line	22	Top of Year 1 Dredge	*430.40*	*430.40*	*430.15*	*430.13*	*430.12*	*430.10*	*448.00*	*448.00*	*448.00*	*448.00*
	Line	23		*430.40*	*430.40*	*430.15*	*430.13*	*430.12*	*430.10*	*445.00*	*445.00*	*445.00*	*445.00*
	Line	24		*430.40*	*430.40*	*430.15*	*430.13*	*430.12*	*430.10*	*442.00*	*442.00*	*442.00*	*442.00*
	Line	25		*430.40*	*430.40*	*430.15*	*430.13*	*430.12*	*430.10*	*439.00*	*439.00*	*439.00*	*439.00*
	Line	26		*430.40*	*430.40*	*430.15*	*430.13*	*430.12*	*430.10*	*436.00*	*436.00*	*436.00*	*436.00*
	Line	27		*430.40*	*430.40*	*430.15*	*430.13*	*430.12*	*430.10*	*433.00*	*433.00*	*433.00*	*433.00*
	Line	28	Top of Gravel(Top of Incompressil	*430.40*	*430.40*	*430.15*	*430.13*	*430.12*	*430.10*	*430.00*	*430.00*	*430.00*	*430.00*
	Line	29	GND for sigma_p	*433.23*	*433.06*	*432.92*	*432.56*	*432.50*	*432.50*	*432.38*	*431.00*	*431.00*	*431.00*
	Line	30	GW	*375.00*	*375.00*	*375.00*	*375.00*	*375.00*	*375.00*	*375.00*	*375.00*	*375.00*	*375.00*
	Line	31	ROCK	*430.40*	*430.40*	*430.15*	*430.13*	*430.12*	*430.10*	*430.00*	*430.00*	*430.00*	*430.00*
LAYER THICKNESS (M/FT)	Layer No.	From	To / Material										
	1	*1*	*2* / *Null Layer*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
	2	*2*	*3* / *YR4-1*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
	3	*3*	*4* / *YR4-2*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
	4	*4*	*5* / *YR4-3*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
	5	*5*	*6* / *YR4-4*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
	6	*6*	*7* / *YR4-5*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
	7	*7*	*8* / *YR4-6*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
	8	*8*	*9* / *YR3-1*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.17*	*1.71*	*1.71*
	9	*9*	*10* / *YR3-2*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.17*	*1.71*	*1.71*
	10	*10*	*11* / *YR3-3*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.17*	*1.71*	*1.71*
	11	*11*	*12* / *YR3-4*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.17*	*1.71*	*1.71*
	12	*12*	*13* / *YR3-5*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.17*	*1.71*	*1.71*
	13	*13*	*14* / *YR3-6*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.17*	*1.71*	*1.71*
	14	*14*	*15* / *YR3-7*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.17*	*1.71*	*1.71*
	15	*15*	*16* / *YR2-1*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
	16	*16*	*17* / *YR2-2*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
	17	*17*	*18* / *YR2-3*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
	18	*18*	*19* / *YR2-4*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
	19	*19*	*20* / *YR2-5*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
	20	*20*	*21* / *YR2-6*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
	21	*21*	*22* / *YR2-7*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
	22	*22*	*23* / *YR1-1*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*3.00*	*3.00*	*3.00*	*3.00*
	23	*23*	*24* / *YR1-2*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*3.00*	*3.00*	*3.00*	*3.00*
	24	*24*	*25* / *YR1-3*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*3.00*	*3.00*	*3.00*	*3.00*
	25	*25*	*26* / *YR1-4*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*3.00*	*3.00*	*3.00*	*3.00*
	26	*26*	*27* / *YR1-5*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*3.00*	*3.00*	*3.00*	*3.00*
	27	*27*	*28* / *YR1-6*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*3.00*	*3.00*	*3.00*	*3.00*
	28												
	29												
	30												
	Thickness Check												
		From Line	To Line / SUM	*0.00*	*0.00*	*0.00*	*0.02*	*0.01*	*0.00*	*18.04*	*19.22*	*29.99*	*30.00*
		1	*28* / Thickness =	*0.00*	*0.00*	*0.00*	*0.02*	*0.01*	*0.00*	*18.04*	*19.22*	*29.99*	*30.00*
			Thickness Check	***OK***	***OK***	***OK***	***OK***	***OK***	***OK***	***OK***	***OK***	***OK***	***OK***

Written by: **Yiwen Cao** Date: **6/10/2009** Reviewed by: **R. Kulasingam/Jay Beech** Date: **6/10/2009**

Client: **Honeywell** Project: **Onondaga Lake SCA IDS** Project/ Proposal No.: **GJ4299** Task No.: **04**

UNIT WEIGHT	Layer No.	Material										
	1	*Null Layer*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*
	2	*YR4-1*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*
	3	*YR4-2*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*
	4	*YR4-3*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*
	5	*YR4-4*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*
	6	*YR4-5*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*
	7	*YR4-6*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*
	8	*YR3-1*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*
	9	*YR3-2*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*
	10	*YR3-3*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*
	11	*YR3-4*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*
	12	*YR3-5*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*
	13	*YR3-6*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*
	14	*YR3-7*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*
	15	*YR2-1*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*
	16	*YR2-2*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*
	17	*YR2-3*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*
	18	*YR2-4*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*
	19	*YR2-5*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*
	20	*YR2-6*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*
	21	*YR2-7*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*
	22	*YR1-1*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*
	23	*YR1-2*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*
	24	*YR1-3*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*
	25	*YR1-4*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*
	26	*YR1-5*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*
	27	*YR1-6*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*
	28											
	29		*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*
	30	*Soil below GW*	*19.6*	*19.6*	*19.6*	*19.6*	*19.6*	*19.6*	*19.6*	*19.6*	*19.6*	*19.6*
	Layer No.	***1*** **Null Layer**										
		Initial Stress Reference Layer (top of layer)	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
		Final Stress Reference Layer (top of layer)	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
		Midpoint Elevation, (m / ft)	430.40	430.40	430.15	430.15	430.13	430.10	448.04	449.22	459.99	460.00
		Initial Effective Stress, σ'_i (kPa /psf)	Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight
		Final Effective Stress, σ'_f (kPa/psf)	Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight
Elastic Method												
Modulus, E (kPa/psf)=		Strain										
		Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)												
Consolidation Properties												
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)												
OCR Manual Input Value												
OCR Computation Input												
Preconsolidation pressure, σ'_p (kPa / psf)												
Modified Primary Compression Index, $C_{c\varepsilon}$												
Modified Recompression Index, $C_{r\varepsilon}$												
Modified Secondary Compression Index, C_α												
ratio of t2 / t1												
Settlements												
Primary Settlement, (m / ft)												
Secondary Settlement (m / ft)												
Total Settlement (m / ft)												
		Elastic or Plastic (E/P)										
		Settlement of Layer 1 (m / ft)										

Written by: **Yiwen Cao** Date: **6/10/2009** Reviewed by: **R. Kulasingam/Jay Beech** Date: **6/10/2009**

Client: **Honeywell** Project: **Onondaga Lake SCA IDS** Project/ Proposal No.: **GJ4299** Task No.: **04**

Layer No.	*2*	**YR4-1**									
Initial Stress Reference Layer (top of layer)		*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*
Final Stress Reference Layer (top of layer)		*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)		430.40	430.40	430.15	430.15	430.13	430.10	448.04	449.22	459.99	460.00
Initial Effective Stress, σ'_i (kPa /psf)		0.00	0.00	0.00	0.14	0.07	0.00	0.07	0.14	0.00	0.00
Final Effective Stress, σ'_f (kPa/psf)		0.00	0.00	0.00	0.14	0.07	0.00	0.07	0.14	0.00	0.00
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*
OCR Manual Input Value		*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		0	0	0	0	0	0	0	0	0	0
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*
Modified Recompression Index, $C_{r\varepsilon}$		*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.08%*	*0.08%*	*0.08%*	*0.08%*	*0.08%*	*0.08%*	*0.08%*	*0.08%*	*0.08%*	*0.08%*
ratio of t2 / t1		*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*
Settlements											
Primary Settlement, (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Secondary Settlement (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total Settlement (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Elastic or Plastic (E/P)		P	P	P	P	P	P	P	P	P	P
		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 2 (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Layer No.	*3*	**YR4-2**									
Initial Stress Reference Layer (top of layer)		*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*
Final Stress Reference Layer (top of layer)		*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)		430.40	430.40	430.15	430.15	430.13	430.10	448.04	449.22	459.99	460.00
Initial Effective Stress, σ'_i (kPa /psf)		0.00	0.00	0.00	0.43	0.21	0.00	0.21	0.43	0.00	0.00
Final Effective Stress, σ'_f (kPa/psf)		0.00	0.00	0.00	0.43	0.21	0.00	0.21	0.43	0.00	0.00
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*
OCR Manual Input Value		*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		0	0	0	0	0	0	0	0	0	0
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*
Modified Recompression Index, $C_{r\varepsilon}$		*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.08%*	*0.08%*	*0.08%*	*0.08%*	*0.08%*	*0.08%*	*0.08%*	*0.08%*	*0.08%*	*0.08%*
ratio of t2 / t1		*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*
Settlements											
Primary Settlement, (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Secondary Settlement (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total Settlement (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Elastic or Plastic (E/P)		P	P	P	P	P	P	P	P	P	P
		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 3 (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Layer No.	*4*	**YR4-3**									
Initial Stress Reference Layer (top of layer)		*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*
Final Stress Reference Layer (top of layer)		*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)		430.40	430.40	430.15	430.14	430.13	430.10	448.04	449.21	459.99	460.00
Initial Effective Stress, σ'_i (kPa /psf)		0.00	0.00	0.00	0.72	0.36	0.00	0.36	0.72	0.00	0.00
Final Effective Stress, σ'_f (kPa/psf)		0.00	0.00	0.00	0.72	0.36	0.00	0.36	0.72	0.00	0.00
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*
OCR Manual Input Value		*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		0	0	0	1	0	0	0	1	0	0
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*
Modified Recompression Index, $C_{r\varepsilon}$		*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.08%*	*0.08%*	*0.08%*	*0.08%*	*0.08%*	*0.08%*	*0.08%*	*0.08%*	*0.08%*	*0.08%*
ratio of t2 / t1		*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*
Settlements											
Primary Settlement, (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Secondary Settlement (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total Settlement (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Elastic or Plastic (E/P)		P	P	P	P	P	P	P	P	P	P
		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 4 (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Written by: **Yiwen Cao** Date: **6/10/2009** Reviewed by: **R. Kulasingam/Jay Beech** Date: **6/10/2009**

Client: **Honeywell** Project: **Onondaga Lake SCA IDS** Project/ Proposal No.: **GJ4299** Task No.: **04**

Layer No.	*5*	**YR4-4**									
Initial Stress Reference Layer (top of layer)		*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*
Final Stress Reference Layer (top of layer)		*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)		430.40	430.40	430.15	430.14	430.12	430.10	448.03	449.21	459.99	460.00
Initial Effective Stress, σ'_i (kPa /psf)		0.00	0.00	0.00	1.00	0.50	0.00	0.50	1.00	0.00	0.00
Final Effective Stress, σ'_f (kPa/psf)		0.00	0.00	0.00	1.00	0.50	0.00	0.50	1.00	0.00	0.00
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*
OCR Manual Input Value		*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		0	0	0	1	1	0	1	1	0	0
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*
Modified Recompression Index, $C_{r\varepsilon}$		*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.08%*	*0.08%*	*0.08%*	*0.08%*	*0.08%*	*0.08%*	*0.08%*	*0.08%*	*0.08%*	*0.08%*
ratio of t2 / t1		*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*
Settlements											
Primary Settlement, (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Secondary Settlement (m / ft)		0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Total Settlement (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Elastic or Plastic (E/P)		P	P	P	P	P	P	P	P	P	P
		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 5 (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Layer No.	*6*	**YR4-5**									
Initial Stress Reference Layer (top of layer)		*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*
Final Stress Reference Layer (top of layer)		*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)		430.40	430.40	430.15	430.14	430.12	430.10	448.03	449.21	459.99	460.00
Initial Effective Stress, σ'_i (kPa /psf)		0.00	0.00	0.00	1.29	0.64	0.00	0.64	1.29	0.00	0.00
Final Effective Stress, σ'_f (kPa/psf)		0.00	0.00	0.00	1.29	0.64	0.00	0.64	1.29	0.00	0.00
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*
OCR Manual Input Value		*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		0	0	0	1	1	0	1	1	0	0
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*
Modified Recompression Index, $C_{r\varepsilon}$		*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.08%*	*0.08%*	*0.08%*	*0.08%*	*0.08%*	*0.08%*	*0.08%*	*0.08%*	*0.08%*	*0.08%*
ratio of t2 / t1		*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*
Settlements											
Primary Settlement, (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Secondary Settlement (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total Settlement (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Elastic or Plastic (E/P)		P	P	P	P	P	P	P	P	P	P
		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 6 (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Layer No.	*7*	**YR4-6**									
Initial Stress Reference Layer (top of layer)		*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*
Final Stress Reference Layer (top of layer)		*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)		430.40	430.40	430.15	430.13	430.12	430.10	448.03	449.20	459.99	460.00
Initial Effective Stress, σ'_i (kPa /psf)		0.00	0.00	0.00	1.58	0.79	0.00	0.79	1.58	0.00	0.00
Final Effective Stress, σ'_f (kPa/psf)		0.00	0.00	0.00	1.58	0.79	0.00	0.79	1.58	0.00	0.00
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*
OCR Manual Input Value		*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		0	0	0	2	1	0	1	2	0	0
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*
Modified Recompression Index, $C_{r\varepsilon}$		*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.08%*	*0.08%*	*0.08%*	*0.08%*	*0.08%*	*0.08%*	*0.08%*	*0.08%*	*0.08%*	*0.08%*
ratio of t2 / t1		*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*
Settlements											
Primary Settlement, (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Secondary Settlement (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total Settlement (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Elastic or Plastic (E/P)											
		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 7 (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Written by: **Yiwen Cao** Date: **6/10/2009** Reviewed by: **R. Kulasingam/Jay Beech** Date: **6/10/2009**

Client: **Honeywell** Project: **Onondaga Lake SCA IDS** Project/ Proposal No.: **GJ4299** Task No.: **04**

Layer No.	*8*	**YR3-1**									
Initial Stress Reference Layer (top of layer)		*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*
Final Stress Reference Layer (top of layer)		*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)		430.40	430.40	430.15	430.13	430.12	430.10	448.03	449.11	459.13	459.14
Initial Effective Stress, σ'_i (kPa /psf)		0.00	0.00	0.00	0.00	0.00	0.00	0.18	7.37	73.65	73.71
Final Effective Stress, σ'_f (kPa/psf)		0.00	0.00	0.00	1.72	0.86	0.00	1.04	9.09	73.65	73.71
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*
OCR Manual Input Value		*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		0	0	0	0	0	0	0	7	74	74
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*
Modified Recompression Index, $C_{r\varepsilon}$		*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.08%*	*0.08%*	*0.08%*	*0.60%*	*0.60%*	*0.08%*	*0.60%*	*0.60%*	*0.08%*	*0.08%*
ratio of t2 / t1		*4*	*4*	*4*	*4*	*4*	*4*	*4*	*4*	*4*	*4*
Settlements											
Primary Settlement, (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.005	0.000	0.000
Secondary Settlement (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.001
Total Settlement (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.005	0.001	0.001
Elastic or Plastic (E/P)		P	P	P	P	P	P	P	P	P	P
		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 8 (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.005	0.001	0.001
Layer No.	*9*	**YR3-2**									
Initial Stress Reference Layer (top of layer)		*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*
Final Stress Reference Layer (top of layer)		*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)		430.40	430.40	430.15	430.13	430.12	430.10	448.02	448.94	457.42	457.43
Initial Effective Stress, σ'_i (kPa /psf)		0.00	0.00	0.00	0.00	0.00	0.00	0.55	22.11	220.96	221.14
Final Effective Stress, σ'_f (kPa/psf)		0.00	0.00	0.00	1.72	0.86	0.00	1.41	23.83	220.96	221.14
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*
OCR Manual Input Value		*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		0	0	0	0	0	0	1	22	221	221
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*
Modified Recompression Index, $C_{r\varepsilon}$		*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.08%*	*0.08%*	*0.08%*	*0.60%*	*0.60%*	*0.08%*	*0.60%*	*0.60%*	*0.08%*	*0.08%*
ratio of t2 / t1		*4*	*4*	*4*	*4*	*4*	*4*	*4*	*4*	*4*	*4*
Settlements											
Primary Settlement, (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.002	0.000	0.000
Secondary Settlement (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.001
Total Settlement (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.002	0.001	0.001
Elastic or Plastic (E/P)		P	P	P	P	P	P	P	P	P	P
		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 9 (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.002	0.001	0.001
Layer No.	*10*	**YR3-3**									
Initial Stress Reference Layer (top of layer)		*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*
Final Stress Reference Layer (top of layer)		*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)		430.40	430.40	430.15	430.13	430.12	430.10	448.02	448.77	455.71	455.71
Initial Effective Stress, σ'_i (kPa /psf)		0.00	0.00	0.00	0.00	0.00	0.00	0.92	36.86	368.26	368.57
Final Effective Stress, σ'_f (kPa/psf)		0.00	0.00	0.00	1.72	0.86	0.00	1.78	38.58	368.26	368.57
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*
OCR Manual Input Value		*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		0	0	0	0	0	0	1	37	368	369
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*
Modified Recompression Index, $C_{r\varepsilon}$		*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.08%*	*0.08%*	*0.08%*	*0.60%*	*0.60%*	*0.08%*	*0.60%*	*0.60%*	*0.08%*	*0.08%*
ratio of t2 / t1		*4*	*4*	*4*	*4*	*4*	*4*	*4*	*4*	*4*	*4*
Settlements											
Primary Settlement, (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000
Secondary Settlement (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.001
Total Settlement (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.001	0.001
Elastic or Plastic (E/P)		P	P	P	P	P	P	P	P	P	P
		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 10 (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.001	0.001

Written by: **Yiwen Cao** Date: **6/10/2009** Reviewed by: **R. Kulasingam/Jay Beech** Date: **6/10/2009**

Client: **Honeywell** Project: **Onondaga Lake SCA IDS** Project/ Proposal No.: **GJ4299** Task No.: **04**

Layer No.	*11*	**YR3-4**									
Initial Stress Reference Layer (top of layer)	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*
Final Stress Reference Layer (top of layer)	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)	430.40	430.40	430.15	430.13	430.12	430.10	448.02	448.60	454.00	454.00
Initial Effective Stress, σ'_i (kPa /psf)	0.00	0.00	0.00	0.00	0.00	0.00	1.29	51.60	515.57	516.00
Final Effective Stress, σ'_f (kPa/psf)	0.00	0.00	0.00	1.72	0.86	0.00	2.15	53.32	515.57	516.00
Elastic Method										
Modulus, E (kPa/psf)= Strain										
Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)										
Consolidation Properties										
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*
OCR Manual Input Value	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input										
Preconsolidation pressure, σ'_p (kPa / psf)	0	0	0	0	0	0	1	52	516	516
Modified Primary Compression Index, $C_{c\varepsilon}$	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*
Modified Recompression Index, $C_{r\varepsilon}$	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$	*0.08%*	*0.08%*	*0.08%*	*0.60%*	*0.60%*	*0.08%*	*0.60%*	*0.60%*	*0.08%*	*0.08%*
ratio of t2 / t1	*4*	*4*	*4*	*4*	*4*	*4*	*4*	*4*	*4*	*4*
Settlements										
Primary Settlement, (m / ft)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000
Secondary Settlement (m / ft)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.001
Total Settlement (m / ft)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.001
Elastic or Plastic (E/P)	P	P	P	P	P	P	P	P	P	P
	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 11 (m / ft)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.001
Layer No.	*12*	**YR3-5**									
Initial Stress Reference Layer (top of layer)	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*
Final Stress Reference Layer (top of layer)	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)	430.40	430.40	430.15	430.13	430.12	430.10	448.01	448.43	452.28	452.29
Initial Effective Stress, σ'_i (kPa /psf)	0.00	0.00	0.00	0.00	0.00	0.00	1.66	66.34	662.88	663.43
Final Effective Stress, σ'_f (kPa/psf)	0.00	0.00	0.00	1.72	0.86	0.00	2.52	68.06	662.88	663.43
Elastic Method										
Modulus, E (kPa/psf)= Strain										
Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)										
Consolidation Properties										
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*
OCR Manual Input Value	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input										
Preconsolidation pressure, σ'_p (kPa / psf)	0	0	0	0	0	0	2	66	663	663
Modified Primary Compression Index, $C_{c\varepsilon}$	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*
Modified Recompression Index, $C_{r\varepsilon}$	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$	*0.08%*	*0.08%*	*0.08%*	*0.60%*	*0.60%*	*0.08%*	*0.60%*	*0.60%*	*0.08%*	*0.08%*
ratio of t2 / t1	*4*	*4*	*4*	*4*	*4*	*4*	*4*	*4*	*4*	*4*
Settlements										
Primary Settlement, (m / ft)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000
Secondary Settlement (m / ft)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.001
Total Settlement (m / ft)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.001
Elastic or Plastic (E/P)	P	P	P	P	P	P	P	P	P	P
	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 12 (m / ft)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.001
Layer No.	*13*	**YR3-6**									
Initial Stress Reference Layer (top of layer)	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*
Final Stress Reference Layer (top of layer)	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)	430.40	430.40	430.15	430.13	430.12	430.10	448.01	448.26	450.57	450.57
Initial Effective Stress, σ'_i (kPa /psf)	0	0	0	0	0	0	2	81	810	811
Final Effective Stress, σ'_f (kPa/psf)	0	0	0	2	1	0	3	83	810	811
Elastic Method										
Modulus, E (kPa/psf)= Strain										
Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)										
Consolidation Properties										
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*
OCR Manual Input Value	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input										
Preconsolidation pressure, σ'_p (kPa / psf)	0	0	0	0	0	0	2	81	810	811
Modified Primary Compression Index, $C_{c\varepsilon}$	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*
Modified Recompression Index, $C_{r\varepsilon}$	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$	*0.08%*	*0.08%*	*0.08%*	*0.60%*	*0.60%*	*0.08%*	*0.60%*	*0.60%*	*0.08%*	*0.08%*
ratio of t2 / t1	*4*	*4*	*4*	*4*	*4*	*4*	*4*	*4*	*4*	*4*
Settlements										
Primary Settlement, (m / ft)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Secondary Settlement (m / ft)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.001
Total Settlement (m / ft)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.001
Elastic or Plastic (E/P)	P	P	P	P	P	P	P	P	P	P
	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 13 (m / ft)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.001

Written by: **Yiwen Cao** Date: **6/10/2009** Reviewed by: **R. Kulasingam/Jay Beech** Date: **6/10/2009**

Client: **Honeywell** Project: **Onondaga Lake SCA IDS** Project/ Proposal No.: **GJ4299** Task No.: **04**

Layer No.	*14*	YR3-7									
Initial Stress Reference Layer (top of layer)		*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*
Final Stress Reference Layer (top of layer)		*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)		430.40	430.40	430.15	430.13	430.12	430.10	448.00	448.09	448.86	448.86
Initial Effective Stress, σ'_i (kPa /psf)		0	0	0	0	0	0	2	96	957	958
Final Effective Stress, σ'_f (kPa/psf)		0	0	0	2	1	0	3	98	957	958
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*
OCR Manual Input Value		*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		0	0	0	0	0	0	2	96	957	958
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*
Modified Recompression Index, $C_{r\varepsilon}$		*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.08%*	*0.08%*	*0.08%*	*0.60%*	*0.60%*	*0.08%*	*0.60%*	*0.60%*	*0.08%*	*0.08%*
ratio of t2 / t1		*4*	*4*	*4*	*4*	*4*	*4*	*4*	*4*	*4*	*4*
Settlements											
Primary Settlement, (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Secondary Settlement (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.001
Total Settlement (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.001
Elastic or Plastic (E/P)		P	P	P	P	P	P	P	P	P	P
		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 14 (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.001
Layer No.	*15*	YR2-1									
Initial Stress Reference Layer (top of layer)		*15*	*15*	*15*	*15*	*15*	*15*	*15*	*15*	*15*	*15*
Final Stress Reference Layer (top of layer)		*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)		430.40	430.40	430.15	430.13	430.12	430.10	448.00	448.00	448.00	448.00
Initial Effective Stress, σ'_i (kPa /psf)		0	0	0	0	0	0	0	0	0	0
Final Effective Stress, σ'_f (kPa/psf)		0	0	0	2	1	0	3	105	1,031	1,032
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*
OCR Manual Input Value		*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		0	0	0	0	0	0	0	0	0	0
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*
Modified Recompression Index, $C_{r\varepsilon}$		*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.08%*	*0.08%*	*0.08%*	*0.60%*	*0.60%*	*0.08%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*
ratio of t2 / t1		*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*
Settlements											
Primary Settlement, (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Secondary Settlement (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total Settlement (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Elastic or Plastic (E/P)		P	P	P	P	P	P	P	P	P	P
		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 15 (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Layer No.	*16*	YR2-2									
Initial Stress Reference Layer (top of layer)		*15*	*15*	*15*	*15*	*15*	*15*	*15*	*15*	*15*	*15*
Final Stress Reference Layer (top of layer)		*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)		430.40	430.40	430.15	430.13	430.12	430.10	448.00	448.00	448.00	448.00
Initial Effective Stress, σ'_i (kPa /psf)		0	0	0	0	0	0	0	0	0	0
Final Effective Stress, σ'_f (kPa/psf)		0	0	0	2	1	0	3	105	1,031	1,032
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*
OCR Manual Input Value		*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		0	0	0	0	0	0	0	0	0	0
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*
Modified Recompression Index, $C_{r\varepsilon}$		*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.08%*	*0.08%*	*0.08%*	*0.60%*	*0.60%*	*0.08%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*
ratio of t2 / t1		*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*
Settlements											
Primary Settlement, (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Secondary Settlement (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total Settlement (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Elastic or Plastic (E/P)		P	P	P	P	P	P	P	P	P	P
		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 16 (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Written by: **Yiwen Cao** Date: **6/10/2009** Reviewed by: **R. Kulasingam/Jay Beech** Date: **6/10/2009**

Client: **Honeywell** Project: **Onondaga Lake SCA IDS** Project/ Proposal No.: **GJ4299** Task No.: **04**

Layer No. *17* **YR2-3**											
Initial Stress Reference Layer (top of layer)	*15*	*15*	*15*	*15*	*15*	*15*	*15*	*15*	*15*	*15*
Final Stress Reference Layer (top of layer)	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)	430.40	430.40	430.15	430.13	430.12	430.10	448.00	448.00	448.00	448.00
Initial Effective Stress, σ'_i (kPa /psf)	0	0	0	0	0	0	0	0	0	0
Final Effective Stress, σ'_f (kPa/psf)	0	0	0	2	1	0	3	105	1,031	1,032
Elastic Method										
Modulus, E (kPa/psf)= Strain										
Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)										
Consolidation Properties										
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*
OCR Manual Input Value	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input										
Preconsolidation pressure, σ'_p (kPa / psf)	0	0	0	0	0	0	0	0	0	0
Modified Primary Compression Index, $C_{c\varepsilon}$	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*
Modified Recompression Index, $C_{r\varepsilon}$	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$	*0.08%*	*0.08%*	*0.08%*	*0.60%*	*0.60%*	*0.08%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*
ratio of t2 / t1	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*
Settlements										
Primary Settlement, (m / ft)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Secondary Settlement (m / ft)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total Settlement (m / ft)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Elastic or Plastic (E/P)	P	P	P	P	P	P	P	P	P	P
	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 17 (m / ft)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Layer No. *18* **YR2-4**										
Initial Stress Reference Layer (top of layer)	*15*	*15*	*15*	*15*	*15*	*15*	*15*	*15*	*15*	*15*
Final Stress Reference Layer (top of layer)	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)	430.40	430.40	430.15	430.13	430.12	430.10	448.00	448.00	448.00	448.00
Initial Effective Stress, σ'_i (kPa /psf)	0	0	0	0	0	0	0	0	0	0
Final Effective Stress, σ'_f (kPa/psf)	0	0	0	2	1	0	3	105	1,031	1,032
Elastic Method										
Modulus, E (kPa/psf)= Strain										
Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)										
Consolidation Properties										
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*
OCR Manual Input Value	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input										
Preconsolidation pressure, σ'_p (kPa / psf)	0	0	0	0	0	0	0	0	0	0
Modified Primary Compression Index, $C_{c\varepsilon}$	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*
Modified Recompression Index, $C_{r\varepsilon}$	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$	*0.08%*	*0.08%*	*0.08%*	*0.60%*	*0.60%*	*0.08%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*
ratio of t2 / t1	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*
Settlements										
Primary Settlement, (m / ft)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Secondary Settlement (m / ft)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total Settlement (m / ft)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Elastic or Plastic (E/P)	P	P	P	P	P	P	P	P	P	P
	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 18 (m / ft)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Layer No. *19* **YR2-5**										
Initial Stress Reference Layer (top of layer)	*15*	*15*	*15*	*15*	*15*	*15*	*15*	*15*	*15*	*15*
Final Stress Reference Layer (top of layer)	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)	430.40	430.40	430.15	430.13	430.12	430.10	448.00	448.00	448.00	448.00
Initial Effective Stress, σ'_i (kPa /psf)	0	0	0	0	0	0	0	0	0	0
Final Effective Stress, σ'_f (kPa/psf)	0	0	0	2	1	0	3	105	1,031	1,032
Elastic Method										
Modulus, E (kPa/psf)= Strain										
Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)										
Consolidation Properties										
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*
OCR Manual Input Value	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input										
Preconsolidation pressure, σ'_p (kPa / psf)	0	0	0	0	0	0	0	0	0	0
Modified Primary Compression Index, $C_{c\varepsilon}$	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*
Modified Recompression Index, $C_{r\varepsilon}$	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$	*0.08%*	*0.08%*	*0.08%*	*0.60%*	*0.60%*	*0.08%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*
ratio of t2 / t1	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*
Settlements										
Primary Settlement, (m / ft)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Secondary Settlement (m / ft)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total Settlement (m / ft)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Elastic or Plastic (E/P)	P	P	P	P	P	P	P	P	P	P
	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 19 (m / ft)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Written by: **Yiwen Cao** Date: **6/10/2009** Reviewed by: **R. Kulasingam/Jay Beech** Date: **6/10/2009**

Client: **Honeywell** Project: **Onondaga Lake SCA IDS** Project/ Proposal No.: **GJ4299** Task No.: **04**

Layer No.	*20*	**YR2-6**									
Initial Stress Reference Layer (top of layer)	*15*	*15*	*15*	*15*	*15*	*15*	*15*	*15*	*15*	*15*
Final Stress Reference Layer (top of layer)	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)	430.40	430.40	430.15	430.13	430.12	430.10	448.00	448.00	448.00	448.00
Initial Effective Stress, σ'_i (kPa /psf)	0	0	0	0	0	0	0	0	0	0
Final Effective Stress, σ'_f (kPa/psf)	0	0	0	2	1	0	3	105	1,031	1,032
Elastic Method										
Modulus, E (kPa/psf)= Strain										
Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)										
Consolidation Properties										
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*
OCR Manual Input Value	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input										
Preconsolidation pressure, σ'_p (kPa / psf)	0	0	0	0	0	0	0	0	0	0
Modified Primary Compression Index, $C_{c\varepsilon}$	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*
Modified Recompression Index, $C_{r\varepsilon}$	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$	*0.08%*	*0.08%*	*0.08%*	*0.60%*	*0.60%*	*0.08%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*
ratio of t2 / t1	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*
Settlements										
Primary Settlement, (m / ft)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Secondary Settlement (m / ft)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total Settlement (m / ft)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Elastic or Plastic (E/P)	P	P	P	P	P	P	P	P	P	P
	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 20 (m / ft)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Layer No.	*21*	**YR2-7**									
Initial Stress Reference Layer (top of layer)	*15*	*15*	*15*	*15*	*15*	*15*	*15*	*15*	*15*	*15*
Final Stress Reference Layer (top of layer)	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)	430.40	430.40	430.15	430.13	430.12	430.10	448.00	448.00	448.00	448.00
Initial Effective Stress, σ'_i (kPa /psf)	0	0	0	0	0	0	0	0	0	0
Final Effective Stress, σ'_f (kPa/psf)	0	0	0	2	1	0	3	105	1,031	1,032
Elastic Method										
Modulus, E (kPa/psf)= Strain										
Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)										
Consolidation Properties										
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*
OCR Manual Input Value	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input										
Preconsolidation pressure, σ'_p (kPa / psf)	0	0	0	0	0	0	0	0	0	0
Modified Primary Compression Index, $C_{c\varepsilon}$	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*
Modified Recompression Index, $C_{r\varepsilon}$	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$	*0.08%*	*0.08%*	*0.08%*	*0.60%*	*0.60%*	*0.08%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*
ratio of t2 / t1	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*
Settlements										
Primary Settlement, (m / ft)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Secondary Settlement (m / ft)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total Settlement (m / ft)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Elastic or Plastic (E/P)	P	P	P	P	P	P	P	P	P	P
	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 21 (m / ft)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Layer No.	*22*	**YR1-1**									
Initial Stress Reference Layer (top of layer)	*22*	*22*	*22*	*22*	*22*	*22*	*22*	*22*	*22*	*22*
Final Stress Reference Layer (top of layer)	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)	430.40	430.40	430.15	430.13	430.12	430.10	446.50	446.50	446.50	446.50
Initial Effective Stress, σ'_i (kPa /psf)	0	0	0	0	0	0	129	129	129	129
Final Effective Stress, σ'_f (kPa/psf)	0	0	0	2	1	0	132	234	1,160	1,161
Elastic Method										
Modulus, E (kPa/psf)= Strain										
Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)										
Consolidation Properties										
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*
OCR Manual Input Value	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input										
Preconsolidation pressure, σ'_p (kPa / psf)	0	0	0	0	0	0	129	129	129	129
Modified Primary Compression Index, $C_{c\varepsilon}$	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*
Modified Recompression Index, $C_{r\varepsilon}$	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$	*0.08%*	*0.08%*	*0.08%*	*0.60%*	*0.60%*	*0.08%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*
ratio of t2 / t1	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*
Settlements										
Primary Settlement, (m / ft)	0.000	0.000	0.000	0.000	0.000	0.000	0.010	0.226	0.834	0.834
Secondary Settlement (m / ft)	0.000	0.000	0.000	0.000	0.000	0.000	0.016	0.016	0.016	0.016
Total Settlement (m / ft)	0.000	0.000	0.000	0.000	0.000	0.000	0.026	0.242	0.850	0.850
Elastic or Plastic (E/P)	P	P	P	P	P	P	P	P	P	P
	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 22 (m / ft)	0.000	0.000	0.000	0.000	0.000	0.000	0.026	0.242	0.850	0.850

Written by: **Yiwen Cao** Date: **6/10/2009** Reviewed by: **R. Kulasingam/Jay Beech** Date: **6/10/2009**

Client: **Honeywell** Project: **Onondaga Lake SCA IDS** Project/ Proposal No.: **GJ4299** Task No.: **04**

Layer No.	*23*	**YR1-2**									
Initial Stress Reference Layer (top of layer)	*22*	*22*	*22*	*22*	*22*	*22*	*22*	*22*	*22*	*22*
Final Stress Reference Layer (top of layer)	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)	430.40	430.40	430.15	430.13	430.12	430.10	443.50	443.50	443.50	443.50
Initial Effective Stress, σ'_i (kPa /psf)	0	0	0	0	0	0	387	387	387	387
Final Effective Stress, σ'_f (kPa/psf)	0	0	0	2	1	0	390	492	1,418	1,419
Elastic Method										
Modulus, E (kPa/psf)= Strain										
Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)										
Consolidation Properties										
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*
OCR Manual Input Value	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input										
Preconsolidation pressure, σ'_p (kPa / psf)	0	0	0	0	0	0	387	387	387	387
Modified Primary Compression Index, $C_{c\varepsilon}$	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*
Modified Recompression Index, $C_{r\varepsilon}$	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$	*0.08%*	*0.08%*	*0.08%*	*0.60%*	*0.60%*	*0.08%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*
ratio of t2 / t1	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*
Settlements										
Primary Settlement, (m / ft)	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.091	0.493	0.493
Secondary Settlement (m / ft)	0.000	0.000	0.000	0.000	0.000	0.000	0.016	0.016	0.016	0.016
Total Settlement (m / ft)	0.000	0.000	0.000	0.000	0.000	0.000	0.020	0.107	0.509	0.509
Elastic or Plastic (E/P)	P	P	P	P	P	P	P	P	P	P
	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 23 (m / ft)	0.000	0.000	0.000	0.000	0.000	0.000	0.020	0.107	0.509	0.509
Layer No.	*24*	**YR1-3**									
Initial Stress Reference Layer (top of layer)	*22*	*22*	*22*	*22*	*22*	*22*	*22*	*22*	*22*	*22*
Final Stress Reference Layer (top of layer)	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)	430.40	430.40	430.15	430.13	430.12	430.10	440.50	440.50	440.50	440.50
Initial Effective Stress, σ'_i (kPa /psf)	0	0	0	0	0	0	645	645	645	645
Final Effective Stress, σ'_f (kPa/psf)	0	0	0	2	1	0	648	750	1,676	1,677
Elastic Method										
Modulus, E (kPa/psf)= Strain										
Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)										
Consolidation Properties										
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*
OCR Manual Input Value	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input										
Preconsolidation pressure, σ'_p (kPa / psf)	0	0	0	0	0	0	645	645	645	645
Modified Primary Compression Index, $C_{c\varepsilon}$	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*
Modified Recompression Index, $C_{r\varepsilon}$	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$	*0.08%*	*0.08%*	*0.08%*	*0.60%*	*0.60%*	*0.08%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*
ratio of t2 / t1	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*
Settlements										
Primary Settlement, (m / ft)	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.057	0.363	0.363
Secondary Settlement (m / ft)	0.000	0.000	0.000	0.000	0.000	0.000	0.016	0.016	0.016	0.016
Total Settlement (m / ft)	0.000	0.000	0.000	0.000	0.000	0.000	0.018	0.073	0.379	0.379
Elastic or Plastic (E/P)	P	P	P	P	P	P	P	P	P	P
	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 24 (m / ft)	0.000	0.000	0.000	0.000	0.000	0.000	0.018	0.073	0.379	0.379
Layer No.	*25*	**YR1-4**									
Initial Stress Reference Layer (top of layer)	*22*	*22*	*22*	*22*	*22*	*22*	*22*	*22*	*22*	*22*
Final Stress Reference Layer (top of layer)	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)	430.40	430.40	430.15	430.13	430.12	430.10	437.50	437.50	437.50	437.50
Initial Effective Stress, σ'_i (kPa /psf)	0.00	0.00	0.00	0.00	0.00	0.00	903.00	903.00	903.00	903.00
Final Effective Stress, σ'_f (kPa/psf)	0.00	0.00	0.00	1.72	0.86	0.00	906.44	1,007.92	1,934.14	1,935.00
Elastic Method										
Modulus, E (kPa/psf)= Strain										
Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)										
Consolidation Properties										
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*
OCR Manual Input Value	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input										
Preconsolidation pressure, σ'_p (kPa / psf)	0	0	0	0	0	0	903	903	903	903
Modified Primary Compression Index, $C_{c\varepsilon}$	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*
Modified Recompression Index, $C_{r\varepsilon}$	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$	*0.08%*	*0.08%*	*0.08%*	*0.60%*	*0.60%*	*0.08%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*
ratio of t2 / t1	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*
Settlements										
Primary Settlement, (m / ft)	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.042	0.289	0.289
Secondary Settlement (m / ft)	0.000	0.000	0.000	0.000	0.000	0.000	0.016	0.016	0.016	0.016
Total Settlement (m / ft)	0.000	0.000	0.000	0.000	0.000	0.000	0.018	0.058	0.305	0.306
Elastic or Plastic (E/P)	P	P	P	P	P	P	P	P	P	P
	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 25 (m / ft)	0.000	0.000	0.000	0.000	0.000	0.000	0.018	0.058	0.305	0.306

Written by: **Yiwen Cao** Date: **6/10/2009** Reviewed by: **R. Kulasingam/Jay Beech** Date: **6/10/2009**

Client: **Honeywell** Project: **Onondaga Lake SCA IDS** Project/ Proposal No.: **GJ4299** Task No.: **04**

Layer No. *26* **YR1-5**											
Initial Stress Reference Layer (top of layer)		*22*	*22*	*22*	*22*	*22*	*22*	*22*	*22*	*22*	*22*
Final Stress Reference Layer (top of layer)		*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)		430.40	430.40	430.15	430.13	430.12	430.10	434.50	434.50	434.50	434.50
Initial Effective Stress, σ'_i (kPa /psf)		0.00	0.00	0.00	0.00	0.00	0.00	1,161.00	1,161.00	1,161.00	1,161.00
Final Effective Stress, σ'_f (kPa/psf)		0.00	0.00	0.00	1.72	0.86	0.00	1,164.44	1,265.92	2,192.14	2,193.00
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*
OCR Manual Input Value		*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		0	0	0	0	0	0	1,161	1,161	1,161	1,161
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*
Modified Recompression Index, $C_{r\varepsilon}$		*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.08%*	*0.08%*	*0.08%*	*0.60%*	*0.60%*	*0.08%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*
ratio of t2 / t1		*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*
Settlements											
Primary Settlement, (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.033	0.241	0.241
Secondary Settlement (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.016	0.016	0.016	0.016
Total Settlement (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.017	0.049	0.258	0.258
Elastic or Plastic (E/P)		P	P	P	P	P	P	P	P	P	P
		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 26 (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.017	0.049	0.258	0.258
Layer No. *27* **YR1-6**											
Initial Stress Reference Layer (top of layer)		*22*	*22*	*22*	*22*	*22*	*22*	*22*	*22*	*22*	*22*
Final Stress Reference Layer (top of layer)		*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)		430.40	430.40	430.15	430.13	430.12	430.10	431.50	431.50	431.50	431.50
Initial Effective Stress, σ'_i (kPa /psf)		0.00	0.00	0.00	0.00	0.00	0.00	1,419.00	1,419.00	1,419.00	1,419.00
Final Effective Stress, σ'_f (kPa/psf)		0.00	0.00	0.00	1.72	0.86	0.00	1,422.44	1,523.92	2,450.14	2,451.00
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*	*MW*
OCR Manual Input Value		*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		0	0	0	0	0	0	1,419	1,419	1,419	1,419
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*	*0.291*
Modified Recompression Index, $C_{r\varepsilon}$		*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.08%*	*0.08%*	*0.08%*	*0.60%*	*0.60%*	*0.08%*	*0.60%*	*0.60%*	*0.60%*	*0.60%*
ratio of t2 / t1		*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*
Settlements											
Primary Settlement, (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.027	0.207	0.207
Secondary Settlement (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.016	0.016	0.016	0.016
Total Settlement (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.017	0.043	0.224	0.224
Elastic or Plastic (E/P)		P	P	P	P	P	P	P	P	P	P
		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 27 (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.017	0.043	0.224	0.224

Written by: **Yiwen Cao** Date: **6/10/2009** Reviewed by: **R. Kulasingam/Jay Beech** Date: **6/10/2009**

Client: **Honeywell** Project: **Onondaga Lake SCA IDS** Project/ Proposal No.: **GJ4299** Task No.: **04**

