# **APPENDIX G**

# SLOPE STABILITY ANALYSES FOR SCA DESIGN

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# **GEOSYNTEC CONSULTANTS**

# COMPUTATION COVER SHEET

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# SLOPE STABILITY ANALYSES 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). Specifically, this package presents static slope stability analyses for the SCA, which will contain geotextile tubes (geo-tubes) filled with dredged material surrounded by a perimeter dike (SCA perimeter dike). For purposes of this calculation package, the SCA perimeter dike refers to the dike that will be constructed around the geo-tubes within WB-13; whereas, the WB-13 perimeter dike refers to the exterior perimeter dike around WB-13.

Seismic slope stability analyses were not performed because the site is not located in a seismic impact zone, as defined by New York State Department of Environmental Conservation (NYSDEC) Regulations Section 360-2.7(b)(7). A detailed explanation regarding the seismic impact zone assessment is presented in Attachment 1 of this package.

# METHODOLOGY

#### Static Slope Stability

Static slope stability analyses were performed using Janbu's method and Spencer's method, using the computer program SLIDE version 5.043 [Rocscience, 2009]. Four potential slip modes were evaluated in the analyses: (i) block slip mode along geo-tube interfaces; (ii) block slip mode along the liner system; (iii) circular slip surfaces through dredge material contained in geo-tubes and WB-13 foundation materials; and (iv) circular slip surfaces through existing WB-13 perimeter dikes.

Spencer's method [Spencer, 1973] satisfies both force and moment equilibrium and is therefore considered more rigorous than other methods, such as Janbu's method [Janbu, 1973] and the simplified Bishop method [Bishop, 1955]. However, Spencer's method often encounters numerical convergence difficulties when considering block slip surfaces. Therefore, Spencer's method was used for the circular slip surfaces, while Janbu's method was used for block slip surfaces.

Information required for the static slope stability analyses included the slope geometry, the subsurface soil stratigraphy, the groundwater table elevation, the material properties of the

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subsurface soils, dredge material, liner and cover system materials, and the external surface loading, if any, at the selected cross section locations.

# Target Factor of Safety

Target factors of safety (FSs) were considered for slope stability of the proposed SCA, one for the interim condition and one for the long-term condition. The interim condition is the condition during the SCA construction and dredge operation period and shortly after the SCA is capped with the final cover system. The long-term condition is the condition a relatively long time after the SCA is capped. In addition, both peak and residual shear strengths were considered in identifying the appropriate FSs for interim and final conditions, as appropriate for geosynthetic materials.

The target FS corresponding to the peak shear strength was considered to be 1.3 for the interim condition and 1.5 for the long-term condition according to U.S. Army Engineer Waterways Experiment Station Technical Report D-77-9 [Hammer and Blackburn, 1977] and U.S. Army Corps of Engineers Engineering Manual 1110-2-1902 [USACE, 2003]. The target FS corresponding to large displacement (i.e., residual) shear strength was considered to be 1.1 for the interim condition and 1.3 for the long-term condition, consistent with general engineering practice.

# 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 Solvay waste (SOLW), the existing WB-13 perimeter dike soil, and the foundation soil, as shown schematically in Figure 1. The SOLW was divided into three zones (i.e., Zone 1, Zone 2, and Zone 3, as shown in the figure) based on its distinct characteristics.

The groundwater table was found to be approximately 50 ft below ground surface (bgs) of the wastebed (or at approximately El. 375 ft) as presented in the Data Package. However, it is noted that "perched" water zones exist in WB-13 according to the site investigation results presented in the Data Package. These "perched" water zones vary spatially and seasonally according to the piezometer data presented in the Data Package but have an average elevation of approximately 15 ft bgs. The slope stability analysis presented in this package conservatively assumes the "perched" water zones are connected to the groundwater table. The groundwater

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table was, therefore, modeled using a single groundwater table 15 ft bgs. Additionally, within the gravel drainage layer in the liner system, a second water table one foot above the top of the liner layer was assumed in the model. This represents the one foot maximum allowable head within the gravel drainage layer. It should be noted that this water table is confined by the liner system and will only affect the gravel drainage layer in the slope stability analysis.

# ANALYZED CROSS-SECTIONS

The proposed SCA consists of a single containment cell surrounded by the SCA perimeter dike as shown in Figure 2. Two cross sections (i.e., Cross-Section A-A and B-B, as shown in Figures 3 and 4) were analyzed for static slope stability. As can be seen in Figure 3, Cross-Section A-A has significantly more vertical interfaces to consider than Cross-Section B-B because of geo-tube orientation. The design height of the proposed SCA perimeter dikes is a minimum of 5 ft above the existing ground surface and a minimum of 2 ft above the top of the gravel at the same location. The elevations of the dikes will vary, as the existing ground elevations vary along the perimeter. The maximum dike height is approximately 10 ft, located near the western sump area. The SCA perimeter dikes are approximately 28 ft wide at the top and have a 2.5 horizontal:1 vertical (2.5H:1V) side slope. There is a 10 ft setback distance between the edge of the lowest geo-tube layer and the dikes.

# Cross-Section A-A

Cross-Section A-A was selected because it follows the direction of minimum overlap between the geo-tube stacks, which is expected to result in the lowest FS for block slip mode stability. Cross-Section A-A runs approximately north-south through WB-13. The geo-tubes are assumed to be 40 ft in width and between 250 ft to 320 ft in length. In the direction of Cross-Section A-A, each additional stack of geo-tubes will straddle geo-tubes that are already in place. This results in each stack of geo-tubes being offset approximately 20 feet from the layer below.

The existing ground below the liner at Cross-Section A-A (i.e., top of existing SOLW elevation) is naturally sloped. The thickness of the SOLW underneath the liner varies, but typically is between 50 and 60 ft. Cross-Section A-A was extended to include the existing WB-13 perimeter dike.

# Cross-Section B-B

Cross-Section B-B runs approximately east-west through WB-13. In this direction, the geotubes are assumed to be between 250 ft and 320 ft long for purposes of this analysis. At the edge

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of the geo-tube layers, tubes are offset approximately 20 ft. Through the interior of the SCA, the offsets between geo-tube layers vary because of the different lengths and number of geo-tubes per layer, but is planned to be a minimum of 20 ft.

# **MATERIAL PROPERTIES**

Table 1 summarizes the material properties (i.e., unit weights and shear strengths) of the SOLW, the dike soil, the foundation soil, the dredged material, the final cover soil, and geosynthetic materials used in the slope stability analyses. The unit weight and the shear strength of the SOLW in WB-13 were considered to be the same for Zone 1, Zone 2, and Zone 3 according to the Data Package. In the stability models presented in this package, the existing WB-13 perimeter dike soil was treated the same as the base foundation material based on previous investigations indicating that these existing WB-13 perimeter dikes were constructed using the native foundation material from beneath WB-13. The term "dike soil" as used in this package therefore refers only to the SCA perimeter dikes that will be constructed. The interfaces between adjacent geo-tubes and between the bottom geo-tube and gravel drainage layer are modeled as thin layers of frictional material. For purposes of this analysis, the final cover is assumed to have a thickness of 3 ft. Figures 5 and 6 show a representation of the layers included in the model.

# Unit Weight

The unit weights of the SOLW, the dike soil, and the foundation soil were considered to be 82 pcf, 120 pcf, and 120 pcf, respectively, according to the Data Package. The unit weights of the proposed liner soil and gravel drainage layer were assumed to be 100 pcf and 120 pcf, The unit weight of the interface between the gravel drainage layer and the respectively. geo-tubes was assumed to have the same calculated unit weight as the dredge material (i.e., 86 pcf). The unit weight of the dredged material was calculated to be approximately 86 pcf as presented in Attachment 2 to the package titled "Settlement Analyses for SCA" (Appendix H of the IDS). It is noted that the interfaces were required to be assigned material properties for numerical stability of the SLIDE program. The unit weight of horizontal interfaces between geotubes was assumed to be 86 pcf (i.e., the same as the dredge material) because there is no potential for a gap between two stacks of geo-tubes along a horizontal interface. However, due to the ellipsoidal shape of the filled geo-tubes, there is potential for gaps between two adjacent geo-tubes along a vertical interface. Therefore, vertical interfaces between geo-tubes were assumed to have a unit weight of 43 pcf (i.e., half of the dredge material). It is noted that the use of half of the unit weight versus the full unit weight along vertical interfaces is not expected to

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cause significant differences in the calculation results. The unit weight of the final cover soil was assumed to be 120 pcf.

# Drained Shear Strength

The drained shear strength was used for the slope stability analyses under the long-term condition. The effective stress friction angles of the SOLW, the dike soil, and the foundation soil were considered to be 34 degrees, 35 degrees, and 37 degrees, respectively, according to the Data Package. For the liner system, laboratory interface direct shear testing was performed on four liner types (i.e., smooth and textured high density polyethylene [HDPE], ethylene propylene diene monomer [EPDM], and polypropylene [PP]), and the results are included in Attachment 2. The peak effective stress friction angle of the proposed liner system varied depending on the type of geomembrane (GM) chosen. Based on these results, smooth HDPE GM is not being considered for use on this project. Among the remaining GM options tested, the peak effective stress friction angle varied from 19 degrees to 27 degrees; therefore, 19 degrees was conservatively assumed in Table 1. The effective stress friction angle of the gravel layer was assumed to be 38 degrees.

The effective stress friction angle for the interface between the bottom geo-tube layer and the gravel drainage layer was considered to be 24 degrees, based on data presented by Koerner [1994] for the interface between woven geotextiles and sand. The geotextiles composing the geo-tubes are modeled as two-end anchored geotextile sheets. The ultimate tensile strength was assumed to be 4800 lb/ft based on standard strength parameters for commercially available geo-tubes. A reduction factor of 3.0 [GRI, 1992] was then applied to result in a design tensile strength of 1600 lb/ft. Current information indicates the dredge material from the In Lake Waste Deposit (ILWD) has a drained friction angle of 37 degrees and, as indicated previously, the existing SOLW in WB-13 has a drained friction angle of 34 degrees. Considering the dredge material as remolded SOLW, the long-term drained effective stress friction angle of the dredge material was conservatively assumed to be 30 degrees. Under short-term conditions, the dredge material was assumed to have half of the drained effective stress friction angle of the material under long-term conditions (i.e., 15 degrees).

The effective stress friction angle of the vertical geo-tube/geo-tube interface was assumed to be negligible due to gaps between the geo-tubes. A value of 0.1 degrees was chosen for this interface to maintain numerical stability of the SLIDE program. Using representative geo-tube samples, the peak effective stress friction angle of the horizontal geo-tube/geo-tube interface was measured to be 15 degrees in laboratory interface direct shear testing (see Attachment 2 for

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results), which is the assumed value provided in Table 1. The effective stress friction angle for the final cover was assumed to be 30 degrees.

At the time this package was initially prepared, the GM component in the final liner system had not been selected; therefore the minimum measured interface friction values of 19 degrees (peak) and 17 degrees (residual) were selected. Once the critical stability cases were established using the minimum value of liner system friction angle from laboratory testing, the critical cases were rerun using the maximum liner system friction angle (both peak and residual) from laboratory testing. These analyses were performed to provide an approximate range of FS values that may be expected. The peak and residual interface friction angles for linear low-density polyethylene (LLDPE) are generally close to the interface friction angles of HDPE. Therefore, the interface friction angle of LLDPE is expected to fall within the range shown in this package. The range of calculated FS values based on the variability in test results is discussed further in Attachment 3.

Stability analyses were also performed to back-calculate the range in effective stress friction angles that would be acceptable for a given target FS, thus providing a range in values that can be used to establish the acceptability of actual geo-tube and liner system components based on laboratory testing, without needing to perform additional analyses. The back-calculation of this range in values is described further in Attachment 4. In cases involving the drained shear strength, the effective stress cohesion intercept was conservatively assumed to be zero.

# Undrained Shear Strength

The undrained shear strength  $(S_u)$  of the WB-13 SOLW was used for the slope stability analyses under the interim condition. It is noted that undrained shear strengths were not assigned to the dike soil, the foundation soil, and the proposed gravel drainage layer because they primarily consist of coarse soil particles and drain relatively quickly under loading. Undrained shear strengths were also not assigned to the models used to represent the vertical and horizontal interfaces between geo-tubes because these interfaces are extremely thin and also drain quickly under loading. For these layers, the drained shear strengths were used for the interim condition as well.

The  $S_u$  of SOLW was developed using the SHANSEP (i.e., stress history and normalized soil engineering properties) method developed by Ladd and Foott [1974], based on the results of the laboratory consolidated-undrained (CU) triaxial compression tests and consolidation tests as presented in the Data Package. The SHANSEP method can be expressed using the following equation:

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$$S_u = S \times \sigma'_{vc} \times OCR^m \tag{1}$$

where,

*S* = undrained shear strength ratio under normal consolidation, obtained from CU tests;

 $\sigma_{vc'}$  = effective vertical consolidation stress for a given loading;

OCR = over-consolidation ratio, obtained from consolidation tests which is the ratio of the preconsolidation pressure ( $p_c'$ ) to the in-situ vertical effective stress ( $\sigma_v'$ ); and

m =SHANSEP modeling parameter (m = 0.8 for most cohesive soils and typical applications [Ladd and DeGroot, 2003]).

As presented in the Data Package, an *S* of 0.3 was established from CU tests on the WB-13 SOLW samples. Data of  $p_c'$ , preconsolidation pressure, were obtained from the Data Package and are plotted in Figure 7 together with the profile of  $\sigma_{v'}$ , the effective in-situ vertical stress. An initial OCR profile was also developed in the Data Package for the SOLW, as shown in Figure 8.

Due to the effective stress increase  $(\Delta \sigma_v)$  imposed by the liner system and geo-tubes, the SOLW will gain additional undrained shear strength as indicated by Equation 1. However, the undrained shear strength gain will occur gradually as the SOLW consolidates over time. To consider the shear strength gain of SOLW during the process of consolidation under the geo-tube load, three  $S_u$  profiles were calculated and are described below.

*Initial*  $S_u$  *profile*: This  $S_u$  profile represents the in-situ shear strength of the SOLW before construction of the SCA liner system. The  $S_u$  was calculated by Equation 1 using the in-situ effective stress  $\sigma_{v, initial}$  in the SOLW. The calculated initial  $S_u$  profile is presented in Figure 9 along with the  $S_u$  measured by the UU tests.

 $S_u$  profile for  $U_{avg} = 75\%$ : This  $S_u$  profile corresponds to the shear strength of the SOLW after it achieves an average degree of consolidation  $(U_{avg})$  of 75%. The  $S_u$  in the SOLW at  $U_{avg}=75\%$  ( $\sigma_{v'75\%}$ ) was calculated as a four-step process. The time factor  $T_v$  necessary to reach an average degree of consolidation of 75% is 0.477 [Das, 2005]. This time factor was used to calculate the variation of the consolidation ratio with depth  $(U_z)$  for an average consolidation ratio of  $U_{avg}=75\%$ , as shown in Figure 10 [Lambe and Whitman, 1969]. Next,  $\sigma_{v'75\%}$  was calculated using Equation 2.

$$\sigma'_{v75\%} = \sigma'_{v,initial} + U_z \times \Delta \sigma_v \tag{2}$$

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Third, the OCR at  $U_{avg} = 75\%$  was back-calculated using the original preconsolidation pressure  $p_c'$  and the current effective stress  $\sigma_{v'75\%}$ . Lastly, these OCR values are applied to the SHANSEP formula to derive the  $S_u$  profile when the SOLW achieves  $U_{avg}=75\%$ . Note that to calculate the  $S_u$  profile for  $U_{avg} = 75\%$ , the additional effective stress  $\Delta \sigma_{v'}$  was based on three layers (18 ft) of dredged material in geo-tubes, 1 ft of gravel, and 1 ft of low permeability soil. The actual thicknesses of gravel and low permeability soil are greater or equal to 1 ft, however, with regards to shear strength gain, this assumption is conservative. The selection of three layers of geo-tubes as additional loading was based on the minimum number of geo-tube layers that would likely be placed the first year and the required time to consolidate, which is explained in detail below.

 $S_u$  profile for  $U_{avg} = 100\%$ : This  $S_u$  profile corresponds to the shear strength of the SOLW after it reaches full consolidation under the same loading conditions as the  $U_{avg} = 75\%$  condition (i.e., three layers [18 ft] of dredged material in geo-tubes, 1 ft of gravel, and 1 ft of low permeability soil). The effective stress after consolidation was calculated using Equation 3. Due to the large additional load of the geo-tubes, the OCR for SOLW when the soil is fully consolidated was assumed to be 1.0. The SHANSEP formula was applied to calculate the final  $S_u$  profile.

$$\sigma'_{v} = \sigma'_{v,initial} + \Delta \sigma_{v} \tag{3}$$

Vertical effective stress profiles for these three stages of consolidation are shown in Figure 11. The resulting undrained shear strength profiles are shown in Figure 12.

#### Consolidation Rate

The time to achieve a  $U_{avg}$  of 75% can be calculated using Equation 4 below [Das, 2005]:

$$t = \frac{T_v H_{dr}^2}{c_v} \tag{4}$$

where,  $c_v$  is the coefficient of consolidation,  $H_{dr}$  is the 50 ft distance to the drainage layer, and  $T_v$  is the time factor based on the required degree of consolidation. For  $U_{avg}$  of 75%,  $T_v$  equals

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0.477 [Das, 2005]. Using a  $c_v$  of 0.009 cm<sup>2</sup>/sec from the laboratory consolidation tests and a  $c_v$  of 0.14 cm<sup>2</sup>/sec from the field test as presented in the Data Package, the time for the SOLW to achieve a  $U_{avg}$  of 75% was calculated to range from approximately 90 to 1420 days (3.9 years). As discussed in the Data Package, the consolidation rate in the field occurred at a much faster rate than in the lab due to lateral drainage. However, since the actual loaded area of the SCA is large enough that lateral drainage likely will not greatly affect the consolidation rate, the lab test rate of  $c_v = 0.009$  cm<sup>2</sup>/sec is considered more representative than the field test rate of actual conditions during SCA construction and operation. Therefore, it is conservatively assumed herein that the SOLW will require approximately 1420 days (3 years, 11 months) to reach the  $U_{avg} = 75\%$  condition.

Based on the current phasing plan, the anticipated effective stress increase of the first year of construction was used to calculate the SOLW undrained shear strength at  $U_{avg} = 75\%$ . The consolidation due to the first year of geo-tube placement will have adequate time to consolidate to be at or near a  $U_{avg} = 75\%$  condition after placement of the final cover. However, consolidation due to years 2, 3, and 4 of geo-tube construction may not have sufficient time to reach  $U_{avg} = 75\%$  conditions, therefore the additional strength gain from these stages of construction was conservatively ignored in calculation of the  $U_{avg} = 75\%$  profile. Additionally, the edges of the geo-tube loaded area will not have the full  $\Delta\sigma_v'$  load calculated above. Therefore, in calculation of the  $U_{avg} = 75\%$  profile, undrained shear strength gain in locations under the side slopes of the SCA was conservatively ignored. A potential first-year geo-tube phasing plan is shown in Figure 13.

In summary, the following items should be noted regarding the incorporation of the  $S_u$  profiles into the slope stability analyses:

- The groundwater table was considered to be at 50 feet bgs (or at approximately El. 375 ft) in the calculation of the undrained shear strength. However, in the SLIDE program, the effect of the perched water zones was taken into account and modeled as a single groundwater table at 15 feet bgs as previously discussed.
- The  $S_u$  profile for  $U_{avg} = 100\%$  was not used in the analyses. The maximum undrained shear strength that the SOLW can achieve under loading was considered to be the  $S_u$  profile for  $U_{avg} = 75\%$  under three stacks of geo-tube loading.
- The initial  $S_u$  profile as a function of depth was input directly into the SLIDE program and used for calculations with the exception of calculating global stability after placement of the final cover, for which the  $S_u$  profile for  $U_{avg} = 75\%$  was used.

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- In order to facilitate the calculations of the undrained shear strength, the initial stepwise  $S_u$  profile of SOLW and the OCR profile recommended in the Data Package have been slightly modified to be smooth curves in this package.
- Due to the low permeability soil liner system, it was assumed that SOLW consolidation will occur in a single-drained state at the foundation soil layer at an average depth of 50 feet bgs.
- The computations for  $U_{avg}=75\%$  and  $U_{avg}=100\%$  are based on calculations of the expected required consolidation time. The actual field consolidation will be monitored through field instrumentation, and the construction will be adjusted accordingly if necessary.

# ANALYZED CASES

Both Cross-Sections A-A and B-B were analyzed for conditions without the final cover and with the final cover for the four potential slip modes mentioned earlier. A more detailed discussion of the analyzed cases is presented below.

# Geo-tube Slip Mode

The block slip of geo-tubes represents potential sliding within the interfaces between individual geo-tubes, resulting in multiple geo-tubes sliding off of the mass of geo-tubes. Computations were performed using short-term strength parameters, including the initial  $S_u$  profile (Figure 9) to represent the undrained shear strength of the underlying SOLW layer. Since the slip surfaces do not pass through the existing SOLW, the  $S_u$  values of SOLW do not affect the calculated FS. This mode was analyzed for 12 different cases for Cross-Section A-A and five different cases for Cross-Section B-B, as summarized on Tables 2 and 3, respectively. More cases were considered for Cross-Section A-A because of the higher number of vertical interfaces to be considered in that cross section, as compared to Cross-Section B-B, due to tube orientation/geometry. The number of stacks indicated in the tables represents the tiers, counting from the top downwards, involved in the potential slip. The number of columns represents the number of geo-tubes per stack involved in the potential slip. A conceptual illustration of "stacks" and "columns" is shown in Figure 14.

As indicated previously, establishing a range in friction angles that would be considered acceptable for the geo-tube/geo-tube interface is also a goal of the stability analyses presented herein. Therefore, based on the initial analyses using the friction angles established through laboratory testing, which yielded acceptable FS values, the most critical case for geo-tube slip

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was identified (i.e., Top 4 stacks; 1 column, as indicated on Table 2). This critical case is illustrated in Figure 15 without a final cover and in Figure 16 with a final cover.

In addition, this critical case was used to back-calculate the required effective stress friction angle of the horizontal geo-tube/geo-tube interface to achieve the target FS for both peak and residual conditions. This procedure was followed for Cross-Section A-A without the final cover (target peak FS=1.3, target residual FS=1.1) and for Cross-Section A-A with the final cover (target peak FS=1.5, target residual FS=1.3). Since the geo-tube slip mode is more critical for Cross-Section A-A due to the geometry involved (see results on Table 2 as compared to 3), the back-calculated values from Cross-Section A-A are also considered acceptable for Cross-Section B-B. This is discussed in more detail in Attachment 4.

#### Liner Stability

Block slip of the liner represents sliding along the proposed liner. Computations using this mode were performed using short-term strength parameters and the initial  $S_u$  profile (Figure 9) to represent the undrained shear strength of the SOLW layer. Since the slip surfaces do not pass through the existing SOLW, these  $S_u$  values do not affect the calculated FS.

Similar to the geo-tube slip mode analysis, first the most critical case for liner stability was identified using the minimum friction angle established during laboratory testing. For liner stability, the critical case involves the liner failing underneath the first column of geo-tubes, as illustrated in Figures 17 and 18 without and with final cover, respectively. Once the critical case was identified, the analysis was also performed using the maximum laboratory measured liner friction angle. Table 2 provides the results using the minimum liner friction angle established in the laboratory testing, and Attachment 3 provides the results (critical case only) using the maximum liner friction angle established in the laboratory testing.

As indicated previously, establishing a range in friction angles that would be considered acceptable for the liner system is also a goal of the stability analyses. Using the critical case identified above, the required effective stress friction angle of the proposed liner system to achieve the target FS could be back-calculated. To establish a range in friction angle values, the sensitivity of the liner friction angle to changes in the geo-tube/geo-tube horizontal interface friction angle was also evaluated. The geo-tube/geo-tube horizontal interface friction angle was changed, and the required liner friction angle to achieve the target FS against liner slip was back-calculated using SLIDE. Based on the results presented in Tables 2 and 3, the Cross-Section A-A geometry is considered to be more critical than the Cross-Section B-B geometry; therefore, the additional analyses were performed on Cross-Section A-A. The results of these calculations before and after placement of the final cover are shown and discussed further in Attachment 4.

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# Global Stability (Circular slip surfaces)

Global stability of the proposed SCA was evaluated with circular potential slip surfaces. The global stability through the foundation material prior to placement of the final cover was evaluated using undrained strength parameters (the initial  $S_u$  profile shown in Figure 9) to represent the undrained shear strength of the SOLW layer. The global stability after placement of the final cover was evaluated for three cases: (i) Interim stability with the initial  $S_u$  profile; (ii) Interim stability with  $U_{avg}$ =75%; and (iii) Long-term stability.

The interim global stability case immediately after placement of the final cover was evaluated using the initial  $S_u$  profile to represent the undrained shear strength of the SOLW layer. The interim global stability case immediately after placement of the final cover was also evaluated using the  $S_u$  profile after consolidation to  $U_{avg}$ =75% to represent the undrained shear strength of the SOLW layer.

The long-term global stability after cover placement was evaluated using drained strength parameters. This long-term global stability evaluation was performed by assuming that the geotextile support of the geo-tubes will be degraded and therefore have no shear strength. The long-term evaluation was performed by also assuming the effective stress friction angle of the dredge material will increase to 30 degrees due to consolidation of the material (i.e., the long-term value provided in Table 1).

# Global Stability of WB-13 Perimeter Dikes (Circular slip surfaces)

Potential global stability for slip surfaces through the SCA and existing WB-13 perimeter dike was evaluated for Cross-Sections A-A and B-B. This slip mode was analyzed for three cases: (i) Interim stability before final cover placement; (ii) Interim stability after final cover placement; and (iii) Long-term global stability.

In addition, global stability of the WB-13 perimeter dike was considered by focusing on potential slip surfaces through the dike. For these analyses, the WB-13 perimeter dike was modeled with a 2-ft thick crusty surficial layer with a cohesion intercept of 50 psf and a friction angle of 37 degrees to represent the effects of desiccation and roots. The inner portion of the WB-13 perimeter dike was modeled only with a friction angle of 37 degrees, consistent with the other cases analyzed. Two cases were considered to model the groundwater table within the WB-13 perimeter dike. The first case considered a water table that varies from the conservatively assumed 15 feet below ground level at the dike-SOLW interface to the ground surface level at the dike-SOLW interface to a level at the outside dike face that is 10 feet above the ground surface level at the toe of the dike.

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### **RESULTS AND DISCUSSION**

#### Slope Stability Analysis

The results of the slope stability analyses for Cross-Sections A-A and B-B are summarized in Tables 2, 3, and 4. The results of the analyses for the most important cases are also shown graphically in Figures 19 through 43. The associated SLIDE runs are presented in Attachment 5 of this package.

The calculation results for Cross-Section A-A are summarized in Table 2 and indicate that the calculated FS values for cases without and with the final cover satisfy the target FS of 1.3 and 1.5, respectively, for the geo-tube slip mode, liner stability, and global stability. Since the global stability case using the initial  $S_u$  profile achieved the interim FS=1.3 criterion, a check of global stability using the  $U_{avg} = 75\%$  profile was not performed for Cross-Section A-A.

The calculation results for Cross-Section B-B are summarized in Table 3 and indicate that the calculated FS values for cases without and with the final cover satisfy the target FS of 1.3 and 1.5, respectively, for the slip modes evaluated (i.e., geo-tubes slip mode, liner stability, and global stability). Slope stability analyses performed to evaluate a potential global slip mechanism resulted in a calculated FS satisfying the interim target FS of 1.3 using the initial  $S_u$ profile. It is noted that the actual  $S_u$  profile will be greater than the initial due to consolidation of the foundation soils under the loading from the geo-tubes. When the  $U_{avg} = 75\% S_u$  profile is used, the calculated FS is greater than when the initial  $S_u$  profile is used. The calculated FS for long-term global stability satisfies the target FS of 1.5.

Slope stability analyses performed to evaluate the potential global slip mechanisms through the SCA and existing WB-13 perimeter dikes resulted in FS values much greater than the target FS. Cross-Section A-A, as expected, has a lower factor of safety than for Cross-Section B-B with regards to global slip of existing WB-13 perimeter dikes, however, the calculated FS for Cross-Section A-A still greatly exceeds the target FS for both interim and long-term conditions.

Slope stability analyses were also performed for slip surfaces through the WB-13 perimeter dike that do not extend to the SCA (i.e., analyses focused on the dike only). For the case with the water table at the toe of the dike, minimum FS values of 3.0 for the critical global slip surface extending to the top of the WB-13 perimeter dike and 1.8 for the critical shallow slip surface within the slope were calculated, as shown in Figure 30. For the case with the water table at 10 feet above the top of the WB-13 perimeter dike and 1.1 for the critical global slip surface extending to the top of the WB-13 perimeter dike and 1.1 for the critical shallow slip surface within the slope were calculated, as shown in Figure 31. This shallow slip surface is located near the toe under the estimated water table level within the WB-13 perimeter dike. A FS of 1.1 for

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shallow slip surfaces is indicative of the potential for surficial sloughing. Since dike stability is directly related to water level (i.e., pore water pressure) within the dike, it is recommended that instrumentation and monitoring be performed during operations, and remedial measures be implemented if appropriate.

FS values were also calculated using residual shear strengths for the geosynthetic components. For Cross-Section A-A, the critical geo-tube slip case of one column of four stacks of geo-tubes and the critical liner slip case of one column of geotubes before and after final cover placement were evaluated. The calculated FS values using residual shear strengths satisfy the target residual FS values for both interim and long-term conditions.

Additionally, the back-calculation presented in Attachment 4 indicates that the required values for the peak laboratory friction angles for the horizontal geo-tube/geo-tube interface and liner system are 13.8 degrees and 18.3 degrees, respectively (or alternative combinations as shown in Figure 44), to meet the target FS values. The required values for the residual laboratory friction angles for the horizontal geo-tube/geo-tube interface and liner system are 11.6 degrees and 16.1 degrees, respectively (or alternative combinations as shown in Figure 45), to meet the target FS values. The minimum required values of peak and residual effective stress friction angle to meet the target FS values are shown in Figures 44 and 45. It is recommended that site-specific testing be performed on the selected liner system to verify the strength parameters meet or exceed these back-calculated values.

# SUMMARY AND CONCLUSIONS

This package evaluates the static slope stability of the proposed SCA. Four potential slip modes were evaluated using the computer computation program SLIDE: (i) block slip mode along geo-tube interfaces; (ii) block slip mode along the liner system, (iii) circular slip surfaces through dredge material contained in geo-tubes and WB-13 foundation materials; and (iv) circular slip surfaces through existing WB-13 perimeter dikes.

Analyses of two critical cross-sections indicate that the calculated FSs for the four potential slip modes meet the target FS for interim and long-term conditions. However, placement of five layers of geo-tubes and the final cover system within the same season results in a calculated FS that only slightly exceeds the target value, a limitation that should be considered during design of the phasing plan for geo-tube construction. Instrumentation to monitor the field consolidation is recommended to verify adequate strength gain occurs before placement of the final cover. In addition, piezometers to monitor the water levels in the dikes, and inclinometers near the SCA berms to monitor stability in the field are recommended. Details regarding this instrumentation

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are provided in Appendix N of the SCA Final Design, "Geotechnical Instrumentation and Monitoring Plan."

Minimum required parameters for the interface between geo-tubes and the liner system have been back-calculated. In order to meet the target factor of safety values against block slip, the peak effective stress friction angle for the interface between geo-tubes should be at least 13.8 degrees and the peak effective stress friction angle for the liner system should be at least 18.1 degrees. In order to meet the target factor of safety values against block slip, the residual effective stress friction angle for the interface between geo-tubes should be at least 11.6 degrees and the peak effective stress friction angle for the liner system should be at least 11.6 degrees. Alternative combinations of geo-tube friction angle and liner friction angle may also be acceptable, as shown in Figures 44 and 45. Laboratory testing indicates that these values are achievable with a variety of common commercially available geosynthetics. Testing of material delivered to the project during construction will be performed to verify components meet the specified strength.

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Tables

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Matarial	Unit Weight	Undrained Shear Strength	Drained Shear Strength
Material	(pcf)	(psf)	Effective Stress Friction Angle (degree)
SOLW	82	See Figures 7 through 12	34
SCA Perimeter Dike Soil	120		35
Foundation Soil			
(including WB-13	120		37
perimeter dike)			
Liner	100		19 <sup>[1]</sup>
Gravel Drainage	120		38
Geo-tube/Gravel	86		24 <sup>[2]</sup>
Interface			21
Geo-tube		Design Tens	sile Strength = $1600 \text{ lb/ft}^{[3]}$
Dredge Material (Short	86		15 <sup>[4]</sup>
Term)			15
Dredge Material (Long-	86		30
Term)	00		50
Geo-tube/Geo-tube	13 <sup>[5]</sup>		0 1 <sup>[6]</sup>
Interface (Vertical)	45		0.1
Geo-tube/Geo-tube	86		15 <sup>[1]</sup>
Interface (Horizontal)	00		15
Final Cover Soil	120		30

Table 1. Summary of Material Properties for Slope Stability Analysis

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Table 1. Summary of Material Properties for Slope Stability Analysis (Continued)

Notes:

- 1. The values presented in this table (i.e., 15 degrees and 19 degrees) are the measured peak effective friction angles for geo-tube/geo-tube interface and liner, respectively (see Attachment 2).
- 2. Taken from Koerner [1994]. A typical value of interface effective friction angle between woven geotextile and sand was assumed.
- 3. The design tensile strength was modeled using a two-end anchored geotextile sheet. Based on commercially available products, the ultimate tensile strength of geo-tubes was assumed to be 4800 lb/ft and a strength reduction factor of 3.0 was applied to calculate the design tensile strength, taking into account creep deformation, chemical degradation, and strength loss within seams, connections, and joints [GRI, 1992].
- 4. Under short-term conditions, the dredge material was assumed to have half of the friction angle of the material under long-term conditions.
- 5. The vertical interface was assumed to have a unit weight equal to half of the unit weight of the dredge material. This was based on the geometry of the geotubes after deformation. The volume of material in the vertical interface after deformation was assumed to be approximately half the total volume available if the geo-tubes could be placed in direct contact with each other along the entire interface.
- 6. The geo-tube/geo-tube vertical interface has insignificant side friction, but a small value of friction angle was necessary for numerical stability of the SLIDE calculation program.

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Table 2. Summary of Slope Stability Analysis: Cross-Section A-A

	Case		Without	Final Cover			With Final Co	ver	
		Calcula	ted FS <sup>[1]</sup>	Figuro	Target	Calculate	ed FS <sup>[1]</sup>	Figuro	Target
		Spencer's Method <sup>[2]</sup>	Janbu's Method <sup>[2]</sup>	Number	F.S.	Spencer's Method <sup>[2]</sup>	Janbu's Method <sup>[2]</sup>	Number	F.S.
	Top 1 stack; 1 column		8.53		1.30		8.68		1.50
	Top 1 stack; 2 columns		26.71		1.30		<sup>[5]</sup>		
	Top 2 stacks; 1 column		2.44		1.30		3.37		1.50
	Top 2 stacks; 2 columns		5.40		1.30		<sup>[5]</sup>		
	Top 3 stacks; 1 column		1.73		1.30		2.02		1.50
Slip of Geo-tubes	Top 3 stacks; 2 columns		3.50		1.30		3.81		1.50
(Block Mode)	Top 4 stacks; 1 column		1.52	19	1.30		1.62	24	1.50
	Top 4 stacks; 2 columns		2.44		1.30		2.79		1.50
	Top 4 stacks; 3 columns		3.89		1.30		<sup>[5]</sup>		
	5 stacks; 1 column		1.72	20	1.30		1.73		1.50
	5 stacks; 2 columns		2.69		1.30		2.89		1.50
	5 stacks; 3 columns		4.47		1.30		[5]		
Liner Stability	One column of geo-tubes		1.57	21	1.30		1.59	25	1.50
(Block Mode)	Two columns of geo-tubes		2.24		1.30		2.48		1.50
	Through Foundation Material (U <sub>avg</sub> =0%) – Interim	1.66 [3]		22	1.30	1.45 <sup>[3]</sup>		26	1.30
Global Stability (Circular Mode)	Through Foundation Material (U <sub>avg</sub> =75%) – Interim					[6]	[6]		
	Through Foundation Material – Long-Term					1.83 <sup>[7]</sup>		27	1.50
Global Stability	Through SCA and Existing WB-13 Perimeter Dike – Interim	3.46 <sup>[4]</sup>		23	1.30	2.84 <sup>[4]</sup>		28	1.30
(Circular Mode)	Through SCA and Existing WB-13 Perimeter Dike – Long Term					5.65		29	1.50

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 Table 2.
 Summary of Slope Stability Analysis: Cross-Section A-A (Continued)

Notes:

- 1. These values are calculated using the laboratory values of peak effective stress friction angle for the geo-tube/geo-tube horizontal interface (15 degrees) and the liner (19 degrees). The laboratory test data are shown in Figures 2-4 and 2-5 of Attachment 2.
- 2. Spencer's method is considered more rigorous than Janbu's method because Spencer's method satisfies both force and moment equilibrium. However, Spencer's method often encounters numerical convergence difficulty when complicated block slip surfaces are
- considered, as in this analysis. Therefore, Spencer's method was used for the circular mode analysis, while Janbu's method was used for the block mode analysis
- 3. This calculation uses the initial  $S_u$  profile for the undrained shear strength of the existing SOLW.
- 4. This was modeled by forcing the slip circle to pass through the existing WB-13 perimeter dike.
- 5. This case was not analyzed due to the acceptable FS values found for similar cases.
- 6. The  $U_{avg}$ =75% case was not analyzed for Cross-Section A-A because the interim FS was acceptable using the initial  $S_u$  profile.
- 7. For long-term, the geotextile of the geo-tubes was assumed to be degraded and therefore have no shear strength. The dredge material was modeled with the long-term friction angle of 30 degrees.
- 8. Figures are only included for the most important cases.

a are shown in Figures 2-4 and 2-5 of Attachment 2. onvergence difficulty when complicated block slip surfaces are

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Table 3.	Summary	of Slope	Stability	Analysis:	Cross-Section B-B
	5	1	5	5	

			Without Final Co	over	With Final Cover				
Case		Calculate	Figuro	Target	Calculate	Figuro	Target		
		Spencer's Method <sup>[2]</sup>	Janbu's Method <sup>[2]</sup>	Number	F.S.	Spencer's Method <sup>[2]</sup>	Janbu's Method <sup>[2]</sup>	Number	F.S.
	Top 1 stack; 1 column		46.93		1.30		21.73		1.50
Slip of	Top 2 stacks; 1 column		13.47		1.30		10.66		1.50
Geo-tubes <sup>[3]</sup>	Top 3 stacks; 1 column		10.73		1.30		9.04		1.50
(Block Mode)	Top 4 stacks; 1 column		6.60	32	1.30		6.00	37	1.50
	5 stacks; 1 column		9.81	33	1.30		9.30		1.50
Liner Stability <sup>[3]</sup> (Block Mode)	One column of geo-tubes		1.86	34	1.30		1.81	38	1.50
Global	Through Foundation Material (U <sub>avg</sub> =0%) – Interim	1.36 <sup>[3]</sup>		35	1.30	1.40 <sup>[3]</sup>		39	1.30
Stability (Circular	Through Foundation Material (U <sub>avg</sub> =75%) – Interim					1.42 <sup>[4]</sup>		40	1.30
Mode)	Through Foundation Material – Long-Term <sup>[5]</sup>					1.91		41	1.50
Global Stability (Circular Mode)	Through SCA and Existing WB-13 Perimeter Dike – Interim	8.39		36	1.30	7.07		42	1.30
	Through SCA and Existing WB-13 Perimeter Dike – Long-Term					11.96		43	1.50

Notes:

1. These values are calculated using the laboratory values of peak effective stress friction angle for the geo-tube/geo-tube horizontal interface (15 degrees) and the liner (19 degrees). The laboratory test data are shown in Figures 2-4 and 2-5 of Attachment 2. Spencer's method is considered more rigorous than Janbu's method because Spencer's method satisfies both force and moment equilibrium. However, Spencer's method often encounters numerical convergence difficulty when complicated block slip surfaces are 2.

considered, as in this analysis. Therefore, Spencer's method was used for the circular mode analysis, while Janbu's method was used for the block mode analysis.

3. This calculation uses the initial  $S_u$  profile for the undrained shear strength of the existing SOLW.

4. This calculation uses the  $U_{avg}=75\%$  profile for the undrained shear strength of the existing SOLW under the gravel, liner system, and three layers of geo-tubes.

For long-term, the geotextile of the geo-tubes was assumed to be degraded and therefore have no shear strength. The dredge material uses the long-term friction angle of 30 degrees. 5.

6. Figures are only included for the most important cases.

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Table 4. Summary of Slope Stability Analysis: Residual Conditions for Cross-Section A-A

		Without Final Cover (	Interim)	With Final Cover (Long-Term)		
Ca	se	Calculated FS <sup>[1]</sup>	Target ES	Calculated FS <sup>[1]</sup>	- Target	
		Janbu's Method <sup>[2]</sup>	Target FS	Janbu's Method <sup>[2]</sup>		
Slip of Geotubes (Block Mode)	Top 4 stacks; 1 column	1.21	1.10	1.34	1.30	
Liner Stability (Block Mode)	Liner Stability (Block Mode) One column of geo-tubes		1.10	1.36	1.30	

Notes:

- 1. These values are calculated using the laboratory values of residual effective stress friction angle for the geo-tube horizontal interface (12 degrees) and the liner (17 degrees). The laboratory test data are shown in Figures 2-2 and 2-5 of Attachment 2.
- 2. The Janbu method was used for the block mode analyses presented here because Spencer's method often encounters numerical convergence difficulty with these types of analyses.
- 3. The target residual FS is 1.1 for the interim condition and 1.3 for long-term conditions.



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Figures





[not to scale; for purpose of showing subsurface stratigraphy only; location of the section is shown below]





Figure 2. Locations of Analyzed Cross Sections

Note: This grading plan was prepared for the purpose of calculating the slope stability of the SCA and therefore settlement has not been accounted for in this figure.



Note: Figures 3 and 4 have an exaggerated scale of 10x in the vertical direction (i.e., 100 ft horizontal=10 ft vertical)





Figure 6. Close view of layers included within the SLIDE Model



Figure 7. Preconsolidation Pressure of SOLW from Consolidation Tests



Figure 8. Overconsolidation Ratio of SOLW before Construction





Figure 10. Consolidation Ratio as a Function of Depth [Lambe and Whitman, 1969] Note: The thickness of the layer was assumed to be 50 ft based on the average depth of the existing SOLW.


Note: Additional vertical effective stress is due to the loading from the liner system and three layers of geo-tubes.



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	434 433 432 431 431 431 431	3440 448 449 449 450 450		33 432 449 449 449 450 451		-434	
		A34 A3	<b>5</b> 43 <sup>56</sup>	31 438 439		437	

Figure 13: Potential First Year Geo-tube Phasing Plan

Note: This grading plan was prepared for the purpose of calculating the slope stability of the SCA and therefore settlement has not been accounted for in this figure.

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Figure 14: Conceptual Illustration of Stacks and Columns





Figure 16. SLIDE Diagram of Critical Surface for Geo-tube Slip (4 stacks, 1 column) after Final Cover





GA090662/SCA Stability









Note: This Figure shows the FS calculated using Spencer's Method.



Note: This Figure shows the FS calculated using Spencer's Method.







Note: This Figure shows the FS calculated using Spencer's Method.





Note: This Figure shows the FS calculated using Spencer's Method.



Figure 29. Slope Stability Analysis Result for Section A-A after Final Cover: NorthSide\_Cover\_Global\_External\_LongTerm\_Lab Note: This Figure shows the FS calculated using Spencer's Method.



Note: This Figure shows the FS calculated using Spencer's Method.





Figure 32. Slope Stability Analysis Result for Section B-B before Final Cover: EastWest\_NoCover\_Tube\_04\_Lab

650



Figure 33. Slope Stability Analysis Result for Section B-B before Final Cover: EastWest\_NoCover\_Tube\_05\_Lab





Note: This Figure shows the FS calculated using Spencer's Method.



Note: This Figure shows the FS calculated using Spencer's Method.





Figure 38. Slope Stability Analysis Result for Section B-B after Final Cover: EastWest\_Cover\_Liner\_Lab



Figure 39. Slope Stability Analysis Result for Section B-B after Final Cover: EastWest\_Cover\_Global\_Su\_Lab Note: This Figure shows the FS calculated using Spencer's Method.



re 40. Slope Stability Analysis Result for Section B-B after Final Cover: EastWest\_Cover\_Global\_U/5\_. Note: This Figure shows the FS calculated using Spencer's Method.



Figure 41. Slope Stability Analysis Result for Section B-B after Final Cover: EastWest\_Cover\_LongTerm\_Lab Note: This Figure shows the FS calculated using Spencer's Method.



Note: This Figure shows the FS calculated using Spencer's Method



Figure 43. Slope Stability Analysis Result for Section B-B after Final Cover: EastWest\_Cover\_External\_LongTerm\_Lab Note: This Figure shows the FS calculated using Spencer's Method

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Figure 44. Sensitivity Analysis of Peak Liner Friction Angle: Minimum required values

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Figure 45. Sensitivity Analysis of Residual Liner Friction Angle: Minimum required values

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Attachment 1 Seismic Impact Zone
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NYSDEC Regulations Section 360-2.7(b)(7) states that a seismic analysis is required "for new landfills, lateral expansions of existing landfills, and subsequent development of any landfill permitted pursuant to these provisions located in a seismic impact zone." The seismic impact zone is defined as "an area with a 10 percent or greater probability that the maximum horizontal acceleration in lithified earth material, expressed as a percentage of the earth's gravitational pull (g), will exceed 0.10g in 250 years."

According to the 2008 USGS National Seismic Hazard Map [Petersen et al, 2008], the SCA site falls within an area characterized by a peak ground acceleration (i.e., maximum horizontal acceleration in lithified earth material) of 0.0784g with 2 percent probability of exceedance in 50 years, which is approximately equivalent to 10 percent of exceedance in 250 years. The USGS Seismic Hazard Curves and Uniform Response Spectra computer analysis program was also used to calculate the peak ground acceleration with 10 percent of exceedance in 250 years directly, resulting in an estimated peak ground acceleration of 0.0765g. Table 1-1 presents the peak ground accelerations based on the site location, as calculated by the software, and Figure 1-1 shows the location of the SCA on the USGS National Seismic Hazard Map.

Therefore, based on the maximum horizontal acceleration, the SCA is not located in a seismic impact zone as defined by NYSDEC Regulations. As a result, a seismic slope stability analysis is not required.

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Table 1-1. Peak Ground Accelerations Based on SCA Site Location

Hazard Curve for PGA, Latitude = 43.0600, Longitude = -76.2500

PGA (%g)	%PE	Time
7.84	2%	50 years
7.65	10%	250 years

Seismic Hazard Curves and Uniform Response Spectra. USGS, October 2008.