	Layer No.	Material										
LAYER SETTLEMENT	1	*Null Layer*										
	2	*YR4-1*	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	3	*YR4-2*	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	4	*YR4-3*	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	5	*YR4-4*	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	6	*YR4-5*	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	7	*YR4-6*	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	8	*YR3-1*	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.005	0.001	0.001
	9	*YR3-2*	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.002	0.001	0.001
	10	*YR3-3*	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.001	0.001
	11	*YR3-4*	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.001
	12	*YR3-5*	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.001
	13	*YR3-6*	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.001
	14	*YR3-7*	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.001
	15	*YR2-1*	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	16	*YR2-2*	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	17	*YR2-3*	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	18	*YR2-4*	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	19	*YR2-5*	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	20	*YR2-6*	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	21	*YR2-7*	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	22	*YR1-1*	0.000	0.000	0.000	0.000	0.000	0.000	0.026	0.242	0.850	0.850
	23	*YR1-2*	0.000	0.000	0.000	0.000	0.000	0.000	0.020	0.107	0.509	0.509
	24	*YR1-3*	0.000	0.000	0.000	0.000	0.000	0.000	0.018	0.073	0.379	0.379
	25	*YR1-4*	0.000	0.000	0.000	0.000	0.000	0.000	0.018	0.058	0.305	0.306
	26	*YR1-5*	0.000	0.000	0.000	0.000	0.000	0.000	0.017	0.049	0.258	0.258
	27	*YR1-6*	0.000	0.000	0.000	0.000	0.000	0.000	0.017	0.043	0.224	0.224
	28	*Additional Foundation Settlement*	2.373	2.407	2.407	2.480	2.574	2.875	6.712	7.072	9.014	9.323
	29											
	30											
		TOTAL SETTLEMENT	**2.37**	**2.41**	**2.41**	**2.48**	**2.57**	**2.88**	**6.83**	**7.66**	**11.54**	**11.85**
POST-SETTLEMENT ELEVATION(M/FT)	Line	1 Top of Year 4 Dredge	428.03	427.99	427.74	427.67	427.56	427.22	441.21	441.56	448.45	448.15
	Line	2 Top of Year 4 Dredge	428.03	427.99	427.74	427.67	427.56	427.22	441.21	441.56	448.45	448.15
	Line	3	428.03	427.99	427.74	427.67	427.55	427.22	441.21	441.56	448.45	448.15
	Line	4	428.03	427.99	427.74	427.66	427.55	427.22	441.21	441.55	448.45	448.15
	Line	5	428.03	427.99	427.74	427.66	427.55	427.22	441.20	441.55	448.45	448.15
	Line	6	428.03	427.99	427.74	427.66	427.55	427.22	441.20	441.55	448.45	448.15
	Line	7	428.03	427.99	427.74	427.65	427.55	427.22	441.20	441.54	448.45	448.15
	Line	8 Top of Year 3 Dredge	428.03	427.99	427.74	427.65	427.55	427.22	441.20	441.54	448.45	448.15
	Line	9	428.03	427.99	427.74	427.65	427.55	427.22	441.20	441.37	446.73	446.43
	Line	10	428.03	427.99	427.74	427.65	427.55	427.22	441.19	441.21	445.02	444.72
	Line	11	428.03	427.99	427.74	427.65	427.55	427.22	441.19	441.04	443.31	443.00
	Line	12	428.03	427.99	427.74	427.65	427.55	427.22	441.18	440.87	441.60	441.29
	Line	13	428.03	427.99	427.74	427.65	427.55	427.22	441.18	440.70	439.89	439.58
	Line	14	428.03	427.99	427.74	427.65	427.55	427.22	441.18	440.53	438.17	437.86
	Line	15 Top of Year 2 Dredge	428.03	427.99	427.74	427.65	427.55	427.22	441.17	440.35	436.46	436.15
	Line	16	428.03	427.99	427.74	427.65	427.55	427.22	441.17	440.35	436.46	436.15
	Line	17	428.03	427.99	427.74	427.65	427.55	427.22	441.17	440.35	436.46	436.15
	Line	18	428.03	427.99	427.74	427.65	427.55	427.22	441.17	440.35	436.46	436.15
	Line	19	428.03	427.99	427.74	427.65	427.55	427.22	441.17	440.35	436.46	436.15
	Line	20	428.03	427.99	427.74	427.65	427.55	427.22	441.17	440.35	436.46	436.15
	Line	21	428.03	427.99	427.74	427.65	427.55	427.22	441.17	440.35	436.46	436.15
	Line	22 Top of Year 1 Dredge	428.03	427.99	427.74	427.65	427.55	427.22	441.17	440.35	436.46	436.15
	Line	23	428.03	427.99	427.74	427.65	427.55	427.22	438.20	437.60	434.31	434.00
	Line	24	428.03	427.99	427.74	427.65	427.55	427.22	435.22	434.70	431.82	431.51
	Line	25	428.03	427.99	427.74	427.65	427.55	427.22	432.24	431.78	429.20	428.89
	Line	26	428.03	427.99	427.74	427.65	427.55	427.22	429.25	428.84	426.51	426.20
	Line	27	428.03	427.99	427.74	427.65	427.55	427.22	426.27	425.88	423.76	423.45
	Line	28 Top of Gravel(Top of Incompressil	428.03	427.99	427.74	427.65	427.55	427.22	423.29	422.93	420.99	420.68
	Line	29										
	Line	30										
	Line	31										

Written by: **Yiwen Cao** Date: **6/10/2009** Reviewed by: **R. Kulasingam/Jay Beech** Date: **6/10/2009**

Client: **Honeywell** Project: **Onondaga Lake SCA IDS** Project/ Proposal No.: **GJ4299** Task No.: **04**

Attachment 8

CASE 7: Calculations of Foundation Settlement During Post-Closure Period (Cross Section A, Points 5 to 14)

Written by: **Yiwen Cao** Date: **6/10/2009** Reviewed by: **R. Kulasingam/Jay Beech** Date: **6/10/2009**

Client: **Honeywell** Project: **Onondaga Lake SCA IDS** Project/ Proposal No.: **GJ4299** Task No.: **04**

Settlement Prediction Model

Programmer: **Yiwen Cao, GeoSyntec Consultants**

Version Control V 1.002 11.14.2007

Project: **Onondaga Lake SCA 50%**

Notes:

Unit: **ft / psf**

Average Compaction Effort = **1440.00** kPa or psf

Consider Compaction Effort = **N** yes or no

Point #				**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**
Distance (meter or ft)				*163.38*	*166.04*	*166.70*	*173.04*	*179.56*	*189.86*	*249.86*	*253.80*	*289.83*	*306.25*
ELEVATION (M/FT)	Line	1	Top of Final Cover	*431.04*	*431.57*	*431.69*	*432.93*	*434.20*	*436.22*	*448.71*	*449.48*	*449.66*	*449.75*
	Line	2	Top of Dredge	*428.03*	*427.99*	*427.74*	*427.67*	*427.56*	*427.22*	*441.21*	*441.56*	*448.45*	*448.15*
	Line	3	Top of Gravel	*428.03*	*427.99*	*427.74*	*427.65*	*427.55*	*427.22*	*423.29*	*422.93*	*420.99*	*420.68*
	Line	4	Top of Clay	*428.03*	*427.99*	*427.68*	*424.52*	*424.25*	*423.65*	*418.74*	*418.33*	*415.48*	*414.74*
	Line	5	Top of Dike	*428.03*	*426.92*	*426.66*	*424.06*	*421.36*	*420.94*	*415.89*	*415.44*	*412.94*	*412.24*
	Line	6	Top of Subgrade	*421.53*	*421.50*	*421.50*	*421.45*	*421.36*	*420.94*	*415.89*	*415.44*	*412.94*	*412.24*
	Line	7		*418.79*	*418.76*	*418.76*	*418.72*	*418.63*	*418.24*	*413.48*	*413.06*	*410.71*	*410.05*
	Line	8		*416.06*	*416.03*	*416.03*	*415.99*	*415.91*	*415.54*	*411.08*	*410.68*	*408.48*	*407.86*
	Line	9		*413.32*	*413.29*	*413.29*	*413.25*	*413.18*	*412.83*	*408.67*	*408.30*	*406.24*	*405.67*
	Line	10		*410.58*	*410.56*	*410.56*	*410.52*	*410.45*	*410.13*	*406.27*	*405.92*	*404.01*	*403.48*
	Line	11		*407.84*	*407.82*	*407.82*	*407.79*	*407.72*	*407.43*	*403.86*	*403.55*	*401.78*	*401.29*
	Line	12		*405.11*	*405.09*	*405.09*	*405.06*	*405.00*	*404.73*	*401.46*	*401.17*	*399.55*	*399.10*
	Line	13		*402.37*	*402.35*	*402.35*	*402.32*	*402.27*	*402.02*	*399.05*	*398.79*	*397.32*	*396.91*
	Line	14		*399.63*	*399.62*	*399.62*	*399.59*	*399.54*	*399.32*	*396.65*	*396.41*	*395.09*	*394.72*
	Line	15		*396.90*	*396.88*	*396.88*	*396.86*	*396.82*	*396.62*	*394.24*	*394.03*	*392.85*	*392.52*
	Line	16		*394.16*	*394.15*	*394.15*	*394.13*	*394.09*	*393.92*	*391.84*	*391.65*	*390.62*	*390.33*
	Line	17		*391.42*	*391.41*	*391.41*	*391.39*	*391.36*	*391.21*	*389.43*	*389.27*	*388.39*	*388.14*
	Line	18		*388.69*	*388.68*	*388.68*	*388.66*	*388.64*	*388.51*	*387.03*	*386.89*	*386.16*	*385.95*
	Line	19		*385.95*	*385.94*	*385.94*	*385.93*	*385.91*	*385.81*	*384.62*	*384.52*	*383.93*	*383.76*
	Line	20		*383.21*	*383.21*	*383.21*	*383.20*	*383.18*	*383.11*	*382.22*	*382.14*	*381.70*	*381.57*
	Line	21		*380.47*	*380.47*	*380.47*	*380.46*	*380.45*	*380.40*	*379.81*	*379.76*	*379.46*	*379.38*
	Line	22		*377.74*	*377.74*	*377.74*	*377.73*	*377.73*	*377.70*	*377.41*	*377.38*	*377.23*	*377.19*
	Line	23	Bottom of Zone2 Above GW	*375.00*	*375.00*	*375.00*	*375.00*	*375.00*	*375.00*	*375.00*	*375.00*	*375.00*	*375.00*
	Line	24		*375.00*	*375.00*	*375.00*	*375.00*	*375.00*	*375.00*	*375.00*	*375.00*	*375.00*	*375.00*
	Line	25	Bottom of Zone 3 Above GW	*375.00*	*375.00*	*375.00*	*375.00*	*375.00*	*375.00*	*375.00*	*375.00*	*375.00*	*375.00*
	Line	26		*371.99*	*371.98*	*371.98*	*371.95*	*371.92*	*371.88*	*371.55*	*371.52*	*371.25*	*371.17*
	Line	27	Bottom of Zone 2 Below GW	*368.98*	*368.95*	*368.95*	*368.90*	*368.84*	*368.75*	*368.09*	*368.03*	*367.49*	*367.33*
	Line	28	Top of Incompressible Layer	*368.98*	*368.95*	*368.95*	*368.90*	*368.84*	*368.75*	*368.09*	*368.03*	*367.49*	*367.33*
	Line	29	GND for sigma_p	*421.53*	*421.50*	*421.50*	*421.45*	*421.36*	*420.94*	*415.89*	*415.44*	*412.94*	*412.24*
	Line	30	GW	*375.00*	*375.00*	*375.00*	*375.00*	*375.00*	*375.00*	*375.00*	*375.00*	*375.00*	*375.00*
	Line	31	ROCK	*368.98*	*368.95*	*368.95*	*368.90*	*368.84*	*368.75*	*368.09*	*368.03*	*367.49*	*367.33*
LAYER THICKNESS (M/FT)	Layer No.	From	To / Material										
	1	*1*	*2* *Cover*	*3.01*	*3.58*	*3.95*	*5.26*	*6.64*	*9.00*	*7.50*	*7.92*	*1.21*	*1.60*
	2	*2*	*3* *Dredge*	*0.00*	*0.00*	*0.00*	*0.02*	*0.01*	*0.00*	*17.92*	*18.63*	*27.46*	*27.47*
	3	*3*	*4* *Gravel*	*0.00*	*0.00*	*0.06*	*3.13*	*3.30*	*3.57*	*4.55*	*4.60*	*5.51*	*5.94*
	4	*4*	*5* *Clay*	*0.00*	*1.07*	*1.02*	*0.46*	*2.89*	*2.71*	*2.85*	*2.89*	*2.54*	*2.50*
	5	*5*	*6* *Dike*	*6.50*	*5.42*	*5.16*	*2.61*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
	6	*6*	*7* *Zone2-Above-GW-1*	*2.74*	*2.74*	*2.74*	*2.73*	*2.73*	*2.70*	*2.41*	*2.38*	*2.23*	*2.19*
	7	*7*	*8* *Zone2-Above-GW-2*	*2.74*	*2.74*	*2.74*	*2.73*	*2.73*	*2.70*	*2.41*	*2.38*	*2.23*	*2.19*
	8	*8*	*9* *Zone2-Above-GW-3*	*2.74*	*2.74*	*2.74*	*2.73*	*2.73*	*2.70*	*2.41*	*2.38*	*2.23*	*2.19*
	9	*9*	*10* *Zone2-Above-GW-4*	*2.74*	*2.74*	*2.74*	*2.73*	*2.73*	*2.70*	*2.41*	*2.38*	*2.23*	*2.19*
	10	*10*	*11* *Zone2-Above-GW-5*	*2.74*	*2.74*	*2.74*	*2.73*	*2.73*	*2.70*	*2.41*	*2.38*	*2.23*	*2.19*
	11	*11*	*12* *Zone2-Above-GW-6*	*2.74*	*2.74*	*2.74*	*2.73*	*2.73*	*2.70*	*2.41*	*2.38*	*2.23*	*2.19*
	12	*12*	*13* *Zone2-Above-GW-7*	*2.74*	*2.74*	*2.74*	*2.73*	*2.73*	*2.70*	*2.41*	*2.38*	*2.23*	*2.19*
	13	*13*	*14* *Zone2-Above-GW-8*	*2.74*	*2.74*	*2.74*	*2.73*	*2.73*	*2.70*	*2.41*	*2.38*	*2.23*	*2.19*
	14	*14*	*15* *Zone2-Above-GW-9*	*2.74*	*2.74*	*2.74*	*2.73*	*2.73*	*2.70*	*2.41*	*2.38*	*2.23*	*2.19*
	15	*15*	*16* *Zone2-Above-GW-10*	*2.74*	*2.74*	*2.74*	*2.73*	*2.73*	*2.70*	*2.41*	*2.38*	*2.23*	*2.19*
	16	*16*	*17* *Zone2-Above-GW-11*	*2.74*	*2.74*	*2.74*	*2.73*	*2.73*	*2.70*	*2.41*	*2.38*	*2.23*	*2.19*
	17	*17*	*18* *Zone2-Above-GW-12*	*2.74*	*2.74*	*2.74*	*2.73*	*2.73*	*2.70*	*2.41*	*2.38*	*2.23*	*2.19*
	18	*18*	*19* *Zone2-Above-GW-13*	*2.74*	*2.74*	*2.74*	*2.73*	*2.73*	*2.70*	*2.41*	*2.38*	*2.23*	*2.19*
	19	*19*	*20* *Zone2-Above-GW-14*	*2.74*	*2.74*	*2.74*	*2.73*	*2.73*	*2.70*	*2.41*	*2.38*	*2.23*	*2.19*
	20	*20*	*21* *Zone2-Above-GW-15*	*2.74*	*2.74*	*2.74*	*2.73*	*2.73*	*2.70*	*2.41*	*2.38*	*2.23*	*2.19*
	21	*21*	*22* *Zone2-Above-GW-16*	*2.74*	*2.74*	*2.74*	*2.73*	*2.73*	*2.70*	*2.41*	*2.38*	*2.23*	*2.19*
	22	*22*	*23* *Zone2-Above-GW-17*	*2.74*	*2.74*	*2.74*	*2.73*	*2.73*	*2.70*	*2.41*	*2.38*	*2.23*	*2.19*
	23	*23*	*24* *Zone3-Above-GW-1*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
	24	*24*	*25* *Zone3-Above-GW-2*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
	25	*25*	*26* *Zone2-Below-GW-18*	*3.01*	*3.02*	*3.02*	*3.05*	*3.08*	*3.13*	*3.46*	*3.49*	*3.76*	*3.84*
	26	*26*	*27* *Zone2-Below-GW-19*	*3.01*	*3.03*	*3.03*	*3.05*	*3.08*	*3.13*	*3.45*	*3.49*	*3.76*	*3.83*
	27	*27*	*28* *Zone3-Below-GW-3*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
	28												
	29	*29*	*30* Soil Above GW	*46.53*	*46.50*	*46.50*	*46.45*	*46.36*	*45.94*	*40.89*	*40.44*	*37.94*	*37.24*
	30	*30*	*31* Soil Below GW	*6.02*	*6.05*	*6.05*	*6.10*	*6.16*	*6.25*	*6.91*	*6.97*	*7.51*	*7.67*
	Thickness Check												
		From Line	To Line / SUM	*62.06*	*62.62*	*62.74*	*64.03*	*65.36*	*67.47*	*80.62*	*81.45*	*82.17*	*82.42*
		1	*28* Thickness =	*62.06*	*62.62*	*62.74*	*64.03*	*65.36*	*67.47*	*80.62*	*81.45*	*82.17*	*82.42*
			Thickness Check	***OK***	***OK***	***OK***	***OK***	***OK***	***OK***	***OK***	***OK***	***OK***	***OK***

Written by: **Yiwen Cao** Date: **6/10/2009** Reviewed by: **R. Kulasingam/Jay Beech** Date: **6/10/2009**

Client: **Honeywell** Project: **Onondaga Lake SCA IDS** Project/ Proposal No.: **GJ4299** Task No.: **04**

UNIT WEIGHT	Layer No.	Material										
	1	*Cover*	*120.0*	*120.0*	*120.0*	*120.0*	*120.0*	*120.0*	*120.0*	*120.0*	*120.0*	*120.0*
	2	*Dredge*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*	*86.0*
	3	*Gravel*	*120.0*	*120.0*	*120.0*	*120.0*	*120.0*	*120.0*	*120.0*	*120.0*	*120.0*	*120.0*
	4	*Clay*	*120.0*	*120.0*	*120.0*	*120.0*	*120.0*	*120.0*	*120.0*	*120.0*	*120.0*	*120.0*
	5	*Dike*	*120.0*	*120.0*	*120.0*	*120.0*	*120.0*	*120.0*	*120.0*	*120.0*	*120.0*	*120.0*
	6	*Zone2-Above-GW-1*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*
	7	*Zone2-Above-GW-2*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*
	8	*Zone2-Above-GW-3*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*
	9	*Zone2-Above-GW-4*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*
	10	*Zone2-Above-GW-5*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*
	11	*Zone2-Above-GW-6*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*
	12	*Zone2-Above-GW-7*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*
	13	*Zone2-Above-GW-8*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*
	14	*Zone2-Above-GW-9*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*
	15	*Zone2-Above-GW-10*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*
	16	*Zone2-Above-GW-11*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*
	17	*Zone2-Above-GW-12*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*
	18	*Zone2-Above-GW-13*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*
	19	*Zone2-Above-GW-14*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*
	20	*Zone2-Above-GW-15*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*
	21	*Zone2-Above-GW-16*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*
	22	*Zone2-Above-GW-17*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*
	23	*Zone3-Above-GW-1*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*
	24	*Zone3-Above-GW-2*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*
	25	*Zone2-Below-GW-18*	*19.6*	*19.6*	*19.6*	*19.6*	*19.6*	*19.6*	*19.6*	*19.6*	*19.6*	*19.6*
	26	*Zone2-Below-GW-19*	*19.6*	*19.6*	*19.6*	*19.6*	*19.6*	*19.6*	*19.6*	*19.6*	*19.6*	*19.6*
	27	*Zone3-Below-GW-3*	*19.6*	*19.6*	*19.6*	*19.6*	*19.6*	*19.6*	*19.6*	*19.6*	*19.6*	*19.6*
	28											
	29	*Soil Above GW*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*
	30	*Soil below GW*	*19.6*	*19.6*	*19.6*	*19.6*	*19.6*	*19.6*	*19.6*	*19.6*	*19.6*	*19.6*
	Layer No.	***1*** **Cover**										
		Initial Stress Reference Layer (top of layer)	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
		Final Stress Reference Layer (top of layer)	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
		Midpoint Elevation, (m / ft)	429.54	429.78	429.72	430.30	430.88	431.72	444.96	445.52	449.06	448.95
		Initial Effective Stress, σ'_i (kPa /psf)	Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight
		Final Effective Stress, σ'_f (kPa/psf)	Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight
Elastic Method												
Modulus, E (kPa/psf)=		Strain										
		Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)												
Consolidation Properties												
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)												
OCR Manual Input Value												
OCR Computation Input												
Preconsolidation pressure, σ'_p (kPa / psf)												
Modified Primary Compression Index, $C_{c\varepsilon}$												
Modified Recompression Index, $C_{r\varepsilon}$												
Modified Secondary Compression Index, C_α												
ratio of t2 / t1												
Settlements												
Primary Settlement, (m / ft)												
Secondary Settlement (m / ft)												
Total Settlement (m / ft)												
		Elastic or Plastic (E/P)										
		Settlement of Layer 1 (m / ft)										

Written by: **Yiwen Cao** Date: **6/10/2009** Reviewed by: **R. Kulasingam/Jay Beech** Date: **6/10/2009**

Client: **Honeywell** Project: **Onondaga Lake SCA IDS** Project/ Proposal No.: **GJ4299** Task No.: **04**

Layer No.	*2*	**Dredge**									
Initial Stress Reference Layer (top of layer)	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*
Final Stress Reference Layer (top of layer)	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*
Midpoint Elevation, (m / ft)	428.03	427.99	427.74	427.66	427.56	427.22	432.25	432.25	434.72	434.42
Initial Effective Stress, σ'_i (kPa /psf)	Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight
Final Effective Stress, σ'_f (kPa/psf)	Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight
Elastic Method										
Modulus, E (kPa/psf)= Strain										
Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)										
Consolidation Properties										
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)										
OCR Manual Input Value										
OCR Computation Input										
Preconsolidation pressure, σ'_p (kPa / psf)										
Modified Primary Compression Index, $C_{c\varepsilon}$										
Modified Recompression Index, $C_{r\varepsilon}$										
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$										
ratio of t2 / t1										
Settlements										
Primary Settlement, (m / ft)										
Secondary Settlement (m / ft)										
Total Settlement (m / ft)										
Elastic or Plastic (E/P)										
Settlement of Layer 2 (m / ft)										
Layer No.	*3*	**Gravel**									
Initial Stress Reference Layer (top of layer)	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*
Final Stress Reference Layer (top of layer)	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*
Midpoint Elevation, (m / ft)	428.03	427.99	427.71	426.09	425.90	425.44	421.02	420.63	418.24	417.71
Initial Effective Stress, σ'_i (kPa /psf)	Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight
Final Effective Stress, σ'_f (kPa/psf)	Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight
Elastic Method										
Modulus, E (kPa/psf)= Strain										
Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)										
Consolidation Properties										
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)										
OCR Manual Input Value										
OCR Computation Input										
Preconsolidation pressure, σ'_p (kPa / psf)										
Modified Primary Compression Index, $C_{c\varepsilon}$										
Modified Recompression Index, $C_{r\varepsilon}$										
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$										
ratio of t2 / t1										
Settlements										
Primary Settlement, (m / ft)										
Secondary Settlement (m / ft)										
Total Settlement (m / ft)										
Elastic or Plastic (E/P)										
Settlement of Layer 3 (m / ft)										
Layer No.	*4*	**Clay**									
Initial Stress Reference Layer (top of layer)	*4*	*4*	*4*	*4*	*4*	*4*	*4*	*4*	*4*	*4*
Final Stress Reference Layer (top of layer)	*4*	*4*	*4*	*4*	*4*	*4*	*4*	*4*	*4*	*4*
Midpoint Elevation, (m / ft)	428.03	427.46	427.17	424.29	422.81	422.30	417.32	416.89	414.21	413.49
Initial Effective Stress, σ'_i (kPa /psf)	Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight
Final Effective Stress, σ'_f (kPa/psf)	Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight
Elastic Method										
Modulus, E (kPa/psf)= Strain										
Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)										
Consolidation Properties										
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)										
OCR Manual Input Value										
OCR Computation Input										
Preconsolidation pressure, σ'_p (kPa / psf)										
Modified Primary Compression Index, $C_{c\varepsilon}$										
Modified Recompression Index, $C_{r\varepsilon}$										
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$										
ratio of t2 / t1										
Settlements										
Primary Settlement, (m / ft)										
Secondary Settlement (m / ft)										
Total Settlement (m / ft)										
Elastic or Plastic (E/P)										
Settlement of Layer 4 (m / ft)										

Written by: **Yiwen Cao** Date: **6/10/2009** Reviewed by: **R. Kulasingam/Jay Beech** Date: **6/10/2009**

Client: **Honeywell** Project: **Onondaga Lake SCA IDS** Project/ Proposal No.: **GJ4299** Task No.: **04**

Layer No.	5	Dike									
Initial Stress Reference Layer (top of layer)			5	5	5	5	5	5	5	5	5	5
Final Stress Reference Layer (top of layer)			5	5	5	5	5	5	5	5	5	5
Midpoint Elevation, (m / ft)			424.78	424.21	424.08	422.76	421.36	420.94	415.89	415.44	412.94	412.24
Initial Effective Stress, σ'_i (kPa /psf)			Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight
Final Effective Stress, σ'_f (kPa/psf)			Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight
Elastic Method												
Modulus, E (kPa/psf)=		Strain										
		Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)												
Consolidation Properties												
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)												
OCR Manual Input Value												
OCR Computation Input												
Preconsolidation pressure, σ'_p (kPa / psf)												
Modified Primary Compression Index, $C_{c\varepsilon}$												
Modified Recompression Index, $C_{r\varepsilon}$												
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$												
ratio of t2 / t1												
Settlements												
Primary Settlement, (m / ft)												
Secondary Settlement (m / ft)												
Total Settlement (m / ft)												
Elastic or Plastic (E/P)												
Settlement of Layer 5 (m / ft)												
Layer No.	6	Zone2-Above-GW-1										
Initial Stress Reference Layer (top of layer)			2	2	2	2	2	2	2	2	2	2
Final Stress Reference Layer (top of layer)			1	1	1	1	1	1	1	1	1	1
Midpoint Elevation, (m / ft)			420.16	420.13	420.13	420.08	420.00	419.59	414.69	414.25	411.82	411.14
Initial Effective Stress, σ'_i (kPa /psf)			892	891	861	858	855	864	2,528	2,599	3,419	3,465
Final Effective Stress, σ'_f (kPa/psf)			1,293	1,369	1,339	1,492	1,646	1,947	3,313	3,320	3,734	3,709
Elastic Method												
Modulus, E (kPa/psf)=		Strain										
		Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)												
Consolidation Properties												
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)			MS	MS	MS	MS	MS	MS	MS	MS	MS	MS
OCR Manual Input Value			4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
OCR Computation Input												
Preconsolidation pressure, σ'_p (kPa / psf)			505	505	505	504	503	499	444	439	412	404
Modified Primary Compression Index, $C_{c\varepsilon}$			0.460	0.460	0.460	0.460	0.460	0.460	0.460	0.460	0.460	0.460
Modified Recompression Index, $C_{r\varepsilon}$			0.014	0.014	0.014	0.014	0.014	0.014	0.014	0.014	0.014	0.014
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$			0.91%	0.91%	0.91%	0.91%	0.91%	0.91%	0.91%	0.91%	0.91%	0.91%
ratio of t2 / t1			8.75	8.75	8.75	8.75	8.75	8.75	8.75	8.75	8.75	8.75
Settlements												
Primary Settlement, (m / ft)			0.203	0.235	0.241	0.302	0.356	0.438	0.130	0.116	0.039	0.030
Secondary Settlement (m / ft)			0.023	0.023	0.023	0.023	0.023	0.023	0.021	0.020	0.019	0.019
Total Settlement (m / ft)			0.226	0.258	0.265	0.326	0.380	0.462	0.151	0.137	0.058	0.049
Elastic or Plastic (E/P)			1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 6 (m / ft)			0.226	0.258	0.265	0.326	0.380	0.462	0.151	0.137	0.058	0.049
Layer No.	7	Zone2-Above-GW-2										
Initial Stress Reference Layer (top of layer)			2	2	2	2	2	2	2	2	2	2
Final Stress Reference Layer (top of layer)			1	1	1	1	1	1	1	1	1	1
Midpoint Elevation, (m / ft)			417.42	417.40	417.40	417.35	417.27	416.89	412.28	411.87	409.59	408.95
Initial Effective Stress, σ'_i (kPa /psf)			1,117	1,115	1,085	1,082	1,079	1,086	2,725	2,794	3,602	3,645
Final Effective Stress, σ'_f (kPa/psf)			1,527	1,600	1,570	1,719	1,870	2,137	3,497	3,504	3,927	3,897
Elastic Method												
Modulus, E (kPa/psf)=		Strain										
		Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)												
Consolidation Properties												
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)			MS	MS	MS	MS	MS	MS	MS	MS	MS	MS
OCR Manual Input Value			4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
OCR Computation Input												
Preconsolidation pressure, σ'_p (kPa / psf)			1,515	1,514	1,514	1,512	1,509	1,496	1,331	1,317	1,235	1,212
Modified Primary Compression Index, $C_{c\varepsilon}$			0.460	0.460	0.460	0.460	0.460	0.460	0.460	0.460	0.460	0.460
Modified Recompression Index, $C_{r\varepsilon}$			0.014	0.014	0.014	0.014	0.014	0.014	0.014	0.014	0.014	0.014
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$			0.91%	0.91%	0.91%	0.91%	0.91%	0.91%	0.91%	0.91%	0.91%	0.91%
ratio of t2 / t1			8.75	8.75	8.75	8.75	8.75	8.75	8.75	8.75	8.75	8.75
Settlements												
Primary Settlement, (m / ft)			0.009	0.035	0.025	0.076	0.122	0.198	0.120	0.108	0.038	0.029
Secondary Settlement (m / ft)			0.023	0.023	0.023	0.023	0.023	0.023	0.021	0.020	0.019	0.019
Total Settlement (m / ft)			0.033	0.059	0.049	0.099	0.146	0.221	0.141	0.128	0.058	0.048
Elastic or Plastic (E/P)			1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 7 (m / ft)			0.033	0.059	0.049	0.099	0.146	0.221	0.141	0.128	0.058	0.048

Written by: **Yiwen Cao** Date: **6/10/2009** Reviewed by: **R. Kulasingam/Jay Beech** Date: **6/10/2009**

Client: **Honeywell** Project: **Onondaga Lake SCA IDS** Project/ Proposal No.: **GJ4299** Task No.: **04**

Layer No.	*8*	**Zone2-Above-GW-3**									
Initial Stress Reference Layer (top of layer)		*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*
Final Stress Reference Layer (top of layer)		*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)		414.69	414.66	414.66	414.62	414.54	414.18	409.88	409.49	407.36	406.76
Initial Effective Stress, σ'_i (kPa /psf)		1,341	1,340	1,310	1,306	1,303	1,308	2,922	2,989	3,785	3,824
Final Effective Stress, σ'_f (kPa/psf)		1,761	1,831	1,801	1,945	2,089	2,328	3,683	3,700	4,119	4,085
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*
OCR Manual Input Value		*4.5*	*4.5*	*4.5*	*4.5*	*4.5*	*4.5*	*4.5*	*4.5*	*4.5*	*4.5*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		2,525	2,523	2,523	2,521	2,516	2,493	2,219	2,194	2,059	2,021
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*
Modified Recompression Index, $C_{r\varepsilon}$		*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.11%*	*0.11%*	*0.11%*	*0.11%*	*0.11%*	*0.11%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*
ratio of t2 / t1		*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*
Settlements											
Primary Settlement, (m / ft)		0.005	0.005	0.005	0.007	0.008	0.009	0.111	0.101	0.038	0.029
Secondary Settlement (m / ft)		0.003	0.003	0.003	0.003	0.003	0.003	0.021	0.020	0.019	0.019
Total Settlement (m / ft)		0.007	0.008	0.008	0.009	0.011	0.012	0.132	0.122	0.057	0.048
Elastic or Plastic (E/P)		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 8 (m / ft)		0.007	0.008	0.008	0.009	0.011	0.012	0.132	0.122	0.057	0.048
Layer No.	*9*	**Zone2-Above-GW-4**									
Initial Stress Reference Layer (top of layer)		*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*
Final Stress Reference Layer (top of layer)		*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)		411.95	411.93	411.93	411.89	411.82	411.48	407.47	407.11	405.13	404.57
Initial Effective Stress, σ'_i (kPa /psf)		1,566	1,564	1,534	1,530	1,526	1,529	3,119	3,184	3,968	4,004
Final Effective Stress, σ'_f (kPa/psf)		1,995	2,062	2,032	2,169	2,304	2,520	3,870	3,885	4,302	4,273
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*
OCR Manual Input Value		*4.5*	*4.5*	*4.5*	*4.5*	*4.5*	*4.5*	*4.5*	*4.5*	*4.5*	*4.5*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		3,535	3,533	3,533	3,529	3,522	3,490	3,106	3,072	2,882	2,829
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*
Modified Recompression Index, $C_{r\varepsilon}$		*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.11%*	*0.11%*	*0.11%*	*0.11%*	*0.11%*	*0.11%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*
ratio of t2 / t1		*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*
Settlements											
Primary Settlement, (m / ft)		0.004	0.005	0.005	0.006	0.007	0.008	0.104	0.095	0.036	0.028
Secondary Settlement (m / ft)		0.003	0.003	0.003	0.003	0.003	0.003	0.021	0.020	0.019	0.019
Total Settlement (m / ft)		0.007	0.007	0.008	0.009	0.010	0.011	0.124	0.115	0.055	0.047
Elastic or Plastic (E/P)		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 9 (m / ft)		0.007	0.007	0.008	0.009	0.010	0.011	0.124	0.115	0.055	0.047
Layer No.	*10*	**Zone2-Above-GW-5**									
Initial Stress Reference Layer (top of layer)		*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*
Final Stress Reference Layer (top of layer)		*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)		409.21	409.19	409.19	409.15	409.09	408.78	405.07	404.74	402.90	402.38
Initial Effective Stress, σ'_i (kPa /psf)		1,790	1,788	1,758	1,754	1,750	1,751	3,317	3,379	4,151	4,184
Final Effective Stress, σ'_f (kPa/psf)		2,229	2,292	2,262	2,391	2,517	2,713	4,034	4,071	4,494	4,452
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*
OCR Manual Input Value		*2.0*	*2.0*	*2.0*	*2.0*	*2.0*	*2.0*	*2.0*	*2.0*	*2.0*	*4.5*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		2,020	2,019	2,019	2,016	2,013	1,994	1,775	1,756	1,647	3,637
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*
Modified Recompression Index, $C_{r\varepsilon}$		*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*
ratio of t2 / t1		*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*
Settlements											
Primary Settlement, (m / ft)		0.056	0.071	0.065	0.095	0.124	0.168	0.094	0.089	0.035	0.027
Secondary Settlement (m / ft)		0.023	0.023	0.023	0.023	0.023	0.023	0.021	0.020	0.019	0.019
Total Settlement (m / ft)		0.079	0.095	0.088	0.119	0.148	0.192	0.115	0.109	0.055	0.046
Elastic or Plastic (E/P)		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 10 (m / ft)		0.079	0.095	0.088	0.119	0.148	0.192	0.115	0.109	0.055	0.046

Written by: **Yiwen Cao** Date: **6/10/2009** Reviewed by: **R. Kulasingam/Jay Beech** Date: **6/10/2009**

Client: **Honeywell** Project: **Onondaga Lake SCA IDS** Project/ Proposal No.: **GJ4299** Task No.: **04**

Layer No.	*11*	**Zone2-Above-GW-6**									
Initial Stress Reference Layer (top of layer)		*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*
Final Stress Reference Layer (top of layer)		*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)		406.48	406.46	406.46	406.42	406.36	406.08	402.66	402.36	400.67	400.19
Initial Effective Stress, σ'_i (kPa /psf)		2,014	2,012	1,982	1,978	1,974	1,972	3,514	3,574	4,334	4,363
Final Effective Stress, σ'_f (kPa/psf)		2,462	2,521	2,491	2,612	2,728	2,908	4,223	4,258	4,686	4,640
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*
OCR Manual Input Value		*2.0*	*2.0*	*2.0*	*2.0*	*2.0*	*2.0*	*2.0*	*2.0*	*2.0*	*2.0*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		2,469	2,467	2,467	2,465	2,460	2,438	2,170	2,146	2,013	1,976
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*
Modified Recompression Index, $C_{r\varepsilon}$		*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.11%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*
ratio of t2 / t1		*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*
Settlements											
Primary Settlement, (m / ft)		0.003	0.015	0.009	0.035	0.060	0.099	0.088	0.083	0.035	0.027
Secondary Settlement (m / ft)		0.003	0.023	0.023	0.023	0.023	0.023	0.021	0.020	0.019	0.019
Total Settlement (m / ft)		0.006	0.039	0.032	0.059	0.083	0.122	0.109	0.104	0.054	0.046
Elastic or Plastic (E/P)		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 11 (m / ft)		0.006	0.039	0.032	0.059	0.083	0.122	0.109	0.104	0.054	0.046
Layer No.	*12*	**Zone2-Above-GW-7**									
Initial Stress Reference Layer (top of layer)		*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*
Final Stress Reference Layer (top of layer)		*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)		403.74	403.72	403.72	403.69	403.63	403.37	400.26	399.98	398.43	398.00
Initial Effective Stress, σ'_i (kPa /psf)		2,239	2,237	2,207	2,202	2,197	2,194	3,711	3,769	4,517	4,543
Final Effective Stress, σ'_f (kPa/psf)		2,694	2,749	2,719	2,832	2,939	3,104	4,412	4,446	4,876	4,827
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*
OCR Manual Input Value		*2.0*	*2.0*	*2.0*	*2.0*	*2.0*	*2.0*	*2.0*	*2.0*	*2.0*	*2.0*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		2,918	2,916	2,916	2,913	2,907	2,881	2,564	2,536	2,379	2,335
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*
Modified Recompression Index, $C_{r\varepsilon}$		*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.11%*	*0.11%*	*0.11%*	*0.11%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*
ratio of t2 / t1		*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*
Settlements											
Primary Settlement, (m / ft)		0.003	0.003	0.003	0.004	0.011	0.045	0.083	0.079	0.034	0.027
Secondary Settlement (m / ft)		0.003	0.003	0.003	0.003	0.023	0.023	0.021	0.020	0.019	0.019
Total Settlement (m / ft)		0.006	0.006	0.006	0.007	0.034	0.068	0.104	0.099	0.053	0.045
Elastic or Plastic (E/P)		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 12 (m / ft)		0.006	0.006	0.006	0.007	0.034	0.068	0.104	0.099	0.053	0.045
Layer No.	*13*	**Zone2-Above-GW-8**									
Initial Stress Reference Layer (top of layer)		*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*
Final Stress Reference Layer (top of layer)		*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)		401.00	400.99	400.99	400.96	400.91	400.67	397.85	397.60	396.20	395.81
Initial Effective Stress, σ'_i (kPa /psf)		2,463	2,461	2,431	2,426	2,421	2,416	3,908	3,964	4,700	4,722
Final Effective Stress, σ'_f (kPa/psf)		2,924	2,976	2,946	3,050	3,149	3,301	4,631	4,634	5,067	5,015
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*
OCR Manual Input Value		*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*2.0*	*2.0*	*2.0*	*2.0*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		1,683	1,682	1,682	1,680	1,677	1,662	2,959	2,926	2,745	2,694
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*
Modified Recompression Index, $C_{r\varepsilon}$		*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*
ratio of t2 / t1		*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*
Settlements											
Primary Settlement, (m / ft)		0.094	0.104	0.105	0.125	0.143	0.169	0.082	0.074	0.033	0.026
Secondary Settlement (m / ft)		0.023	0.023	0.023	0.023	0.023	0.023	0.021	0.020	0.019	0.019
Total Settlement (m / ft)		0.117	0.127	0.128	0.148	0.167	0.192	0.102	0.095	0.053	0.045
Elastic or Plastic (E/P)		p	p	p	p	p	p	p	p	p	p
		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 13 (m / ft)		0.117	0.127	0.128	0.148	0.167	0.192	0.102	0.095	0.053	0.045

Written by: **Yiwen Cao** Date: **6/10/2009** Reviewed by: **R. Kulasingam/Jay Beech** Date: **6/10/2009**

Client: **Honeywell** Project: **Onondaga Lake SCA IDS** Project/ Proposal No.: **GJ4299** Task No.: **04**

Layer No.	*14*	**Zone2-Above-GW-9**									
Initial Stress Reference Layer (top of layer)		*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*
Final Stress Reference Layer (top of layer)		*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)		398.27	398.25	398.25	398.23	398.18	397.97	395.45	395.22	393.97	393.62
Initial Effective Stress, σ'_i (kPa /psf)		2,688	2,685	2,655	2,650	2,644	2,637	4,106	4,159	4,883	4,902
Final Effective Stress, σ'_f (kPa/psf)		3,153	3,202	3,172	3,274	3,373	3,522	4,820	4,823	5,250	5,194
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*
OCR Manual Input Value		*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*2.0*	*2.0*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		1,908	1,907	1,907	1,904	1,901	1,884	1,676	1,658	3,111	3,054
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*
Modified Recompression Index, $C_{r\varepsilon}$		*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*
ratio of t2 / t1		*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*
Settlements											
Primary Settlement, (m / ft)		0.087	0.096	0.097	0.115	0.133	0.156	0.077	0.070	0.032	0.025
Secondary Settlement (m / ft)		0.023	0.023	0.023	0.023	0.023	0.023	0.021	0.020	0.019	0.019
Total Settlement (m / ft)		0.111	0.120	0.121	0.139	0.156	0.179	0.098	0.091	0.051	0.044
Elastic or Plastic (E/P)		p	p	p	p	p	p	p	p	p	p
		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 14 (m / ft)		0.111	0.120	0.121	0.139	0.156	0.179	0.098	0.091	0.051	0.044
Layer No.	*15*	**Zone2-Above-GW-10**									
Initial Stress Reference Layer (top of layer)		*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*
Final Stress Reference Layer (top of layer)		*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)		395.53	395.51	395.51	395.49	395.45	395.27	393.04	392.84	391.74	391.43
Initial Effective Stress, σ'_i (kPa /psf)		2,912	2,910	2,880	2,874	2,868	2,859	4,303	4,354	5,066	5,082
Final Effective Stress, σ'_f (kPa/psf)		3,382	3,427	3,397	3,493	3,583	3,720	5,009	5,018	5,439	5,381
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*
OCR Manual Input Value		*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		2,132	2,131	2,131	2,129	2,124	2,105	1,874	1,853	1,739	1,706
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*
Modified Recompression Index, $C_{r\varepsilon}$		*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*
ratio of t2 / t1		*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*
Settlements											
Primary Settlement, (m / ft)		0.082	0.089	0.090	0.106	0.121	0.142	0.073	0.067	0.032	0.025
Secondary Settlement (m / ft)		0.023	0.023	0.023	0.023	0.023	0.023	0.021	0.020	0.019	0.019
Total Settlement (m / ft)		0.105	0.113	0.114	0.130	0.145	0.165	0.094	0.088	0.051	0.044
Elastic or Plastic (E/P)		p	p	p	p	p	p	p	p	p	p
		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 15 (m / ft)		0.105	0.113	0.114	0.130	0.145	0.165	0.094	0.088	0.051	0.044
Layer No.	*16*	**Zone2-Above-GW-11**									
Initial Stress Reference Layer (top of layer)		*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*
Final Stress Reference Layer (top of layer)		*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)		392.79	392.78	392.78	392.76	392.73	392.57	390.63	390.46	389.51	389.24
Initial Effective Stress, σ'_i (kPa /psf)		3,137	3,134	3,104	3,098	3,092	3,080	4,500	4,549	5,249	5,261
Final Effective Stress, σ'_f (kPa/psf)		3,609	3,651	3,621	3,710	3,793	3,920	5,199	5,207	5,629	5,568
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*
OCR Manual Input Value		*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		2,357	2,355	2,355	2,353	2,348	2,327	2,071	2,048	1,922	1,886
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*
Modified Recompression Index, $C_{r\varepsilon}$		*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*
ratio of t2 / t1		*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*
Settlements											
Primary Settlement, (m / ft)		0.077	0.083	0.084	0.098	0.111	0.130	0.069	0.064	0.031	0.025
Secondary Settlement (m / ft)		0.023	0.023	0.023	0.023	0.023	0.023	0.021	0.020	0.019	0.019
Total Settlement (m / ft)		0.100	0.107	0.108	0.122	0.135	0.153	0.090	0.085	0.050	0.044
Elastic or Plastic (E/P)		p	p	p	p	p	p	p	p	p	p
		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 16 (m / ft)		0.100	0.107	0.108	0.122	0.135	0.153	0.090	0.085	0.050	0.044

Written by: **Yiwen Cao** Date: **6/10/2009** Reviewed by: **R. Kulasingam/Jay Beech** Date: **6/10/2009**

Client: **Honeywell** Project: **Onondaga Lake SCA IDS** Project/ Proposal No.: **GJ4299** Task No.: **04**

Layer No. *17* **Zone2-Above-GW-12**											
Initial Stress Reference Layer (top of layer)		*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*
Final Stress Reference Layer (top of layer)		*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)		390.05	390.04	390.04	390.03	390.00	389.86	388.23	388.08	387.27	387.05
Initial Effective Stress, σ'_i (kPa /psf)		3,361	3,358	3,328	3,322	3,315	3,302	4,697	4,744	5,432	5,441
Final Effective Stress, σ'_f (kPa/psf)		3,835	3,875	3,845	3,928	4,004	4,120	5,369	5,396	5,818	5,754
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*
OCR Manual Input Value		*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		2,581	2,579	2,579	2,577	2,572	2,548	2,268	2,243	2,105	2,066
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*
Modified Recompression Index, $C_{r\varepsilon}$		*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*
ratio of t2 / t1		*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*
Settlements											
Primary Settlement, (m / ft)		0.072	0.078	0.079	0.091	0.103	0.120	0.064	0.061	0.031	0.025
Secondary Settlement (m / ft)		0.023	0.023	0.023	0.023	0.023	0.023	0.021	0.020	0.019	0.019
Total Settlement (m / ft)		0.096	0.102	0.102	0.115	0.126	0.143	0.085	0.082	0.050	0.043
Elastic or Plastic (E/P)		p	p	p	p	p	p	p	p	p	p
		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 17 (m / ft)		0.096	0.102	0.102	0.115	0.126	0.143	0.085	0.082	0.050	0.043
Layer No. *18* **Zone2-Above-GW-13**											
Initial Stress Reference Layer (top of layer)		*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*
Final Stress Reference Layer (top of layer)		*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)		387.32	387.31	387.31	387.30	387.27	387.16	385.82	385.70	385.04	384.86
Initial Effective Stress, σ'_i (kPa /psf)		3,585	3,582	3,552	3,546	3,539	3,524	4,895	4,939	5,615	5,621
Final Effective Stress, σ'_f (kPa/psf)		4,059	4,098	4,068	4,145	4,215	4,322	5,560	5,585	6,006	5,941
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*
OCR Manual Input Value		*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		2,805	2,804	2,804	2,801	2,795	2,770	2,465	2,438	2,288	2,245
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*
Modified Recompression Index, $C_{r\varepsilon}$		*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*
ratio of t2 / t1		*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*
Settlements											
Primary Settlement, (m / ft)		0.068	0.074	0.074	0.085	0.095	0.110	0.061	0.058	0.030	0.024
Secondary Settlement (m / ft)		0.023	0.023	0.023	0.023	0.023	0.023	0.021	0.020	0.019	0.019
Total Settlement (m / ft)		0.091	0.097	0.098	0.109	0.119	0.133	0.082	0.079	0.049	0.043
Elastic or Plastic (E/P)		p	p	p	p	p	p	p	p	p	p
		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 18 (m / ft)		0.091	0.097	0.098	0.109	0.119	0.133	0.082	0.079	0.049	0.043
Layer No. *19* **Zone2-Above-GW-14**											
Initial Stress Reference Layer (top of layer)		*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*
Final Stress Reference Layer (top of layer)		*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)		384.58	384.57	384.57	384.56	384.54	384.46	383.42	383.33	382.81	382.67
Initial Effective Stress, σ'_i (kPa /psf)		3,810	3,807	3,777	3,770	3,763	3,745	5,092	5,134	5,798	5,800
Final Effective Stress, σ'_f (kPa/psf)		4,285	4,321	4,291	4,362	4,427	4,524	5,751	5,775	6,189	6,120
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*
OCR Manual Input Value		*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		3,030	3,028	3,028	3,025	3,019	2,992	2,663	2,633	2,471	2,425
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*
Modified Recompression Index, $C_{r\varepsilon}$		*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*
ratio of t2 / t1		*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*
Settlements											
Primary Settlement, (m / ft)		0.064	0.069	0.070	0.080	0.089	0.102	0.058	0.056	0.029	0.024
Secondary Settlement (m / ft)		0.023	0.023	0.023	0.023	0.023	0.023	0.021	0.020	0.019	0.019
Total Settlement (m / ft)		0.088	0.093	0.093	0.103	0.112	0.125	0.079	0.076	0.048	0.042
Elastic or Plastic (E/P)		p	p	p	p	p	p	p	p	p	p
		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 19 (m / ft)		0.088	0.093	0.093	0.103	0.112	0.125	0.079	0.076	0.048	0.042