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Figure 1-1. Location of the SCA on the USGS National Seismic Hazard Map

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Attachment 2 Interface Direct Shear Testing (Results provided to Geosyntec by Parsons)

## Geosyntec<sup>▷</sup>

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## Attachment 2 Notes:

This attachment contains a summary of interface direct shear tests performed by SGI Testing Services at the request of Parsons. These tests focus on measuring shear st

Test	Figure	Upper Shear Box	Top Liner	Bottom Liner	Lower Shear Box	Φ' <sub>PEAK</sub> (°) <sup>[1]</sup>	c′ <sub>PEAK</sub> (psf) <sup>[2]</sup>	$\begin{array}{c} \Phi'_{\text{RESIDUAL}} \\ (\circ)^{[1]} \end{array}$	c' <sub>RESIDUAL</sub> (psf) <sup>[2]</sup>	Figure Number
C-1	2-1	Concrete Sand	Non-Woven Geotextile	Smooth HDPE Geomembrane	Compacted Clay	13 <sup>[3]</sup>	30 <sup>[3]</sup>	9	25	2-1
C-2	2-2	Concrete Sand	Non-Woven Geotextile	Textured HDPE Geomembrane	Compacted Clay	27	225	17	130	2-2
C-3	2-3	Concrete Sand	Non-Woven Geotextile	EPDM Geomembrane	Compacted Clay	22	5	18	10	2-3
C-4	2-4	Concrete Sand	Non-Woven Geotextile	PP Geomembrane	Compacted Clay	19 <sup>[4]</sup>	5	18	5	2-4
C-5	2-5	Rigid Substrate	Geo-tube Geotextile	Geo-tube Geotextile	Concrete Sand	15 <sup>[5]</sup>	<b>-5</b> <sup>[6]</sup>	12	5	2-5

- 1. This is the friction angle. The laboratory designated the friction angle as  $\delta$ , however in this table, it has been labeled  $\Phi$ ' for consistency with the rest of this package.
- 2. This is the cohesion intercept. The laboratory designated the cohesion intercept as α, however in this table, it has been labeled c' for consistency with the rest of this package. In stability calculations, this value was conservatively modeled to be zero.
- Smooth HDPE Geomembrane is not considered for use in this project. 3.
- This peak effective stress friction angle between the geomembrane and compacted clay layer was used in the analyses presented herein because it had the lowest value of the three geomembrane types under consideration 4. for this project. This liner friction angle value was input into SLIDE. Final selection of geomembrane will be made based on the results of ongoing chemical compatibility testing.
- This peak effective stress friction angle for the geo-tube/geo-tube interface was input into SLIDE for calculation of FS values. 5.
- 6. This negative value is due to the linear interpolation method used to interpret strength parameters.

1	0	1		1.	• • •
trengths	tor	several	possible	slin	interfaces
uenguns	101	Several	possiole	Ship	miler faces.



1B NOTES:

1A

12 x 12

12 x 12

12 x 1

2100 3500

(1) Sliding (i.e., shear failure) occurred at the interface between the non heat-treated side of 16 oz nonwoven geotextile and geomembrane

(2) Each geosynthetic specimen was tested in the machine direction (i.e., direction of shearing parallel to MD)

0.04

0.04

0.04

	DATE OF REPORT:	2/2/2009
	FIGURE NO.	C-1
	PROJECT NO.	SGI9002
Carl SGI IESTING SERVICES, LLC	DOCUMENT NO.	
	FILE NO.	

13.6

13.1

12.5

196

526 855

135

590

(1)

(1)

Figure 2-1: Direct Shear Testing of Geotextile/Smooth HDPE Geomembrane Interface

118.6 13.9

118.9

110.3 13.0



Figure 2-2: Direct Shear Testing of Geotextile/Textured HDPE Geomembrane Interface



Figure 2-3: Direct Shear Testing of Geotextile/EPDM Geomembrane Interface



Figure 2-4: Direct Shear Testing of Geotextile/PP Geomembrane Interface



Figure 2-5: Direct Shear Testing of Geo-tube/Geo-tube Interface

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Attachment 3 Slope Stability Analyses Using the Maximum Laboratory Measured Liner Friction Angles

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Slope stability analyses were performed for the critical cases of Cross-Section A-A using the maximum friction angles found from laboratory testing of possible liner system materials. This is intended to show an expected range of calculated FS values based on the laboratory variability in effective stress friction angle. The maximum liner effective stress peak and residual friction angles found in laboratory testing are 27 degrees and 18 degrees, respectively.

It is noted that the horizontal geo-tube/geo-tube interface has been modeled with peak and residual effective stress friction angles of 15 degrees and 12 degrees, respectively, in the following analyses, and other material properties are modeled as discussed in the main text.

Table 3-1 on the following page shows the FS for the critical liner case of one column of the liner slipping under one column geo-tubes. This case was evaluated using Janbu's method for peak and residual shear strengths before and after construction of the final cover. These cases can be compared with the equivalent Cross-Section A-A case from Table 2 for the minimum measured peak friction angle.

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# Table 3-1: Critical Liner Case for Cross-Section A-A using the Maximum Laboratory Effective Stress Friction Angle

Case	Calculated FS	Target FS
Peak Friction Angle, without Final Cover <sup>[1]</sup>	1.88	1.3
Residual Friction Angle, without Final Cover <sup>[2]</sup>	1.36	1.1
Peak Friction Angle, with Final Cover <sup>[1]</sup>	1.94	1.5
Residual Friction Angle, with Final Cover <sup>[2]</sup>	1.40	1.3

- 1. These FS values are calculated using the laboratory values of peak effective stress friction angle for the geo-tube/geo-tube horizontal interface (15 degrees) and maximum peak effective stress friction angle for the liner system (27 degrees). The laboratory test data are shown in Figures 2-2 and 2-5 of Attachment 2.
- 2. These FS values are calculated using the laboratory values of residual effective stress friction angle for the geo-tube/geo-tube horizontal interface (12 degrees) and maximum residual effective stress friction angle for the liner system (18 degrees). The laboratory test data are shown in Figures 2-4 and 2-5 of Attachment 2.
- 3. This table calculates the FS for the critical liner case of one column of geo-tubes.

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Attachment 4 Back-Calculation of Required Geo-tube\Geo-tube and Liner System Interface Shear Strengths

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## Notes:

The stability analyses discussed in the Results and Discussion section of this package were performed using friction angles from laboratory testing on materials that will likely be used for the geo-tubes and liner. Since the required FS values were met, the ability to achieve adequate stability using typical construction materials has been established. However, the use of different materials may be preferred; therefore, development of a range of acceptable parameters is required.

As described in the Analyzed Cases section, once the critical cases were identified for geotube and liner stability slip modes, peak and residual effective stress friction angles for the geotube interface and the proposed liner could be back-calculated. Since Cross-Section A-A was the more critical cross section of the two, the back-calculations were only performed on that cross section. These back-calculations indicated the following:

- For the interim condition before final cover placement, peak effective stress friction angles of 13 degrees for the horizontal geo-tube interface and 14.8 degrees for the proposed liner are required. In addition, residual effective stress friction angles of 11.0 degrees for the horizontal geo-tube interface and 12.4 degrees for the proposed liner are required.
- For the final condition after final cover placement, peak effective stress friction angles of 13.8 degrees for the horizontal geo-tube interface and 18.3 degrees for the proposed liner are required. In addition, residual effective stress friction angles of 11.6 degrees for the horizontal geo-tube interface and 16.1 degrees for the proposed liner are required.
- Therefore, the minimum required peak effective stress friction angles to meet the target FS values for both interim and final conditions are 13.8 degrees for the horizontal geo-tube interface and 18.3 degrees for the proposed liner system. The minimum required residual effective stress friction angles to meet the target FS values for both the interim and final conditions are 11.6 degrees for the horizontal geo-tube interface and 16.1 degrees for the proposed liner. Alternative combinations of horizontal geo-tube interface and liner interface strengths may be acceptable as shown in Figures 4-5 and 4-6.

These back-calculated friction angles for interim and final conditions are plotted in Figures 4-1 through 4-6. The blue boxes indicate the friction angles found from the laboratory testing of commercially available products, as shown in Attachment 2. The combinations of horizontal

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geo-tube and liner interface friction angles required to reach the target FS are shown in Tables 4-1 through 4-4.

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Figure 4-1: Sensitivity Analysis of Liner Interface Friction Angle Without Final Cover, using Peak Strengths





Figure 4-2: Sensitivity Analysis of Liner Interface Friction Angle Without Final Cover, using Residual Strengths

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Figure 4-3: Sensitivity Analysis of Liner Interface Friction Angle after Final Cover Placement, using Peak Strengths

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Figure 4-4: Sensitivity Analysis of Liner Interface Friction Angle after Final Cover Placement, using Residual Strengths

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Figure 4-5: Sensitivity Analysis of Peak Liner Friction Angle: Minimum Required Values





Figure 4-6: Sensitivity Analysis of Residual Liner Friction Angle: Minimum Required Values

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## Table 4-1. Sensitivity Analysis of Liner Interface Friction Angle Without Final Cover, using Peak Strengths

Geotube interface	Liner friction angle			
friction angle (degree)	(degree)			
10	19.3			
11	17.8			
12	16.3			
13	14.8			
14	13.3			
15	11.7			
16	10.1			

- 1. For peak shear strengths, this table presents the minimum required liner friction angles and corresponding geo-tube/geo-tube interface friction angles to achieve the target FS of 1.3 for the liner slip mode.
- 2. These values were calculated using Cross-Section A-A without cover for the most critical liner slip case involving one column of geo-tubes.
- 3. These values are plotted graphically in Figure 4-1.
- 4. For peak shear strengths, in order to achieve the target FS of 1.3 for the geo-tube slip mode, the minimum required geo-tube/geo-tube horizontal interface friction angle was back-calculated to be 13.0 degrees, which corresponds to a minimum liner friction angle of 14.8 degrees.

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Table 4-2. Sensitivity Analysis of Liner Interface Frie	ction Angle Without Final Cover, using
Residual Streng	ths

Geotube interface	Liner friction angle (degree)
meden angle (aegree)	(469166)
10	14
11	12.4
12	10.9
13	9.3
14	7.7
15	6.2
16	4.6

- 1. For residual strengths, this table presents the minimum required liner friction angles and corresponding geo-tube/geo-tube interface friction angles to achieve the target FS of 1.1 for the liner slip mode.
- 2. These values were calculated using Cross-Section A-A without cover for the most critical liner slip case involving one column of geo-tubes.
- 3. These values are plotted graphically in Figure 4-2.
- 4. For residual strengths, in order to achieve the target FS of 1.1 for the geo-tube slip mode, the minimum required geo-tube/geo-tube horizontal interface friction angle was back-calculated to be 11.0 degrees, which corresponds to a minimum liner friction angle of 12.4 degrees.

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Table 4-3. Sensitivity Analysis of Liner Interface Friction Angle after Final Cover Placement,
using Peak Strengths

Geotube interface	Liner friction angle
friction angle (degree)	(degree)
12	20.3
13	19.2
13.8	18.3
14	18.1
15	16.9
16	15.7
17	14.5

- 1. For peak shear strengths, this table presents the minimum required liner friction angles and corresponding geo-tube/geo-tube interface friction angles to achieve the target FS of 1.5 for the liner slip mode.
- 2. These values were calculated using Cross-Section A-A without cover for the most critical liner slip case involving one column of geo-tubes.
- 3. These values are plotted graphically in Figure 4-3.
- 4. For peak shear strengths, in order to achieve the target FS of 1.5 for the geo-tube slip mode, the minimum required geo-tube/geo-tube horizontal interface friction angle was back-calculated to be 13.8 degrees, which corresponds to a minimum liner friction angle of 18.3 degrees.

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## Table 4-4. Sensitivity Analysis of Liner Interface Friction Angle after Final Cover Placement, using Residual Strengths

Geotube interface	Liner friction angle
friction angle (degree)	(degree)
10	18
11	16.8
11.6	16.1
12	15.6
13	14.5
14	13.3
15	12.1

- 1. For residual strengths, this table presents the minimum required liner friction angles and corresponding geo-tube/geo-tube interface friction angles to achieve the target FS of 1.3 for the liner slip mode.
- 2. These values were calculated using Cross-Section A-A without cover for the most critical liner slip case involving one column of geo-tubes.
- 3. These values are plotted graphically in Figure 4-4.
- 4. For residual strengths, in order to achieve the target FS of 1.3 for the geo-tube slip mode, the minimum required geo-tube/geo-tube horizontal interface friction angle was back-calculated to be 11.6 degrees, which corresponds to a minimum liner friction angle of 16.1 degrees.

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Attachment 5 SLIDE Output Files

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- 1.) The error messages in the output files are a result of invalid slip surfaces generated by the SLIDE program during the automatic search for the most critical slip surface. The invalid slip surfaces included surfaces that are beyond the defined model boundaries, surfaces that are kinematically not feasible, and surfaces that mathematically do not converge to a solution. The invalid slip surfaces do not affect the valid slip surfaces from which the critical slip surface is identified. A list of error codes identifying the meaning of each message is included immediately after this notes page.
- 2.) In the SLIDE output files, the model boundaries and definitions are only included twice for each Cross-Section: once before placement of cover and once after the final cover placement, to avoid redundancy.

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## List of Error Codes

-101 = Only one (or zero) surface/slope interactions.

-102 = Two surface / slope intersections, but resulting arc is actually outside soil region.

-103 = Two surface / slope intersections, but one or more surface / nonslope external polygon intersections lie between them. This usually occurs when the slip surface extends past the bottom of the soil region, but may also occur on a benched slope model with two sets of Slope Limits.

-105 = More than two surface / slope intersections with no valid slip surface.

-106 = Average slice width is less than 0.0001 \* (maximum horizontal extent of soil region). This limitation is imposed to avoid numerical errors which may result from too many slices, or too small a slip region.

-107 = Total driving moment or total driving force is negative. This will occur if the wrong failure direction is specified, or if high external or anchor loads are applied against the failure direction.

-108 = Total driving moment or total driving force < 0.1. This is to limit the calculation of extremely high safety factors if the driving force is very small (0.1 is an arbitrary number).

-110 = The water table or a piezoline does not span the slip region for a given slip surface, when Water Surfaces is specified as the method of pore pressure calculation. If this error occurs, check that the water table or piezoline(s) span the appropriate soil cells.

-111 = safety factor equation did not converge

-112 = The coefficient M-Alpha = cos(alpha)(1+tan(alpha)tan(phi)/F)< 0.2 for the final iteration of the safety factor calculation. This screens out some slip surfaces which may not be valid in the context of the analysis, in particular, deep seated slip surfaces with many high negative base angle slices in the passive zone.

-113 = Surface intersects outside slope limits.

-116 = Not enough slices to analyze the surface. Increase the number of slices in the job control in the modeler.

-1000 = No valid slip surfaces are generated at a grid center. Unable to draw a surface.

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					Page	100	of	212
Written by:	Joseph Sura	Date:	12/4/2009	Reviewed by:	R. Kulasingam/Jay Beech	Date:	12/8/	2009
Client:	Honeywell Proje	ect: Ono	ndaga Lake S(	CA Final Design	Project/ Proposal No.: C	GJ4299	Task No.:	18

**Cross-Section A-A: Before Placement of Final Cover** 

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						con	sultant	S
					Page	101	of	212
Written by:	Joseph Sura	Date:	12/4/2009	Reviewed by:	R. Kulasingam/Jay Beech	Date:	riteC isultants <u>of 212</u> : <u>12/8/2009</u> Task No : 1	3/2009
Client:	Honeywell Project:	Onor	ndaga Lake SC	CA Final Design	Project/ Proposal No.:	GJ4299	Task No.	.: 18

## Slide Analysis Information

#### Document Name

File Name: northside\_nocover\_tube\_07\_lab

#### Project Settings

Project Title: SLIDE - An Interactive Slope Stability Program Failure Direction: Right to Left Units of Measurement: Imperial Units Pore Fluid Unit Weight: 62.4 lb/ft3 Groundwater Method: Water Surfaces Data Output: Standard Calculate Excess Pore Pressure: Off Allow Ru with Water Surfaces or Grids: Off Random Numbers: Pseudo-random Seed Random Number Seed: 10116 Random Number Generation Method: Park and Miller v.3

#### **Analysis Methods**

Analysis Methods used: Bishop simplified Janbu simplified Spencer

Number of slices: 25 Tolerance: 0.005 Maximum number of iterations: 50

#### Surface Options

Surface Type: Non-Circular Block Search Number of Surfaces: 5000 Pseudo-Random Surfaces: Enabled Convex Surfaces Only: Disabled Left Projection Angle (Start Angle): 95 Left Projection Angle (End Angle): 175 Right Projection Angle (Start Angle): 5 Right Projection Angle (End Angle): 85 Minimum Elevation: Not Defined Minimum Depth: Not Defined

#### **Material Properties**

Material: Dike Soil Strength Type: Mohr-Coulomb Unit Weight: 120 lb/ft3 Cohesion: 0 psf Friction Angle: 35 degrees Water Surface: Water Table Custom Hu value: 1

Material: Gravel Strength Type: Mohr-Coulomb Unit Weight: 120 lb/ft3 Cohesion: 0 psf Friction Angle: 38 degrees Water Surface: Piezometric Line 1 Custom Hu value: 1

Material: SOLW (undrained) Strength Type: Discrete function Unit Weight: 82 lb/ft3 Water Surface: Water Table Custom Hu value: 1

Material: Dredge Material Strength Type: Mohr-Coulomb Unit Weight: 86 lb/ft3 Cohesion: 0 psf Friction Angle: 15 degrees Water Surface: Water Table Custom Hu value: 1

Material: Tube-Tube Interface (Horizontal) Strength Type: Mohr-Coulomb Unit Weight: 86 lb/ft3 Cohesion: 0 psf Friction Angle: 15 degrees Water Surface: Water Table

Custom Hu value: 1

Material: Tub-Tube Interface (Vertical) Strength Type: Mohr-Coulomb Unit Weight: 43 lb/ft3 Cohesion: 0 psf Friction Angle: 0.1 degrees Water Surface: Water Table Custom Hu value: 1

Material: Tube-Gravel Interface Strength Type: Mohr-Coulomb Unit Weight: 86 lb/ft3 Cohesion: 0 psf

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						Page	102	of 2	212
ritten by:	Joseph S	Sura	Date:	12/4/2009	Reviewed by:	R. Kulasingam/Jay Be	ech Date	: 12/8/2	009
ent:	Honeywell	Project:	Onor	ndaga Lake SC	CA Final Design	Project/ Proposal No.:	GJ4299	Task No.:	
Fr	iction Anale: 2	24 dearee	s		Ax	is Location: 1005.384	553,134		
W	ater Surface:	Water Tak	ble		Le	ft Slip Surface Endpoi	nt: 978.000	, 441.320	
С	ustom Hu valu	ue: 1			Ri	ght Slip Surface Endpo	oint: 1078.4	05,	
					464.	138			
	aterial: Liner	Mohr Cou	lomb		Le	ft Slope Intercept: 978	5.000 447.21 79 405 464	(4   120	
St Lh	nengin Type. hit Weight: 10	0 lh/ft3	amo		Re	sisting Horizontal For	070.400 404 re-20290 lt	1.100 N	
C	ohesion: 0 pst	-			Dr	iving Horizontal Force	=13360.4 lb	)	
Fr	iction Angle:	19 degree	s			9			
W	ater Surface:	Water Tak	ole		Me	ethod: spencer			
С	ustom Hu valu	ue: 1			FS	3: 2.310560			
N.4.	otorial: Found	lation			Ax	tis Location: 1005.597,	, 553.240	444 500	
<u>IVI</u> St	renath Type	<u>ialion</u> Mohr-Cou	lomh		Le	nt Slip Sunace Endpoi	ni. 976.000 hint: 1078 4	, 441.533 05	
U	nit Weight: 12	0 lb/ft3			464.	138	5int. 1070.4	00,	
C	ohesion: 0 pst	f			Le	ft Slope Intercept: 978	.000 447.27	74	
Fr	iction Angle:	37 degree	S		Ri	ght Slope Intercept: 10	078.405 464	.138	
W	ater Surface:	Water Tak	ble		Re	sisting Moment=2.566	687e+006 lk	o-ft	
C	ustom Hu valu	le: 1			Dr	iving Moment=1.1109	3e+006 lb-fi	i 'lh	
S	unnort Pro	nortios			Dr	iving Horizontal Force	=10282 7 lb		
S	upport: Geotu	be				geea e.ee			
G	eotube	<u></u>			<u>Va</u>	alid / Invalid Surfa	aces		
Sı	upport Type: (	GeoTextile	•		Me	ethod: bishop simplifie	d		
Fo	orce Applicatio	on: Passiv	e		Nu	Imber of Valid Surface	s: 4164		
FC	orce Orientatio	on: Langei	nt to Sli	p Surface	NU Fr	imber of Invalid Surfac	ces: 836		
AI Sł	icholage. Doi	n Enus Model: Lir	hear		El Fr	ror Code -108 reported	d for 834 su	rfaces	
St	rip Coverage:	: 100 perce	ent		Er	ror Code -112 reported	d for 2 surfa	ICES	
Te	ensile Strengt	h: 1600 lb/	′ft						
Ρι	ullout Strength	n Adhesior	n: 5 lb/f	t2	Me	ethod: janbu simplified			
Ρι	ullout Strength	h Friction A	Angle: 4	10 degrees	NU	Imber of Valid Surface	s: 4147		
C	labal Minir	numo			INU Fr	imper of invalid Surfac	es: 853		
	othod: hishon	<u>nums</u> simplified			Er	ror Code -108 reported	d for 851 su	rfaces	
FS	S: 1.554920	Simplineu			Er	ror Code -112 reported	d for 2 surfa	ces	
A	kis Location: 1	005.384,	553.13	4					
Le	eft Slip Surfac	e Endpoin	t: 978.0	000, 441.320	) <u>Me</u>	ethod: spencer			
Ri	ght Slip Surfa	ice Endpoi	int: 107	8.405,	NU	imber of Valid Surface	s: 3193		
464	.138	000t 070	000 44		INU Fr	iniper of invalid Suffaction for Codes.			
LE	abt Slope Inter	cept: 978.	000 44. 78 ⊿∩5	1.214 161 132	Er	ror Code -108 reported	d for 1754 s	urfaces	
Re	esisting Mom	ent=2.142	31e+00	-0100 16 lb-ft	Er	ror Code -111 reported	d for 51 surf	aces	
Di	riving Momen	t=1.37809	e+006	lb-ft	Er	ror Code -112 reported	d for 2 surfa	ices	
M	ethod: janbu s	simplified			Li	st of All Coordina	ates		
FS	S: 1.518670				Blo	ock Search Polyline			

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							Dago		102	of	212	
							Page		105	01	212	
Written by:	Josep	h Sura	Date:	12/4/2009	Reviewed by:	R. Kulas	ingam/Jay Bo	eech	Date:	12/8/	2009	
Client:	Honeywell	Project:	Onor	idaga Lake SC	CA Final Design	Project/ P	roposal No.:	GJ4	1299	Task No.:	18	
	078 000	111 318				1400 000	136 750					
	1017.040	441.054				1400.000	430.730					
					М	aterial Bou	ndarv					
Μ	aterial Bour	ndary				998.000	447.048					
	953.000	433.500				1017.014	446.832					
	958.000	433.500				1018.514	446.815					
	1400.000	427.700				1037.015	446.606					
						1038.521	446.589					
M	aterial Bour	ndary				1057.021	446.380					
	978.000	441.524				1058.520	446.363					
	997.000	441.309				1077.016	446.154					
	998.500	441.292				1078.515	446.137					
	1017.009	441.083				1097.005	445.928					
	1018.508	441.066				1098.523	445.910					
	1037.000	440.856				1117.022	445.701					
	1038.500	440.839				1118.509	445.684					
	1057.015	440.630				1137.023	445.475					
	1058.509	440.613				1138.511	445.458					
	1096.999	440.178				1157.009	445.249					
	1098.506	440.161				1158.509	445.232					
	1117.012	439.951				1177.011	445.023					
	1118.512	439.934				1178.494	445.006					
	1137.006	439.725				1197.022	444.796					
	1138.505	439.708				1198.509	444.779					
	1157.006	439.499				1217.011	444.570					
	1158.500	439.482				1218.511	444.553					
	1176.999	439.273				1237.016	444.344					
	1178.492	439.256				1238.509	444.327					
	1197.013	439.046				1257.015	444.117					
	1198.512	439.029				1258.515	444.101					
	1217.005	438.820				1277.009	443.891					
	1218.499	438.803				1278.515	443.874					
	1237.000	438.594				1296.975	443.665					
	1238.506	438.577				1298.475	443.648					
	1257.010	438.368				1317.016	443.439					
	1258.509	438.351				1318.515	443.422					
	1277.013	438.141				1336.981	443.213					
	1278.513	438.124				1338.481	443.196					
	1296.975	437.915				1357.016	442.986					
	1298.469	437.899				1358.516	442.969					
	1317.013	437.689				1376.981	442.760					
	1318.507	437.672				1378.481	442.743					
	1336.969	437.463				1400.000	442.500					
	1338.469	437.446										
	1357.000	437.236			Μ	<u>aterial Bo</u> u	ndary					
	1358.510	437.219				998.000	447.298					
	1376.969	437.011				1017.014	447.082					
	1378.475	436.993				1018.514	447.066					

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							Page	104	of	212	
Written by:	Josep	h Sura	Date:	12/4/2009	Reviewed by:	R. Kulas	ingam/Jay Beech	Date	: 12/8/2	2009	
Client:	Honeywell	Project:	Onon	daga Lake SC	CA Final Design	Project/ P	roposal No.:	GJ4299	Task No.:	18	
	1007.010	440.050				4447.000	454 704				
	1037.016	446.856				1117.028	451.701				
	1038.521	446.839				1118.527	451.684				
	1057.021	446.630				1137.001	451.475				
	1058.521	446.613				1138.501	451.458				
	1077.016	446.404				1157.027	451.249				
	1078.516	446.387				1158.521	451.232				
	1097.005	446.178				1176.995	451.023				
	1098.524	446.160				1178.495	451.006				
	1117.022	445.951				1197.028	450.796				
	1118.510	445.934				1198.521	450.779				
	1137.024	445.725				1217.001	450.570				
	1138.511	445.708				1218.501	450.553				
	1157.010	445.499				1237.022	450.344				
	1130.310	440.402				1230.313	400.027				
	1170.001	440.273				1257.007	400.110				
	1178.494	445.256				1258.501	450.101				
	1197.022	445.040				1277.021	449.091				
	1190.010	443.029				12/0.021	449.074				
	1217.011	444.020				1297.001	449.000				
	1210.011	444.003				1290.001	449.040				
	1237.010	444.394				1210 521	449.439				
	1250.009	444.077				1310.021	449.422				
	1257.010	444.300				1337.000	449.213				
	1200.010	444.551				1350.001	449.190				
	1277.010	444.141				1357.022	440.900				
	1210.010	444.124				1330.321	440.909				
	1290.975	443.915				1378 508	440.700				
	1230.475	443.090				1400.000	440.743				
	1219 516	443.009				1400.000	440.000				
	1336 081	443.072			N	laterial Bou	ndany				
	1338 /81	443.405			<u>IV</u>	1018 000	1001 y 153 071				
	1357 016	443.440				1010.000	453.071				
	1358 516	443.230				1037.022	452.050				
	1376 081	443.219				1057.007	452.039				
	1270.901	443.010				1057.007	452.050				
	1370.401	442.993				1038.301	452.013				
	1400.000	442.750				1077.022	452 387				
M	laterial Bour	ndarv				1076.020	452.507				
IV	1018 000	452 821				1098 501	452 161				
	1037 021	452.021				1117 028	451 951				
	1038 521	452 580				1118 528	451 021				
	1057 007	452 380				1137 0020	451 725				
	1058 501	452 363				1138 501	451 708				
	1077 021	452 151				1157 028	451 400				
	1078 527	452 134				1158 522	451 482				
	1096 995	451 928				1176 006	451 273				
	1090.995	451 011				1178 /06	451 256				
	1030.001	401.911				11/0.490	401.200				

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							Page	105	of	212		
Written by: Client:	Joseph Sura		Date:	12/4/2009	Reviewed by:	R. Kulas	R. Kulasingam/Jay Beech		e: <u>12/8/</u>	12/8/2009		
	Honeywell	Project:	Onon	daga Lake SO	CA Final Design	Project/ P	roposal No.:	GJ4299	Task No.:	18		
	1107 000	451 046				1007 010						
	1197.020	451.040				1297.013	455.005					
	1217 001	451.029				1290.013	400.040					
	1217.001	450.620				1219 505	400.409					
	1210.001	450.605				1310.000	400.422					
	1237.022	450.594				1338 507	455.215					
	1257.007	450.577				1350.507	455.190					
	1257.007	450.500				1357.000	404.900					
	1230.301	450.551				1330.311	454.909					
	1277.022	450.141				1377.021	454.700					
	12/0.022	430.124				1370.010	454.745					
	1297.002	449.915				1400.000	454.500					
	1290.002	449.090			N	latarial Pau	ndon					
	1317.020	449.009			<u>IV</u>	1029 000	<u>nuary</u> AEO OAE					
	1310.322	449.072				1050.000	400.040					
	1337.000	449.403				1057.013	400.000					
	1330.302	449.440				1000.010	400.013					
	1357.022	449.230				1077.000	400.404					
	1358.522	449.219				1078.505	458.387					
	1377.008	449.010				1097.013	458.178					
	1376.306	440.993				1090.013	400.101					
	1400.000	446.750				1117.011	457.951					
Ν.	latorial Rou	odony				1127 020	457.954					
1	1029 000	<u>1001 y</u> 159 505				1129 507	457.725					
	1057.000	458 380				1157.005	457.700					
	1058 512	458 363				1158 /00	457 482					
	1077 005	458 154				1177 013	457 273					
	1077.005	450.154				1178 510	457 255					
	1070.000	457 928				1107 006	457.046					
	1097.013	457.920				1108 /00	457.040					
	1030.313	457.511				1217 007	457.029					
	1118 /08	457.701				1217.007	450.020					
	1137 010	457.005				1237.006	450.005					
	1138 507	457.475				1238 511	450.594					
	1157.005	457.450				1257.007	450.577					
	1158 /08	457 232				1258 507	450.500					
	1177 013	457.023				1277 005	450.551					
	1178 518	457.025				12778 505	456 124					
	1107 005	457.000				1207 014	450.124					
	1108 /08	450.790				1297.014	455.915					
	1217 007	456 570				1317 005	455 620					
	1218 501	450.570				1318 505	455.009					
	1210.001	450.555				1337 014	400.012					
	1237.005	456 207				1338 507	455.405					
	1250.011	450.521				1357 000	400.440					
	1257.007	450.110				1358 511	400.200					
	1200.007	450.101				1377 004	400.219					
	1279 505	400.091				1270 E1/	400.010					
	1210.000	400.0/4				13/0.314	404.990					

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						Dage			106	of	212
							1 uge		100	01	212
Written by:	Josep	h Sura	Date:	12/4/2009	Reviewed by:	R. Kulas	ingam/Jay B	seech	Date	: 12/8/2	2009
Client:	Honeywell	Project:	Onond	aga Lake SC	A Final Design	Project/ P	roposal No.:	GJ4	4299	Task No.:	18
	1400 000	454 750				1107 012	438 796				
	1400.000	404.700				1198.512	438,779				
М	aterial Bour	ndarv				1217.005	438.570				
<u></u>	958.000	435.500				1218.499	438.553				
	997.000	435.059				1237.000	438.344				
	998.500	435.042				1238.506	438.327				
	1037.000	434.606				1257.009	438.118				
	1038.494	434.589				1258.509	438.101				
	1077.000	434.154				1277.013	437.891				
	1078.500	434.137				1278.512	437.874				
	1117.000	433.701				1296.975	437.665				
	1118.494	433.684				1298.469	437.649				
	1156.994	433.249				1317.013	437.439				
	1158.494	433.232				1318.507	437.422				
	1197.006	432.796				1336.969	437.213				
	1198.500	432.779				1338.469	437.196				
	1236.994	432.344				1357.000	436.986				
	1238.494	432.327				1358.510	436.969				
	1277.007	431.891				1376.969	436.761				
	1278.507	431.874				1378.475	436.743				
	1317.007	431.439				1400.000	436.500				
	1318.507	431.422									
	1357.000	430.986			N	aterial Bou	<u>ndary</u>				
	1358.499	430.969				958.000	435.750				
	1400.000	430.500				997.000	435.309				
						998.500	435.292				
M	aterial Bour	<u>ndary</u>				1037.000	434.856				
	978.000	441.274				1038.494	434.839				
	997.000	441.059				1077.000	434.404				
	998.500	441.042				1078.500	434.387				
	1017.008	440.832				1117.001	433.951				
	1018.508	440.816				1118.494	433.934				
	1037.000	440.606				1156.994	433.499				
	1030.300	440.369				1100.494	433.462				
	1057.015	440.380				1197.007	433.040				
	1036.306	440.303				1226 004	433.029				
	1077.000	440.134				1230.994	432.394				
	1070.494	440.137				1230.494	432.377				
	1090.999	439.920				1278 507	432.141				
	1117 012	439 701				1317 007	431 689				
	1118 511	439 684				1318 507	431 672				
	1137 005	439 475				1357 000	431 236				
	1138 505	439 458				1358 500	431 219				
	1157 006	439 249				1400 000	430 750				
	1158.500	439.232				. 100.000	100.100				
	1176.999	439.023			N	aterial Bou	ndarv				
	1178.492	439.006			<u></u>	895.681	432.081				
								con	sultants		
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							Page	107	of	212	
Written by:	Josep	bh Sura	Date:	12/4/2009	Reviewed by:	R. Kula	singam/Jay Bee	ch Date:	12/8/2	2009	
Client:	Honeywell	Project:	Onond	aga Lake So	CA Final Desigr	Project/ l	Proposal No.:	GJ4299	Task No.:	18	
	953 504	431 272				1318 507	431 672				
	1400.000	425.200				1318.507	437.422				
	11001000	1201200				1318 507	437 672				
N	Anterial Bou	ndarv				10101001	1011012				
<u></u>	661.000	436.500			Ν	/aterial Bou	undarv				
	748.000	412.600			-	1077.000	434.154				
	789.000	386.700				1077.000	434.404				
	835.000	386.800				1077.006	440.154				
	980,000	376 600									
	1400 000	367 800			Ν	Anterial Bou	Indary				
	1100.000	001.000			<u>-</u>	1078 494	440 137				
N/	Anterial Bou	ndarv				1078 500	434 387				
<u></u>	942 667	435 500				1078 500	434 137				
	947 793	433 500				1070.000	404.107				
	953 504	431 272			Ν	Anterial Rou	Indary				
	333.304	401.272			<u> </u>	1117 000	/33 701				
N	Anterial Rou	ndarv				1117.000	433.051				
<u>IV</u>	1357 000	130 986				1117.001	430.331				
	1357.000	431 236				1117.012	430.051				
	1357.000	431.230				1117.012	439.931				
	1357.000	430.900			Ν	Antorial Rou	indon				
	1557.000	437.230			<u> </u>	1119 /0/	122 694				
N/	Anterial Bou	ndany				1118 /0/	433.004				
<u>IV</u>	1358 /00	130 060				1118 511	430.684				
	1358 500	430.909				1110.511	439.004				
	1358 510	436.969				1110.512	409.904				
	1358 510	430.303			Ν	Anterial Rou	Indary				
	1000.010	407.210			<u>-</u>	1156 994	<u>433</u> 249				
N/	Anterial Rou	ndarv				1156 994	400.240				
10	1277 007	<u>431 801</u>				1157.006	439 249				
	1277.007	432 141				1157.000	430.243				
	1277.007	437 801				1107.000	400.400				
	1277.013	438 141			Ν	Anterial Rou	Indary				
	1277.010	400.141			<u>-</u>	1158 494	<u>433 232</u>				
N/	Anterial Rou	ndarv				1158 494	433 482				
<u>IV</u>	1278 507	131 871				1158 500	430.402				
	1278 507	431.074				1158.500	439.232				
	1270.507	437.874				1150.500	409.402				
	1270.012	437.074			Ν	Antorial Rou	indon				
	1270.015	430.124			<u>I</u>	1107 006	<u>422</u> 706				
Ν.	Actorial Day	odon (				1197.000	432.790				
<u>IV</u>	1217 007	121 420				1107.00/	400.040				
	1317.007	431.439				1107.012	430.190				
	1317.007	431.009				1197.013	439.040				
	1317.013	437.439				Antonial De	undor:				
	1317.013	437.689			<u>N</u>	ALOS TOC	andary 400 770				
						1198.500	432.779				
N	naterial Boui	ndary				1198.500	433.029				
	1318 507	431 477					1.20 //0				

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						Page	108	of	212
Written by:	Josep	h Sura	Date: 12/4/2009	Reviewed by:	R. Kulas	singam/Jay B	Beech Date	: 12/8	8/2009
Client:	Honeywell	Project:	Onondaga Lake SC	CA Final Design	Project/ P	Proposal No.:	GJ4299	Task No.	.: 18
	1198.512	439.029			1298.475	443.898			
N	Material Bour	ndary		M	aterial Bou	ndary			
	1236.994	432.344			1336.969	437.213			
	1236.994	432.594			1336.969	437.463			
	1237.000	438.344			1336.981	443.213			
	1237.000	438.594			1336.981	443.463			
Ν	Material Bour	ndary		M	aterial Bou	ndary			
	1238.494	432.327			1338.469	437.196			
	1238.494	432.577			1338.469	437.446			
	1238.506	438.327			1338.481	443.196			
	1238.506	438.577			1338.481	443.446			
Ν	Material Bour	ndarv		Μ	aterial Bou	ndarv			
<u>.</u>	997.000	435.059		<u></u>	1376.969	436.761			
	997.000	435.309			1376.969	437.011			
	997.000	441.059			1376.981	442.760			
	997.000	441.309			1376.981	443.010			
Ν	Jaterial Rour	ndarv		M	aterial Rou	ndarv			
<u></u>	998 500	435 042		<u></u>	1378 475	436 743			
	998 500	435 292			1378 475	436 993			
	998 500	441 042			1378 481	442 743			
	998.500	441.292			1378.481	442.993			
	Actorial Days	a da mi		Ν.	atarial Day	a da na			
<u>N</u>	1027 000	<u>10ary</u> 424 606		IVI	<u>aterial Bou</u>	120 110			
	1037.000	434.000			1257.009	430.110			
	1037.000	434.030			1257.010	430.300			
	1037.000	440.856			1257.016	444.368			
_		_							
<u>N</u>	Material Bour	<u>ndary</u>		M	aterial Bou	ndary			
	1038.494	434.589			1258.509	438.101			
	1038.494	434.839			1258.509	438.351			
	1038.500	440.589 440.839			1258.515	444.101 444.351			
N	Material Bour	ndary		M	aterial Bou	ndary			
	1296.975	437.665			1096.999	439.928			
	1296.975	437.915			1096.999	440.178			
	1296.975	443.665			1097.005	445.928			
	1296.975	443.915			1097.005	446.178			
Ν	Material Bour	ndary		M	aterial Bou	ndary			
	1298.469	437.649			1098.505	439.911			
	1298.469	437.899			1098.506	440.161			
	1298.475	443.648			1098.523	445.910			

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									con	sultants	3
							Page	1	109	of	212
Written by:	Josep	oh Sura	Date:	12/4/2009	Reviewed by:	R. Kulas	singam/Jay B	Seech	Date:	12/8/	/2009
Client:	Honeywell	Project:	Onor	ndaga Lake SC	CA Final Design	Project/ F	Proposal No.:	GJ4	299	Task No.:	18
	1098.524	446.160				1018.514	447.066				
N	laterial Bou	ndary			M	laterial Bou	indary				
	1137.005	439.475				1057.015	440.380				
	1137.006	439.725				1057.015	440.630				
	1137.023	445.475				1057.021	446.380				
	1137.024	445.725				1057.021	446.630				
N	laterial Bou	ndary			Μ	laterial Bou	Indary				
	1138.505	439.458				1058.508	440.363				
	1138.505	439.708				1058.509	440.613				
	1138.511	445.458				1058.520	446.363				
	1138.511	445.708				1058.521	446.613				
N	laterial Bou	ndarv			Μ	laterial Bou	Indary				
<u></u>	1176 999	439 023			<u></u>	1037 015	446 606				
	1176 999	439 273				1037 016	446 856				
	1177 011	445 023				1037 021	452 606				
	1177.011	445.273				1037.022	452.856				
N	Interial Rou	ndony			N/	latorial Rou	undon <i>u</i>				
<u>IV</u>	1178 /02	130 006			1	1038 521	116 580				
	1178.492	439.000				1038.521	440.009				
	1170.492	439.230				1030.521	440.039				
	1178.494	445.256				1038.521	452.839				
N	laterial Bou	ndary			N	laterial Bou	indary				
	1217.005	438.570				1077.016	446.154				
	1217.005	438.820				1077.016	446.404				
	1217.011	444.570				1077.021	452.154				
	1217.011	444.820				1077.022	452.404				
N	laterial Bou	<u>ndary</u>			M	laterial Bou	indary				
	1218.499	438.553				1078.515	446.137				
	1218.499	438.803				1078.516	446.387				
	1218.511	444.553				1078.527	452.137				
	1218.511	444.803				1078.528	452.387				
Ν	laterial Bou	ndarv			Μ	laterial Bou	Indarv				
<u></u>	1017.008	440.832			<u></u>	1117.022	445.701				
	1017.009	441.083				1117.022	445.951				
	1017.014	446.832				1117.028	451.701				
	1017.014	447.082				1117.028	451.951				
N/	laterial Rou	ndarv			Γ.	laterial Rou	Indary				
<u>IV</u>	1018 508	440 816			10	1118 509	445 684				
	1018 508	441 066				1118 510	445 021				
	1018 514	<u>446 815</u>				1118 527	151 6Q1				
	1010.014	-TU.01J				1110.021	401.004				

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									cons	ultants	
							Page	11	0	of	212
Written by:	Josep	bh Sura	Date:	12/4/2009	Reviewed by:	R. Kulas	singam/Jay B	eech 1	Date:	12/8/2	2009
Client:	Honeywell	Project:	Ononda	ga Lake SC	CA Final Design	Project/ I	Proposal No.:	GJ429	9	Task No.:	18
	1118.528	451.934				1278.522	450.124				
M	laterial Bou	ndary			N	laterial Bou	Indary				
	1157.009	445.249				1317.016	443.439				
	1157.010	445.499				1317.016	443.689				
	1157.027	451.249				1317.028	449.439				
	1157.028	451.499				1317.028	449.689				
М	laterial Bou	ndarv			Ν	laterial Bou	Indarv				
<u></u>	1158,509	445.232			<u></u>	1318.515	443.422				
	1158 510	445 482				1318 516	443 672				
	1158 521	451 232				1318 521	449 422				
	1158.522	451.482				1318.522	449.672				
N/	laterial Bou	ndany			N	latorial Bou	Indany				
<u>IV</u>	1107 022	<u>110ary</u> 111 706			<u>IV</u>	1257 016	110 <u>01 y</u>				
	1197.022	444.790				1257.010	442.900				
	1197.022	445.040				1357.010	443.230				
	1197.028	450.796				1357.022	440.900				
Γ.	latarial Dau	odon (			N/	latarial Day	un dom (				
IV	1100 E00	<u>10ary</u>			<u>IV</u>	12E9 E16					
	1198.509	444.779				1358.516	442.969				
	1198.510	445.029				1358.516	443.219				
	1198.521	450.779				1358.521	448.969				
	1198.522	451.029				1358.522	449.219				
M	laterial Bou	ndary			N	laterial Bou	<u>Indary</u>				
	1237.016	444.344				1057.007	452.380				
	1237.016	444.594				1057.007	452.630				
	1237.022	450.344				1057.013	458.380				
	1237.022	450.594				1057.013	458.630				
M	laterial Bou	ndary			N	laterial Bou	<u>Indary</u>				
	1238.509	444.327				1058.501	452.363				
	1238.509	444.577				1058.501	452.613				
	1238.515	450.327				1058.512	458.363				
	1238.515	450.577				1058.513	458.613				
М	laterial Bou	ndarv			N	aterial Bou	Indarv				
<u></u>	1277.009	443.891			<u></u>	1098.501	451.911				
	1277.010	444 141				1098.501	452 161				
	1277 021	449 891				1098 513	457 911				
	1277.022	450.141				1098.513	458.161				
N /	laterial Bou	ndany			R /	latorial Bou	indan.				
IV	1278 515	1/12 271			<u>IV</u>	1006 005	11001 Y 151 020				
	1210.010	440.0/4				1090.990	401.920				
	1270.010	444.124 110 071				1090.990	402.170				
	1210.321	449.0/4				1091.013	407.928				

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									con	sultants	S
							Page		111	of	212
Written by:	Josep	oh Sura	Date:	12/4/2009	Reviewed by:	R. Kulas	singam/Jay E	Beech	Date:	12/8	/2009
Client:	Honeywell	Project:	Onon	daga Lake S	CA Final Design	Project/ F	Proposal No.:	GJ	4299	Task No.:	: 18
	1097.013	458.178				1258.507	456.351				
Ν	laterial Bou	ndary			Ν	laterial Bou	Indary				
	1137.001	451.475				1297.001	449.665				
	1137.002	451.725				1297.002	449.915				
	1137.019	457.475				1297.013	455.665				
	1137.020	457.725				1297.014	455.915				
N	laterial Rou	ndarv			N	laterial Rou	Indary				
<u>IV</u>	1138 501	151 158			<u>IV</u>	1208 501	1/0 6/8				
	1138 501	451.450				1290.001	449.040				
	1130.501	451.700				1290.002	449.090				
	1138 507	407.400				1290.013	400.040				
	1100.007	407.700				1230.314	400.000				
N	laterial Bou	<u>ndary</u>			N	laterial Bou	<u>indary</u>				
	1176.995	451.023				1337.008	449.213				
	1176.996	451.273				1337.008	449.463				
	1177.013	457.023				1337.014	455.213				
	1177.013	457.273				1337.014	455.463				
M	laterial Bou	ndarv			N	laterial Bou	Indary				
<u></u>	1178 495	451 006			<u></u>	1338 501	449 196				
	1178 /06	451.000				1338 502	110 116				
	1178 518	457.006				1338 507	455 106				
	1178.519	457.255				1338.507	455.446				
N	laterial Bou	<u>ndary</u>			<u>N</u>	laterial Bou	<u>indary</u>				
	1217.001	450.570				1377.008	448.760				
	1217.001	450.820				1377.008	449.010				
	1217.007	456.570				1377.021	454.760				
	1217.007	456.820				1377.021	455.010				
N	laterial Bou	ndarv			N	laterial Bou	Indarv				
<u></u>	1218 501	450 553			<u></u>	1378 508	448 743				
	1218 501	450 803				1378 508	448 993				
	1218 501	456 553				1378 513	454 743				
	1218.501	456.803				1378.514	454.993				
					_						
N	laterial Bou	ndary			N	laterial Bou	indary				
	1257.007	450.118				1077.005	458.154				
	1257.007	450.368				1077.006	458.404				
	1257.007	456.118				1077.017	464.154				
	1257.007	456.368			R /	latorial Bas	undon (				
R.	latarial Davi	ndany			<u>IV</u>	1079 505	11Ualy 150 107				
<u>IV</u>	1050 504					1070 505	400.13/				
	1208.501	450.101				1078.505	408.38/				
		1 L I I I L I				A / \ //\ / A · A ·	A. A. A. I. I.				
	1258.501	450.351				1078.517	464.137				