Written by: **Yiwen Cao** Date: **6/10/2009** Reviewed by: **R. Kulasingam/Jay Beech** Date: **6/10/2009**

Client: **Honeywell** Project: **Onondaga Lake SCA IDS** Project/ Proposal No.: **GJ4299** Task No.: **04**

Layer No.	*20*	**Zone2-Above-GW-15**									
Initial Stress Reference Layer (top of layer)		*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*
Final Stress Reference Layer (top of layer)		*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)		381.84	381.84	381.84	381.83	381.82	381.76	381.01	380.95	380.58	380.48
Initial Effective Stress, σ'_i (kPa /psf)		4,034	4,031	4,001	3,994	3,986	3,967	5,289	5,329	5,981	5,980
Final Effective Stress, σ'_f (kPa/psf)		4,510	4,543	4,513	4,579	4,639	4,727	5,966	5,964	6,377	6,306
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*
OCR Manual Input Value		*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		3,254	3,252	3,252	3,249	3,242	3,213	2,860	2,828	2,654	2,605
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*
Modified Recompression Index, $C_{r\varepsilon}$		*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*
ratio of t2 / t1		*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*
Settlements											
Primary Settlement, (m / ft)		0.061	0.065	0.066	0.075	0.083	0.095	0.058	0.053	0.029	0.023
Secondary Settlement (m / ft)		0.023	0.023	0.023	0.023	0.023	0.023	0.021	0.020	0.019	0.019
Total Settlement (m / ft)		0.084	0.089	0.089	0.098	0.106	0.118	0.078	0.074	0.048	0.042
Elastic or Plastic (E/P)		p	p	p	p	p	p	p	p	p	p
		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 20 (m / ft)		0.084	0.089	0.089	0.098	0.106	0.118	0.078	0.074	0.048	0.042
Layer No.	*21*	**Zone2-Above-GW-16**									
Initial Stress Reference Layer (top of layer)		*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*
Final Stress Reference Layer (top of layer)		*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)		379.11	379.10	379.10	379.10	379.09	379.05	378.61	378.57	378.35	378.29
Initial Effective Stress, σ'_i (kPa /psf)		4,259	4,255	4,225	4,219	4,210	4,188	5,486	5,524	6,164	6,159
Final Effective Stress, σ'_f (kPa/psf)		4,734	4,765	4,735	4,796	4,851	4,932	6,155	6,159	6,565	6,492
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*
OCR Manual Input Value		*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		3,479	3,477	3,477	3,473	3,466	3,435	3,057	3,023	2,837	2,784
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*
Modified Recompression Index, $C_{r\varepsilon}$		*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*
ratio of t2 / t1		*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*
Settlements											
Primary Settlement, (m / ft)		0.058	0.062	0.062	0.070	0.077	0.088	0.055	0.052	0.028	0.023
Secondary Settlement (m / ft)		0.023	0.023	0.023	0.023	0.023	0.023	0.021	0.020	0.019	0.019
Total Settlement (m / ft)		0.081	0.085	0.086	0.093	0.101	0.111	0.076	0.072	0.047	0.042
Elastic or Plastic (E/P)		p	p	p	p	p	p	p	p	p	p
		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 21 (m / ft)		0.081	0.085	0.086	0.093	0.101	0.111	0.076	0.072	0.047	0.042
Layer No.	*22*	**Zone2-Above-GW-17**									
Initial Stress Reference Layer (top of layer)		*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*
Final Stress Reference Layer (top of layer)		*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)		376.37	376.37	376.37	376.37	376.36	376.35	376.20	376.19	376.12	376.10
Initial Effective Stress, σ'_i (kPa /psf)		4,483	4,480	4,450	4,443	4,433	4,410	5,683	5,720	6,347	6,339
Final Effective Stress, σ'_f (kPa/psf)		4,957	4,986	4,956	5,013	5,064	5,137	6,346	6,349	6,752	6,677
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*
OCR Manual Input Value		*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		3,703	3,701	3,701	3,697	3,690	3,656	3,254	3,219	3,020	2,964
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*
Modified Recompression Index, $C_{r\varepsilon}$		*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*
ratio of t2 / t1		*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*
Settlements											
Primary Settlement, (m / ft)		0.055	0.059	0.059	0.066	0.072	0.082	0.053	0.050	0.028	0.023
Secondary Settlement (m / ft)		0.023	0.023	0.023	0.023	0.023	0.023	0.021	0.020	0.019	0.019
Total Settlement (m / ft)		0.078	0.082	0.082	0.089	0.096	0.106	0.074	0.070	0.047	0.042
Elastic or Plastic (E/P)		p	p	p	p	p	p	p	p	p	p
		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 22 (m / ft)		0.078	0.082	0.082	0.089	0.096	0.106	0.074	0.070	0.047	0.042

Written by: **Yiwen Cao** Date: **6/10/2009** Reviewed by: **R. Kulasingam/Jay Beech** Date: **6/10/2009**

Client: **Honeywell** Project: **Onondaga Lake SCA IDS** Project/ Proposal No.: **GJ4299** Task No.: **04**

Layer No. *23* **Zone3-Above-GW-1**											
Initial Stress Reference Layer (top of layer)		2	2	2	2	2	2	2	2	2	2
Final Stress Reference Layer (top of layer)		1	1	1	1	1	1	1	1	1	1
Midpoint Elevation, (m / ft)		375.00	375.00	375.00	375.00	375.00	375.00	375.00	375.00	375.00	375.00
Initial Effective Stress, σ'_i (kPa /psf)		4,595	4,592	4,562	4,555	4,545	4,521	5,782	5,817	6,439	6,429
Final Effective Stress, σ'_f (kPa/psf)		5,068	5,095	5,065	5,118	5,165	5,232	6,422	6,441	6,844	6,767
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*
OCR Manual Input Value		*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		3,815	3,813	3,813	3,809	3,802	3,767	3,353	3,316	3,111	3,054
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.380*	*0.380*	*0.380*	*0.380*	*0.380*	*0.380*	*0.380*	*0.380*	*0.380*	*0.380*
Modified Recompression Index, $C_{r\varepsilon}$		*0.021*	*0.021*	*0.021*	*0.021*	*0.021*	*0.021*	*0.021*	*0.021*	*0.021*	*0.021*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.70%*	*0.70%*	*0.70%*	*0.70%*	*0.70%*	*0.70%*	*0.70%*	*0.70%*	*0.70%*	*0.70%*
ratio of t2 / t1		*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*
Settlements											
Primary Settlement, (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Secondary Settlement (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total Settlement (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Elastic or Plastic (E/P)		p	p	p	p	p	p	p	p	p	p
		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 23 (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Layer No. *24* **Zone3-Above-GW-2**											
Initial Stress Reference Layer (top of layer)		2	2	2	2	2	2	2	2	2	2
Final Stress Reference Layer (top of layer)		1	1	1	1	1	1	1	1	1	1
Midpoint Elevation, (m / ft)		375.00	375.00	375.00	375.00	375.00	375.00	375.00	375.00	375.00	375.00
Initial Effective Stress, σ'_i (kPa /psf)		4,595	4,592	4,562	4,555	4,545	4,521	5,782	5,817	6,439	6,429
Final Effective Stress, σ'_f (kPa/psf)		5,068	5,095	5,065	5,118	5,165	5,232	6,422	6,441	6,844	6,767
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*
OCR Manual Input Value		*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		3,815	3,813	3,813	3,809	3,802	3,767	3,353	3,316	3,111	3,054
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.380*	*0.380*	*0.380*	*0.380*	*0.380*	*0.380*	*0.380*	*0.380*	*0.380*	*0.380*
Modified Recompression Index, $C_{r\varepsilon}$		*0.021*	*0.021*	*0.021*	*0.021*	*0.021*	*0.021*	*0.021*	*0.021*	*0.021*	*0.021*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.70%*	*0.70%*	*0.70%*	*0.70%*	*0.70%*	*0.70%*	*0.70%*	*0.70%*	*0.70%*	*0.70%*
ratio of t2 / t1		*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*
Settlements											
Primary Settlement, (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Secondary Settlement (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total Settlement (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Elastic or Plastic (E/P)		p	p	p	p	p	p	p	p	p	p
		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 24 (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Layer No. *25* **Zone2-Below-GW-18**											
Initial Stress Reference Layer (top of layer)		2	2	2	2	2	2	2	2	2	2
Final Stress Reference Layer (top of layer)		1	1	1	1	1	1	1	1	1	1
Midpoint Elevation, (m / ft)		373.50	373.49	373.49	373.48	373.46	373.44	373.27	373.26	373.12	373.08
Initial Effective Stress, σ'_i (kPa /psf)		4,625	4,621	4,591	4,585	4,575	4,551	5,816	5,851	6,475	6,466
Final Effective Stress, σ'_f (kPa/psf)		5,098	5,125	5,095	5,148	5,195	5,262	6,471	6,475	6,885	6,810
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*
OCR Manual Input Value		*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		3,845	3,843	3,843	3,839	3,832	3,798	3,387	3,350	3,148	3,091
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*
Modified Recompression Index, $C_{r\varepsilon}$		*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*
ratio of t2 / t1		*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*
Settlements											
Primary Settlement, (m / ft)		0.059	0.063	0.063	0.071	0.078	0.091	0.074	0.071	0.046	0.040
Secondary Settlement (m / ft)		0.026	0.026	0.026	0.026	0.026	0.027	0.030	0.030	0.032	0.033
Total Settlement (m / ft)		0.084	0.088	0.089	0.097	0.105	0.117	0.103	0.100	0.078	0.073
Elastic or Plastic (E/P)											
		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 25 (m / ft)		0.084	0.088	0.089	0.097	0.105	0.117	0.103	0.100	0.078	0.073

Written by: **Yiwen Cao** Date: **6/10/2009** Reviewed by: **R. Kulasingam/Jay Beech** Date: **6/10/2009**

Client: **Honeywell** Project: **Onondaga Lake SCA IDS** Project/ Proposal No.: **GJ4299** Task No.: **04**

Layer No.	*26*	**Zone2-Below-GW-19**									
Initial Stress Reference Layer (top of layer)		*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*
Final Stress Reference Layer (top of layer)		*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)		370.49	370.46	370.46	370.43	370.38	370.31	369.82	369.77	369.37	369.25
Initial Effective Stress, σ'_i (kPa /psf)		4,684	4,681	4,651	4,644	4,636	4,613	5,884	5,920	6,549	6,542
Final Effective Stress, σ'_f (kPa/psf)		5,155	5,181	5,151	5,201	5,245	5,309	6,532	6,532	6,962	6,890
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*
OCR Manual Input Value		*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		3,904	3,902	3,902	3,899	3,892	3,859	3,455	3,419	3,221	3,166
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*	*0.460*
Modified Recompression Index, $C_{r\varepsilon}$		*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*	*0.014*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*	*0.91%*
ratio of t2 / t1		*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*
Settlements											
Primary Settlement, (m / ft)		0.058	0.061	0.062	0.069	0.076	0.088	0.072	0.069	0.046	0.040
Secondary Settlement (m / ft)		0.026	0.026	0.026	0.026	0.026	0.027	0.030	0.030	0.032	0.033
Total Settlement (m / ft)		0.083	0.087	0.088	0.095	0.102	0.115	0.102	0.098	0.078	0.073
Elastic or Plastic (E/P)		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 26 (m / ft)		0.083	0.087	0.088	0.095	0.102	0.115	0.102	0.098	0.078	0.073
Layer No.	*27*	**Zone3-Below-GW-3**									
Initial Stress Reference Layer (top of layer)		*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*
Final Stress Reference Layer (top of layer)		*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Midpoint Elevation, (m / ft)		368.98	368.95	368.95	368.90	368.84	368.75	368.09	368.03	367.49	367.33
Initial Effective Stress, σ'_i (kPa /psf)		4,713	4,710	4,680	4,674	4,666	4,643	5,918	5,954	6,586	6,579
Final Effective Stress, σ'_f (kPa/psf)		5,183	5,207	5,177	5,224	5,266	5,325	6,558	6,566	7,002	6,933
Elastic Method											
Modulus, E (kPa/psf)=	Strain										
	Settlement (m / ft)										
1-D Consolidation Theory (Plastic Method)											
Consolidation Properties											
OCR Manual or Auto Input (MW/MS: Manual waste/soil, A:Automatic)		*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*	*MS*
OCR Manual Input Value		*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
OCR Computation Input											
Preconsolidation pressure, σ'_p (kPa / psf)		3,933	3,932	3,932	3,928	3,922	3,890	3,488	3,453	3,258	3,204
Modified Primary Compression Index, $C_{c\varepsilon}$		*0.380*	*0.380*	*0.380*	*0.380*	*0.380*	*0.380*	*0.380*	*0.380*	*0.380*	*0.380*
Modified Recompression Index, $C_{r\varepsilon}$		*0.021*	*0.021*	*0.021*	*0.021*	*0.021*	*0.021*	*0.021*	*0.021*	*0.021*	*0.021*
Modified Secondary Compression Index, $C_{\alpha\varepsilon}$		*0.70%*	*0.70%*	*0.70%*	*0.70%*	*0.70%*	*0.70%*	*0.70%*	*0.70%*	*0.70%*	*0.70%*
ratio of t2 / t1		*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*	*8.75*
Settlements											
Primary Settlement, (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Secondary Settlement (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total Settlement (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Elastic or Plastic (E/P)		1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D	1-D
Settlement of Layer 27 (m / ft)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Written by: **Yiwen Cao** Date: **6/10/2009** Reviewed by: **R. Kulasingam/Jay Beech** Date: **6/10/2009**

Client: **Honeywell** Project: **Onondaga Lake SCA IDS** Project/ Proposal No.: **GJ4299** Task No.: **04**

	Layer No.	Material										
LAYER SETTLEMENT	1	*Cover*										
	2	*Dredge*										
	3	*Gravel*										
	4	*Clay*										
	5	*Dike*										
	6	*Zone2-Above-GW-1*	0.226	0.258	0.265	0.326	0.380	0.462	0.151	0.137	0.058	0.049
	7	*Zone2-Above-GW-2*	0.033	0.059	0.049	0.099	0.146	0.221	0.141	0.128	0.058	0.048
	8	*Zone2-Above-GW-3*	0.007	0.008	0.008	0.009	0.011	0.012	0.132	0.122	0.057	0.048
	9	*Zone2-Above-GW-4*	0.007	0.007	0.008	0.009	0.010	0.011	0.124	0.115	0.055	0.047
	10	*Zone2-Above-GW-5*	0.079	0.095	0.088	0.119	0.148	0.192	0.115	0.109	0.055	0.046
	11	*Zone2-Above-GW-6*	0.006	0.039	0.032	0.059	0.083	0.122	0.109	0.104	0.054	0.046
	12	*Zone2-Above-GW-7*	0.006	0.006	0.006	0.007	0.034	0.068	0.104	0.099	0.053	0.045
	13	*Zone2-Above-GW-8*	0.117	0.127	0.128	0.148	0.167	0.192	0.102	0.095	0.053	0.045
	14	*Zone2-Above-GW-9*	0.111	0.120	0.121	0.139	0.156	0.179	0.098	0.091	0.051	0.044
	15	*Zone2-Above-GW-10*	0.105	0.113	0.114	0.130	0.145	0.165	0.094	0.088	0.051	0.044
	16	*Zone2-Above-GW-11*	0.100	0.107	0.108	0.122	0.135	0.153	0.090	0.085	0.050	0.044
	17	*Zone2-Above-GW-12*	0.096	0.102	0.102	0.115	0.126	0.143	0.085	0.082	0.050	0.043
	18	*Zone2-Above-GW-13*	0.091	0.097	0.098	0.109	0.119	0.133	0.082	0.079	0.049	0.043
	19	*Zone2-Above-GW-14*	0.088	0.093	0.093	0.103	0.112	0.125	0.079	0.076	0.048	0.042
	20	*Zone2-Above-GW-15*	0.084	0.089	0.089	0.098	0.106	0.118	0.078	0.074	0.048	0.042
	21	*Zone2-Above-GW-16*	0.081	0.085	0.086	0.093	0.101	0.111	0.076	0.072	0.047	0.042
	22	*Zone2-Above-GW-17*	0.078	0.082	0.082	0.089	0.096	0.106	0.074	0.070	0.047	0.042
	23	*Zone3-Above-GW-1*	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	24	*Zone3-Above-GW-2*	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	25	*Zone2-Below-GW-18*	0.084	0.088	0.089	0.097	0.105	0.117	0.103	0.100	0.078	0.073
	26	*Zone2-Below-GW-19*	0.083	0.087	0.088	0.095	0.102	0.115	0.102	0.098	0.078	0.073
	27	*Zone3-Below-GW-3*	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	28											
	29	*Soil Above GW*										
	30	*Soil Below GW*										
		TOTAL SETTLEMENT	**1.48**	**1.66**	**1.65**	**1.97**	**2.28**	**2.74**	**1.94**	**1.82**	**1.04**	**0.90**
POST-SETTLEMENT ELEVATION(M/FT)	Line	1 Top of Final Cover	429.56	429.91	430.04	430.96	431.92	433.48	446.77	447.66	448.62	448.85
	Line	2 Top of Dredge	426.55	426.33	426.09	425.70	425.28	424.48	439.27	439.74	447.41	447.25
	Line	3 Top of Gravel	426.55	426.33	426.09	425.68	425.27	424.48	421.35	421.11	419.95	419.78
	Line	4 Top of Clay	426.55	426.33	426.03	422.55	421.97	420.91	416.80	416.51	414.44	413.84
	Line	5 Top of Dike	426.55	425.26	425.01	422.09	419.08	418.20	413.95	413.62	411.90	411.34
	Line	6 Top of Subgrade	420.05	419.84	419.85	419.48	419.08	418.20	413.95	413.62	411.90	411.34
	Line	7	417.53	417.36	417.38	417.08	416.73	415.95	411.70	411.38	409.73	409.19
	Line	8	414.83	414.68	414.69	414.44	414.15	413.47	409.43	409.12	407.55	407.05
	Line	9	412.10	411.96	411.96	411.72	411.44	410.78	407.16	406.87	405.38	404.91
	Line	10	409.37	409.23	409.23	409.00	408.72	408.09	404.88	404.60	403.20	402.76
	Line	11	406.71	406.59	406.59	406.38	406.14	405.58	402.59	402.33	401.02	400.62
	Line	12	403.98	403.89	403.88	403.71	403.50	403.00	400.29	400.06	398.85	398.48
	Line	13	401.25	401.16	401.16	400.99	400.80	400.37	397.99	397.78	396.67	396.33
	Line	14	398.63	398.56	398.55	398.40	398.24	397.86	395.69	395.49	394.49	394.18
	Line	15	396.00	395.94	395.93	395.81	395.67	395.33	393.38	393.21	392.31	392.04
	Line	16	393.37	393.32	393.31	393.21	393.09	392.80	391.07	390.92	390.13	389.89
	Line	17	390.74	390.69	390.68	390.60	390.50	390.25	388.75	388.62	387.95	387.74
	Line	18	388.09	388.06	388.05	387.98	387.90	387.69	386.43	386.32	385.76	385.60
	Line	19	385.45	385.42	385.41	385.35	385.29	385.12	384.11	384.02	383.58	383.45
	Line	20	382.80	382.77	382.77	382.72	382.67	382.54	381.78	381.72	381.40	381.30
	Line	21	380.15	380.13	380.13	380.09	380.05	379.96	379.46	379.42	379.21	379.15
	Line	22	377.49	377.48	377.48	377.45	377.42	377.36	377.13	377.11	377.03	377.00
	Line	23 Bottom of Zone2 Above GW	374.83	374.82	374.82	374.81	374.79	374.77	374.80	374.80	374.84	374.85
	Line	24	374.83	374.82	374.82	374.81	374.79	374.77	374.80	374.80	374.84	374.85
	Line	25 Bottom of Zone 3 Above GW	374.83	374.82	374.82	374.81	374.79	374.77	374.80	374.80	374.84	374.85
	Line	26	371.91	371.89	371.89	371.85	371.82	371.76	371.44	371.42	371.17	371.09
	Line	27 Bottom of Zone 2 Below GW	368.98	368.95	368.95	368.90	368.84	368.75	368.09	368.03	367.49	367.33
	Line	28 Top of Incompressible Layer	368.98	368.95	368.95	368.90	368.84	368.75	368.09	368.03	367.49	367.33
	Line	29 GND										
	Line	30 GW										
	Line	31 ROCK										
POST-SETTLEMENT STRAINS & GRADES COMPUTATION												
	Layer No.	**4** Pre-Settlement Elevation	428.030	427.990	427.680	424.520	424.250	423.650	418.740	418.330	415.480	414.740
		Top of Clay Post-Settlement Elevation	426.546	426.328	426.027	422.555	421.971	420.905	416.803	416.507	414.440	413.836
Intial Liner Segment Length, L_0 (ft)			14.755	2.667	0.729	7.076	6.530	10.316	60.203	3.961	36.142	16.441
Post Settle. Liner Segment Length, L_0 (ft)			14.782	2.676	0.725	7.221	6.550	10.353	60.142	3.951	36.089	16.436
Post Settlement Liner Strain (+ comp, - tension)			**-0.2%**	**-0.3%**	0.5%	**-2.0%**	**-0.3%**	**-0.4%**	0.1%	0.3%	0.1%	0.0%
PreSettlement Slope (+ up, - down)			-2.0%	-1.5%	-47.0%	-49.9%	-4.1%	-5.8%	-8.2%	-10.4%	-7.9%	-4.5%
Post Settlement Slope			-6.4%	-8.2%	-45.7%	-54.8%	-9.0%	-10.3%	-6.8%	-7.5%	-5.7%	-3.7%
Grade Difference (+ steeper, - milder)			4.4%	6.7%	-1.3%	4.9%	4.8%	4.5%	-1.3%	-2.9%	-2.2%	-0.8%

APPENDIX I

EVALUATION OF HYDRAULIC PERFORMANCE FOR SCA DESIGN

GEOSYNTEC CONSULTANTS

COMPUTATION COVER SHEET

Client: Honeywell **Project:** Onondaga Lake SCA IDS **Project/Proposal #:** GJ4299 **Task #:** 08

TITLE OF COMPUTATIONS **EVALUTION OF HYDRAULIC PERFORMANCE FOR SCA DESIGN**

COMPUTATIONS BY:

Signature [signature] 8/4/2009 DATE

Printed Name and Title: Joseph Sura, Staff Engineer

ASSUMPTIONS AND PROCEDURES CHECKED BY:
(Peer Reviewer)

Signature [signature] 8/4/2009 DATE

Printed Name and Title: R. Kulasingam, Project Engineer

COMPUTATIONS CHECKED BY:

Signature [signature] 8/4/2009 DATE

Printed Name and Title: Fan Zhu, Staff Engineer

COMPUTATIONS BACKCHECKED BY:
(Originator)

Signature [signature] 8/4/2009 DATE

Printed Name and Title: Joseph Sura, Staff Engineer

APPROVED BY:
(PM or Designate)

Signature [signature] 4 AUG 2009 DATE

Printed Name and Title: Jay Beech, Principal

STATE OF NEW YORK · JAY F. BEECH · No. 066337 · LICENSED PROFESSIONAL ENGINEER

APPROVAL NOTES:

REVISIONS (Number and initial all revisions)

NO.	SHEET	DATE	BY	CHECKED BY	APPROVAL

Written by:	Joseph Sura	Date:	5/18/2009	Reviewed by:	R. Kulasingam/Jay Beech	Date:	5/19/2009
Client:	Honeywell	Project:	Onondaga Lake SCA IDS	Project/ Proposal No.:	GJ4299	Task No.:	08

EVALUATION OF HYDRAULIC PERFORMANCE FOR SCA DESIGN

INTRODUCTION

This package was prepared in support of the design of the Sediment Consolidation Area (SCA) for the Onondaga Lake Bottom Site, which will be constructed on Wastebed 13 (WB-13). This package presents an analysis of hydraulic performance of the SCA, which will consist of geotextile tubes (geo-tubes) filled with dredge material from Onondaga Lake. The analysis presented in this package has two main objectives:

1. Evaluate infiltration rates through the final cover system. The infiltration rate through the cover system is needed to calculate the amount of liquid to be pumped through the base liner leachate management system (LMS) after closure of the SCA. The details of the final cover system have yet to be developed; therefore, for purposes of the preliminary analyses provided herein, a final cover system consisting of a 3-inch leveling layer and 18 inches of cover soil was assumed.
2. Evaluate the liquid head above the liner system. It should be noted that the maximum liquid head acting on the base liner system will be limited to 12 inches per New York State Department of Environmental Conservation (NYSDEC) regulations.

In addition, calculations were performed to estimate the amount of consolidation water that could potentially be squeezed out of the foundation Solvay waste (SOLW) due to the SCA loading. The estimated amount of consolidation water was compared with the estimated reduction in infiltration of precipitation into WB-13 due to the installation of the SCA liner system.

The liquid head on the cover system and the veneer stability of the cover, which is directly impacted by the liquid head on the cover system, will be evaluated in the final design submittal when the details of the cover have been established.

METHODOLOGY

The calculations in this package were performed using the "Hydraulic Evaluation of Landfill Performance" (HELP) software, Version 3.07 developed by the U.S. Environmental Protection Agency. The HELP model is a quasi two-dimensional hydrologic model of water movement across, into, through, and out of landfills. The model accepts weather, soil, and design data and accounts for the effects of surface storage, snowmelt, runoff, infiltration,

evapotranspiration, vegetative growth, lateral drainage, and leakage through liners [Schroeder, 1994]. The amount of consolidation water was estimated using methods that are consistent with the calculation package titled "Settlement Analyses for SCA".

INPUT PARAMETERS

The HELP software accepts parameters for layer type, hydraulic conductivity *K* for each layer, drainage path length, slope, moisture storage values, and climate. The SCA was modeled as shown in Figure 1, which provides a typical cross section. Specific properties of the eight different layers of materials are included in Table 1 and are discussed further below.

SCA Geometry and Cover

The current design of the side slopes of the SCA is based on a 20-ft offset between geo-tubes. Each geo-tube layer is designed to be approximately 6-ft thick. This results in side slopes of 20 horizontal : 6 vertical (i.e., 30% slopes) and a slope angle β=16.7 degrees. The length of drainage path along the top of the side slopes is 100 ft. On the side slopes of the SCA, a cover with a minimum thickness of 21 inches (i.e., a 3-inch leveling layer and 18 inches of cover soil) was assumed in the analysis.

On the top portion of the SCA, a leveling layer with a minimum thickness of 3 inches was assumed to smooth post-settlement contours and maintain positive drainage. In addition, a 18-inch cover soil layer was assumed in the analysis as part of the final cover system. The overall final cover slope is approximately 0.5% towards the low points near the sump areas. The longest possible drainage path is shown in Figure 2, which is approximately 1500 ft in length.

The leveling layer and the cover soil layer, both along the side slopes and on top of the SCA, were combined into a single 21-inch cover layer and modeled as a sandy clay (SC) soil type with a hydraulic conductivity of 1.0×10^{-5} cm/s.

Geo-tubes and Dredge Material

The geo-tubes above the gravel drainage layer were modeled as three separate layers, from bottom to top: (i) a layer for the dredge material; (ii) a small intermediate layer; and (iii) a layer for the geotextile of the top layer of geo-tubes. The 30-ft thick dredge material was modeled with similar properties to a low plasticity silt (ML). The dredge material was represented with a hydraulic conductivity of $K_{DREDGE} = 1.0 \times 10^{-5}$ cm/s. Laboratory test results on the material to be

dredged, which consists mostly of Solvay waste (SOLW) from the In-Lake Waste Deposit (ILWD) of Onondaga Lake, indicate that the hydraulic conductivity of the dredge material (K_{DREDGE}) may vary from approximately $K_{DREDGE}=10^{-5}$ cm/s to $K_{DREDGE}=10^{-6}$ cm/s. As discussed in subsequent sections, sensitivity analyses were performed to evaluate the effect of K_{DREDGE} on the infiltration rate and the head on the liner.

The intermediate layer above the dredge material was modeled as a vertical percolation layer of 60-mil thickness of dredge material. This layer is necessary due to modeling restrictions within the HELP program, which does not allow the placement of a barrier soil layer underlying another barrier soil layer.

The geotextile layer represents the interface between the geo-tubes and dredge material. As the liquid flows through the cover system to reach the top geo-tube/dredge material interface, it will experience preferential flow patterns. As shown in Figure 3, the liquid can pass through the geotextile material itself or through the open area filled with dredge material. Therefore, this layer was modeled using a combined equivalent hydraulic conductivity K_{EQ}, calculated using Equation 1 below, as discussed by Das [2005].

$$K_{EQ} = K_{DREDGE} \times A_{DREDGE} + K_{GT} \times A_{GT} \qquad \text{(Eq.1)}$$

where:

K_{EQ} = Equivalent hydraulic conductivity

K_{DREDGE} = Hydraulic conductivity of dredge material

A_{DREDGE} = Cross-sectional area of dredge material, measured as percent open area of the geotextile

K_{GT} = Hydraulic conductivity of woven geotextile

A_{GT} = Cross-sectional area covered by woven geotextile material and calculated as 100% - A_{DREDGE}

The percent open area was assumed to be 4% based on the standard typical minimum value for a woven geotextile [TC Mirafi, 2000]. A sensitivity analysis on the equivalent hydraulic conductivity resulting from different values of K_{GT} was performed and is shown in Figure 4. As described on Figure 4, a value of $K_{EQ} = 4.0\text{x}10^{-7}$ cm/s was selected based on this analysis. This layer was modeled as a barrier soil liner to allow measurement of liquid head build-up within the cover system.

Liner System

The SCA liner system consists of the following layers from top to bottom:

- Gravel drainage layer;
- Nonwoven geotextile cushion;
- Geomembrane (GM) liner; and
- Low permeability soil layer.

The proposed gravel drainage layer has an average thickness of 2 ft. It was modeled conservatively as a 1-ft thick layer. This drainage layer will be sloped towards the sumps to allow gravity drainage. Based on the proposed grading of the underlying low permeability soil layer, the gravel drainage layer was modeled with a slope of 1% and a drainage path length of 1500 ft, as shown in Figure 5. A sensitivity analysis using a slope of 0.5% for the gravel drainage layer was also performed. The assumed hydraulic conductivity of the gravel is 10 cm/s based on available material sources. Sensitivity analyses were performed to evaluate the effect of K_{GRAVEL} ranging from 5 cm/s to 15 cm/s, based on a range in values for other potentially available gravel types.

A nonwoven (NW) geotextile (GT) cushion will be placed between the gravel drainage layer and GM for protection. This NW GT layer was not included in the HELP model.

The GM was modeled using the HELP model parameters for a low density polyethylene (LDPE) liner, which is available in the HELP database. It is noted that changing the type of GM to other materials, such as ethylene-propylene diene monomer (EPDM) or high density polyethylene (HDPE), which are also available in the HELP database, did not affect the calculated values. It was assumed to contain one hole per acre and have good contact with the soil layer below, both of which can typically be achieved during construction. The holes in the GM were assumed to be 0.16 in^2, following the recommendations of Giroud & Bonaparte [1989].

The low permeability soil layer has a proposed minimum thickness of 1 ft. The top 6 inches of this layer is required to have a hydraulic conductivity of $K=10^{-6}$ cm/s or lower, per agreement with NYSDEC. The bottom part of this layer was modeled with a hydraulic conductivity of $K=10^{-5}$ cm/s.

Climate Data

The data for precipitation, temperature, humidity, and solar radiation were modeled using the HELP software synthetic data generation function for Syracuse, New York for a 100-year modeling period. This generation uses recorded mean monthly data for Syracuse, shown in Table 2, to stochastically generate daily data with approximately the same statistical characteristics as the historic data. The precipitation data was manually adjusted to account for the design storm event of a 25-year, 24-hour rainfall. The rainfall corresponding to the design storm event was selected to be 4.5 inches based on recommendations from the Natural Resources Conservation Service [1986], as shown in Figure 6. The evaporative zone depth, which is the maximum depth from which water may be removed by evapotranspiration, was assumed to be 21 inches, corresponding to the total thickness of the leveling layer and the cover soil layer. The leaf area index, defined as the dimensionless ratio of leaf area of active vegetation to the nominal surface area, was chosen to be zero, corresponding to bare ground. Values of the climate parameters are shown in Table 3.

CASES ANALYZED

As part of the analyses, a sensitivity analysis was performed on K_{DREDGE} and K_{GRAVEL}. The sensitivity evaluation matrix is presented in Table 4.

The effect of uncertainty in the hydraulic conductivity of the dredge material was studied in Case I. The effect of using $K_{DREDGE}=10^{-5}$ cm/s compared to $K_{DREDGE}=10^{-6}$ cm/s was analyzed in the HELP runs labeled 21INCH_A and 21INCH_B.

The sensitivity of the liquid head on the geomembrane liner and leachate production of the SCA based on variability of the hydraulic conductivity of the gravel drainage layer was studied in Case II. The effect of K_{GRAVEL}=5 cm/s and 15 cm/s were evaluated in the HELP runs labeled 21INCH_AB and 21INCH_AC, respectively. The effect of the base case K_{GRAVEL}=10 cm/s was evaluated in the run labeled 21INCH_A.

RESULTS OF ANALYSIS

The results of the HELP Model analyses are summarized in Tables 5 and 6. HELP Output files for the base case on the SCA flat top and SCA side slopes are included in Attachment 1.

The effect of uncertainty in the hydraulic conductivity of the dredge material was studied in Case I. Increasing the hydraulic conductivity of the dredge material appears to increase the calculated liquid head on the geomembrane liner and leachate observed on the peak day and have

minimal effect on the calculated average annual values of liquid head or leachate flow rate. Therefore, it is recommended that a value of $K_{DREDGE}=10^{-5}$ cm/s be used for design purposes.

When compared to the base case 21INCH_A (K_{GRAVEL}=10 cm/s), the lower gravel hydraulic conductivity resulted in larger values of liquid head and leachate on the peak day. However, the calculated liquid head on the liner geomembrane still satisfied the NYSDEC requirement of 12 inches or less of liquid head on the liner. Calculated average annual values of liquid head and leachate were not affected significantly. It is, therefore, recommended to choose a single design value of K_{GRAVEL}=10 cm/s for the gravel drainage layer. Cases I and II were additionally evaluated for the SCA side slopes, using the drainage length and slope parameters discussed previously. The SCA side slope analyses resulted in lower computed leachate flow rates for both the peak day and annual average compared with the flat top tests. The calculated liquid head on the cover system was also the same or lower for the side slope analyses compared with the flat top analyses.

The sensitivity analysis using a slope of 0.5% for the gravel drainage layer resulted in increased peak liquid head to 2.1 inches on the liner and a calculated average annual leachate flow rate of 15.0 gallons per minute, compared to the base case 21INCH_A. However, the calculated liquid head on the liner geomembrane still satisfied the NYSDEC requirement of 12 inches or less of liquid head on the liner.

The results of the consolidation water and infiltration reduction calculations are presented in Table 7. These calculations were performed on an annual average basis during the SCA operational period using reasonable assumptions regarding liner construction and geo-tube filling phasing. Key assumptions are presented as footnotes in Table 7. During the four years of operation, total amounts of consolidation water due to filling of the SCA and infiltration reduction due to installation of the liner were calculated to be 189 and 162 million gallons, respectively. Considering the complicated nature of nonlinear field processes such as consolidation and infiltration and the use of idealized simple models to perform the estimates, the total amounts of consolidation water and reduction in infiltration are considered to be comparable over a four year operational period. The current capacity of the existing leachate collection system and its ability to handle a potential increase in flow will be further evaluated as part of the closure of WB-9 through WB-15.

SUMMARY AND CONCLUSIONS

This package presents the analyses of the hydraulic performance of the proposed SCA using the HELP model. The evaluation presented in this package has two main objectives: (i) evaluate

infiltration rates through a final cover system consisting of a 3-inch leveling layer and 18 inches of cover soil (i.e., 21 inches total); and (ii) evaluate the liquid head above the liner system. Analysis of the flat SCA top and side slopes indicates that the calculated liquid head satisfies the NYSDEC requirement of 1 ft or less on the liner system. The calculated annual average leachate rate for the flat top case was approximately 15 gallons per minute.

In addition, the calculations performed to estimate the amount of consolidation water indicate that the amount of water squeezed out over the four year operational period is the same order of magnitude as the reduction in infiltration that will occur due to liner system installation. The capacity of the existing leachate collection system is currently being evaluated as part of the WB-9 through WB-15 closure.

Once the final cover configuration is established, detailed analyses of the head buildup in the final cover system and veneer stability will be prepared. These analyses will be presented in the final design submittal.

REFERENCES

Das, B.M., "*Fundamentals of Geotechnical Engineering*", Second Edition, Thomson, 2005.

Giroud, J.P. and Bonaparte, R. "*Leakage Through Liners Constructed with Geomembranes, Part I: Geomembrane Liners*", Geotextiles and Geomembranes, Vol.8, No.1, 1989.

Natural Resources Conservation Service (NRCS), "*Urban Hydrology for Small Watersheds*", 210-VI-TR-55, Second Edition, June 1986.

Schroeder, P.R., et al. "*The Hydrologic Evaluation of Landfill Performance (HELP) Model: Engineering Documentation for Version 3*", EPA/600/9-94/xxx, U.S. EPA Risk Reduction Engineering Laboratory, Cincinnati, OH, 1994.

TC Mirafi, "*Filtration and Drainage*", Pendergrass, GA, 2000.

Written by: **Joseph Sura** Date: **5/18/2009** Reviewed by: **R. Kulasingam/Jay Beech** Date: **5/19/2009**

Client: **Honeywell** Project: **Onondaga Lake SCA IDS** Project/ Proposal No.: **GJ4299** Task No.: **08**

Tables

Table 1: Material Properties of Layers within SCA System

Layer	Description[1]	Layer Type[2]	Thickness (in)	K (cm/s)
1	Cover[3]	2	21	1.0E-05
2	Geo-tube with Dredge Filter Cake	3	0.06	4.0E-07[4]
3	Dredge material[5]	1	0.06	1.0E-05[6]
4	Dredge material	3	360	1.0E-05[6]
5	Gravel Drainage	2	12	10[7]
6	Geomembrane	4	0.06	4.0E-13[8]
7	Low Permeability Soil (Top 6")	3	6	1.0E-06
8	Low Permeability Soil (Bottom 6")	1	6	1.0E-05

Notes:

1. This is a general description of each layer.
2. The following layer types are available in the HELP model: 1=Vertical Percolation, 2=Lateral Drainage, 3=Barrier Soil Liner, 4=Geomembrane Liner (GM).
3. The 3-inch leveling layer and 18-inch cover soil layer have been combined into a single layer in the HELP program.
4. This was calculated using the percent Open Area, as discussed in the package.
5. This layer is identical to the 360 inch (30 ft) layer of dredge material, but is modeled as a vertical percolation layer. This is necessary due to modeling restrictions within the HELP program.
6. The value shown here is the base parameter, used in cases labeled "A". This value was changed to $K=1.0x10^{-6}$ cm/s in cases labeled "B" to evaluate sensitivity.
7. The assumed hydraulic conductivity of the gravel is 10 cm/s, based on potentially available material.
8. This layer is modeled as LDPE GM, using typical values from the HELP database. Selection of a different GM type is not expected to affect the results significantly.

Table 2: Normal Mean Precipitation and Temperature Data for Syracuse, NY

Month	Precipitation (in)	Temperature (^{o}F)
January	2.61	22.80
February	2.65	24.00
March	3.11	33.30
April	3.34	46.10
May	3.16	57.00
June	3.63	66.30
July	3.76	70.90
August	3.77	69.30
September	3.29	62.10
October	3.14	51.30
November	3.45	40.60
December	3.20	28.30

Note:

These are the default normal mean monthly values of precipitation and temperature for Syracuse, NY, available in the HELP software.

Table 3: Climate Parameters for Syracuse, NY and Other Parameters for the SCA Final Cover (HELP Default Values Unless Stated Otherwise)

Parameter	Value	Units
Fraction of Area allowing Runoff	100%	percent of total area
Evaporative Zone Depth	21	inches
Latitude	43.07	degrees
Maximum Leaf Area Index	0[3]	--
Start of Growing Season (date)	124[4]	--
End of Growing Season (date)	284[4]	--
Planar Area[1]	1	acre
Average Annual Wind Speed	9.7	miles/hr
Average 1st Quarter Relative Humidity	72%	--
Average 2nd Quarter Relative Humidity	68%	--
Average 3rd Quarter Relative Humidity	75%	--
Average 4th Quarter Relative Humidity	76%	--
Peak Daily Rainfall, 25-year, 24-hour storm event[2]	4.50	inches

Notes:

1. The area was modeled as one acre to produce values on a per-acre basis. This was multiplied by the total number of acres to calculate total flow rates over the entire area of the SCA. The total area of the SCA was conservatively assumed to be approximately 70 acres.
2. Value from National Resources Conservation Service data shown in Figure 6.
3. This value corresponds to the bare ground condition of the final cover.
4. These dates correspond to May 4 through October 11.

Table 4: Cases Evaluated

CASE	Variable	Description of Variable	Values Used (cm/s)	Run ID[1]
I	K_{DREDGE}	Hydraulic conductivity of dredge material	10^{-5}, 10^{-6}	21INCH_A, 21INCH_B
II	K_{GRAVEL}	Hydraulic conductivity of gravel drainage layer	5, 10, 15	21INCH_AB, 21INCH_A, 21INCH_AC

Note:

The Run ID corresponds to the case listed in Table 5.

Written by: **Joseph Sura** Date: **5/18/2009** Reviewed by: **R. Kulasingam/Jay Beech** Date: **5/19/2009**

Client: **Honeywell** Project: **Onondaga Lake SCA IDS** Project/ Proposal No.: **GJ4299** Task No.: **08**

Table 5: Results of HELP Modeling: Flat top area of SCA

Run ID	Curve Number	Leaf Index	Cap Thickness (in)	K_{DREDGE} (cm/s)	K_{GRAVEL} (cm/s)	Peak Daily Values				Average Annual Values		
						H_{MAX} (in) liner	H_{AVG} (in) liner	Leachate (ft^3/acre-day)	Leachate (gal/min)	H_{AVG} (in) liner	Leachate (ft^3/acre-year)	Leachate (gal/min)
21INCH_A	93.1	0	21	10^{-5}	10	1.4	0.7	1000	363.6	0.0	15066	15.0
21INCH_B	93.1	0	21	10^{-6}	10	0.2	0.1	123	44.9	0.0	15068	15.0
21INCHAB	93.1	0	21	10^{-5}	5	2.2	1.1	782	284.4	0.1	15066	15.0
21INCHAC	93.1	0	21	10^{-5}	15	1.0	0.5	1040	378.3	0.0	15066	15.0

Notes:
1. Selected maximum precipitation for a single day is 4.5 inches, based on the National Resources Conservation Service recommendations for a 25 year, 24 hour storm event.
2. SCA is assumed to have a total acreage of 70 acres.
3. This table uses a drainage path length of 1500 ft and slope of 0.51% for the final cover and a drainage path length of 1500 ft and slope of 1% for the gravel drainage layer.
4. Detailed analysis of the head buildup in the final cover system will be performed after the details of the final cover system are developed.
5. The HELP Output file for the base case, 21INCH_A, is included in Attachment 1.