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									con	sultants	5
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Written by:	Josep	h Sura	Date:	12/4/2009	Reviewed by:	R. Kulas	ingam/Jay B	eech	Date:	12/8/	2009
Client:	Honeywell	Project:	Onor	idaga Lake SC	CA Final Design	Project/ P	roposal No.:	GJ4	1299	Task No.:	18
M	laterial Rour	ndarv				1278 505	461 874				
111	1117.011	457.701				1270.000	401.074				
	1117.011	457.951			М	aterial Bou	ndarv				
	1117.011	463,701				1317.005	455.439				
						1317.005	455.689				
М	laterial Bour	ndarv				1317.011	461.439				
	1118,498	457,685									
	1118.499	457.934			Μ	aterial Bou	ndarv				
	1118.511	463,684				1318.505	455.422				
						1318.505	455.672				
М	laterial Bour	ndarv				1318.517	461.422				
<u></u>	1157.005	457.249									
	1157.005	457,499			М	aterial Bou	ndarv				
	1157.011	463.249			<u></u>	1357.006	454.986				
						1357.006	455.236				
М	laterial Bour	ndarv				1357 017	460 986				
<u></u>	1158 498	457 232					1001000				
	1158 499	457 482			М	aterial Bou	ndarv				
	1158 511	463 232			<u></u>	1358 511	454 969				
	1100.011	100.202				1358 511	455 219				
М	laterial Bour	ndarv				1358 511	460 969				
<u></u>	1197 005	456 796				1000.011	100.000				
	1197.006	457 046			М	aterial Bou	ndarv				
	1197.000	462 796			<u></u>	937 818	437 500				
	1107.017	402.100				940.000	436 600				
М	laterial Bour	ndarv				942 667	435 500				
111	1108 408	456 779				542.007	400.000				
	1108 /00	457 020			E,	vternal Rou	Indary				
	1108 517	462 779			<u> </u>	000 818	437 500				
	1130.317	402.113				800 186	433 425				
М	latarial Rour	ndarv				805 681	432 081				
111	1237 005	456 344				661 000	436 500				
	1237.005	456 594				638.000	432 900				
	1237.000	462 344				555 000	396 200				
	1201.024	402.044				483 000	398 300				
M	latarial Rour	ndarv				461 000	390.500				
<u>IV</u>	1238 511	1001 y 156 327				307 000	386 700				
	1238 511	456 577				277 000	373 000				
	1238 517	462 327				1 726	374 500				
	1230.317	402.527				1.720	167 800				
Γ.Λ	aterial Rou	ndarv				1400 000	167 200				
<u>IVI</u>	1277 005	1001 y 155 801				1/00.000	267 200				
	1277 005	400.091				1400.000	307.000 425.200				
	1277 014	400.141				1400.000	420.200				
	1211.011	401.091				1400.000	421.100				
	latarial Davi	don				1400.000	430.500				
IVI	ADZO EOE					1400.000	430.750				
	1218.505	400.8/4				1400.000	430.500				
	1210.505	400.124				1400.000	430.750				

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									con	sultants	
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Written by:	Josep	bh Sura	Date:	12/4/2009	Reviewed by:	R. Kulas	singam/Jay Be	ech	Date:	12/8/	2009
Client:	Honeywell	Project:	Onor	1daga Lake SC	CA Final Design	Project/ F	Proposal No.:	GJ	4299	Task No.:	18
	1400.000	442.500				958.000	434.500				
	1400.000	442.750				1400.000	428.700				
	1400.000	448.500									
	1400.000	448.750			<u>V</u>	Vater Table					
	1400.000	454.500				715.262	421.594				
	1400.000	454.750				900.000	417.000				
	1400.000	460.500				935.504	416.272				
	1358.511	460.969				1400.000	410.200				
	1357.017	460.986									
	1318 517	461 422			F	ocus/Block	Search Poir	nt			
	1317 011	461 439			<u>-</u>	1017 040	441 054				
	1278 505	461 874				1017.040	441.004				
	1270.000	461 801			F	ocus/Block	Search Poir	ht.			
	1277.011	401.091			<u>1</u>	1019 172	146 949	<u>n</u>			
	1230.017	402.327				1010.472	440.040				
	1237.024	462.344			-						
	1198.517	462.779			<u>F</u>	OCUS/BIOCK	Search Poir	<u>nt</u>			
	1197.017	462.796				1037.037	446.830				
	1158.511	463.232									
	1157.011	463.249			<u> </u>	ocus/Block	Search Poir	<u>nt</u>			
	1118.511	463.684				1038.507	452.594				
	1117.011	463.701									
	1078.517	464.137			<u> </u>	ocus/Block	Search Poir	<u>nt</u>			
	1077.017	464.154				1057.020	452.618				
	1038.000	464.595									
	1038.000	458.845			F	ocus/Block	Search Poir	nt			
	1038.000	458.595			_	1058,459	458.411	_			
	1018 000	458 821									
	1018 000	453 071			F	ocus/Block	Search Poir	nt			
	1018 000	452 821			<u>-</u>	1077 037	458 372	<u></u>			
	008 000	453 048				1077.007	400.072				
	998.000	403.040				ocuc/Block	Soarch Doir	<b>^</b> +			
	998.000	447.290			<u> </u>	1070 405		<u>n</u>			
	996.000	447.040				1076.405	404.130				
	978.000	447.274									
	978.000	441.524			<u>5</u>	Support					
	978.000	441.274				1358.511	460.969				
	958.000	441.500				1400.000	460.500				
	958.000	435.750									
	958.000	435.500			<u>S</u>	Support					
	953.000	433.500				1400.000	454.750				
	948.793	433.500				1400.000	460.500				
	943.667	435.500									
	941.000	436.600			S	Support					
	938,818	437,500			<u>-</u>	1400.000	454.750				
	937.818	437.500				1358.511	455.219				
<u>P</u>	<u>Piezo Line</u>				<u>S</u>	Support					
	946.230	434.500			_	1358.511	455.219				
	948.793	434.500				1358.511	460.969				

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						Page	114	of	2	12
Written by:	Josep	bh Sura	Date: 12/4/2009	Reviewed by:	R. Kulas	singam/Jay Bo	eech Dat	e: 1	2/8/20	09
Client:	Honeywell	Project:	Onondaga Lake	SCA Final Design	Project/ P	roposal No.:	GJ4299	Task N	No.:	18
<u>S</u>	upport			<u>Su</u>	pport					
	1378.513	454.743		1	400.000	430.750				
	1378.508	448.993		1	400.000	436.500				
S	upport			Su	pport					
	1378.508	448.993		1	400.000	436.500				
	1400.000	448.750		1	358.510	436.969				
0				0						
<u>S</u>	upport	440 750		Su	pport	420.000				
	1400.000	448.750		1	358.510	436.969				
	1400.000	454.500			358.500	431.219				
S	upport			Su	pport					
	1400.000	454.500		1	358.500	431.219				
	1378.513	454.743		1	400.000	430.750				
5	unnort			<u>.</u>	nnart					
<u></u>	<u>1400 000</u>	449 500		<u></u>	276.060	127 011				
	1400.000	442.750		1	376.981	442.760				
<u>S</u>	upport			<u>Su</u>	<u>pport</u>					
	1400.000	442.750		1	377.021	454.760				
	1358.516	443.219		1	377.008	449.010				
S	upport			Su	pport					
	1358.516	443.219		1	338.481	443.196				
	1358.521	448.969		1	376.981	442.760				
0				<b>C</b>						
5	<u>upport</u> 1259 521	118 060		<u>5u</u>	276.060	427 011				
	1400 000	448.909		1	338 469	437.011				
	1100.000	110.000			000.100	107.110				
<u>S</u>	upport									
	1400.000	442.500								
	1400.000	436.750								
S	upport									
	1400.000	436.750								
	1378.475	436.993								
0										
5	1378 475	136 002								
	1378.481	430.993								
<u>S</u>	upport									
	1378.481	442.743								
	4 400 000	110 -0-								

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					Page	115	of	212
Written by:	Joseph Sura	Date:	12/4/2009	Reviewed by:	R. Kulasingam/Jay Beech	Date	: 12/	8/2009
Client:	Honeywell Project:	Onoi	ndaga Lake SC	CA Final Design	Project/ Proposal No.:	GJ4299	Task No	o.: <b>18</b>

#### **Document Name**

File Name: northside\_nocover\_tube\_10\_lab

## **Project Settings**

Project Title: SLIDE - An Interactive Slope Stability Program Failure Direction: Right to Left Units of Measurement: Imperial Units Pore Fluid Unit Weight: 62.4 lb/ft3 Groundwater Method: Water Surfaces Data Output: Standard Calculate Excess Pore Pressure: Off Allow Ru with Water Surfaces or Grids: Off Random Numbers: Pseudo-random Seed Random Number Seed: 10116 Random Number Generation Method: Park and Miller v.3

## **Analysis Methods**

Analysis Methods used: Bishop simplified Janbu simplified Spencer

Number of slices: 25 Tolerance: 0.005 Maximum number of iterations: 50

#### Surface Options

Surface Type: Non-Circular Block Search Number of Surfaces: 5000 Pseudo-Random Surfaces: Enabled Convex Surfaces Only: Disabled Left Projection Angle (Start Angle): 95 Left Projection Angle (End Angle): 175 Right Projection Angle (Start Angle): 5 Right Projection Angle (End Angle): 85 Minimum Elevation: Not Defined Minimum Depth: Not Defined

## **Material Properties**

Material: Dike Soil Strength Type: Mohr-Coulomb Unit Weight: 120 lb/ft3 Cohesion: 0 psf Friction Angle: 35 degrees Water Surface: Water Table Custom Hu value: 1

Material: Gravel Strength Type: Mohr-Coulomb Unit Weight: 120 lb/ft3 Cohesion: 0 psf Friction Angle: 38 degrees Water Surface: Piezometric Line 1 Custom Hu value: 1

Material: SOLW (undrained) Strength Type: Discrete function Unit Weight: 82 lb/ft3 Water Surface: Water Table Custom Hu value: 1

Material: Dredge Material Strength Type: Mohr-Coulomb Unit Weight: 86 lb/ft3 Cohesion: 0 psf Friction Angle: 15 degrees Water Surface: Water Table Custom Hu value: 1

Material: Tube-Tube Interface (Horizontal) Strength Type: Mohr-Coulomb Unit Weight: 86 lb/ft3 Cohesion: 0 psf Friction Angle: 15 degrees Water Surface: Water Table

Custom Hu value: 1

Material: Tub-Tube Interface (Vertical) Strength Type: Mohr-Coulomb Unit Weight: 43 lb/ft3 Cohesion: 0 psf Friction Angle: 0.1 degrees Water Surface: Water Table Custom Hu value: 1

Material: Tube-Gravel Interface Strength Type: Mohr-Coulomb Unit Weight: 86 lb/ft3 Cohesion: 0 psf

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						Page	116	of	212
ritten by:	Joseph	Sura	Date:	12/4/2009	Reviewed by:	R. Kulasingam/Jay B	eech Date	e: 12/8	8/2009
ent:	Honeywell	Project:	Ono	ndaga Lake SC	CA Final Design	Project/ Proposal No.:	GJ4299	Task No.	
Er	iction Angle:	24 degrees	2		٨٧	is Location: 080 581	570 232		
W	ater Surface:	Water Tab	ble		Le	ft Slip Surface Endpoi	int: 958.000	. 435.516	5
Сι	ustom Hu valu	ue: 1			Ri	ght Slip Surface Endp	oint: 1078.4	05,	
					464	138			
Ma	aterial: Liner				Le	ft Slope Intercept: 958	8.000 441.50	00	
St	rength Type:	Mohr-Cou	lomb		Ri	ght Slope Intercept: 10	078.405 464	1.138	
Ur	hit Weight: 10	0 lb/ft3			Re	esisting Horizontal For	rce=30889.6	5 lb	
	bhesion: 0 ps	10 do arco	_		Dr	iving Horizontal Force	=18003.3 lb	)	
	ator Surface:	19 degrees	S No		N/A	athad: spansor			
	ater Surface.		Jie						
00		uc. 1			Ax	ris Location: 989 861	570 372		
Ma	aterial: Found	lation			Le	ft Slip Surface Endpo	int: 958.000	. 435.797	,
St	rength Type:	Mohr-Cou	lomb		Ri	ght Slip Surface Endp	oint: 1078.4	05,	
Ur	nit Weight: 12	0 lb/ft3			464.	138			
Co	phesion: 0 ps	f			Le	ft Slope Intercept: 958	8.000 441.50	00	
Fr	iction Angle:	37 degrees	S		Ri	ght Slope Intercept: 1	078.405 464	1.138	
W	ater Surface:	Water Tak	ble		Re	esisting Moment=4.47	741e+006 lt	o-ft	
Cl	ustom Hu vali	le: 1			Dr	IVING MOMENT=1.6563		[ :   b	
S	unnort Pro	nortios			Dr	iving Horizontal Force	=12834 lb		
<u>S</u>	inport: Geotu	he			D1		-1200110		
Ge	eotube	<u></u>			Va	alid / Invalid Surfa	aces		
Su	apport Type: (	GeoTextile	•		Me	ethod: bishop simplifie	ed		
Fc	orce Application	on: Passiv	е		Nu	Imber of Valid Surface	es: 4384		
Fc	orce Orientation	on: Tanger	nt to SI	ip Surface	Νι	umber of Invalid Surfa	ces: 616		
Ar	nchorage: Bot	th Ends			Er	ror Codes:			
Sh	hear Strength	Model: Lir	near		Er	ror Code -108 reporte	d for 285 su	irfaces	
51	rip Coverage	: 100 perce	ent /f+		Er	ror Code -112 reporte	a for 331 su	Infaces	
Pi	illout Strengt	n. 1000 lb/ h Adhesior	ונ זי 5 lb/f	12	M	athod: janhu simplified	4		
Pi	illout Strengt	h Friction A	Angle: 4	40 dearees	Ni	umber of Valid Surface	<u>4</u> es: 4364		
	g.			10 0.09.000	Nu	mber of Invalid Surfa	ces: 636		
G	lobal Miniı	nums			Er	ror Codes:			
M	ethod: bishop	simplified			Er	ror Code -108 reporte	d for 287 su	irfaces	
FS	S: 1.773320				Er	ror Code -111 reporte	d for 2 surfa	aces	
Ах	kis Location: 9	989.581, 5 <sup>-</sup>	70.232		Er	ror Code -112 reporte	d for 347 su	irfaces	
Le	ft Slip Surfac	e Endpoin	t: 958.0	000, 435.516	) N 4	thad anonar			
Ri	ght Slip Surfa	ace Endpoi	nt: 107	78.405,		eniou: spencer	SC: 3070		
464	.138 # Slene later	000 to 000 to	000 44	1 500	INU Ni	imper of Invalid Surface	ces: 1028		
Le	abt Slope Inter	cept: 958.0	000 44 78 105	1.000	Fr	ror Codes:	000. 1020		
	sisting Mom	ent=3 0351	0.400 12e+00	-04.130 )6 lh-ft	Er	ror Code -108 reporte	d for 1465 s	urfaces	
Dr	iving Momen	t=2.21906	e+006	lb-ft	Er	ror Code -111 reporte	d for 26 sur	faces	
					Er	ror Code -112 reporte	d for 437 su	irfaces	
M	<u>ethod: janbu</u> :	simplified							

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					Page	117	of	212
Written by:	Joseph Sura	Date:	12/4/2009	Reviewed by:	R. Kulasingam/Jay Beech	Date:	12/8	3/2009
Client:	Honeywell Project:	Onor	1daga Lake SC	CA Final Design	Project/ Proposal No.: C	GJ4299	Task No.	.: 18

## **Document Name**

File Name: northside\_nocover\_liner\_i\_lab

#### **Project Settings**

Project Title: SLIDE - An Interactive Slope Stability Program Failure Direction: Right to Left Units of Measurement: Imperial Units Pore Fluid Unit Weight: 62.4 lb/ft3 Groundwater Method: Water Surfaces Data Output: Standard Calculate Excess Pore Pressure: Off Allow Ru with Water Surfaces or Grids: Off Random Numbers: Pseudo-random Seed Random Number Seed: 10116 Random Number Generation Method: Park and Miller v.3

## **Analysis Methods**

Analysis Methods used: Bishop simplified Janbu simplified Spencer

Number of slices: 25 Tolerance: 0.005 Maximum number of iterations: 50

#### Surface Options

Surface Type: Non-Circular Block Search Number of Surfaces: 5000 Pseudo-Random Surfaces: Enabled Convex Surfaces Only: Disabled Left Projection Angle (Start Angle): 95 Left Projection Angle (End Angle): 175 Right Projection Angle (Start Angle): 5 Right Projection Angle (End Angle): 85 Minimum Elevation: Not Defined Minimum Depth: Not Defined

## **Material Properties**

Material: Dike Soil Strength Type: Mohr-Coulomb Unit Weight: 120 lb/ft3 Cohesion: 0 psf Friction Angle: 35 degrees Water Surface: Water Table Custom Hu value: 1

Material: Gravel Strength Type: Mohr-Coulomb Unit Weight: 120 lb/ft3 Cohesion: 0 psf Friction Angle: 38 degrees Water Surface: Piezometric Line 1 Custom Hu value: 1

Material: SOLW (undrained) Strength Type: Discrete function Unit Weight: 82 lb/ft3 Water Surface: Water Table Custom Hu value: 1

Material: Dredge Material Strength Type: Mohr-Coulomb Unit Weight: 86 lb/ft3 Cohesion: 0 psf Friction Angle: 15 degrees Water Surface: Water Table Custom Hu value: 1

Material: Tube-Tube Interface (Horizontal) Strength Type: Mohr-Coulomb Unit Weight: 86 lb/ft3 Cohesion: 0 psf Friction Angle: 15 degrees Water Surface: Water Table

Custom Hu value: 1

Material: Tub-Tube Interface (Vertical) Strength Type: Mohr-Coulomb Unit Weight: 43 lb/ft3 Cohesion: 0 psf Friction Angle: 0.1 degrees Water Surface: Water Table Custom Hu value: 1

Material: Tube-Gravel Interface Strength Type: Mohr-Coulomb Unit Weight: 86 lb/ft3 Cohesion: 0 psf

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							СС	nsulta	ints
						Page	118	of	212
Vritten by:	Joseph S	Sura	Date:	12/4/2009	Reviewed by:	R. Kulasingam/Jay B	eech Da	ie:	12/8/2009
lient:	Honeywell	Project:	Onor	ndaga Lake SC	CA Final Design	Project/ Proposal No.:	GJ4299	Task	No.: 18
Fr	iction Angle: 2	24 degree	S		R	ight Slip Surface Endp	oint: 1078.	405,	
W	ater Surface:	Water Ta	ble		464	.138			
C	ustom Hu valu	ie: 1			R	esisting Horizontal For	ce=33517.	9 lb	
М	aterial: Liner				D	nving Honzontal Force	=21305.01	D	
St	rength Type:	Mohr-Cou	llomb		Μ	ethod: spencer			
U	nit Weight: 10	0 lb/ft3			F	S: 2.582370			
C	ohesion: 0 psf				A	xis Location: 984.608,	575.137		
Fr	iction Angle:	19 degree	S		Le	eft Slip Surface Endpo	int: 952.08	7, 433.5	500
	ater Surface:	vvater 1a	bie		R 464	Ight Slip Sufface Endp	oint: 1078.	405,	
		IC. I			404 R	esisting Moment=4 88	485e+006	lb-ft	
Μ	aterial: Found	ation			D	riving Moment=1.8916	1e+006 lb-	ft	
St	rength Type:	Mohr-Cou	llomb		R	esisting Horizontal For	ce=36073.	5 lb	
U	nit Weight: 12	0 lb/ft3			D	riving Horizontal Force	=13969.1	b	
C	ohesion: 0 psf		-						
	ater Surface:	37 degree Water Ta	S hla		<u>V</u>	alid / Invalid Surfa	aces		
C	ustom Hu valu	ue: 1	bic		<u>IVI</u> N	umber of Valid Surface	<u>90</u> 25: 3700		
					N	umber of Invalid Surface	ces: 1291		
S	upport Pro	perties			E	rror Codes:			
Su	upport: Geotu	be			E	rror Code -108 reporte	d for 21 su	rfaces	
G	eotube				E	rror Code -111 reporte	d for 18 su	rfaces	
Su	upport Type: (	Seo l'extile	) )		E	rror Code -112 reporte	d for 1252	surface	es
FC	orce Orientatio	on: Tange	re nt to Sli	n Surface	М	ethod: ianbu simplified	4		
Ar	nchorage: Bot	h Ends		pedilace	N	umber of Valid Surface	<u>.</u> es: 3658		
Sł	near Strength	Model: Li	near		Ν	umber of Invalid Surfa	ces: 1342		
St	rip Coverage:	100 perc	ent		E	rror Codes:			
Te	ensile Strengtl	h: 1600 lb	/ft		E	rror Code -108 reporte	d for 15 su	rfaces	
Pi	ullout Strengtr	n Friction	n: 5 lb/f Angle: 4	12 10 degrees	E	rror Code -111 reporte	d for 30 su d for 1297	rtaces surface	s
G	lobal Minir	nums			M	ethod: spencer			
Μ	ethod: bishop	simplified	<u>I</u>		N	umber of Valid Surface	es: 1495		
FS	S: 1.615880				N	umber of Invalid Surfa	ces: 3505		
A	kis Location: 9	983.826, 5 9 Endnair	76.701			rror Code -108 reporte	d for 1070	surface	29
Ri	aht Slip Surfa	ce Endpoir	int: 950.0	023, 433.000 8 405	, E	rror Code -111 reporte	d for 1080	surface	es
464	.138		1111. 107	0.400,	E	rror Code -112 reporte	d for 1355	surface	es
Re Di	esisting Mome	ent=4.573 =2.83064	96e+00 e+006	6 lb-ft lb-ft					
M	ethod: janbu s	simplified							
FS A	5: 1.568/80 vis Location: 6	183 826 E	76 701						
A)	aft Slip Surface	00.020, 0	0.101						
16		e Endnoir	nt 950 4	)/3 433 500					

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					Page	119	of	212
Written by:	Joseph Sura	Date:	12/4/2009	Reviewed by:	R. Kulasingam/Jay Beech	Date:	12/8	3/2009
Client:	Honeywell Project	: Onoi	ndaga Lake SC	CA Final Design	Project/ Proposal No.: G	J4299	Task No.	.: 18

## **Document Name**

File Name: northside\_nocover\_global\_su\_lab

## **Project Settings**

Project Title: SLIDE - An Interactive Slope Stability Program Failure Direction: Right to Left Units of Measurement: Imperial Units Pore Fluid Unit Weight: 62.4 lb/ft3 Groundwater Method: Water Surfaces Data Output: Standard Calculate Excess Pore Pressure: Off Allow Ru with Water Surfaces or Grids: Off Random Numbers: Pseudo-random Seed Random Number Seed: 10116 Random Number Generation Method: Park and Miller v.3

## **Analysis Methods**

Analysis Methods used: Bishop simplified Janbu simplified Spencer

Number of slices: 25 Tolerance: 0.005 Maximum number of iterations: 50

#### Surface Options

Surface Type: Circular Search Method: Grid Search Radius increment: 10 Composite Surfaces: Disabled Reverse Curvature: Create Tension Crack Minimum Elevation: Not Defined Minimum Depth: Not Defined

#### **Material Properties**

<u>Material: Dike Soil</u> Strength Type: Mohr-Coulomb Unit Weight: 120 lb/ft3 Cohesion: 0 psf Friction Angle: 35 degrees Water Surface: Water Table Custom Hu value: 1 ~

Material: Gravel Strength Type: Mohr-Coulomb Unit Weight: 120 lb/ft3 Cohesion: 0 psf Friction Angle: 38 degrees Water Surface: Piezometric Line 1 Custom Hu value: 1

Material: SOLW (undrained) Strength Type: Discrete function Unit Weight: 82 lb/ft3 Water Surface: Water Table Custom Hu value: 1

#### <u>Material: Dredge Material</u> Strength Type: Mohr-Coulomb Unit Weight: 86 lb/ft3 Cohesion: 0 psf Friction Angle: 15 degrees Water Surface: Water Table

Custom Hu value: 1 Material: Tube-Tube Interface (Horizontal)

Strength Type: Mohr-Coulomb Unit Weight: 86 lb/ft3 Cohesion: 0 psf Friction Angle: 15 degrees Water Surface: Water Table Custom Hu value: 1

#### Material: Tub-Tube Interface (Vertical) Strength Type: Mohr-Coulomb Unit Weight: 43 lb/ft3 Cohesion: 0 psf Friction Angle: 0.1 degrees Water Surface: Water Table Custom Hu value: 1

#### Material: Tube-Gravel Interface

Strength Type: Mohr-Coulomb Unit Weight: 86 lb/ft3 Cohesion: 0 psf Friction Angle: 24 degrees Water Surface: Water Table Custom Hu value: 1

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					Page	120	of	212
Written by:	Joseph Sura	Date:	12/4/2009	Reviewed by:	R. Kulasingam/Jay Beech	Date:	12/8/2	2009
Client:	Honeywell Proje	et: Ono	ndaga Lake So	CA Final Design	Project/ Proposal No.: G	J4299	Task No.:	18

Material: Liner Strength Type: Mohr-Coulomb Unit Weight: 100 lb/ft3 Cohesion: 0 psf Friction Angle: 19 degrees Water Surface: Water Table Custom Hu value: 1

<u>Material: Foundation</u> Strength Type: Mohr-Coulomb Unit Weight: 120 lb/ft3 Cohesion: 0 psf Friction Angle: 37 degrees Water Surface: Water Table Custom Hu value: 1

## **Support Properties**

Support: Geotube Geotube Support Type: GeoTextile Force Application: Passive Force Orientation: Tangent to Slip Surface Anchorage: Both Ends Shear Strength Model: Linear Strip Coverage: 100 percent Tensile Strength: 1600 lb/ft Pullout Strength Adhesion: 5 lb/ft2 Pullout Strength Friction Angle: 40 degrees

## **Global Minimums**

Method: bishop simplified FS: 1.625930 Center: 1004.086, 486.952 Radius: 76.891 Left Slip Surface Endpoint: 948.812, 433.500 Right Slip Surface Endpoint: 1077.518, 464.148 Resisting Moment=7.29026e+006 lb-ft Driving Moment=4.48376e+006 lb-ft

<u>Method: janbu simplified</u> FS: 1.677300 Center: 1004.086, 521.413 Radius: 108.025 Left Slip Surface Endpoint: 936.056, 437.500 Right Slip Surface Endpoint: 1095.556, 463.944 Resisting Horizontal Force=91023.7 lb Driving Horizontal Force=54268.1 lb

Method: spencer

FS: 1.659310 Center: 1004.086, 521.413 Radius: 108.025 Left Slip Surface Endpoint: 936.056, 437.500 Right Slip Surface Endpoint: 1095.556, 463.944 Resisting Moment=1.13708e+007 lb-ft Driving Moment=6.85275e+006 lb-ft Resisting Horizontal Force=91045 lb Driving Horizontal Force=54869.3 lb

## Valid / Invalid Surfaces

Method: bishop simplified Number of Valid Surfaces: 2115 Number of Invalid Surfaces: 2725 Error Codes: Error Code -101 reported for 2 surfaces Error Code -102 reported for 27 surfaces Error Code -106 reported for 250 surfaces Error Code -107 reported for 946 surfaces Error Code -112 reported for 417 surfaces Error Code -113 reported for 166 surfaces Error Code -116 reported for 4 surfaces Error Code -110 reported for 913 surfaces

Method: janbu simplified Number of Valid Surfaces: 1823 Number of Invalid Surfaces: 3017 Error Codes: Error Code -101 reported for 2 surfaces Error Code -102 reported for 27 surfaces Error Code -106 reported for 250 surfaces Error Code -107 reported for 946 surfaces Error Code -108 reported for 287 surfaces Error Code -111 reported for 3 surfaces Error Code -112 reported for 419 surfaces Error Code -113 reported for 166 surfaces Error Code -116 reported for 4 surfaces Error Code -116 reported for 913 surfaces

Method: spencer

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							con	sultants	
						Page	121	of	212
Written by:	ten Joseph Sura		Date:	12/4/2009	Reviewed by:	R. Kulasingam/Jay Beed	ch Date:	12/8/2	2009
Client:	Honeywell	Project:	Ono	ndaga Lake SC	CA Final Design	Project/ Proposal No.:	GJ4299	Task No.:	18
N N E	umber of Vali umber of Inva rror Codes:	d Surfaces alid Surface	s: 627 es: 421	3					
E	rror Codes: rror Code -10 rror Code -10	1 reported 2 reported	for 2 s for 27	urfaces surfaces					

Error Code -106 reported for 250 surfaces Error Code -107 reported for 946 surfaces Error Code -108 reported for 317 surfaces Error Code -111 reported for 1164 surfaces Error Code -112 reported for 424 surfaces Error Code -113 reported for 166 surfaces Error Code -116 reported for 4 surfaces Error Code -1000 reported for 913 surfaces

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					Page	122	of	212		
Written by:	Joseph Sura	Date:	12/4/2009	Reviewed by:	R. Kulasingam/Jay Beech	Date:	12/	/8/2009		
Client:	Honeywell Project	Onoi	ndaga Lake SC	CA Final Design	Project/ Proposal No.: G	J4299	Task Nc	o.: <b>18</b>		

## **Document Name**

File Name: northside\_nocover\_external\_lab

## **Project Settings**

Project Title: SLIDE - An Interactive Slope Stability Program Failure Direction: Right to Left Units of Measurement: Imperial Units Pore Fluid Unit Weight: 62.4 lb/ft3 Groundwater Method: Water Surfaces Data Output: Standard Calculate Excess Pore Pressure: Off Allow Ru with Water Surfaces or Grids: Off Random Numbers: Pseudo-random Seed Random Number Seed: 10116 Random Number Generation Method: Park and Miller v.3

## **Analysis Methods**

Analysis Methods used: Bishop simplified Janbu simplified Spencer

Number of slices: 25 Tolerance: 0.005 Maximum number of iterations: 50

#### Surface Options

Surface Type: Circular Search Method: Grid Search Radius increment: 10 Composite Surfaces: Disabled Reverse Curvature: Create Tension Crack Minimum Elevation: Not Defined Minimum Depth: Not Defined

#### **Material Properties**

<u>Material: Dike Soil</u> Strength Type: Mohr-Coulomb Unit Weight: 120 lb/ft3 Cohesion: 0 psf Friction Angle: 35 degrees Water Surface: Water Table Custom Hu value: 1

Material: Gravel Strength Type: Mohr-Coulomb Unit Weight: 120 lb/ft3 Cohesion: 0 psf Friction Angle: 38 degrees Water Surface: Piezometric Line 1 Custom Hu value: 1

Material: SOLW (undrained) Strength Type: Discrete function Unit Weight: 82 lb/ft3 Water Surface: Water Table Custom Hu value: 1

Material: Dredge Material Strength Type: Mohr-Coulomb Unit Weight: 86 lb/ft3 Cohesion: 0 psf Friction Angle: 15 degrees Water Surface: Water Table Custom Hu value: 1

Material: Tube-Tube Interface (Horizontal) Strength Type: Mohr-Coulomb Unit Weight: 86 lb/ft3 Cohesion: 0 psf Friction Angle: 15 degrees Water Surface: Water Table Custom Hu value: 1

Material: Tub-Tube Interface (Vertical) Strength Type: Mohr-Coulomb Unit Weight: 43 lb/ft3 Cohesion: 0 psf Friction Angle: 0.1 degrees Water Surface: Water Table Custom Hu value: 1

Material: Tube-Gravel Interface

Strength Type: Mohr-Coulomb Unit Weight: 86 lb/ft3 Cohesion: 0 psf Friction Angle: 24 degrees Water Surface: Water Table Custom Hu value: 1

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						Page	123	of	212
Written by:	Joseph Sura		Date:	12/4/2009	Reviewed by:	R. Kulasingam/Jay Beec	h Date	: 12/	8/2009
Client:	Honeywell Project: Onondaga Lake SCA Final De		CA Final Design	Project/ Proposal No.:	GJ4299	Task No	o.: <b>18</b>		

Material: Liner Strength Type: Mohr-Coulomb Unit Weight: 100 lb/ft3 Cohesion: 0 psf Friction Angle: 19 degrees Water Surface: Water Table Custom Hu value: 1

<u>Material: Foundation</u> Strength Type: Mohr-Coulomb Unit Weight: 120 lb/ft3 Cohesion: 0 psf Friction Angle: 37 degrees Water Surface: Water Table Custom Hu value: 1

#### Support Properties

Support: Geotube Geotube Support Type: GeoTextile Force Application: Passive Force Orientation: Tangent to Slip Surface Anchorage: Both Ends Shear Strength Model: Linear Strip Coverage: 100 percent Tensile Strength: 1600 lb/ft Pullout Strength Adhesion: 5 lb/ft2 Pullout Strength Friction Angle: 40 degrees

## **Global Minimums**

Method: bishop simplified FS: 3.454470 Center: 920.639, 1281.335 Radius: 883.832 Left Slip Surface Endpoint: 661.000, 436.500 Right Slip Surface Endpoint: 1252.489, 462.169 Resisting Moment=3.50544e+008 lb-ft Driving Moment=1.01475e+008 lb-ft

<u>Method: janbu simplified</u> FS: 3.448700 Center: 920.639, 1281.335 Radius: 883.832 Left Slip Surface Endpoint: 661.000, 436.500 Right Slip Surface Endpoint: 1252.489, 462.169 Resisting Horizontal Force=389737 lb

- 4 -

Driving Horizontal Force=113010 lb

Method: spencer

FS: 3.454580 Center: 920.639, 1281.335 Radius: 883.832 Left Slip Surface Endpoint: 661.000, 436.500 Right Slip Surface Endpoint: 1252.489, 462.169 Resisting Moment=3.50554e+008 lb-ft Driving Moment=1.01475e+008 lb-ft Resisting Horizontal Force=389751 lb Driving Horizontal Force=112822 lb

## Valid / Invalid Surfaces

Method: bishop simplified Number of Valid Surfaces: 668 Number of Invalid Surfaces: 4172 Error Codes: Error Code -101 reported for 48 surfaces Error Code -107 reported for 17 surfaces Error Code -110 reported for 875 surfaces Error Code -113 reported for 207 surfaces Error Code -1000 reported for 3025 surfaces

Method: janbu simplified Number of Valid Surfaces: 668 Number of Invalid Surfaces: 4172 Error Codes: Error Code -101 reported for 48 surfaces Error Code -107 reported for 17 surfaces Error Code -110 reported for 875 surfaces Error Code -113 reported for 207 surfaces Error Code -1000 reported for 3025 surfaces

Method: spencer Number of Valid Surfaces: 602 Number of Invalid Surfaces: 4238 Error Codes: Error Code -101 reported for 48 surfaces Error Code -107 reported for 17 surfaces Error Code -108 reported for 1 surface Error Code -110 reported for 875 surfaces Error Code -111 reported for 65 surfaces

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					Page	124	of	212
Written by:	Joseph Sura	Date:	12/4/2009	Reviewed by:	R. Kulasingam/Jay Beech	Date:	12/8/2	2009
Client:	Honeywell Project	: Onoi	ndaga Lake SO	CA Final Design	Project/ Proposal No.: G	J4299	Task No.:	18

Error Code -113 reported for 207 surfaces Error Code -1000 reported for 3025 surfaces

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					Page	125	of	212			
Written by:	Joseph Sura	Date:	12/4/2009	Reviewed by:	R. Kulasingam/Jay Beech	Date:	12/8/2	2009			
Client:	Honeywell Project	t: Ono	ndaga Lake SO	CA Final Design	Project/ Proposal No.: G	GJ4299	Task No.:	18			

**Cross-Section A-A: After Placement of Final Cover** 

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					Page	126	of	212
Written by:	Joseph Sura	Joseph Sura Date: 12/4/2009 Reviewe		Reviewed by:	R. Kulasingam/Jay Beech	Date: 12/8/20		2009
Client:	Honeywell Project:	Onor	ndaga Lake SC	CA Final Design	Project/ Proposal No.: G	J4299	Task No.:	18

## **Document Name**

File Name: northside\_cover\_tube\_07\_lab

## Project Settings

Project Title: SLIDE - An Interactive Slope Stability Program Failure Direction: Right to Left Units of Measurement: Imperial Units Pore Fluid Unit Weight: 62.4 lb/ft3 Groundwater Method: Water Surfaces Data Output: Standard Calculate Excess Pore Pressure: Off Allow Ru with Water Surfaces or Grids: Off Random Numbers: Pseudo-random Seed Random Number Seed: 10116 Random Number Generation Method: Park and Miller v.3

## Analysis Methods

Analysis Methods used: Bishop simplified Janbu simplified Spencer

Number of slices: 25 Tolerance: 0.005 Maximum number of iterations: 50

## Surface Options

Surface Type: Non-Circular Block Search Number of Surfaces: 5000 Pseudo-Random Surfaces: Enabled Convex Surfaces Only: Disabled Left Projection Angle (Start Angle): 95 Left Projection Angle (End Angle): 175 Right Projection Angle (Start Angle): 5 Right Projection Angle (End Angle): 85 Minimum Elevation: Not Defined Minimum Depth: Not Defined

## **Material Properties**

Material: Final Cover Soil

Strength Type: Mohr-Coulomb Unit Weight: 120 lb/ft3 Cohesion: 0 psf Friction Angle: 30 degrees Water Surface: Water Table Custom Hu value: 1

Material: Dike Soil Strength Type: Mohr-Coulomb Unit Weight: 120 lb/ft3 Cohesion: 0 psf Friction Angle: 35 degrees Water Surface: Water Table Custom Hu value: 1

<u>Material: Gravel</u> Strength Type: Mohr-Coulomb Unit Weight: 120 lb/ft3 Cohesion: 0 psf Friction Angle: 38 degrees Water Surface: Piezometric Line 1 Custom Hu value: 1

#### Material: SOLW (undrained) Strength Type: Discrete function Unit Weight: 82 lb/ft3 Water Surface: Water Table Custom Hu value: 1

Material: Dredge Material Strength Type: Mohr-Coulomb Unit Weight: 86 lb/ft3 Cohesion: 0 psf Friction Angle: 15 degrees Water Surface: Water Table Custom Hu value: 1

Material: Tube-Tube Interface (Horizontal) Strength Type: Mohr-Coulomb Unit Weight: 86 lb/ft3 Cohesion: 0 psf Friction Angle: 15 degrees Water Surface: Water Table Custom Hu value: 1

Material: Tub-Tube Interface (Vertical) Strength Type: Mohr-Coulomb Unit Weight: 43 lb/ft3

	Geosyntec <sup>⊳</sup>								
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Written by:	Joseph Sura	Date:	12/4/2009	Reviewed by:	R. Kulasingam/Jay Bee	ech Date:	12/8/2009		
Client:	Honeywell Projec	t: Ono	ndaga Lake SC	CA Final Design	Project/ Proposal No.:	GJ4299	Task No.: 1	8	
C	obesion: 0 nsf			Ri	ight Slip Surface Endpo	int: 1080 63	28		
F	riction Angle: 0.1 dear	ees		467		1111. 1000.02	_0,		
Ŵ	/ater Surface: Water T	able		R	esisting Moment=5 653	91e+006 lb	-ft		
C	ustom Hu value: 1	abio		D	riving Moment=3.3784e	+006 lb-ft	it i		
•					geee.e.e.e				
Μ	aterial: Tube-Gravel Ir	nterface		Μ	ethod: janbu simplified				
S	trength Type: Mohr-Co	oulomb		FS	S: 1.616810				
U	nit Weight: 86 lb/ft3			A	kis Location: 996.469, 5	78.457			
С	ohesion: 0 psf			Le	eft Slip Surface Endpoir	nt: 957.879,	444.337		
F	riction Angle: 24 degre	es		Ri	ight Slip Surface Endpo	int: 1080.6	10,		
W	/ater Surface: Water T	able		467	.113				
С	ustom Hu value: 1			Re	esisting Horizontal Forc	e=41178.9	lb		
				Di	riving Horizontal Force=	25469.3 lb			
	laterial: Liner	Julomb		N 4	athadi ananaar				
о 11	nengin Type. Mon-Co	amoind							
0	obesion: 0 nef				5. 2.000240 vis Location: 1016 750	500 008			
F	riction Angle: 19 degre	200			aft Slin Surface Endnoir	1010.990	447 648		
Ŵ	/ater Surface: Water T	able		Ri	ight Slip Surface Endpoi	int: 1102 84	14		
C	ustom Hu value: 1	abio		466	.861	1111 1102.0	,		
•				Re	esisting Moment=6.287	06e+006 lb	-ft		
Μ	aterial: Foundation			Di	riving Moment=2.50656	e+006 lb-ft			
S	trength Type: Mohr-Co	oulomb		R	esisting Horizontal Forc	e=42923.8	lb		
U	nit Weight: 120 lb/ft3			Di	riving Horizontal Force=	17113.1 lb			
С	ohesion: 0 psf				-				
F	riction Angle: 37 degre	es		V	alid / Invalid Surfa	ces			
N	ater Surface: Water T	able		Μ	ethod: bishop simplified	1			
С	ustom Hu value: 1			N	umber of Valid Surfaces	s: 4114			
-				N	umber of Invalid Surface	es: 886			
<u>S</u>	upport Properties	<u>S</u>		Er	rror Codes:				
<u>S</u>	upport: Geotube			Er	ror Code -107 reported	for 59 surfa	aces		
G	eotube			Er	ror Code -108 reported	for 226 sui	faces		
5	upport Type: GeoText	lle		Er Er	ror Code -111 reported	for 21 surf	aces		
	orce Application: Pass	ive	in Surface	E	ror Code - 112 reported	10r 580 Sul	Taces		
	nchorage: Both Ende		ip Surface	N/	ethod: janhu simplified				
 م	hear Strength Model I	inear			umber of Valid Surfaces	× 4036			
5	trip Coverage: 100 per	cent		Ni	umber of Invalid Surface	es: 964			
Tr	ensile Strength: 1600	lb/ft		Fr	ror Codes:	00.007			
P	ullout Strenath Adhesi	on: 5 lb/f	t2	Er	ror Code -107 reported	for 59 surfa	aces		
P	ullout Strength Friction	Angle:	40 degrees	Er	ror Code -108 reported	for 241 su	faces		
	0	0 -	0	Er	ror Code -111 reported	for 49 surfa	aces		
G	lobal Minimums			Er	ror Code -112 reported	for 615 su	rfaces		
M	ethod: bishop simplifie	ed			•				
F	S: 1.673550			M	ethod: spencer				
A	xis Location: 994.617,	580.470		N	umber of Valid Surfaces	s: 2849			
Le	eft Slip Surface Endpo	int: 955.	538, 443.647	N	umber of Invalid Surfac	es: 2151			

					Geosyntec <sup>▷</sup>					D	
									con	sultants	
							Page		128	of	212
Written by:	Josep	h Sura	Date:	12/4/2009	Reviewed by:	R. Kulas	ingam/Jay Bo	eech	Date:	12/8/2	2009
Client:	Honeywell	Project:	Onor	daga Lake SC	A Final Design	Project/ P	roposal No.:	GJ4	299	Task No.:	18
г.						4000 400	407.000				
	rror Codes:	07 reported	for EQ	urfaces		1298.469	437.899				
	rror Code -1	07 reported	101 09 3			1317.013	437.009				
	rror Code -1	11 reported	101 130			1310.007	437.072				
	rror Code -1	12 reported	101 90 S			1330.909	437.403				
E	nor Code - I	12 reponed	101 039	sunaces		1330.409	437.440				
						1357.000	437.230				
Ļ	IST OF AIL	Coordinat	<u>es</u>			1330.310	437.219				
B	lock Search	Polyline				1370.909	437.011				
	978.000	441.278				13/0.4/3	430.993				
	1017.040	441.054				1400.000	430.750				
					N	laterial Bou	ndarv				
IVI	aterial Bour	<u>idary</u>			10	008 000	1/17 0/18				
	953.000	433.500				1017 014	446 832				
	958.000	433.500				1018 514	440.002				
	1400.000	427.700				1037 015	446 606				
N /	atorial David	dom.				1038 521	446.589				
IVI	aterial Bour	<u>idary</u>				1057 021	446.380				
	978.000	441.524				1057.021	440.300				
	997.000	441.309				1077 016	446 154				
	998.500	441.292				1078 515	446 137				
	1017.009	441.083				1097 005	445 928				
	1018.508	441.000				1098 523	445 910				
	1037.000	440.000				1117 022	445 701				
	1056.500	440.639				1118.509	445.684				
	1057.015	440.030				1137 023	445 475				
	1006.009	440.013				1138 511	445 458				
	1090.999	440.170				1157.009	445.249				
	1096.000	440.101				1158 509	445 232				
	1117.012	439.931				1177 011	445 023				
	1127 006	439.934				1178 494	445 006				
	1137.000	439.725				1197.022	444.796				
	1157.006	439.700				1198.509	444,779				
	1158 500	439.499				1217.011	444.570				
	1176 000	439.402				1218.511	444.553				
	1178 /02	439.275				1237.016	444.344				
	1107 013	439.230				1238.509	444.327				
	1108 512	439.040				1257.015	444.117				
	1217 005	438 820				1258.515	444.101				
	1218 499	438 803				1277.009	443.891				
	1237 000	438 594				1278.515	443.874				
	1238 506	438 577				1296.975	443.665				
	1257 010	438 368				1298.475	443.648				
	1258 509	438 351				1317.016	443.439				
	1277 013	438 141				1318.515	443.422				
	1278 513	438 124				1336.981	443.213				
	1296 975	437 915				1338.481	443.196				
						1357.016	442.986				

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									cor	, sultants	
							Page		129	of	212
							1 480		12)	01	212
Written by:	Josep	h Sura	Date:	12/4/2009	Reviewed by:	R. Kulas	ingam/Jay B	Beech	Date	. 12/8/	2009
Client:	Honeywell	Project:	Onor	idaga Lake SC	A Final Design	Project/ P	roposal No.:	GJ	4299	Task No.:	18
		440.000				4040.000	450.004				
	1358.516	442.969				1018.000	452.821				
	1376.981	442.760				1037.021	452.606				
	1378.481	442.743				1038.521	452.589				
	1400.000	442.500				1057.007	452.380				
						1058.501	452.363				
N	laterial Bour	<u>ndary</u>				1077.021	452.154				
	998.000	447.298				1078.527	452.137				
	1017.014	447.082				1096.995	451.928				
	1018.514	447.066				1098.501	451.911				
	1037.016	446.856				1117.028	451.701				
	1038.521	446.839				1118.527	451.684				
	1057.021	446.630				1137.001	451,475				
	1058 521	446 613				1138 501	451 458				
	1077 016	446 404				1157 027	451 249				
	1077.010	446 387				1158 521	451 232				
	1078.310	440.307				1176 005	451.252				
	1097.005	440.170				1170.995	451.025				
	1096.524	440.100				11/0.490	451.006				
	1117.022	445.951				1197.028	450.796				
	1118.510	445.934				1198.521	450.779				
	1137.024	445.725				1217.001	450.570				
	1138.511	445.708				1218.501	450.553				
	1157.010	445.499				1237.022	450.344				
	1158.510	445.482				1238.515	450.327				
	1177.011	445.273				1257.007	450.118				
	1178.494	445.256				1258.501	450.101				
	1197.022	445.046				1277.021	449.891				
	1198.510	445.029				1278.521	449.874				
	1217.011	444.820				1297.001	449.665				
	1218.511	444.803				1298.501	449.648				
	1237.016	444.594				1317.028	449,439				
	1238.509	444.577				1318.521	449.422				
	1257 016	444 368				1337 008	449 213				
	1258 515	444 351				1338 501	449 196				
	1277 010	444.001				1357 022	448 986				
	12778 516	444 124				1358 521	118 060				
	1270.010	444.124				1330.321	440.909				
	1290.975	443.913				1377.000	440.700				
	1298.475	443.898				1378.508	448.743				
	1317.016	443.689				1400.000	448.500				
	1318.516	443.672			_						
	1336.981	443.463			M	laterial Bou	ndary				
	1338.481	443.446				1018.000	453.071				
	1357.016	443.236				1037.022	452.856				
	1358.516	443.219				1038.521	452.839				
	1376.981	443.010				1057.007	452.630				
	1378.481	442.993				1058.501	452.613				
	1400.000	442.750				1077.022	452.404				
						1078.528	452.387				
N	laterial Bour	ndarv				1096,996	452.178				
<u></u>	Dour Dour	<u></u>									

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							Page		130	of	212
Written by:	Josep	h Sura	Date:	12/4/2009	Reviewed by:	R. Kulas	ingam/Jay B	eech	Date:	12/8/2	2009
Client:	Honeywell	Project:	Onor	idaga Lake SC.	A Final Design	Project/ Pr	roposal No.:	GJ	1299	Task No.:	18
	1009 501	150 161				1100 100	456 770				
	1090.001	452.101				1217 007	400.779				
	1117.020	451.951				1217.007	430.370				
	1110.020	401.904				1210.001	450.555				
	1137.002	451.725				1237.005	400.044				
	1150.001	451.700				1230.311	400.027				
	1107.020	401.499				1257.007	400.110				
	1130.322	401.402				1230.307	450.101				
	1170.990	401.275				1277.005	400.091				
	11/0.490	451.250				12/0.000	400.074				
	1197.028	451.040				1297.013	455.005				
	1198.522	451.029				1298.513	455.648				
	1217.001	450.820				1317.005	455.439				
	1218.501	450.803				1318.505	455.422				
	1237.022	450.594				1337.014	455.213				
	1238.515	450.577				1338.507	455.196				
	1257.007	450.368				1357.006	454.986				
	1258.501	450.351				1358.511	454.969				
	1277.022	450.141				1377.021	454.760				
	1278.522	450.124				1378.513	454.743				
	1297.002	449.915				1400.000	454.500				
	1298.502	449.898				latarial Daw	a da m i				
	1317.028	449.689			IV	1029 000					
	1310.322	449.072				1036.000	400.040				
	1337.000	449.403				1057.013	400.000				
	1330.302	449.440				1036.313	400.013				
	1307.022	449.230				1077.000	400.404				
	1330.322	449.219				1076.303	400.007				
	1377.000	449.010				1097.013	400.170				
	1378.308	440.993				1096.513	400.101				
	1400.000	448.750				1117.011	457.951				
Ν.4	otorial Pour	don				1110.499	437.934				
<u>IVI</u>	1029 000	<u>1021 y</u> 159 505				1137.020	437.723				
	1030.000	400.090				1150.007	457.700				
	1057.015	400.000				1157.005	437.499				
	1030.312	400.000				1156.499	407.402				
	1077.005	400.104				1179 510	437.273				
	1076.303	400.107				1170.019	457.255				
	1097.013	457.920				1197.000	457.040				
	1090.010	457.911				1190.499	457.029				
	1117.011	457.00				1217.007	400.020				
	1110.490	401.000				10.001	400.003				
	1137.019	401.410 167 150				1237.000	400.094				
	1130.00/	401.400				1200.011	400.0//				
	1157.005	457.249				1201.001	400.300				
	1158.498	457.232				1200.007	400.351				
	11/7.013	457.023				1271.005	400.141				
	11/0.510	457.006				12/0.505	400.124				
	1197.005	456.796				1297.014	455.915				

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Written by:	Josep	h Sura	Date:	12/4/2009	Reviewed by:	R. Kulas	ingam/Jay Bo	eech	Date:	12/8/2	.009
Client:	Honeywell	Project:	Onon	daga Lake SC	A Final Design	Project/ P	roposal No.:	GJ	4299	Task No.:	18
	1000 514	AFE 000				1000 505	420 011				
	1290.014	400.090				1096.000	439.911				
	1219 505	455.009				1119 511	439.701				
	1227 014	455.072				1127 005	439.004				
	1337.014	455.465				1129 505	439.475				
	1350.507	455.440				1157.006	439.450				
	1357.000	400.200				1157.000	439.249				
	1330.311	455.219				1176 000	439.232				
	10770 511	455.010				1170.999	439.023				
	1370.314	404.995				11/0.492	439.000				
	1400.000	454.750				1197.012	430.790				
Ν.4	starial Daur	don				1017 005	430.779				
<u>IVI</u>	ALEITAI DOUL	<u>10ary</u> 425 500				1217.005	430.370				
	958.000	435.500				1218.499	438.553				
	997.000	435.059				1237.000	400.044				
	996.500	433.042				1230.300	430.327				
	1037.000	434.606				1257.009	438.118				
	1038.494	434.589				1258.509	438.101				
	1077.000	434.154				1277.013	437.891				
	1078.500	434.137				1278.512	437.874				
	1117.000	433.701				1296.975	437.005				
	1118.494	433.684				1298.469	437.649				
	1156.994	433.249				1317.013	437.439				
	1158.494	433.232				1318.507	437.422				
	1197.006	432.796				1336.969	437.213				
	1198.500	432.779				1338.469	437.196				
	1236.994	432.344				1357.000	436.986				
	1238.494	432.327				1358.510	436.969				
	1277.007	431.891				1376.969	436.761				
	1278.507	431.874				1378.475	436.743				
	1317.007	431.439				1400.000	436.500				
	1318.507	431.422									
	1357.000	430.986			IV	aterial Bou	ndary				
	1358.499	430.969				958.000	435.750				
	1400.000	430.500				997.000	435.309				
						998.500	435.292				
<u>IVI</u>	aterial Bour	<u>idary</u>				1037.000	434.856				
	978.000	441.274				1038.494	434.839				
	997.000	441.059				1077.000	434.404				
	998.500	441.042				1078.500	434.387				
	1017.008	440.832				1117.001	433.951				
	1018.508	440.816				1118.494	433.934				
	1037.000	440.606				1156.994	433.499				
	1038.500	440.589				1158.494	433.482				
	1057.015	440.380				1197.007	433.046				
	1058.508	440.363				1198.500	433.029				
	1077.006	440.154				1236.994	432.594				
	1078.494	440.137				1238.494	432.577				
	1096.999	439.928				1277.007	432.141				

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									con	sultants	S
							Page		132	of	212
Written by:	Josep	oh Sura	Date:	12/4/2009	Reviewed by:	R. Kulas	singam/Jay B	Beech	Date:	12/8	/2009
Client:	Honeywell	Project:	Onor	ndaga Lake So	CA Final Design	Project/ I	Proposal No.:	GJ	4299	Task No.:	: 18
	1278 507	432 124									
	1317.007	431.689			Ma	aterial Bou	Indarv				
	1318.507	431.672			<u></u>	1317.007	431.439				
	1357.000	431.236				1317.007	431.689				
	1358.500	431.219				1317.013	437.439				
	1400.000	430.750				1317.013	437.689				
Μ	laterial Bou	ndarv			Ма	aterial Bou	Indary				
	895.681	432.081				1318.507	431.422				
	953.504	431.272				1318.507	431.672				
	1400.000	425.200				1318.507	437.422				
						1318.507	437.672				
M	laterial Bou	ndary									
	661.000	436.500			Ma	aterial Bou	indary				
	748.000	412.600				1077.000	434.154				
	789.000	386.700				1077.000	434.404				
	835.000	386.800				1077.006	440.154				
	980.000	376.600									
	1400.000	367.800			Ma	aterial Bou	indary				
						1078.494	440.137				
<u>IVI</u>	laterial Boul	ndary				1078.500	434.387				
	942.667	435.500				1078.500	434.137				
	947.793	433.500				at a stall Day					
	953.504	431.272			<u>IVI8</u>	aterial Bou	indary 422 704				
N	latarial Day	ndon				1117.000	433.701				
IVI	1257 000	<u>1000 000</u>				1117.001	433.931				
	1357.000	430.900				1117.012	439.701				
	1357.000	431.230				1117.012	439.951				
	1357.000	430.900			N A	otorial Day	undom (				
	1357.000	437.230			<u>IVI6</u>	<u>aterial DOL</u>	100019 122 601				
Ν/	latorial Row	ndany				1110.494	433.004				
111	1259 100	<u>120 060</u>				1110.494	433.934				
	1358 500	430.909				1110.011	439.004				
	1358 510	431.219				1110.312	459.954				
	1358.510	430.909			N/	atorial Ray	Indony				
	1338.310	437.219				1156 00/	133 240				
M	laterial Bou	ndany				1156 00/	433.249				
111	1277 007	131 801				1157 006	433.499				
	1277.007	431.091				1157.000	439.249				
	1277 013	437 801				107.000	-00.400				
	1277 012	438 1/1			Ν.Λ.	aterial Roy	Indary				
	1211.013					1158 <u>/</u> 0/	<u>433</u> 333				
Ν.	laterial Rou	ndarv				1158 /0/	433.232				
<u>IVI</u>	1278 507	131 971				1158 500	400.40Z				
	12/0.30/	431.074				1100.000	439.232				
	1070 507	122 121				1150 500	120 100				
	1278.507	432.124				1158.500	439.482				
	1278.507 1278.512	432.124 437.874			۸۸	1158.500	439.482				

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Written										
by:	Josep	h Sura	Date:	12/4/2009	Reviewed by:	R. Kula	singam/Jay Bee	ch Date:	12/8/2	2009
Client:	Honeywell	Project:	Onor	idaga Lake S	CA Final Design	Project/ I	Proposal No.:	GJ4299	Task No.:	18
	1197 006	432 796				1296 975	437 665			
	1197.007	433 046				1296 975	437 915			
	1197 012	438 796				1296 975	443 665			
	1197.012	439.046				1296.975	443.915			
N	Anterial Bou	ndarv			٨	laterial Bou	Indary			
<u></u>	1198 500	432 779			<u></u>	1298 469	437 649			
	1198 500	433 029				1208.460	437 899			
	1108 512	438 770				1208 475	407.000			
	1198.512	439.029				1298.475	443.898			
N	laterial Bou	odarv			Λ	Anterial Bou	Indary			
1	1226 004	<u>1001 y</u> 122 244			<u> </u>	1226 060	127 212			
	1230.994	432.344				1330.909	437.213			
	1230.994	432.394				1330.909	437.403			
	1237.000	438.344				1336.981	443.213			
	1237.000	438.594				1336.981	443.463			
N	Aterial Bour	<u>ndary</u>			N	Aaterial Bou	<u>indary</u>			
	1238.494	432.327				1338.469	437.196			
	1238.494	432.577				1338.469	437.446			
	1238.506	438.327				1338.481	443.196			
	1238.506	438.577				1338.481	443.446			
N	aterial Bou	ndarv			Ν	Aaterial Bou	Indarv			
<u></u>	997.000	435.059				1376,969	436.761			
	997 000	435 309				1376 969	437 011			
	997.000	400.000				1376 081	407.011			
	997.000	441.309				1376.981	443.010			
_					_					
N	<u>laterial Bour</u>	<u>ndary</u>			<u>N</u>	<u>laterial Bou</u>	<u>indary</u>			
	998.500	435.042				1378.475	436.743			
	998.500	435.292				1378.475	436.993			
	998.500	441.042				1378.481	442.743			
	998.500	441.292				1378.481	442.993			
N	Aterial Bour	ndary			Ν	Aaterial Bou	Indary			
	1037.000	434.606			_	1257.009	438.118			
	1037.000	434.856				1257.010	438.368			
	1037 000	440 606				1257 015	444 117			
	1037.000	440.856				1257.016	444.368			
N	laterial Rou	ndarv			٨	laterial Rou	Indary			
10	1038 494	434 580			<u> </u>	1258 500	<u>438</u> 101			
	1038 404	131 930				1258 500	138 251			
	1030.494	404.009				1200.009	430.331			
	1038.500	440.589 440.839				1258.515	444.101			
						-				
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						Page	134	of 2	212
Written by:	Josep	h Sura	Date: 12/4/2009	Reviewed by:	R. Kulas	ingam/Jay Beech	Date	12/8/2	009
Client:	Honeywell	Project:	Onondaga Lake SC	A Final Design	Project/ P	roposal No.:	GJ4299	Task No.:	18
	1096 999	439 928			1017 008	440 832			
	1096 999	440 178			1017 009	441 083			
	1097 005	445 928			1017 014	446 832			
	1097.005	446.178			1017.014	447.082			
<u>N</u>	<u>Aaterial Bour</u>	<u>ndary</u>		M	aterial Bou	ndary			
	1098.505	439.911			1018.508	440.816			
	1098.506	440.161			1018.508	441.066			
	1098.523	445.910			1018.514	446.815			
	1098.524	446.160			1018.514	447.066			
Ν	/laterial Bour	ndarv		Ν	aterial Bou	ndarv			
_	1137.005	439,475			1057.015	440.380			
	1137.006	439.725			1057.015	440.630			
	1137.023	445.475			1057.021	446.380			
	1137.024	445.725			1057.021	446.630			
N	Address Addres	<u>ndary</u>		<u>IV</u>	aterial Bou	ndary			
	1138.505	439.458			1058.508	440.363			
	1138.505	439.708			1058.509	440.613			
	1138.511	445.458			1058.520	446.363			
	1138.511	445.708			1058.521	446.613			
Ν	Aaterial Bour	ndary		Μ	aterial Bou	ndary			
_	1176.999	439.023			1037.015	446.606			
	1176.999	439.273			1037.016	446.856			
	1177.011	445.023			1037.021	452.606			
	1177.011	445.273			1037.022	452.856			
Ν	Antorial Rour	adany		N	atorial Rou	ndany			
<u>IV</u>	1178 /02	<u>130</u> 006		<u>IV</u>	1038 521	<u>110ary</u> 116 580			
	1178.492	439.000			1038 521	440.309			
	1178.492	439.230			1038 521	440.009			
	1178.494	445.256			1038.521	452.839			
N	Aaterial Bour	ndary		M	aterial Bou	<u>ndary</u>			
	1217.005	438.570			1077.016	446.154			
	1217.005	438.820			1077.016	446.404			
	1217.011	444.570			1077.021	452.154			
	1217.011	444.820			1077.022	452.404			
N.	Aterial Bour	ndarv		M	aterial Bou	ndarv			
<u></u>	1218,499	438.553		<u></u>	1078.515	446.137			
	1218 499	438,803			1078 516	446.387			
	1218 511	444 553			1078 527	452 137			
	1218.511	444.803			1078.528	452.387			
_									
<u>N</u>	Aaterial Bour	ndary		<u>N</u>	aterial Bou	<u>ndary</u>			

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							Page	135	of	212
Written by:	Josep	oh Sura	Date:	12/4/2009	Reviewed by:	R. Kula	singam/Jay Beec	<b>h</b> Date:	12/8/2	2009
Client:	Honeywell	Project:	Onon	daga Lake S	CA Final Design	Project/ I	Proposal No.:	GJ4299	Task No.:	18
	1117 022	445 701				1277 009	443 891			
	1117.022	445 951				1277 010	440.001			
	1117.022	451 701				1277.010	1/0 801			
	1117.028	451.951				1277.021	450.141			
N	laterial Bou	ndary			<u>N</u>	Aaterial Bou	<u>undary</u>			
	1118.509	445.684				1278.515	443.874			
	1118.510	445.934				1278.516	444.124			
	1118.527	451.684				1278.521	449.874			
	1118.528	451.934				1278.522	450.124			
N	Antorial Rou	ndarv			Ν	Natorial Rou	Indary			
1	1157 009	<u>445</u> 249			<u> </u>	1317 016	<u>11001 y</u> 113 130			
	1157.005	115 100				1317.010	443.400			
	1157.010	445.499				1217.010	445.009			
	1157.027	451.249				1317.020	449.439			
	1157.028	451.499				1317.028	449.689			
Ν	Aterial Bou	ndary			Ν	/laterial Bou	undary			
	1158,509	445.232				1318.515	443.422			
	1158.510	445,482				1318.516	443.672			
	1158 521	451 232				1318 521	449 422			
	1158.522	451.482				1318.522	449.672			
N	laterial Bou	ndary			<u>N</u>	Anterial Bou	<u>indary</u>			
	1197.022	444.796				1357.016	442.986			
	1197.022	445.046				1357.016	443.236			
	1197.028	450.796				1357.022	448.986			
	1197.028	451.046				1357.022	449.236			
N	Anterial Bou	ndarv			Ν	Anterial Bou	Indary			
<u></u>	1198 509	444 779			<u></u>	1358 516	442 969			
	1108 510	115 029				1358 516	1/3 210			
	1109 521	450 770				1259 521	449.060			
	1198.521	451.029				1358.521	449.219			
N	laterial Bou	ndary			<u>N</u>	<u>/laterial Bou</u>	<u>indary</u>			
	1237.016	444.344				1057.007	452.380			
	1237.016	444.594				1057.007	452.630			
	1237.022	450.344				1057.013	458.380			
	1237.022	450.594				1057.013	458.630			
N	Actorial Paul	ndon			Ν	Actorial Pau	undors.			
<u>IV</u>	1000 E00	<u>110ary</u> 444.227			<u>N</u>	1059 501	<u>450.060</u>			
	1230.309	444.321				1000.001	402.000			
	1238.509	444.577				1058.501	452.613			
	1238.515	450.327				1058.512	458.363			
	1238.515	450.577				1058.513	458.613			
N	Aterial Bou	ndarv			Ν	Aterial Bou	undarv			
<u></u>		<u></u>			<u> </u>					

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						Page	136	of 2	212
Written by:	Josep	h Sura	Date: 12/4/2009	Reviewed by:	R. Kulas	ingam/Jay Beech	n Date:	12/8/2	009
Client:	Honeywell	Project:	Onondaga Lake SC	A Final Design	Project/ P	roposal No.:	GJ4299	Task No.:	18
	1098 501	451 911			1257 007	450 118			
	1098 501	452 161			1257.007	450 368			
	1098 513	457 911			1257.007	456 118			
	1098.513	458.161			1257.007	456.368			
	Astanial David				laterial Davi				
IV	Accelerate Bour	<u>10ary</u>		<u>IV</u>	ACCO FOA	ndary 450 404			
	1096.995	451.928			1258.501	450.101			
	1096.996	452.178			1258.501	450.351			
	1097.013	457.928			1258.507	456.101			
	1097.013	458.178			1258.507	456.351			
N	laterial Bour	ndary		N	laterial Bou	ndary			
	1137.001	451.475			1297.001	449.665			
	1137.002	451.725			1297.002	449.915			
	1137.019	457.475			1297.013	455.665			
	1137.020	457.725			1297.014	455.915			
N	latorial Bour	adary		N	Interial Bou	ndany			
1	1120 E01	<u>1001 y</u> 451 450		<u>IV</u>	1200 E01	<u>110ary</u> 440.640			
	1130.301	401.400			1296.501	449.040			
	1138.501	451.708			1298.502	449.898			
	1138.507	457.458			1298.513	455.648			
	1100.007	407.700			1200.014	400.000			
N	laterial Bour	<u>ndary</u>		N	laterial Bou	<u>ndary</u>			
	1176.995	451.023			1337.008	449.213			
	1176.996	451.273			1337.008	449.463			
	1177.013	457.023			1337.014	455.213			
	1177.013	457.273			1337.014	455.463			
N	laterial Bour	ndarv		Ν	laterial Bou	ndarv			
<u></u>	1178 495	451 006		<u></u>	1338 501	449 196			
	1178 /06	151.000			1338 502	110.100			
	1178 518	457 006			1338 507	455 196			
	1178.519	457.255			1338.507	455.446			
N	aterial Bour	hdary		N	laterial Bou	ndary			
	1217.001	450.570			1377.008	448.760			
	1217.001	450.820			1377.008	449.010			
	1217.007	456.570			1377.021	454.760			
	1217.007	456.820			1377.021	455.010			
Ν	<u>later</u> ial Bour	ndary		Ν	laterial Bou	ndary			
	1218.501	450.553		_	1378.508	448.743			
	1218.501	450.803			1378.508	448.993			
	1218.501	456.553			1378.513	454 743			
	1218.501	456.803			1378.514	454.993			
N	1aterial Bour	<u>ndary</u>		N	laterial Bou	ndary			

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								C	onsu	ıltants	
							Page	137	(	of	212
Written by:	Josep	oh Sura	Date:	12/4/2009	Reviewed by:	R. Kula	singam/Jay H	Beech Da	ite:	12/8/2	2009
Client:	Honeywell	Project:	Onor	ndaga Lake SC	CA Final Design	Project/ I	Proposal No.:	GJ4299	Ta	ask No.:	18
	1077 005	150 151									
	1077.005	458.154			Ν	Anterial Rou	Indary				
	1077.000	464 154			<u> </u>	1277 005	455 891				
	1077.017	404.104				1277 005	456 141				
Ν	laterial Bou	ndary				1277.011	461.891				
_	1078.505	458.137									
	1078.505	458.387			Ν	Aaterial Bou	indary				
	1078.517	464.137				1278.505	455.874				
						1278.505	456.124				
N	laterial Bou	<u>ndary</u>				1278.505	461.874				
	1117.011	457.701									
	1117.011	457.951			<u>N</u>	<u>Aaterial Bou</u>	indary				
	1117.011	463.701				1317.005	455.439				
						1317.005	455.689				
IV	<u>laterial Boul</u>	ndary				1317.011	461.439				
	1118.498	457.085			N	Actorial Pau	undon/				
	1110.499	407.934			<u>N</u>	1219 505	100019 155 122				
	1110.511	403.004				1318.505	400.422				
N	laterial Bou	ndarv				1318 517	461 422				
<u></u>	1157 005	457 249				1010.017	401.422				
	1157.005	457,499			Ν	Aaterial Bou	Indary				
	1157.011	463.249			<u></u>	1357.006	454.986				
						1357.006	455.236				
N	laterial Bou	ndary				1357.017	460.986				
	1158.498	457.232									
	1158.499	457.482			<u>N</u>	laterial Bou	<u>indary</u>				
	1158.511	463.232				1358.511	454.969				
_						1358.511	455.219				
N	laterial Bou	ndary				1358.511	460.969				
	1197.005	456.796				Actorial Day	un don (				
	1197.006	407.040			<u>N</u>	027 919	100019 127 500				
	1197.017	402.790				937.010	437.500				
N	laterial Bou	ndarv				942 667	435 500				
<u></u>	1198 498	456 779				042.007	400.000				
	1198.499	457.029			Ν	/laterial Bou	Indarv				
	1198.517	462.779			_	934.712	437.500				
						937.818	437.500				
N	laterial Bou	<u>ndary</u>				938.818	437.500				
	1237.005	456.344				941.000	436.600				
	1237.006	456.594				943.667	435.500				
	1237.024	462.344				948.793	433.500				
-						953.000	433.500				
N	laterial Bou	ndary				955.504	434.501				
	1238.511	456.327				958.000	435.500				
	1238.511	456.577				958.000	435.750				
	1238.517	402.327				998.000	441.500				

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							Page		138	of	212
Written by:	Josep	h Sura	Date:	12/4/2009	Reviewed by:	R. Kulas	ingam/Jay Be	ech	Date:	12/8/	2009
Client:	Honeywell	Project:	Onon	daga Lake SC.	A Final Design	Project/ Pr	roposal No.:	GJ4	299	Task No.:	18
	070 000	444 074				4 4 0 0 0 0 0	407 700				
	978.000	441.274				1400.000	427.700				
	978.000	441.524				1400.000	430.500				
	978.000	447.274				1400.000	430.750				
	998.000	447.048				1400.000	436.500				
	998.000	447.298				1400.000	436.750				
	998.000	453.048				1400.000	442.500				
	1018.000	452.821				1400.000	442.750				
	1018.000	453.071				1400.000	448.500				
	1018.000	458.821				1400.000	448.750				
	1038.000	458.595				1400.000	454.500				
	1038.000	458.845				1400.000	454.750				
	1038.000	464.595				1400.000	460.500				
	1077.017	464.154				1400.000	463.500				
	1078.517	464.137				1038.000	467.595				
	1117.011	463.701				1018.000	461.821				
	1118.511	463.684				998.000	456.048				
	1157.011	463.249				978.000	450.274				
	1158.511	463.232				958.430	444.500				
	1197.017	462.796			_						
	1198.517	462.779			<u>P</u>	iezo Line					
	1237.024	462.344				955.504	434.501				
	1238.517	462.327				958.000	434.500				
	1277.011	461.891				1400.000	428.700				
	1278.505	461.874									
	1317.011	461.439			<u> </u>	ater Table					
	1318.517	461.422				715.262	421.594				
	1357.017	460.986				900.000	417.000				
	1358.511	460.969				935.504	416.272				
	1400.000	460.500				1400.000	410.200				
<u>E</u> :	xternal Bour	ndary			F	ocus/Block	Search Poir	<u>nt</u>			
	934.712	437.500				1017.040	441.054				
	921.920	437.500									
	909.818	437.500			<u>F</u>	ocus/Block	Search Poir	<u>nt</u>			
	899.186	433.425				1018.472	446.848				
	895.681	432.081									
	661.000	436.500			F	ocus/Block	Search Poir	nt			
	638.000	432.900				1037.037	446.830				
	555.000	396.200									
	483.000	398.300			F	ocus/Block	Search Poir	nt			
	461.000	390,500			<u>.                                    </u>	1038,507	452,594				
	307.000	386.700									
	277.000	373,000			F	ocus/Block	Search Poir	nt			
	1 726	374 590			<u>.</u>	1057 020	452 618	<u></u>			
	1 726	167 800				1001.020	-102.010				
	1400 000	167 800			<b>_</b>	ocus/Rlock	Search Doir	nt			
		367 800			<u> </u>	1058 /50	<u>458</u> /11	<u></u>			
	1400.000	425.200				1000.408	400.411				

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								con	sultants	
							Page	139	of	212
Written by:	Josep	oh Sura	Date:	12/4/2009	Reviewed by:	R. Kulas	singam/Jay Bee	ech Date:	12/8/2	2009
Client:	Honeywell	Project:	Onor	ıdaga Lake S	CA Final Design	Project/ P	roposal No.:	GJ4299	Task No.:	18
<u>Fo</u>	<u>ocus/Block</u> 1077 037	Search Point 458.372				1358.521	448.969			
<u>Fo</u>	<u>ocus/Block</u> 1078.405	Search Point 464.138			<u>Sı</u>	<u>upport</u> 1358.521 1400.000	448.969 448.500			
<u>Si</u>	<u>upport</u> 1358.511 1400.000	460.969 460.500			<u>Sı</u>	<u>upport</u> 1400.000 1400.000	442.500 436.750			
<u>Si</u>	<u>upport</u> 1400.000 1400.000	454.750 460.500			<u>Sı</u>	<u>upport</u> 1400.000 1378.475	436.750 436.993			
<u>S</u> ı	<u>upport</u> 1400.000 1358.511	454.750 455.219								
<u>Si</u>	upport 1358.511 1358.511	455.219 460.969								
<u>S</u> ı	<u>upport</u> 1378.513 1378.508	454.743 448.993								
<u>S</u> ı	<u>upport</u> 1378.508 1400.000	448.993 448.750								
<u>Si</u>	<u>upport</u> 1400.000 1400.000	448.750 454.500								
<u>Sı</u>	<u>upport</u> 1400.000 1378.513	454.500 454.743								
<u>S</u> I	<u>upport</u> 1400.000 1400.000	448.500 442.750								
<u>Si</u>	upport 1400.000 1358.516	442.750 443.219								
<u>S</u> ı	<u>upport</u> 1358.516	443.219								

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					Page	140	of	212
Written by:	Joseph Sura	Date:	12/4/2009	Reviewed by:	R. Kulasingam/Jay Beech	Date:	: 12/8	3/2009
Client:	Honeywell Project:	Onor	ndaga Lake SC	CA Final Design	Project/ Proposal No.: G	J4299	Task No.	.: 18

## **Document Name**

File Name: northside\_cover\_liner\_i\_lab

#### **Project Settings**

Project Title: SLIDE - An Interactive Slope Stability Program Failure Direction: Right to Left Units of Measurement: Imperial Units Pore Fluid Unit Weight: 62.4 lb/ft3 Groundwater Method: Water Surfaces Data Output: Standard Calculate Excess Pore Pressure: Off Allow Ru with Water Surfaces or Grids: Off Random Numbers: Pseudo-random Seed Random Number Seed: 10116 Random Number Generation Method: Park and Miller v.3

## **Analysis Methods**

Analysis Methods used: Bishop simplified Janbu simplified Spencer

Number of slices: 25 Tolerance: 0.005 Maximum number of iterations: 50

#### Surface Options

Surface Type: Non-Circular Block Search Number of Surfaces: 5000 Pseudo-Random Surfaces: Enabled Convex Surfaces Only: Disabled Left Projection Angle (Start Angle): 95 Left Projection Angle (End Angle): 175 Right Projection Angle (Start Angle): 5 Right Projection Angle (End Angle): 85 Minimum Elevation: Not Defined Minimum Depth: Not Defined

## **Material Properties**

Material: Final Cover Soil Strength Type: Mohr-Coulomb Unit Weight: 120 lb/ft3 Cohesion: 0 psf Friction Angle: 30 degrees Water Surface: Water Table Custom Hu value: 1

Material: Dike Soil Strength Type: Mohr-Coulomb Unit Weight: 120 lb/ft3 Cohesion: 0 psf Friction Angle: 35 degrees Water Surface: Water Table Custom Hu value: 1

#### Material: Gravel

Strength Type: Mohr-Coulomb Unit Weight: 120 lb/ft3 Cohesion: 0 psf Friction Angle: 38 degrees Water Surface: Piezometric Line 1 Custom Hu value: 1

#### Material: SOLW (undrained)

Strength Type: Discrete function Unit Weight: 82 lb/ft3 Water Surface: Water Table Custom Hu value: 1

#### Material: Dredge Material

Strength Type: Mohr-Coulomb Unit Weight: 86 lb/ft3 Cohesion: 0 psf Friction Angle: 15 degrees Water Surface: Water Table Custom Hu value: 1

#### Material: Tube-Tube Interface (Horizontal)

Strength Type: Mohr-Coulomb Unit Weight: 86 lb/ft3 Cohesion: 0 psf Friction Angle: 15 degrees Water Surface: Water Table Custom Hu value: 1

Material: Tub-Tube Interface (Vertical) Strength Type: Mohr-Coulomb Unit Weight: 43 lb/ft3 Cohesion: 0 psf

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								con	sultants	5
						Page		141	of	212
Written by:	Joseph	Sura	Date:	12/4/2009	Reviewed by:	R. Kulasingam/Ja	ay Beech	Date:	12/8	/2009
Client:	Honeywell	Project:	Ono	ndaga Lake SC	A Final Design	Project/ Proposal N	lo.: G	J4299	Task No.:	18
F	riction Anale:	0.1 dearee	s		R	ight Slip Surface E	ndpoint:	1079.56	62.	
Ŵ	/ater Surface:	Water Tak	ble		467	7.125			,	
С	ustom Hu valu	ue: 1			R	esisting Moment=9	).57242e	+006 lb	-ft	
		<b>.</b>			D	riving Moment=5.7	6303e+0	06 lb-ft		
<u>N</u>	laterial: Tube-	Gravel Inte	erface				· C - 1			
5	trength Type:	Wonr-Cou	amo			lethod: janbu simpi	ITIED			
0	obesion: 0 ps	f ID/ILS				5. 1.390690 vis Location: 070 /	17 505	121		
F	riction Angle	24 dearee	s			eft Slip Surface En	dpoint 9	37 107	438 207	
Ň	/ater Surface:	Water Tab	ble		R	ight Slip Surface E	ndpoint:	1079.56	52.	
С	ustom Hu valu	ue: 1			467	7.125			,	
					R	esisting Horizontal	Force=6	0808.1	lb	
M	laterial: Liner				D	riving Horizontal Fo	orce=382	222.6 lb		
S	trength Type:	Mohr-Cou	lomb							
0	nit weight: 10					lethod: spencer				
E E	riction Angle	I 19 degree	2			5. 2.775020 vis Location: 971.1	17 609	951		
Ń	/ater Surface:	Water Tak	ble			eft Slip Surface En	dpoint 9	21 922	437 500	
C	ustom Hu valu	ue: 1			R	ight Slip Surface E	ndpoint:	1079.56	51,	
N	laterial: Found	lation			407 R	. IZƏ esistina Moment–1	1/7/80	±007 lb.	_ft	
5	trength Type:	Mohr-Cou	lomb			riving Moment=4 1	3504e+0	-007 10 106 lb-ft	-11	
Ŭ	nit Weight: 12	0 lb/ft3			R	esisting Horizontal	Force=6	6582.4	lb	
С	ohesion: 0 ps	f			D	riving Horizontal Fo	orce=239	93.5 lb		
F	riction Angle:	37 degree	S							
N	/ater Surface:	Water Tak	ble		<u>v</u>	<u>alid / Invalid Security (alid / Invalid Security)</u>	<u>urfaces</u>	<u>s</u>		
С	ustom Hu valu	ue: 1			M	lethod: bishop simp	olified			
~					N	umber of Valid Sur	faces: 32	201		
<u>2</u>	upport Pro	perties			N	umber of Invalid Su	urfaces: 7	1799		
<u>5</u> C	upport: Geotu	be			E	rror Codes:	ortod for	2 curfo	200	
S	upport Type: (	GeoTextile			E	rror Code -100 rep	orted for	267 sur	faces	
F	orce Applicatio	on: Passiv	e		E	rror Code -111 rep	orted for	39 surfa	aces	
F	orce Orientatio	on: Tanger	nt to Sl	ip Surface	E	rror Code -112 rep	orted for	1290 st	urfaces	
A	nchorage: Bot	th Ends				·				
S	hear Strength	Model: Lir	near		M	lethod: janbu simpl	ified			
S	trip Coverage	: 100 perce	ent		N	umber of Valid Sur	faces: 31	137		
	ensile Strengt	h: 1600 lb/	'tt 	40	N	umber of Invalid St	urfaces: "	1863		
ר ס	ullout Strength	1 AUTIESION	1. J ID/T	ı∠ 10 degrees	E	rror Code -108 rop	orted for	3 curfor	200	
٢	anour Strengti		angle. 4	to degrees	F	rror Code -110 rep	orted for	467 sur	faces	
G	ilobal Minir	ทมพร			E	rror Code -111 rep	orted for	66 surfa	aces	
M	lethod: bishop	simplified			E	rror Code -112 rep	orted for	1327 st	urfaces	
F	S: 1.661010	5								
A	xis Location: §	979.417, 5	95.121		M	lethod: spencer				
Le	eft Slip Surfac	e Endpoin	t: 937.′	107, 438.207	N	umber of Valid Sur	faces: 20	)41		
					N	umber of Invalid Si	urraces: 2	2959		

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						Page	142	of	212
Written by:	Joseph S	Sura	Date:	12/4/2009	Reviewed by:	R. Kulasingam/Jay Beed	ch Date	: 12/	8/2009
Client:	Honeywell	Project:	Onon	ndaga Lake SC	CA Final Design	Project/ Proposal No.:	GJ4299	Task No	.: 18

Error Codes:

Error Code -108 reported for 443 surfaces Error Code -110 reported for 467 surfaces Error Code -111 reported for 408 surfaces Error Code -112 reported for 1641 surfaces
					G	mtec sultant	s S	
					Page	143	of	212
Written by:	Joseph Sura	Date:	12/4/2009	Reviewed by:	R. Kulasingam/Jay Beech	Date:	12/8	/2009
Client:	Honeywell Project:	Onoi	ndaga Lake SO	CA Final Design	Project/ Proposal No.: G		Task No.	: 18

### **Document Name**

File Name: northside\_cover\_global\_su\_lab

## **Project Settings**

Project Title: SLIDE - An Interactive Slope Stability Program Failure Direction: Right to Left Units of Measurement: Imperial Units Pore Fluid Unit Weight: 62.4 lb/ft3 Groundwater Method: Water Surfaces Data Output: Standard Calculate Excess Pore Pressure: Off Allow Ru with Water Surfaces or Grids: Off Random Numbers: Pseudo-random Seed Random Number Seed: 10116 Random Number Generation Method: Park and Miller v.3

# **Analysis Methods**

Analysis Methods used: Bishop simplified Janbu simplified Spencer

Number of slices: 25 Tolerance: 0.005 Maximum number of iterations: 50

### Surface Options

Surface Type: Circular Search Method: Grid Search Radius increment: 10 Composite Surfaces: Disabled Reverse Curvature: Create Tension Crack Minimum Elevation: Not Defined Minimum Depth: Not Defined

### **Material Properties**

Material: Final Cover Soil Strength Type: Mohr-Coulomb Unit Weight: 120 lb/ft3 Cohesion: 0 psf Friction Angle: 30 degrees Water Surface: Water Table Custom Hu value: 1

Material: Dike Soil Strength Type: Mohr-Coulomb Unit Weight: 120 lb/ft3 Cohesion: 0 psf Friction Angle: 35 degrees Water Surface: Water Table Custom Hu value: 1

<u>Material: Gravel</u> Strength Type: Mohr-Coulomb Unit Weight: 120 lb/ft3 Cohesion: 0 psf Friction Angle: 38 degrees Water Surface: Piezometric Line 1 Custom Hu value: 1

<u>Material: SOLW (undrained)</u> Strength Type: Discrete function Unit Weight: 82 lb/ft3 Water Surface: Water Table Custom Hu value: 1

Material: Dredge Material Strength Type: Mohr-Coulomb Unit Weight: 86 lb/ft3 Cohesion: 0 psf Friction Angle: 15 degrees Water Surface: Water Table Custom Hu value: 1

<u>Material: Tube-Tube Interface (Horizontal)</u> Strength Type: Mohr-Coulomb Unit Weight: 86 lb/ft3 Cohesion: 0 psf Friction Angle: 15 degrees Water Surface: Water Table Custom Hu value: 1

Material: Tub-Tube Interface (Vertical) Strength Type: Mohr-Coulomb Unit Weight: 43 lb/ft3 Cohesion: 0 psf Friction Angle: 0.1 degrees Water Surface: Water Table Custom Hu value: 1

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					Page	144	of	212
Written by:	Joseph Sura	Date	: <b>12/4/2009</b>	Reviewed by:	R. Kulasingam/Jay Beech	Date:	12/8	3/2009
Client:	Honeywell P	Project: Or	nondaga Lake So	CA Final Design	Project/ Proposal No.:	GJ4299	Task No.	: 18

Material: Tube-Gravel Interface Strength Type: Mohr-Coulomb Unit Weight: 86 lb/ft3 Cohesion: 0 psf Friction Angle: 24 degrees Water Surface: Water Table Custom Hu value: 1

Material: Liner Strength Type: Mohr-Coulomb Unit Weight: 100 lb/ft3 Cohesion: 0 psf Friction Angle: 19 degrees Water Surface: Water Table Custom Hu value: 1

<u>Material: Foundation</u> Strength Type: Mohr-Coulomb Unit Weight: 120 lb/ft3 Cohesion: 0 psf Friction Angle: 37 degrees Water Surface: Water Table Custom Hu value: 1

## Support Properties

Support: Geotube Geotube Support Type: GeoTextile Force Application: Passive Force Orientation: Tangent to Slip Surface Anchorage: Both Ends Shear Strength Model: Linear Strip Coverage: 100 percent Tensile Strength: 1600 lb/ft Pullout Strength Adhesion: 5 lb/ft2 Pullout Strength Friction Angle: 40 degrees

# **Global Minimums**

Method: bishop simplified FS: 1.452590 Center: 968.333, 521.413 Radius: 115.992 Left Slip Surface Endpoint: 894.314, 432.107 Right Slip Surface Endpoint: 1070.888, 467.223 Resisting Moment=1.51229e+007 lb-ft

#### Driving Moment=1.0411e+007 lb-ft

Method: janbu simplified FS: 1.378860 Center: 968.333, 521.413 Radius: 122.851 Left Slip Surface Endpoint: 883.761, 432.306 Right Slip Surface Endpoint: 1078.544, 467.136 Resisting Horizontal Force=133358 lb Driving Horizontal Force=96715.9 lb

Method: spencer

FS: 1.447420 Center: 968.333, 521.413 Radius: 115.992 Left Slip Surface Endpoint: 894.314, 432.107 Right Slip Surface Endpoint: 1070.888, 467.223 Resisting Moment=1.50691e+007 lb-ft Driving Moment=1.0411e+007 lb-ft Resisting Horizontal Force=111172 lb Driving Horizontal Force=76807 lb

# Valid / Invalid Surfaces

Method: bishop simplified Number of Valid Surfaces: 2232 Number of Invalid Surfaces: 2608 Error Codes: Error Code -102 reported for 22 surfaces Error Code -106 reported for 75 surfaces Error Code -107 reported for 973 surfaces Error Code -110 reported for 8 surfaces Error Code -112 reported for 409 surfaces Error Code -113 reported for 183 surfaces Error Code -116 reported for 14 surfaces Error Code -1000 reported for 924 surfaces

Method: janbu simplified Number of Valid Surfaces: 2153 Number of Invalid Surfaces: 2687 Error Codes: Error Code -102 reported for 22 surfaces Error Code -106 reported for 75 surfaces Error Code -107 reported for 973 surfaces Error Code -108 reported for 75 surfaces Error Code -110 reported for 8 surfaces

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						consultants				
						Page	145	of	212	
Written by:	Joseph Sura		Date:	12/4/2009	Reviewed by:	R. Kulasingam/Jay Beecl	n Date	: 12/8/2	2009	
Client:	Honeywell	Project:	Onor	idaga Lake SC	CA Final Design	Project/ Proposal No.:	GJ4299	Task No.:	18	

Error Code -111 reported for 9 surfaces Error Code -112 reported for 404 surfaces Error Code -113 reported for 183 surfaces Error Code -116 reported for 14 surfaces Error Code -1000 reported for 924 surfaces

Method: spencer Number of Valid Surfaces: 1214 Number of Invalid Surfaces: 3626 Error Codes: Error Code -102 reported for 22 surfaces Error Code -106 reported for 75 surfaces Error Code -107 reported for 973 surfaces Error Code -108 reported for 103 surfaces Error Code -110 reported for 8 surfaces Error Code -111 reported for 906 surfaces Error Code -112 reported for 418 surfaces Error Code -113 reported for 183 surfaces Error Code -116 reported for 14 surfaces Error Code -116 reported for 924 surfaces

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					Page	146	of	212
Written by:	Joseph Sura	Date:	12/4/2009	Reviewed by:	R. Kulasingam/Jay Beech	Date: 12/2	/8/2009	
Client:	Honeywell Project:	Onor	ndaga Lake SC	CA Final Design	Project/ Proposal No.: G	J4299	Task No	o.: <b>18</b>

### **Document Name**

File Name: northside\_cover\_longterm\_lab

#### **Project Settings**

Project Title: SLIDE - An Interactive Slope Stability Program Failure Direction: Right to Left Units of Measurement: Imperial Units Pore Fluid Unit Weight: 62.4 lb/ft3 Groundwater Method: Water Surfaces Data Output: Standard Calculate Excess Pore Pressure: Off Allow Ru with Water Surfaces or Grids: Off Random Numbers: Pseudo-random Seed Random Number Seed: 10116 Random Number Generation Method: Park and Miller v.3

# **Analysis Methods**

Analysis Methods used: Bishop simplified Janbu simplified Spencer

Number of slices: 25 Tolerance: 0.005 Maximum number of iterations: 50

#### Surface Options

Surface Type: Circular Search Method: Grid Search Radius increment: 10 Composite Surfaces: Disabled Reverse Curvature: Create Tension Crack Minimum Elevation: Not Defined Minimum Depth: Not Defined

#### Material Properties

Material: Final Cover Soil Strength Type: Mohr-Coulomb Unit Weight: 120 lb/ft3 Cohesion: 0 psf Friction Angle: 30 degrees Water Surface: Water Table Custom Hu value: 1

Material: Dike Soil Strength Type: Mohr-Coulomb Unit Weight: 120 lb/ft3 Cohesion: 0 psf Friction Angle: 35 degrees Water Surface: Water Table Custom Hu value: 1

<u>Material: Gravel</u> Strength Type: Mohr-Coulomb Unit Weight: 120 lb/ft3 Cohesion: 0 psf Friction Angle: 38 degrees Water Surface: Piezometric Line 1 Custom Hu value: 1

Material: SOLW (Drained) Strength Type: Mohr-Coulomb Unit Weight: 82 lb/ft3 Cohesion: 0 psf Friction Angle: 34 degrees Water Surface: Water Table Custom Hu value: 1

Material: Dredge Material (Long) Strength Type: Mohr-Coulomb Unit Weight: 86 lb/ft3 Cohesion: 0 psf Friction Angle: 30 degrees Water Surface: Water Table Custom Hu value: 1

Material: Tube-Tube Interface (Horizontal) Strength Type: Mohr-Coulomb Unit Weight: 86 lb/ft3 Cohesion: 0 psf Friction Angle: 15 degrees Water Surface: Water Table Custom Hu value: 1

Material: Tub-Tube Interface (Vertical) Strength Type: Mohr-Coulomb Unit Weight: 43 lb/ft3 Cohesion: 0 psf Friction Angle: 0.1 degrees

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						Page	147	of	212
Written by:	Joseph	Sura	Date:	12/4/2009	Reviewed by:	R. Kulasingam/Jay Bee	ch Date:	12/8/2	2009
Client:	Honeywell	Project:	Onor	1daga Lake SC	CA Final Design	Project/ Proposal No.:	GJ4299	Task No.:	18
١٨	Vator Surface:	Water Ta	blo		Po	sisting Moment-403 30	)8 lb_ft		