Table 6: Results of HELP Modeling: Side slopes of SCA

Run ID	Curve Number	Leaf Index	Cap Thickness (in)	K_{DREDGE} (cm/s)	K_{GRAVEL} (cm/s)	Peak Daily Values				Average Annual Values		
						H_{MAX} (in) liner	H_{AVG} (in) liner	Leachate (ft^3/acre-day)	Leachate (gal/min)	H_{AVG} (in) liner	Leachate (ft^3/acre-year)	Leachate (gal/min)
S21IN_A	94.6	0	21	10^{-5}	10	1.4	0.7	992	360.8	0.0	12132	12.1
S21IN_B	94.6	0	21	10^{-6}	10	0.2	0.1	123	44.9	0.0	12134	12.1
S21IN_AB	94.6	0	21	10^{-5}	5	2.2	1.1	778	282.8	0.0	12132	12.1
S21IN_AC	94.6	0	21	10^{-5}	15	1.0	0.5	1030	374.4	0.0	12132	12.1

Notes:

1. Selected maximum precipitation for a single day is 4.5 inches, based on the National Resources Conservation Service recommendations for a 25 year, 24 hour storm event.
2. SCA is assumed to have a total acreage of 70 acres.
3. This table uses a drainage path length of 100 ft and slope of 30% for the final cover and a drainage path length of 1500 ft and slope of 1% for the gravel drainage layer.
4. Detailed analysis of the head buildup in the final cover system will be performed after the details of the final cover system are developed.
5. The HELP Output file for the base slope case, S21IN_A, is included in Attachment 1.

Written by: **Joseph Sura** Date: **5/18/2009** Reviewed by: **R. Kulasingam/Jay Beech** Date: **5/19/2009**

Client: **Honeywell** Project: **Onondaga Lake SCA IDS** Project/ Proposal No.: **GJ4299** Task No.: **08**

Table 7: Results of Consolidation Water and Reduction in Infiltration Rate Calculations

Year	SCA Footprint at End of Each Phase (ac)[1]	New SCA Footprint in Each Year (ac)	Total Lined SCA Area at End of Each Phase (ac)[2]	Additional Lined Area (ac)[3]	Infiltration Cut-off (million gallons)		Consolidation Squeezed Water (million gallons)				
					Assuming 40" Infiltration Each Year[4]	Assuming 0.5 x 40" Infiltration Each Year[5]	Estimated Average Geo-tube Height (ft)[6]	Estimated Average Total Thickness of Gravel Drainage Layer and Liner (ft)[7]	Estimated Total Equivalent Soil Thickness (ft)[8]	Estimated Average Settlement (ft)[9]	Estimated Consolidation Squeezed Water in Each Year (million gallons)[10]
0	--	--	15	10	14	7	--	--	--	--	--
1	30	30	40	10	54	27	18	5	18.1	5.4	53
2	50	20	61	10	77	39	22	5	20.7	6.2	48
3	72	22	72	10	89	45	23	5	21.3	6.4	49
4	72	0	72	10	89	45	30	5	26.8	8.0	38
Total Estimated Infiltration Cut-off in 4+ years (million gallons)					323	**162**	Total Estimated Consolidation Squeezed Water in 4 years (million gallons)				**189**

Notes:

1. The SCA footprint is measured from the outside toe of the perimeter berm.
2. Assuming half of the new SCA footprint will be lined in advance during the previous year.
3. Additional lined area for water treatment facility.
4. The infiltration cut-off volume equals 40 inches of annual average rainfall multiplied by the total lined area at the end of each year. In year 0, only half a year for the infiltration cut-off was assumed.
5. Assuming 50% for evapotranspiration based on the analysis presented in the HELP calculations.
6. To estimate the average geo-tube height for calculating loads for settlements, a 25% decrease of the available footprint was considered to account for the SCA perimeter berm, the 10-ft gap between geo-tubes and the berm, and the 20-ft offset distance for geo-tube stacking. This assumption is considered reasonable based on the calculation of an average geo-tube height of 30 ft height for year 4.
7. These thicknesses are based on the calculations presented in the package titled "Volume Calculations for SCA Design".
8. Assuming a unit weight of 120 pcf for liner and gravel and 86 pcf for dredge material. The total thickness was converted to an equivalent thickness of soil with a unit weight of 120 pcf.
9. Using a rule of thumb: 10 ft soil causes approximately 3 ft of settlement in SOLW (based on test plot results). The total calculated average settlement of 7.9 feet in the 4th year is consistent with the results of detailed settlement calculations presented in the calculation package titled "Settlement Analyses for SCA".
10. The Solvay waste above the groundwater table was conservatively assumed to be fully saturated in the calculation. Primary consolidation time was assumed to be less than one year, thus resulting in all calculated consolidation water for a given year being squeezed out within that year.

Written by: **Joseph Sura** Date: **5/18/2009** Reviewed by: **R. Kulasingam/Jay Beech** Date: **5/19/2009**

Client: **Honeywell** Project: **Onondaga Lake SCA IDS** Project/ Proposal No.: **GJ4299** Task No.: **08**

Figures

Written by: **Joseph Sura** Date: **5/18/2009** Reviewed by: **R. Kulasingam/Jay Beech** Date: **5/19/2009**

Client: **Honeywell** Project: **Onondaga Lake SCA IDS** Project/ Proposal No.: **GJ4299** Task No.: **08**

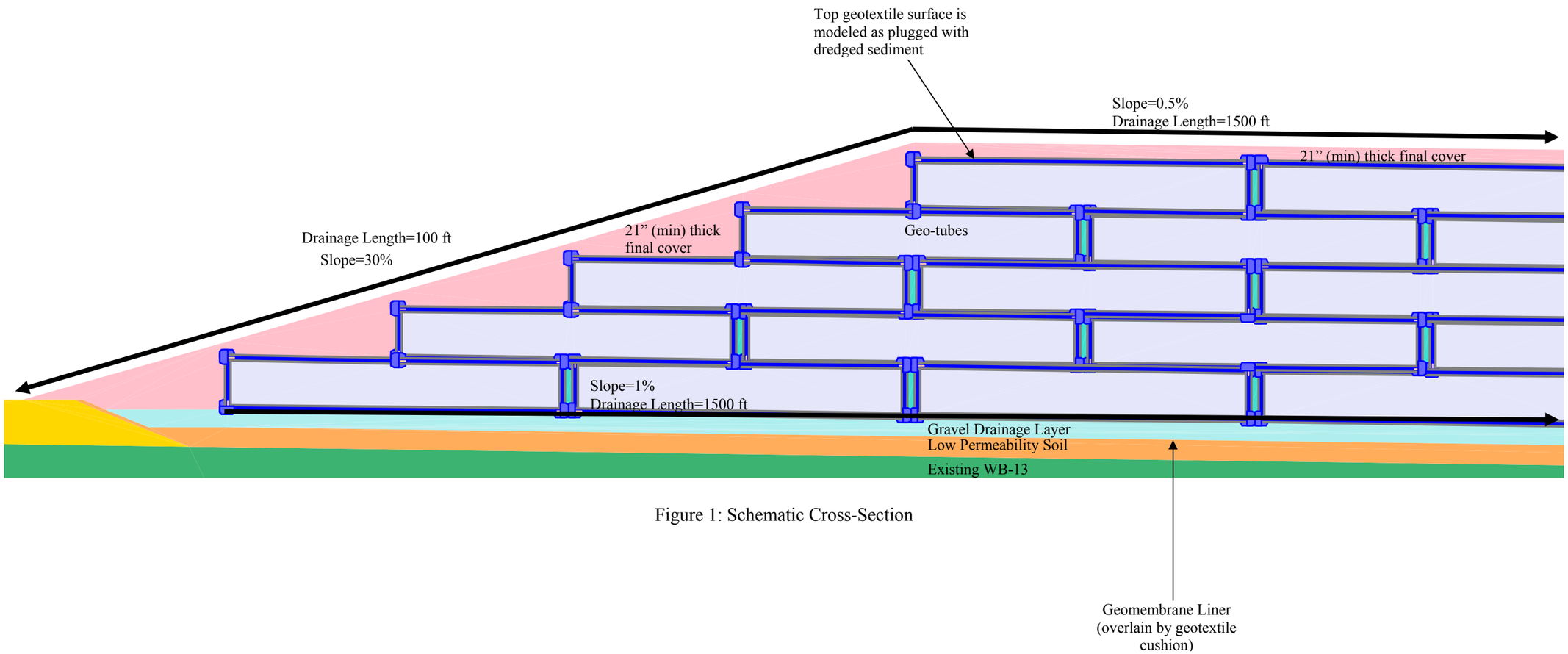


Figure 1: Schematic Cross-Section

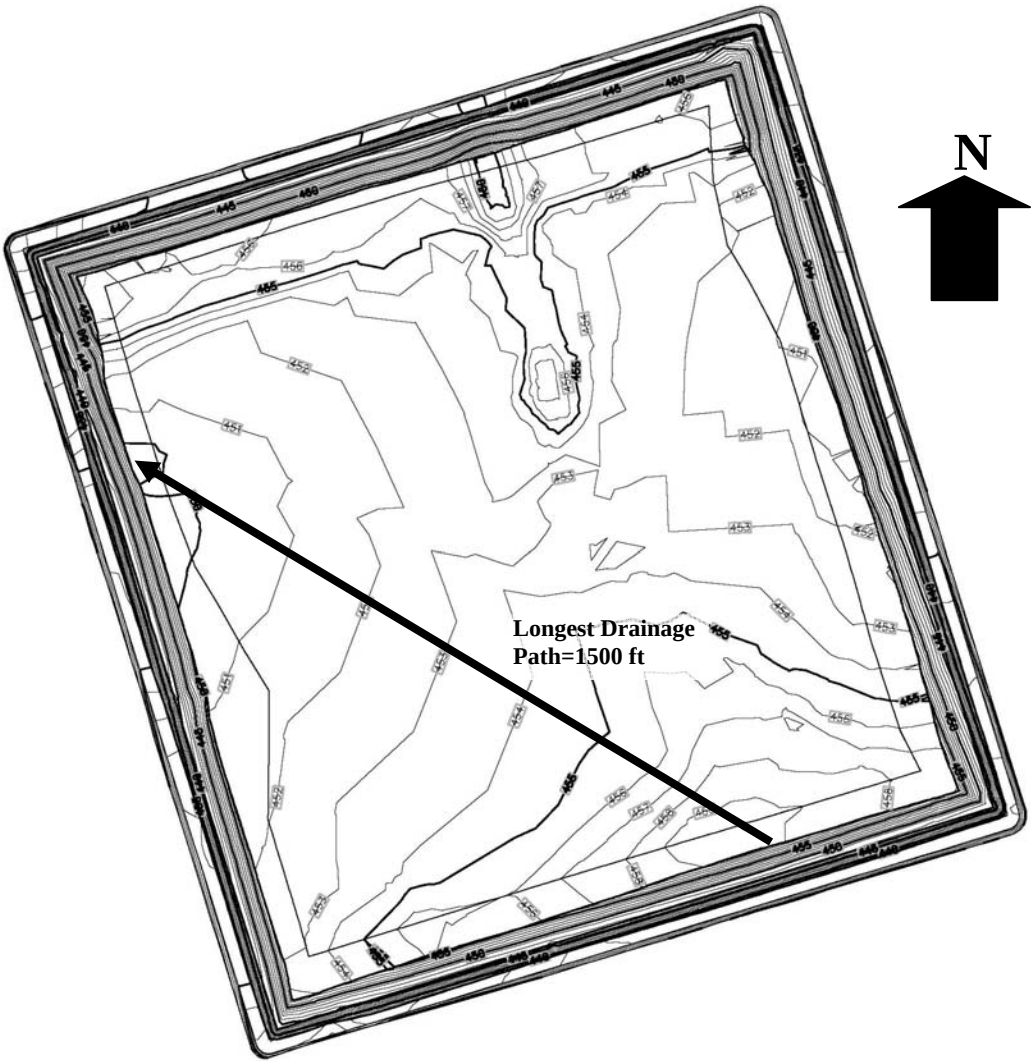


Figure 2: Design Top of Final Cover

Notes:

1. The final cover system was assumed to consist of a 3-inch leveling layer and 18 inches of cover soil for the purposes of the HELP modeling.
2. SCA layout presented on this figure corresponds to the analyses presented in this calculation package. Since the actual SCA layout was developed concurrently with this package, there are some slight differences between the final layout presented in the Drawings (i.e., Appendix E of the IDS) and in this figure. This will be addressed during final design.

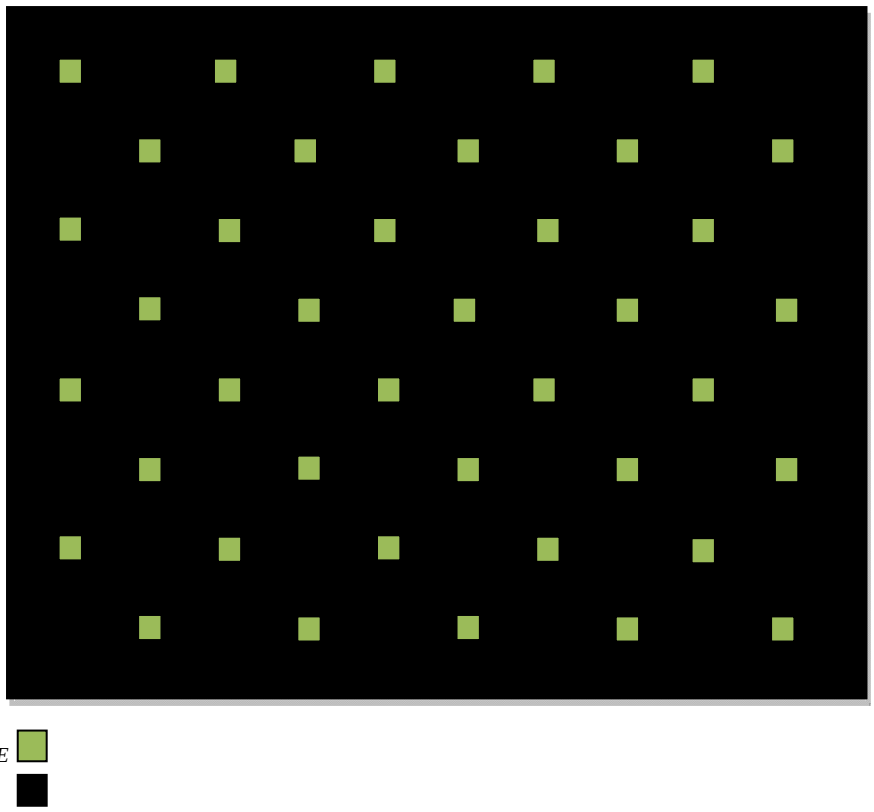


Figure 3: Conceptual View of Geo-tube/Dredge Material Layer Equivalent Hydraulic Conductivity

Notes:

1. This figure illustrates the modeling of the geo-tube/dredge material layer equivalent hydraulic conductivity.
2. The open area of the geo-tubes (assumed to be 4% of total area) is covered with dredge filter cake material, as shown. Therefore, the hydraulic conductivity of the geo-tubes/dredge material interface layer was modeled as a liner with equivalent hydraulic conductivity.

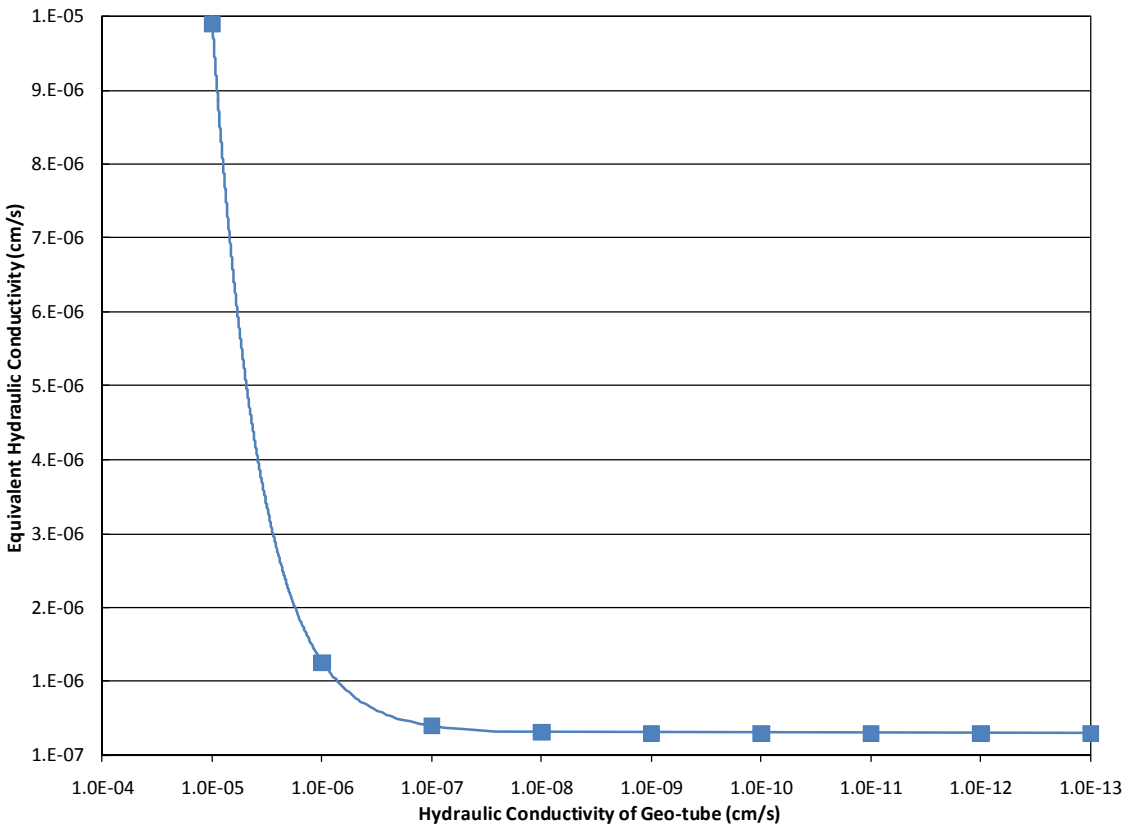


Figure 4: Sensitivity of Dredge Material/Geo-tube Equivalent Hydraulic Conductivity to the Hydraulic Conductivity of the Geo-tube Material

Notes:

1. This figure shows the equivalent hydraulic conductivity of Layer 2, the top of geo-tubes with open areas plugged with dredge material.
2. The actual fabric of a woven geotextile was assumed to have a hydraulic conductivity of 10^{-8} cm/s or less.
3. The calculations were performed using a hydraulic conductivity of 1.0×10^{-5} cm/s for the dredge material.
4. Based on the assumed $K_{GT}=10^{-8}$ cm/s, a K_{EQ} value of 4×10^{-7} cm/s has been assumed for the analyses.

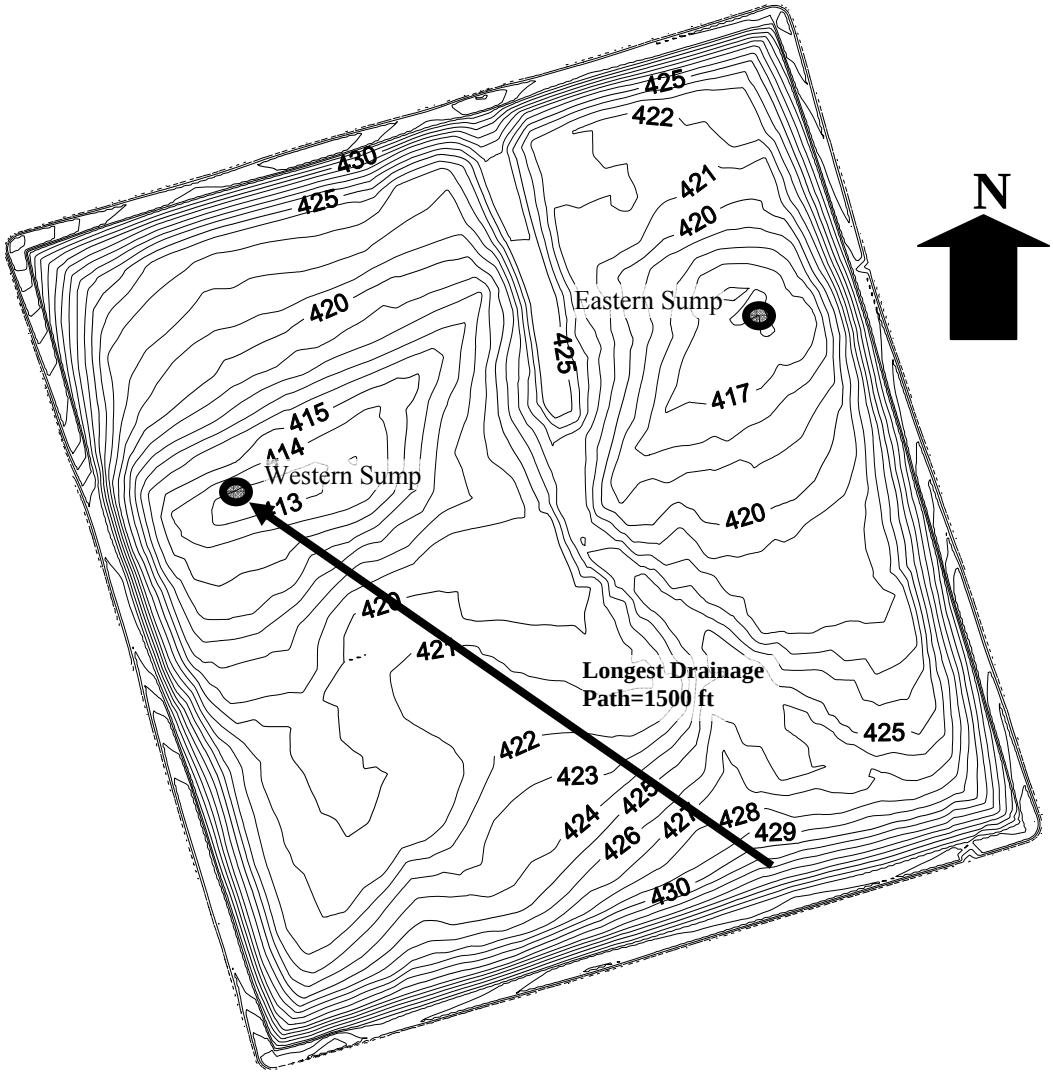


Figure 5: Top of Low Permeability Soil Liner Grades - 30 Years after Closure

Note:

SCA layout presented on this figure corresponds to the analyses presented in this calculation package. Since the actual SCA layout was developed concurrently with this package, there are some slight differences between the final layout presented in the Drawings (i.e., Appendix E of the IDS) and in this figure. This will be addressed during final design.

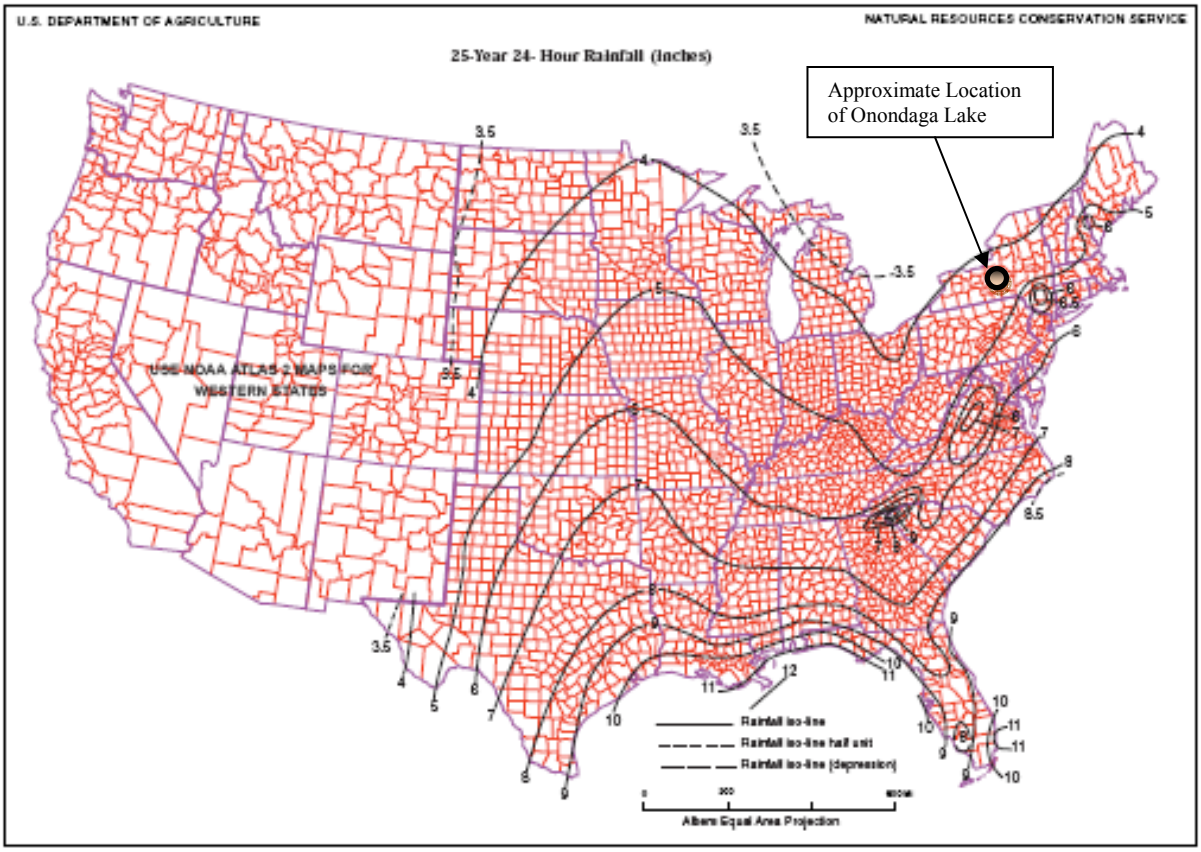


Figure 6: NRCS Map for Calculation of 25-year, 24-hour Storm Event [NRCS, 1986]

Note:

The value selected for the model is 4.5 inches, based on the approximate location of Onondaga Lake.

Attachment 1: HELP Output Files

Written by: **Joseph Sura** Date: **5/18/2009** Reviewed by: **R. Kulasingam/Jay Beech** Date: **5/19/2009**

Client: **Honeywell** Project: **Onondaga Lake SCA IDS** Project/ Proposal No.: **GJ4299** Task No.: **08**

```
******************************************************************************
 ******************************************************************************
 **                                                                          **
 **                                                                          **
 **              HYDROLOGIC EVALUATION OF LANDFILL PERFORMANCE               **
 **                HELP MODEL VERSION 3.07  (1 NOVEMBER 1997)                **
 **                  DEVELOPED BY ENVIRONMENTAL LABORATORY                   **
 **                    USAE WATERWAYS EXPERIMENT STATION                     **
 **             FOR USEPA RISK REDUCTION ENGINEERING LABORATORY              **
 **                                                                          **
 **                                                                          **
 ******************************************************************************
 ******************************************************************************


 PRECIPITATION DATA FILE:    C:\PROGRA~1\HELP\OLPRECIP.D4
 TEMPERATURE DATA FILE:      C:\PROGRA~1\HELP\OLTEMP.D7
 SOLAR RADIATION DATA FILE:  C:\PROGRA~1\HELP\OLSOLAR.D13
 EVAPOTRANSPIRATION DATA:    C:\PROGRA~1\HELP\OLEVAPTR.D11
 SOIL AND DESIGN DATA FILE:  C:\PROGRA~1\HELP\21INCH_A.D10
 OUTPUT DATA FILE:           C:\PROGRA~1\HELP\21INCH_A.OUT


 TIME:  14:23     DATE:   8/ 5/2009


 ******************************************************************************

      TITLE:  Onondaga Lake SCA - 50% Design

 ******************************************************************************


      NOTE:  INITIAL MOISTURE CONTENT OF THE LAYERS AND SNOW WATER WERE
               COMPUTED AS NEARLY STEADY-STATE VALUES BY THE PROGRAM.


                                    LAYER  1
                                    --------

                         TYPE 2 - LATERAL DRAINAGE LAYER
                           MATERIAL TEXTURE NUMBER  70
            THICKNESS                   =     21.00   INCHES
            POROSITY                    =      0.3980 VOL/VOL
            FIELD CAPACITY              =      0.2440 VOL/VOL
            WILTING POINT               =      0.1360 VOL/VOL
            INITIAL SOIL WATER CONTENT  =      0.3568 VOL/VOL
            EFFECTIVE SAT. HYD. COND.   =  0.999999975000E-05 CM/SEC
            SLOPE                       =      0.51   PERCENT
            DRAINAGE LENGTH             =   1500.0    FEET
```

```
                         LAYER  2
                         --------

              TYPE 3 - BARRIER SOIL LINER
              MATERIAL TEXTURE NUMBER  85
THICKNESS                   =      0.06   INCHES
POROSITY                    =      0.8500 VOL/VOL
FIELD CAPACITY              =      0.0100 VOL/VOL
WILTING POINT               =      0.0050 VOL/VOL
INITIAL SOIL WATER CONTENT  =      0.8500 VOL/VOL
EFFECTIVE SAT. HYD. COND.   =  0.400000005000E-06 CM/SEC


                         LAYER  3
                         --------

          TYPE 1 - VERTICAL PERCOLATION LAYER
              MATERIAL TEXTURE NUMBER  95
THICKNESS                   =      0.06   INCHES
POROSITY                    =      0.4630 VOL/VOL
FIELD CAPACITY              =      0.2320 VOL/VOL
WILTING POINT               =      0.1160 VOL/VOL
INITIAL SOIL WATER CONTENT  =      0.2320 VOL/VOL
EFFECTIVE SAT. HYD. COND.   =  0.999999975000E-05 CM/SEC


                         LAYER  4
                         --------

              TYPE 3 - BARRIER SOIL LINER
              MATERIAL TEXTURE NUMBER  95
THICKNESS                   =    360.00   INCHES
POROSITY                    =      0.4630 VOL/VOL
FIELD CAPACITY              =      0.2320 VOL/VOL
WILTING POINT               =      0.1160 VOL/VOL
INITIAL SOIL WATER CONTENT  =      0.4630 VOL/VOL
EFFECTIVE SAT. HYD. COND.   =  0.999999975000E-05 CM/SEC


                         LAYER  5
                         --------

            TYPE 2 - LATERAL DRAINAGE LAYER
              MATERIAL TEXTURE NUMBER   0
THICKNESS                   =     12.00   INCHES
POROSITY                    =      0.3970 VOL/VOL
FIELD CAPACITY              =      0.0320 VOL/VOL
WILTING POINT               =      0.0130 VOL/VOL
INITIAL SOIL WATER CONTENT  =      0.0320 VOL/VOL
EFFECTIVE SAT. HYD. COND.   =   10.0000000000     CM/SEC
SLOPE                       =      1.00   PERCENT
DRAINAGE LENGTH             =   1500.0    FEET
```

```
                         LAYER  6
                         --------

            TYPE 4 - FLEXIBLE MEMBRANE LINER
              MATERIAL TEXTURE NUMBER  36
THICKNESS                   =      0.06   INCHES
POROSITY                    =      0.0000 VOL/VOL
FIELD CAPACITY              =      0.0000 VOL/VOL
WILTING POINT               =      0.0000 VOL/VOL
INITIAL SOIL WATER CONTENT  =      0.0000 VOL/VOL
EFFECTIVE SAT. HYD. COND.   =  0.399999993000E-12 CM/SEC
FML PINHOLE DENSITY         =      0.00   HOLES/ACRE
FML INSTALLATION DEFECTS    =      1.00   HOLES/ACRE
FML PLACEMENT QUALITY       =  3 - GOOD


                         LAYER  7
                         --------

              TYPE 3 - BARRIER SOIL LINER
              MATERIAL TEXTURE NUMBER  90
THICKNESS                   =      6.00   INCHES
POROSITY                    =      0.3980 VOL/VOL
FIELD CAPACITY              =      0.2440 VOL/VOL
WILTING POINT               =      0.1360 VOL/VOL
INITIAL SOIL WATER CONTENT  =      0.3980 VOL/VOL
EFFECTIVE SAT. HYD. COND.   =  0.999999997000E-06 CM/SEC


                         LAYER  8
                         --------

          TYPE 1 - VERTICAL PERCOLATION LAYER
              MATERIAL TEXTURE NUMBER  91
THICKNESS                   =      6.00   INCHES
POROSITY                    =      0.3980 VOL/VOL
FIELD CAPACITY              =      0.2440 VOL/VOL
WILTING POINT               =      0.1360 VOL/VOL
INITIAL SOIL WATER CONTENT  =      0.2337 VOL/VOL
EFFECTIVE SAT. HYD. COND.   =  0.999999975000E-05 CM/SEC


         GENERAL DESIGN AND EVAPORATIVE ZONE DATA
         ----------------------------------------

NOTE:  SCS RUNOFF CURVE NUMBER WAS COMPUTED FROM DEFAULT
         SOIL DATA BASE USING SOIL TEXTURE #10 WITH BARE
         GROUND CONDITIONS, A SURFACE SLOPE OF  1.% AND
```

```
          A SLOPE LENGTH OF 1500. FEET.

   SCS RUNOFF CURVE NUMBER             =     93.10
   FRACTION OF AREA ALLOWING RUNOFF    =    100.0    PERCENT
   AREA PROJECTED ON HORIZONTAL PLANE  =      1.000  ACRES
   EVAPORATIVE ZONE DEPTH              =     21.0    INCHES
   INITIAL WATER IN EVAPORATIVE ZONE   =      7.493  INCHES
   UPPER LIMIT OF EVAPORATIVE STORAGE  =      8.358  INCHES
   LOWER LIMIT OF EVAPORATIVE STORAGE  =      2.856  INCHES
   INITIAL SNOW WATER                  =      0.000  INCHES
   INITIAL WATER IN LAYER MATERIALS    =    178.412  INCHES
   TOTAL INITIAL WATER                 =    178.412  INCHES
   TOTAL SUBSURFACE INFLOW             =      0.00   INCHES/YEAR


            EVAPOTRANSPIRATION AND WEATHER DATA
            -----------------------------------

    NOTE:  EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
             SYRACUSE              NEW YORK

        STATION LATITUDE                       =  43.07 DEGREES
        MAXIMUM LEAF AREA INDEX                =   0.00
        START OF GROWING SEASON (JULIAN DATE)  =    124
        END OF GROWING SEASON (JULIAN DATE)    =    284
        EVAPORATIVE ZONE DEPTH                 =  21.0  INCHES
        AVERAGE ANNUAL WIND SPEED              =   9.70 MPH
        AVERAGE 1ST QUARTER RELATIVE HUMIDITY  =  72.00 %
        AVERAGE 2ND QUARTER RELATIVE HUMIDITY  =  68.00 %
        AVERAGE 3RD QUARTER RELATIVE HUMIDITY  =  75.00 %
        AVERAGE 4TH QUARTER RELATIVE HUMIDITY  =  76.00 %


    NOTE:  PRECIPITATION DATA WAS SYNTHETICALLY GENERATED USING
             COEFFICIENTS FOR    SYRACUSE            NEW YORK

             NORMAL MEAN MONTHLY PRECIPITATION (INCHES)

JAN/JUL     FEB/AUG     MAR/SEP     APR/OCT     MAY/NOV     JUN/DEC
-------     -------     -------     -------     -------     -------
  2.61        2.65        3.11        3.34        3.16        3.63
  3.76        3.77        3.29        3.14        3.45        3.20


    NOTE:  TEMPERATURE DATA WAS SYNTHETICALLY GENERATED USING
             COEFFICIENTS FOR    SYRACUSE            NEW YORK

        NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL     FEB/AUG     MAR/SEP     APR/OCT     MAY/NOV     JUN/DEC
-------     -------     -------     -------     -------     -------
 22.80       24.00       33.30       46.10       57.00       66.30
 70.90       69.30       62.10       51.30       40.60       28.30
```

Written by: **Joseph Sura** Date: **5/18/2009** Reviewed by: **R. Kulasingam/Jay Beech** Date: **5/19/2009**

Client: **Honeywell** Project: **Onondaga Lake SCA IDS** Project/ Proposal No.: **GJ4299** Task No.: **08**

```
        NOTE:  SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
                 COEFFICIENTS FOR    SYRACUSE            NEW YORK
                   AND STATION LATITUDE  =  43.07 DEGREES
```

```
*******************************************************************************

         AVERAGE MONTHLY VALUES IN INCHES FOR YEARS    1 THROUGH  100
-------------------------------------------------------------------------------

                         JAN/JUL  FEB/AUG  MAR/SEP  APR/OCT  MAY/NOV  JUN/DEC
                         -------  -------  -------  -------  -------  -------
  PRECIPITATION
  -------------
    TOTALS                 2.59     2.72     3.16     3.27     3.09     3.71
                           3.87     3.95     3.27     2.95     3.40     3.22

    STD. DEVIATIONS        0.70     0.96     1.19     1.19     1.31     1.58
                           1.67     1.76     1.60     1.16     1.19     0.76

  RUNOFF
  ------
    TOTALS                 0.712    1.584    4.905    1.833    0.545    0.980
                           1.001    1.065    0.860    0.647    0.751    0.689

    STD. DEVIATIONS        0.848    1.569    2.417    1.371    0.555    0.835
                           0.809    0.803    0.829    0.534    0.586    0.703

  EVAPOTRANSPIRATION
  ------------------
    TOTALS                 0.487    0.399    0.440    1.865    2.641    2.606
                           2.857    2.627    2.149    1.717    1.127    0.560

    STD. DEVIATIONS        0.084    0.081    0.190    0.772    0.842    0.756
                           0.943    0.916    0.703    0.388    0.204    0.167

  LATERAL DRAINAGE COLLECTED FROM LAYER  1
  ----------------------------------------
    TOTALS                 0.0000   0.0000   0.0000   0.0000   0.0000   0.0000
                           0.0000   0.0000   0.0000   0.0000   0.0000   0.0000

    STD. DEVIATIONS        0.0000   0.0000   0.0000   0.0000   0.0000   0.0000
                           0.0000   0.0000   0.0000   0.0000   0.0000   0.0000

  PERCOLATION/LEAKAGE THROUGH LAYER  2
  -------------------------------------
    TOTALS                 0.0411   0.0000   0.1169   1.0511   0.2884   0.0620
                           0.0568   0.1096   0.2118   0.3912   0.8955   0.9263

    STD. DEVIATIONS        0.1316   0.0000   0.3135   0.3052   0.2685   0.0911
                           0.0975   0.1439   0.2307   0.3511   0.5218   0.5928

  PERCOLATION/LEAKAGE THROUGH LAYER  4
  -------------------------------------
```

```
  TOTALS                 0.0417   0.0000   0.1157   1.0488   0.2918   0.0620
                         0.0568   0.1096   0.2118   0.3912   0.8950   0.9261

  STD. DEVIATIONS        0.1323   0.0000   0.3111   0.3087   0.2733   0.0911
                         0.0975   0.1439   0.2307   0.3511   0.5212   0.5923

LATERAL DRAINAGE COLLECTED FROM LAYER  5
-----------------------------------------
  TOTALS                 0.0517   0.0000   0.1039   1.0292   0.3204   0.0629
                         0.0572   0.1065   0.2092   0.3849   0.8639   0.9609

  STD. DEVIATIONS        0.1497   0.0000   0.2888   0.3260   0.3021   0.0899
                         0.0982   0.1405   0.2277   0.3495   0.5055   0.5884

PERCOLATION/LEAKAGE THROUGH LAYER  7
-------------------------------------
  TOTALS                 0.0000   0.0000   0.0000   0.0000   0.0000   0.0000
                         0.0000   0.0000   0.0000   0.0000   0.0000   0.0000

  STD. DEVIATIONS        0.0000   0.0000   0.0000   0.0000   0.0000   0.0000
                         0.0000   0.0000   0.0000   0.0000   0.0000   0.0000

PERCOLATION/LEAKAGE THROUGH LAYER  8
-------------------------------------
  TOTALS                 0.0001   0.0000   0.0000   0.0003   0.0005   0.0003
                         0.0002   0.0003   0.0004   0.0004   0.0004   0.0004

  STD. DEVIATIONS        0.0001   0.0000   0.0003   0.0008   0.0009   0.0005
                         0.0005   0.0005   0.0007   0.0008   0.0007   0.0007


-------------------------------------------------------------------------------
               AVERAGES OF MONTHLY AVERAGED DAILY HEADS (INCHES)
-------------------------------------------------------------------------------


DAILY AVERAGE HEAD ON TOP OF LAYER  2
-------------------------------------
  AVERAGES               0.0043   0.0000   0.0148   0.1259   0.0173   0.0024
                         0.0022   0.0058   0.0137   0.0293   0.0912   0.0972

  STD. DEVIATIONS        0.0138   0.0000   0.0401   0.0397   0.0290   0.0066
                         0.0056   0.0113   0.0221   0.0371   0.0684   0.0729

DAILY AVERAGE HEAD ON TOP OF LAYER  4
-------------------------------------
  AVERAGES               0.0006   0.0000   0.0009   0.0107   0.0047   0.0011
                         0.0010   0.0019   0.0036   0.0062   0.0126   0.0123

  STD. DEVIATIONS        0.0020   0.0000   0.0025   0.0038   0.0035   0.0016
                         0.0017   0.0024   0.0037   0.0049   0.0059   0.0066

DAILY AVERAGE HEAD ON TOP OF LAYER  6
-------------------------------------
  AVERAGES               0.0044   0.0000   0.0089   0.0908   0.0273   0.0056
                         0.0049   0.0091   0.0184   0.0329   0.0762   0.0820

  STD. DEVIATIONS        0.0128   0.0000   0.0247   0.0288   0.0258   0.0079
                         0.0084   0.0120   0.0201   0.0298   0.0446   0.0502
```

```
******************************************************************************


******************************************************************************

     AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS    1 THROUGH  100
------------------------------------------------------------------------------
                                      INCHES            CU. FEET       PERCENT
                                 -------------------   -------------   ---------
 PRECIPITATION                    39.20    (   4.823)     142283.3     100.00

 RUNOFF                           15.572   (  3.1194)      56527.99     39.729

 EVAPOTRANSPIRATION               19.475   (  2.2639)      70693.06     49.685

 LATERAL DRAINAGE COLLECTED        0.00000 (  0.00000)         0.009    0.00001
   FROM LAYER  1

 PERCOLATION/LEAKAGE THROUGH       4.15055 (  0.96291)     15066.501    10.58909
   LAYER  2

 AVERAGE HEAD ON TOP               0.034 (    0.010)
   OF LAYER  2

 PERCOLATION/LEAKAGE THROUGH       4.15055 (  0.96233)     15066.501    10.58909
   LAYER  4

 AVERAGE HEAD ON TOP               0.005 (    0.001)
   OF LAYER  4

 LATERAL DRAINAGE COLLECTED        4.15050 (  0.96025)     15066.326   10.58897
   FROM LAYER  5

 PERCOLATION/LEAKAGE THROUGH       0.00005 (  0.00001)         0.170     0.00012
   LAYER  7

 AVERAGE HEAD ON TOP               0.030 (    0.007)
   OF LAYER  6

 PERCOLATION/LEAKAGE THROUGH       0.00331 (  0.00586)        12.008     0.00844
   LAYER  8

 CHANGE IN WATER STORAGE          -0.004   (  1.2709)        -16.11     -0.011

******************************************************************************

******************************************************************************

                PEAK DAILY VALUES FOR YEARS    1 THROUGH  100
   ------------------------------------------------------------------------
                                              (INCHES)      (CU. FT.)
                                             ----------   -------------
      PRECIPITATION                            4.50         16335.000

      RUNOFF                                   4.272        15508.6543

      DRAINAGE COLLECTED FROM LAYER  1         0.00000          0.00125
```

```
PERCOLATION/LEAKAGE THROUGH LAYER  2       0.420048      1524.77307

AVERAGE HEAD ON TOP OF LAYER  2            1.786

MAXIMUM HEAD ON TOP OF LAYER  2            3.238

LOCATION OF MAXIMUM HEAD IN LAYER  1
      (DISTANCE FROM DRAIN)              140.3 FEET

PERCOLATION/LEAKAGE THROUGH LAYER  4       0.340209      1234.95764

AVERAGE HEAD ON TOP OF LAYER  4            0.060

DRAINAGE COLLECTED FROM LAYER  5           0.27550       1000.06726

PERCOLATION/LEAKAGE THROUGH LAYER  7       0.000003         0.00930

AVERAGE HEAD ON TOP OF LAYER  6            0.729

MAXIMUM HEAD ON TOP OF LAYER  6            1.413

LOCATION OF MAXIMUM HEAD IN LAYER  5
      (DISTANCE FROM DRAIN)               46.5 FEET

PERCOLATION/LEAKAGE THROUGH LAYER  8       0.000247         0.89726

SNOW WATER                                 9.62         34911.7891


MAXIMUM VEG. SOIL WATER (VOL/VOL)                  0.3725

MINIMUM VEG. SOIL WATER (VOL/VOL)                  0.2391


 ***  Maximum heads are computed using McEnroe's equations.  ***

      Reference:  Maximum Saturated Depth over Landfill Liner
                  by Bruce M. McEnroe, University of Kansas
                  ASCE Journal of Environmental Engineering
                  Vol. 119, No. 2, March 1993, pp. 262-270.

******************************************************************************

******************************************************************************

                  FINAL WATER STORAGE AT END OF YEAR  100
    ---------------------------------------------------------------------
                   LAYER        (INCHES)       (VOL/VOL)
                   -----        --------       ---------
                     1            7.3291         0.3490

                     2            0.0510         0.8500

                     3            0.0139         0.2320

                     4          166.6800         0.4630
```

```
                    5          0.3840        0.0320

                    6          0.0000        0.0000

                    7          2.3880        0.3980

                    8          1.0763        0.1794

                SNOW WATER     0.046

*******************************************************************************
*******************************************************************************
```

```
******************************************************************************
 ******************************************************************************
 **                                                                          **
 **                                                                          **
 **              HYDROLOGIC EVALUATION OF LANDFILL PERFORMANCE               **
 **                HELP MODEL VERSION 3.07  (1 NOVEMBER 1997)                **
 **                  DEVELOPED BY ENVIRONMENTAL LABORATORY                   **
 **                    USAE WATERWAYS EXPERIMENT STATION                     **
 **             FOR USEPA RISK REDUCTION ENGINEERING LABORATORY              **
 **                                                                          **
 **                                                                          **
 ******************************************************************************
 ******************************************************************************


 PRECIPITATION DATA FILE:    C:\PROGRA~1\HELP\OLPRECIP.D4
 TEMPERATURE DATA FILE:      C:\PROGRA~1\HELP\OLTEMP.D7
 SOLAR RADIATION DATA FILE:  C:\PROGRA~1\HELP\OLSOLAR.D13
 EVAPOTRANSPIRATION DATA:    C:\PROGRA~1\HELP\OLEVAPTR.D11
 SOIL AND DESIGN DATA FILE:  C:\PROGRA~1\HELP\S21IN_A.D10
 OUTPUT DATA FILE:           C:\PROGRA~1\HELP\S21IN_A.OUT


 TIME:  14:25     DATE:   8/ 5/2009


 ******************************************************************************

      TITLE:  Onondaga Lake SCA - 50% Design

 ******************************************************************************


      NOTE:  INITIAL MOISTURE CONTENT OF THE LAYERS AND SNOW WATER WERE
               COMPUTED AS NEARLY STEADY-STATE VALUES BY THE PROGRAM.


                                    LAYER  1
                                    --------

                         TYPE 2 - LATERAL DRAINAGE LAYER
                           MATERIAL TEXTURE NUMBER  70
            THICKNESS                   =     21.00   INCHES
            POROSITY                    =      0.3980 VOL/VOL
            FIELD CAPACITY              =      0.2440 VOL/VOL
            WILTING POINT               =      0.1360 VOL/VOL
            INITIAL SOIL WATER CONTENT  =      0.3560 VOL/VOL
            EFFECTIVE SAT. HYD. COND.   =  0.999999975000E-05 CM/SEC
            SLOPE                       =     30.00   PERCENT
            DRAINAGE LENGTH             =    100.0    FEET
```

```
                         LAYER  2
                         --------

              TYPE 3 - BARRIER SOIL LINER
              MATERIAL TEXTURE NUMBER  85
THICKNESS                   =      0.06   INCHES
POROSITY                    =      0.8500 VOL/VOL
FIELD CAPACITY              =      0.0100 VOL/VOL
WILTING POINT               =      0.0050 VOL/VOL
INITIAL SOIL WATER CONTENT  =      0.8500 VOL/VOL
EFFECTIVE SAT. HYD. COND.   =  0.400000005000E-06 CM/SEC


                         LAYER  3
                         --------

          TYPE 1 - VERTICAL PERCOLATION LAYER
              MATERIAL TEXTURE NUMBER   0
THICKNESS                   =      0.06   INCHES
POROSITY                    =      0.4630 VOL/VOL
FIELD CAPACITY              =      0.2320 VOL/VOL
WILTING POINT               =      0.1160 VOL/VOL
INITIAL SOIL WATER CONTENT  =      0.2320 VOL/VOL
EFFECTIVE SAT. HYD. COND.   =  0.999999975000E-05 CM/SEC


                         LAYER  4
                         --------

              TYPE 3 - BARRIER SOIL LINER
              MATERIAL TEXTURE NUMBER  95
THICKNESS                   =    360.00   INCHES
POROSITY                    =      0.4630 VOL/VOL
FIELD CAPACITY              =      0.2320 VOL/VOL
WILTING POINT               =      0.1160 VOL/VOL
INITIAL SOIL WATER CONTENT  =      0.4630 VOL/VOL
EFFECTIVE SAT. HYD. COND.   =  0.999999975000E-05 CM/SEC


                         LAYER  5
                         --------

            TYPE 2 - LATERAL DRAINAGE LAYER
              MATERIAL TEXTURE NUMBER   0
THICKNESS                   =     12.00   INCHES
POROSITY                    =      0.3970 VOL/VOL
FIELD CAPACITY              =      0.0320 VOL/VOL
WILTING POINT               =      0.0130 VOL/VOL
INITIAL SOIL WATER CONTENT  =      0.0320 VOL/VOL
EFFECTIVE SAT. HYD. COND.   =   10.0000000000     CM/SEC
SLOPE                       =      1.00   PERCENT
DRAINAGE LENGTH             =   1500.0    FEET
```

```
                         LAYER  6
                         --------

              TYPE 4 - FLEXIBLE MEMBRANE LINER
                MATERIAL TEXTURE NUMBER  36
THICKNESS                   =      0.06   INCHES
POROSITY                    =      0.0000 VOL/VOL
FIELD CAPACITY              =      0.0000 VOL/VOL
WILTING POINT               =      0.0000 VOL/VOL
INITIAL SOIL WATER CONTENT  =      0.0000 VOL/VOL
EFFECTIVE SAT. HYD. COND.   =  0.399999993000E-12 CM/SEC
FML PINHOLE DENSITY         =      0.00   HOLES/ACRE
FML INSTALLATION DEFECTS    =      1.00   HOLES/ACRE
FML PLACEMENT QUALITY       =  3 - GOOD


                         LAYER  7
                         --------

                TYPE 3 - BARRIER SOIL LINER
                MATERIAL TEXTURE NUMBER  90
THICKNESS                   =      6.00   INCHES
POROSITY                    =      0.3980 VOL/VOL
FIELD CAPACITY              =      0.2440 VOL/VOL
WILTING POINT               =      0.1360 VOL/VOL
INITIAL SOIL WATER CONTENT  =      0.3980 VOL/VOL
EFFECTIVE SAT. HYD. COND.   =  0.999999997000E-06 CM/SEC


                         LAYER  8
                         --------

            TYPE 1 - VERTICAL PERCOLATION LAYER
                MATERIAL TEXTURE NUMBER  91
THICKNESS                   =      6.00   INCHES
POROSITY                    =      0.3980 VOL/VOL
FIELD CAPACITY              =      0.2440 VOL/VOL
WILTING POINT               =      0.1360 VOL/VOL
INITIAL SOIL WATER CONTENT  =      0.2343 VOL/VOL
EFFECTIVE SAT. HYD. COND.   =  0.999999975000E-05 CM/SEC


          GENERAL DESIGN AND EVAPORATIVE ZONE DATA
          ----------------------------------------

NOTE:  SCS RUNOFF CURVE NUMBER WAS COMPUTED FROM DEFAULT
         SOIL DATA BASE USING SOIL TEXTURE #10 WITH BARE
         GROUND CONDITIONS, A SURFACE SLOPE OF 30.% AND
```