Water Surface: Water Table Custom Hu value: 1

Material: Tube-Gravel Interface Strength Type: Mohr-Coulomb Unit Weight: 86 lb/ft3 Cohesion: 0 psf Friction Angle: 24 degrees Water Surface: Water Table Custom Hu value: 1

<u>Material: Liner</u> Strength Type: Mohr-Coulomb Unit Weight: 100 lb/ft3 Cohesion: 0 psf Friction Angle: 19 degrees Water Surface: Water Table Custom Hu value: 1

Material: Foundation Strength Type: Mohr-Coulomb Unit Weight: 120 lb/ft3 Cohesion: 0 psf Friction Angle: 37 degrees Water Surface: Water Table Custom Hu value: 1

### **Support Properties**

Support: Geotube (Long Term)Geotube (Long Term)Support Type: GeoTextileForce Application: PassiveForce Orientation: Tangent to Slip SurfaceAnchorage: Both EndsShear Strength Model: LinearStrip Coverage: 100 percentTensile Strength: 0.1 lb/ftPullout Strength Adhesion: 5 lb/ft2Pullout Strength Friction Angle: 40 degrees

# **Global Minimums**

<u>Method: bishop simplified</u> FS: 1.826860 Center: 878.950, 504.182 Radius: 73.340 Left Slip Surface Endpoint: 903.345, 435.019 Right Slip Surface Endpoint: 907.036, 436.434 Resisting Moment=403.398 lb-ft Driving Moment=220.815 lb-ft

Method: janbu simplified FS: 1.826960 Center: 878.950, 504.182 Radius: 73.340 Left Slip Surface Endpoint: 903.345, 435.019 Right Slip Surface Endpoint: 907.036, 436.434 Resisting Horizontal Force=5.13684 lb Driving Horizontal Force=2.81169 lb

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Method: spencer FS: 1.827030 Center: 878.950, 504.182 Radius: 73.340 Left Slip Surface Endpoint: 903.345, 435.019 Right Slip Surface Endpoint: 907.036, 436.434 Resisting Moment=403.436 lb-ft Driving Moment=220.815 lb-ft Resisting Horizontal Force=5.13679 lb Driving Horizontal Force=2.81155 lb

# Valid / Invalid Surfaces

Method: bishop simplified Number of Valid Surfaces: 2202 Number of Invalid Surfaces: 2638 Error Codes: Error Code -102 reported for 22 surfaces Error Code -106 reported for 75 surfaces Error Code -107 reported for 973 surfaces Error Code -110 reported for 8 surfaces Error Code -112 reported for 439 surfaces Error Code -113 reported for 183 surfaces Error Code -116 reported for 14 surfaces Error Code -116 reported for 924 surfaces

Method: janbu simplified Number of Valid Surfaces: 2209 Number of Invalid Surfaces: 2631 Error Codes: Error Code -102 reported for 22 surfaces Error Code -106 reported for 75 surfaces Error Code -107 reported for 973 surfaces Error Code -108 reported for 4 surfaces Error Code -110 reported for 8 surfaces Error Code -111 reported for 2 surfaces

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Written by:	Joseph S	bura	Date:	12/4/2009	Reviewed by:	R. Kulasingam/Jay Beech	Date		12/8/20(	09
Client:	Honeywell	Project:	Onon	idaga Lake SC	CA Final Design	Project/ Proposal No.: G	GJ4299	Task	No.:	18

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Error Code -112 reported for 426 surfaces Error Code -113 reported for 183 surfaces Error Code -116 reported for 14 surfaces Error Code -1000 reported for 924 surfaces

Method: spencer Number of Valid Surfaces: 2190 Number of Invalid Surfaces: 2650 Error Codes: Error Code -102 reported for 22 surfaces Error Code -106 reported for 75 surfaces Error Code -107 reported for 973 surfaces Error Code -108 reported for 6 surfaces Error Code -110 reported for 8 surfaces Error Code -111 reported for 3 surfaces Error Code -112 reported for 442 surfaces Error Code -113 reported for 183 surfaces Error Code -116 reported for 14 surfaces Error Code -1000 reported for 924 surfaces

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					Page	149	of	212
Written by:	Joseph Sura	Date:	12/4/2009	Reviewed by:	R. Kulasingam/Jay Beech	Date:	12/8/2	2009
Client:	Honeywell Project	: Ono	ndaga Lake SC	CA Final Design	Project/ Proposal No.: 0	GJ4299	Task No.:	18

### **Document Name**

File Name: northside\_cover\_external\_lab

## **Project Settings**

Project Title: SLIDE - An Interactive Slope Stability Program Failure Direction: Right to Left Units of Measurement: Imperial Units Pore Fluid Unit Weight: 62.4 lb/ft3 Groundwater Method: Water Surfaces Data Output: Standard Calculate Excess Pore Pressure: Off Allow Ru with Water Surfaces or Grids: Off Random Numbers: Pseudo-random Seed Random Number Seed: 10116 Random Number Generation Method: Park and Miller v.3

# **Analysis Methods**

Analysis Methods used: Bishop simplified Janbu simplified Spencer

Number of slices: 25 Tolerance: 0.005 Maximum number of iterations: 50

### Surface Options

Surface Type: Circular Search Method: Grid Search Radius increment: 10 Composite Surfaces: Disabled Reverse Curvature: Create Tension Crack Minimum Elevation: Not Defined Minimum Depth: Not Defined

### **Material Properties**

Material: Final Cover Soil Strength Type: Mohr-Coulomb Unit Weight: 120 lb/ft3 Cohesion: 0 psf Friction Angle: 30 degrees Water Surface: Water Table Custom Hu value: 1

Material: Dike Soil Strength Type: Mohr-Coulomb Unit Weight: 120 lb/ft3 Cohesion: 0 psf Friction Angle: 35 degrees Water Surface: Water Table Custom Hu value: 1

<u>Material: Gravel</u> Strength Type: Mohr-Coulomb Unit Weight: 120 lb/ft3 Cohesion: 0 psf Friction Angle: 38 degrees Water Surface: Piezometric Line 1 Custom Hu value: 1

<u>Material: SOLW (undrained)</u> Strength Type: Discrete function Unit Weight: 82 lb/ft3 Water Surface: Water Table Custom Hu value: 1

Material: Dredge Material Strength Type: Mohr-Coulomb Unit Weight: 86 lb/ft3 Cohesion: 0 psf Friction Angle: 15 degrees Water Surface: Water Table Custom Hu value: 1

Material: Tube-Tube Interface (Horizontal) Strength Type: Mohr-Coulomb Unit Weight: 86 lb/ft3 Cohesion: 0 psf Friction Angle: 15 degrees Water Surface: Water Table Custom Hu value: 1

Material: Tub-Tube Interface (Vertical) Strength Type: Mohr-Coulomb Unit Weight: 43 lb/ft3 Cohesion: 0 psf Friction Angle: 0.1 degrees Water Surface: Water Table Custom Hu value: 1

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					Page	150	of	212
Written by:	Joseph Sura	Date:	12/4/2009	Reviewed by:	R. Kulasingam/Jay Beech	Date:	12/8/	/2009
Client:	Honeywell Project:	Onor	ndaga Lake SC	CA Final Design	Project/ Proposal No.: G	J4299	Task No.:	18

Material: Tube-Gravel Interface Strength Type: Mohr-Coulomb Unit Weight: 86 lb/ft3 Cohesion: 0 psf Friction Angle: 24 degrees Water Surface: Water Table Custom Hu value: 1

<u>Material: Liner</u> Strength Type: Mohr-Coulomb Unit Weight: 100 lb/ft3 Cohesion: 0 psf Friction Angle: 19 degrees Water Surface: Water Table Custom Hu value: 1

<u>Material: Foundation</u> Strength Type: Mohr-Coulomb Unit Weight: 120 lb/ft3 Cohesion: 0 psf Friction Angle: 37 degrees Water Surface: Water Table Custom Hu value: 1

### **Support Properties**

Support: Geotube Geotube Support Type: GeoTextile Force Application: Passive Force Orientation: Tangent to Slip Surface Anchorage: Both Ends Shear Strength Model: Linear Strip Coverage: 100 percent Tensile Strength: 1600 lb/ft Pullout Strength Adhesion: 5 lb/ft2 Pullout Strength Friction Angle: 40 degrees

# **Global Minimums**

Method: bishop simplified FS: 2.836910 Center: 900.517, 1215.482 Radius: 814.973 Left Slip Surface Endpoint: 661.000, 436.500 Right Slip Surface Endpoint: 1219.532, 465.541 Resisting Moment=2.96961e+008 lb-ft

#### Driving Moment=1.04678e+008 lb-ft

Method: janbu simplified FS: 2.825190 Center: 900.517, 1215.482 Radius: 814.973 Left Slip Surface Endpoint: 661.000, 436.500 Right Slip Surface Endpoint: 1219.532, 465.541 Resisting Horizontal Force=357282 lb Driving Horizontal Force=126463 lb

#### Method: spencer

FS: 2.836810 Center: 900.517, 1215.482 Radius: 814.973 Left Slip Surface Endpoint: 661.000, 436.500 Right Slip Surface Endpoint: 1219.532, 465.541 Resisting Moment=2.96952e+008 lb-ft Driving Moment=1.04678e+008 lb-ft Resisting Horizontal Force=357290 lb Driving Horizontal Force=125948 lb

# Valid / Invalid Surfaces

Method: bishop simplified Number of Valid Surfaces: 4101 Number of Invalid Surfaces: 14390 Error Codes: Error Code -101 reported for 229 surfaces Error Code -107 reported for 114 surfaces Error Code -110 reported for 5896 surfaces Error Code -113 reported for 51 surfaces Error Code -116 reported for 4 surfaces Error Code -1000 reported for 8096 surfaces

Method: janbu simplified Number of Valid Surfaces: 4101 Number of Invalid Surfaces: 14390 Error Codes: Error Code -101 reported for 229 surfaces Error Code -107 reported for 114 surfaces Error Code -110 reported for 5896 surfaces Error Code -113 reported for 51 surfaces Error Code -116 reported for 4 surfaces Error Code -1000 reported for 8096 surfaces

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						CO				
					Page	151	of	212		
Written by:	<sup>n</sup> Joseph Sura Date:		12/4/2009	Reviewed by:	: <b>R. Kulasingam/Jay Beech</b> Date: <b>12/8</b>			2009		
Client:	Honeywell Project	: Ono	ndaga Lake SC	CA Final Design	Project/ Proposal No.:	GJ4299	Task No.:	18		
M N N	lethod: spencer umber of Valid Surface umber of Invalid Surface	es: 3925 ces: 145	66							

Number of Invalid Surfaces: 3925 Number of Invalid Surfaces: 14566 Error Codes: Error Code -101 reported for 229 surfaces Error Code -107 reported for 114 surfaces Error Code -108 reported for 1 surface Error Code -110 reported for 5896 surfaces Error Code -111 reported for 175 surfaces Error Code -113 reported for 51 surfaces Error Code -116 reported for 4 surfaces Error Code -1000 reported for 8096 surfaces

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					Page	152	of	212
Written by:	Joseph Sura	Date:	12/4/2009	Reviewed by:	R. Kulasingam/Jay Beech	Date:	12/8/	/2009
Client:	Honeywell Project:	Onor	ndaga Lake SC	- CA Final Design	Project/ Proposal No · G	 LJ4299	Task No <sup>.</sup>	18

## **Document Name**

File Name: northside\_cover\_external\_longterm\_lab

#### **Project Settings**

Project Title: SLIDE - An Interactive Slope Stability Program Failure Direction: Right to Left Units of Measurement: Imperial Units Pore Fluid Unit Weight: 62.4 lb/ft3 Groundwater Method: Water Surfaces Data Output: Standard Calculate Excess Pore Pressure: Off Allow Ru with Water Surfaces or Grids: Off Random Numbers: Pseudo-random Seed Random Number Seed: 10116 Random Number Generation Method: Park and Miller v.3

## **Analysis Methods**

Analysis Methods used: Bishop simplified Janbu simplified Spencer

Number of slices: 25 Tolerance: 0.005 Maximum number of iterations: 50

# Surface Options

Surface Type: Circular Search Method: Grid Search Radius increment: 10 Composite Surfaces: Disabled Reverse Curvature: Create Tension Crack Minimum Elevation: Not Defined Minimum Depth: Not Defined

### **Material Properties**

Material: Final Cover Soil Strength Type: Mohr-Coulomb Unit Weight: 120 lb/ft3 Cohesion: 0 psf Friction Angle: 30 degrees Water Surface: Water Table Custom Hu value: 1

<u>Material: Dike Soil</u> Strength Type: Mohr-Coulomb Unit Weight: 120 lb/ft3 Cohesion: 0 psf Friction Angle: 35 degrees Water Surface: Water Table Custom Hu value: 1

<u>Material: Gravel</u> Strength Type: Mohr-Coulomb Unit Weight: 120 lb/ft3 Cohesion: 0 psf Friction Angle: 38 degrees Water Surface: Piezometric Line 1 Custom Hu value: 1

#### Material: SOLW (Drained)

Strength Type: Mohr-Coulomb Unit Weight: 82 lb/ft3 Cohesion: 0 psf Friction Angle: 34 degrees Water Surface: Water Table Custom Hu value: 1

# Material: Dredge Material (Long)

Strength Type: Mohr-Coulomb Unit Weight: 86 lb/ft3 Cohesion: 0 psf Friction Angle: 30 degrees Water Surface: Water Table Custom Hu value: 1

#### Material: Tube-Tube Interface (Horizontal)

Strength Type: Mohr-Coulomb Unit Weight: 86 lb/ft3 Cohesion: 0 psf Friction Angle: 15 degrees Water Surface: Water Table Custom Hu value: 1

Material: Tub-Tube Interface (Vertical) Strength Type: Mohr-Coulomb Unit Weight: 43 lb/ft3 Cohesion: 0 psf

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								con	sultant	ts	
						Page		153	of	212	
Written by:	Joseph	Sura	Date:	12/4/2009	Reviewed by:	R. Kulasingam/.	Jay Beech	Date	12/2	8/2009	
Client:	Honeywell	Project:	Ono	ndaga Lake SC.	A Final Design	Project/ Proposal	No.: G	J4299	Task No	.: 18	3
F	riction Angle	0 1 degree	s		R	ight Slip Surface I	Endpoint <sup>.</sup>	1134 7	74		
W	Vater Surface:	Water Tab	ble		466	6.500		1101.7	,		
С	ustom Hu val	ue: 1			R	esisting Moment=	=3.56667e	+008 lb	-ft		
					D	riving Moment=6.	32717e+0	07 lb-ft			
N	laterial: Tube-	Gravel Inte	erface			U U					
S	trength Type:	Mohr-Cou	lomb		M	ethod: janbu simp	olified				
U	Init Weight: 86	5 lb/ft3			F	S: 5.443350					
С	ohesion: 0 ps	f			C	enter: 867.880, 8	92.619				
F	riction Angle:	24 degrees	S		R	adius: 500.843					
W	Vater Surface:	Water Tak	ble		Le	eft Slip Surface Er	ndpoint: 66	51.000,	436.500	)	
C	ustom Hu valu	ue: 1			R	ight Slip Surface I	Endpoint:	1131.1:	32,		
	A - t - u' - l - l - i				466	0.541 		00404	11-		
<u>IV</u>	trongth Type:	Mohr Cou	lomb		R	riving Horizontal	al Force=6	03124   022  h	a		
о П	Init Weight: 10	1010111-000	amo		D			023 10			
0	Cohesion: 0 ns	f			M	ethod: spencer					
F	riction Angle	ı 19 dearees	3		<u></u>	S 5 646630					
W	Vater Surface:	Water Tab	ble		C	enter: 867.880. 9	25.386				
Ċ	ustom Hu val	ue: 1			R	adius: 530.856					
					Le	eft Slip Surface Er	ndpoint: 66	51.000,	436.500	)	
N	laterial: Found	dation			R	ight Ślip Surface I	Endpoint:	1134.7	74,		
S	trength Type:	Mohr-Cou	lomb		466	5.500					
U	Init Weight: 12	20 lb/ft3			R	esisting Moment=	=3.57272e	+008 lb	-ft		
C	ohesion: 0 ps	f			D	riving Moment=6.	32717e+0	07 lb-ft			
F	riction Angle:	37 degrees	S <sub>.</sub>		R	esisting Horizonta	al Force=6	50912	lb		
V	Vater Surface:	Water Tab	ble		D	riving Horizontal H	-orce=115	274 lb			
C	sustom Hu vali	ue: 1			.,		<b>.</b>				
	unnert Dre	nortion			<u>v</u>	alid / Invalid S	Surfaces	5			
20		<u>perties</u>				ethod: bishop sim	<u>iplified</u>				
<u>3</u>	Contube (Long	<u>De (Long I</u> Torm)	erm)		IN N	umber of valid St	Inaces: 63	94 1206			
9	Support Type:	GeoTevtile				uniber of invalid a	Sunaces. 4	+200			
F	orce Applicati	on: Passiv	e		F	rror Code -101 rei	ported for	9 surfa	ces		
F	orce Orientati	on: Tanger	nt to Sli	ip Surface	E	rror Code -103 re	ported for	1 surfa	ce		
Ā	nchorage: Bo	th Ends			Ē	rror Code -107 re	ported for	137 su	rfaces		
S	hear Strength	Model: Lir	near		E	rror Code -110 re	ported for	734 su	rfaces		
S	trip Coverage	: 100 perce	ent		E	rror Code -112 re	ported for	47 surf	aces		
Т	ensile Strengt	h: 0.1 lb/ft			E	rror Code -1000 r	eported fo	r 3278	surfaces	5	
Р	ullout Strengtl	h Adhesior	n: 5 lb/f	t2							
Р	ullout Strengt	h Friction A	Angle: 4	10 degrees	<u>M</u>	ethod: janbu simp	olified	_			
					N	umber of Valid Su	urfaces: 63	85			
<u>C</u>	Blobal Minii	<u>mums</u>			N	umber of Invalid S	Surfaces: 4	1205			
N	lethod: bishop	simplified			E	rror Codes:	nominal fa	0	~~~		
F	S: 5.637060				El F	rror Code -101 re	ported for	9 SUITA	ces		
C	enter: 867.88	0, 925.386			E	rror Code -103 re	ported for	1 SUITA	rfacea		
R	adius: 530.85	6		000 400 500		$\frac{101}{101} = \frac{101}{100} = \frac{101}{100} = \frac{100}{100} = $	ported for	າວ/SU 73/ຄະບ	rfaces		
L	en Sup Surfac	e Endboin	t: 661.(	100, 436.500	E		poneu ioi	1 54 SU	110000		

					G	/ <b>ntec</b> sultants	D	
					Page	154	of	212
Written by:	Joseph Sura	Joseph Sura Date: 12/4/2009		Reviewed by:	R. Kulasingam/Jay Beech	h Date: <u>12/8/2</u>		2009
Client:	Honeywell Project:	Onor	ndaga Lake SO	CA Final Design	Project/ Proposal No.: G	J4299	Task No.:	18

Error Code -112 reported for 46 surfaces Error Code -1000 reported for 3278 surfaces

Method: spencer Number of Valid Surfaces: 622 Number of Invalid Surfaces: 4218 Error Codes: Error Code -101 reported for 9 surfaces Error Code -103 reported for 1 surface Error Code -107 reported for 137 surfaces Error Code -108 reported for 12 surfaces Error Code -110 reported for 734 surfaces Error Code -112 reported for 47 surfaces Error Code -1000 reported for 3278 surfaces

					G	eosy <sub>con</sub>	mtec sultants	D
					Page	155	of	212
Written by:	Joseph Sura	Date:	12/4/2009	Reviewed by:	R. Kulasingam/Jay Beech	Date:	12/8/2	2009
Client:	Honeywell Project	: Ono	ndaga Lake SC	CA Final Design	Project/ Proposal No.: G	J4299	Task No.:	18

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# **Cross-Section B-B: Before Placement of Final Cover**

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					Page	156	of	212
Written by:	Joseph Sura	Date:	12/4/2009	Reviewed by:	R. Kulasingam/Jay Beech	Date:	12/8	/2009
Client:	Honeywell Project:	Onor	ndaga Lake SO	CA Final Design	Project/ Proposal No.: G	J4299	Task No.:	18

#### **Document Name**

File Name: eastwest\_nocover\_tube\_04\_lab

### **Project Settings**

Project Title: SLIDE - An Interactive Slope Stability Program Failure Direction: Right to Left Units of Measurement: Imperial Units Pore Fluid Unit Weight: 62.4 lb/ft3 Groundwater Method: Water Surfaces Data Output: Standard Calculate Excess Pore Pressure: Off Allow Ru with Water Surfaces or Grids: Off Random Numbers: Pseudo-random Seed Random Number Seed: 10116 Random Number Generation Method: Park and Miller v.3

### Analysis Methods

Analysis Methods used: Bishop simplified Janbu simplified Spencer

Number of slices: 25 Tolerance: 0.005 Maximum number of iterations: 50

#### Surface Options

Surface Type: Non-Circular Block Search Number of Surfaces: 5000 Pseudo-Random Surfaces: Enabled Convex Surfaces Only: Disabled Left Projection Angle (Start Angle): 95 Left Projection Angle (End Angle): 175 Right Projection Angle (Start Angle): 5 Right Projection Angle (End Angle): 85 Minimum Elevation: Not Defined Minimum Depth: Not Defined

### **Material Properties**

Material: Final Cover Soil Strength Type: Mohr-Coulomb Unit Weight: 120 lb/ft3 Cohesion: 0 psf Friction Angle: 30 degrees Water Surface: Water Table Custom Hu value: 1

Material: Dike Soil Strength Type: Mohr-Coulomb Unit Weight: 120 lb/ft3 Cohesion: 0 psf Friction Angle: 35 degrees Water Surface: Water Table Custom Hu value: 1

#### Material: Gravel

Strength Type: Mohr-Coulomb Unit Weight: 120 lb/ft3 Cohesion: 0 psf Friction Angle: 38 degrees Water Surface: Piezometric Line 1 Custom Hu value: 1

#### Material: SOLW (undrained)

Strength Type: Discrete function Unit Weight: 82 lb/ft3 Water Surface: Water Table Custom Hu value: 1

#### Material: Dredge Material

Strength Type: Mohr-Coulomb Unit Weight: 86 lb/ft3 Cohesion: 0 psf Friction Angle: 15 degrees Water Surface: Water Table Custom Hu value: 1

#### Material: Tube-Tube Interface (Horizontal)

Strength Type: Mohr-Coulomb Unit Weight: 86 lb/ft3 Cohesion: 0 psf Friction Angle: 15 degrees Water Surface: Water Table Custom Hu value: 1

Material: Tub-Tube Interface (Vertical) Strength Type: Mohr-Coulomb Unit Weight: 43 lb/ft3 Cohesion: 0 psf

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						СС	nsul	ltants	
					Page	157	of	f	212
ritten by:	Joseph Sura	Date:	12/4/2009	Reviewed by:	R. Kulasingam/Jay B	eech Da	te:	12/8/2	2009
ent:	Honeywell Pr	oject: Onor	ndaga Lake SO	CA Final Design	Project/ Proposal No.:	GJ4299	Ta	sk No.:	18
F	riction Angle: 0.1 d	earees		1.6	eft Slope Intercept: 208	3 000 442 (	000		
Ŵ	ater Surface: Wat	er Table		R	ight Slope Intercept: 5	0.516 460	.000		
C	ustom Hu value: 1			R	esisting Moment=4.34	696e+007	lb-ft		
0				D	riving Moment=7.0568	e+006 lb-fi			
М	aterial: Tube-Grav	el Interface		Ľ					
S	trength Type: Moh	r-Coulomb		Μ	ethod: janbu simplified				
Ū	nit Weight: 86 lb/ft	3		F	S: 6.595000	-			
č	ohesion: 0 psf	-		A	xis Location: 343.773.	767.305			
F	riction Anale: 24 de	egrees		Le	eft Slip Surface Endpo	nt: 208.00	), 436	5.161	
W	ater Surface: Wat	er Table		R	ight Slip Surface Endp	oint: 527.2	24.4	60.000	
С	ustom Hu value: 1			Le	oft Slope Intercept: 208	3.000 442.0	)0Ó		
				R	ight Slope Intercept: 5	27.224 460	.000		
Μ	aterial: Liner			R	esisting Horizontal For	ce=14871	5 lb		
S	trength Type: Moh	r-Coulomb		D	riving Horizontal Force	=22549.7	b		
U	nit Weight: 100 lb/	ft3			U				
С	ohesion: 0 psf			M	ethod: spencer				
Fi	riction Angle: 19 de	egrees		R	esisting Moment=0 lb-	ft			
W	ater Surface: Wat	er Table		D	riving Moment=0 lb-ft				
С	ustom Hu value: 1			R	esisting Horizontal For	ce=0 lb			
				D	riving Horizontal Force	=0 lb			
M	aterial: Foundation	<u>1</u>							
S	trength Type: Moh	r-Coulomb		V	alid / Invalid Surfa	aces			
U	nit Weight: 120 lb/	ft3		M	ethod: bishop simplifie	d			
С	ohesion: 0 psf			N	umber of Valid Surface	es: 1528			
Fi	riction Angle: 37 de	egrees		Ν	umber of Invalid Surfa	ces: 3472			
W	ater Surface: Wat	er Table		E	rror Codes:				
С	ustom Hu value: 1			E	rror Code -107 reporte	d for 1664	surfa	ces	
				E	rror Code -108 reporte	d for 1772	surfa	ces	
<u>S</u>	upport Proper	<u>ties</u>		E	rror Code -112 reporte	d for 36 su	rface	s	
S	<u>upport: Geotube</u>								
G	eotube			M	ethod: janbu simplified	<u> </u>			
S	upport Type: GeoT	Textile		N	umber of Valid Surface	es: 1256			
F	orce Application: P	assive		N	umber of Invalid Surfa	ces: 3744			
F	orce Orientation: T	angent to Sli	p Surface	E	rror Codes:				
A	nchorage: Both En	lds		E	rror Code -107 reporte	d for 1664	surfa	ces	
S	hear Strength Mod	lel: Linear		E	rror Code -108 reporte	d for 2054	surfa	ces	
S	trip Coverage: 100	percent		E	rror Code -112 reporte	d for 26 su	rface	S	
Te	ensile Strength: 16	600 lb/ft							
P	ullout Strength Adł	nesion: 5 lb/ft	2	M	ethod: spencer				
P	ullout Strength Frid	ction Angle: 4	0 degrees	N	umber of Valid Surface	es: 0			
~					unider of invalid Sulla	Jes. 2000			
G		<u>115</u>			ror Code 107 reports	d for 1661	ourfo	000	
M	ethod: bishop simp	plified			ror Code 107 reporte	d for 2200	surfa	Ces	
E.	S' 6 159960			E		u ioi 2299	suna	Ces	

Axis Location: 330.455, 740.615 Left Slip Surface Endpoint: 208.000, 436.197 Right Slip Surface Endpoint: 500.516, 460.000

Error Code -111 reported for 1001 surfaces Error Code -112 reported for 36 surfaces

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									con	sultant	S
							Page		158	of	212
Written by:	Josep	oh Sura	Date:	12/4/2009	Reviewed by:	R. Kulas	ingam/Jay F	Beech	Date:	12/8	/2009
Client:	Honeywell	Project:	Ono	ndaga Lake SC	A Final Design	Project/ P	roposal No.:	GJ	4299	Task No.:	18
	ist of All	Coordinat	tos		М	aterial Rou	ndarv				
B	lock Search	Polyline	162		<u></u>	188.000	430.000				
	208 000	436.003				824.000	430.000				
	466 201	436 248				1161.000	433.000				
	400.201	400.240				1236.000	432.000				
М	aterial Bou	ndarv				1400.000	431.000				
<u></u>	0.000	427 500				1778.100	431.000				
	122 000	424 650									
	122.359	424.645			Μ	aterial Bou	ndary				
	177.171	423.910				188.000	430.250				
	204.000	423.550				506.200	430.250				
	267.961	422.659				507.700	430.250				
	405.000	420.750				824.000	430.250				
	472.000	422.050				824.200	430.252				
	768.000	422,250				825.700	430.265				
	805.000	423.150				1142.148	433.082				
	925.000	423.250				1143.812	433.097				
	1165.000	428.350				1161.000	433.250				
	1347.000	425.150				1236.000	432.250				
	1436.000	426.150				1400.000	431.250				
	1642.000	424,450				1460.199	431.250				
	1786.163	426,261				1461.784	431.250				
	1841.000	426.950				1778.100	431.250				
	1841.123	426.953									
					M	aterial Bou	<u>ndary</u>				
Μ	aterial Bou	ndary				208.000	436.000				
	122.000	424.500				506.200	436.000				
	122.359	424.645				507.700	436.000				
						824.000	436.000				
Μ	aterial Bou	ndary				824.200	436.002				
	180.062	426.825				825.700	436.015				
	347.000	423.600				1142.148	438.832				
	600.000	423.600				1143.812	438.847				
	640.000	424.000				1161.000	439.000				
	728.000	424.000				1236.000	438.000				
	1102.000	431.000				1400.000	437.000				
	1176.000	431.000				1460.199	437.000				
	1356.000	428.000				1461.784	437.000				
	1474.000	427.500				1758.000	437.000				
	1619.000	426.500									
	1689.000	426.500			M	aterial Bou	ndary				
	1785.758	427.937				208.000	436.250				
						466.200	436.250				
M	aterial Bour	<u>ndary</u>				467.700	436.250				
	1827.000	432.300				/24.201	436.250				
	1841.123	426.953				/25.697	436.250				
						824.000	436.250				
						982.197	437.658				

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							Page	159	of	212
Written by:	Josep	oh Sura	Date:	12/4/2009	Reviewed by:	R. Kulas	ingam/Jay Beec	h Date:	12/8/	2009
Client:	Honeywell	Project:	Onor	ndaga Lake SC	CA Final Design	Project/ F	Proposal No.:	GJ4299	Task No.:	18
	002 710	107 670				824 000	449.000			
	903.710	437.072				024.000	440.000			
	101.000	439.250				032.191	440.073			
	1236.000	438.250				833.715	448.086			
	1240.193	438.224				1134.188	450.761			
	1241.724	438.215				1135.719	450.775			
	1400.000	437.250				1161.000	451.000			
	1498.182	437.250				1236.000	450.000			
	1499.766	437.250				1400.000	449.000			
	1758.000	437.250				1436.205	449.000			
						1437.780	449.000			
N	laterial Bour	<u>ndary</u>				1718.000	449.000			
	228.000	442.000								
	466.200	442.000			Ν	laterial Bou	ndary			
	467.700	442.000				248.000	448.250			
	724.201	442.000				493.200	448.250			
	725.697	442,000				494,700	448,250			
	824 000	442 000				738 195	448 250			
	982 197	443 408				739 701	448 250			
	083 718	113 122				824 000	448.200			
	1161 000	445 000				024.000	440.250			
	1226.000	444.000				09/ 72/	449.007			
	1230.000	444.000				1161 000	449.001			
	1240.193	443.974				101.000	451.250			
	1241.724	443.905				1220.192	450.554			
	1400.000	443.000				1229.723	450.334			
	1498.182	443.000				1236.000	450.250			
	1499.766	443.000				1400.000	449.250			
	1738.000	443.000				1473.204	449.250			
-						14/4./88	449.250			
N	laterial Bour	<u>ndary</u>				1718.000	449.250			
	228.000	442.250								
	530.200	442.250			<u>N</u>	laterial Bou	<u>ndary</u>			
	531.700	442.250				268.000	454.000			
	824.000	442.250				493.200	454.000			
	832.191	442.323				494.700	454.000			
	833.715	442.336				738.195	454.000			
	1134.188	445.011				739.701	454.000			
	1135.719	445.025				824.000	454.000			
	1161.000	445.250				983.182	455.417			
	1236 000	444 250				984 724	455 431			
	1400 000	443 250				1161 000	457 000			
	1436 205	443 250				1228 192	456 104			
	1437 780	443 250				1220 722	456 084			
	1738 000	443 250				1236 000	456 000			
	1730.000	445.250				1200.000	455 000			
R.A	Interial Dam	ndon				1400.000	400.000			
<u>IV</u>	249 000					14/3.204	400.000			
	248.000	448.000				14/4./88	400.000			
	530.200	448.000				1698.000	455.000			
	531.700	448.000								

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									con	sultan	ts	
							Page	1	60	of	2	12
Written by:	Josep	h Sura	Date:	12/4/2009	Reviewed by:	R. Kula	singam/Jay Be	ech	Date:	12	/8/20	09
Client:	Honeywell	Project:	Onor	ndaga Lake SC	A Final Design	Project/ I	Proposal No.:	GJ42	99	Task No	o.:	18
N/	atorial Bour	donu			Ν.4	atorial Roy	undon/					
<u>IVI</u>	268 000	<u>10ary</u> 151 250			<u>IVI</u>	551 200	<u>454 250</u>					
	554 200	454 250				554 200	460 000					
	555 700	454 250				004.200	400.000					
	824 000	454 250			М	aterial Bou	Indary					
	840 193	454 394			<u></u>	555 700	454 250					
	841 706	454 408				555 700	460 000					
	1126 178	456 940				555.700	400.000					
	1120.170	456 954			М	aterial Rou	Indary					
	1161 000	457 250			<u>1V1</u>	82/1 200	130 252					
	1236.000	457.250				821 200	430.232					
	1200.000	455 250				024.200	430.002					
	1/12 105	455 250			M	atorial Rou	Indary					
	1412.195	455.250			<u>IVI</u>	825 700	<u>130 265</u>					
	1608 000	455 250				825 700	436.015					
	1030.000	400.200				023.700	430.013					
Μ	aterial Bour	ndary			M	aterial Bou	undary					
	506.200	430.250				724.201	436.250					
	506.200	436.000				724.201	442.000					
Ν.4	atorial Bour	dany			N <i>A</i>	atorial Bou	Indony					
<u>IVI</u>	507 700	<u>10al y</u> 420 250			<u>IVI</u>	<u>alenai Dul</u> 725 607	<u>426 250</u>					
	507.700	430.230				725.097	430.250					
	507.700	430.000				125.091	442.000					
Μ	aterial Bour	ndary			M	aterial Bou	undary					
	466.200	436.250			<u> </u>	738.195	448.250					
	466.200	442.000				738.195	454.000					
N/	atorial Rour	ndarv			N/I	atorial Rou	Indary					
111	467 700	136 250			<u>IVI</u>	730 701	<u>448 250</u>					
	467 700	430.230				730 701	440.200					
	407.700	442.000				155.101	434.000					
Μ	aterial Bour	ndary			M	aterial Bou	undary					
	530.200	442.250				840.193	454.394					
	530.200	448.000				840.193	460.144					
M	aterial Rour	ndarv			M	aterial Rou	Indary					
111	531 700	<u>442</u> 250			<u></u>	841 706	<u>454</u> 408					
	531.700	448.000				841.706	460.158					
M	aterial Bour	idary			M	aterial Bou	undary					
	493.200	448.250				832.191	442.323					
	493.200	454.000				832.191	448.073					
M	aterial Bour	ndary			M	aterial Bou	undary					
	494.700	448.250				833.715	442.336					
	494.700	454.000				833.715	448.086					

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							Page	10	51	of	212
Vritten by:	Josep	h Sura	Date:	12/4/2009	Reviewed by:	R. Kulas	singam/Jay B	eech	Date:	12/8	3/2009
lient:	Honeywell	Project:	Onor	ndaga Lake S	SCA Final Design	Project/ P	Proposal No.:	GJ42	99	Task No.	: 1
М	aterial Bour	ndarv			N	aterial Bou	Indary				
<u></u> (	982.197	437.658			<u></u>	1228.192	450.354				
9	982.197	443.408				1228.192	456.104				
M	aterial Bour	ndary			Ν	aterial Bou	Indary				
(	983.182	449.667			—	1229.723	450.334				
9	983.182	455.417				1229.723	456.084				
M	aterial Bour	ndary			Ν	aterial Bou	Indary				
!	983.718	437.672				1240.193	438.224				
9	983.718	443.422				1240.193	443.974				
M	aterial Bour	ndary			Ν	aterial Bou	Indary				
!	984.724	449.681				1241.724	438.215				
9	984.724	455.431				1241.724	443.965				
M	aterial Bour	ndary			Ν	aterial Bou	Indary				
	1134.188	445.011			_	1412.195	455.250				
	1134.188	450.761				1412.195	461.000				
M	aterial Bour	ndary			N	aterial Bou	indary				
	1135.719	445.025				1413.743	455.250				
	1135.719	450.775				1413.743	461.000				
M	aterial Bour	ndary			N	aterial Bou	indary				
	1436.205	443.250				1460.199	431.250				
	1436.205	449.000				1460.199	437.000				
M	aterial Bour	ndary			N	aterial Bou	indary				
	1437.780	443.250				1461.784	431.250				
	1437.780	449.000				1461.784	437.000				
M	aterial Bour	<u>ndary</u>			N	aterial Bou	indary				
	1126.178	456.940				1498.182	437.250				
	1126.178	462.690				1498.182	443.000				
M	aterial Bour	ndary			N	aterial Bou	Indary				
	1127.707	456.954				1499.766	437.250				
	1127.707	462.704				1499.766	443.000				
M	aterial Bour	ndary			N	aterial Bou	Indary				
	1142.148	433.082				1473.204	449.250				
	1142.148	438.832				1473.204	455.000				
M	aterial Bour	ndary			N	aterial Bou	indary				
	1143.812	433.097				1474.788	449.250				
	1143.812	438.847				1474 788	455.000				

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									con	sultants	3
							Page		162	of	212
Written by:	Josep	h Sura	Date:	12/4/2009	Reviewed by:	R. Kulas	ingam/Jay B	eech	Date:	12/8/	/2009
Client:	Honeywell	Project:	Onon	daga Lake SC	A Final Design	Project/ P	roposal No.:	GJ	4299	Task No.:	18
N/	atorial Bour	darv				1702 668	120 000				
<u>IVI</u>	165 176	430 000				1790.000	429.000				
	177 171	423 910				1785 758	427 937				
		120.010				1785.600	428.000				
Μ	aterial Bour	ndarv				1783.100	429.000				
	0.000	387.500				1780.600	430.000				
	268.000	387.845				1778.100	431.000				
	1979.000	390.050				1778.100	431.250				
						1778.100	437.000				
<u>M</u>	aterial Bour	<u>ndary</u>				1758.000	437.000				
	1786.163	426.261				1758.000	437.250				
	1799.372	431.000				1758.000	443.000				
						1738.000	443.000				
<u>M</u>	aterial Bour	<u>ndary</u>				1738.000	443.250				
	164.400	430.400				1738.000	449.000				
	165.176	430.000				1718.000	449.000				
N /	atorial Davi	a da mir				1718.000	449.250				
IVI	1700 272	<u>10ary</u>				1718.000	455.000				
	1/99.3/2	431.000				1698.000	455.000				
	1003.000	452.500				1698.000	461 000				
М	aterial Bour	ndarv				1413 743	461.000				
111	164 400	430 400				1412 195	461.000				
	165.257	430.401				1400.000	461.000				
						1236.000	462.000				
Μ	aterial Bour	ndary				1161.000	463.000				
	267.961	422.659				1127.707	462.704				
	268.000	387.845				1126.178	462.690				
						841.706	460.158				
M	aterial Bour	<u>ndary</u>				840.193	460.144				
	157.414	434.000				824.000	460.000				
	162.619	431.318				555.700	460.000				
	164.400	430.400				554.200	460.000				
г.						268.000	460.000				
<u>E</u> )	xternal Boul	ndary				268.000	454.250				
	107.318	424.990				268.000	454.000				
	0.000	427.500				248.000	434.000				
	0.000	347 500				248.000	448.230				
	1979 000	350 000				228 000	448.000				
	1979 000	390.050				228 000	442 250				
	1979.000	430.050				228,000	442 000				
	1841.123	426.953				208.000	442.000				
	1841.000	427.000				208.000	436.250				
	1827.000	432.300				208.000	436.000				
	1803.000	432.300				188.000	436.000				
	1801.461	432.301				188.000	430.250				
	1798.000	431.000				188.000	430.000				

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								COI	nsultants	6
							Page	163	of	212
Written by:	Josep	h Sura	Date:	12/4/2009	Reviewed by:	R. Kula	singam/Jay Bee	e <b>ch</b> Date	: 12/8/	/2009
Client:	Honeywell	Project:	Onor	ndaga Lake SC	CA Final Design	Project/ ]	Proposal No.:	GJ4299	Task No.:	18
	195 500	420.000			г	oouo/Diool	Saarah Dain			
	183.000	429.000			<u> </u>	<u>467 696</u>	442 004	<u>II</u>		
	182 450	427 779				407.000	442.004			
	180.500	427.000			F	ocus/Block	Search Poin	it		
	180.062	426.825			<u>.                                    </u>	466.201	436.248	-		
	173.133	426.959								
	166.176	430.000			<u>S</u>	upport				
	165.257	430.401				554.200	454.250			
	164.289	430.900				554.200	460.000			
	163.062	431.533								
	162.619	431.761			<u>S</u>	upport				
	158.274	434.000				554.200	460.000			
	157.414	434.000				268.000	460.000			
	142.619	434.000								
	129.614	434.000			<u>S</u>	upport	454.000			
-						268.000	454.000			
<u>P</u>	<u>1ezo Line</u>	407 770				248.000	454.000			
	162.430	427.779			0	upport				
	547.000 600.000	424.000			<u> </u>	2/18 000	454 000			
	640,000	425,000				248.000	448 250			
	728 000	425,000				240.000	440.200			
	1102.000	432.000			S	upport				
	1176.000	432.000				248.000	448.250			
	1356.000	429.000				493.200	448.250			
	1474.000	428.500								
	1619.000	427.500			<u>S</u>	upport				
	1689.000	427.500				493.200	454.000			
	1790.000	429.000				493.200	448.250			
	1792.668	429.000			_					
					<u>S</u>	upport				
<u>V</u>	Vater Lable	440 500				268.000	460.000			
	0.000	412.500				268.000	454.250			
	204.000	408.550			0	upport				
	405.000	405.750			<u> </u>		151 250			
	472.000	407.050				200.000 554 200	454.250			
	768 000	407 250				554.200	404.200			
	805.000	408 150			S	upport				
	925.000	408.250			<u> </u>	555.700	454,250			
	1165.000	413.350				555.700	460.000			
	1347.000	410.150								
	1436.000	411.150			S	upport				
	1642.000	409.450				555.700	460.000			
	1768.160	411.260				824.000	460.000			
	1841.123	411.953								
	1979.000	415.050			<u>S</u>	upport				
						824.000	460.000			

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							Page	164	of	212
Written by:	Josep	bh Sura	Date:	12/4/2009	Reviewed by:	R. Kula	singam/Jay B	eech Date	e: <u>12/8/2</u>	2009
Client:	Honeywell	Project:	Onor	ndaga Lake SC	CA Final Design	Project/	Proposal No.:	GJ4299	Task No.:	18
	840.193	460.144				724.201	442.000			
<u>S</u>	<u>Support</u> 840.193 840.193	460.144 454.394			<u>Sı</u>	u <u>pport</u> 228.000 228.000	448.000 442.250			
<u>S</u>	<u>support</u> 840.193 824.000	454.394 454.250			<u>Sı</u>	<u>upport</u> 248.000 530.200	448.000 448.000			
<u>S</u>	<u>support</u> 824.000 555.700	454.250 454.250			<u>Sı</u>	u <u>pport</u> 530.200 530.200	448.000 442.250			
<u>S</u>	<u>Support</u> 738.195 738.195	454.000 448.250			<u>Sı</u>	u <u>pport</u> 531.700 531.700	442.250 448.000			
<u>S</u>	<u>Support</u> 739.701 739.701	454.000 448.250			<u>Sı</u>	u <u>pport</u> 530.200 228.000	442.250 442.250			
<u>S</u>	<u>Support</u> 738.195 494.700	454.000 454.000			<u>Sı</u>	<u>upport</u> 228.000 248.000	448.000 448.000			
<u>S</u>	<u>Support</u> 494.700 494.700	454.000 448.250			<u>Sı</u>	<u>upport</u> 208.000 208.000	436.250 442.000			
<u>S</u>	<u>Support</u> 494.700 738.195	448.250 448.250			<u>Sı</u>	<u>upport</u> 208.000 228.000	442.000 442.000			
<u>S</u>	<u>Support</u> 724.201 724.201	442.000 436.250			<u>Sı</u>	<u>upport</u> 228.000 466.200	442.000 442.000			
<u>S</u>	<u>support</u> 724.201 467.700	436.250 436.250			<u>Si</u>	<u>upport</u> 466.200 466.200	442.000 436.250			
<u>S</u>	<u>upport</u> 467.700 467.700	436.250 442.000			<u>Si</u>	<u>upport</u> 466.200 208.000	436.250 436.250			
<u>S</u>	<u>support</u> 467.700	442.000			<u>Sı</u>	<u>upport</u> 188.000	430.250			

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							Page	165	of 2	212
Written by:	Josep	h Sura	Date:	12/4/2009	Reviewed by:	R. Kula	singam/Jay Beech	Date:	12/8/20	009
Client:	Honeywell	Project:	Onon	daga Lake SC	CA Final Design	Project/	Proposal No.:	GJ4299	Task No.:	18
	188.000	436.000				531.700	448.000			
<u>S</u>	<u>upport</u> 188.000 208.000	436.000 436.000			<u>S</u>	<u>upport</u> 531.700 824.000	442.250 442.250			
<u>S</u>	<u>upport</u> 208.000 506.200	436.000 436.000			<u>S</u>	<u>upport</u> 824.000 832.191	442.250 442.323			
<u>S</u>	<u>upport</u> 507.700 507.700	436.000 430.250			<u>S</u>	<u>upport</u> 841.706 841.706	460.158 454.408			
<u>S</u>	<u>upport</u> 506.200 506.200	436.000 430.250			<u>S</u>	<u>upport</u> 825.700 825.700	436.015 430.265			
<u>S</u>	<u>upport</u> 506.200 188.000	430.250 430.250			<u>S</u>	<u>upport</u> 725.697 725.697	442.000 436.250			
<u>S</u>	<u>upport</u> 507.700 824.200	430.250 430.252			<u>S</u>	<u>upport</u> 725.697 824.000	436.250 436.250			
<u>S</u>	<u>upport</u> 824.200 824.200	430.252 436.002			<u>S</u>	<u>upport</u> 824.000 982.197	436.250 437.658			
<u>S</u>	<u>upport</u> 824.200 507.700	436.002 436.000			<u>S</u>	<u>upport</u> 982.197 982.197	437.658 443.408			
<u>S</u>	<u>upport</u> 832.191 832.191	442.323 448.073			<u>S</u>	<u>upport</u> 982.197 824.000	443.408 442.000			
<u>S</u>	<u>upport</u> 833.715 833.715	442.336 448.086			<u>S</u>	<u>upport</u> 824.000 725.697	442.000 442.000			
<u>S</u>	<u>upport</u> 832.191 824.000	448.073 448.000			<u>S</u>	<u>upport</u> 739.701 824.000	448.250 448.250			
<u>S</u>	<u>upport</u> 824.000	448.000			<u>S</u>	<u>upport</u> 824.000	448.250			