Written by: **Joseph Sura** Date: **5/18/2009** Reviewed by: **R. Kulasingam/Jay Beech** Date: **5/19/2009**

Client: **Honeywell** Project: **Onondaga Lake SCA IDS** Project/ Proposal No.: **GJ4299** Task No.: **08**

```
          A SLOPE LENGTH OF  100. FEET.

   SCS RUNOFF CURVE NUMBER             =     94.60
   FRACTION OF AREA ALLOWING RUNOFF    =    100.0    PERCENT
   AREA PROJECTED ON HORIZONTAL PLANE  =      1.000  ACRES
   EVAPORATIVE ZONE DEPTH              =     21.0    INCHES
   INITIAL WATER IN EVAPORATIVE ZONE   =      7.476  INCHES
   UPPER LIMIT OF EVAPORATIVE STORAGE  =      8.358  INCHES
   LOWER LIMIT OF EVAPORATIVE STORAGE  =      2.856  INCHES
   INITIAL SNOW WATER                  =      0.000  INCHES
   INITIAL WATER IN LAYER MATERIALS    =    178.399  INCHES
   TOTAL INITIAL WATER                 =    178.399  INCHES
   TOTAL SUBSURFACE INFLOW             =      0.00   INCHES/YEAR


             EVAPOTRANSPIRATION AND WEATHER DATA
             -----------------------------------

    NOTE:  EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
             SYRACUSE              NEW YORK

        STATION LATITUDE                       =  43.07 DEGREES
        MAXIMUM LEAF AREA INDEX                =   0.00
        START OF GROWING SEASON (JULIAN DATE)  =    124
        END OF GROWING SEASON (JULIAN DATE)    =    284
        EVAPORATIVE ZONE DEPTH                 =  21.0  INCHES
        AVERAGE ANNUAL WIND SPEED              =   9.70 MPH
        AVERAGE 1ST QUARTER RELATIVE HUMIDITY  =  72.00 %
        AVERAGE 2ND QUARTER RELATIVE HUMIDITY  =  68.00 %
        AVERAGE 3RD QUARTER RELATIVE HUMIDITY  =  75.00 %
        AVERAGE 4TH QUARTER RELATIVE HUMIDITY  =  76.00 %


    NOTE:  PRECIPITATION DATA WAS SYNTHETICALLY GENERATED USING
             COEFFICIENTS FOR    SYRACUSE            NEW YORK

             NORMAL MEAN MONTHLY PRECIPITATION (INCHES)

JAN/JUL     FEB/AUG     MAR/SEP     APR/OCT     MAY/NOV     JUN/DEC
-------     -------     -------     -------     -------     -------
  2.61        2.65        3.11        3.34        3.16        3.63
  3.76        3.77        3.29        3.14        3.45        3.20


    NOTE:  TEMPERATURE DATA WAS SYNTHETICALLY GENERATED USING
             COEFFICIENTS FOR    SYRACUSE            NEW YORK

        NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL     FEB/AUG     MAR/SEP     APR/OCT     MAY/NOV     JUN/DEC
-------     -------     -------     -------     -------     -------
 22.80       24.00       33.30       46.10       57.00       66.30
 70.90       69.30       62.10       51.30       40.60       28.30
```

Written by: **Joseph Sura** Date: **5/18/2009** Reviewed by: **R. Kulasingam/Jay Beech** Date: **5/19/2009**

Client: **Honeywell** Project: **Onondaga Lake SCA IDS** Project/ Proposal No.: **GJ4299** Task No.: **08**

```
        NOTE:  SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
                 COEFFICIENTS FOR    SYRACUSE            NEW YORK
                   AND STATION LATITUDE  =  43.07 DEGREES
```

```
*******************************************************************************

         AVERAGE MONTHLY VALUES IN INCHES FOR YEARS    1 THROUGH  100
-------------------------------------------------------------------------------

                         JAN/JUL  FEB/AUG  MAR/SEP  APR/OCT  MAY/NOV  JUN/DEC
                         -------  -------  -------  -------  -------  -------
  PRECIPITATION
  -------------
    TOTALS                 2.59     2.72     3.16     3.27     3.09     3.71
                           3.87     3.95     3.27     2.95     3.40     3.22

    STD. DEVIATIONS        0.70     0.96     1.19     1.19     1.31     1.58
                           1.67     1.76     1.60     1.16     1.19     0.76

  RUNOFF
  ------
    TOTALS                 0.712    1.583    4.907    1.931    0.711    1.224
                           1.253    1.324    1.063    0.814    0.924    0.759

    STD. DEVIATIONS        0.846    1.568    2.415    1.350    0.629    0.929
                           0.906    0.911    0.916    0.602    0.655    0.714

  EVAPOTRANSPIRATION
  ------------------
    TOTALS                 0.487    0.399    0.440    1.848    2.519    2.417
                           2.642    2.477    2.045    1.688    1.123    0.560

    STD. DEVIATIONS        0.084    0.081    0.190    0.759    0.791    0.707
                           0.894    0.864    0.682    0.387    0.205    0.167

  LATERAL DRAINAGE COLLECTED FROM LAYER  1
  ----------------------------------------
    TOTALS                 0.0000   0.0000   0.0001   0.0006   0.0001   0.0000
                           0.0000   0.0000   0.0000   0.0001   0.0003   0.0004

    STD. DEVIATIONS        0.0001   0.0000   0.0002   0.0002   0.0001   0.0000
                           0.0000   0.0000   0.0001   0.0001   0.0003   0.0003

  PERCOLATION/LEAKAGE THROUGH LAYER  2
  -------------------------------------
    TOTALS                 0.0383   0.0000   0.1158   1.0168   0.2464   0.0366
                           0.0135   0.0183   0.0909   0.2335   0.7036   0.8286

    STD. DEVIATIONS        0.1219   0.0000   0.3104   0.3045   0.2481   0.0452
                           0.0360   0.0486   0.1357   0.2589   0.4430   0.5213

  PERCOLATION/LEAKAGE THROUGH LAYER  4
  -------------------------------------
```

```
  TOTALS                 0.0383   0.0000   0.1145   1.0149   0.2496   0.0366
                         0.0135   0.0183   0.0909   0.2335   0.7033   0.8289

  STD. DEVIATIONS        0.1219   0.0000   0.3077   0.3070   0.2532   0.0453
                         0.0360   0.0486   0.1357   0.2589   0.4427   0.5215

LATERAL DRAINAGE COLLECTED FROM LAYER  5
-----------------------------------------
  TOTALS                 0.0473   0.0000   0.1028   0.9974   0.2763   0.0385
                         0.0137   0.0176   0.0875   0.2283   0.6739   0.8589

  STD. DEVIATIONS        0.1377   0.0000   0.2857   0.3192   0.2824   0.0455
                         0.0356   0.0476   0.1321   0.2551   0.4276   0.5187

PERCOLATION/LEAKAGE THROUGH LAYER  7
-------------------------------------
  TOTALS                 0.0000   0.0000   0.0000   0.0000   0.0000   0.0000
                         0.0000   0.0000   0.0000   0.0000   0.0000   0.0000

  STD. DEVIATIONS        0.0000   0.0000   0.0000   0.0000   0.0000   0.0000
                         0.0000   0.0000   0.0000   0.0000   0.0000   0.0000

PERCOLATION/LEAKAGE THROUGH LAYER  8
-------------------------------------
  TOTALS                 0.0001   0.0000   0.0001   0.0003   0.0006   0.0004
                         0.0001   0.0001   0.0002   0.0004   0.0005   0.0005

  STD. DEVIATIONS        0.0001   0.0000   0.0003   0.0009   0.0009   0.0005
                         0.0003   0.0005   0.0006   0.0008   0.0008   0.0007


-------------------------------------------------------------------------------
               AVERAGES OF MONTHLY AVERAGED DAILY HEADS (INCHES)
-------------------------------------------------------------------------------


DAILY AVERAGE HEAD ON TOP OF LAYER  2
-------------------------------------
  AVERAGES               0.0039   0.0000   0.0147   0.1216   0.0139   0.0011
                         0.0004   0.0007   0.0048   0.0152   0.0674   0.0839

  STD. DEVIATIONS        0.0125   0.0000   0.0397   0.0405   0.0266   0.0020
                         0.0012   0.0029   0.0108   0.0247   0.0562   0.0627

DAILY AVERAGE HEAD ON TOP OF LAYER  4
-------------------------------------
  AVERAGES               0.0006   0.0000   0.0009   0.0102   0.0040   0.0007
                         0.0002   0.0003   0.0016   0.0039   0.0105   0.0117

  STD. DEVIATIONS        0.0019   0.0000   0.0025   0.0034   0.0032   0.0008
                         0.0006   0.0008   0.0023   0.0040   0.0057   0.0063

DAILY AVERAGE HEAD ON TOP OF LAYER  6
-------------------------------------
  AVERAGES               0.0040   0.0000   0.0088   0.0880   0.0236   0.0034
                         0.0012   0.0015   0.0077   0.0195   0.0594   0.0733

  STD. DEVIATIONS        0.0118   0.0000   0.0244   0.0282   0.0241   0.0040
                         0.0030   0.0041   0.0117   0.0218   0.0377   0.0443
```

```
******************************************************************************


******************************************************************************

     AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS    1 THROUGH  100
------------------------------------------------------------------------------
                                      INCHES            CU. FEET       PERCENT
                                 -------------------   -------------   ---------
 PRECIPITATION                    39.20    (   4.823)     142283.3     100.00

 RUNOFF                           17.207   (  3.2909)      62462.16     43.900

 EVAPOTRANSPIRATION               18.646   (  2.1402)      67686.69     47.572

 LATERAL DRAINAGE COLLECTED        0.00154 (  0.00044)         5.602    0.00394
   FROM LAYER  1

 PERCOLATION/LEAKAGE THROUGH       3.34230 (  0.78612)     12132.546     8.52704
   LAYER  2

 AVERAGE HEAD ON TOP               0.027 (    0.008)
   OF LAYER  2

 PERCOLATION/LEAKAGE THROUGH       3.34230 (  0.78612)     12132.546     8.52704
   LAYER  4

 AVERAGE HEAD ON TOP               0.004 (    0.001)
   OF LAYER  4

 LATERAL DRAINAGE COLLECTED        3.34226 (  0.78390)     12132.407    8.52694
   FROM LAYER  5

 PERCOLATION/LEAKAGE THROUGH       0.00004 (  0.00001)         0.137     0.00010
   LAYER  7

 AVERAGE HEAD ON TOP               0.024 (    0.006)
   OF LAYER  6

 PERCOLATION/LEAKAGE THROUGH       0.00320 (  0.00563)        11.624     0.00817
   LAYER  8

 CHANGE IN WATER STORAGE          -0.004   (  1.2702)        -15.17     -0.011

******************************************************************************

*****************************************************************************

                PEAK DAILY VALUES FOR YEARS    1 THROUGH  100
   ------------------------------------------------------------------------
                                                (INCHES)      (CU. FT.)
                                               ----------   -------------
      PRECIPITATION                              4.50         16335.000

      RUNOFF                                     4.273        15510.7783

      DRAINAGE COLLECTED FROM LAYER  1           0.00028          1.00855
```

```
PERCOLATION/LEAKAGE THROUGH LAYER  2       0.418749      1520.05920

AVERAGE HEAD ON TOP OF LAYER  2            1.781

MAXIMUM HEAD ON TOP OF LAYER  2            3.434

LOCATION OF MAXIMUM HEAD IN LAYER  1
      (DISTANCE FROM DRAIN)                0.0 FEET

PERCOLATION/LEAKAGE THROUGH LAYER  4       0.340209      1234.95764

AVERAGE HEAD ON TOP OF LAYER  4            0.060

DRAINAGE COLLECTED FROM LAYER  5           0.27335        992.27362

PERCOLATION/LEAKAGE THROUGH LAYER  7       0.000003         0.00923

AVERAGE HEAD ON TOP OF LAYER  6            0.723

MAXIMUM HEAD ON TOP OF LAYER  6            1.402

LOCATION OF MAXIMUM HEAD IN LAYER  5
      (DISTANCE FROM DRAIN)               46.2 FEET

PERCOLATION/LEAKAGE THROUGH LAYER  8       0.000257         0.93328

SNOW WATER                                 9.62         34911.7891


MAXIMUM VEG. SOIL WATER (VOL/VOL)                  0.3725

MINIMUM VEG. SOIL WATER (VOL/VOL)                  0.2396


 ***  Maximum heads are computed using McEnroe's equations.  ***

      Reference:  Maximum Saturated Depth over Landfill Liner
                  by Bruce M. McEnroe, University of Kansas
                  ASCE Journal of Environmental Engineering
                  Vol. 119, No. 2, March 1993, pp. 262-270.

******************************************************************************

******************************************************************************

                  FINAL WATER STORAGE AT END OF YEAR  100
    ---------------------------------------------------------------------
                   LAYER        (INCHES)       (VOL/VOL)
                   -----        --------       ---------
                     1            7.3289         0.3490

                     2            0.0510         0.8500

                     3            0.0139         0.2320

                     4          166.6800         0.4630
```

Written by: **Joseph Sura** Date: **5/18/2009** Reviewed by: **R. Kulasingam/Jay Beech** Date: **5/19/2009**

Client: **Honeywell** Project: **Onondaga Lake SCA IDS** Project/ Proposal No.: **GJ4299** Task No.: **08**

```
                    5          0.3840        0.0320

                    6          0.0000        0.0000

                    7          2.3880        0.3980

                    8          1.0894        0.1816

                SNOW WATER     0.046

*******************************************************************************
*******************************************************************************
```

APPENDIX J

SUMP AND RISER CALCULATIONS FOR SCA DESIGN

GEOSYNTEC CONSULTANTS

COMPUTATION COVER SHEET

Client: Honeywell **Project:** Onondaga Lake SCA IDS **Project/Proposal #:** GJ4299 **Task #:** 06

TITLE OF COMPUTATIONS **SUMP AND RISER CALCULATIONS FOR SCA DESIGN**

COMPUTATIONS BY:
Signature [signature] 8/4/2009 DATE
Printed Name and Title Joseph Sura, Staff Engineer

ASSUMPTIONS AND PROCEDURES CHECKED BY:
(Peer Reviewer)
Signature R. Kulasingam 8/4/2009 DATE
Printed Name and Title R. Kulasingam, Project Engineer

COMPUTATIONS CHECKED BY:
Signature Fan Zhu 8/4/2009 DATE
Printed Name and Title Fan Zhu, Staff Engineer

COMPUTATIONS BACKCHECKED BY:
(Originator)
Signature [signature] 8/4/2009 DATE
Printed Name and Title Joseph Sura, Staff Engineer

APPROVED BY:
(PM or Designate)
Signature [signature] 4/8/2009 DATE
Printed Name and Title Jay Beech, Principal

STATE OF NEW YORK · JOHN E. BEECH · No. 066337 · LICENSED PROFESSIONAL ENGINEER

APPROVAL NOTES:

REVISIONS (Number and initial all revisions)

NO.	SHEET	DATE	BY	CHECKED BY	APPROVAL

Written by:	Joseph Sura	Date:	5/28/2009	Reviewed by:	R. Kulasingam/Jay Beech	Date:	5/29/2009

Client:	Honeywell	Project:	Onondaga Lake SCA IDS	Project/ Proposal No.:	GJ4299	Task No.:	06

SUMP AND RISER CALCULATIONS FOR SCA DESIGN

INTRODUCTION

This package was prepared in support of the design of the Sediment Consolidation Area (SCA) for the Onondaga Lake Bottom Site, which will be constructed on Wastebed 13 (WB-13) to contain dredged material from the Lake. This package presents analysis of the proposed liquid management system (LMS) sump and riser of the SCA, which will utilize geotextile tubes (geo-tubes) for dewatering. The purpose of the analyses presented in this package is to:

1. Evaluate the hydraulic requirements for riser pipe perforations to handle the design inflow during post-closure conditions.
2. Evaluate the requirements for structural stability of the riser pipe, including wall crushing, wall buckling, ring deflection, and ring bending strain.
3. Calculate the liquid storage volume and typical pump off and on times for the sumps during post-closure conditions.

The pumps, risers, and sumps analyzed herein are designed for the post-closure conditions. Interim liquid removal measures (e.g., temporary pumps) will be used during the operational period, as needed. These measures are not addressed in this package.

METHODOLOGY

The sump and riser calculations in this package include three steps: (i) sizing the riser pipe perforations to achieve the target inflow rates; (ii) calculating the dimensions and structural stability of the riser pipe; and (iii) calculating the volume of the sump.

Pipe Perforation Sizing:

The riser pipe perforations were sized to accommodate the target design inflow, following the general procedure of Bernoulli's Equation [Qian et al., 2002]. Initially, the area of each perforation A_b (ft^2) was calculated with an assumed diameter d (ft) as follows:

$$A_b = \frac{\pi}{4} * d^2 \quad (1)$$

Bernoulli's Equation was then used to calculate the inflow capacity of a single perforation of diameter *d* as follows:

$$Q_b = C * A_b * v_{ent} \quad (2)$$

where:

Q_b	=	Inflow per orifice (ft^3/s)
C	=	Discharge coefficient, assumed to be 0.62 [Qian et al., 2002]
v_{ent}	=	Entry velocity (ft/s), assumed to be 0.1 ft/s [Qian et al., 2002]

The calculated maximum inflow capacity for a selected perforated pipe length *L* was then computed using Equation 3.

$$Q_{in} = Q_b * N_{row} * R * L \quad (3)$$

where:

Q_{IN}	=	Calculated maximum inflow capacity for the perforated length (ft^3/s)
N_{row}	=	Number of perforations per row $= \frac{360°}{\theta}$
θ	=	Angle between perforations within a row (°)
R	=	Number of rows per foot $= \frac{12}{\delta}$
δ	=	Offset between rows of perforations (in)
L	=	Perforated pipe length (ft)

The perforated pipe length *L* only takes into account the length between the automatic "off" elevation of the pump and the top of the sump excavation (i.e., the "on" elevation of

the pump). The number of perforations per row and offset between rows for the proposed riser pipe was varied to analyze various possible pipe perforation options.

Pipe Structural Stability:

Calculations were performed to verify that the proposed riser pipes are able to withstand the loads applied on them with adequate factors of safety. Failure mechanisms that were checked include: (i) wall crushing; (ii) wall buckling; (iii) excessive ring deflection; and (iv) excessive bending strain. Plastic pipe can be designed to resist failure by the above mechanisms using design methods presented in the technical literature [Chevron Phillips, 2003].

Stresses applied on the proposed riser pipes will be estimated for the post-closure condition. During the post-closure condition, the stress applied to the pipe is due to the materials surrounding the pipe. The perforations within the pipe will also increase the stress on the pipe by reducing the area available to handle loads. The vertical stress on a horizontal pipe can be calculated as follows [Qian et al., 2002]:

$$P_v = \frac{\sum \gamma_p * H}{144 * (1 - n * d / 12)} \tag{4}$$

where:

P_v	=	Vertical stress, (psi);
γ_p	=	Weighted average unit weight of the overburden materials (pcf);
H	=	Thickness of the overburden materials (ft);
n	=	Number of perforations per row per foot of pipe; and
d	=	Diameter of individual perforation (in).

It should be noted that the previous equation calculates the vertical stress on a horizontal pipe, however, the SCA riser pipe is a vertical pipe experiencing horizontal stresses. Therefore, the following equation is used to convert vertical stress to horizontal stress [Das, 2008].

$$P_t = P_v * K_0 \tag{5}$$

where:

P_t = Stress on the riser pipe (psi);
P_v = Vertical stress (psi); and
K_0 = Lateral earth pressure coefficient at-rest.

Wall Crushing: Wall crushing can occur when the stress in the pipe wall, due to external pressure, exceeds the compressive strength of the pipe material. The compressive stress on the pipe wall can be calculated by the following equation [Chevron Phillips, 2003]:

$$S = \frac{P_t * D}{288 \cdot t} \tag{6}$$

where:

S = Pipe wall compressive stress (psi);
P_t = Load applied to the pipe (psf);
D = Nominal outer diameter of pipe (in); and
t = Minimum wall thickness of pipe (in).

The factor of safety (FS) against pipe wall crushing may be calculated using the following equation:

$$FS_{wc} = \frac{\sigma_y}{S} \tag{7}$$

where:

FS_{wc} = Factor of safety against pipe wall crushing;
σ_y = Compressive yield strength of the pipe (psi); and
S = Pipe wall compressive stress (psi).

A FS of 2.0 is recommended by Chevron Phillips [2003] for wall crushing.

Wall Buckling: Wall buckling, a longitudinal wrinkling in the pipe wall, can occur if the external pressure exceeds the critical buckling pressure of the pipe/bedding aggregate system. The critical wall buckling may be calculated using the following equation [Chevron Phillips, 2003]:

$$P_{WB} = 5.65 * \sqrt{R * B' * E' \frac{E}{12 * (SDR - 1)^3}} \tag{8}$$

where:

P_{WB} = Critical wall buckling pressure (psi);
R = Water buoyancy factor;

$$R = 1 - (0.33 * \frac{H_w}{H}) \tag{9}$$

H_w = Height of water table above pipe (ft);
H = Height of waste + final cover above pipe (ft);
B' = Coefficient of elastic support;

$$B' = \frac{1}{1 + 4 * e^{-0.065 \cdot H}} \tag{10}$$

E' = Modulus of soil reaction for pipe bedding (psi);
E = Long-term modulus of elasticity of the pipe material (psi); and
SDR = Standard dimension ratio of the pipe.

The FS against pipe wall buckling may be calculated using the following equation:

$$FS_{WB} = \frac{P_{WB}}{P_t} \tag{11}$$

where:

FS_{WB} = Factor of safety against pipe wall buckling;
P_{WB} = Critical wall buckling pressure (psi); and
P_t = Maximum load applied to the pipe (psi).

A FS of 2.0 is recommended by Chevron Phillips [2003] for wall buckling.

Excessive Ring Deflection: Excessive ring deflection, a horizontal over-deflection of the pipe causing a reversal of curvature of the pipe wall, can occur where large external pressures are applied to the pipe/bedding aggregate system. In addition, excessive ring deflection can lead to substantial loss in flow capacity. Ring deflection is calculated using Spangler's Modified Iowa Formula [Chevron Phillips, 2003]:

$$\Delta X\% = \frac{\Delta X}{D_i} * 100 = \left[\frac{P_t * K * L}{\left(\frac{2 * E}{3} \frac{1}{(SDR-1)^3} \right) + (0.061 * E')} \right] * 100 \tag{12}$$

where:

$\Delta X\%$ = Ring deflection (%);
ΔX = Maximum deflection or change in diameter (in);
D_i = Internal pipe diameter (in);
P_t = Pipe crown pressure (psi);
K = Bedding constant (assume 0.1) [Chevron Phillips, 2003];
L = Deflection lag factor;
E = Short-term modulus of elasticity of the pipe material (psi);
SDR = Standard dimension ratio; and
E' = Modulus of soil reaction for pipe bedding material (psi).

Spangler recommends a value between 1.0 and 1.5 for the deflection lag factor (L) to be used in the Modified Iowa Formula, to account for visco-elastic deformation of the pipe [Chevron Phillips, 2003]. An average value of 1.25 is used for the calculations presented herein. An allowable ring deflection of 7.5% is assumed based on guidance from Chevron Phillips [2003].

Excessive Bending Strain: When a pipe deflects under load, bending strains are induced in the pipe wall. Bending strain occurs in the pipe wall as external pressures are applied to the pipe/bedding aggregate system. Bending strain is calculated using the following equation [Chevron Phillips, 2003]:

$$\varepsilon_b = f_d * \frac{\Delta X}{D_m} * \frac{2 \cdot C}{D_m} \tag{13}$$

where:

ε_b	=	Bending strain in the pipe wall (%);
f_d	=	Deformation shape factor;
ΔX	=	Maximum deflection or change in diameter (in);
C	=	Distance from outer fiber to wall centroid, (in);
	=	0.5 * (1.06 * pipe wall thickness), [Chevron Phillips, 2003];
D_m	=	Mean pipe diameter (in);
	=	D – (1.06 * pipe wall thickness), [Chevron Phillips, 2003]; and
D	=	Nominal outer diameter of pipe (in).

The deformation factor (f_d) or shape factor is a function of pipe stiffness (PS), type of backfill material, and compaction level. Based on the guidance presented in the Design Manual for Corrugated HDPE pipes by Plastics Pipe Institute [PPI, 2007], a deformation factor can be selected, based on the calculated PS of the proposed riser pipe and bedding material used. A list of long-term PS values for typical commercially available pipes is presented in Table 1, and the corresponding deformation shape factors are shown in Table 2.

The following are recommendations for allowable bending strain from the literature and plastic pipe manufacturers:

- An allowable bending strain of 5% is recommended by Wilson-Fahmy and Koerner [1994], based on AASHTO guidelines.
- An allowable bending strain of 4.2% is recommended as conservative in Chevron Phillips [2003], where it is noted that strains up to 8% are reported in the literature as acceptable for a design period of 50 years.

Based on the above recommendations and the calculation of a very conservative maximum deflection (ΔX) value since the effect of arching was neglected, an allowable strain of 5% was selected for this application.

Sump Volume and Pump Sizing:

The storage volume of the sump is calculated as the volume between the pump off level and the top of the low permeability soil liner outside the sump area. This volume is a combination of open area inside the riser pipes and pore volume of areas outside the risers that are filled with gravel.

Pump on time is calculated by dividing the storage volume by the selected pumping rate minus the design inflow rate. Pump off time is calculated by dividing the storage volume by the inflow rate to the sump.

INPUT PROPERTIES

The design inflow rate for the entire SCA was calculated to be 15 gal/min, as presented in the package titled *"Hydraulic Evaluation of Performance for SCA Design"* (referred to as the "HELP Package"). This inflow rate has been computed for conditions following the fourth year of construction; that is five stacks of geo-tubes, a 3-inch (average) soil leveling layer, and an 18-inch minimum final cover on top of the geo-tubes. As presented in Figure 1, the liner grading plan indicates that the total water infiltration will be split between the western sump area and the eastern sump area. Based on the relative areas, it appears that approximately 67% of the infiltration will drain to the western sump and approximately 33% to the eastern sump area. Therefore, the assumed target liquid inflow rate for the individual sump areas is 10 gal/min. The perforation sizing and pipe structural analyses performed in this package assume that both the western and

eastern sump areas will be designed identically to be able to handle the target inflow of 10 gal/min. The volume and pump on and off time calculations use a target liquid inflow rate of 10 gal/min for the western sump area and 5 gal/min for the eastern sump area.

It is further assumed that each sump area will consist of two separate riser pipes with pumps, a main and a backup, and a 10 ft offset between each riser pipe. The backup pump is considered to have characteristics similar to the main pump, therefore analysis has been only performed on the main pump and riser.

As presented in Figure 2, the pump was assumed to require a 1 ft working pad above the liner, have an automatic off elevation 3 ft above the bottom of the pump, and have an automatic on elevation *L* ft above the bottom of the pump. The walls of the excavated sump area were assumed to be sloped at a 2.5 horizontal:1 vertical (H:V) slope. Each riser pipe was assumed to be approximately 5 ft in diameter. In addition, a 10 ft offset between the edge of the riser pipe and the start of the sump side slopes was provided. The area of the pumps is small relative to the total sump area and has been neglected with respect to the sump volume calculation. The riser pipes are assumed to be high density polyethylene (HDPE) SDR 17 with a short-term modulus of elasticity at 73°F of 110,000 psi and a long-term modulus of elasticity at 73°F of 28,200 psi [Chevron Phillips, 2003]. The riser pipes are assumed to have a typical compressive yield strength of 1600 psf, as shown in Table 3 [IscoIndustries, 2009]. It is assumed that the riser pipes are surrounded by a layer of gravel throughout their entire height.

Based on discussions with Parsons, two types of gravel, #2 and #3A, are available from nearby quarry sites for use in the SCA drainage layer, including the sump areas. The sieve analysis test results for these two types of gravel are presented in Table 4, and the associated grain size distribution curves are in Figure 3. Gravel type #3A has a larger D_{85} value (D_{85}=1.4 in) than type #2 (D_{85}=0.9 in), therefore it has been assumed that #3A will be selected for the drainage layer to provide more drainage capacity. The unit weight of the gravel is considered to be 120 pcf, following recommendations from the previously presented calculation package titled, "Slope Stability Analysis for SCA Design". A typical value of 0.4 is chosen for the porosity of the gravel. The lateral earth coefficient K_0 has been assumed to be 0.5. The soil reaction modulus for coarse grained soils is assumed to be 1000 psi [Chevron Phillips, 2003].

CALCULATIONS

A sample calculation spreadsheet for the pipe perforation sizing is included in Attachment 1, following the methodology described above. The calculation worksheets for the pipe structural stability and sump volume are also provided in Attachment 1.

RESULTS OF ANALYSIS

The results of the pipe perforation sizing are summarized in Table 5. Multiple combinations of perforation angle and row offset resulted in acceptable calculated FS values. Choosing a pipe perforation length of 4 ft (i.e., a total excavation depth of 8 ft), pipe perforation angle of 45 degrees and row offset of 3 inches results in a calculated inflow capacity of 19.4 gal/min. A conceptual diagram of the proposed design is presented in Figure 4.

Based on the pipe perforation dimensions chosen, the structural stability appears to be acceptable, as summarized in Table 6. Specifically, the calculated FS values against crushing and wall buckling are 7.5 and 4.8, respectively, satisfying the target FS of 2.0 in both cases. In addition, the calculated ring deflection of 4.0% and ring bending strain of 1.2% also satisfy the target criteria of less than 7.5% and less than 5.0% respectively.

The results of the sump volume calculations are summarized in Table 7. Based on the results presented previously, a sump depth of 8 ft was selected, with the two sumps separated by a 10 ft offset. This configuration resulted in a total storage volume of 59,000 gallons for each of the sump areas and a filling time of approximately 99 hours for the western sump area and 198 hours for the eastern sump area. For a selected pumping rate of 30 gal/min, the western sump will have a pump on time of approximately 49 hours. For a selected pumping rate of 20 gal/min, the eastern sump will have a pump on time of approximately 66 hours.

SUMMARY AND CONCLUSIONS

This package presents calculations to support the design of the sump areas of the proposed SCA within WB-13. Three types of calculations were performed: (i) evaluation of the hydraulic requirements for pipe perforations to handle the required inflow during post-closure conditions; (ii) evaluation of the requirements for structural stability of the

riser pipe, including wall crushing, wall buckling, ring deflection, and bending strain; and (iii) calculation of liquid storage volume and filling time for the sump area during post-closure conditions.

Based on the calculations, the recommended riser pipe is 5 ft in diameter, with a perforation angle of 45 degrees, perforation row offset of 3 inches, and a total SOLW excavation depth of 8 ft. This resulted in a calculated inflow capacity of 19.4 gal/min, exceeding the target design inflow of 10 gal/min. In addition, the calculated FS of the riser pipe satisfied the target FS with regards to wall buckling and wall crushing. The calculated ring deflection and bending strains also satisfied the target values.

For the western sump area, the calculated sump storage volume of 59,000 gallons resulted in a pump off time of 99 hours and pump on time of 49 hours using the design inflow rate of 10 gal/min and a pumping rate of 30 gal/min. The eastern sump area with a calculated sump storage volume of 59,000 gallons, a design inflow rate of 5 gal/min, and a pumping rate of 20 gal/min, resulted in a calculated pump off time of 198 hours and pump on time of 66 hours. Different pump capacities and on/off times may be used as appropriate based on actual field conditions, as long as performance requirements are met.

REFERENCES

Chevron Phillips, "*Performance Pipe*", Manufacturers' literature, Bulletin: PP 900, Chevron Phillips Chemical Company, 2003.

Das, B.M., "*Fundamentals of Geotechnical Engineering"*, Third Edition, Thomson Learning, Toronto, Canada, 2008.

IscoIndustries, "*High Density Polyethylene Pipe Typical Physical Properties*", Manufacturers' Literature, 2009.

PPI, "The Complete Corrugated Polyethylene Pipe Design Manual and Installation Guide", Manufacturers' Literature, Plastics Pipe Institute, 2007.

Qian, X., Koerner, R.M., and Gray, D.H., *"Geotechnical Aspects of Landfill Design and Construction"*, Prentice Hall Inc., Upper Saddle River, NJ, 2002.

Wilson-Fahmy, R.F., and Koerner, R.M, "*Finite Element Analysis of Plastic Sewer Pipe Behavior in Leachate Collection and Removal Systems*", Geosynthetic Research Institute - Drexel University, Philadelphia, PA, 1994.

Tables

Table 1: Typical Pipe Properties [PPI, 2007]

Inside Diameter, ID		Typical Outside Diameter, OD		Minimum Pipe Stiffness at 5% Deflection, PS		Section Area, A_s		Distance from Inside Diameter to Neutral Axis, c		Moment of Inertia, I	
in	mm	in	mm	pii	N/m/mm**	in²/in	mm²/mm	in	mm	in⁴/in	mm⁴/mm
4	100	4.7	119	35	241	0.0448	1.138	0.139	3.531	0.0	11.5
6	150	7	178	35	241	0.0568	1.443	0.192	4.876	0.0	54.1
8	200	9.9	251	35	241	0.0837	2.126	0.297	7.535	0.0	142.6
10	250	12	305	35	241	0.1044	2.652	0.393	9.97	0.0	303.2
12	300	14.7	373	50	345	0.125	3.175	0.35	8.89	0.0	393.3
15	375	17.7	457	42	290	0.159	4.043	0.45	11.43	0.1	868.5
18	450	21.5	546	40	275	0.195	4.953	0.5	12.70	0.1	1016.0
24	600	28.7	729	34	235	0.262	6.646	0.65	16.51	0.1	1900.9
30	750	36.4	925	28	195	0.327	8.297	0.75	19.05	0.2	2671.1
36	900	42.5	1080	22	150	0.375	9.525	0.9	22.86	0.22	3637.9
42	1050	48	1219	20	140	0.391	9.927	1.11	28.19	0.52	8898.2
48	1200	55	1397	18	125	0.429	10.901	1.15	29.21	0.52	8898.2
54	1350	61	1549	16	110	0.473	12.014	1.25	31.75	0.82	13552.1
60	1500	67.3	1709	14	97	0.538	13.665	1.37	34.798	1.0	16518.2

Notes:

1. These are typical commercially available HDPE pipe sizes and dimensions.
2. The pipe chosen has an OD of 61 in, based on the nominal diameter of 5 ft as discussed in the package.
3. The PS value of 16 selected from this table is used in Table 2 to select the appropriate deformation shape factor to compute the bending strain.

Table 2: Deformation Shape Factors, f_d [PPI, 2007]

	Gravel GW, GP, GW-GC, GW-GM, GP-GC and GP-GM		Sand SW, SP, SM, SC, GM, GC or Mixtures	
Pipe Stiffness, PS pii (kPa)	Dumped to Slight (<85% SPD)	Moderate to High (≥85% SPD)	Dumped to Slight (<85% SPD)	Moderate to High (≥85% SPD)
14 (97)	4.9	6.2	5.4	7.2
16 (110)	4.7	5.8	5.2	6.8
17 (117)	4.6	5.7	5.1	6.7
20 (138)	4.4	5.4	4.9	6.4
22 (152)	4.3	5.3	4.8	6.3
28 (193)	4.1	4.9	4.4	5.9
30 (210)	4.0	4.8	4.3	5.8
34 (234)	3.9	4.6	4.1	5.6
35 (241)	3.8	4.6	4.1	5.6
38 (262)	3.8	4.5	4.0	5.4
40 (276)	3.7	4.4	3.9	5.4
42 (290)	3.7	4.4	3.9	5.3
46 (320)	3.7	4.4	3.9	5.2
50 (345)	3.6	4.2	3.8	5.1

Notes:

1. The PS was considered to be 16, as shown in Table 1.
2. The bedding material was assumed to be dumped gravel.

Table 3: Typical Physical Properties of HDPE Pipe [IscoIndustries, 2009]

HIGH DENSITY POLYETHYLENE PIPE
Typical Physical Properties***

Property	Specification	Unit	Nominal Value
Material Designation	PPI / ASTM		PE 3408
Material Classification	ASTM D-1248		III C 5 P34
Cell Classification	ASTM D3350-99		345464C
-Density (3)	ASTM D-1505	gm/cm3	0.955
-Melt Index (4)	ASTM D-1238 (216 kg/190iC)	gm/10 min.	0.11*
-Flex Modulus (5)	ASTM D-790	psi	135,000
-Tensile Strength (4)	ASTM D-638	psi	3,200
PENT (6)	ASTM F-1473	Hours	>100
-HDB @73i F (4)	ASTM D-2837	psi	1,600
-HDB @ 140 Deg F	ASTM D-2837	psi	800
-U-V Stabilizer (C)	ASTM D-1603	% C	2.5
Hardness	ASTM D-2240	Shore "D"	65
Compressive Strength (yield)	ASTM D-695	psi	1,600
Tensile Strength @ Yield (Type IV Spec.)	ASTM D-638 (2"/min.)	psi	3,200
Elongation @ Yield	ASTM D-638	%, minimum	8
Tensile Strength @ Break (Type IV Spec.)	ASTM D-638	psi	5,000
Elongation @ Break	ASTM D-638	%, minimum	750
Modulus of Elasticity	ASTM D-638	psi	130,000
PENT (6)	ASTM F-1473	Hours	>100
(Cond. A, B, C: Mold. Slab)	ASTM D-1693	Fo, Hours	>5,000
(Compressed Ring - pipe)	ASTM F-1248	Fo, Hours	>3,500
Slow Crack Growth	Battelle Method	Days to Failure	>64
Impact Strength (IZOD) (.125Ó Thick)	ASTM D-256 (Method A)	In-lb / in notch	42
Linear Thermal Expansion Coef.	ASTM D-696	in / in/iF	1.2x10-4
Thermal Conductivity	ASTM D-177	BTU-in/ft2/ hrs/ degreesF	2.7
Brittleness Temp.	ASTM D-746	degrees F	< -180
Vicat Soft. Temp.	ASTM D-1525	degrees F	257
Heat Fusion Cond.	ASTM D-1525	@ psi degrees F	75 @ 400

σ_y used for design

*** This list of typical physical properties is intended for basic characterization of the material and does not represent specific determinations of specifications. The physical properties values reported herein were determined on compression molded specimens prepared in accordance with Procedure C of ASTM D 1928 and may differ from specimens taken from pipe.
** Tests were discontinued because no failures and no indication of stress crackinitiation.
* Average Melt Index value with a standard deviation of 0.01

Table 4: Sieve Analysis Test Results for Potential Gravel Sources

Sieve Size	#3A's	#2
3"	100.0%	100.0%
2"	100.0%	100.0%
1 1/2"	95.1%	100.0%
1"	14.5%	91.5%
3/4"	5.8%	65.2%
1/2"	3.4%	13.3%
3/8"	2.4%	0.8%
1/4"	1.8%	0.4%
#4		
1/8"		
#8		
#10		
#16		
#20		
#30		
#40		
#50		
#80		
#100		
#200		

Note:

1. These results were provided to Geosyntec by Parsons.

Table 5: Pipe Perforation Summary

Assumed Hole Diameter *d* (in)	Perforated Pipe Length *L* (ft)	Perforation Angle θ (°)	Row Offset *δ* (in)	Computed Inflow Capacity (gal/min)
1.00	3	45	2	21.9
1.00	3	45	3	14.6
1.00	4	45	3	19.4
1.00	4	60	2	21.9
1.00	4	60	3	10.9

Note:

1. This table summarizes acceptable combinations of perforated pipe length *L*, perforation angle *θ,* and row offset *δ*.