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Written by:	Josep	h Sura	Date:	12/4/2009	Reviewed by:	R. Kulas	ingam/Jay Beec	h Date:	12/8/20	009
Client:	Honeywell	Project:	Onon	daga Lake SC	CA Final Desigr	n Project/ Pr	roposal No.:	GJ4299	Task No.:	18
	983.182	449.667				825.700	430.265			
<u>S</u> I	<u>upport</u> 983.182 983.182	449.667 455.417			<u>2</u>	<u>Support</u> 984.724 984.724	455.431 449.681			
<u>S</u> I	<u>upport</u> 983.182 824.000	455.417 454.000			<u>2</u>	<u>Support</u> 983.718 983.718	443.422 437.672			
<u>S</u> I	<u>upport</u> 824.000 739.701	454.000 454.000			<u>2</u>	<u>Support</u> 983.718 1161.000	437.672 439.250			
<u>S</u> I	<u>upport</u> 841.706 1126.178	454.408 456.940			<u>2</u>	<u>Support</u> 1161.000 1236.000	439.250 438.250			
<u>S</u> I	<u>upport</u> 1126.178 1126.178	456.940 462.690			<u>2</u>	<u>Support</u> 1236.000 1240.193	438.250 438.224			
<u>S</u> I	<u>upport</u> 1126.178 841.706	462.690 460.158			<u>2</u>	<u>Support</u> 1240.193 1240.193	438.224 443.974			
<u>S</u> I	<u>upport</u> 833.715 1134.188	448.086 450.761			<u>2</u>	<u>Support</u> 1240.193 1236.000	443.974 444.000			
<u>S</u> I	<u>upport</u> 1134.188 1134.188	450.761 445.011			<u>S</u>	<u>Support</u> 1236.000 1161.000	444.000 445.000			
<u>S</u>	<u>upport</u> 1134.188 833.715	445.011 442.336			<u>S</u>	<u>Support</u> 1161.000 983.718	445.000 443.422			
<u>S</u> I	<u>upport</u> 825.700 1142.148	436.015 438.832			<u>S</u>	<u>Support</u> 984.724 1161.000	455.431 457.000			
<u>S</u> I	<u>upport</u> 1142.148 1142.148	438.832 433.082			<u>8</u>	<u>Support</u> 1161.000 1228.192	457.000 456.104			
<u>S</u> ı	<u>upport</u> 1142.148	433.082			<u>2</u>	<u>Support</u> 1228.192	456.104			

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							Page	167	of 2	212
Written by:	Josep	h Sura	Date:	12/4/2009	Reviewed by:	R. Kulasi	ingam/Jay Beech	Date:	12/8/2	009
Client:	Honeywell	Project:	Onon	idaga Lake SC	CA Final Design	Project/ Pr	roposal No.:	GJ4299	Task No.:	18
	1228.192	450.354				1161.000	457.250			
<u>S</u> I	<u>upport</u> 1228.192 1161.000	450.354 451.250			<u>S</u> i	<u>upport</u> 1161.000 1127.707	457.250 456.954			
<u>S</u> I	<u>upport</u> 1161.000 984.724	451.250 449.681			<u>Si</u>	<u>upport</u> 1135.719 1135.719	450.775 445.025			
<u>S</u> I	<u>upport</u> 268.000 493.200	454.000 454.000			<u>S</u> i	<u>upport</u> 1135.719 1161.000	450.775 451.000			
<u>S</u> I	<u>upport</u> 1127.707 1127.707	462.704 456.954			<u>S</u> i	<u>upport</u> 1161.000 1135.719	445.250 445.025			
<u>Si</u>	<u>upport</u> 1127.707 1161.000	462.704 463.000			<u>S</u> i	<u>upport</u> 1161.000 1236.000	445.250 444.250			
<u>Si</u>	<u>upport</u> 1161.000 1236.000	463.000 462.000			<u>S</u>	<u>upport</u> 1236.000 1400.000	444.250 443.250			
<u>Si</u>	<u>upport</u> 1236.000 1400.000	462.000 461.000			<u>S</u> i	<u>upport</u> 1400.000 1436.205	443.250 443.250			
<u>S</u> I	<u>upport</u> 1400.000 1412.195	461.000 461.000			<u>S</u>	<u>upport</u> 1436.205 1436.205	443.250 449.000			
<u>S</u> i	<u>upport</u> 1412.195 1412.195	461.000 455.250			<u>S</u> i	<u>upport</u> 1437.780 1437.780	449.000 443.250			
<u>S</u> I	<u>upport</u> 1412.195 1400.000	455.250 455.250			<u>S</u> i	<u>upport</u> 1436.205 1400.000	449.000 449.000			
<u>S</u> I	<u>upport</u> 1400.000 1236.000	455.250 456.250			<u>S</u>	<u>upport</u> 1400.000 1236.000	449.000 450.000			
<u>S</u> I	<u>upport</u> 1236.000	456.250			<u>S</u>	<u>upport</u> 1236.000	450.000			

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Written by:	Josep	h Sura	Date:	12/4/2009	Reviewed by:	R. Kulas	ingam/Jay Beech	Date:	12/8/2	009
Client:	Honeywell	Project:	Onor	ndaga Lake SC	CA Final Design	Project/ Pr	roposal No.:	GJ4299	Task No.:	18
	1161.000	451.000				1161.000	433.250			
<u>S</u>	<u>upport</u> 1229.723 1229.723	456.084 450.334			<u>S</u>	<u>upport</u> 1161.000 1143.812	439.000 438.847			
<u>S</u>	<u>upport</u> 1229.723 1236.000	450.334 450.250			<u>S</u>	<u>upport</u> 1161.000 1236.000	439.000 438.000			
<u>S</u> i	<u>upport</u> 1236.000 1229.723	456.000 456.084			<u>S</u>	<u>upport</u> 1236.000 1400.000	438.000 437.000			
<u>S</u> i	<u>upport</u> 1236.000 1400.000	456.000 455.000			<u>S</u>	<u>upport</u> 1400.000 1460.199	437.000 437.000			
<u>S</u> i	<u>upport</u> 1400.000 1473.204	455.000 455.000			<u>S</u>	<u>upport</u> 1460.199 1460.199	437.000 431.250			
<u>S</u> i	<u>upport</u> 1473.204 1473.204	455.000 449.250			<u>S</u>	<u>upport</u> 1461.784 1461.784	431.250 437.000			
<u>S</u> i	<u>upport</u> 1474.788 1474.788	449.250 455.000			<u>S</u>	<u>upport</u> 1460.199 1400.000	431.250 431.250			
<u>S</u> i	<u>upport</u> 1473.204 1400.000	449.250 449.250			<u>S</u>	<u>upport</u> 1400.000 1236.000	431.250 432.250			
<u>S</u>	<u>upport</u> 1400.000 1236.000	449.250 450.250			<u>S</u>	<u>upport</u> 1236.000 1161.000	432.250 433.250			
<u>S</u> i	<u>upport</u> 1241.724 1241.724	438.215 443.965			<u>S</u>	<u>upport</u> 1241.724 1400.000	438.215 437.250			
<u>S</u> i	<u>upport</u> 1143.812 1143.812	438.847 433.097			<u>S</u>	<u>upport</u> 1400.000 1498.182	437.250 437.250			
S	<u>upport</u> 1143.812	433.097			<u>S</u>	<u>upport</u> 1498.182	443.000			

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Written by:	Josep	h Sura	Date:	12/4/2009	Reviewed by:	R. Kulas	singam/Jay Beech	Date:	12/8/2	009
Client:	Honeywell	Project:	Onon	daga Lake SC	CA Final Design	Project/ P	Proposal No.:	GJ4299	Task No.:	18
	1498.182	437.250				1778.100	437.000			
<u>S</u>	<u>upport</u> 1499.766 1499.766	437.250 443.000			<u>Si</u>	<u>upport</u> 1758.000 1461.784	437.000 437.000			
<u>S</u>	<u>upport</u> 1498.182 1400.000	443.000 443.000			<u>S</u> ı	<u>upport</u> 1437.780 1738.000	443.250 443.250			
<u>S</u>	<u>upport</u> 1400.000 1241.724	443.000 443.965			<u>Si</u>	upport 1738.000 1738.000	443.250 449.000			
<u>S</u>	<u>upport</u> 1413.743 1413.743	461.000 455.250			<u>Si</u>	<u>upport</u> 1718.000 1437.780	449.000 449.000			
<u>S</u>	<u>upport</u> 1413.743 1698.000	461.000 461.000			<u>Si</u>	<u>upport</u> 1499.766 1758.000	437.250 437.250			
<u>S</u>	<u>upport</u> 1698.000 1698.000	461.000 455.250			<u>Si</u>	<u>upport</u> 1758.000 1758.000	437.250 443.000			
<u>S</u>	<u>upport</u> 1698.000 1413.743	455.250 455.250			<u>S</u> ı	<u>upport</u> 1738.000 1499.766	443.000 443.000			
<u>S</u>	<u>upport</u> 1474.788 1718.000	449.250 449.250			<u>Si</u>	<u>upport</u> 1718.000 1698.000	455.000 455.000			
<u>S</u>	<u>upport</u> 1718.000 1718.000	449.250 455.000			<u>Si</u>	<u>upport</u> 1718.000 1738.000	449.000 449.000			
<u>S</u>	<u>upport</u> 1698.000 1474.788	455.000 455.000			<u>Si</u>	<u>upport</u> 1738.000 1758.000	443.000 443.000			
<u>S</u>	<u>upport</u> 1461.784 1778.100	431.250 431.250			<u>Si</u>	<u>upport</u> 1758.000 1778.100	437.000 437.000			
<u>S</u>	<u>upport</u> 1778.100	431.250								

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						con	sultants	3
					Page	170	of	212
Written by:	Joseph Sura	Date:	12/4/2009	Reviewed by:	R. Kulasingam/Jay Beech	Date	12/8	/2009
Client:	Honeywell Project	Onoi	ndaga Lake SC	- CA Final Design	Project/ Proposal No.: 0	GJ4299	Task No.:	18

### **Document Name**

File Name: eastwest\_nocover\_tube\_05\_lab

#### **Project Settings**

Project Title: SLIDE - An Interactive Slope Stability Program Failure Direction: Right to Left Units of Measurement: Imperial Units Pore Fluid Unit Weight: 62.4 lb/ft3 Groundwater Method: Water Surfaces Data Output: Standard Calculate Excess Pore Pressure: Off Allow Ru with Water Surfaces or Grids: Off Random Numbers: Pseudo-random Seed Random Number Seed: 10116 Random Number Generation Method: Park and Miller v.3

#### **Analysis Methods**

Analysis Methods used: Bishop simplified Janbu simplified Spencer

Number of slices: 25 Tolerance: 0.005 Maximum number of iterations: 50

#### Surface Options

Surface Type: Non-Circular Block Search Number of Surfaces: 5000 Pseudo-Random Surfaces: Enabled Convex Surfaces Only: Disabled Left Projection Angle (Start Angle): 95 Left Projection Angle (End Angle): 175 Right Projection Angle (Start Angle): 5 Right Projection Angle (End Angle): 85 Minimum Elevation: Not Defined Minimum Depth: Not Defined

#### Material Properties

Material: Final Cover Soil Strength Type: Mohr-Coulomb Unit Weight: 120 lb/ft3 Cohesion: 0 psf Friction Angle: 30 degrees Water Surface: Water Table Custom Hu value: 1

Material: Dike Soil Strength Type: Mohr-Coulomb Unit Weight: 120 lb/ft3 Cohesion: 0 psf Friction Angle: 35 degrees Water Surface: Water Table Custom Hu value: 1

#### Material: Gravel

Strength Type: Mohr-Coulomb Unit Weight: 120 lb/ft3 Cohesion: 0 psf Friction Angle: 38 degrees Water Surface: Piezometric Line 1 Custom Hu value: 1

#### Material: SOLW (undrained)

Strength Type: Discrete function Unit Weight: 82 lb/ft3 Water Surface: Water Table Custom Hu value: 1

#### Material: Dredge Material

Strength Type: Mohr-Coulomb Unit Weight: 86 lb/ft3 Cohesion: 0 psf Friction Angle: 15 degrees Water Surface: Water Table Custom Hu value: 1

#### Material: Tube-Tube Interface (Horizontal)

Strength Type: Mohr-Coulomb Unit Weight: 86 lb/ft3 Cohesion: 0 psf Friction Angle: 15 degrees Water Surface: Water Table Custom Hu value: 1

<u>Material: Tub-Tube Interface (Vertical)</u> Strength Type: Mohr-Coulomb Unit Weight: 43 lb/ft3 Cohesion: 0 psf

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						Page	171	of	2	212
Written by:	Joseph	Sura	Date:	12/4/2009	Reviewed by:	R. Kulasingam/Jay Be	ech Date	: 1	12/8/20	009
Client:	Honeywell	Project:	Onor	ndaga Lake SC	CA Final Design	Project/ Proposal No.:	GJ4299	Task	No.:	18
F V C <u>M</u> S L C F V C <u>M</u> S L	riction Angle: Vater Surface: Custom Hu vali Atterial: Tube- trength Type: Init Weight: 86 Cohesion: 0 ps riction Angle: Vater Surface: Custom Hu vali Atterial: Liner Crength Type: Init Weight: 10	0.1 degree Water Tab ue: 1 <u>Gravel Inte</u> Mohr-Cou b lb/ft3 f 24 degrees Water Tab ue: 1 Mohr-Cou 00 lb/ft3	es ble e <u>rface</u> lomb s ble		Le Ri Dr <u>Mi</u> FS Ax Le Ri Le Ri Dr	oft Slope Intercept: 188 ght Slope Intercept: 55 esisting Moment=1.303 iving Moment=1.38649 ethod: janbu simplified 3: 9.809610 dis Location: 357.745, 8 oft Slip Surface Endpoin ght Slip Surface Endpoin ght Slope Intercept: 188 ght Slope Intercept: 58 esisting Horizontal Forces	.000 436.00 1.470 460. 882e+008 lk 9e+007 lb-fi 844.189 nt: 188.000 pint: 587.08 .000 436.00 7.089 460. ce=353073 =35992.6 lb	00 000 p-ft t 9, 430.2 9, 460 00 000 Ib	200 .000	
	Cohesion: 0 ps riction Angle: Vater Surface: Custom Hu value Atterial: Found Atterial: Found trength Type: Juit Weight: 12 Cohesion: 0 ps riction Angle: Vater Surface: Custom Hu value	f 19 degrees Water Tab ue: 1 <u>dation</u> Mohr-Cou 20 lb/ft3 f 37 degrees Water Tab ue: 1	s ble lomb s ble		Ma Re Dr Re Dr <b>Va</b> Nu Nu Er	ethod: spencer esisting Moment=0 lb-ft iving Moment=0 lb-ft esisting Horizontal Force iving Horizontal Force alid / Invalid Surfa ethod: bishop simplified umber of Valid Surface umber of Invalid Surface ror Codes:	t ce=0 lb =0 lb <u>ices</u> <u>d</u> s: 1648 ces: 3352	u rfo oo	0	

### **Support Properties**

Support: Geotube Geotube Support Type: GeoTextile Force Application: Passive Force Orientation: Tangent to Slip Surface Anchorage: Both Ends Shear Strength Model: Linear Strip Coverage: 100 percent Tensile Strength: 1600 lb/ft Pullout Strength Adhesion: 5 lb/ft2 Pullout Strength Friction Angle: 40 degrees

#### **Global Minimums**

Method: bishop simplified FS: 9.403780 Axis Location: 339.979, 808.592 Left Slip Surface Endpoint: 188.000, 430.244 Right Slip Surface Endpoint: 551.470, 460.000

Error Code -107 reported for 1640 surfaces Error Code -108 reported for 1654 surfaces Error Code -112 reported for 58 surfaces

Method: janbu simplified Number of Valid Surfaces: 1420 Number of Invalid Surfaces: 3580 Error Codes: Error Code -107 reported for 1640 surfaces Error Code -108 reported for 1906 surfaces Error Code -112 reported for 34 surfaces

Method: spencer Number of Valid Surfaces: 0 Number of Invalid Surfaces: 5000 Error Codes: Error Code -107 reported for 1640 surfaces Error Code -108 reported for 2152 surfaces Error Code -111 reported for 1149 surfaces Error Code -112 reported for 59 surfaces

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						con	sultants	
					Page	172	of	212
Written by:	Joseph Sura	Date:	12/4/2009	Reviewed by:	R. Kulasingam/Jay Beech	Date:	12/8/2	009
Client:	Honeywell Project:	Onoi	ndaga Lake S(	CA Final Design	Project/ Proposal No.: C	J4299	Task No.:	18

### **Document Name**

File Name: eastwest\_nocover\_liner\_lab

### **Project Settings**

Project Title: SLIDE - An Interactive Slope Stability Program Failure Direction: Right to Left Units of Measurement: Imperial Units Pore Fluid Unit Weight: 62.4 lb/ft3 Groundwater Method: Water Surfaces Data Output: Standard Calculate Excess Pore Pressure: Off Allow Ru with Water Surfaces or Grids: Off Random Numbers: Pseudo-random Seed Random Number Seed: 10116 Random Number Generation Method: Park and Miller v.3

# **Analysis Methods**

Analysis Methods used: Bishop simplified Janbu simplified Spencer

Number of slices: 25 Tolerance: 0.005 Maximum number of iterations: 50

### Surface Options

Surface Type: Non-Circular Block Search Number of Surfaces: 5000 Pseudo-Random Surfaces: Enabled Convex Surfaces Only: Disabled Left Projection Angle (Start Angle): 95 Left Projection Angle (End Angle): 175 Right Projection Angle (Start Angle): 5 Right Projection Angle (End Angle): 85 Minimum Elevation: Not Defined Minimum Depth: Not Defined

# **Material Properties**

Material: Final Cover Soil Strength Type: Mohr-Coulomb Unit Weight: 120 lb/ft3 Cohesion: 0 psf Friction Angle: 30 degrees Water Surface: Water Table Custom Hu value: 1

Material: Dike Soil Strength Type: Mohr-Coulomb Unit Weight: 120 lb/ft3 Cohesion: 0 psf Friction Angle: 35 degrees Water Surface: Water Table Custom Hu value: 1

#### Material: Gravel

Strength Type: Mohr-Coulomb Unit Weight: 120 lb/ft3 Cohesion: 0 psf Friction Angle: 38 degrees Water Surface: Piezometric Line 1 Custom Hu value: 1

#### Material: SOLW (undrained)

Strength Type: Discrete function Unit Weight: 82 lb/ft3 Water Surface: Water Table Custom Hu value: 1

#### Material: Dredge Material

Strength Type: Mohr-Coulomb Unit Weight: 86 lb/ft3 Cohesion: 0 psf Friction Angle: 15 degrees Water Surface: Water Table Custom Hu value: 1

#### Material: Tube-Tube Interface (Horizontal)

Strength Type: Mohr-Coulomb Unit Weight: 86 lb/ft3 Cohesion: 0 psf Friction Angle: 15 degrees Water Surface: Water Table Custom Hu value: 1

Material: Tub-Tube Interface (Vertical) Strength Type: Mohr-Coulomb Unit Weight: 43 lb/ft3 Cohesion: 0 psf

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							co	nsulta	ints	
						Page	173	of	2	212
Written by:	Joseph S	Sura	Date:	12/4/2009	Reviewed by:	R. Kulasingam/Jay Be	ech Dat	e:	12/8/20	009
Client:	Honeywell	Project:	Onor	ndaga Lake SC	CA Final Design	Project/ Proposal No.:	GJ4299	Task	No.:	18
F	riction Angle:	0.1 degree	es		Re	esisting Moment=7.931	33e+006 l	b-ft		
N	Vater Surface:	Water Ta	ble		Dr	iving Moment=4.38456	Se+006 lb-	ŕt		
C	sustom Hu Vall	Je: 1			Ma	othod: ionhu cimplified				
N	laterial <sup>.</sup> Tube-	Gravel Int	erface		<u>IVIE</u> FS					
<u>10</u> S	trength Type:	Mohr-Cou	lomb		Ax	ris Location: 200 120 5	584 614			
Ŭ	Init Weight: 86	lb/ft3			Le	ft Slip Surface Endpoir	nt: 159.018	3. 431.7	727	
Č	ohesion: 0 ps	+			Rie	ght Slip Surface Endpo	oint: 297.76	58, 460	0.000	
F	riction Angle:	24 degree	S		Re	esisting Horizontal Ford	ce=48680.	7 ĺb		
V	Vater Surface:	Water Ta	ble		Dr	iving Horizontal Force=	=26119.5	b		
С	ustom Hu valu	ue: 1				•				

Material: Liner Strength Type: Mohr-Coulomb Unit Weight: 100 lb/ft3 Cohesion: 0 psf Friction Angle: 19 degrees Water Surface: Water Table Custom Hu value: 1

Material: Foundation Strength Type: Mohr-Coulomb Unit Weight: 120 lb/ft3 Cohesion: 0 psf Friction Angle: 37 degrees Water Surface: Water Table Custom Hu value: 1

### **Support Properties**

Support: Geotube Geotube Support Type: GeoTextile Force Application: Passive Force Orientation: Tangent to Slip Surface Anchorage: Both Ends Shear Strength Model: Linear Strip Coverage: 100 percent Tensile Strength: 1600 lb/ft Pullout Strength Adhesion: 5 lb/ft2 Pullout Strength Friction Angle: 40 degrees

### **Global Minimums**

Method: bishop simplified FS: 1.808920 Axis Location: 200.120, 584.614 Left Slip Surface Endpoint: 159.018, 431.727 Right Slip Surface Endpoint: 297.768, 460.000

#### Method: spencer

FS: 1.909240 Axis Location: 214.140, 607.141 Left Slip Surface Endpoint: 162.955, 430.152 Right Slip Surface Endpoint: 325.020, 460.000 Resisting Moment=1.42301e+007 lb-ft Driving Moment=7.4533e+006 lb-ft Resisting Horizontal Force=75987 lb Driving Horizontal Force=39799.6 lb

# Valid / Invalid Surfaces

Method: bishop simplified Number of Valid Surfaces: 798 Number of Invalid Surfaces: 4202 Error Codes: Error Code -105 reported for 3904 surfaces Error Code -107 reported for 27 surfaces Error Code -108 reported for 128 surfaces Error Code -112 reported for 143 surfaces

Method: janbu simplified Number of Valid Surfaces: 762 Number of Invalid Surfaces: 4238 Error Codes: Error Code -105 reported for 3904 surfaces Error Code -107 reported for 27 surfaces Error Code -108 reported for 172 surfaces Error Code -112 reported for 135 surfaces

Method: spencer Number of Valid Surfaces: 246 Number of Invalid Surfaces: 4754 Error Codes: Error Code -105 reported for 3904 surfaces Error Code -107 reported for 27 surfaces Error Code -108 reported for 171 surfaces

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						con	sultant	S
					Page	174	of	212
Written by:	Joseph Sura	Date:	12/4/2009	Reviewed by:	R. Kulasingam/Jay Beech	Date:	12/8	8/2009
Client:	Honeywell Project	t: Ono	ndaga Lake SC	CA Final Design	Project/ Proposal No.: 0	GJ4299	Task No.	.: 18

Error Code -111 reported for 508 surfaces Error Code -112 reported for 144 surfaces

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					Page	175	of	212
Written by:	Joseph Sura	Date:	12/4/2009	Reviewed by:	R. Kulasingam/Jay Beech	Date:	12/	/8/2009
Client:	Honeywell Project:	Onor	ndaga Lake SC	CA Final Design	Project/ Proposal No.: G	J4299	Task No	o.: <b>18</b>

## Document Name

File Name: eastwest\_nocover\_global\_su\_lab

### **Project Settings**

Project Title: SLIDE - An Interactive Slope Stability Program Failure Direction: Right to Left Units of Measurement: Imperial Units Pore Fluid Unit Weight: 62.4 lb/ft3 Groundwater Method: Water Surfaces Data Output: Standard Calculate Excess Pore Pressure: Off Allow Ru with Water Surfaces or Grids: Off Random Numbers: Pseudo-random Seed Random Number Seed: 10116 Random Number Generation Method: Park and Miller v.3

# **Analysis Methods**

Analysis Methods used: Bishop simplified Janbu simplified Spencer

Number of slices: 25 Tolerance: 0.005 Maximum number of iterations: 50

# Surface Options

Surface Type: Circular Search Method: Grid Search Radius increment: 10 Composite Surfaces: Disabled Reverse Curvature: Create Tension Crack Minimum Elevation: Not Defined Minimum Depth: Not Defined

# **Material Properties**

Material: Final Cover Soil Strength Type: Mohr-Coulomb Unit Weight: 120 lb/ft3 Cohesion: 0 psf Friction Angle: 30 degrees Water Surface: Water Table Custom Hu value: 1

Material: Dike Soil Strength Type: Mohr-Coulomb Unit Weight: 120 lb/ft3 Cohesion: 0 psf Friction Angle: 35 degrees Water Surface: Water Table Custom Hu value: 1

<u>Material: Gravel</u> Strength Type: Mohr-Coulomb Unit Weight: 120 lb/ft3 Cohesion: 0 psf Friction Angle: 38 degrees Water Surface: Piezometric Line 1 Custom Hu value: 1

<u>Material: SOLW (undrained)</u> Strength Type: Discrete function Unit Weight: 82 lb/ft3 Water Surface: Water Table Custom Hu value: 1

Material: Dredge Material Strength Type: Mohr-Coulomb Unit Weight: 86 lb/ft3 Cohesion: 0 psf Friction Angle: 15 degrees Water Surface: Water Table Custom Hu value: 1

<u>Material: Tube-Tube Interface (Horizontal)</u> Strength Type: Mohr-Coulomb Unit Weight: 86 lb/ft3 Cohesion: 0 psf Friction Angle: 15 degrees Water Surface: Water Table Custom Hu value: 1

Material: Tub-Tube Interface (Vertical) Strength Type: Mohr-Coulomb Unit Weight: 43 lb/ft3 Cohesion: 0 psf Friction Angle: 0.1 degrees Water Surface: Water Table Custom Hu value: 1

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						con	sultants	
					Page	176	of	212
Written by:	Joseph Sura	Date:	12/4/2009	Reviewed by:	R. Kulasingam/Jay Beech	Date:	12/8/2	2009
Client:	Honevwell Proje	ect: Ono	ndaga Lake SO	– CA Final Design	Project/ Proposal No.:	GJ4299	Task No.:	18

Material: Tube-Gravel Interface Strength Type: Mohr-Coulomb Unit Weight: 86 lb/ft3 Cohesion: 0 psf Friction Angle: 24 degrees Water Surface: Water Table Custom Hu value: 1

- <u>Material: Liner</u> Strength Type: Mohr-Coulomb Unit Weight: 100 lb/ft3 Cohesion: 0 psf Friction Angle: 19 degrees Water Surface: Water Table Custom Hu value: 1
- <u>Material: Foundation</u> Strength Type: Mohr-Coulomb Unit Weight: 120 lb/ft3 Cohesion: 0 psf Friction Angle: 37 degrees Water Surface: Water Table Custom Hu value: 1

### **Support Properties**

Support: Geotube Geotube Support Type: GeoTextile Force Application: Passive Force Orientation: Tangent to Slip Surface Anchorage: Both Ends Shear Strength Model: Linear Strip Coverage: 100 percent Tensile Strength: 1600 lb/ft Pullout Strength Adhesion: 5 lb/ft2 Pullout Strength Friction Angle: 40 degrees

# **Global Minimums**

Method: bishop simplified FS: 1.360620 Center: 229.669, 488.062 Radius: 84.414 Left Slip Surface Endpoint: 171.784, 426.621 Right Slip Surface Endpoint: 309.282, 460.000 Resisting Moment=8.19054e+006 lb-ft Driving Moment=6.01973e+006 lb-ft Method: janbu simplified FS: 1.339970 Center: 229.669, 488.062 Radius: 84.414 Left Slip Surface Endpoint: 171.784, 426.621 Right Slip Surface Endpoint: 309.282, 460.000 Resisting Horizontal Force=77760.4 lb Driving Horizontal Force=58031.5 lb

#### Method: spencer

FS: 1.359710 Center: 229.669, 488.062 Radius: 84.414 Left Slip Surface Endpoint: 171.784, 426.621 Right Slip Surface Endpoint: 309.282, 460.000 Resisting Moment=8.18509e+006 lb-ft Driving Moment=6.01973e+006 lb-ft Resisting Horizontal Force=77704.5 lb Driving Horizontal Force=57147.8 lb

# Valid / Invalid Surfaces

Method: bishop simplified Number of Valid Surfaces: 9250 Number of Invalid Surfaces: 9241 Error Codes: Error Code -103 reported for 7193 surfaces Error Code -105 reported for 1 surface Error Code -106 reported for 551 surfaces Error Code -107 reported for 239 surfaces Error Code -108 reported for 136 surfaces Error Code -110 reported for 79 surfaces Error Code -111 reported for 1042 surfaces

Method: janbu simplified Number of Valid Surfaces: 8601 Number of Invalid Surfaces: 9890 Error Codes: Error Code -103 reported for 7193 surfaces Error Code -105 reported for 1 surface Error Code -106 reported for 551 surfaces Error Code -107 reported for 239 surfaces Error Code -108 reported for 743 surfaces Error Code -110 reported for 79 surfaces Error Code -111 reported for 1084 surfaces

### Method: spencer

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						Page	177	of	212
Written by:	Joseph	Sura	Date:	12/4/2009	Reviewed by:	R. Kulasingam/Jay Bee	<b>ch</b> Date	: 12/8/	2009
Client:	Honeywell	Project:	Onor	ndaga Lake SC	CA Final Design	Project/ Proposal No.:	GJ4299	Task No.:	18
N N E E	umber of Valio umber of Inva rror Codes: rror Code -103	d Surfaces Ilid Surface 3 reported	s: 5324 es: 1310 for 719	67 )3 surfaces					

Error Code -105 reported for 1 surface

Error Code -106 reported for 551 surfaces Error Code -107 reported for 239 surfaces Error Code -108 reported for 876 surfaces

Error Code -110 reported for 79 surfaces

Error Code -111 reported for 3126 surfaces Error Code -112 reported for 1102 surfaces

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					Page	178	of	212
Written by:	Joseph Sura	Date:	12/4/2009	Reviewed by:	R. Kulasingam/Jay Beecl	n Date:	12/8	/2009
Client:	Honevwell Pro	iect: Ono	ndaga Lake SO	CA Final Design	Project/ Proposal No.:	GJ4299	Task No.:	18

## **Document Name**

File Name: eastwest\_nocover\_external\_lab

### **Project Settings**

Project Title: SLIDE - An Interactive Slope Stability Program Failure Direction: Right to Left Units of Measurement: Imperial Units Pore Fluid Unit Weight: 62.4 lb/ft3 Groundwater Method: Water Surfaces Data Output: Standard Calculate Excess Pore Pressure: Off Allow Ru with Water Surfaces or Grids: Off Random Numbers: Pseudo-random Seed Random Number Seed: 10116 Random Number Generation Method: Park and Miller v.3

# **Analysis Methods**

Analysis Methods used: Bishop simplified Janbu simplified Spencer

Number of slices: 25 Tolerance: 0.005 Maximum number of iterations: 50

# Surface Options

Surface Type: Circular Search Method: Grid Search Radius increment: 10 Composite Surfaces: Disabled Reverse Curvature: Create Tension Crack Minimum Elevation: Not Defined Minimum Depth: Not Defined

# **Material Properties**

Material: Final Cover Soil Strength Type: Mohr-Coulomb Unit Weight: 120 lb/ft3 Cohesion: 0 psf Friction Angle: 30 degrees Water Surface: Water Table Custom Hu value: 1

Material: Dike Soil Strength Type: Mohr-Coulomb Unit Weight: 120 lb/ft3 Cohesion: 0 psf Friction Angle: 35 degrees Water Surface: Water Table Custom Hu value: 1

<u>Material: Gravel</u> Strength Type: Mohr-Coulomb Unit Weight: 120 lb/ft3 Cohesion: 0 psf Friction Angle: 38 degrees Water Surface: Piezometric Line 1 Custom Hu value: 1

<u>Material: SOLW (undrained)</u> Strength Type: Discrete function Unit Weight: 82 lb/ft3 Water Surface: Water Table Custom Hu value: 1

Material: Dredge Material Strength Type: Mohr-Coulomb Unit Weight: 86 lb/ft3 Cohesion: 0 psf Friction Angle: 15 degrees Water Surface: Water Table Custom Hu value: 1

Material: Tube-Tube Interface (Horizontal) Strength Type: Mohr-Coulomb Unit Weight: 86 lb/ft3 Cohesion: 0 psf Friction Angle: 15 degrees Water Surface: Water Table Custom Hu value: 1

Material: Tub-Tube Interface (Vertical) Strength Type: Mohr-Coulomb Unit Weight: 43 lb/ft3 Cohesion: 0 psf Friction Angle: 0.1 degrees Water Surface: Water Table Custom Hu value: 1
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						cons	sultants	
					Page	179	of	212
Written by:	Joseph Sura	Date:	12/4/2009	Reviewed by:	R. Kulasingam/Jay Beech	Date:	12/8/2	2009
Client:	Honevwell Project:	Onor	ndaga Lake SC	– CA Final Design	Project/ Proposal No.: G	J4299	Task No.:	18

Material: Tube-Gravel Interface Strength Type: Mohr-Coulomb Unit Weight: 86 lb/ft3 Cohesion: 0 psf Friction Angle: 24 degrees Water Surface: Water Table Custom Hu value: 1

- <u>Material: Liner</u> Strength Type: Mohr-Coulomb Unit Weight: 100 lb/ft3 Cohesion: 0 psf Friction Angle: 19 degrees Water Surface: Water Table Custom Hu value: 1
- <u>Material: Foundation</u> Strength Type: Mohr-Coulomb Unit Weight: 120 lb/ft3 Cohesion: 0 psf Friction Angle: 37 degrees Water Surface: Water Table Custom Hu value: 1

### **Support Properties**

Support: Geotube Geotube Support Type: GeoTextile Force Application: Passive Force Orientation: Tangent to Slip Surface Anchorage: Both Ends Shear Strength Model: Linear Strip Coverage: 100 percent Tensile Strength: 1600 lb/ft Pullout Strength Adhesion: 5 lb/ft2 Pullout Strength Friction Angle: 40 degrees

## **Global Minimums**

<u>Method: bishop simplified</u> FS: 8.385650 Center: -41.981, 4880.403 Radius: 4492.873 Left Slip Surface Endpoint: -698.188, 435.710 Right Slip Surface Endpoint: 761.724, 460.000 Resisting Moment=4.66372e+009 lb-ft Driving Moment=5.56154e+008 lb-ft Method: janbu simplified FS: 8.383790 Center: -41.981, 4880.403 Radius: 4492.873 Left Slip Surface Endpoint: -698.188, 435.710 Right Slip Surface Endpoint: 761.724, 460.000 Resisting Horizontal Force=1.0337e+006 lb Driving Horizontal Force=123298 lb

#### Method: spencer

FS: 8.385530 Center: -41.981, 4880.403 Radius: 4492.873 Left Slip Surface Endpoint: -698.188, 435.710 Right Slip Surface Endpoint: 761.724, 460.000 Resisting Moment=4.66365e+009 lb-ft Driving Moment=5.56154e+008 lb-ft Resisting Horizontal Force=1.03369e+006 lb Driving Horizontal Force=123271 lb

## Valid / Invalid Surfaces

Method: bishop simplified Number of Valid Surfaces: 944 Number of Invalid Surfaces: 3863 Error Codes: Error Code -101 reported for 38 surfaces Error Code -110 reported for 247 surfaces Error Code -113 reported for 212 surfaces Error Code -1000 reported for 3366 surfaces

Method: janbu simplified Number of Valid Surfaces: 944 Number of Invalid Surfaces: 3863 Error Codes: Error Code -101 reported for 38 surfaces Error Code -110 reported for 247 surfaces Error Code -113 reported for 212 surfaces Error Code -1000 reported for 3366 surfaces

Method: spencer Number of Valid Surfaces: 939 Number of Invalid Surfaces: 3868 Error Codes: Error Code -101 reported for 38 surfaces Error Code -110 reported for 247 surfaces Error Code -111 reported for 5 surfaces

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						con	sulta	ants
					Page	180	of	212
Written by:	Joseph Sura	Date:	12/4/2009	Reviewed by:	R. Kulasingam/Jay Beech	Date:		12/8/2009
Client:	Honeywell Project:	Onor	ndaga Lake SC	CA Final Design	Project/ Proposal No.: G	J4299	Task	No.: 18

Error Code -113 reported for 212 surfaces Error Code -1000 reported for 3366 surfaces

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						con	sultan	ts
					Page	181	of	212
Written by:	Joseph Sura	Date:	12/4/2009	Reviewed by:	R. Kulasingam/Jay Beech	Date:	12/	/8/2009
Client:	Honeywell Project	Onor	ndaga Lake SC	CA Final Design	Project/ Proposal No.:	GJ4299	Task No	o.: <b>18</b>

**Cross-Section B-B: After Placement of Final Cover** 

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					Page	182	of	212
Written by:	Joseph Sura	Date:	12/4/2009	Reviewed by:	R. Kulasingam/Jay Beech	Date	. 12/	/8/2009
Client:	Honeywell Project	Onoi	ndaga Lake SC	CA Final Design	Project/ Proposal No.: G	J4299	Task No	o.: <b>18</b>

#### **Document Name**

File Name: eastwest\_cover\_tube\_04\_lab

### Project Settings

Project Title: SLIDE - An Interactive Slope Stability Program Failure Direction: Right to Left Units of Measurement: Imperial Units Pore Fluid Unit Weight: 62.4 lb/ft3 Groundwater Method: Water Surfaces Data Output: Standard Calculate Excess Pore Pressure: Off Allow Ru with Water Surfaces or Grids: Off Random Numbers: Pseudo-random Seed Random Number Seed: 10116 Random Number Generation Method: Park and Miller v.3

#### **Analysis Methods**

Analysis Methods used: Bishop simplified Janbu simplified Spencer

Number of slices: 25 Tolerance: 0.005 Maximum number of iterations: 50

#### Surface Options

Surface Type: Non-Circular Block Search Number of Surfaces: 5000 Pseudo-Random Surfaces: Enabled Convex Surfaces Only: Disabled Left Projection Angle (Start Angle): 95 Left Projection Angle (End Angle): 175 Right Projection Angle (Start Angle): 5 Right Projection Angle (End Angle): 85 Minimum Elevation: Not Defined Minimum Depth: Not Defined

### **Material Properties**

Material: Final Cover Soil Strength Type: Mohr-Coulomb Unit Weight: 120 lb/ft3 Cohesion: 0 psf Friction Angle: 30 degrees Water Surface: Water Table Custom Hu value: 1

Material: Dike Soil Strength Type: Mohr-Coulomb Unit Weight: 120 lb/ft3 Cohesion: 0 psf Friction Angle: 35 degrees Water Surface: Water Table Custom Hu value: 1

#### Material: Gravel

Strength Type: Mohr-Coulomb Unit Weight: 120 lb/ft3 Cohesion: 0 psf Friction Angle: 38 degrees Water Surface: Piezometric Line 1 Custom Hu value: 1

#### Material: SOLW (undrained)

Strength Type: Discrete function Unit Weight: 82 lb/ft3 Water Surface: Water Table Custom Hu value: 1

#### Material: Dredge Material

Strength Type: Mohr-Coulomb Unit Weight: 86 lb/ft3 Cohesion: 0 psf Friction Angle: 15 degrees Water Surface: Water Table Custom Hu value: 1

#### Material: Tube-Tube Interface (Horizontal)

Strength Type: Mohr-Coulomb Unit Weight: 86 lb/ft3 Cohesion: 0 psf Friction Angle: 15 degrees Water Surface: Water Table Custom Hu value: 1

<u>Material: Tub-Tube Interface (Vertical)</u> Strength Type: Mohr-Coulomb Unit Weight: 43 lb/ft3 Cohesion: 0 psf

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Written by:	Joseph	Sura	Date:	12/4/2009	Reviewed by:	: .	R. Kulasingam/Jay B	eech	Date	: 12/8/2	2009
Client:	Honeywell	Project:	Ono	ndaga Lake SO	CA Final Design	n I	Project/ Proposal No.:	G	J4299	Task No.:	18
F W	riction Angle: Vater Surface	: 0.1 degree : Water Tal	es ble		F	Resis Drivir	sting Moment=6.58 ng Moment=1.1300	126e 9e+0	+007 lb 07 lb-ft	o-ft	
0		iue. I			Ν	Meth	od <sup>.</sup> ianhu simplified	4			
Ν	laterial: Tube	-Gravel Inte	erface		F	-S: 5	5.999280	<u>-</u>			
S	trength Type	: Mohr-Cou	lomb		A	Axis I	Location: 320.318,	784.9	965		
U	Init Weight: 8	6 lb/ft3			L	_eft S	Slip Surface Endpoi	int: 17	79.292,	436.392	
С	ohesion: 0 p	sf			F	Right	Slip Surface Endp	oint:	514.56	0, 463.000	)
F	riction Angle	24 degree	s		F	Resis	sting Horizontal For	rce=1	85215	lb	
W C	Vater Surface	e: Water Tal lue: 1	ble		C	Drivir	ng Horizontal Force	e=308	872.8 lb	)	
					Ν	Metho	od: spencer				
N	laterial: Liner	•			F	FS: 6	5.014270				
S	trength Type	: Mohr-Cou	llomb		A	Axis I	Location: 343.614,	829.9	987		
U	Init Weight: 1	00 lb/ft3			L	_eft S	Slip Surface Endpo	int: 17	79.933,	436.584	
С	ohesion: 0 p	sf			F	Right	Slip Surface Endp	oint:	560.12	7, 463.000	)
F	riction Angle:	19 degree	S		F	Resis	sting Moment=7.91	383e	+007 lb	o-ft	
V	Vater Surface	: Water Ta	ble		C	Drivir	ng Moment=1.3158	4e+0	07 lb-ft		
С	ustom Hu va	lue: 1			F C	Resis Drivir	sting Horizontal For	rce=1 e=330	98854 )63.8 lb	lb	
N	laterial: Foun	dation									
S	trength Type	: Mohr-Cou	llomb		<u>\</u>	Valio	<u>d / Invalid Surfa</u>	aces	5		
U	Init Weight: 1	20 lb/ft3			N	Metho	od: bishop simplifie	ed	_		
C	ohesion: 0 p	sf			Ν	Numb	ber of Valid Surface	es: 18	373		
F	riction Angle:	37 degree	S		Ν	Numb	ber of Invalid Surfa	ces: 3	3127		
M	Vater Surface	: Water Tal	ble		E	Error	Codes:				
C	ustom Hu va	lue: 1			E	Error	Code -107 reporte	d for	1503 s	urfaces	
~					E	Error	Code -108 reporte	d for	1466 s	urfaces	
5	Support Pr	operties			E	Error	Code -112 reporte	d for	158 su	rfaces	
<u>S</u>	upport: Geot	<u>ube</u>									
G		OssTautila			<u>N</u>	Vieth	od: janbu simplified	1	205		
5	upport Type:	Geo I extile	) )				ber of Valid Surface	es: 16	995 2005		
F	orce Application	lion: Passiv	e nt to Sli	n Curfaga			Codoor	ces: c	3305		
	nchorage: Br	uon. Tange		p Sunace			Code -107 reporte	d for	1503 c	urfaces	
۸ ۹	hear Strengt	h Model: Liu	noar		E	Error	Code -107 reporte	d for	1665 c	urfaces	
5	trin Coverage	e: 100 nero	ent				Code -112 reporte	d for	137 91	rfaces	
т	ensile Strend	1600 JUIC	/ft		L				101 30	14000	
P	ullout Streng	th Adhesio	n: 5 lb/f	t2	Ν	Meth	od: spencer				
P	ullout Streng	th Friction	Anale: 4	10 dearees	N	Numh	ber of Valid Surface	es: 14	1		
	en e				N	Numt	ber of Invalid Surfa	ces: 4	4986		
C.	lobal Mini	imums			Ē	Error	Codes:				
	lethod: hisho	n simplified	l		E	Error	Code -107 reporte	d for	1503 s	urfaces	
<u>11</u> F	S: 5.823670		<u>.</u>		E	Error	Code -108 reporte	d for	1922 s	urfaces	
A	xis Location.	320.318 7	84,965		E	Error	Code -111 reporte	d for	1394 s	urfaces	
L	eft Slip Surfa	ce Endpoin	it: 179 2	292, 436.392	<u>2</u> E	Error	Code -112 reporte	d for	167 su	rfaces	
R	ight Slip Sur	face Endpo	int: 514	.560, 463.00	00						

								Ge	eosy	mtec	D
							Page		184	of	212
Written by:	Josep	h Sura	Date:	12/4/2009	Reviewed by:	R. Kulas	singam/Jay B	Beech	Date:	12/8/2	2009
Client:	Honeywell	Project:	Ono	ndaga Lake SC	CA Final Design	Project/ P	roposal No.:	GJ	4299	Task No.:	18
	iot of All	Coordina	100								
B	LIST OF AIL	<u>Coordina</u> Polylina	tes		Ma	aterial Bou	ndarv				
<u>D</u>	178 169	436.056			<u></u>	1827.000	432,300				
	466 208	436 240				841.123	426.953				
	400.200	400.240									
М	laterial Bou	ndarv			Ma	aterial Bou	ndary				
	0.000	427.500				188.000	430.000				
	122.000	424.650			8	324.000	430.000				
	122.359	424.645				161.000	433.000				
	177.171	423.910				236.000	432.000				
	204.000	423.550				1400.000	431.000				
	267.961	422.659				1778.100	431.000				
	405.000	420.750									
	472.000	422.050			Ma	aterial Bou	<u>ndary</u>				
	768.000	422.250				188.000	430.250				
	805.000	423.150			Ę	506.200	430.250				
	925.000	423.250			Ę	507.700	430.250				
	1165.000	428.350			8	324.000	430.250				
	1347.000	425.150			8	324.200	430.252				
	1436.000	426.150			8	325.700	430.265				
	1642.000	424.450				142.148	433.082				
	1786.163	426.261				143.812	433.097				
	1841.000	426.950				161.000	433.250				
	1841.123	426.953				236.000	432.250				
						400.000	431.250				
M	laterial Bour	<u>ndary</u>				460.199	431.250				
	122.000	424.500				461.784	431.250				
	122.359	424.645				1778.100	431.250				
Μ	laterial Bou	ndary			Ma	aterial Bou	ndary				
	166.176	430.000				208.000	436.000				
	173.133	426.959			Ę	506.200	436.000				
	180.062	426.825			Ę	507.700	436.000				
	182.423	426.779			8	324.000	436.000				
	347.000	423.600			8	324.200	436.002				
	600.000	423.600			8	325.700	436.015				
	640.000	424.000				142.148	438.832				
	728.000	424.000				143.812	438.847				
	1102.000	431.000				161.000	439.000				
	1176.000	431.000				1236.000	438.000				
	1356.000	428.000				400.000	437.000				
	1474.000	427.500				1460.199	437.000				
	1619.000	426.500				1461.784	437.000				
	1689.000	426.500				1758.000	437.000				
	1785.758	427.937									
	1790.000	428.000			Ma	aterial Bou	ndary				
	1798.000	431.000			2	208.000	436.250				
					4	166.200	436.250				