Table 6: Mechanical Stability Summary

Calculation	Target	Calculated	OK?
Wall Crushing (FS Value)	≥2.0	7.5	Yes
Wall Buckling (FS Value)	≥2.0	4.8	Yes
Ring Deflection (%)	≤7.5%	4.0%	Yes
Ring Bending Strain (%)	≤5%	1.2%	Yes

Note:

1. These values are calculated assuming an excavation depth of 8 ft, pipe perforation angle of 45 degrees, and perforation row offset of 3 in, as described in the package.

Table 7: Sump Volume Summary

	Q_{DESIGN} (gal/min)	Pump Off Time[2] (hr)	Pump Rate (gal/min)	Pump Time (hr)
Sump 1	10	98.8	30	49.4
Sump 2	5	197.5	20	65.8

Notes:

1. These values are calculated assuming an excavation depth of 8 ft, pipe perforation angle of 45 degrees, and perforation row offset of 3 inches, as described in the package.
2. This is the time taken for the liquid level to go from the minimum to maximum level within the sump area.

Figures

Written by: **Joseph Sura** Date: **5/28/2009** Reviewed by: **R. Kulasingam/Jay Beech** Date: **5/29/2009**

Client: **Honeywell** Project: **Onondaga Lake SCA IDS** Project/ Proposal No.: **GJ4299** Task No.: **06**

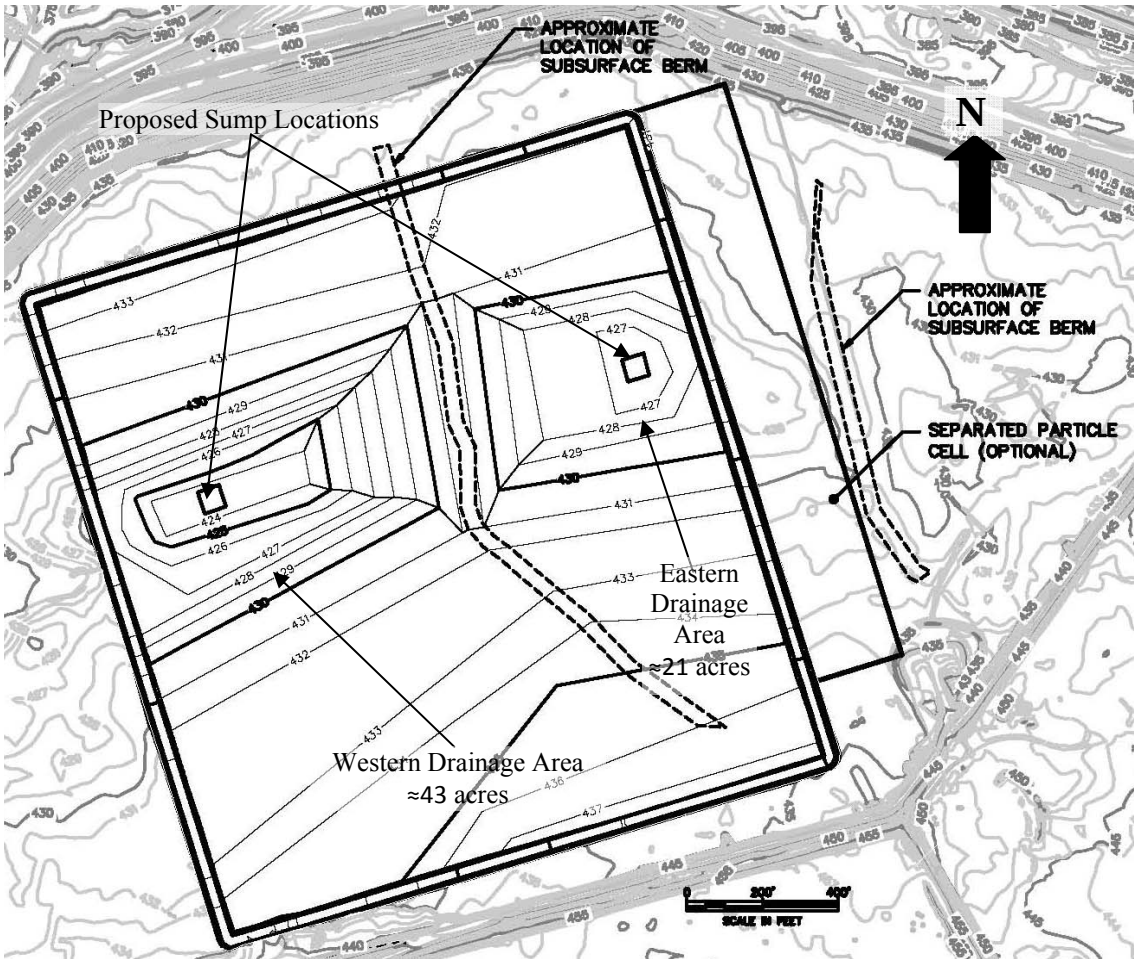


Figure 1: Grading Plan of Top of Low Permeability Soil Layer

Notes:

1. Approximately 67% of the SCA area will drain to the western sump area, and approximately 33% of the SCA area will drain to the eastern sump area.
2. SCA layout presented on this figure corresponds to the analyses presented in this calculation package. Since the actual SCA layout was developed concurrently with this package, there are some slight differences between the final layout presented in the Drawings (i.e., Appendix E of the IDS) and in this figure. This will be addressed during final design.

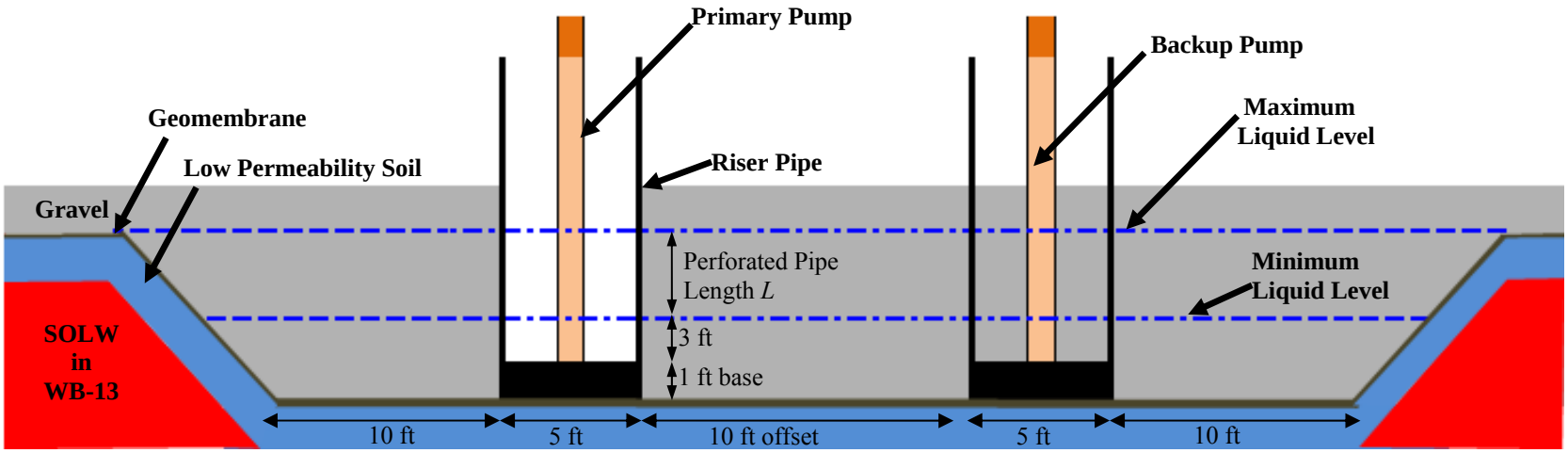


Figure 2: Conceptual View of Sump Area

Notes:

1. The backup riser is conservatively assumed to be filled with gravel, therefore no extra sump volume capacity is considered.
2. The total SOLW excavation depth is the sum of *L* (perforated pipe length), the 3 ft minimum liquid height and the 1 ft base. The 3 ft minimum liquid height is sufficient for several commercially available electrical pumps.
3. The side slopes are 2.5 horizontal:1 vertical.
4. The low permeability soil liner has a minimum thickness of 1.8 ft near the sump areas.

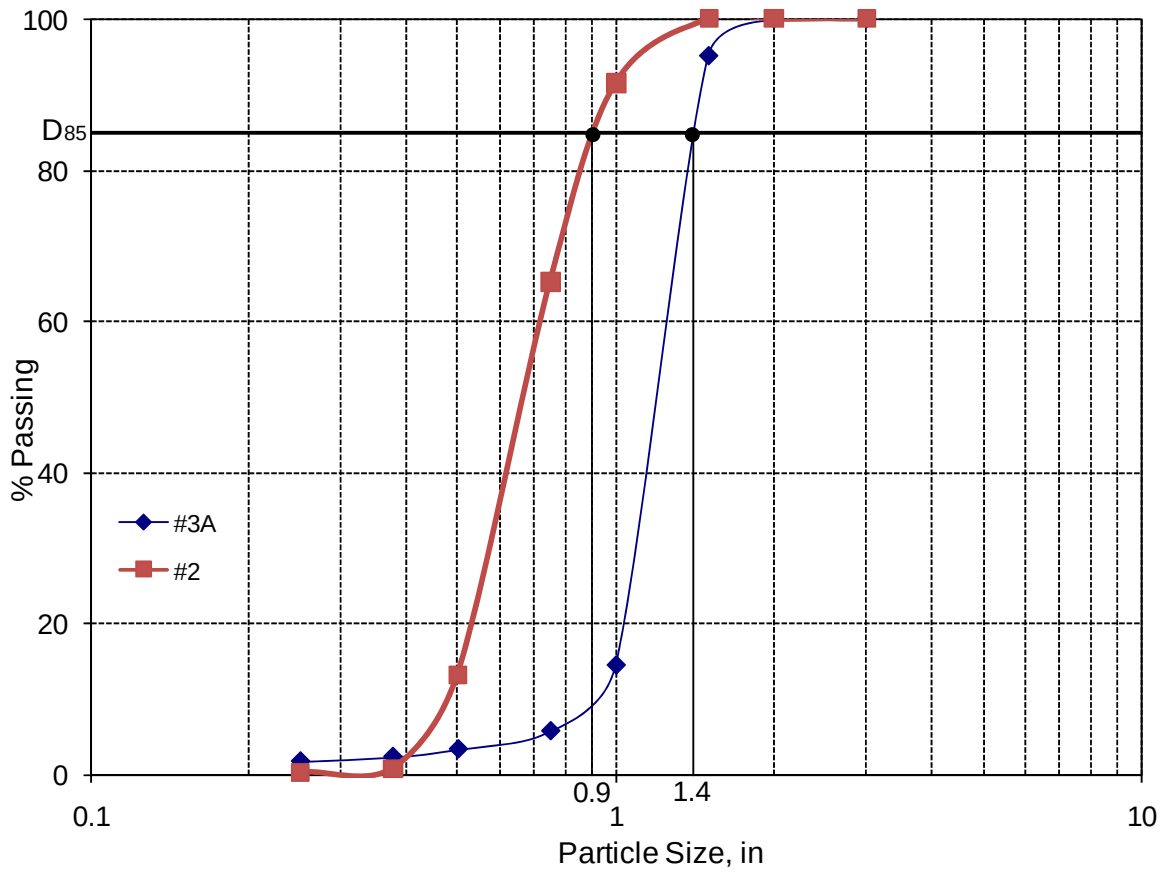


Figure 3: Grain Size Distribution Curves

Note:

1. These grain size distribution curves are based on sieve analysis results for potential gravel sources provided to Geosyntec by Parsons.

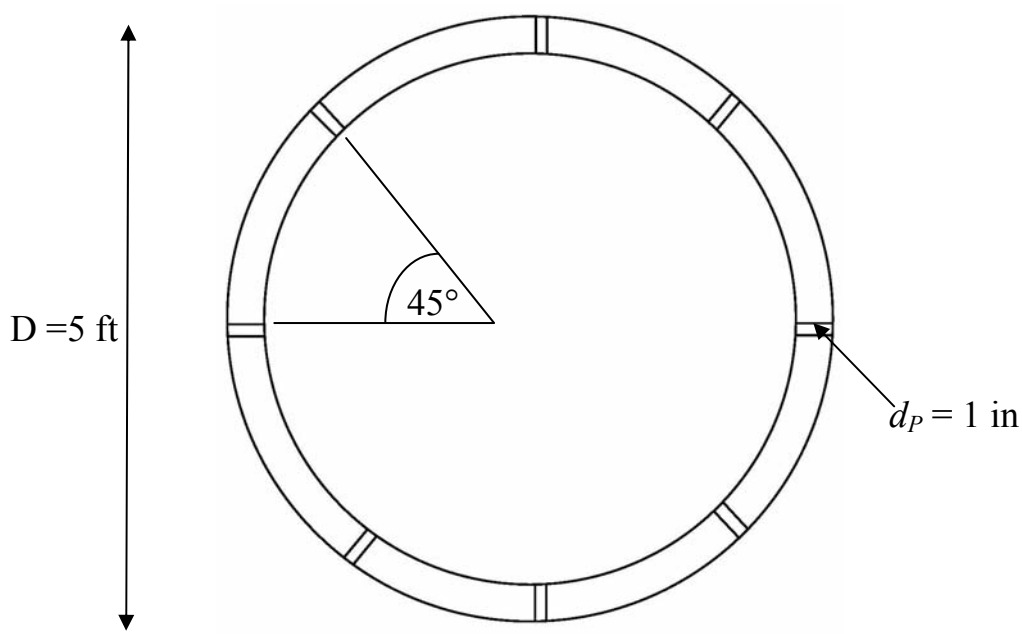


Figure 4a: Conceptual View of Proposed Perforated Pipe Section Design (Plan View)

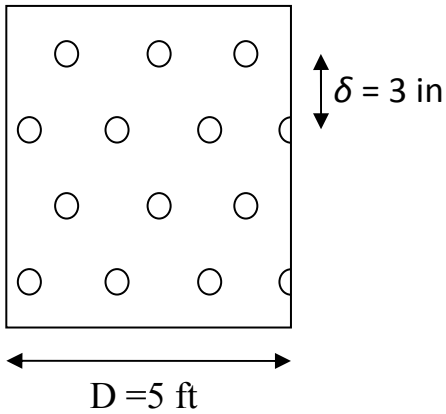


Figure 4b: Conceptual View of Proposed Perforated Riser Pipe Section Design (Side View)

Attachment 1: Calculation Spreadsheets

Written by: **Joseph Sura** Date: **5/28/2009** Reviewed by: **R. Kulasingam/Jay Beech** Date: **5/29/2009**

Client: **Honeywell** Project: **Onondaga Lake SCA 50% Design** Project/ Proposal No.: **GJ4299** Task No.: **06**

Bernoulli's Equation to calculate pipe perforations

Finding Area of Each Perforation	$A_b=\pi/4*d^2$			
Diameter of Perforation [d] =	1.00	in =	8.33E-02	ft
Area of Perforation [A_b] =	5.45E-03	ft^2		

Bernoulii Equation [1]	$Q_b=C*A_b*v_{ent}$			
Entry Velocity [v_{ent}] =	0.1	ft/s		
Discharge Coefficient [C] =	0.62			
Inflow per Orifice [Q_b] =	3.38E-04	ft^3/s =	2.03E-02	ft^3/min

Pipe Design		
Perforation offset angle [θ] =	45	degrees
#Perforations in each row [N_{row}] =	8	
Offset between rows [δ] =	3.00	in
Number of Rows [R] =	4	
Pipe Length [L] =	4	ft

Maximum Flow	$Q_{in} = Q_b * N_{row} * R * L$			
Maximum Inflow Rate [Q_{in}] =	2.60	ft^3/min =	**19.43**	gal/min

Note:

1. Qian et al. [2002]

Written by: **Joseph Sura** Date: **5/28/2009** Reviewed by: **R. Kulasingam/Jay Beech** Date: **5/29/2009**

Client: **Honeywell** Project: **Onondaga Lake SCA 50% Design** Project/ Proposal No.: **GJ4299** Task No.: **06**

PROPOSED LCS RISER PIPE DESIGN
Onondaga Lake - SCA Design

Pipe Type:

Name: Unspecified Pipe

Norminal Outer Diameter	D =	**61**	in
Minimum wall thickness	t =	**3.59**	in
Average inner diameter	D_i =	**53.82**	in
Standard Dimension Ratio of pipe	SDR =	**17.0**	
Number of Perforations Per Row Per Foot	n =	**4.00**	
Diameter of Perforation	d =	**1.00**	in

Stress on collector pipe

Quick Check: Are requirements met?
Yes

Post Closure Condition

Post Closure Condition

Layer No.	γ_p (pcf)	H (ft)	K0	γ_p x H (psf)
1 (Gravel)	**120**	**40.0**	**0.5**	**2400**
2				
3				
4				
5				
6				

Total = **2400** psf = 16.67 psi

Stress Increase Factor due to Perforations = 1.5

Maximum Horizontal Stress = P_t = **3600** psf = 25.00 psi

Wall Crushing

σ_y = **230400** psf = 1600 psi From IscoIndustries, 2009

Actual Wall compressive stress $S = \frac{P_t \cdot D}{288 \cdot t}$ From Chevron Phillips, 2003

= **212.40** psi

Factor of Safety against Wall Crushing $FS_{WC} = \frac{\sigma_y}{S}$

= **7.53** <= FS>2.0, OK

Wall Buckling

Height of water table above Pipe	H_w =	**0**	ft			
Height of Waste+Final Cover above Pipe	H =	**40.0**	ft			From Chevron Phillips, 2003
long-term modulus of elasticity of pipe	E =	**4060800.0**	psf =	28200	psi	For 50 years @ 73°F
modulus of soil reaction	E' =	**144000.0**	psf =	1000	psi	From Chevron Phillips, 2003

$$P_{WB} = 5.65 \cdot \sqrt{R \cdot B' \cdot E' \cdot \frac{E}{12 \cdot (SDR - 1)^3}}$$ From Chevron Phillips, 2003

where

$$R = 1 - \left(0.33 \cdot \frac{H_w}{H}\right) \quad \text{and} \quad B' = \frac{1}{1 + 4 \cdot e^{-0.065 \cdot H}}$$ From Chevron Phillips, 2003

Water Buoyancy Factor	R =	**1.0000**			
Coefficient of Elastic Support	B' =	**0.7710**			
Critical Wall Buckling Pressure	P_{WB} =	**17125**	psf =	118.92	psi

Factor of Safety against Wall Buckling $FS_{WB} = \frac{P_{WB}}{P_t}$

= **4.76** <= FS>2.0, OK

Written by: **Joseph Sura** Date: **5/28/2009** Reviewed by: **R. Kulasingam/Jay Beech** Date: **5/29/2009**

Client: **Honeywell** Project: **Onondaga Lake SCA 50% Design** Project/ Proposal No.: **GJ4299** Task No.: **06**

MAXIMUM RING DEFLECTION AND RING BENDING STRAIN

Ring Deflection Using the Modified Spangler Equation:

$$\frac{\Delta X}{D_i} = \frac{P_t \cdot K \cdot L}{\left(\frac{2 \cdot E}{3} \frac{1}{(SDR-1)^3}\right) + (0.061 \cdot E')}$$

L	**1.25**	
K	**0.1**	
P_t	**25.00**	psi
D_i	**53.820**	in.
E	**110000**	psi
E'	**1000**	psi
SDR	**17.0**	

ΔX = maximum deflection or change in diameter, in;
L = deflection lag factor (1.0-1.5) [Chevron Phillips, 2003];
K = bedding constant (assume 0.1) [PPI, 2007];
D_i = internal pipe diameter, in
P_t = pipe crown pressure, psi;
E = short-term modulus of elasticity of polyethlene pipe material @ 73 ° F, [Chevron Phillips, 2003], psi;
E' = the modulus of soil reaction for clean coarse soils without compaction used as bedding material [Chevron Phillips, 2003], psi;
SDR = standard Dimension Ratio [Chevron Phillips, 2003]
ΔX% = ring deflection, %,
= 100 (DX/D_i).

Change in diameter, ΔX = **2.13** in.

$$\Delta X\,\% = \frac{\Delta X}{D_i}.100$$

= **3.96** % <= Ring Deflection < 7.5%, OK

Ring Bending Strain

$$\varepsilon_b = f_d \cdot \frac{\Delta X}{D_m} \cdot \frac{2 \cdot C}{D_m}$$

D_m	**57.195**	
f_d	**4.7**	
C	**1.903**	in

ε_b = bending strain, %;
ΔX =maximum deflection or change in diameter, in;
D_m = mean pipe diameter, in,
= D - (1.06* pipe wall thickness); [Chevron Phillips, 2003]
f_d = deformation shape factor;
C = distance from outer fiber to wall centroid, in.
= 0.5 * (1.06* pipe wall thickness); [Chevron Phillips, 2003].

Bending strain, ε_b = **1.17** % <= Bending Strain < 5%, OK

Written by: **Joseph Sura** Date: **5/28/2009** Reviewed by: **R. Kulasingam/Jay Beech** Date: **5/29/2009**

Client: **Honeywell** Project: **Onondaga Lake SCA 50% Design** Project/ Proposal No.: **GJ4299** Task No.: **06**

Sump Volume Calculations

Design Parameters[1]

	Sump 1	Sump 2
Gravel Porosity n =	0.4	0.4
Perforated Length L (ft) =	4	4
Target Inflow Rate Q_{IN} (gal/min) =	10	5
Pumping rate Q_{PUMP} (gal/min) =	30	20
Riser Nominal Diameter D_R (ft)=	5	5
Sump Width at Minimum Liquid Level W_{MIN} (ft) =	60	60
Sump Width at Maximum Liquid Level W_{MAX} (ft) =	80	80

Volume Calculations[2]

Vol. of Sump from W_{MIN} to W_{MAX} (gal) =	$V_{PYRAMID}$	
$V_{PYRAMID}$ (gal) =	$(1/3*(W_{MIN}^2+W_{MAX}^2+W_{MIN}*W_{MAX})*L)/0.134$	
$V_{PYRAMID}$ (gal) =	147263.7	147263.7
Storage Vol. inside Riser V_{RISER} (gal) =	$(\pi/4*D_R^2*L)/.134$	
V_{RISER} (gal)=	586.1	586.1
Total Storage Vol. (gal) =	$(V_{PYRAMID}-V_{RISER})*n+V_{RISER}$	
Total Storage Vol. (gal) =	59257.1	59257.1

Pump On and Pump Off Time Calculations[3]

Pump off time (hr)=	$V_{STORAGE}/Q_{IN}$	
Pump off time (hr)=	98.8	197.5
Pump on time (hr)=	$V_{STORAGE}/(Q_{PUMP}-Q_{IN})$	
Pump on time (hr)=	49.4	65.8

Notes:

1. The width at minimum and maximum liquid levels is calculated assuming a 2.5 H:1 V side slope and geometry as shown in Figure 2.
2. The sump volume is calculated based on a truncated rectangular pyramid. The riser pipe volume is calculated based on a cylindrical pipe. The volume occupied by the riser pipe wall thickness is small relative to the overall storage volume and is ignored.
3. Pump off time represents the amount of time necessary for the sump area to fill from the minimum water level to the maximum water level. The pump on time represents the amount of time that the pump runs to remove the liquid.
4. The backup riser is conservatively assumed to be filled with gravel in this calculation.

APPENDIX K

PRELIMINARY FINAL COVER SYSTEM SURFACE WATER MANAGEMENT SYSTEM DESIGN

GEOSYNTEC CONSULTANTS

COMPUTATION COVER SHEET

Client: Honeywell **Project:** Onondaga Lake SCA IDS **Project/Proposal #:** GJ4299 **Task #:** 08

TITLE OF COMPUTATIONS **PRELIMINARY FINAL COVER SYSTEM SURFACE WATER MANAGEMENT SYSTEM DESIGN**

COMPUTATIONS BY:
Signature
Printed Name and Title: Jesus Sanchez, Staff Engineer
DATE: 8/4/09

ASSUMPTIONS AND PROCEDURES CHECKED BY:
(Peer Reviewer)
Signature
Printed Name and Title: Ganesh Krishnan, Associate
DATE: 8/4/2009

COMPUTATIONS CHECKED BY:
Signature
Printed Name and Title: For Manjula Bathina, Senior Staff Engineer
DATE: 8/4/2009

COMPUTATIONS BACKCHECKED BY:
(Originator)
Signature
Printed Name and Title: Jesus Sanchez, Staff Engineer
DATE: 8/4/09

APPROVED BY:
(PM or Designate)
Signature
Printed Name and Title: Jay Beech, Principal
DATE: 4 Aug 2009

STATE OF NEW YORK JOHN F. BEECH No. 066337 LICENSED PROFESSIONAL ENGINEER

APPROVAL NOTES:

REVISIONS (Number and initial all revisions)

NO.	SHEET	DATE	BY	CHECKED BY	APPROVAL

PRELIMINARY FINAL COVER SYSTEM
SURFACE WATER MANAGEMENT SYSTEM DESIGN
ONONDAGA LAKE SEDIMENT CONSOLIDATION AREA

BACKGROUND & PURPOSE

This package was prepared in support of the design of the Sediment Consolidation Area (SCA) for the Onondaga Lake Bottom Site, which will be constructed on Wastebed 13 (WB-13). Specifically, the package is intended to present the preliminary design and analysis of the surface water management system for the proposed final cover system of the SCA.

The package addresses the surface water management system for the proposed preliminary SCA final cover system. For purposes of the calculations conducted in this package, the SCA has a footprint corresponding to a capacity of 2.65 million cubic yards of dredge material within geotextile tubes (geo-tubes) surrounded by a perimeter dike (SCA perimeter dike). The design of the final cover system for the SCA is currently in a preliminary stage, and the calculations presented herein will be updated and/or revised as the design is advanced further.

KEY CONSIDERATIONS AND LIMITATIONS

This package addresses surface water management within the limits of the SCA perimeter dike, and does not address how surface water management will be implemented outside the limits of the SCA perimeter dike. Surface water management outside the limits of the SCA perimeter dike will be addressed separately.

The anticipated duration for placement of dredged material in geo-tubes is 4 years, at which time it is expected that the final cover system will be constructed. Settlement is expected to occur during the four-year operational period, and continue to occur, after the final cover system is constructed. The calculations performed herein were based on a “calculated four-year post-settlement grade” of the SCA (i.e., at the time when the final cover system will be constructed) based on calculations presented in the package titled “Settlement Analyses for SCA”. It is recognized that settlement of the SCA will continue to occur after the construction of the final cover system; however, the magnitude of the differential settlement is expected to be relatively small, based on calculations. Therefore, the design of the surface water management system presented herein does not consider the “calculated 30-year post-settlement grade”. Periodic visual inspections, maintenance activities, and repair of the

components of the surface water management system will be specified in the Post-Closure Care Plan for the final cover system to address any deficiencies that might be identified during the design life of the SCA final cover system.

SURFACE WATER MANAGEMENT SYSTEM COMPONENTS

The surface water management system of the SCA final cover system will include the components listed below. The preliminary design of each of the components listed below is addressed in this calculation package.

- **Diversion Berms –** Runoff from the top deck of the final cover system, where the cover slopes are the flattest, will be intercepted by 1.5-foot high diversion berms, which will be constructed at the edge of the top deck. The diversion berms will direct the runoff towards one of two locations where runoff will be conveyed to riprap chutes.

- **Riprap Chutes** – Trapezoidal riprap chutes (10-foot wide base, 1-foot deep) will be constructed at two locations on the final cover system. Riprap chutes will collect runoff from the diversion berms and convey the runoff from the edge of the top deck along the side slopes of the cover system to the two culvert locations.

- **Toe Drainage Channels –** The toe drainage channels will be located on the SCA perimeter dike and will collect runoff from the side slopes and convey the runoff to the two culvert locations.

- **Perimeter Culverts –** Perimeter culverts will be located at two locations across the SCA perimeter dike at the low-points of the toe drainage channels. The culverts will convey the runoff from the toe drainage channels, and riprap chutes, across the dike to a location outside the limits of the final cover system.

REGULATORY & DESIGN CRITERIA

The surface water management system is designed to manage the calculated runoff from a 25-year, 24-hour design storm event as required by New York State Department of Environmental Conservation (NYSDEC) Regulations Section 360-2.7(b)(8)(iii). Specifically, the components of the surface water management system are designed to handle calculated peak velocities from the design storm, and the surface water conveyances are

designed to convey the calculated discharges from the design storm event with a minimum free-board of 6 inches.

ANALYSIS METHODOLOGY

Hydrologic analyses are conducted using methods presented in TR-20 (USDA-SCS, 1983) and TR-55 (USDA-SCS, 1986). Analyses are conducted using computer program *HydroCAD*™ (HydroCAD, 2005). Computer program analyses are supplemented with other design calculation methods wherever applicable.

MAJOR ASSUMPTIONS

- **Schematic Surface Water Management System Plan –** Attachment 1 provides a schematic surface water management system plan identifying the locations of the four key components which are designed in this package: Diversion Berms; Riprap Chutes; Toe Drainage Channels; and Perimeter Culverts. Additionally, Attachment 1 provides the calculated four-year post-settlement contours of the final cover system. This grading plan is used as the topography for the design and analysis conducted herein.

- **Subcatchment Properties –** For purposes of the analyses conducted herein, the extent of the final cover system is divided into eight subcatchments – four top-deck subcatchments (i.e., above the drainage berms, S1A through S4A), and four side-slope subcatchments (i.e., below the drainage berms and above the toe drainage channel, S1B through S4B). Tables 1 and 2 summarize the important topographic features of the top-deck and side-slope subcatchments, respectively, including: area, longest travel path, and elevation maxima and minima.

Table 1 – Summary of Top-Deck Subcatchments

	S1A	S2A	S3A	S4A
Area (acres)	15.7	13.3	9.2	8.0
Longest Path (ft)	1399	1071	1016	675
Max. Elev. (ft)	460.0	460.5	460.0	460.5
Min. Elev. (ft)	449.5	449.5	451.5	451.5

Table 2 – Summary of Side-Slope Subcatchments

	S1B	S2B	S3B	S4B
Area (acres)	7.6	2.4	5.4	8.8
Longest Path (ft)	128	128	157	157
Max Elev. (ft)	449.5	449.5	451.5	451.5
Min. Elev. (ft)	428.5	428.5	431.5	431.5

- **Manning Coefficients** – For purposes of the calculations conducted herein, Manning Coefficients were adopted from the built-in database in HydroCAD™. The complete table is shown in Attachment 2 (HydroCAD, 2005).

- **Hydrologic Soil Group (HSG) for Cover System** – For purposes of this calculation, it is assumed that the final cover system soils are of HSG Type D (i.e., clay loam, silty clay loam, sandy clay, silty clay, or clay). This assumption will result in the most conservative estimate of the final cover runoff volumes as soils of HSG Type D result in the highest runoff quantity. For an extended description of HSG see Attachment 3 (TR-55, USDA-SCS, 1986).

- **Runoff Curve Number (CN)** – The final cover system is expected to be well vegetated. CN = 80 is selected based on Open Space, Good Condition, HSG Type D from Attachment 3 (TR-55, USDA-SCS, 1986).

- **Rainfall Distribution for Design Storm -** As shown in Attachment 4 (TR-55, USDA-SCS, 1986), the site is located in a region designated under a SCS Type II Rainfall Distribution.

- **Rainfall Depth for Design Storm -** Rainfall depths for 25-year and 2-year 24-hour design storm events were obtained from Attachment 5 (TR-55, USDA-SCS, 1986) and summarized below.

Table 3 – Rainfall Depths for Design Storm Events

Return Period (years)	Rainfall Depth (inches)
2	2.55
25	4.40

HYDROLOGIC MODELING

- **Nodal Network Diagram –** Attachment 6 presents a nodal network diagram showing the connectivity of the subcatchments and the surface water management system components listed below.
    - S1A through S4A – Top-deck subcatchments
    - S1B through S4B – Side-slope subcatchments
    - RD1 through RD4 – Diversion Berms
    - RC1 and RC2 - Riprap Chutes
    - TD1 through TD4 – Toe drainage channels
    - C1 and C2 – Perimeter Culverts
- **Computer Modeling –** A hydrologic analysis was conducted using the above described assumptions and the HydroCAD computer model. The results of the modeling are presented in Attachment 7.

DESIGN OF SURFACE WATER MANAGEMENT SYSTEM COMPONENTS

- **Diversion Berms –**Diversion berms are designed to collect and convey the runoff from top-deck subcatchments S1A, S2A, S3A, and S4A. The berms are designed with the following properties.
    - Available Channel Depth = 1.5 foot
    - Bottom Width of Chutes = 0 feet (V-Channel)
    - Left Side Slope = 3H:1V
    - Right Side Slope = Varies based on grading of top-deck areas
        - If calculated side slope is less than 1%, it is rounded to 1%. Limitation of HydroCAD^{TM}.
    - Channel Lining = Grass (Manning's n = 0.030)

The proposed dimensions and hydraulic properties of the diversion berms are modeled within HydroCAD (i.e., RD1 through RD4), and the peak flow depth and the peak velocities for the 25-year, 24-hour design storm for each diversion berm is calculated within the model. The table below summarizes the performance of the diversion berms. As shown below, each berm has at least 6" of freeboard during peak flow and is below the 5 ft/s allowable peak velocity.

Table 4 – Summary of Diversion Berms

	RD1	RD2	RD3	RD4
Peak Inflow (cfs)	18.68	19.23	12.74	13.99
Peak Depth (ft)	0.57	0.56	0.40	0.46
Peak Velocity (ft/s)	1.4	1.7	1.4	1.2

- **Riprap Chutes –** Riprap chutes are designed as trapezoidal channels that will convey discharges from the diversion berms to the toe drainage channels. Two riprap chutes are modeled in HydroCAD as RC1 and RC2. The design of the rock-chutes involved the selection of a riprap size that can withstand the calculated tractive stresses from the calculated peak flow condition. Riprap was selected based on permissible tractive stress using an established method by Robinson et al., 1998. Attachment 8 provides the calculation for required riprap size. Based on this calculation, a riprap size with D_{50} = 6 inches is selected for design. Design summary is as follows:

    - Peak Design Q = 31.80 cfs (greater of the two RC1 and RC2)
    - Available Channel Depth = 1 foot
    - Bottom Width of Chutes = 10 feet
    - Left Side Slope = 3H:1V
    - Right Side Slope = 3H:1V
    - Manning's n = 0.045 (Riprap size with D_{50} = 6 inches)
    - Calculated Maximum Depth of Flow = 0.42 ft (available free-board = 6.96 inches based on an available depth of 1 foot)

- **Toe Drainage Channel –** Toe drainage channels will collect and convey the runoff from the side slopes and convey the runoff to the two culvert locations. The channels are designed with the following properties:

    - Available Channel Depth = 2 feet

- Bottom Width of Chutes = 4 feet
- Left Side Slope = 2H:1V
- Right Side Slope = 2H:1V
- Channel Lining = Grass (Manning's n = 0.030)

Toe drainage channels are modeled in HydroCAD as TD1 through TD4. The proposed dimensions and hydraulic properties of the toe drainage channels are modeled within HydroCAD (i.e., TD1 through TD4), and the peak flow depth and the peak velocities for the 25-year, 24-hour design storm for each toe drainage channel is calculated within the model. The table below summarizes the performance of the toe drainage channels. As shown below, each channel has at least 6" of freeboard during peak flow and is below the 5 ft/s allowable peak velocity.

Table 5 – Summary of Toe Drainage Channels

	TD1	TD2	TD3	TD4
Peak Inflow (cfs)	32.63	10.03	21.72	35.33
Peak Depth (ft)	1.13	0.52	0.98	1.23
Peak Velocity (ft/s)	2.9	3.5	2.6	2.5

- **Perimeter Culverts –** Perimeter culverts will be located at two locations across the SCA perimeter dike at the low-points of the toe drainage channel. The detailed design of the culverts is deferred to a later time since the design of the areas outside the limits of the SCA dike are in the process of being developed. Therefore, nodes C1 and C2 are modeled as "dummy nodes" at this time in the HydroCAD™ computer model. However, for planning purposes, the diameter of the pipes required to convey the peak discharge is calculated based on the following assumptions:

  - Design Q = 42.32 cfs (greater of the two C1 and C2)
  - Pipe Material = Corrugated Metal Pipe (Manning's n = 0.025)
  - Longitudinal Slope = 0.05 ft/ft (Assumed Minimum Slope)

  Attachment 9 provides a solution of Manning's Equation for the above assumptions. Accordingly, the following combinations of pipes could be used for conveying the peak discharge: one pipe 30" in diameter; two pipes 24" in diameter; four pipes 18" in diameter; or ten pipes 12" in diameter.

CONCLUSION

The components of the proposed preliminary surface water management system for the SCA were designed to convey the calculated discharges from a 25-year, 24-hour design storm. This package addresses surface water management within the limits of the SCA perimeter dike, and does not address how surface water management will be implemented outside the limits of the SCA perimeter dike. Surface water management outside the limits of the SCA perimeter dike will be addressed separately.

REFERENCES

HydroCAD, "HydroCAD™ Storm water Modeling System, Version 7.1", HydroCAD Software Solutions LLC., Chocorua, New Hampshire, 2005.

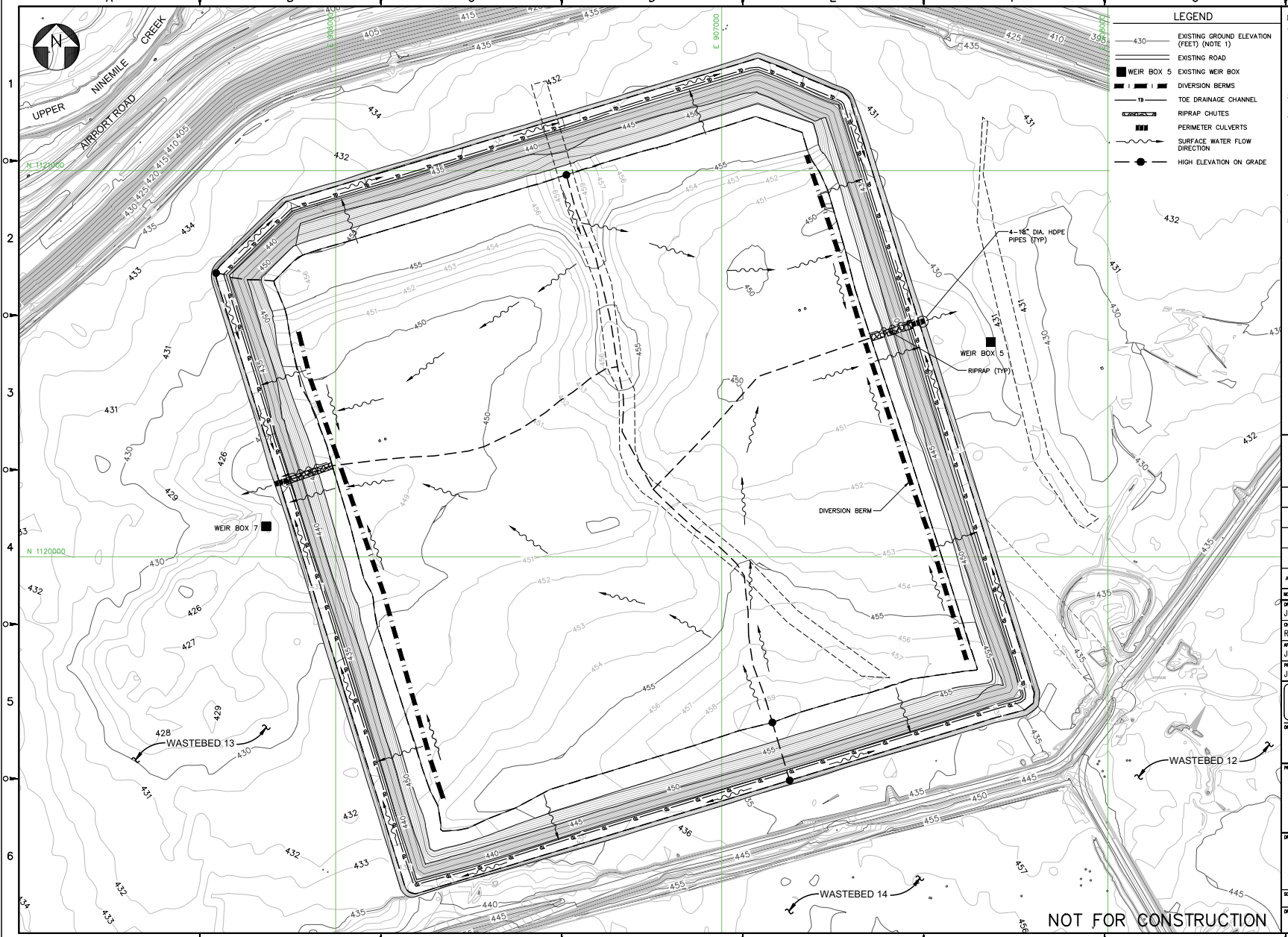
NYSDEC (New York State Department of Environmental Conservation), 1998. Solid Waste Management Facilities. Part 360 of Title 6 of the Official Compilation of Codes, Rules, and Regulations.

Robinson, K. M., Rice, C. E., Kadavy, K. C., "Design of Rock Chutes", American Society of Agricultural Engineers, Volume 41, No. 3, 1998, pp. 621-626.

USDA-SCS, "Computer Program for Project Formulation-Hydrology, Technical Release 20 (TR-20)", United States Department of Agriculture, Soil Conservation Service, Washington, D.C., 1983.

USDA-SCS, "Hydrology for Small Watersheds, Technical Release 55 (TR-55)", United States Department of Agriculture, Soil Conservation Service, Washington, D.C., 1986.

Attachment 1 – Schematic Surface Water Management System Plan



LEGEND

- 430 — EXISTING GROUND ELEVATION (FEET) (NOTE 1)
- EXISTING ROAD
- WEIR BOX 5 — EXISTING WEIR BOX
- DIVERSION BERMS
- TD — TOE DRAINAGE CHANNEL
- RIPRAP CHUTES
- PERIMETER CULVERTS
- SURFACE WATER FLOW DIRECTION
- HIGH ELEVATION ON GRADE

NOTES:

1. THE TOPOGRAPHIC CONTOURS SHOWN ON THIS DRAWING WERE OBTAINED FROM A TOPOGRAPHIC MAP COMPILED BY TVGA CONSULTANTS USING PHOTOGRAMMETRIC METHODS BASED ON AERIAL PHOTOGRAPHY PERFORMED ON 6 APRIL 2008. THE MAP WAS COMPILED IN ACCORDANCE WITH NATIONAL MAP ACCURACY STANDARDS FOR 1 INCH EQUAL TO 50 FEET SCALE. THE TOPOGRAPHIC MAP WAS PROVIDED TO GEOSYNTEC BY PARSONS.
2. THE SCA DESIGN SHOWN ON THIS DRAWING IS FOR A CAPACITY OF 2.65 MILLION CUBIC YARDS.
3. THE TOP OF FINAL COVER ELEVATIONS SHOWN ON THIS DRAWING ARE BASED ON THE CALCULATED SETTLED TOP OF GEO-TUBE ELEVATIONS CORRESPONDING TO THE END OF DEWATERING OPERATIONS. ACTUAL FINAL COVER ELEVATIONS MAY VARY FROM THE PROPOSED ELEVATIONS IF THE CALCULATED AND ACTUAL TOP OF GEO-TUBE ELEVATIONS AT THE END OF DEWATERING OPERATIONS ARE DIFFERENT. THE THICKNESS AND SOME DESIGN FEATURES OF THE FINAL COVER MAY VARY DEPENDING ON THE SELECTED FINAL COVER TYPE.
4. SURFACE WATER MANAGEMENT FEATURES SUCH AS SURFACE WATER CONTROL BERMS AND DITCHES ARE NOT GRADED IN THE DRAWING AT THIS TIME.
5. DETAIL PLANS TO ROUTE THE WATER FROM SCA TO LOCATIONS OUTSIDE OF WASTEBED 13 ARE NOT PRESENTED ON THIS DRAWING.

0 120' 240'
SCALE IN FEET

Geosyntec consultants
1255 ROBERTS BOULEVARD, N.W., SUITE 200
KENNESAW, GEORGIA 30144 USA
PHONE: 678.202.9500

NO.	DESCRIPTION	DATE	DRWN	CHK'D	APP'D
A	INITIAL DESIGN SUBMITTAL				

DRAWN BY JHS	DATE AUG 2009
CHECKED BY RK	DATE AUG 2009
APPROVED BY JFB	DATE AUG 2009
PROJECT MGR. JFB	DATE AUG 2009

SEAL

PARSONS
COMMERCIAL TECHNOLOGY GROUP

OFFICE
301 PLAINFIELD ROAD
SYRACUSE, NY 13212
(315) 451-9560

JOB 444853
WBS

PROJECT TITLE
Honeywell
SEDIMENT CONSOLIDATION AREA
ONONDAGA LAKE BOTTOM
SUBSITE REMEDIAL DESIGN

DRAWING TITLE
CONCEPTUAL SURFACE WATER MANAGEMENT PLAN

SCALE: 1" = 120'

DRAWING NO. 444853-101-C-014 REV. A

NOTICE:
THIS DRAWING, THE PROPERTY OF HONEYWELL, IS FURNISHED SUBJECT TO RETURN ON DEMAND AND THE CONDITION THAT THE INFORMATION AND TECHNOLOGY EMBODIED THEREIN SHALL NOT BE DISCLOSED OR REPRODUCED IN WHOLE OR IN PART WITHOUT THE WRITTEN PERMISSION OF HONEYWELL. THIS DRAWING IS TRANSMITTED IN CONFIDENCE AND WITH THE UNDERSTANDING THAT THE INFORMATION CONTAINED HEREIN WILL BE HELD STRICTLY LIABLE FOR ANY VIOLATION WHETHER WILLFUL OR NEGLIGENT. ANY PERSON WHO MAY RECEIVE OR OBSERVE THIS DESIGN WILL BE HELD STRICTLY LIABLE FOR ANY VIOLATION WHETHER WILLFUL OR NEGLIGENT.