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									con	sultants	
							Page	1	185	of	212
Written	Josepl	h Sura	Date:	12/4/2009	Reviewed by:	R. Kulas	ingam/Jay B	seech	Date:	12/8/2	2009
			-		-						
Client: Ho	oneywell	Project:	Onon	daga Lake SC	CA Final Design	Project/ P	roposal No.:	GJ4	299	Task No.:	18
407	7 700	400.050									
467	1.700	436.250				atorial Day	n do m i				
724	4.201 5.607	430.230			<u>IV</u>	249 000	<u>110ary</u>				
12:	0.097 4.000	430.230				240.000	448.000				
024	4.000 2.107	430.230				530.200	446.000				
902	2.197	437.000				224 000	446.000				
903	5.7 10 61 000	437.072				024.000	440.000				
123	26,000	439.230				032.191	440.073				
120	10 102	430.230				112/ 100	440.000				
124	40.193	430.224				1124.100	450.701				
124	41.724	430.213				1135.719	450.775				
140	00.000	437.230				1226.000	451.000				
14:	90.10Z	437.230				1230.000	430.000				
14:	99.700 59.000	437.230				1400.000	449.000				
173	36.000	437.230				1430.203	449.000				
Moto	rial Daun	don				1437.760	449.000				
		<u>10ary</u> 442.000				1718.000	449.000				
220	6.000 6.200	442.000			N/	atorial Rou	ndany				
400	0.200 7 700	442.000			<u>IV</u>	249 000	110ary 110 250				
407	1.700	442.000				240.000	440.200				
724	4.201 5.607	442.000				493.200	440.200				
12:	4 000	442.000				494.700	440.200				
024	4.000	442.000				730.193	440.200				
904	2.191	443.400				739.701	446.200				
903	5.710 61.000	443.422				024.000	446.200				
110		445.000				903.102	449.007				
120	30.000 40.402	444.000				904.724	449.001				
124	40.193	443.974				1101.000	451.250				
124	41.724	443.905				1220.192	450.554				
140		443.000				1229.723	450.334				
148	90.10Z	443.000				1230.000	430.230				
14:	20 000	443.000				1400.000	449.250				
173	30.000	443.000				1473.204	449.250				
Mate	vial Roun	darv				1718 000	449.250				
228	8 000	1001 y 112 250				17 10.000	449.200				
530	0.000	442.250			N	atorial Bou	ndary				
531	1 700	442.250			111	268 000	454 000				
82/	1.700	442.250				103 200	454 000				
831	2 101	442.230				493.200	454.000				
032	∠.131 2.715	772.020				738 105	454.000				
144	3/ 100	442.000 AA5 011				730 701	454.000				
110	25 710	440.011				824 000	454.000				
113	55.7 19 61 000	440.020				024.000	404.000				
110		440.200				303.10Z	400.417				
123		444.200				304.124	400.401				
14(		443.250				1101.000	457.000				
143	30.2U5	443.250				1228.192	450.104				
143	31.180	443.250				1229.723	450.084				
173	30.000	443.230				1230.000	400.000				

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								СС	onsul	tants	
							Page	186	of		212
Written by:	Josep	bh Sura	Date:	12/4/2009	Reviewed by:	R. Kula	singam/Jay Bo	eech Da	te:	12/8/2	2009
Client:	Honeywell	Project:	Onor	ndaga Lake SC	CA Final Design	Project/	Proposal No.:	GJ4299	Tas	k No.:	18
	1400.000	455.000									
	1473.204	455.000			Ma	aterial Bo	undarv				
	1474.788	455.000			4	194.700	448.250				
	1698.000	455.000			2	194.700	454.000				
М	aterial Bou	ndarv			Ma	aterial Bo	undarv				
	268 000	454 250			<u>- 1116</u> F	554 200	454 250				
	554 200	454 250			E F	54 200	460.000				
	555 700	454 250			· · · ·	.200	400.000				
	924 000	454.250			Ma	storial Ray	undony				
	024.000	454.250				<u>555 700</u>	<u>464.260</u>				
	040.193	404.094			ت ۲	555.700	454.250				
	041.700	404.406			5	000.700	460.000				
	1126.178	456.940			Ν.4						
	1127.707	456.954			<u>IVI</u>	aterial Bol	undary				
	1161.000	457.250			ξ	324.200	430.252				
	1236.000	456.250			8	324.200	436.002				
	1400.000	455.250									
	1412.195	455.250			Ma	aterial Bo	<u>undary</u>				
	1413.743	455.250			8	325.700	430.265				
	1698.000	455.250			8	325.700	436.015				
М	aterial Bou	ndarv			Ma	aterial Bo	undarv				
	506.200	430.250			7	724.201	436.250				
	506.200	436.000			7	724.201	442.000				
М	aterial Rou	ndarv			Ma	aterial Ro	undary				
111	507 700	<u>130 250</u>			<u>IVIC</u>	725 607	<u>436 250</u>				
	507.700	436.000			7	25.697	442.000				
							_				
M	aterial Bour	<u>ndary</u>			<u>Ma</u>	aterial Bo	<u>undary</u>				
	466.200	436.250			7	738.195	448.250				
	466.200	442.000			7	738.195	454.000				
М	aterial Bou	ndary			Ма	aterial Bo	undary				
	467.700	436.250			7	739.701	448.250				
	467.700	442.000			7	739.701	454.000				
М	aterial Bou	ndarv			Ma	aterial Bo	undary				
<u></u>	530 200	442 250			<u></u> 8	R40 193	454 394				
	530.200	448.000			8	340.193	460.144				
N 4	atorial Barr	odon <i>i</i>			N / -	torial Ba	undon				
<u>IVI</u>	aterial BOUI	142 250				1101 BO	<u>454 400</u>				
	531.700 531.700	442.250 448.000			۲ ۲	341.706	404.408 460.158				
_					_						
M	aterial Bou	ndary			Ma	aterial Bou	undary				
	493.200	448.250			5	552.191	442.323				
	493 200	454 ()()()			c		a a t t t \ /* )				

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								(	consi	ultants	
							Page	18′	7	of	212
Written by:	Josep	h Sura	Date:	12/4/2009	Reviewed by:	R. Kulas	singam/Jay B	Beech I	Date:	12/8/	2009
Client:	Honeywell	Project:	Ono	ndaga Lake SC	CA Final Design	Project/ P	roposal No.:	GJ429	<b>9</b> T	Task No.:	18
M	aterial Bour	ndary			Ma	aterial Bou	ndary				
	833.715	442.336				1143.812	433.097				
	833.715	448.086				1143.812	438.847				
M	aterial Bour	ndary			Ma	aterial Bou	ndary				
	982.197	437.658				1228.192	450.354				
	982.197	443.408				1228.192	456.104				
М	aterial Bour	ndarv			Ma	aterial Bou	ndarv				
<u></u>	983.182	449.667			<u></u>	1229.723	450.334				
	983.182	455.417				1229.723	456.084				
М	aterial Bour	ndarv			Ma	aterial Bou	ndarv				
111	983 718	437 672			<u></u>	1240 193	438 224				
	983.718	443.422				1240.193	443.974				
N/	atorial Bour	darv			NA	atorial Bou	ndany				
111	984 724	<u>449</u> 681			1110	1241 724	<u>438 215</u>				
	984.724	455.431				1241.724	443.965				
Ν.4	atorial Pour	don			NA	storial Pau	ndon				
<u>IVI</u>	<u>alenai Doui</u> 113/ 188	<u>10ary</u> 115 011				<u>alenai Dou</u> 1/12 105	<u>155 250</u>				
	1134.188	450.761				1412.195	461.000				
	atorial Davy	ala ni			N 4 a	starial Day					
IVI	ateriai Bour	10ary 445.025				ateriai Bou	ndary 455 250				
	1135.719	4450.775				1413.743	455.250				
M	aterial Bour	hdary			<u>Ma</u>	aterial Bou	ndary				
	1436.205	443.250				1460.199	431.250				
	1430.203	449.000				1400.199	437.000				
M	aterial Bour	ndary			<u>Ma</u>	aterial Bou	ndary				
	1437.780	443.250				1461.784	431.250				
	1437.780	449.000				1461.784	437.000				
M	aterial Bour	ndary			Ma	aterial Bou	ndary				
	1126.178	456.940				1498.182	437.250				
	1126.178	462.690				1498.182	443.000				
M	<u>aterial Bo</u> ur	ndary			Ma	aterial Bou	ndary				
	1127.707	456.954				1499.766	437.250				
	1127.707	462.704				1499.766	443.000				
М	<u>ateri</u> al Bour	ndary			Ма	aterial Bou	ndary				
_	1142.148	433.082				1473.204	449.250				
	1142.148	438.832				1473.204	455.000				

United by:   Joseph Sura   Date:   12/4/2009   Reviewed by:   R. Kulasingani/Jay Beech   Date:   12/8/2009     Chest   Honeywell   Project   Onondaga Lake SCA Final Design   Project/Proposal No.:   GJ4299   Task No.:   18     Material Boundary   554,200   460,000   460,000   1474,788   449,250   555,700   460,000   440,193   460,144   462,690   177,171   423,910   1127,707   462,704   1161,000   460,000   460,000   460,000   460,000   460,000   460,000   460,000   460,000   460,168   460,158   460,168   460,168   460,168   460,168   460,163   460,163   460,100   460,000   460,000   460,000   460,000   460,000   460,000   460,000   460,000   460,000   460,100   460,163   460,163   460,163   460,163   460,163   460,163   460,163   460,163   460,163   460,163   460,163   460,000   460,000   461,000   460,000   471,771,774,776,93   460,000 <td< th=""><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th>Ge</th><th>eosy</th><th>/ntec</th><th>) D</th></td<>									Ge	eosy	/ntec	) D
Written by:   Joseph Sura   Date   124/2009   Reviewed by:   R. Kulasingam/Jay Beech   Date:   128/2009     Client:   Honeywell   Project:   Onondaga Lake SCA Final Design   Project/ Proposal No.:   GJ4299   Task No.:   18     Material Boundary   554.200   460.000   460.000   1474.788   449.250   555.700   460.000     1474.788   450.000   1122.077   462.704   460.144   Material Boundary   128.200   460.000   142.004   460.144     Material Boundary   128.000   1127.707   462.704   1127.707   462.704     1779.171   423.910   1126.100   450.100   450.000   1132.100   1698.000   461.000     268.000   387.500   1400.000   461.000   1133.461.000   1138.000   461.000   1138.000   460.100   1698.000   455.250   1689.000   455.250   1689.000   455.250   1689.000   455.250   1689.000   455.250   1689.000   455.250   1689.000   432.000   1778.000										con	isultants	5
Witter by:   Joseph Sura   Date:   12/4/2009   Reviewed by:   R. Kuhasingam/Jay Beech   Date:   12/8/2009     Chen:   Moneywell   Project:   Onondaga Lake SCA Final Design   Project/ Proposal No:   G/4299   Task No:   18     Material Boundary 1474,788   455,000   460,000   255,700   460,0								Page		188	of	212
Clen:   Nerved   Yojet   Onodaga Lake SCA Final Desig   Poject/ Proposal Not:   Cit 20   Tak Not:   18     Material Boundary   1474.788   455.000   460.000   460.000   1474.788   455.000   824.000   460.000   1474.7788   455.000   824.000   460.000   841.706   460.138   1127.777   462.704   1101.777.7   462.704   1101.777.7   462.704   1101.777.7   462.704   1101.777.7   462.704   1101.777.7   462.704   1101.777.7   462.704   1101.777.7   462.704   1101.777.7   462.704   1101.777.7   462.704   1101.777.7   462.704   1101.777.7   462.704   1101.777.7   462.704   1101.777.7   462.704   1101.777.7   462.714   1102.777.452.714   1101.777.7   462.714   1101.777.7   462.714   1101.777.7   462.714   1101.777.7   462.714   1101.777.7   462.714   1101.777.7   462.714   1101.777.7   462.714   1101.777.7   462.714   1101.777.7   462.714   1101.777.7   462.714   1101.777.7   462.7	Written by:	Josep	bh Sura	Date:	12/4/2009	Reviewed by:	R. Kulas	singam/Jay Bo	eech	Date	12/8	/2009
268.000   460.000     1474.788   449.250     1474.788   449.250     1474.788   455.000     1474.788   455.000     1474.788   455.000     1474.788   455.000     1474.788   455.000     165.176   430.000     177.717   422.3910     1126.777   462.690     0.000   387.500     1400.000   461.000     268.000   387.500     1400.000   461.000     268.000   387.500     1979.000   390.050     1413.743   461.000     1979.000   390.050     1413.743   461.000     1979.000   390.050     1413.743   461.000     1979.000   390.050     164.400   430.400     1688.000   463.000     1718.000   445.000     1738.000   443.000     1738.000   443.000     1738.000   433.000     1	Client:	Honeywell	Project:	Onor	ndaga Lake SO	CA Final Design	Project/ F	Proposal No.:	G	14299	Task No.:	18
Material Boundary   554.200   460.000     1474.788   449.250   555.700   460.000     1474.788   455.000   824.000   460.000     840.193   460.144     Material Boundary   841.706   460.158     165.176   430.000   1126.778   462.690     177.171   423.910   1126.000   462.000     0.000   387.500   1400.000   461.000     268.000   387.545   1412.195   461.000     1979.000   300.050   1413.743   461.000     Material Boundary   1698.000   463.000   1698.000     17780.372   431.000   1698.000   455.000     165.176   430.400   1698.000   455.000     165.776   430.400   1698.000   443.000     1718.000   449.250   1738.000   443.000     1738.000   432.000   1738.000   443.000     180.000   432.50   1738.000   433.000     188.000   430.000   177							268 000	460 000				
1474,788   442,250   555,700   450,000     1474,788   4455,000   824,000   460,000     1474,788   455,000   824,000   460,144     Material Boundary   841,706   460,158   165,176   430,000     177,171   423,910   1127,707   462,704   1161,000   483,000     0.000   387,500   1400,000   461,000   268,000   461,000     1979,000   397,845   1412,195   461,000   461,000     1979,000   390,050   1698,000   463,000   465,000     1799,372   431,000   1698,000   455,000   165,176   430,400     148,400   430,400   1788,000   443,000   1748,000   443,000     1799,372   431,000   1738,000   443,000   1748,000   443,000     1799,372   431,000   1738,000   443,000   1748,000   443,000     180,000   132,800   443,000   1748,000   443,000   1748,000   431,000	N	Aaterial Bou	ndarv				554 200	460.000				
1474.788   455.000   824.000   460.000     Material Boundary   841.78   460.188     165.176   430.000   1126.178   462.690     177.171   423.910   1127.707   462.704     Material Boundary   1236.000   463.000     0.000   387.500   1400.000   461.000     288.000   387.845   1412.195   461.000     1979.000   390.050   1413.743   461.000     Material Boundary   1698.000   463.000     1779.372   431.000   1698.000   461.000     Material Boundary   1698.000   455.250     164.400   430.400   1698.000   455.000     165.176   430.000   1718.000   449.000     1799.372   431.000   1738.000   443.250     186.200   430.400   1788.000   437.250     186.000   432.200   1778.100   431.000     188.000   430.250   1778.100   431.200     188.000   430.000	<u></u>	1474,788	449.250				555.700	460.000				
Baterial Boundary   B40.193   460.148     Material Boundary   841.706   480.158     177.171   423.910   1127.707   482.690     0.000   387.500   1400.000   483.000     0.000   387.500   1400.000   461.000     288.000   387.845   1412.195   461.000     1979.000   390.050   1413.743   481.000     Material Boundary   1786.163   266.261   1688.000     1979.000   390.050   1698.000   463.000     1979.372   431.000   1698.000   463.000     Material Boundary   1698.000   455.050     164.400   430.400   1688.000   432.000     1799.372   431.000   1718.000   449.000     1785.020   433.000   1718.000   443.000     1803.000   432.000   1738.000   433.000     1803.000   1778.100   437.000   188.000     188.000   430.000   1778.100   431.000     188.000		1474,788	455.000				824.000	460.000				
Material Boundary   B41706   450158     165.176   430.000   1126.178   462.680     1777.171   423.910   1127.077   462.704     Material Boundary   1236.000   462.000     0.000   387.500   1400.000   461.000     268.000   387.845   1412.195   461.000     1979.000   390.050   1413.743   461.000     Material Boundary   1698.000   463.000     1786.163   426.261   Material Boundary     1799.372   431.000   1698.000   465.000     164.400   430.400   1698.000   455.500     165.176   430.000   1718.000   449.050     Material Boundary   1718.000   443.000     179.372   431.000   1738.000   443.000     1803.000   432.300   1738.000   443.000     1803.000   432.300   1778.100   431.000     188.000   430.250   1777.8100   431.000     188.000   432.250   186.000							840.193	460.144				
165.176   430.000   1126.178   462.690     177.171   423.910   1127.707   462.704     1181.000   463.000   463.000     0.000   387.500   1400.000   462.000     268.000   387.845   1412.195   461.000     1979.000   387.645   1413.743   461.000     Material Boundary   1698.000   463.000     1799.372   431.000   1698.000   463.000     Material Boundary   1698.000   455.250     164.400   430.400   1698.000   455.000     165.176   430.000   1718.000   443.000     179.9.372   431.000   1738.000   443.250     Material Boundary   1718.000   443.000   1738.000     1803.000   432.300   1738.000   437.250     184.400   430.401   1758.000   437.000     180.000   430.000   1778.100   437.000     180.000   430.000   1778.100   431.000     188.000 <td< td=""><td>Ν</td><td>Aterial Bou</td><td>ndarv</td><td></td><td></td><td></td><td>841.706</td><td>460.158</td><td></td><td></td><td></td><td></td></td<>	Ν	Aterial Bou	ndarv				841.706	460.158				
177.171 423.910 1127.707 462.704   Material Boundary 1236.000 462.000   0.000 387.500 1400.000 461.000   288.000 387.845 1412.195 461.000   1979.000 390.050 1413.743 461.000   Material Boundary 1698.000 461.000   1779.372 431.000 1698.000 463.000   Material Boundary 1698.000 455.250   164.400 430.400 1698.000 455.000   165.176 430.000 1718.000 443.000   1799.372 431.000 1738.000 443.000   1799.372 431.000 1738.000 443.000   1799.372 431.000 1738.000 443.000   1803.000 432.250 1788.000 433.000   1803.000 432.250 1788.000 433.000   186.00 430.000 1778.100 431.250   188.000 430.000 1778.100 431.250   188.000 436.000 1778.100 431.250   188.000 436.000 <td><u></u></td> <td>165.176</td> <td>430.000</td> <td></td> <td></td> <td></td> <td>1126.178</td> <td>462.690</td> <td></td> <td></td> <td></td> <td></td>	<u></u>	165.176	430.000				1126.178	462.690				
1161.000   463.000     Material Boundary   1236.000   462.000     288.000   387.500   1400.000   461.000     288.000   387.500   14140.000   461.000     1979.000   390.050   1412.195   461.000     Material Boundary   1698.000   463.000     1786.163   426.261   Material Boundary     178.6163   426.261   1698.000   455.000     184.400   430.400   1698.000   455.000     155.176   430.000   1718.000   449.250     Material Boundary   1718.000   443.000   1799.372     178.000   443.000   1778.000   443.000     1799.372   431.000   1788.000   443.000     180.00   430.400   1788.000   443.250     Material Boundary   1788.000   437.250     180.00   430.000   1778.100   437.000     188.000   430.000   1778.100   431.250     188.000   436.000   180.500   427.0		177.171	423.910				1127.707	462.704				
Material Boundary   1236.000   462.000     0.000   387.500   1440.000   461.000     268.000   387.845   1412.195   461.000     1979.000   390.050   1413.743   461.000     Material Boundary   1698.000   463.000     1779.9372   431.000   1698.000   463.000     Material Boundary   1698.000   455.250     164.400   430.400   1698.000   455.000     165.176   430.000   1718.000   449.250     Material Boundary   1788.000   443.250     1799.372   431.000   1778.000   443.000     1799.372   431.000   1778.000   443.000     180.300   432.300   1738.000   443.000     180.300   432.300   1738.000   433.000     180.300   430.400   1758.000   437.000     180.300   430.000   1778.100   431.000     180.300   430.000   1778.100   431.000     180.00   430.000							1161.000	463.000				
0.000   367   500   1400.000   461.000     268.000   387.845   1412.195   461.000     1979.000   390.050   1413.743   461.000     Material Boundary   1698.000   461.000     1799.372   431.000   1698.000   461.000     Material Boundary   1698.000   455.250   164.400   430.400     185.000   455.000   165.000   165.000   449.250     184.400   430.400   1718.000   449.250     186.30.00   432.300   1738.000   443.000     1803.000   432.300   1738.000   443.000     1803.000   432.300   1738.000   433.000     186.400   430.400   1785.000   432.300     186.257   430.000   1778.100   437.000     186.300   432.300   1778.100   431.000     186.000   436.250   1778.100   431.000     188.000   436.250   1778.100   431.000     188.000   436.250	Ν	laterial Bou	ndarv				1236.000	462.000				
268.000   387.845   1412.195   461.000     1979.000   390.050   1413.743   461.000     Material Boundary   1698.000   463.000     1799.372   431.000   1698.000   463.000     Material Boundary   1698.000   463.000     Material Boundary   1698.000   455.250     164.400   430.400   1698.000   455.000     185.176   430.000   1718.000   449.250     Material Boundary   1718.000   449.000     1803.000   432.300   1738.000   443.250     1738.000   443.000   1738.000   443.000     184.400   430.400   1758.000   437.250     184.400   430.400   1758.000   437.250     185.257   430.401   1758.000   437.250     186.000   430.250   1778.100   431.000     188.000   430.000   1778.100   431.000     188.000   436.000   1778.100   431.000     188.000   442.200	-	0.000	387.500				1400.000	461.000				
1979.000 390.050 1413.743 461.000   Material Boundary 1786.163 426.261 Material Boundary   1799.372 431.000 1698.000 461.000   Material Boundary 1698.000 461.000   Material Boundary 1698.000 455.250   164.400 430.400 1698.000 455.500   165.176 430.000 1718.000 449.000   1799.372 431.000 1738.000 449.000   1803.000 432.300 1738.000 443.000   1803.000 432.300 1778.000 437.000   164.400 430.400 1758.000 437.000   166.176 430.000 1778.100 431.000   166.257 430.400 1778.000 437.000   166.376 430.000 1778.100 431.000   188.000 430.250 1778.100 431.000   208.000 442.000 1801.461 432.301   208.000 442.000 1800.062 426.825   228.000 442.000 183.000 428.000   2		268,000	387.845				1412,195	461.000				
Material Boundary   1698.000   461.000     17786.163   426.261   Material Boundary     1799.372   431.000   1698.000   463.000     Material Boundary   1698.000   455.250     164.400   430.400   1698.000   455.250     165.176   430.000   1718.000   449.250     Material Boundary   1718.000   443.250     1799.372   431.000   1738.000   443.250     Material Boundary   1758.000   432.250     1803.000   432.300   1738.004   443.000     1803.000   432.400   1758.000   437.000     166.176   430.000   1778.100   437.000     166.257   430.401   1758.000   431.000     188.000   430.000   1778.100   431.000     188.000   436.000   1778.100   431.000     208.000   442.000   1801.461   432.301     208.000   442.000   1801.461   432.301     208.000   442.000   180		1979.000	390.050				1413.743	461.000				
Material Boundary   Material Boundary     17786.163   426.261   1698.000   463.000     1799.372   431.000   1698.000   463.000     Material Boundary   1698.000   455.250     164.400   430.400   1698.000   455.250     164.400   430.000   1718.000   445.250     165.176   430.000   1718.000   449.250     1799.372   431.000   1738.000   443.000     1803.000   432.300   1738.000   443.000     164.400   430.400   1758.000   437.250     164.400   430.400   1758.000   437.000     1803.000   1778.100   431.000   164.400     164.400   430.400   1758.000   437.000     164.400   430.400   1778.100   431.000     164.400   430.250   1778.100   431.000     188.000   430.250   1778.100   431.000     188.000   436.250   180.500   427.069     208.000 <td< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td>1698.000</td><td>461.000</td><td></td><td></td><td></td><td></td></td<>							1698.000	461.000				
1786.163   426.261   Material Boundary     1799.372   431.000   1698.000   463.000     Material Boundary   1698.000   463.000     164.400   430.400   1698.000   455.020     165.176   430.000   1718.000   455.000     165.176   430.000   1718.000   449.020     1799.372   431.000   1738.000   449.020     1799.372   431.000   1738.000   449.020     1799.372   431.000   1738.000   443.020     1799.372   431.000   1738.000   443.020     1803.000   432.300   1738.000   443.020     1803.000   430.400   1758.000   437.250     166.257   430.401   1758.000   437.000     166.176   430.000   1778.100   431.250     188.000   436.000   1778.100   431.000     188.000   436.200   180.461   432.301     208.000   442.000   180.062   426.825     228.000<	Ν	laterial Bou	ndarv									
1799.372 431.000 1698.000 463.000   Material Boundary 1698.000 455.250   164.400 430.400 1698.000 455.000   165.176 430.000 1718.000 449.250   Material Boundary 1718.000 449.000   1799.372 431.000 1738.000 443.000   1738.000 443.000 1738.000 443.000   1803.000 432.300 1758.000 437.250   164.400 430.400 1758.000 437.250   165.257 430.401 1758.000 437.000   165.257 430.401 1758.000 437.000   188.000 430.250 1778.100 431.000   188.000 436.000 1778.100 431.000   188.000 436.000 1798.000 431.000   208.000 442.000 180.062 426.825   228.000 442.250 180.062 426.825   228.000 442.250 183.000 420.000   248.000 448.000 183.000 426.825   228.000 44	_	1786.163	426.261			Ν	aterial Bou	ndary				
Material Boundary   1698.000   461.000     164.400   430.400   1698.000   455.250     164.400   430.400   1698.000   455.000     165.176   430.000   1718.000   449.200     1718.000   449.200   1738.000   449.000     1799.372   431.000   1738.000   443.250     1803.000   432.300   1738.000   443.000     164.400   430.400   1758.000   433.000     164.400   430.400   1758.000   437.250     165.257   430.401   1758.000   437.000     164.76   430.000   1778.100   431.000     188.000   430.250   1778.100   431.000     188.000   436.000   1798.000   421.250     188.000   436.250   180.62   426.825     228.000   442.000   180.62   426.825     228.000   442.000   180.500   423.000     248.000   448.000   183.000   428.000     24		1799.372	431.000				1698.000	463.000				
Material Boundary   1698.000   455.250     164.400   430.400   1688.000   455.000     165.176   430.000   1718.000   455.000     1718.000   449.250   1718.000   449.000     1799.372   431.000   1738.000   449.000     1803.000   432.300   1738.000   443.250     1803.000   432.250   1758.000   433.000     164.400   430.400   1758.000   437.250     165.257   430.401   1758.000   437.000     166.176   430.000   1778.100   431.250     188.000   430.250   1778.100   431.000     188.000   436.000   1778.100   431.000     208.000   442.250   180.500   426.825     228.000   442.250   180.500   426.825     228.000   442.250   180.500   427.060     248.000   448.250   185.500   428.000     248.000   454.000   188.000   430.000 <td< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td>1698.000</td><td>461.000</td><td></td><td></td><td></td><td></td></td<>							1698.000	461.000				
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	Ν	laterial Bou	ndarv				1698.000	455.250				
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	_	164.400	430.400				1698.000	455.000				
1718.000   449.250     Material Boundary   1718.000   449.000     1799.372   431.000   1738.000   449.000     1803.000   432.300   1738.000   443.250     1738.000   443.250   1738.000   443.250     164.400   430.400   1758.000   443.000     165.257   430.401   1758.000   437.000     188.000   430.000   1778.100   437.000     188.000   430.020   1778.100   431.000     188.000   436.000   1798.000   431.000     208.000   436.000   1801.461   432.301     208.000   442.000   180.062   426.825     228.000   442.000   182.423   427.000     228.000   448.250   183.000   429.000     248.000   448.250   188.000   430.000     248.000   454.250   188.000   430.000     268.000   454.250   1778.100   431.000     268.000   454.250		165.176	430.000				1718.000	455.000				
Material Boundary 1718.000 449.000   1799.372 431.000 1738.000 443.250   1738.000 432.300 1738.000 443.000   Material Boundary 1758.000 443.000   164.400 430.400 1758.000 437.250   165.257 430.401 1758.000 437.000   166.176 430.000 1778.100 431.000   188.000 430.250 1778.100 431.000   188.000 430.250 1778.100 431.000   208.000 436.250 180.461 423.2301   208.000 442.000 180.062 426.825   228.000 442.250 180.500 427.000   228.000 442.000 180.062 426.825   228.000 448.000 183.000 428.000   248.000 448.000 183.000 428.000   248.000 454.000 183.000 430.000   268.000 454.250 1778.100 431.000   268.000 454.250 1778.100 431.000   268.000 454.25							1718.000	449.250				
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	Ν	laterial Bou	ndary				1718.000	449.000				
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	_	1799.372	431.000				1738.000	449.000				
$\begin{array}{cccccccccccccccccccccccccccccccccccc$		1803.000	432.300				1738.000	443.250				
Material Boundary   1758.000   443.000     164.400   430.400   1758.000   437.250     165.257   430.401   1758.000   437.000     166.176   430.000   1778.100   437.000     188.000   430.250   1778.100   431.250     188.000   436.000   1798.000   431.000     208.000   436.000   1801.461   432.301     208.000   442.000   Material Boundary   228.000   442.000     208.000   442.000   180.062   426.825     228.000   442.250   180.500   427.000     228.000   448.000   182.423   427.769     248.000   448.250   188.000   430.000     248.000   448.250   188.000   430.000     248.000   454.000   188.000   430.000     268.000   454.250   Material Boundary     268.000   454.250   Material Boundary     268.000   462.000   1778.100   431.000     17							1738.000	443.000				
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	Ν	laterial Bou	ndarv				1758.000	443.000				
165.257 $430.401$ $1758.000$ $437.000$ $166.176$ $430.000$ $1778.100$ $437.000$ $188.000$ $430.250$ $1778.100$ $431.250$ $188.000$ $436.000$ $1798.000$ $431.000$ $208.000$ $436.000$ $1801.461$ $432.301$ $208.000$ $436.250$ $360.002$ $180.062$ $208.000$ $442.000$ $180.062$ $426.825$ $228.000$ $442.250$ $180.500$ $427.000$ $228.000$ $448.000$ $182.423$ $427.769$ $248.000$ $448.250$ $185.500$ $429.000$ $248.000$ $454.000$ $188.000$ $430.000$ $268.000$ $454.250$ $1778.100$ $431.000$ $268.000$ $454.250$ $1778.100$ $430.000$ $268.000$ $462.000$ $1778.100$ $430.000$ $268.000$ $462.000$ $1785.600$ $428.000$		164.400	430.400				1758.000	437.250				
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188.000 430.000 1778.100 431.250   188.000 430.250 1778.100 431.000   188.000 436.000 1798.000 431.000   208.000 436.250 1801.461 432.301   208.000 442.000 Material Boundary   228.000 442.250 180.662 426.825   228.000 442.250 180.500 427.000   228.000 448.000 183.000 428.000   248.000 448.000 185.500 429.000   248.000 454.000 188.000 430.000   268.000 454.250 1778.100 431.000   268.000 460.000 1778.100 431.000   1780.600 430.000 1780.600 430.000		166.176	430.000				1778.100	437.000				
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$\begin{array}{cccccccccccccccccccccccccccccccccccc$		188.000	436.000				1798.000	431.000				
$\begin{array}{cccccccccccccccccccccccccccccccccccc$		208.000	436.000				1801.461	432.301				
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228.000 442.250 180.500 427.000   228.000 448.000 182.423 427.769   248.000 448.000 183.000 428.000   248.000 448.250 185.500 429.000   248.000 454.000 188.000 430.000   268.000 454.250 Material Boundary   268.000 462.000 1783.100 429.000   268.000 462.000 1785.600 428.000		228.000	442.000				180.062	426.825				
228.000 448.000 182.423 427.769   248.000 448.000 183.000 428.000   248.000 448.250 185.500 429.000   248.000 454.000 188.000 430.000   268.000 454.250 Material Boundary   268.000 460.000 1778.100 431.000   Material Boundary 1783.100 429.000   268.000 462.000 1785.600 428.000		228.000	442.250				180.500	427.000				
248.000 448.000 183.000 428.000   248.000 448.250 185.500 429.000   248.000 454.000 188.000 430.000   268.000 454.250 Material Boundary   268.000 460.000 1778.100 431.000   Material Boundary 1783.100 429.000   268.000 462.000 1785.600 428.000		228.000	448.000				182.423	427.769				
248.000 448.250 185.500 429.000   248.000 454.000 188.000 430.000   268.000 454.250 Material Boundary   268.000 460.000 1778.100 431.000   Material Boundary 1783.100 429.000   268.000 462.000 1785.600 428.000		248.000	448.000				183.000	428.000				
248.000 454.000   268.000 454.250   268.000 460.000   1778.100 431.000   1780.600 430.000   1780.600 430.000   1783.100 429.000   268.000 462.000		248.000	448.250				185.500	429.000				
268.000 454.000   268.000 454.250   268.000 460.000   1778.100 431.000   1780.600 430.000   Material Boundary 1783.100   268.000 462.000		248.000	454.000				188.000	430.000				
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268.000 460.000 1778.100 431.000   Material Boundary 1780.600 430.000   268.000 462.000 1785.600 428.000		268.000	454.250			N	aterial Bou	ndarv				
Material Boundary 1780.600 430.000   268.000 462.000 1785.600 428.000		268.000	460.000			<u></u>	1778.100	431.000				
Material Boundary   1783.100   429.000     268.000   462.000   1785.600   428.000							1780.600	430.000				
268.000 462.000 1785.600 428.000	N	laterial Bou	ndarv				1783 100	429 000				
	<u></u>	268.000	462.000				1785.600	428.000				

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Written by:	Josep	h Sura	Date:	12/4/2009	Reviewed by:	R. Kulas	ingam/Jay B	eech	Date:	12/8/	2009
Client:	Honeywell	Project:	Onor	1daga Lake SC	CA Final Design	Project/ P	roposal No.:	GJ	4299	Task No.:	18
	1785 758	427 937				157 414	434 000				
						142.619	434.000				
M	laterial Bour	<u>ndary</u>				129.614	434.000				
	267.961	422.659									
	268.000	387.845			<u>P</u>	<u>iezo Line</u>					
						182.423	427.779				
M	laterial Bour	<u>ndary</u>				347.000	424.600				
	157.414	434.000				600.000	424.600				
	162.619	431.318				640.000	425.000				
	164.400	430.400				728.000	425.000				
						1102.000	432.000				
Μ	laterial Bour	<u>ndary</u>				1176.000	432.000				
	163.062	431.533				1356.000	429.000				
	164.289	430.900				1474.000	428.500				
	165.257	430.401				1619.000	427.500				
						1689.000	427.500				
<u>E</u>	xternal Bour	<u>ndary</u>				1790.000	429.000				
	107.318	424.996				1792.668	429.000				
	0.000	427.500									
	0.000	387.500			V	/ater Table					
	0.000	347.500				0.000	412.500				
	1979.000	350.000				204.000	408.550				
	1979.000	390.050				405.000	405.750				
	1979.000	430.050				472.000	407.050				
	1841.123	426.953				557.156	407.108				
	1841.000	427.000				768.000	407.250				
	1827.000	432.300				805.000	408.150				
	1803.000	432.300				925.000	408.250				
	1801.461	432.301				1165.000	413.350				
	1801.461	433.301				1347.000	410.150				
	1778.100	440.000				1436.000	411.150				
	1758.000	446.000				1642.000	409.450				
	1738.000	452.000				1768.160	411.260				
	1718.000	458.000				1841.123	411.953				
	1698.000	464.000				1979.000	415.050				
	1400.000	464.000									
	1236.000	465.000			<u>F</u>	ocus/Block	Search Po	int			
	1161.000	466.000				467.689	442.010				
	824.000	463.000									
	268.000	463.000			<u>F</u>	ocus/Block	Search Po	int			
	248.000	457.000				466.208	436.240				
	228.000	451.000									
	208.000	445.000			<u>S</u>	upport					
	188.000	439.000				554.200	454.250				
	167.871	432.972				554.200	460.000				
	163.062	431.533									
	162.619	431.761			<u>S</u>	<u>upport</u>					
	158.274	434.000			_	554.200	460.000				

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							Page	190	of	212
Written by:	Josep	bh Sura	Date:	12/4/2009	Reviewed by:	R. Kula	singam/Jay B	Beech Date	e: <u>12/8/2</u>	2009
Client:	Honeywell	Project:	Onor	ndaga Lake SC	CA Final Design	Project/	Proposal No.:	GJ4299	Task No.:	18
	268.000	460.000				555.700	454.250			
<u>S</u>	<u>Support</u> 268.000 248.000	454.000 454.000			<u>Si</u>	<u>upport</u> 738.195 738.195	454.000 448.250			
<u>S</u>	<u>support</u> 248.000 248.000	454.000 448.250			<u>S</u> I	upport 739.701 739.701	454.000 448.250			
<u>S</u>	<u>Support</u> 248.000 493.200	448.250 448.250			<u>S</u> (	<u>upport</u> 738.195 494.700	454.000 454.000			
<u>S</u>	<u>Support</u> 493.200 493.200	454.000 448.250			<u>S</u> I	<u>upport</u> 494.700 494.700	454.000 448.250			
<u>S</u>	<u>Support</u> 268.000 268.000	460.000 454.250			<u>S</u> I	<u>upport</u> 494.700 738.195	448.250 448.250			
<u>S</u>	<u>support</u> 268.000 554.200	454.250 454.250			<u>Si</u>	<u>upport</u> 724.201 724.201	442.000 436.250			
<u>S</u>	<u>Support</u> 555.700 555.700	454.250 460.000			<u>Si</u>	<u>upport</u> 724.201 467.700	436.250 436.250			
<u>S</u>	<u>support</u> 555.700 824.000	460.000 460.000			<u>Si</u>	<u>upport</u> 467.700 467.700	436.250 442.000			
<u>S</u>	<u>Support</u> 824.000 840.193	460.000 460.144			<u>Si</u>	<u>upport</u> 467.700 724.201	442.000 442.000			
<u>S</u>	<u>support</u> 840.193 840.193	460.144 454.394			<u>S</u> i	<u>upport</u> 228.000 228.000	448.000 442.250			
<u>S</u>	<u>Support</u> 840.193 824.000	454.394 454.250			<u>Si</u>	<u>upport</u> 248.000 530.200	448.000 448.000			
<u>S</u>	<u>support</u> 824.000	454.250			<u>Si</u>	<u>upport</u> 530.200	448.000			

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Written by:	Josep	h Sura	Date:	12/4/2009	Reviewed by:	R. Kula	singam/Jay Beech	Date:	12/8/20	009
Client:	Honeywell	Project:	Onon	idaga Lake SC	CA Final Design	Project/	Proposal No.:	GJ4299	Task No.:	18
	530.200	442.250				507.700	430.250			
<u>Sı</u>	<u>upport</u> 531.700 531.700	442.250 448.000			<u>S</u>	<u>Support</u> 506.200 506.200	436.000 430.250			
<u>Sı</u>	<u>upport</u> 530.200 228.000	442.250 442.250			<u>S</u>	<u>Support</u> 506.200 188.000	430.250 430.250			
<u>Sı</u>	<u>upport</u> 228.000 248.000	448.000 448.000			<u>S</u>	<u>Support</u> 507.700 824.200	430.250 430.252			
<u>Sı</u>	<u>upport</u> 208.000 208.000	436.250 442.000			<u>S</u>	<u>Support</u> 824.200 824.200	430.252 436.002			
<u>Sı</u>	<u>upport</u> 208.000 228.000	442.000 442.000			<u>S</u>	<u>Support</u> 824.200 507.700	436.002 436.000			
<u>Sı</u>	<u>upport</u> 228.000 466.200	442.000 442.000			<u>S</u>	<u>Support</u> 832.191 832.191	442.323 448.073			
<u>Sı</u>	<u>upport</u> 466.200 466.200	442.000 436.250			<u>S</u>	<u>Support</u> 833.715 833.715	442.336 448.086			
<u>Sı</u>	<u>upport</u> 466.200 208.000	436.250 436.250			<u>S</u>	<u>Support</u> 832.191 824.000	448.073 448.000			
<u>S</u> (	<u>upport</u> 188.000 188.000	430.250 436.000			<u>S</u>	<u>Support</u> 824.000 531.700	448.000 448.000			
<u>Sı</u>	<u>upport</u> 188.000 208.000	436.000 436.000			<u>S</u>	<u>Support</u> 531.700 824.000	442.250 442.250			
<u>Sı</u>	<u>upport</u> 208.000 506.200	436.000 436.000			<u>S</u>	<u>Support</u> 824.000 832.191	442.250 442.323			
<u>Sı</u>	<u>upport</u> 507.700	436.000			<u>c</u>	<u>Support</u> 841.706	460.158			

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							Page	192	of 2	212
Written by:	Josep	h Sura	Date:	12/4/2009	Reviewed by:	R. Kulasi	ingam/Jay Beech	Date:	12/8/2	009
Client:	Honeywell	Project:	Onon	daga Lake SC	CA Final Desigr	n Project/ Pr	coposal No.:	GJ4299	Task No.:	18
	841.706	454.408				739.701	454.000			
<u>Si</u>	<u>upport</u> 825.700 825.700	436.015 430.265			<u>S</u>	<u>Support</u> 841.706 1126.178	454.408 456.940			
<u>Si</u>	<u>upport</u> 725.697 725.697	442.000 436.250			<u>c</u>	<u>Support</u> 1126.178 1126.178	456.940 462.690			
<u>S</u> I	<u>upport</u> 725.697 824.000	436.250 436.250			<u>S</u>	<u>Support</u> 1126.178 841.706	462.690 460.158			
<u>S</u> I	<u>upport</u> 824.000 982.197	436.250 437.658			<u>2</u>	<u>Support</u> 833.715 1134.188	448.086 450.761			
<u>S</u> I	<u>upport</u> 982.197 982.197	437.658 443.408			2	<u>Support</u> 1134.188 1134.188	450.761 445.011			
<u>S</u> I	<u>upport</u> 982.197 824.000	443.408 442.000			<u>2</u>	<u>Support</u> 1134.188 833.715	445.011 442.336			
<u>S</u> I	<u>upport</u> 824.000 725.697	442.000 442.000			<u>8</u>	<u>Support</u> 825.700 1142.148	436.015 438.832			
<u>S</u> I	<u>upport</u> 739.701 824.000	448.250 448.250			<u>S</u>	Support 1142.148 1142.148	438.832 433.082			
<u>S</u> I	<u>upport</u> 824.000 983.182	448.250 449.667			<u>9</u>	Support 1142.148 825.700	433.082 430.265			
<u>S</u> i	<u>upport</u> 983.182 983.182	449.667 455.417			<u>2</u>	<u>Support</u> 984.724 984.724	455.431 449.681			
<u>S</u> I	<u>upport</u> 983.182 824.000	455.417 454.000			<u>2</u>	<u>Support</u> 983.718 983.718	443.422 437.672			
<u>S</u> I	<u>upport</u> 824.000	454.000			5	<u>Support</u> 983.718	437.672			

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							Page	193	of	212
Written by:	Josep	h Sura	Date:	12/4/2009	Reviewed by:	R. Kulas	ingam/Jay Beech	Date:	12/8/2	009
Client:	Honeywell	Project:	Onon	daga Lake SC	CA Final Design	Project/ P	roposal No.:	GJ4299	Task No.:	18
	1161.000	439.250				493.200	454.000			
<u>Sı</u>	<u>upport</u> 1161.000 1236.000	439.250 438.250			<u>S</u>	<u>upport</u> 1127.707 1127.707	462.704 456.954			
<u>S</u> ı	upport 1236.000	438.250			<u>S</u>	upport 1127.707	462.704			
Si	1240.193	438.224			S	1161.000	463.000			
<u>.</u>	1240.193 1240.193 1240.193	438.224 443.974			<u> </u>	1161.000 1236.000	463.000 462.000			
<u>Si</u>	<u>upport</u> 1240.193 1236.000	443.974 444.000			<u>S</u>	<u>upport</u> 1236.000 1400.000	462.000 461.000			
<u>Sı</u>	<u>upport</u> 1236.000 1161.000	444.000 445.000			<u>S</u>	<u>upport</u> 1400.000 1412.195	461.000 461.000			
<u>S</u> I	<u>upport</u> 1161.000 983.718	445.000 443.422			<u>S</u>	<u>upport</u> 1412.195 1412.195	461.000 455.250			
<u>Si</u>	<u>upport</u> 984.724 1161.000	455.431 457.000			<u>S</u>	<u>upport</u> 1412.195 1400.000	455.250 455.250			
<u>S</u> I	<u>upport</u> 1161.000 1228.192	457.000 456.104			<u>S</u>	<u>upport</u> 1400.000 1236.000	455.250 456.250			
<u>Si</u>	<u>upport</u> 1228.192 1228.192	456.104 450.354			<u>S</u>	<u>upport</u> 1236.000 1161.000	456.250 457.250			
<u>Si</u>	<u>upport</u> 1228.192 1161.000	450.354 451.250			<u>S</u>	<u>upport</u> 1161.000 1127.707	457.250 456.954			
<u>S</u> (	<u>upport</u> 1161.000 984.724	451.250 449.681			<u>S</u>	<u>upport</u> 1135.719 1135.719	450.775 445.025			
<u>Sı</u>	<u>upport</u> 268.000	454.000			<u>S</u>	<u>upport</u> 1135.719	450.775			

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Written by:	Josep	h Sura	Date:	12/4/2009	Reviewed by:	R. Kulas	ingam/Jay Beech	Date:	12/8/2	009
Client:	Honeywell	Project:	Onon	idaga Lake SC	CA Final Design	Project/ Pr	roposal No.:	GJ4299	Task No.:	18
	1161.000	451.000				1229.723	456.084			
<u>S</u> ı	<u>upport</u> 1161.000 1135.719	445.250 445.025			<u>S</u>	<u>upport</u> 1236.000 1400.000	456.000 455.000			
<u>Sı</u>	<u>upport</u> 1161.000 1236.000	445.250 444.250			<u>S</u>	<u>upport</u> 1400.000 1473.204	455.000 455.000			
<u>Si</u>	<u>upport</u> 1236.000 1400.000	444.250 443.250			<u>S</u>	<u>upport</u> 1473.204 1473.204	455.000 449.250			
<u>S</u> I	<u>upport</u> 1400.000 1436.205	443.250 443.250			<u>S</u>	<u>upport</u> 1474.788 1474.788	449.250 455.000			
<u>Sı</u>	<u>upport</u> 1436.205 1436.205	443.250 449.000			<u>S</u>	<u>upport</u> 1473.204 1400.000	449.250 449.250			
<u>S</u> I	<u>upport</u> 1437.780 1437.780	449.000 443.250			<u>S</u>	<u>upport</u> 1400.000 1236.000	449.250 450.250			
<u>S</u> I	<u>upport</u> 1436.205 1400.000	449.000 449.000			<u>S</u>	<u>upport</u> 1241.724 1241.724	438.215 443.965			
<u>S</u> ı	<u>upport</u> 1400.000 1236.000	449.000 450.000			<u>S</u>	<u>upport</u> 1143.812 1143.812	438.847 433.097			
<u>S</u> ı	<u>upport</u> 1236.000 1161.000	450.000 451.000			<u>S</u>	<u>upport</u> 1143.812 1161.000	433.097 433.250			
<u>S</u> ı	<u>upport</u> 1229.723 1229.723	456.084 450.334			<u>S</u>	<u>upport</u> 1161.000 1143.812	439.000 438.847			
<u>S</u> ı	<u>upport</u> 1229.723 1236.000	450.334 450.250			<u>S</u>	<u>upport</u> 1161.000 1236.000	439.000 438.000			
<u>Si</u>	<u>upport</u> 1236.000	456.000			<u>S</u>	<u>upport</u> 1236.000	438.000			

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Written by:	Josep	h Sura	Date:	12/4/2009	Reviewed by:	R. Kulas	ingam/Jay Beech	Date:	12/8/2	009
Client:	Honeywell	Project:	Onor	ndaga Lake SC	CA Final Design	Project/ P	roposal No.:	GJ4299	Task No.:	18
	1400.000	437.000				1241.724	443.965			
<u>S</u>	<u>upport</u> 1400.000 1460.199	437.000 437.000			<u>S</u>	<u>upport</u> 1413.743 1413.743	461.000 455.250			
<u>S</u>	<u>upport</u> 1460.199 1460.199	437.000 431.250			<u>S</u>	<u>upport</u> 1413.743 1698.000	461.000 461.000			
<u>S</u>	<u>upport</u> 1461.784 1461.784	431.250 437.000			<u>S</u>	<u>upport</u> 1698.000 1698.000	461.000 455.250			
<u>S</u>	<u>upport</u> 1460.199 1400.000	431.250 431.250			<u>S</u>	<u>upport</u> 1698.000 1413.743	455.250 455.250			
<u>S</u>	<u>upport</u> 1400.000 1236.000	431.250 432.250			<u>S</u>	<u>upport</u> 1474.788 1718.000	449.250 449.250			
<u>S</u>	<u>upport</u> 1236.000 1161.000	432.250 433.250			<u>S</u>	<u>upport</u> 1718.000 1718.000	449.250 455.000			
<u>S</u>	<u>upport</u> 1241.724 1400.000	438.215 437.250			<u>S</u>	<u>upport</u> 1698.000 1474.788	455.000 455.000			
<u>S</u>	<u>upport</u> 1400.000 1498.182	437.250 437.250			<u>S</u>	<u>upport</u> 1461.784 1778.100	431.250 431.250			
<u>S</u>	<u>upport</u> 1498.182 1498.182	443.000 437.250			<u>S</u>	<u>upport</u> 1778.100 1778.100	431.250 437.000			
<u>S</u>	<u>upport</u> 1499.766 1499.766	437.250 443.000			<u>S</u>	<u>upport</u> 1758.000 1461.784	437.000 437.000			
<u>S</u>	<u>upport</u> 1498.182 1400.000	443.000 443.000			<u>S</u>	<u>upport</u> 1437.780 1738.000	443.250 443.250			
<u>S</u>	<u>upport</u> 1400.000	443.000			<u>S</u>	<u>upport</u> 1738.000	443.250			

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							Daga	con	sultan	ts
Written by:	Josep	h Sura	Date:	12/4/2009	Reviewed by:	R. Kul	Page asingam/Jay Bee	ch Date:	<u>12/</u>	8/2009
Client:	Honeywell	Project:	Onor	idaga Lake SC	CA Final Design	Project/	Proposal No.:	GJ4299	Task No	.: 18
	1738.000	449.000								
<u>S</u>	<u>upport</u> 1718.000 1437.780	449.000 449.000								
<u>S</u>	<u>upport</u> 1499.766 1758.000	437.250 437.250								
<u>S</u>	<u>upport</u> 1758.000 1758.000	437.250 443.000								
<u>S</u>	<u>upport</u> 1738.000 1499.766	443.000 443.000								
<u>S</u>	<u>upport</u> 1718.000 1698.000	455.000 455.000								
<u>S</u>	<u>upport</u> 1718.000 1738.000	449.000 449.000								
<u>S</u>	<u>upport</u> 1738.000 1758.000	443.000 443.000								
<u>S</u>	upport 1758.000 1778.100	437.000 437.000								

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					Page	197	of	212
Written by:	Joseph Sura	Date:	12/4/2009	Reviewed by:	R. Kulasingam/Jay Beech	Date	12/8/2	2009
Client:	Honeywell Project	: Ono	ndaga Lake SO	CA Final Design	Project/ Proposal No.: 0	GJ4299	Task No.:	18

### **Document Name**

File Name: eastwest\_cover\_liner\_lab

### **Project Settings**

Project Title: SLIDE - An Interactive Slope Stability Program Failure Direction: Right to Left Units of Measurement: Imperial Units Pore Fluid Unit Weight: 62.4 lb/ft3 Groundwater Method: Water Surfaces Data Output: Standard Calculate Excess Pore Pressure: Off Allow Ru with Water Surfaces or Grids: Off Random Numbers: Pseudo-random Seed Random Number Seed: 10116 Random Number Generation Method: Park and Miller v.3

### **Analysis Methods**

Analysis Methods used: Bishop simplified Janbu simplified Spencer

Number of slices: 25 Tolerance: 0.005 Maximum number of iterations: 50

### Surface Options

Surface Type: Non-Circular Block Search Number of Surfaces: 5000 Pseudo-Random Surfaces: Enabled Convex Surfaces Only: Disabled Left Projection Angle (Start Angle): 95 Left Projection Angle (End Angle): 175 Right Projection Angle (Start Angle): 5 Right Projection Angle (End Angle): 85 Minimum Elevation: Not Defined Minimum Depth: Not Defined

### **Material Properties**

Material: Final Cover Soil

Strength Type: Mohr-Coulomb Unit Weight: 120 lb/ft3 Cohesion: 0 psf Friction Angle: 30 degrees Water Surface: Water Table Custom Hu value: 1

Material: Dike Soil Strength Type: Mohr-Coulomb Unit Weight: 120 lb/ft3 Cohesion: 0 psf Friction Angle: 35 degrees Water Surface: Water Table Custom Hu value: 1

<u>Material: Gravel</u> Strength Type: Mohr-Coulomb Unit Weight: 120 lb/ft3 Cohesion: 0 psf Friction Angle: 38 degrees Water Surface: Piezometric Line 1 Custom Hu value: 1

Material: SOLW (undrained) Strength Type: Discrete function Unit Weight: 82 lb/ft3 Water Surface: Water Table Custom Hu value: 1

Material: Dredge Material Strength Type: Mohr-Coulomb Unit Weight: 86 lb/ft3 Cohesion: 0 psf Friction Angle: 15 degrees Water Surface: Water Table Custom Hu value: 1

Material: Tube-Tube Interface (Horizontal) Strength Type: Mohr-Coulomb Unit Weight: 86 lb/ft3 Cohesion: 0 psf Friction Angle: 15 degrees Water Surface: Water Table Custom Hu value: 1

Material: Tub-Tube Interface (Vertical) Strength Type: Mohr-Coulomb Unit Weight: 43 lb/ft3

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							8			
Written	Joseph S	Sura	Date:	12/4/2009	Reviewed by:	R. Kulasiı	ngam/Jay Be	ech Date	e: 12/8/2	009
Uy.					-					
Client:	Honeywell	Project:	Onor	ndaga Lake SO	CA Final Design	Project/ Pro	oposal No.:	GJ4299	Task No.:	18
С	ohesion: 0 ps	f			R	iaht Slip Sur	face Endpo	oint: 284.54	2. 463.000	
F	riction Angle:	0.1 degree	es		R	esisting Mor	nent=1.012	275e+007 lk	o-ft	
N	/ater Surface:	Water Tak	ole		D	riving Mome	nt=5.56707	7e+006 lb-f	t	
С	ustom Hu valu	ue: 1				5				
					N	lethod: janbu	u simplified			
Μ	laterial: Tube-	Gravel Inte	erface		F	S: 1.813810	-			
S	trength Type:	Mohr-Cou	lomb		A	xis Location:	191.041,	570.041		
U	nit Weight: 86	b/ft3			L	eft Slip Surfa	ice Endpoir	nt: 161.508	, 431.016	
С	ohesion: 0 ps	f			R	ight Slip Sur	face Endpo	oint: 284.54	2, 463.000	
F	riction Angle:	24 degree	s		R	esisting Hori	zontal For	ce=66479.5	5 lb	
N	/ater Surface:	Water Tak	ole		D	riving Horizo	ntal Force	=36651.9 lb	)	
С	ustom Hu valu	ue: 1								
					<u>N</u>	lethod: spen	<u>cer</u>			
M	laterial: Liner				F	S: 1.511940				
S	trength Type:	Mohr-Cou	lomb		A	xis Location:	180.031,	558.609		
U	nit Weight: 10	0 lb/ft3			L	eft Slip Surfa	ice Endpoi	nt: 152.083	, 434.000	
	onesion: 0 ps	[ 10 de avec	-		R	ight Slip Sur		Dint: 262.94	9,461.485	
	Inction Angle:	19 degree	S		R	esisting wor	nent=3.887		D-IT	
	ustom Hu vali		JIE		D	esisting Hori	TIL=2.07 130		l Ih	
0		JC. I				riving Horizo	ntal Force	=116776 lb	ю	
M	laterial: Found	lation			D	inving honze				
S	trenath Type:	Mohr-Cou	lomb		V	alid / Inva	lid Surfa	ices		
Ū	nit Weight: 12	0 lb/ft3			-	lethod: hishc	n simplifie	d <u>000</u>		
С	ohesion: 0 ps	f			N	umber of Va	lid Surface	<u>-</u> s: 3139		
F	riction Angle:	37 degree	s		N	umber of Inv	alid Surfac	es: 1861		
N	/ater Surface:	Water Tak	ole		E	rror Codes:				
С	ustom Hu valu	ue: 1			E	rror Code -1	05 reported	d for 357 su	irfaces	
					E	rror Code -1	07 reported	d for 186 su	irfaces	
<u>S</u>	Support Pro	perties			E	rror Code -1	08 reported	d for 379 su	irfaces	
<u>S</u>	upport: Geotu	be			E	rror Code -1	10 reported	d for 285 su	irfaces	
G	eotube				E	rror Code -1	12 reported	d for 654 su	irfaces	
S	upport Type: (	GeoTextile	•							
F	orce Applicati	on: Passiv	e	o (	<u>N</u>	<u>lethod: janbu</u>	<u>u simplified</u>			
F	orce Orientati	on: Langei	nt to Sli	p Surface	N	umber of Va	lid Surface	s: 3045		
A	nchorage: Boi	th Ends				umber of Inv	alid Suffac	es: 1955		
5	near Strength	Wodel: Lif	near		E	rror Codes:	OF reported	for 257 ou	rfagga	
о т	oncilo Stronge		511L /ft			rror Code -1	03 reported	1 for 196 ou	urfacec	
	ullout Strengt	n. 1000 ID/ n Adhasiar	יונ זי 5 lh/fi	2		rror Code -1	07 reported	1 for 507 eu	irfaces	
г Р	ullout Strengt	n Friction I	anale: A	LO dearees		rror Code -1	10 renorter	1 for 285 eu	irfaces	
	anour otrongu			ie degrees	E	rror Code -1	12 reported	d for 620 su	irfaces	
G	lobal Minii	nums			_					
M	lethod: bishop	simplified			N	lethod: spen	<u>cer</u>			
F	S: 1.819170				N	umber of Va	lid Surface	s: 1412		
A	xis Location: <sup>2</sup>	191.041, 5	70.041		Ν	umber of Inv	alid Surfac	es: 3588		
L	eft Slip Surfac	e Endpoin	t: 161.5	508, 431.016	; E	rror Codes:				

						C	ieosy	/ntec	D
							con	sultants	
						Page	199	of	212
Written by:	Joseph	Sura	Date:	12/4/2009	Reviewed by:	R. Kulasingam/Jay Beech	Date:	12/8/2	009
Client:	Honeywell	Project:	Onor	ndaga Lake SC	CA Final Design	Project/ Proposal No.:	GJ4299	Task No.:	18
F	rror Code -10	5 reported	for 357	surfaces					

Error Code -105 reported for 357 surfaces Error Code -107 reported for 186 surfaces Error Code -108 reported for 521 surfaces Error Code -110 reported for 285 surfaces Error Code -111 reported for 1573 surfaces Error Code -112 reported for 666 surfaces

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					Page	200	of	212
Written by:	Joseph Sura	Date:	12/4/2009	Reviewed by:	R. Kulasingam/Jay Beech	Date:	12/	8/2009
Client:	Honeywell Project	: Ono	ndaga Lake SO	CA Final Design	Project/ Proposal No.: 0	J4299	Task No	o.: <b>18</b>

### **Document Name**

File Name: eastwest\_cover\_global\_su\_lab

### **Project Settings**

Project Title: SLIDE - An Interactive Slope Stability Program Failure Direction: Right to Left Units of Measurement: Imperial Units Pore Fluid Unit Weight: 62.4 lb/ft3 Groundwater Method: Water Surfaces Data Output: Standard Calculate Excess Pore Pressure: Off Allow Ru with Water Surfaces or Grids: Off Random Numbers: Pseudo-random Seed Random Number Seed: 10116 Random Number Generation Method: Park and Miller v.3

### **Analysis Methods**

Analysis Methods used: Bishop simplified Janbu simplified Spencer

Number of slices: 25 Tolerance: 0.005 Maximum number of iterations: 50

### Surface Options

Surface Type: Circular Search Method: Grid Search Radius increment: 10 Composite Surfaces: Disabled Reverse Curvature: Create Tension Crack Minimum Elevation: Not Defined Minimum Depth: Not Defined

### **Material Properties**

Material: Final Cover Soil Strength Type: Mohr-Coulomb Unit Weight: 120 lb/ft3 Cohesion: 0 psf Friction Angle: 30 degrees Water Surface: Water Table Custom Hu value: 1

Material: Dike Soil Strength Type: Mohr-Coulomb Unit Weight: 120 lb/ft3 Cohesion: 0 psf Friction Angle: 35 degrees Water Surface: Water Table Custom Hu value: 1

<u>Material: Gravel</u> Strength Type: Mohr-Coulomb Unit Weight: 120 lb/ft3 Cohesion: 0 psf Friction Angle: 38 degrees Water Surface: Piezometric Line 1 Custom Hu value: 1

<u>Material: SOLW (undrained)</u> Strength Type: Discrete function Unit Weight: 82 lb/ft3 Water Surface: Water Table Custom Hu value: 1

Material: Dredge Material Strength Type: Mohr-Coulomb Unit Weight: 86 lb/ft3 Cohesion: 0 psf Friction Angle: 15 degrees Water Surface: Water Table Custom Hu value: 1

<u>Material: Tube-Tube Interface (Horizontal)</u> Strength Type: Mohr-Coulomb Unit Weight: 86 lb/ft3 Cohesion: 0 psf Friction Angle: 15 degrees Water Surface: Water Table Custom Hu value: 1

Material: Tub-Tube Interface (Vertical) Strength Type: Mohr-Coulomb Unit Weight: 43 lb/ft3 Cohesion: 0 psf Friction Angle: 0.1 degrees Water Surface: Water Table Custom Hu value: 1

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						con	sultant	S
					Page	201	of	212
Written by:	Joseph Sura	Date:	12/4/2009	Reviewed by:	R. Kulasingam/Jay Beech	Date	: 12/8	\$/2009
Client:	Honeywell Project	: Onoi	ndaga Lake SC	- CA Final Design	Project/ Proposal No.: 0	GJ4299	Task No.	: 18

Material: Tube-Gravel Interface Strength Type: Mohr-Coulomb Unit Weight: 86 lb/ft3 Cohesion: 0 psf Friction Angle: 24 degrees Water Surface: Water Table Custom Hu value: 1

- <u>Material: Liner</u> Strength Type: Mohr-Coulomb Unit Weight: 100 lb/ft3 Cohesion: 0 psf Friction Angle: 19 degrees Water Surface: Water Table Custom Hu value: 1
- <u>Material: Foundation</u> Strength Type: Mohr-Coulomb Unit Weight: 120 lb/ft3 Cohesion: 0 psf Friction Angle: 37 degrees Water Surface: Water Table Custom Hu value: 1

### Support Properties

Support: Geotube Geotube Support Type: GeoTextile Force Application: Passive Force Orientation: Tangent to Slip Surface Anchorage: Both Ends Shear Strength Model: Linear Strip Coverage: 100 percent Tensile Strength: 1600 lb/ft Pullout Strength Adhesion: 5 lb/ft2 Pullout Strength Friction Angle: 40 degrees

## **Global Minimums**

Method: bishop simplified FS: 1.401700 Center: 185.620, 545.117 Radius: 150.468 Left Slip Surface Endpoint: 94.610, 425.293 Right Slip Surface Endpoint: 311.705, 463.000 Resisting Moment=2.36525e+007 lb-ft Driving Moment=1.68741e+007 lb-ft Method: janbu simplified FS: 1.322780 Center: 185.620, 545.117 Radius: 150.468 Left Slip Surface Endpoint: 94.610, 425.293 Right Slip Surface Endpoint: 311.705, 463.000 Resisting Horizontal Force=137554 lb Driving Horizontal Force=103988 lb

#### Method: spencer

FS: 1.396240 Center: 185.620, 545.117 Radius: 150.468 Left Slip Surface Endpoint: 94.610, 425.293 Right Slip Surface Endpoint: 311.705, 463.000 Resisting Moment=2.35602e+007 lb-ft Driving Moment=1.68741e+007 lb-ft Resisting Horizontal Force=137283 lb Driving Horizontal Force=98323.7 lb

## Valid / Invalid Surfaces

Method: bishop simplified Number of Valid Surfaces: 3054 Number of Invalid Surfaces: 1786 Error Codes: Error Code -103 reported for 1443 surfaces Error Code -107 reported for 17 surfaces Error Code -108 reported for 1 surface Error Code -110 reported for 23 surfaces Error Code -112 reported for 302 surfaces

Method: janbu simplified Number of Valid Surfaces: 3031 Number of Invalid Surfaces: 1809 Error Codes: Error Code -103 reported for 1443 surfaces Error Code -107 reported for 17 surfaces Error Code -108 reported for 17 surfaces Error Code -110 reported for 23 surfaces Error Code -111 reported for 1 surface Error Code -112 reported for 308 surfaces

Method: spencer Number of Valid Surfaces: 2417 Number of Invalid Surfaces: 2423 Error Codes:

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						Page	202	of	212
Written by:	Joseph Su	Joseph Sura Date: 12/4/2009 Review		Reviewed by:	R. Kulasingam/Jay Beec	h Date	12/8/2	2009	
Client:	Honeywell	Project:	Onor	ndaga Lake SC	CA Final Design	Project/ Proposal No.:	GJ4299	Task No.:	18

Error Code -103 reported for 1443 surfaces Error Code -107 reported for 17 surfaces Error Code -108 reported for 23 surfaces Error Code -110 reported for 23 surfaces Error Code -111 reported for 596 surfaces Error Code -112 reported for 321 surfaces

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					Page	203	of	212			
Written by:	Joseph Sura	Date:	12/4/2009	Reviewed by:	R. Kulasingam/Jay Beech	Date:	12/8/	2009			
Client:	Honeywell Pro	ject: Ono	ndaga Lake So	CA Final Design	Project/ Proposal No.:	GJ4299	Task No.:	18			

### **Document Name**

File Name: eastwest\_cover\_global\_u75\_lab

### **Project Settings**

Project Title: SLIDE - An Interactive Slope Stability Program Failure Direction: Right to Left Units of Measurement: Imperial Units Pore Fluid Unit Weight: 62.4 lb/ft3 Groundwater Method: Water Surfaces Data Output: Standard Calculate Excess Pore Pressure: Off Allow Ru with Water Surfaces or Grids: Off Random Numbers: Pseudo-random Seed Random Number Seed: 10116 Random Number Generation Method: Park and Miller v.3

### **Analysis Methods**

Analysis Methods used: Bishop simplified Janbu simplified Spencer

Number of slices: 25 Tolerance: 0.005 Maximum number of iterations: 50

### Surface Options

Surface Type: Circular Search Method: Grid Search Radius increment: 10 Composite Surfaces: Disabled Reverse Curvature: Create Tension Crack Minimum Elevation: Not Defined Minimum Depth: Not Defined

### **Material Properties**

Material: Final Cover Soil Strength Type: Mohr-Coulomb Unit Weight: 120 lb/ft3 Cohesion: 0 psf Friction Angle: 30 degrees Water Surface: Water Table Custom Hu value: 1

Material: Dike Soil Strength Type: Mohr-Coulomb Unit Weight: 120 lb/ft3 Cohesion: 0 psf Friction Angle: 35 degrees Water Surface: Water Table Custom Hu value: 1

<u>Material: Gravel</u> Strength Type: Mohr-Coulomb Unit Weight: 120 lb/ft3 Cohesion: 0 psf Friction Angle: 38 degrees Water Surface: Piezometric Line 1 Custom Hu value: 1

<u>Material: SOLW (undrained)</u> Strength Type: Discrete function Unit Weight: 82 lb/ft3 Water Surface: Water Table Custom Hu value: 1

Material: Dredge Material Strength Type: Mohr-Coulomb Unit Weight: 86 lb/ft3 Cohesion: 0 psf Friction Angle: 15 degrees Water Surface: Water Table Custom Hu value: 1

Material: Tube-Tube Interface (Horizontal) Strength Type: Mohr-Coulomb Unit Weight: 86 lb/ft3 Cohesion: 0 psf Friction Angle: 15 degrees Water Surface: Water Table Custom Hu value: 1

Material: Tub-Tube Interface (Vertical) Strength Type: Mohr-Coulomb Unit Weight: 43 lb/ft3 Cohesion: 0 psf Friction Angle: 0.1 degrees Water Surface: Water Table Custom Hu value: 1

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					Page		204	of	212
Written by:	Joseph Sura	Date:	12/4/2009	Reviewed by:	R. Kulasingam/Jay	Beech	Date:	12/8/2	2009
Client:	Honeywell Project	: Onoi	1daga Lake SC	CA Final Design	Project/ Proposal No.	: GJ	4299	Task No.:	18
				0	Contor: 177 600 E4E	117			
N	laterial: Tube-Gravel In	terface		R	Padius: 149 072	117			
<u>10</u> S	trength Type: Mohr-Co	ulomb			eft Slip Surface Endp	oint <sup>.</sup> 88	756 4	25 429	
U	nit Weight: 86 lb/ft3			R	ight Slip Surface Enc	Inoint ?	302 039	463 000	1
Č	cohesion: 0 psf			R	esisting Moment=2.2	7764e-	-007 lb-	, .00.000 ft	
F	riction Angle: 24 degre	es		D	priving Moment=1.597	′53e+0(	07 lb-ft		
V	/ater Surface: Water Ta	able			0				
С	ustom Hu value: 1			N	lethod: janbu simplifie	<u>əd</u>			
				F	S: 1.340700				
<u>N</u>	laterial: Liner			C	enter: 177.623, 535.9	909			
S	trength Type: Mohr-Co	ulomb		R	adius: 141.842				
U	nit Weight: 100 lb/ft3			L	eft Slip Surface Endp	oint: 88	663, 42	25.431	
C	ohesion: 0 psf			R	light Slip Surface Enc	ipoint: 2	299.292	, 463.000	
F	riction Angle: 19 degre	es		R	esisting Horizontal F	orce=13	34615 lk	)	
V\ C	vater Surface: water 18	able		L	Priving Horizontal Ford	ce=1004	407 10		
C	ustom Hu value: 1			N	lethod: spencer				
N	laterial: Foundation				S. 1 /100/0				
<u>s</u>	trength Type: Mohr-Co	ulomb			Center: 177 623 545 '	117			
U	nit Weight: 120 lb/ft3	alonno		R	adius: 149.072				
Č	ohesion: 0 psf			L	eft Slip Surface Endp	oint: 88	.756, 42	25.429	
F	riction Angle: 37 degre	es		R	ight Slip Surface End	point: 3	302.039	, 463.000	1
V	/ater Surface: Water Ta	able		R	esisting Moment=2.2	6697e+	-007 lb-	ft	
С	ustom Hu value: 1			D	vriving Moment=1.597	'53e+0(	07 lb-ft		
				R	esisting Horizontal F	orce=13	33379 lk	)	
<u>N</u>	laterial: SOLW U=75%			D	Priving Horizontal Fore	ce=9399	92.7 lb		
S	trength Type: Discrete	function				-			
U	nit Weight: 82 lb/ft3			<u>v</u>	<u>/alid / Invalid Sur</u>	<u>faces</u>			
V\ C	vater Surface: water 18	able		N	lethod: bishop simplif	<u>ied</u>			
C				N	lumber of Valid Surfa	ces: 30	53		
c	unnort Properties	•			iumber of invalid Surf	aces: 1	/8/		
00	upport: Cootubo	<u>&gt;</u>			rror Code, 102 ropor	tod for '	1442 си	rfacac	
<u>3</u>	apport. Geotube				rror Code -103 report	ted for '	1443 Su 17 curfa	naces	
S	unnort Type: GeoTexti	ام		F	rror Code -107 report	ted for '	1 surfac	- - -	
F	orce Application: Passi	ive		E	rror Code -110 report	ted for 2	23 surfa	ces	
F	orce Orientation: Tang	ent to Sli	p Surface	E	rror Code -112 report	ted for (	303 surf	aces	
A	nchorage: Both Ends			_					
S	hear Strength Model: L	inear		Ν	<u>lethod: janbu simp</u> lifie	<u>əd</u>			
S	trip Coverage: 100 per	cent		N	lumber of Valid Surfa	ces: 30	29		
Т	ensile Strength: 1600 I	b/ft		N	lumber of Invalid Surf	aces: 1	811		
Р	ullout Strength Adhesic	on: 5 lb/f	t2	E	rror Codes:				
Р	ullout Strength Friction	Angle: 4	10 degrees	E	rror Code -103 report	ted for 1	1443 su	rfaces	
				E	rror Code -107 report	ied for	17 surfa	ces	
G	<u> Blobal Minimums</u>			E	rror Code -108 repor	ed for	17 surfa	ces	
N	lethod: bishop simplifie	d		E	rror Code -110 report	led for 2	23 surta	ces	
F	S: 1.425720			E	anor Code -111 report	ied tor .	i surfac	e	

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					Page	205	of	212
Written by:	Joseph Sura	Date:	12/4/2009	Reviewed by:	R. Kulasingam/Jay Beech	Date:	12/8/	2009
Client:	Honeywell Project:	Onor	ndaga Lake SC	CA Final Design	Project/ Proposal No.: G	J4299	Task No.:	18

Error Code -112 reported for 310 surfaces

Method: spencer Number of Valid Surfaces: 2416 Number of Invalid Surfaces: 2424 Error Codes: Error Code -103 reported for 1443 surfaces Error Code -107 reported for 17 surfaces Error Code -108 reported for 23 surfaces Error Code -110 reported for 23 surfaces Error Code -111 reported for 597 surfaces Error Code -112 reported for 321 surfaces

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					Page	206	of	212		
Written by:	Joseph Sura	Date:	12/4/2009	Reviewed by:	R. Kulasingam/Jay Beech	Date:	12/3	8/2009		
Client:	Honeywell Project:	Onoi	ndaga Lake SC	CA Final Design	Project/ Proposal No.: G	GJ4299	Task No	o.: 18		

### **Document Name**

File Name: eastwest\_cover\_longterm\_lab

### **Project Settings**

Project Title: SLIDE - An Interactive Slope Stability Program Failure Direction: Right to Left Units of Measurement: Imperial Units Pore Fluid Unit Weight: 62.4 lb/ft3 Groundwater Method: Water Surfaces Data Output: Standard Calculate Excess Pore Pressure: Off Allow Ru with Water Surfaces or Grids: Off Random Numbers: Pseudo-random Seed Random Number Seed: 10116 Random Number Generation Method: Park and Miller v.3

### **Analysis Methods**

Analysis Methods used: Bishop simplified Janbu simplified Spencer

Number of slices: 25 Tolerance: 0.005 Maximum number of iterations: 50

### Surface Options

Surface Type: Circular Search Method: Grid Search Radius increment: 10 Composite Surfaces: Disabled Reverse Curvature: Create Tension Crack Minimum Elevation: Not Defined Minimum Depth: Not Defined

### **Material Properties**

<u>Material: Final Cover Soil</u> Strength Type: Mohr-Coulomb Unit Weight: 120 lb/ft3 Cohesion: 0 psf Friction Angle: 30 degrees Water Surface: Water Table Custom Hu value: 1

Material: Dike Soil Strength Type: Mohr-Coulomb Unit Weight: 120 lb/ft3 Cohesion: 0 psf Friction Angle: 35 degrees Water Surface: Water Table Custom Hu value: 1

<u>Material: Gravel</u> Strength Type: Mohr-Coulomb Unit Weight: 120 lb/ft3 Cohesion: 0 psf Friction Angle: 38 degrees Water Surface: Piezometric Line 1 Custom Hu value: 1

Material: SOLW (Drained) Strength Type: Mohr-Coulomb Unit Weight: 82 lb/ft3 Cohesion: 0 psf Friction Angle: 34 degrees Water Surface: Water Table Custom Hu value: 1

Material: Dredge Material (Long) Strength Type: Mohr-Coulomb Unit Weight: 86 lb/ft3 Cohesion: 0 psf Friction Angle: 30 degrees Water Surface: Water Table Custom Hu value: 1

Material: Tube-Tube Interface (Horizontal) Strength Type: Mohr-Coulomb Unit Weight: 86 lb/ft3 Cohesion: 0 psf Friction Angle: 15 degrees Water Surface: Water Table Custom Hu value: 1

Material: Tub-Tube Interface (Vertical) Strength Type: Mohr-Coulomb Unit Weight: 43 lb/ft3 Cohesion: 0 psf Friction Angle: 0.1 degrees

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							cor	nsultants		
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Written by:	Joseph	Sura	Date:	12/4/2009	Reviewed by:	R. Kulasingam/Jay Beec	ch Date	: 12/8/2	:009	
Client:	Honeywell	Project:	Onor	ndaga Lake SC	CA Final Design	Project/ Proposal No.:	GJ4299	Task No.:	18	
١٨	Votor Surface	· Motor To	blo		Po	cicting Moment-2079 0				

Water Surface: Water Table Custom Hu value: 1

Material: Tube-Gravel Interface Strength Type: Mohr-Coulomb Unit Weight: 86 lb/ft3 Cohesion: 0 psf Friction Angle: 24 degrees Water Surface: Water Table Custom Hu value: 1

<u>Material: Liner</u> Strength Type: Mohr-Coulomb Unit Weight: 100 lb/ft3 Cohesion: 0 psf Friction Angle: 19 degrees Water Surface: Water Table Custom Hu value: 1

<u>Material: Foundation</u> Strength Type: Mohr-Coulomb Unit Weight: 120 lb/ft3 Cohesion: 0 psf Friction Angle: 37 degrees Water Surface: Water Table Custom Hu value: 1

### **Support Properties**

Support: Geotube (Long Term)Geotube (Long Term)Support Type: GeoTextileForce Application: PassiveForce Orientation: Tangent to Slip SurfaceAnchorage: Both EndsShear Strength Model: LinearStrip Coverage: 100 percentTensile Strength: 0.1 lb/ftPullout Strength Adhesion: 5 lb/ft2Pullout Strength Friction Angle: 40 degrees

### **Global Minimums**

<u>Method: bishop simplified</u> FS: 1.914240 Center: 137.637, 600.367 Radius: 169.097 Left Slip Surface Endpoint: 182.213, 437.251 Right Slip Surface Endpoint: 190.658, 439.797 Resisting Moment=3978.07 lb-ft Driving Moment=2078.14 lb-ft

Method: janbu simplified FS: 1.914040 Center: 137.637, 600.367 Radius: 169.097 Left Slip Surface Endpoint: 182.213, 437.251 Right Slip Surface Endpoint: 190.658, 439.797 Resisting Horizontal Force=22.5224 lb Driving Horizontal Force=11.7669 lb

Method: spencer FS: 1.914150 Center: 137.637, 600.367 Radius: 169.097 Left Slip Surface Endpoint: 182.213, 437.251 Right Slip Surface Endpoint: 190.658, 439.797 Resisting Moment=3977.88 lb-ft Driving Moment=2078.14 lb-ft Resisting Horizontal Force=22.5223 lb Driving Horizontal Force=11.7662 lb

### Valid / Invalid Surfaces

Method: bishop simplified Number of Valid Surfaces: 3024 Number of Invalid Surfaces: 1816 Error Codes: Error Code -103 reported for 1443 surfaces Error Code -107 reported for 17 surfaces Error Code -108 reported for 1 surface Error Code -110 reported for 23 surfaces Error Code -112 reported for 332 surfaces

Method: janbu simplified Number of Valid Surfaces: 3064 Number of Invalid Surfaces: 1776 Error Codes: Error Code -103 reported for 1443 surfaces Error Code -107 reported for 17 surfaces Error Code -108 reported for 2 surfaces Error Code -110 reported for 23 surfaces Error Code -112 reported for 291 surfaces

Method: spencer Number of Valid Surfaces: 3017 Number of Invalid Surfaces: 1823

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						Page	208	of	212			
Written by:	Joseph S	Sura	Date:	12/4/2009	Reviewed by:	R. Kulasingam/Jay Beec	h Date	: 12/8/2	009			
Client:	Honeywell	Project:	Onor	ndaga Lake SC	CA Final Design	Project/ Proposal No.:	GJ4299	Task No.:	18			
E	rror Codes:											

Error Code -103 reported for 1443 surfaces Error Code -107 reported for 17 surfaces Error Code -108 reported for 6 surfaces Error Code -110 reported for 23 surfaces Error Code -111 reported for 2 surfaces Error Code -112 reported for 332 surfaces

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					Page	209	of	212			
Written by:	Joseph Sura	Date:	12/4/2009	Reviewed by:	R. Kulasingam/Jay Beech	Date:	12/3	8/2009			
Client:	Honeywell Project:	Onoi	ndaga Lake SC	- CA Final Design	Project/ Proposal No.: G	J4299	Task No	.: 18			

### **Document Name**

File Name: eastwest\_cover\_external\_lab

### **Project Settings**

Project Title: SLIDE - An Interactive Slope Stability Program Failure Direction: Right to Left Units of Measurement: Imperial Units Pore Fluid Unit Weight: 62.4 lb/ft3 Groundwater Method: Water Surfaces Data Output: Standard Calculate Excess Pore Pressure: Off Allow Ru with Water Surfaces or Grids: Off Random Numbers: Pseudo-random Seed Random Number Seed: 10116 Random Number Generation Method: Park and Miller v.3

### **Analysis Methods**

Analysis Methods used: Bishop simplified Janbu simplified Spencer

Number of slices: 25 Tolerance: 0.005 Maximum number of iterations: 50

### Surface Options

Surface Type: Circular Search Method: Grid Search Radius increment: 10 Composite Surfaces: Disabled Reverse Curvature: Create Tension Crack Minimum Elevation: Not Defined Minimum Depth: Not Defined

### **Material Properties**

Material: Final Cover Soil Strength Type: Mohr-Coulomb Unit Weight: 120 lb/ft3 Cohesion: 0 psf Friction Angle: 30 degrees Water Surface: Water Table Custom Hu value: 1

Material: Dike Soil Strength Type: Mohr-Coulomb Unit Weight: 120 lb/ft3 Cohesion: 0 psf Friction Angle: 35 degrees Water Surface: Water Table Custom Hu value: 1

<u>Material: Gravel</u> Strength Type: Mohr-Coulomb Unit Weight: 120 lb/ft3 Cohesion: 0 psf Friction Angle: 38 degrees Water Surface: Piezometric Line 1 Custom Hu value: 1

<u>Material: SOLW (undrained)</u> Strength Type: Discrete function Unit Weight: 82 lb/ft3 Water Surface: Water Table Custom Hu value: 1

Material: Dredge Material Strength Type: Mohr-Coulomb Unit Weight: 86 lb/ft3 Cohesion: 0 psf Friction Angle: 15 degrees Water Surface: Water Table Custom Hu value: 1

Material: Tube-Tube Interface (Horizontal) Strength Type: Mohr-Coulomb Unit Weight: 86 lb/ft3 Cohesion: 0 psf Friction Angle: 15 degrees Water Surface: Water Table Custom Hu value: 1

Material: Tub-Tube Interface (Vertical) Strength Type: Mohr-Coulomb Unit Weight: 43 lb/ft3 Cohesion: 0 psf Friction Angle: 0.1 degrees Water Surface: Water Table Custom Hu value: 1

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					Page	210	of	212	
Written by:	Joseph Sura	Date:	12/4/2009	Reviewed by:	R. Kulasingam/Jay Beech	Date:	12/	/8/2009	
Client:	Honevwell Project	et: Ono	ndaga Lake S(	CA Final Design	Project/ Proposal No.:	GJ4299	Task No	o.: <b>18</b>	

Material: Tube-Gravel Interface Strength Type: Mohr-Coulomb Unit Weight: 86 lb/ft3 Cohesion: 0 psf Friction Angle: 24 degrees Water Surface: Water Table Custom Hu value: 1

- <u>Material: Liner</u> Strength Type: Mohr-Coulomb Unit Weight: 100 lb/ft3 Cohesion: 0 psf Friction Angle: 19 degrees Water Surface: Water Table Custom Hu value: 1
- <u>Material: Foundation</u> Strength Type: Mohr-Coulomb Unit Weight: 120 lb/ft3 Cohesion: 0 psf Friction Angle: 37 degrees Water Surface: Water Table Custom Hu value: 1

### **Support Properties**

Support: Geotube Geotube Support Type: GeoTextile Force Application: Passive Force Orientation: Tangent to Slip Surface Anchorage: Both Ends Shear Strength Model: Linear Strip Coverage: 100 percent Tensile Strength: 1600 lb/ft Pullout Strength Adhesion: 5 lb/ft2 Pullout Strength Friction Angle: 40 degrees

### **Global Minimums**

Method: bishop simplified FS: 7.070290 Center: -4.256, 5490.384 Radius: 5102.085 Left Slip Surface Endpoint: -698.188, 435.710 Right Slip Surface Endpoint: 867.871, 463.391 Resisting Moment=5.67039e+009 lb-ft Driving Moment=8.02003e+008 lb-ft Method: janbu simplified FS: 7.073590 Center: -4.256, 5490.384 Radius: 5102.085 Left Slip Surface Endpoint: -698.188, 435.710 Right Slip Surface Endpoint: 867.871, 463.391 Resisting Horizontal Force=1.1071e+006 lb Driving Horizontal Force=156511 lb

#### Method: spencer

FS: 7.070600 Center: -4.256, 5490.384 Radius: 5102.085 Left Slip Surface Endpoint: -698.188, 435.710 Right Slip Surface Endpoint: 867.871, 463.391 Resisting Moment=5.67065e+009 lb-ft Driving Moment=8.02003e+008 lb-ft Resisting Horizontal Force=1.10715e+006 lb Driving Horizontal Force=156585 lb

### Valid / Invalid Surfaces

Method: bishop simplified Number of Valid Surfaces: 1229 Number of Invalid Surfaces: 3578 Error Codes: Error Code -101 reported for 46 surfaces Error Code -110 reported for 463 surfaces Error Code -1000 reported for 3069 surfaces

Method: janbu simplified Number of Valid Surfaces: 1229 Number of Invalid Surfaces: 3578 Error Codes: Error Code -101 reported for 46 surfaces Error Code -110 reported for 463 surfaces Error Code -1000 reported for 3069 surfaces

Method: spencer Number of Valid Surfaces: 1228 Number of Invalid Surfaces: 3579 Error Codes: Error Code -101 reported for 46 surfaces Error Code -110 reported for 463 surfaces Error Code -111 reported for 1 surface Error Code -1000 reported for 3069 surfaces

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					Page	211	of	212
Written by:	Joseph Sura	Date:	12/4/2009	Reviewed by:	R. Kulasingam/Jay Beech	Date:	12	2/8/2009
Client:	Honeywell Project:	Onor	ndaga Lake SC	CA Final Design	Project/ Proposal No.: G	J4299	Task N	lo.: <b>18</b>

### Document Name

File Name:

eastwest\_cover\_external\_longterm\_lab

### Project Settings

Project Title: SLIDE - An Interactive Slope Stability Program Failure Direction: Right to Left Units of Measurement: Imperial Units Pore Fluid Unit Weight: 62.4 lb/ft3 Groundwater Method: Water Surfaces Data Output: Standard Calculate Excess Pore Pressure: Off Allow Ru with Water Surfaces or Grids: Off Random Numbers: Pseudo-random Seed Random Number Seed: 10116 Random Number Generation Method: Park and Miller v.3

### **Analysis Methods**

Analysis Methods used: Bishop simplified Janbu simplified Spencer

Number of slices: 25 Tolerance: 0.005 Maximum number of iterations: 50

### Surface Options

Surface Type: Circular Search Method: Grid Search Radius increment: 10 Composite Surfaces: Disabled Reverse Curvature: Create Tension Crack Minimum Elevation: Not Defined Minimum Depth: Not Defined

### Material Properties

Material: Final Cover Soil Strength Type: Mohr-Coulomb Unit Weight: 120 lb/ft3 Cohesion: 0 psf Friction Angle: 30 degrees Water Surface: Water Table Custom Hu value: 1

Material: Dike Soil Strength Type: Mohr-Coulomb Unit Weight: 120 lb/ft3 Cohesion: 0 psf Friction Angle: 35 degrees Water Surface: Water Table Custom Hu value: 1

<u>Material: Gravel</u> Strength Type: Mohr-Coulomb Unit Weight: 120 lb/ft3 Cohesion: 0 psf Friction Angle: 38 degrees Water Surface: Piezometric Line 1 Custom Hu value: 1

Material: SOLW (Drained) Strength Type: Mohr-Coulomb Unit Weight: 82 lb/ft3 Cohesion: 0 psf Friction Angle: 34 degrees Water Surface: Water Table Custom Hu value: 1

Material: Dredge Material (Long) Strength Type: Mohr-Coulomb Unit Weight: 86 lb/ft3 Cohesion: 0 psf Friction Angle: 30 degrees Water Surface: Water Table Custom Hu value: 1

Material: Tube-Tube Interface (Horizontal) Strength Type: Mohr-Coulomb Unit Weight: 86 lb/ft3 Cohesion: 0 psf Friction Angle: 15 degrees Water Surface: Water Table Custom Hu value: 1

Material: Tub-Tube Interface (Vertical) Strength Type: Mohr-Coulomb Unit Weight: 43 lb/ft3 Cohesion: 0 psf Friction Angle: 0.1 degrees

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					Page	212	of	212
Written by:	Joseph Sura	Date:	12/4/2009	Reviewed by:	R. Kulasingam/Jay Beech	Date:	12/8/2	009
Client:	Honeywell Project:	Onor	ndaga Lake SC	CA Final Design	Project/ Proposal No.: G	5J4299	Task No.:	18

Water Surface: Water Table Custom Hu value: 1

Material: Tube-Gravel Interface Strength Type: Mohr-Coulomb Unit Weight: 86 lb/ft3 Cohesion: 0 psf Friction Angle: 24 degrees Water Surface: Water Table Custom Hu value: 1

<u>Material: Liner</u> Strength Type: Mohr-Coulomb Unit Weight: 100 lb/ft3 Cohesion: 0 psf Friction Angle: 19 degrees Water Surface: Water Table Custom Hu value: 1

<u>Material: Foundation</u> Strength Type: Mohr-Coulomb Unit Weight: 120 lb/ft3 Cohesion: 0 psf Friction Angle: 37 degrees Water Surface: Water Table Custom Hu value: 1

### **Support Properties**

Support: Geotube (Long Term)Geotube (Long Term)Support Type: GeoTextileForce Application: PassiveForce Orientation: Tangent to Slip SurfaceAnchorage: Both EndsShear Strength Model: LinearStrip Coverage: 100 percentTensile Strength: 0.1 lb/ftPullout Strength Adhesion: 5 lb/ft2Pullout Strength Friction Angle: 40 degrees

### **Global Minimums**

<u>Method: bishop simplified</u> FS: 11.956800 Center: -516.970, 6468.046 Radius: 6107.435 Left Slip Surface Endpoint: -867.917, 370.702 Right Slip Surface Endpoint: 596.668, 463.000 Resisting Moment=2.0544e+010 lb-ft Driving Moment=1.71819e+009 lb-ft

Method: janbu simplified FS: 11.903600 Center: -516.970, 6468.046 Radius: 6107.435 Left Slip Surface Endpoint: -867.917, 370.702 Right Slip Surface Endpoint: 596.668, 463.000 Resisting Horizontal Force=3.35325e+006 lb Driving Horizontal Force=281702 lb

Method: spencer FS: 11.955500 Center: -516.970, 6468.046 Radius: 6107.435 Left Slip Surface Endpoint: -867.917, 370.702 Right Slip Surface Endpoint: 596.668, 463.000 Resisting Moment=2.05419e+010 lb-ft Driving Moment=1.71819e+009 lb-ft Resisting Horizontal Force=3.35407e+006 lb Driving Horizontal Force=280545 lb

### Valid / Invalid Surfaces

Method: bishop simplified Number of Valid Surfaces: 1229 Number of Invalid Surfaces: 3578 Error Codes: Error Code -101 reported for 46 surfaces Error Code -110 reported for 463 surfaces Error Code -1000 reported for 3069 surfaces

Method: janbu simplified Number of Valid Surfaces: 1229 Number of Invalid Surfaces: 3578 Error Codes: Error Code -101 reported for 46 surfaces Error Code -110 reported for 463 surfaces Error Code -1000 reported for 3069 surfaces

Method: spencer Number of Valid Surfaces: 1229 Number of Invalid Surfaces: 3578 Error Codes: Error Code -101 reported for 46 surfaces Error Code -110 reported for 463 surfaces Error Code -1000 reported for 3069 surfaces