FILE NAME: L:\JOBS\P\ONONDAGA LAKE\PERMIT\SCA SEDIMENTS\30-PERCENT DESIGN 0429927.01\DRAWINGS\4299-014.DWG
PLOT DATE: 7/2/2009 10:11 AM PLOTTED BY: JONATHAN SPEED

Attachment 2 – Manning Coefficients

(HydroCAD, 2005)

VALUES OF THE ROUGHNESS COEFFICIENT *n*
(Boldface figures are values generally recommended in design)

Type of channel and description	Minimum	Normal	Maximum
A. CLOSED CONDUITS FLOWING PARTLY FULL			
A-1. Metal			
a. Brass, smooth	0.009	**0.010**	0.013
b. Steel			
1. Lockbar and welded	0.010	0.012	0.014
2. Riveted and spiral	0.013	0.016	0.017
c. Cast iron			
1. Coated	0.010	0.013	0.014
2. Uncoated	0.011	0.014	0.016
d. Wrought iron			
1. Black	0.012	0.014	0.015
2. Galvanized	0.013	0.016	0.017
e. Corrugated metal			
1. Subdrain	0.017	0.019	0.021
2. Storm drain	0.021	**0.024**	0.030
A-2. Nonmetal			
a. Lucite	0.008	0.009	0.010
b. Glass	0.009	**0.010**	0.013
c. Cement			
1. Neat, surface	0.010	0.011	0.013
2. Mortar	0.011	0.013	0.015
d. Concrete			
1. Culvert, *straight and free of debris*	0.010	0.011	0.013
2. Culvert with bends, connections, and some debris	0.011	**0.013**	0.014
3. Finished	0.011	0.012	0.014
4. Sewer with manholes, inlet, etc., straight	0.013	0.015	0.017
5. Unfinished, steel form	0.012	0.013	0.014
6. Unfinished, smooth wood form	0.012	**0.014**	0.016
7. Unfinished, rough wood form	0.015	0.017	0.020
e. Wood			
1. Stave	0.010	0.012	0.014
2. Laminated, treated	0.015	0.017	0.020
f. Clay			
1. Common drainage tile	0.011	**0.013**	0.017
2. Vitrified sewer	0.011	0.014	0.017
3. Vitrified sewer with manholes, inlet, etc.	0.013	0.015	0.017
4. Vitrified subdrain with open joint	0.014	**0.016**	**0.018**
g. Brickwork			
1. Glazed	0.011	0.013	0.015
2. Lined with cement mortar	0.012	0.015	0.017
h. Sanitary sewers coated with sewage slimes, with bends and connections	0.012	0.013	0.016
i. Paved invert, sewer, smooth bottom	0.016	0.019	0.020
j. Rubble masonry, cemented	0.018	0.025	0.030

VALUES OF THE ROUGHNESS COEFFICIENT *n* (*continued*)

Type of channel and description	Minimum	Normal	Maximum
B. LINED OR BUILT-UP CHANNELS			
B-1. Metal			
a. Smooth steel surface			
1. Unpainted	0.011	**0.012**	0.014
2. Painted	0.012	0.013	0.017
b. Corrugated	0.021	0.025	0.030
B-2. Nonmetal			
a. Cement			
1. Neat, surface	0.010	0.011	0.013
2. Mortar	0.011	0.013	0.015
b. Wood			
1. Planed, untreated	0.010	0.012	0.014
2. Planed, creosoted	0.011	0.012	0.015
3. Unplaned	0.011	0.013	0.015
4. Plank with battens	0.012	0.015	0.018
5. Lined with roofing paper	0.010	0.014	0.017
c. Concrete			
1. Trowel finish	0.011	**0.013**	0.015
2. Float finish	0.013	0.015	0.016
3. Finished, with gravel on bottom	0.015	0.017	0.020
4. Unfinished	0.014	0.017	0.020
5. Gunite, good section	0.016	0.019	0.023
6. Gunite, wavy section	0.018	0.022	0.025
7. On good excavated rock	0.017	0.020	
8. On irregular excavated rock	0.022	0.027	
d. Concrete bottom float finished with sides of			
1. Dressed stone in mortar	0.015	0.017	0.020
2. Random stone in mortar	0.017	0.020	0.024
3. Cement rubble masonry, plastered	0.016	0.020	0.024
4. Cement rubble masonry	0.020	0.025	0.030
5. Dry rubble or riprap	0.020	0.030	0.035
e. Gravel bottom with sides of			
1. Formed concrete	0.017	0.020	0.025
2. Random stone in mortar	0.020	0.023	0.026
3. Dry rubble or riprap	0.023	0.033	0.036
f. Brick			
1. Glazed	0.011	**0.013**	0.015
2. In cement mortar	0.012	**0.015**	0.018
g. Masonry			
1. Cemented rubble	0.017	0.025	0.030
2. Dry rubble	0.023	0.032	0.035
h. Dressed ashlar	0.013	0.015	0.017
i. Asphalt			
1. Smooth	0.013	0.013	
2. Rough	0.016	0.016	
j. Vegetal lining	0.030	.....	0.500

This table reprinted from OPEN CHANNEL HYDRAULICS by Ven Te Chow, Copyright 1959 by McGraw-Hill, with the permission of the publisher.

Written by: **Jesus Sanchez** Date: **6/15/2009** Reviewed by: **Ganesh Krishnan** Date: **6/15/2009**

Client: **Honeywell** Project: **Onondaga Lake SCA IDS** Project No.: **GJ4299** Task No.: **08**

VALUES OF THE ROUGHNESS COEFFICIENT *n* (*continued*)

Type of channel and description	Minimum	Normal	Maximum
C. EXCAVATED OR DREDGED			
a. Earth, straight and uniform			
1. Clean, recently completed	0.016	0.018	0.020
2. Clean, after weathering	0.018	0.022	0.025
3. Gravel, uniform section, clean	0.022	0.025	0.030
4. With short grass, few weeds	0.022	0.027	0.033
b. Earth, winding and sluggish			
1. No vegetation	0.023	0.025	0.030
2. Grass, some weeds	0.025	0.030	0.033
3. Dense weeds or aquatic plants in deep channels	0.030	0.035	0.040
4. Earth bottom and rubble sides	0.028	0.030	0.035
5. Stony bottom and weedy banks	0.025	0.035	0.040
6. Cobble bottom and clean sides	0.030	0.040	0.050
c. Dragline-excavated or dredged			
1. No vegetation	0.025	0.028	0.033
2. Light brush on banks	0.035	0.050	0.060
d. Rock cuts			
1. Smooth and uniform	0.025	0.035	0.040
2. Jagged and irregular	0.035	0.040	0.050
e. Channels not maintained, weeds and brush uncut			
1. Dense weeds, high as flow depth	0.050	0.080	0.120
2. Clean bottom, brush on sides	0.040	0.050	0.080
3. Same, highest stage of flow	0.045	0.070	0.110
4. Dense brush, high stage	0.080	0.100	0.140
D. NATURAL STREAMS			
D-1. Minor streams (top width at flood stage <100 ft)			
a. Streams on plain			
1. Clean, straight, full stage, no rifts or deep pools	0.025	0.030	0.033
2. Same as above, but more stones and weeds	0.030	0.035	0.040
3. Clean, winding, some pools and shoals	0.033	0.040	0.045
4. Same as above, but some weeds and stones	0.035	0.045	0.050
5. Same as above, lower stages, more ineffective slopes and sections	0.040	0.048	0.055
6. Same as 4, but more stones	0.045	0.050	0.060
7. Sluggish reaches, weedy, deep pools	0.050	0.070	0.080
8. Very weedy reaches, deep pools, or floodways with heavy stand of timber and underbrush	0.075	0.100	0.150

VALUES OF THE ROUGHNESS COEFFICIENT *n* (*continued*)

Type of channel and description	Minimum	Normal	Maximum
b. Mountain streams, no vegetation in channel, banks usually steep, trees and brush along banks submerged at high stages			
1. Bottom: gravels, cobbles, and few boulders	0.030	0.040	0.050
2. Bottom: cobbles with large boulders	0.040	0.050	0.070
D-2. Flood plains			
a. Pasture, no brush			
1. Short grass	0.025	0.030	0.035
2. High grass	0.030	0.035	0.050
b. Cultivated areas			
1. No crop	0.020	0.030	0.040
2. Mature row crops	0.025	0.035	0.045
3. Mature field crops	0.030	0.040	0.050
c. Brush			
1. Scattered brush, heavy weeds	0.035	0.050	0.070
2. Light brush and trees, in winter	0.035	0.050	0.060
3. Light brush and trees, in summer	0.040	0.060	0.080
4. Medium to dense brush, in winter	0.045	0.070	0.110
5. Medium to dense brush, in summer	0.070	0.100	0.160
d. Trees			
1. Dense willows, summer, straight	0.110	0.150	0.200
2. Cleared land with tree stumps, no sprouts	0.030	0.040	0.050
3. Same as above, but with heavy growth of sprouts	0.050	0.060	0.080
4. Heavy stand of timber, a few down trees, little undergrowth, flood stage below branches	0.080	0.100	0.120
5. Same as above, but with flood stage reaching branches	0.100	0.120	0.160
D-3. Major streams (top width at flood stage >100 ft). The *n* value is less than that for minor streams of similar description, because banks offer less effective resistance.			
a. Regular section with no boulders or brush	0.025	.....	0.060
b. Irregular and rough section	0.035	.....	0.100

This table reprinted from OPEN CHANNEL HYDRAULICS by Ven Te Chow, Copyright 1959 by McGraw-Hill, with the permission of the publisher.

Attachment 3 – Hydrologic Soil Groups and Runoff Curve Numbers

(TR-55, USDA-SCS, 1986)

Soils are classified into hydrologic soil groups (HSG's) to indicate the minimum rate of infiltration obtained for bare soil after prolonged wetting. The HSG's, which are A, B, C, and D, are one element used in determining runoff curve numbers (see chapter 2). For the convenience of TR-55 users, exhibit A-1 lists the HSG classification of United States soils.

The infiltration rate is the rate at which water enters the soil at the soil surface. It is controlled by surface conditions. HSG also indicates the transmission rate—the rate at which the water moves within the soil. This rate is controlled by the soil profile. Approximate numerical ranges for transmission rates shown in the HSG definitions were first published by Musgrave (USDA 1955). The four groups are defined by SCS soil scientists as follows:

Group A soils have low runoff potential and high infiltration rates even when thoroughly wetted. They consist chiefly of deep, well to excessively drained sand or gravel and have a high rate of water transmission (greater than 0.30 in/hr).

Group B soils have moderate infiltration rates when thoroughly wetted and consist chiefly of moderately deep to deep, moderately well to well drained soils with moderately fine to moderately coarse textures. These soils have a moderate rate of water transmission (0.15-0.30 in/hr).

Group C soils have low infiltration rates when thoroughly wetted and consist chiefly of soils with a layer that impedes downward movement of water and soils with moderately fine to fine texture. These soils have a low rate of water transmission (0.05-0.15 in/hr).

Group D soils have high runoff potential. They have very low infiltration rates when thoroughly wetted and consist chiefly of clay soils with a high swelling potential, soils with a permanent high water table, soils with a claypan or clay layer at or near the surface, and shallow soils over nearly impervious material. These soils have a very low rate of water transmission (0-0.05 in/hr).

In exhibit A-1, some of the listed soils have an added modifier; for example, "Abrazo, gravelly." This refers to a gravelly phase of the Abrazo series that is found in SCS soil map legends.

Disturbed soil profiles

As a result of urbanization, the soil profile may be considerably altered and the listed group classification may no longer apply. In these circumstances, use the following to determine HSG according to the texture of the new surface soil, provided that significant compaction has not occurred (Brakensiek and Rawls 1983).

HSG	*Soil textures*
A	Sand, loamy sand, or sandy loam
B	Silt loam or loam
C	Sandy clay loam
D	Clay loam, silty clay loam, sandy clay, silty clay, or clay

Drainage and group D soils

Some soils in the list are in group D because of a high water table that creates a drainage problem. Once these soils are effectively drained, they are placed in a different group. For example, Ackerman soil is classified as A/D. This indicates that the drained Ackerman soil is in group A and the undrained soil is in group D.

Table 2-2a Runoff curve numbers for urban areas [1]

Cover description: Cover type and hydrologic condition	Average percent impervious area [2]	Curve numbers for hydrologic soil group: A	B	C	D
Fully developed urban areas (vegetation established)					
Open space (lawns, parks, golf courses, cemeteries, etc.) [3]:					
Poor condition (grass cover < 50%)		68	79	86	89
Fair condition (grass cover 50% to 75%)		49	69	79	84
Good condition (grass cover > 75%)		39	61	74	80
Impervious areas:					
Paved parking lots, roofs, driveways, etc. (excluding right-of-way)		98	98	98	98
Streets and roads:					
Paved; curbs and storm sewers (excluding right-of-way)		98	98	98	98
Paved; open ditches (including right-of-way)		83	89	92	93
Gravel (including right-of-way)		76	85	89	91
Dirt (including right-of-way)		72	82	87	89
Western desert urban areas:					
Natural desert landscaping (pervious areas only) [4]		63	77	85	88
Artificial desert landscaping (impervious weed barrier, desert shrub with 1- to 2-inch sand or gravel mulch and basin borders)		96	96	96	96
Urban districts:					
Commercial and business	85	89	92	94	95
Industrial	72	81	88	91	93
Residential districts by average lot size:					
1/8 acre or less (town houses)	65	77	85	90	92
1/4 acre	38	61	75	83	87
1/3 acre	30	57	72	81	86
1/2 acre	25	54	70	80	85
1 acre	20	51	68	79	84
2 acres	12	46	65	77	82
Developing urban areas					
Newly graded areas (pervious areas only, no vegetation) [5]		77	86	91	94
Idle lands (CN's are determined using cover types similar to those in table 2-2c).					

1 Average runoff condition, and $I_a = 0.2S$.

2 The average percent impervious area shown was used to develop the composite CN's. Other assumptions are as follows: impervious areas are directly connected to the drainage system, impervious areas have a CN of 98, and pervious areas are considered equivalent to open space in good hydrologic condition. CN's for other combinations of conditions may be computed using figure 2-3 or 2-4.

3 CN's shown are equivalent to those of pasture. Composite CN's may be computed for other combinations of open space cover type.

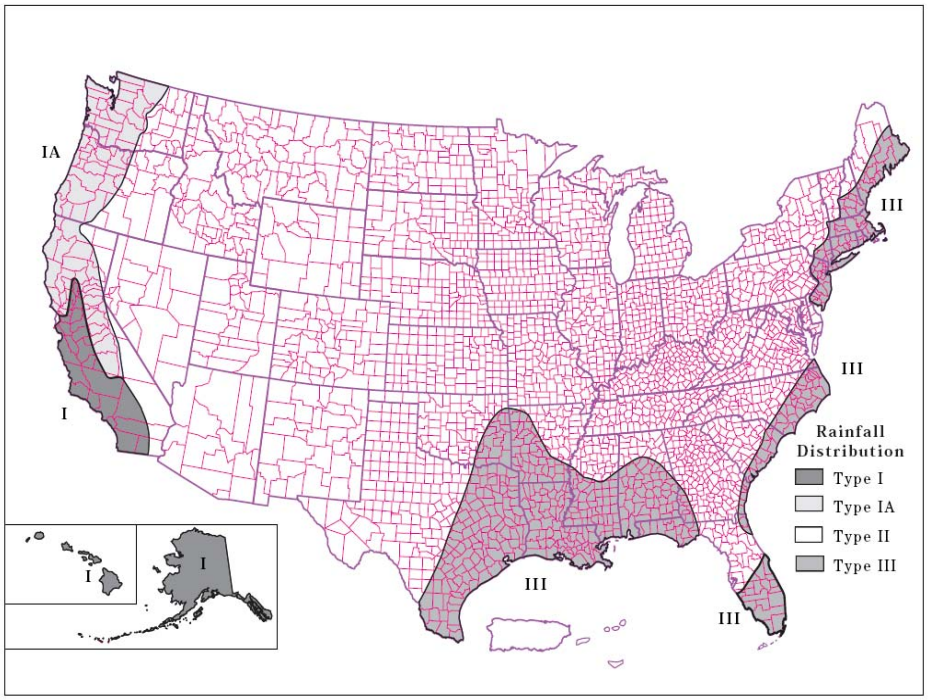
4 Composite CN's for natural desert landscaping should be computed using figures 2-3 or 2-4 based on the impervious area percentage (CN = 98) and the pervious area CN. The pervious area CN's are assumed equivalent to desert shrub in poor hydrologic condition.

5 Composite CN's to use for the design of temporary measures during grading and construction should be computed using figure 2-3 or 2-4 based on the degree of development (impervious area percentage) and the CN's for the newly graded pervious areas.

Attachment 4 – Rainfall Distributions

(TR-55, USDA-SCS, 1986)

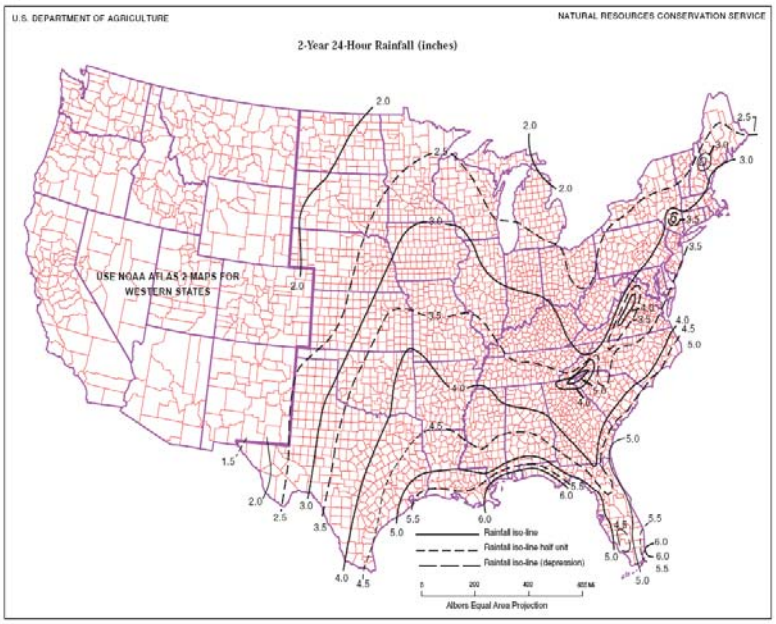
Figure B-2 Approximate geographic boundaries for NRCS (SCS) rainfall distributions



Attachment 5 – Rainfall Depths

(TR-55, USDA-SCS, 1986)

Figure B-3 2-year, 24-hr rainfall



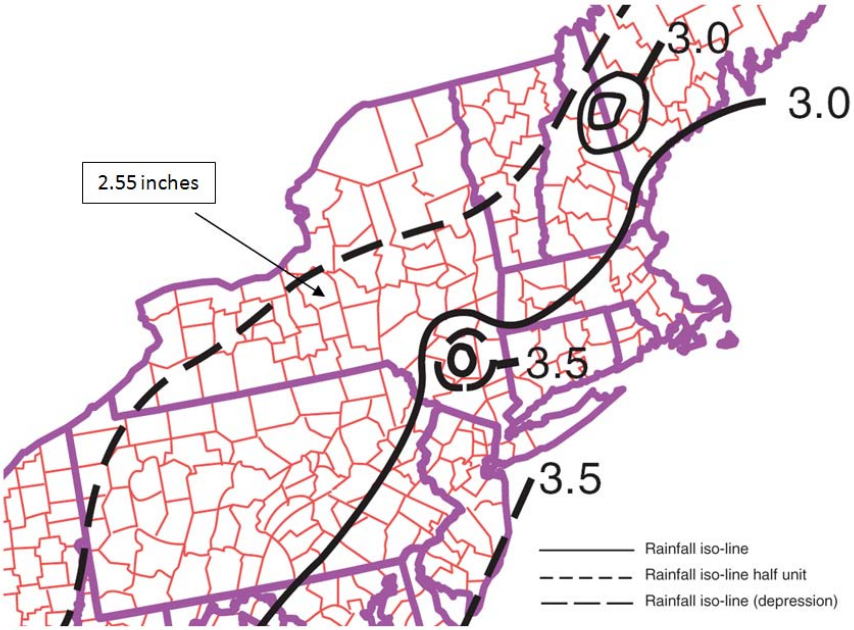
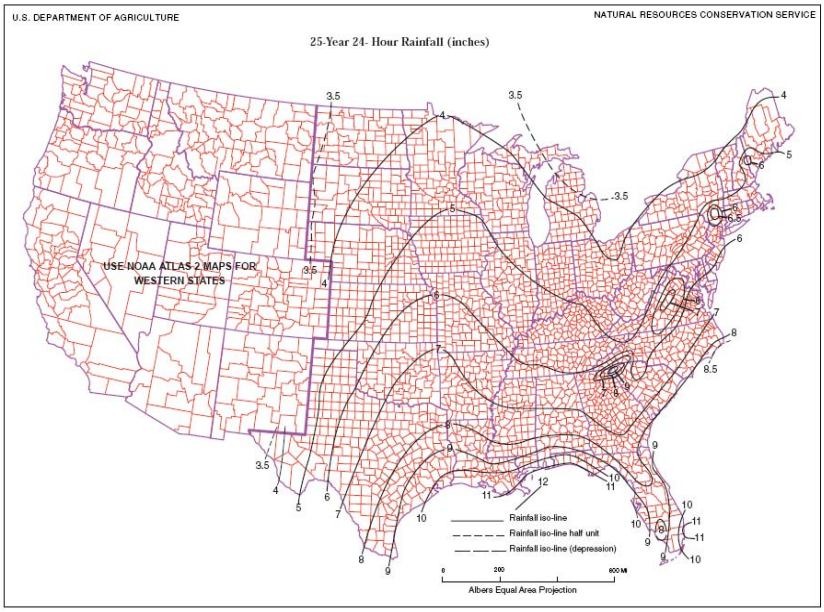
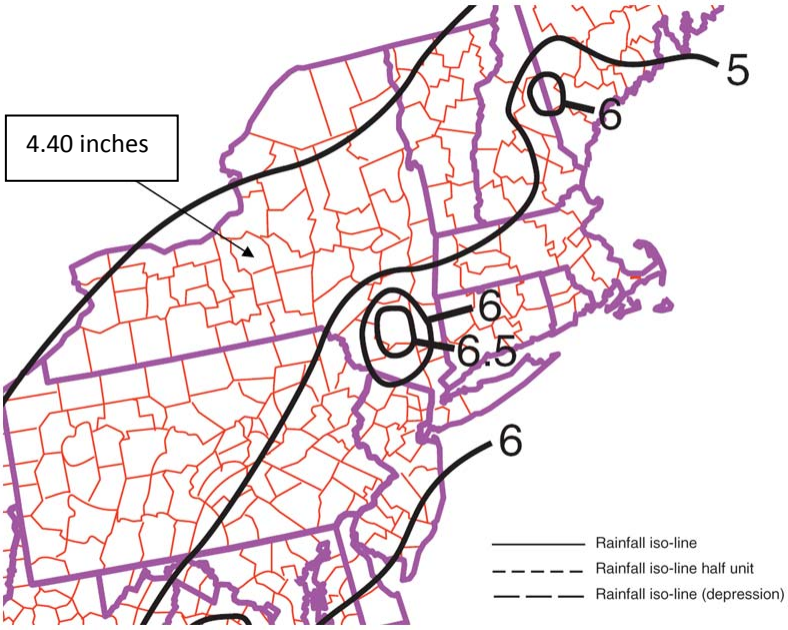
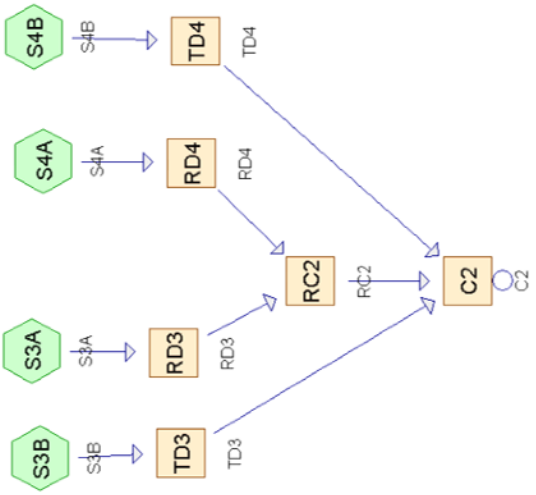


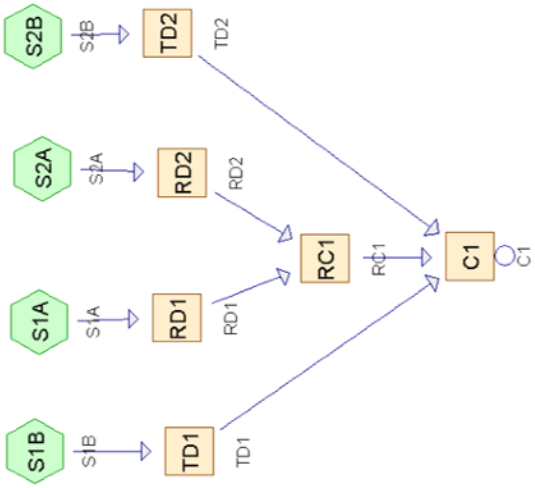
Figure B-6 25-year, 24-hour rainfall



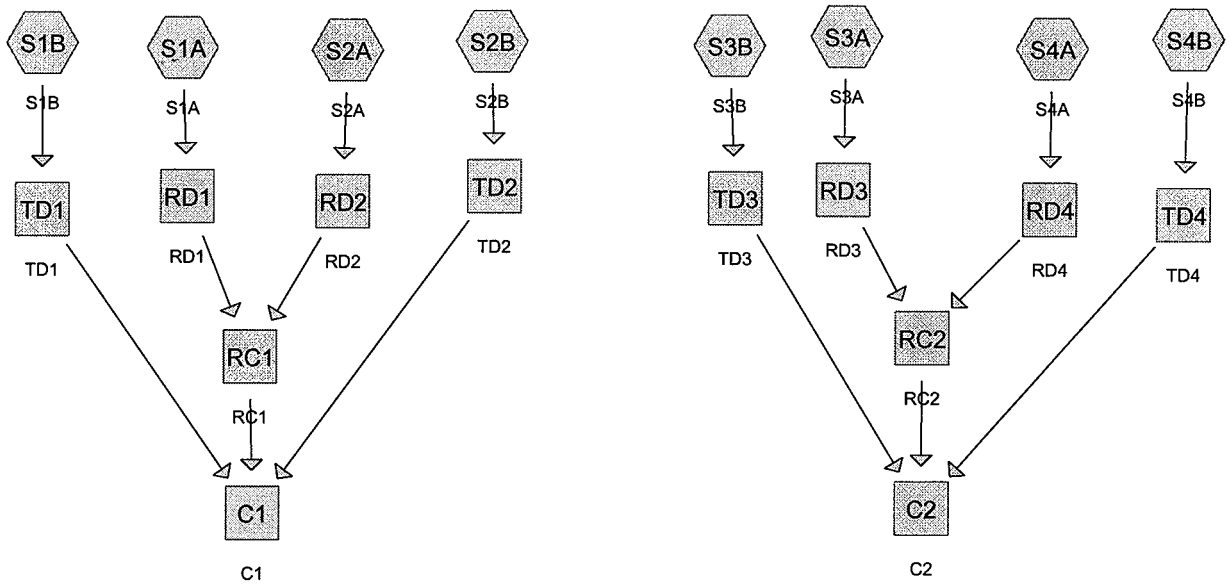


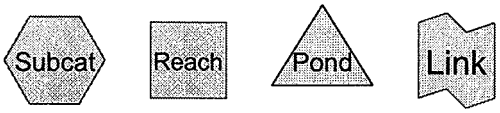
Attachment 6 – Nodal Network Diagram


S4B
S4B
TD4
TD4
S4A
S4A
RD4
RD4
S3A
S3A
RD3
RD3
RC2
RC2
C2
C2
S3B
S3B
TD3
TD3


S2B
S2B
TD2
TD2
S2A
S2A
RD2
RD2
S1A
S1A
RD1
RD1
RC1
RC1
C1
C1
S1B
S1B
TD1
TD1

Attachment 7 – HydroCAD Analysis





Drainage Diagram for SW_Onondaga_5YR
Prepared by {enter your company name here} 6/18/2009
HydroCAD® 7.10 s/n 003933 © 2005 HydroCAD Software Solutions LLC

Time span=5.00-20.00 hrs, dt=0.01 hrs, 1501 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment S1A: S1A Runoff Area=15.683 ac Runoff Depth>2.15"
Flow Length=1,399' Tc=65.2 min CN=80 Runoff=18.68 cfs 2.804 af

Subcatchment S1B: S1B Runoff Area=7.642 ac Runoff Depth>2.19"
Flow Length=128' Tc=5.7 min CN=80 Runoff=32.63 cfs 1.398 af

Subcatchment S2A: S2A Runoff Area=13.283 ac Runoff Depth>2.16"
Flow Length=1,071' Tc=49.7 min CN=80 Runoff=19.23 cfs 2.390 af

Subcatchment S2B: S2B Runoff Area=2.350 ac Runoff Depth>2.19"
Flow Length=128' Tc=5.7 min CN=80 Runoff=10.03 cfs 0.430 af

Subcatchment S3A: S3A Runoff Area=9.161 ac Runoff Depth>2.16"
Flow Length=1,016' Tc=52.6 min CN=80 Runoff=12.74 cfs 1.646 af

Subcatchment S3B: S3B Runoff Area=5.391 ac Runoff Depth>2.19"
Flow Length=157' Tc=7.3 min CN=80 Runoff=21.72 cfs 0.985 af

Subcatchment S4A: S4A Runoff Area=8.019 ac Runoff Depth>2.17"
Flow Length=675' Tc=38.3 min CN=80 Runoff=13.99 cfs 1.449 af

Subcatchment S4B: S4B Runoff Area=8.827 ac Runoff Depth>2.19"
Flow Length=157' Tc=7.5 min CN=80 Runoff=35.33 cfs 1.613 af

Reach C1: C1 Peak Depth=1.66' Max Vel=10.7 fps Inflow=37.24 cfs 6.927 af
D=30.0" n=0.025 L=10.0' S=0.0500 '/' Capacity=47.69 cfs Outflow=37.24 cfs 6.927 af

Reach C2: C2 Peak Depth=1.83' Max Vel=11.0 fps Inflow=42.32 cfs 5.589 af
D=30.0" n=0.025 L=10.0' S=0.0500 '/' Capacity=47.69 cfs Outflow=42.32 cfs 5.589 af

Reach RC1: RC1 Peak Depth=0.42' Max Vel=6.7 fps Inflow=31.81 cfs 5.139 af
n=0.045 L=139.1' S=0.1510 '/' Capacity=143.31 cfs Outflow=31.80 cfs 5.136 af

Reach RC2: RC2 Peak Depth=0.37' Max Vel=5.5 fps Inflow=22.82 cfs 3.058 af
n=0.045 L=166.6' S=0.1200 '/' Capacity=127.79 cfs Outflow=22.82 cfs 3.055 af

Reach RD1: RD1 Peak Depth=0.57' Max Vel=1.4 fps Inflow=18.68 cfs 2.804 af
n=0.030 L=867.1' S=0.0040 '/' Capacity=237.86 cfs Outflow=17.72 cfs 2.761 af

Reach RD2: RD2 Peak Depth=0.56' Max Vel=1.7 fps Inflow=19.23 cfs 2.390 af
n=0.030 L=366.1' S=0.0068 '/' Capacity=267.56 cfs Outflow=19.09 cfs 2.378 af

Reach RD3: RD3 Peak Depth=0.40' Max Vel=1.4 fps Inflow=12.74 cfs 1.646 af
n=0.030 L=866.6' S=0.0069 '/' Capacity=393.81 cfs Outflow=11.91 cfs 1.622 af

Reach RD4: RD4 Peak Depth=0.46' Max Vel=1.2 fps Inflow=13.99 cfs 1.449 af
n=0.030 L=492.0' S=0.0041 '/' Capacity=301.76 cfs Outflow=13.22 cfs 1.435 af

Reach TD1: TD1 Peak Depth=1.13' Max Vel=2.9 fps Inflow=32.63 cfs 1.398 af
n=0.030 L=2,170.0' S=0.0046 '/' Capacity=61.97 cfs Outflow=20.14 cfs 1.365 af

Reach TD2: TD2 Peak Depth=0.52' Max Vel=3.5 fps Inflow=10.03 cfs 0.430 af
n=0.030 L=692.5' S=0.0159 '/' Capacity=115.04 cfs Outflow=9.18 cfs 0.427 af

Reach TD3: TD3 Peak Depth=0.98' Max Vel=2.6 fps Inflow=21.72 cfs 0.985 af
n=0.030 L=1,570.1' S=0.0045 '/' Capacity=60.95 cfs Outflow=15.19 cfs 0.966 af

Reach TD4: TD4 Peak Depth=1.23' Max Vel=2.5 fps Inflow=35.33 cfs 1.613 af
n=0.030 L=2,408.1' S=0.0033 '/' Capacity=52.61 cfs Outflow=20.13 cfs 1.568 af

Total Runoff Area = 70.356 ac Runoff Volume = 12.715 af Average Runoff Depth = 2.17"

Subcatchment S1A: S1A

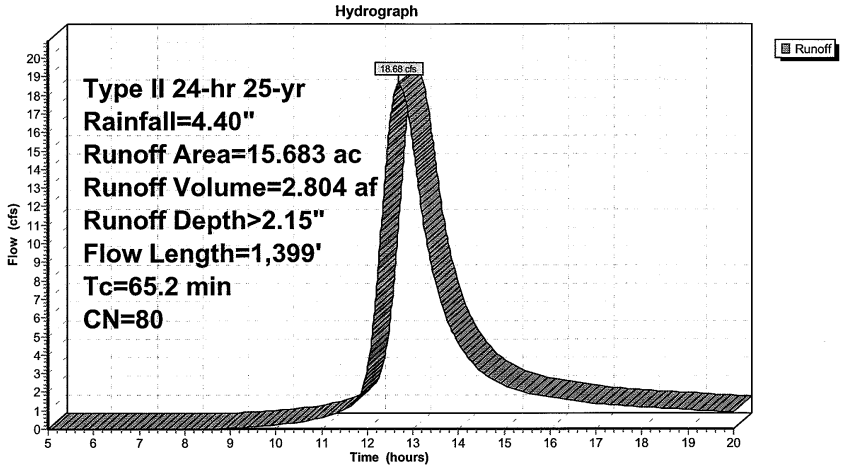
Runoff = 18.68 cfs @ 12.68 hrs, Volume= 2.804 af, Depth> 2.15"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.01 hrs
Type II 24-hr 25-yr Rainfall=4.40"

Area (ac)	CN	Description
15.683	80	>75% Grass cover, Good, HSG D

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
31.1	300	0.0133	0.2		**Sheet Flow, Sheet** Grass: Short n= 0.150 P2= 2.55"
34.1	1,099	0.0059	0.5		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
65.2	1,399	Total			

Subcatchment S1A: S1A



Subcatchment S1B: S1B

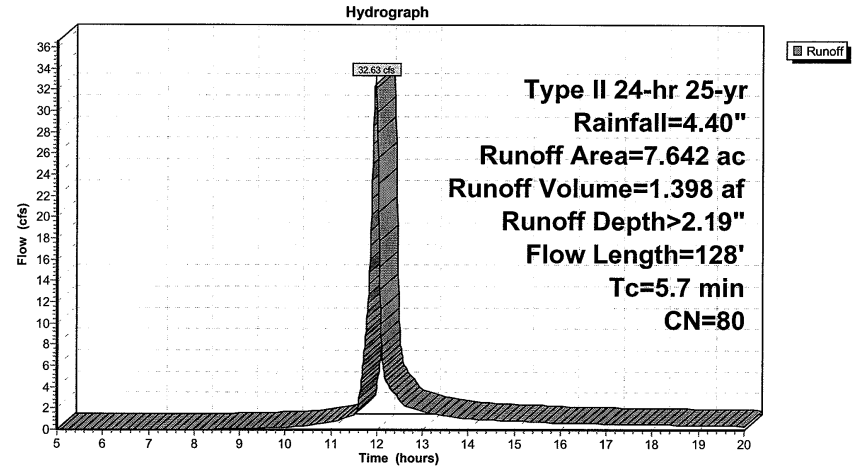
Runoff = 32.63 cfs @ 11.97 hrs, Volume= 1.398 af, Depth> 2.19"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.01 hrs
Type II 24-hr 25-yr Rainfall=4.40"

Area (ac)	CN	Description
7.642	80	>75% Grass cover, Good, HSG D

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.7	128	0.1660	0.4		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.55"

Subcatchment S1B: S1B



Subcatchment S2A: S2A

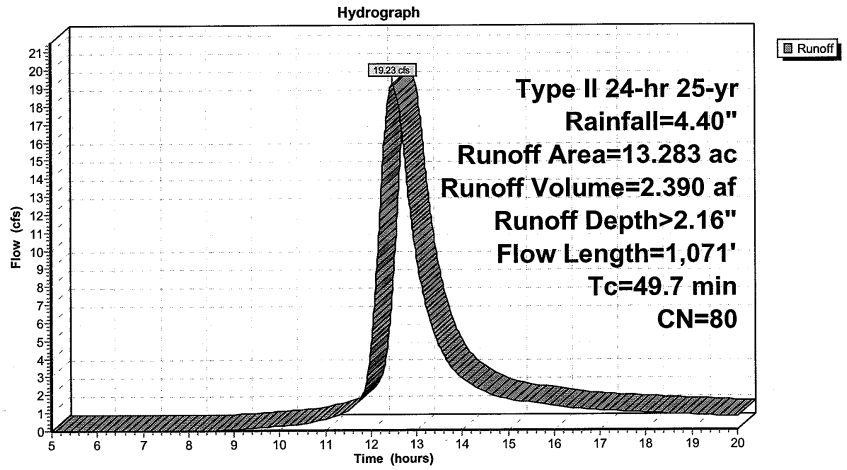
Runoff = 19.23 cfs @ 12.49 hrs, Volume= 2.390 af, Depth> 2.16"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.01 hrs
Type II 24-hr 25-yr Rainfall=4.40"

Area (ac)	CN	Description
13.283	80	>75% Grass cover, Good, HSG D

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
25.6	300	0.0217	0.2		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.55"
24.1	771	0.0058	0.5		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
49.7	1,071	Total			

Subcatchment S2A: S2A



Subcatchment S2B: S2B

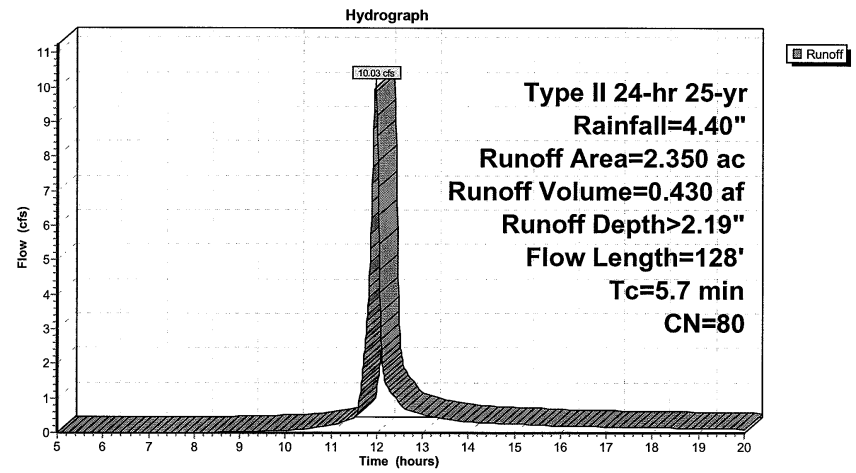
Runoff = 10.03 cfs @ 11.97 hrs, Volume= 0.430 af, Depth> 2.19"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.01 hrs
Type II 24-hr 25-yr Rainfall=4.40"

Area (ac)	CN	Description
2.350	80	>75% Grass cover, Good, HSG D

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.7	128	0.1664	0.4		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.55"

Subcatchment S2B: S2B



Subcatchment S3A: S3A

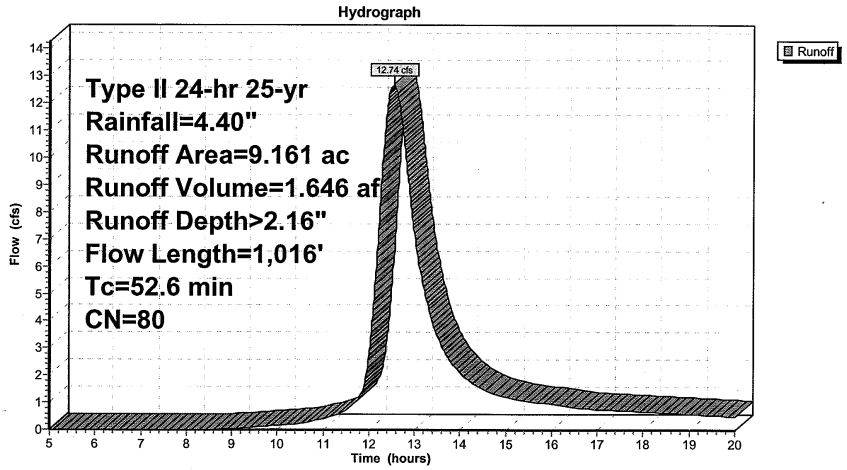
Runoff = 12.74 cfs @ 12.56 hrs, Volume= 1.646 af, Depth> 2.16"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.01 hrs
Type II 24-hr 25-yr Rainfall=4.40"

Area (ac)	CN	Description
9.161	80	>75% Grass cover, Good, HSG D

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
31.1	300	0.0133	0.2		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.55"
21.5	716	0.0063	0.6		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
52.6	1,016	Total			

Subcatchment S3A: S3A



Subcatchment S3B: S3B

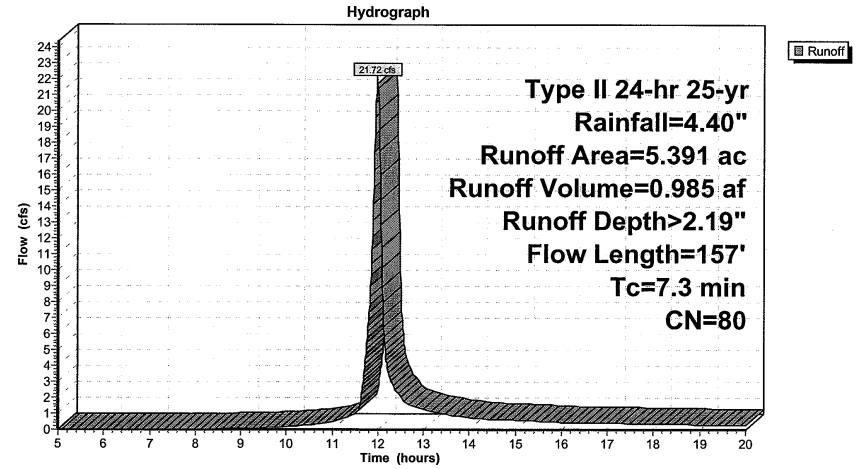
Runoff = 21.72 cfs @ 11.99 hrs, Volume= 0.985 af, Depth> 2.19"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.01 hrs
Type II 24-hr 25-yr Rainfall=4.40"

Area (ac)	CN	Description
5.391	80	>75% Grass cover, Good, HSG D

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.3	157	0.1353	0.4		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.55"

Subcatchment S3B: S3B



Subcatchment S4A: S4A

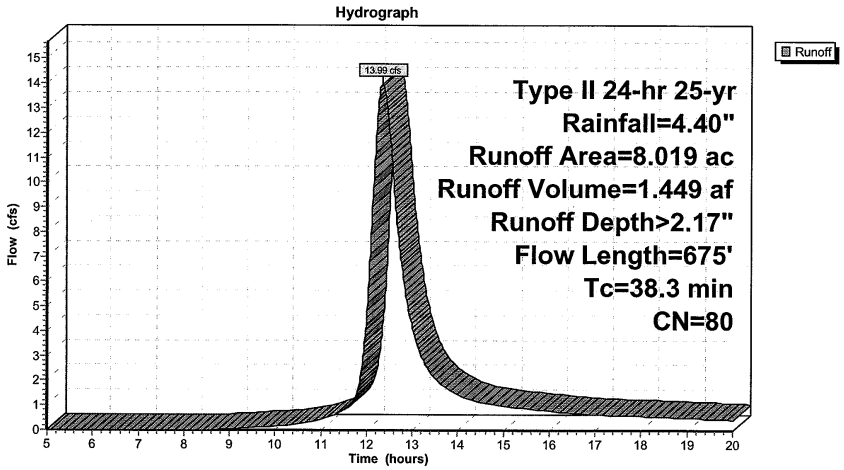
Runoff = 13.99 cfs @ 12.34 hrs, Volume= 1.449 af, Depth> 2.17"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.01 hrs
Type II 24-hr 25-yr Rainfall=4.40"

Area (ac)	CN	Description
8.019	80	>75% Grass cover, Good, HSG D

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
24.2	300	0.0250	0.2		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.55"
14.1	375	0.0040	0.4		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
38.3	675	Total			

Subcatchment S4A: S4A



Subcatchment S4B: S4B

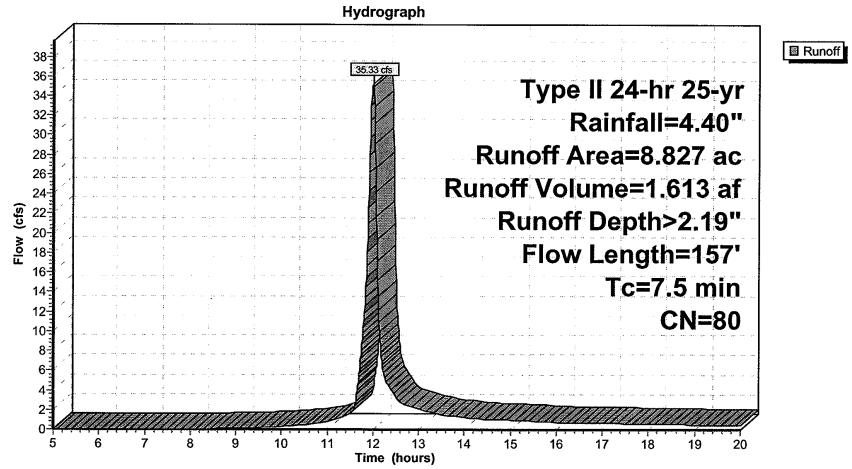
Runoff = 35.33 cfs @ 11.99 hrs, Volume= 1.613 af, Depth> 2.19"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.01 hrs
Type II 24-hr 25-yr Rainfall=4.40"

Area (ac)	CN	Description
8.827	80	>75% Grass cover, Good, HSG D

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.5	157	0.1288	0.4		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.55"

Subcatchment S4B: S4B



Reach C1: C1

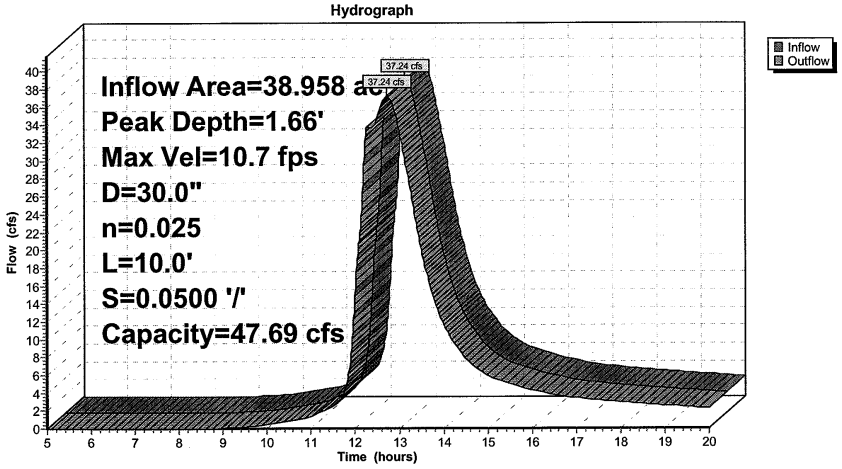
[52] Hint: Inlet conditions not evaluated
[61] Hint: Submerged 8% of Reach RC1 bottom
[61] Hint: Submerged 17% of Reach TD1 bottom
[61] Hint: Submerged 15% of Reach TD2 bottom

Inflow Area = 38.958 ac, Inflow Depth > 2.13" for 25-yr event
Inflow = 37.24 cfs @ 12.73 hrs, Volume= 6.927 af
Outflow = 37.24 cfs @ 12.73 hrs, Volume= 6.927 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.01 hrs
Max. Velocity= 10.7 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 5.6 fps, Avg. Travel Time= 0.0 min

Peak Depth= 1.66' @ 12.73 hrs
Capacity at bank full= 47.69 cfs
Inlet Invert= 428.50', Outlet Invert= 428.00'
30.0" Diameter Pipe, n= 0.025 Corrugated metal
Length= 10.0' Slope= 0.0500 '/'

Reach C1: C1



Reach C2: C2

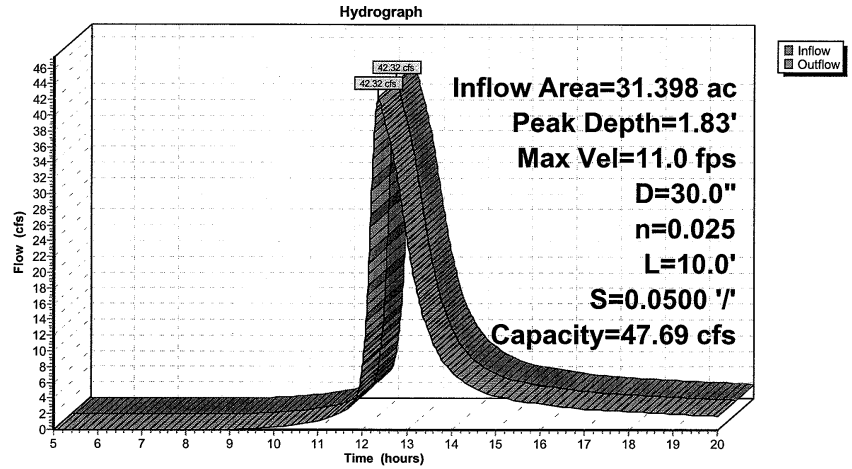
[52] Hint: Inlet conditions not evaluated
[61] Hint: Submerged 9% of Reach RC2 bottom
[61] Hint: Submerged 26% of Reach TD3 bottom
[61] Hint: Submerged 23% of Reach TD4 bottom

Inflow Area = 31.398 ac, Inflow Depth > 2.14" for 25-yr event
Inflow = 42.32 cfs @ 12.35 hrs, Volume= 5.589 af
Outflow = 42.32 cfs @ 12.35 hrs, Volume= 5.589 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.01 hrs
Max. Velocity= 11.0 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 5.3 fps, Avg. Travel Time= 0.0 min

Peak Depth= 1.83' @ 12.35 hrs
Capacity at bank full= 47.69 cfs
Inlet Invert= 431.50', Outlet Invert= 431.00'
30.0" Diameter Pipe, n= 0.025 Corrugated metal
Length= 10.0' Slope= 0.0500 '/'

Reach C2: C2



Reach RC1: RC1

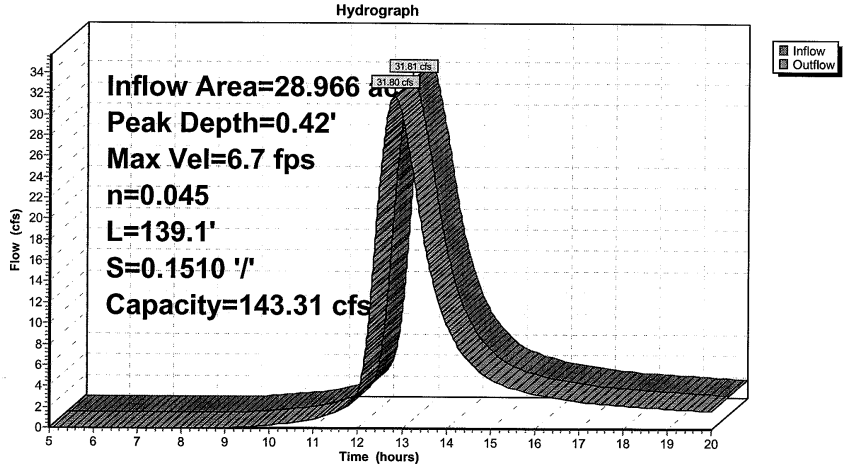
[61] Hint: Submerged 12% of Reach RD1 bottom
[61] Hint: Submerged 17% of Reach RD2 bottom

Inflow Area = 28.966 ac, Inflow Depth > 2.13" for 25-yr event
Inflow = 31.81 cfs @ 12.80 hrs, Volume= 5.139 af
Outflow = 31.80 cfs @ 12.81 hrs, Volume= 5.136 af, Atten= 0%, Lag= 0.6 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.01 hrs
Max. Velocity= 6.7 fps, Min. Travel Time= 0.3 min
Avg. Velocity = 2.8 fps, Avg. Travel Time= 0.8 min

Peak Depth= 0.42' @ 12.80 hrs
Capacity at bank full= 143.31 cfs
Inlet Invert= 449.50', Outlet Invert= 428.50'
10.00' x 1.00' deep channel, n= 0.045
Side Slope Z-value= 3.0 '/' Top Width= 16.00'
Length= 139.1' Slope= 0.1510 '/'

Reach RC1: RC1



Reach RC2: RC2

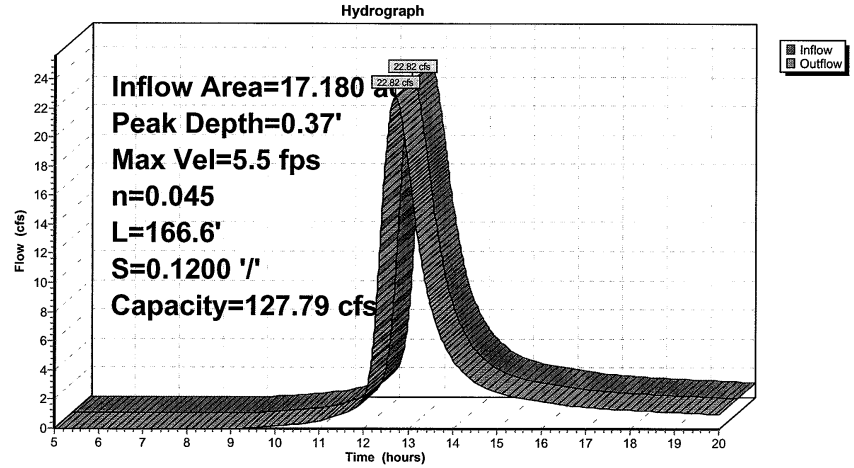
[61] Hint: Submerged 6% of Reach RD3 bottom
[61] Hint: Submerged 19% of Reach RD4 bottom

Inflow Area = 17.180 ac, Inflow Depth > 2.14" for 25-yr event
Inflow = 22.82 cfs @ 12.67 hrs, Volume= 3.058 af
Outflow = 22.82 cfs @ 12.69 hrs, Volume= 3.055 af, Atten= 0%, Lag= 0.8 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.01 hrs
Max. Velocity= 5.5 fps, Min. Travel Time= 0.5 min
Avg. Velocity = 2.1 fps, Avg. Travel Time= 1.3 min

Peak Depth= 0.37' @ 12.68 hrs
Capacity at bank full= 127.79 cfs
Inlet Invert= 451.50', Outlet Invert= 431.50'
10.00' x 1.00' deep channel, n= 0.045
Side Slope Z-value= 3.0 '/' Top Width= 16.00'
Length= 166.6' Slope= 0.1200 '/'

Reach RC2: RC2



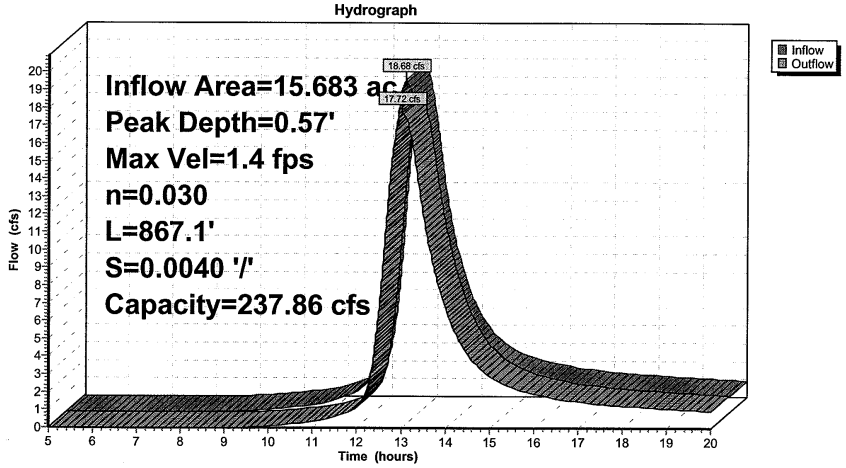
Reach RD1: RD1

Inflow Area = 15.683 ac, Inflow Depth > 2.15" for 25-yr event
Inflow = 18.68 cfs @ 12.68 hrs, Volume= 2.804 af
Outflow = 17.72 cfs @ 13.02 hrs, Volume= 2.761 af, Atten= 5%, Lag= 20.6 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.01 hrs
Max. Velocity= 1.4 fps, Min. Travel Time= 10.7 min
Avg. Velocity = 0.7 fps, Avg. Travel Time= 20.5 min

Peak Depth= 0.57' @ 12.85 hrs
Capacity at bank full= 237.86 cfs
Inlet Invert= 453.00', Outlet Invert= 449.50'
0.00' x 1.50' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 3.0 78.5 '/' Top Width= 122.25'
Length= 867.1' Slope= 0.0040 '/'

Reach RD1: RD1



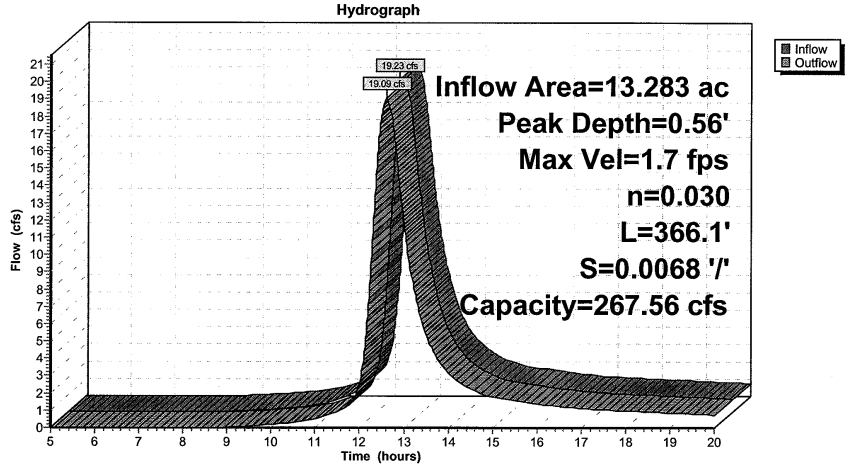
Reach RD2: RD2

Inflow Area = 13.283 ac, Inflow Depth > 2.16" for 25-yr event
Inflow = 19.23 cfs @ 12.49 hrs, Volume= 2.390 af
Outflow = 19.09 cfs @ 12.60 hrs, Volume= 2.378 af, Atten= 1%, Lag= 7.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.01 hrs
Max. Velocity= 1.7 fps, Min. Travel Time= 3.5 min
Avg. Velocity = 0.9 fps, Avg. Travel Time= 7.1 min

Peak Depth= 0.56' @ 12.54 hrs
Capacity at bank full= 267.56 cfs
Inlet Invert= 452.00', Outlet Invert= 449.50'
0.00' x 1.50' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 3.0 67.5 '/' Top Width= 105.75'
Length= 366.1' Slope= 0.0068 '/'

Reach RD2: RD2



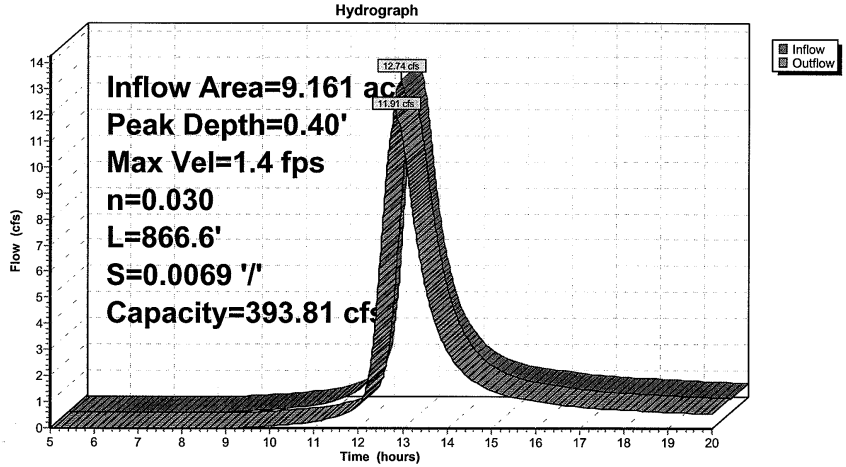
Reach RD3: RD3

Inflow Area = 9.161 ac, Inflow Depth > 2.16" for 25-yr event
Inflow = 12.74 cfs @ 12.56 hrs, Volume= 1.646 af
Outflow = 11.91 cfs @ 12.84 hrs, Volume= 1.622 af, Atten= 6%, Lag= 17.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.01 hrs
Max. Velocity= 1.4 fps, Min. Travel Time= 10.2 min
Avg. Velocity = 0.7 fps, Avg. Travel Time= 20.2 min

Peak Depth= 0.40' @ 12.67 hrs
Capacity at bank full= 393.81 cfs
Inlet Invert= 457.50', Outlet Invert= 451.50'
0.00' x 1.50' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 3.0 100.0 '/' Top Width= 154.50'
Length= 866.6' Slope= 0.0069 '/'

Reach RD3: RD3



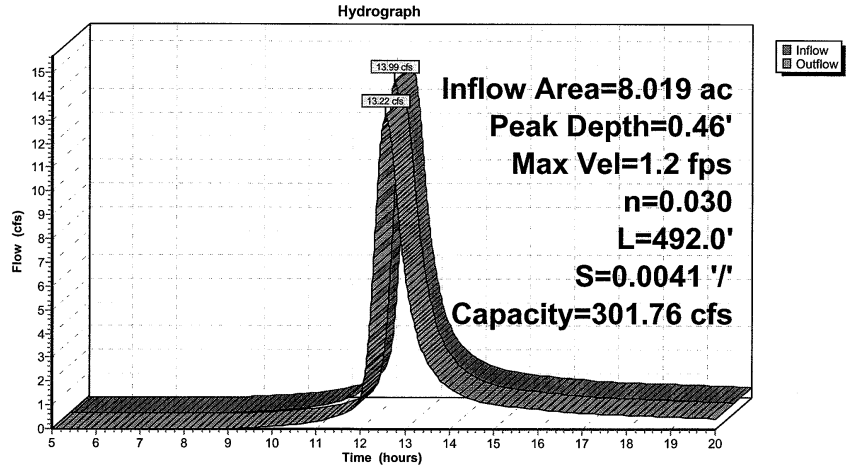
Reach RD4: RD4

Inflow Area = 8.019 ac, Inflow Depth > 2.17" for 25-yr event
Inflow = 13.99 cfs @ 12.34 hrs, Volume= 1.449 af
Outflow = 13.22 cfs @ 12.55 hrs, Volume= 1.435 af, Atten= 5%, Lag= 12.6 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.01 hrs
Max. Velocity= 1.2 fps, Min. Travel Time= 6.9 min
Avg. Velocity = 0.6 fps, Avg. Travel Time= 14.4 min

Peak Depth= 0.46' @ 12.44 hrs
Capacity at bank full= 301.76 cfs
Inlet Invert= 453.50', Outlet Invert= 451.50'
0.00' x 1.50' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 3.0 100.0 '/' Top Width= 154.50'
Length= 492.0' Slope= 0.0041 '/'

Reach RD4: RD4



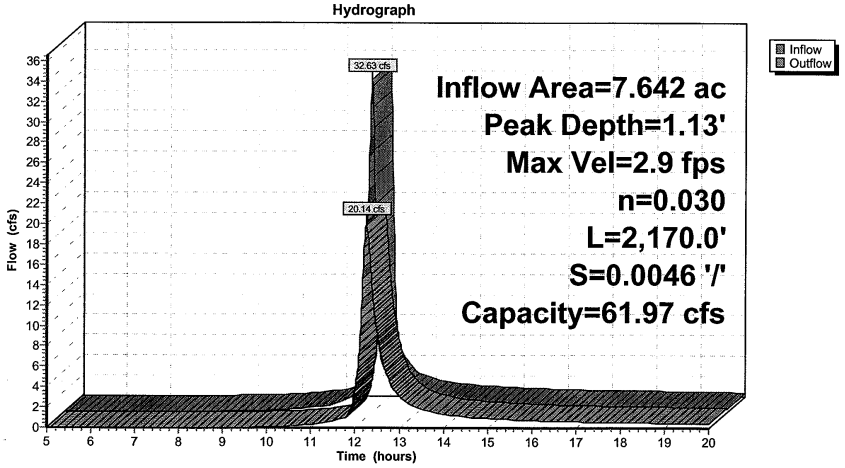
Reach TD1: TD1

Inflow Area = 7.642 ac, Inflow Depth > 2.19" for 25-yr event
Inflow = 32.63 cfs @ 11.97 hrs, Volume= 1.398 af
Outflow = 20.14 cfs @ 12.25 hrs, Volume= 1.365 af, Atten= 38%, Lag= 17.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.01 hrs
Max. Velocity= 2.9 fps, Min. Travel Time= 12.7 min
Avg. Velocity = 1.0 fps, Avg. Travel Time= 37.9 min

Peak Depth= 1.13' @ 12.04 hrs
Capacity at bank full= 61.97 cfs
Inlet Invert= 438.50', Outlet Invert= 428.50'
4.00' x 2.00' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 2.0 '/' Top Width= 12.00'
Length= 2,170.0' Slope= 0.0046 '/'

Reach TD1: TD1



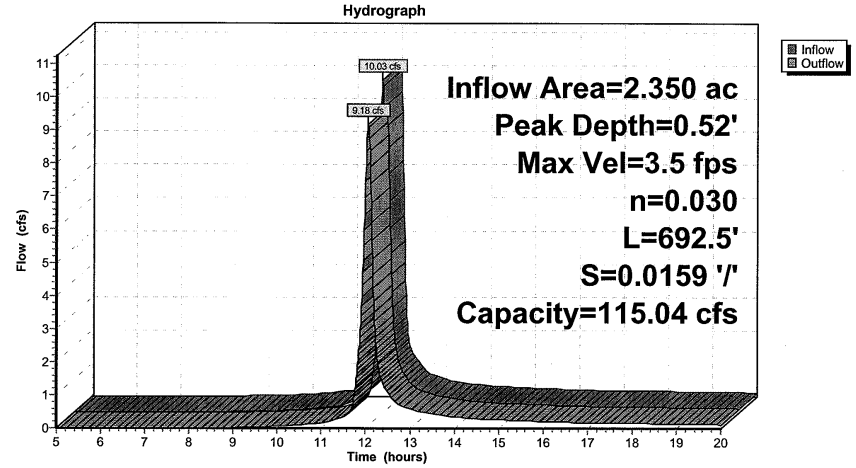
Reach TD2: TD2

Inflow Area = 2.350 ac, Inflow Depth > 2.19" for 25-yr event
Inflow = 10.03 cfs @ 11.97 hrs, Volume= 0.430 af
Outflow = 9.18 cfs @ 12.06 hrs, Volume= 0.427 af, Atten= 8%, Lag= 5.1 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.01 hrs
Max. Velocity= 3.5 fps, Min. Travel Time= 3.3 min
Avg. Velocity = 0.9 fps, Avg. Travel Time= 12.2 min

Peak Depth= 0.52' @ 12.00 hrs
Capacity at bank full= 115.04 cfs
Inlet Invert= 439.50', Outlet Invert= 428.50'
4.00' x 2.00' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 2.0 '/' Top Width= 12.00'
Length= 692.5' Slope= 0.0159 '/'

Reach TD2: TD2



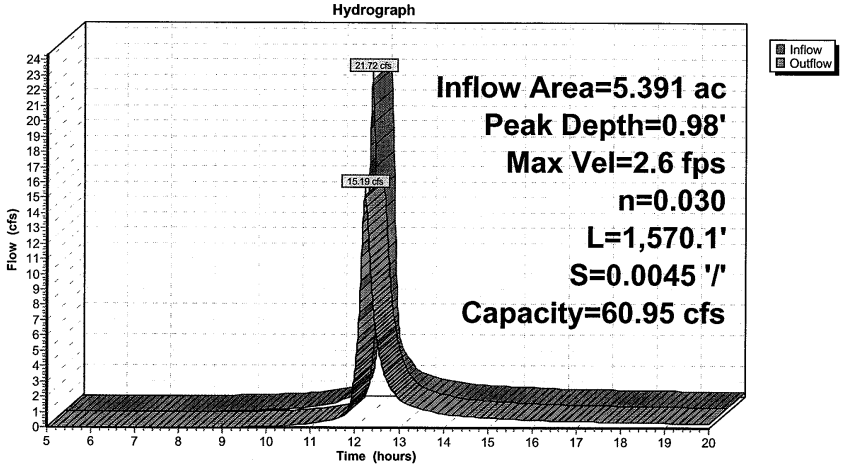
Reach TD3: TD3

Inflow Area = 5.391 ac, Inflow Depth > 2.19" for 25-yr event
Inflow = 21.72 cfs @ 11.99 hrs, Volume= 0.985 af
Outflow = 15.19 cfs @ 12.22 hrs, Volume= 0.966 af, Atten= 30%, Lag= 14.1 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.01 hrs
Max. Velocity= 2.6 fps, Min. Travel Time= 10.1 min
Avg. Velocity = 0.8 fps, Avg. Travel Time= 31.2 min

Peak Depth= 0.98' @ 12.06 hrs
Capacity at bank full= 60.95 cfs
Inlet Invert= 438.50', Outlet Invert= 431.50'
4.00' x 2.00' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 2.0 '/' Top Width= 12.00'
Length= 1,570.1' Slope= 0.0045 '/'

Reach TD3: TD3



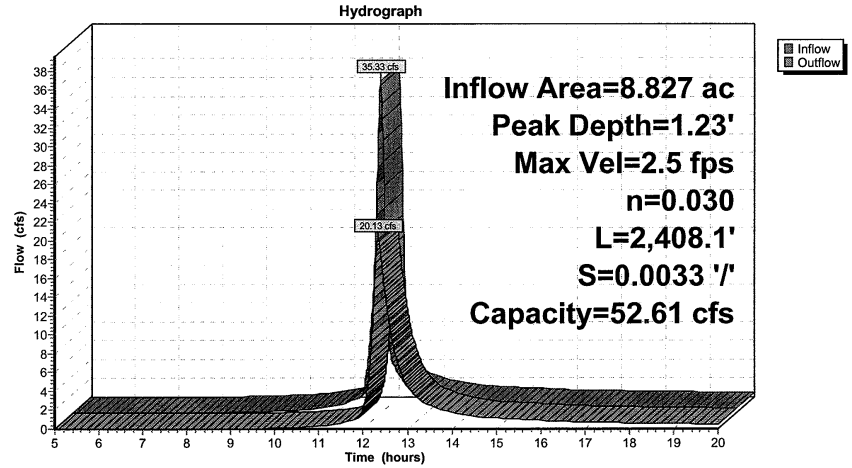
Reach TD4: TD4

Inflow Area = 8.827 ac, Inflow Depth > 2.19" for 25-yr event
Inflow = 35.33 cfs @ 11.99 hrs, Volume= 1.613 af
Outflow = 20.13 cfs @ 12.34 hrs, Volume= 1.568 af, Atten= 43%, Lag= 21.1 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.01 hrs
Max. Velocity= 2.5 fps, Min. Travel Time= 15.8 min
Avg. Velocity = 0.9 fps, Avg. Travel Time= 44.6 min

Peak Depth= 1.23' @ 12.08 hrs
Capacity at bank full= 52.61 cfs
Inlet Invert= 439.50', Outlet Invert= 431.50'
4.00' x 2.00' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 2.0 '/' Top Width= 12.00'
Length= 2,408.1' Slope= 0.0033 '/'

Reach TD4: TD4



Attachment 8 – Riprap Chute Analysis

Written by:	Jesus Sanchez	Date:	6/15/2009	Reviewed by:	Ganesh Krishnan	Date:	6/15/2009
Client:	Honeywell	Project:	Onondaga Lake SCA IDS	Project No.:	GJ4299	Task No.:	08

Design - Trapezoidal Riprap Chute

Methodology: Robinson et.al 1998

Project: Onandaga Lake SCA

Chute ID: RC1

INPUT PARAMETERS

Peak Discharge, Q_{max} =	31.80	cfs
Bottom Width, B =	10.00	ft
Left Side Slope, Z_1 =	3.00	horizontal :1 vertical
Right Side Slope, Z_2 =	3.00	horizontal :1 vertical
Longitudinal Channel Slope, S_o =	0.1200	ft/ft

ROCK SIZING

Equivalent Unit Discharge, q_t =	3.18	cfs/ft
Median Rock Diameter, D_{50} =	5.33	inches

MANNING'S ROUGHNESS

Calculated Channel Roughness, n =	0.044

NORMAL DEPTH CALCULATIONS - Using Manning's Equation

Depth of Flow Y ft	Area of Flow A ft^2	Wetted Perimeter P ft	Hydraulic Radius R=A/P ft	Average Velocity V ft/s	Discharge (Flow Rate) Q=AV ft^3/s	Avg. Tractive Stress τ_o lb/ft^2	Comments
0.45	5.11	12.85	0.40	6.34	32.38	2.98	DESIGN Q

Attachment 9 – Culvert Analysis

Written by:	Jesus Sanchez	Date:	6/15/2009	Reviewed by:	Ganesh Krishnan	Date:	6/15/2009
Client:	Honeywell	Project:	Onondaga Lake SCA IDS	Project No.:	GJ4299	Task No.:	08

Culverts Analysis
Flow Through Circular Pipe

Diameter of pipe, D=	30	inches
Longitudinal Slope, So=	0.05	ft/ft
Manning's n=	0.025	
Density of flowing liquid, rho=	1.94	slugs/ft^3

Theta radians	Theta degrees	Depth of Flow y inches	Area of Flow A ft^2	Wetted Perimeter P ft	Hydraulic Radius R ft	Average Velocity V ft/s	Discharge Q=A*V cfs	Force* F lbf
0.00	0	0.0	0.000	0.00		0.0	0.00	0.0
0.25	14	0.1	0.002	0.31	0.01	0.5	0.00	0.0
0.50	29	0.5	0.016	0.63	0.03	1.2	0.02	0.0
0.75	43	1.0	0.053	0.94	0.06	2.0	0.11	0.4
1.00	57	1.8	0.124	1.25	0.10	2.9	0.35	2.0
1.25	72	2.8	0.235	1.56	0.15	3.8	0.89	6.5
1.50	86	4.0	0.393	1.88	0.21	4.7	1.84	16.8
1.75	100	5.4	0.598	2.19	0.27	5.6	3.36	36.6
2.00	115	6.9	0.852	2.50	0.34	6.5	5.54	69.9
2.25	129	8.5	1.150	2.81	0.41	7.3	8.44	120.2
2.50	143	10.3	1.486	3.13	0.48	8.1	12.06	189.8
2.75	158	12.1	1.850	3.44	0.54	8.8	16.31	279.0
3.00	172	13.9	2.233	3.75	0.60	9.4	21.07	385.5
3.25	186	15.8	2.624	4.06	0.65	10.0	26.12	504.5
3.50	201	17.7	3.008	4.38	0.69	10.4	31.23	629.0
3.75	215	19.5	3.376	4.69	0.72	10.7	36.15	750.9
4.00	229	21.2	3.716	5.00	0.74	10.9	40.63	861.9
4.25	244	22.9	4.020	5.31	0.76	11.1	44.47	954.7
4.50	258	24.4	4.279	5.63	0.76	11.1	47.52	1023.8
4.75	272	25.8	4.492	5.94	0.76	11.1	49.69	1066.6
5.00	286	27.0	4.655	6.25	0.74	10.9	50.98	1082.9
5.25	301	28.0	4.773	6.56	0.73	10.8	51.43	1075.2
5.50	315	28.9	4.848	6.88	0.71	10.6	51.18	1048.2
5.75	329	29.5	4.889	7.19	0.68	10.3	50.39	1007.6
6.00	344	29.8	4.906	7.50	0.65	10.0	49.26	959.5
6.25	358	30.0	4.909	7.81	0.63	9.8	47.98	909.9

Written by:	Jesus Sanchez	Date:	6/15/2009	Reviewed by:	Ganesh Krishnan	Date:	6/15/2009
Client:	Honeywell	Project:	Onondaga Lake SCA IDS	Project No.:	GJ4299	Task No.:	08

Culverts Analysis
Flow Through Circular Pipe

Diameter of pipe, D=	24	inches
Longitudinal Slope, So=	0.05	ft/ft
Manning's n=	0.025	
Density of flowing liquid, rho=	1.94	slugs/ft^3

Theta radians	Theta degrees	Depth of Flow y inches	Area of Flow A ft^2	Wetted Perimeter P ft	Hydraulic Radius R ft	Average Velocity V ft/s	Discharge Q=A*V cfs	Force* F lbf
0.00	0	0.0	0.000	0.00		0.0	0.00	0.0
0.25	14	0.1	0.001	0.25	0.01	0.4	0.00	0.0
0.50	29	0.4	0.010	0.50	0.02	1.0	0.01	0.0
0.75	43	0.8	0.034	0.75	0.05	1.7	0.06	0.2
1.00	57	1.5	0.079	1.00	0.08	2.5	0.19	0.9
1.25	72	2.3	0.151	1.25	0.12	3.2	0.49	3.1
1.50	86	3.2	0.251	1.50	0.17	4.0	1.02	8.0
1.75	100	4.3	0.383	1.75	0.22	4.8	1.85	17.4
2.00	115	5.5	0.545	2.00	0.27	5.6	3.05	33.2
2.25	129	6.8	0.736	2.25	0.33	6.3	4.65	57.1
2.50	143	8.2	0.951	2.50	0.38	7.0	6.65	90.2
2.75	158	9.7	1.184	2.75	0.43	7.6	9.00	132.6
3.00	172	11.2	1.429	3.00	0.48	8.1	11.62	183.2
3.25	186	12.7	1.679	3.25	0.52	8.6	14.40	239.7
3.50	201	14.1	1.925	3.50	0.55	8.9	17.22	298.9
3.75	215	15.6	2.161	3.75	0.58	9.2	19.94	356.9
4.00	229	17.0	2.378	4.00	0.59	9.4	22.41	409.6
4.25	244	18.3	2.572	4.25	0.61	9.5	24.53	453.7
4.50	258	19.5	2.739	4.50	0.61	9.6	26.21	486.6
4.75	272	20.6	2.875	4.75	0.61	9.5	27.41	506.9
5.00	286	21.6	2.979	5.00	0.60	9.4	28.11	514.6
5.25	301	22.4	3.054	5.25	0.58	9.3	28.36	511.0
5.50	315	23.1	3.103	5.50	0.56	9.1	28.23	498.2
5.75	329	23.6	3.129	5.75	0.54	8.9	27.79	478.8
6.00	344	23.9	3.140	6.00	0.52	8.7	27.17	456.0
6.25	358	24.0	3.142	6.25	0.50	8.4	26.46	432.4

Written by:	Jesus Sanchez	Date:	6/15/2009	Reviewed by:	Ganesh Krishnan	Date:	6/15/2009
Client:	Honeywell	Project:	Onondaga Lake SCA IDS	Project No.:	GJ4299	Task No.:	08

Culverts Analysis
Flow Through Circular Pipe

Diameter of pipe, D=	18	inches
Longitudinal Slope, So=	0.05	ft/ft
Manning's n=	0.025	
Density of flowing liquid, rho=	1.94	slugs/ft^3

Theta radians	Theta degrees	Depth of Flow y inches	Area of Flow A ft^2	Wetted Perimeter P ft	Hydraulic Radius R ft	Average Velocity V ft/s	Discharge Q=A*V cfs	Force* F lbf
0.00	0	0.0	0.000	0.00		0.0	0.00	0.0
0.25	14	0.1	0.001	0.19	0.00	0.3	0.00	0.0
0.50	29	0.3	0.006	0.38	0.02	0.8	0.00	0.0
0.75	43	0.6	0.019	0.56	0.03	1.4	0.03	0.1
1.00	57	1.1	0.045	0.75	0.06	2.0	0.09	0.4
1.25	72	1.7	0.085	0.94	0.09	2.7	0.23	1.2
1.50	86	2.4	0.141	1.13	0.13	3.3	0.47	3.1
1.75	100	3.2	0.215	1.31	0.16	4.0	0.86	6.7
2.00	115	4.1	0.307	1.50	0.20	4.6	1.42	12.7
2.25	129	5.1	0.414	1.69	0.25	5.2	2.16	21.9
2.50	143	6.2	0.535	1.88	0.29	5.8	3.09	34.6
2.75	158	7.2	0.666	2.06	0.32	6.3	4.18	50.8
3.00	172	8.4	0.804	2.25	0.36	6.7	5.39	70.2
3.25	186	9.5	0.944	2.44	0.39	7.1	6.69	91.9
3.50	201	10.6	1.083	2.63	0.41	7.4	8.00	114.6
3.75	215	11.7	1.215	2.81	0.43	7.6	9.26	136.8
4.00	229	12.7	1.338	3.00	0.45	7.8	10.40	157.0
4.25	244	13.7	1.447	3.19	0.45	7.9	11.39	173.9
4.50	258	14.7	1.541	3.38	0.46	7.9	12.17	186.5
4.75	272	15.5	1.617	3.56	0.45	7.9	12.72	194.2
5.00	286	16.2	1.676	3.75	0.45	7.8	13.05	197.2
5.25	301	16.8	1.718	3.94	0.44	7.7	13.17	195.8
5.50	315	17.3	1.745	4.13	0.42	7.5	13.11	190.9
5.75	329	17.7	1.760	4.31	0.41	7.3	12.90	183.5
6.00	344	17.9	1.766	4.50	0.39	7.1	12.61	174.7
6.25	358	18.0	1.767	4.69	0.38	7.0	12.29	165.7

Written by:	Jesus Sanchez	Date:	6/15/2009	Reviewed by:	Ganesh Krishnan	Date:	6/15/2009
Client:	Honeywell	Project:	Onondaga Lake SCA IDS	Project No.:	GJ4299	Task No.:	08

Culverts Analysis
Flow Through Circular Pipe

Diameter of pipe, D=	12	inches
Longitudinal Slope, So=	0.05	ft/ft
Manning's n=	0.025	
Density of flowing liquid, rho=	1.94	slugs/ft^3

Theta radians	Theta degrees	Depth of Flow y inches	Area of Flow A ft^2	Wetted Perimeter P ft	Hydraulic Radius R ft	Average Velocity V ft/s	Discharge Q=A*V cfs	Force* F lbf
0.00	0	0.0	0.000	0.00		0.0	0.00	0.0
0.25	14	0.0	0.000	0.13	0.00	0.3	0.00	0.0
0.50	29	0.2	0.003	0.25	0.01	0.6	0.00	0.0
0.75	43	0.4	0.009	0.38	0.02	1.1	0.01	0.0
1.00	57	0.7	0.020	0.50	0.04	1.5	0.03	0.1
1.25	72	1.1	0.038	0.63	0.06	2.0	0.08	0.3
1.50	86	1.6	0.063	0.75	0.08	2.5	0.16	0.8
1.75	100	2.2	0.096	0.88	0.11	3.0	0.29	1.7
2.00	115	2.8	0.136	1.00	0.14	3.5	0.48	3.3
2.25	129	3.4	0.184	1.13	0.16	4.0	0.73	5.7
2.50	143	4.1	0.238	1.25	0.19	4.4	1.05	8.9
2.75	158	4.8	0.296	1.38	0.22	4.8	1.42	13.1
3.00	172	5.6	0.357	1.50	0.24	5.1	1.83	18.2
3.25	186	6.3	0.420	1.63	0.26	5.4	2.27	23.8
3.50	201	7.1	0.481	1.75	0.28	5.6	2.71	29.6
3.75	215	7.8	0.540	1.88	0.29	5.8	3.14	35.4
4.00	229	8.5	0.595	2.00	0.30	5.9	3.53	40.6
4.25	244	9.2	0.643	2.13	0.30	6.0	3.86	45.0
4.50	258	9.8	0.685	2.25	0.30	6.0	4.13	48.3
4.75	272	10.3	0.719	2.38	0.30	6.0	4.32	50.3
5.00	286	10.8	0.745	2.50	0.30	5.9	4.43	51.0
5.25	301	11.2	0.764	2.63	0.29	5.8	4.47	50.7
5.50	315	11.5	0.776	2.75	0.28	5.7	4.44	49.4
5.75	329	11.8	0.782	2.88	0.27	5.6	4.38	47.5
6.00	344	11.9	0.785	3.00	0.26	5.4	4.28	45.2
6.25	358	12.0	0.785	3.13	0.25	5.3	4.17	42.9

APPENDIX L

CONSTRUCTION QUALITY ASSURANCE PLAN OUTLINE

CONSTRUCTION QUALITY ASSURANCE PLAN
OUTLINE

LIST OF ACRONYMS

1. INTRODUCTION
   - 1.1 Purpose
   - 1.2 Remedial Action Objectives
   - 1.3 Report Organization
   - 1.4 Site Location and Description
   - 1.5 Site History
   - 1.6 Selected Remedy

2. DEFINITIONS AND USE OF TERMS
   - 2.1 Definitions Relating to CQA
   - 2.2 References to Standard
   - 2.3 Units

3. PROJECT MANAGEMENT
   - 3.1 Roles and Responsibilities of the Remedial Action Project Team
     - 3.1.1 Agencies
     - 3.1.2 Honeywell
     - 3.1.3 Remedial Action Contractor
     - 3.1.4 Engineer
       - 3.1.4.1 Soils CQA Laboratory
       - 3.1.4.2 Geosynthetics CQA Laboratory
     - 3.1.5 Design Engineer
   - 3.2 Chain of Command and Communication
   - 3.3 Meetings
     - 3.3.1 Construction Kickoff Meeting
     - 3.3.2 Progress Meetings
     - 3.3.3 Public Meetings
     - 3.3.4 Construction Wrap-up Meeting

4. CONSTRUCTION OVERSIGHT TASKS
- 4.1 Inspections
  - 4.1.1 Routine Work Inspections
  - 4.1.2 Pre-Final and Final Inspections
- 4.2 Quality Control and Assurance Testing
- 4.3 Technical Submittal Review
- 4.4 Documentation
  - 4.4.1 Field Log Book
  - 4.4.2 Daily Field Reports
  - 4.4.3 Photographic Documentation
  - 4.4.4 Monthly Progress Report
  - 4.4.5 Construction Certification Report and Record Drawings
  - 4.4.6 Field Change Form

5. REFERENCES

APPENDIX M

GEOTECHNICAL INSTRUMENTATION AND MONITORING PLAN OUTLINE

GEOTECHNICAL INSTRUMENTATION & MONITORING PLAN OUTLINE

1. INTRODUCTION
   - 1.1 Project Background
   - 1.2 Purpose of Instrumentation and Monitoring Program
   - 1.3 Report Organization

2. INSTRUMENTATION PROGRAM
   - 2.1 Introduction
   - 2.2 Instrumentation Plan
   - 2.3 Surveying and Settlement Model Calibration
   - 2.4 Instrumentation Installation
     - 2.4.1 Installation of Settlement Profiler System
     - 2.4.2 Installation of Vibrating Wire Settlement Cells
     - 2.4.3 Installation of Vibrating Wire Piezometers
   - 2.5 Documentation

3. MONITORING PROGRAM
   - 3.1 Introduction
   - 3.2 Baseline Survey
   - 3.3 Baseline Monitoring
   - 3.4 Monitoring during Construction/Operations
     - 3.4.1 Measurement of Settlement
       - 3.4.1.1 Settlement Profiler System
       - 3.4.1.2 Vibrating Wire Settlement Cells
       - 3.4.1.3 Surveying
     - 3.4.2 Measurement of Piezometric Water Pressure
     - 3.4.3 Frequency of Monitoring
   - 3.5 Post-Closure Monitoring
   - 3.6 Data Management and Analysis

4. CONTINGENCY PLAN
   - 4.1 Introduction

4.2 Contingency Procedures

5. INSTRUMENTATION MAINTENANCE PROGRAM
5.1 Introduction
5.2 Frequency of Maintenance
5.3 Regular Maintenance Procedures
5.4 Documentation

APPENDIX N

POST-CLOSURE PLAN OUTLINE

POST-CLOSURE CARE PLAN
OUTLINE

1. INTRODUCTION
   - 1.1 Project Background
   - 1.2 Purpose of Post-Closure Care Plan
   - 1.3 Plan Organization

2. FINAL COVER
   - 2.1 Introduction
   - 2.2 Inspection and Maintenance
   - 2.3 Recordkeeping and Reporting

3. SURFACE WATER MANAGEMENT, SOIL EROSION, AND SEDIMENT CONTROL
   - 3.1 Introduction
   - 3.2 Inspection and Maintenance
   - 3.3 Recordkeeping and Reporting

4. LIQUID MANAGEMENT SYSTEM (LMS)
   - 4.1 Introduction
   - 4.2 LMS Operation
   - 4.3 Inspection and Maintenance
   - 4.4 Recordkeeping and Reporting

5. DOCUMENTATION
   - 5.1 Inspection, Operation, and Maintenance Form
   - 5.2 Monitoring Documentation
   - 5.3 Monthly and Annual Reports
   - 5.4 Five-year Review Report

6. OPERATION, MONITORING, & MAINTENANCE (OM&M) STAFFING REQUIREMENTS

7. CITIZEN PARTICIPATION

7.1 OM&M Citizen Participation
7.2 Contact List
7.3 Freedom of Information Law Packet

8. HEALTH AND SAFETY

9. ACCESS CONTROL

10. POST-CLOSURE SITE USE

11. REFERENCES